

**MITSUBISHI
ELECTRIC**

UNINTERRUPTIBLE POWER SUPPLY SYSTEM

MODEL

2033G SERIES

OWNERS / TECHNICAL MANUAL

Preface

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



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



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 Mitsubishi field service group assistance and correspondence is required.

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

1.0 INTRODUCTION

The Mitsubishi Uninterruptible Power Supply (UPS) is designed to provide many years of reliable power supply and protection from power failure, brown-outs, line noise and voltage transients. To ensure optimum performance of the equipment, follow the manufacturer's instructions accordingly. This manual contains descriptions for the installation and operation procedures of the UPS. Please read this manual carefully and retain it for future reference.

**IMPORTANT SAFETY INSTRUCTIONS
RETAIN THESE INSTRUCTIONS**



This manual contains important instructions for the 2033G Series Uninterruptible Power Supply Systems that should be adhered to during installation, operation 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 a qualified service for this equipment as per instructions.**

WARNING 2

In no event will MITSUBISHI 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 MITSUBISHI 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 the human lives.

- *
 - 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.**

- **
 - 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.

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: 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 2250m(7400ft) 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 following IEC654-4 Part 4	There should be no inflammable/explosive gas.	
		Hydrogen sulfide (H ₂ S)	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 an AC input circuit breaker (MCCB) to protect the bypass and main input circuit. The AC input circuit breaker (MCCB) is to be field supplied and installed. Recommended circuit breaker (MCCB)'s specifications are as follows:

TABLE 1.2 Rating of AC input circuit breaker

Capacity (kVA)	AC input Voltage (Vac)	AC input Rating (Aac)	Recommended Breaker (A)
30	208	85	125
50	208	142	200

AC output and DC input overcurrent protection and disconnection devices shall be field supplied and installed. Refer to the ratings of overcurrent protection device as indicated "Breaker" in TABLE 1.6.

1.2 GENERAL

The Mitsubishi 2033G Series UPS is designed to provide continuous and clean electrical power to a critical 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, backup 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 2033G Series UPS is available in Two (2) kVA sizes: 30 and 50kVA. Specifications for each kVA model appear in Section 1.5. Each model has external batteries. The principles of operation described herein are applicable to all models.

This manual provides an overview of the 2033G 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 which 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 Converter / Charger, Inverter, Static Transfer Switch, Internal Bypass line, operator controls, and internal control systems required to provide specified AC power to a load.

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

CONVERTER / CHARGER - 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 Converter / Charger, or the battery, to AC power required by the critical load.

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

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

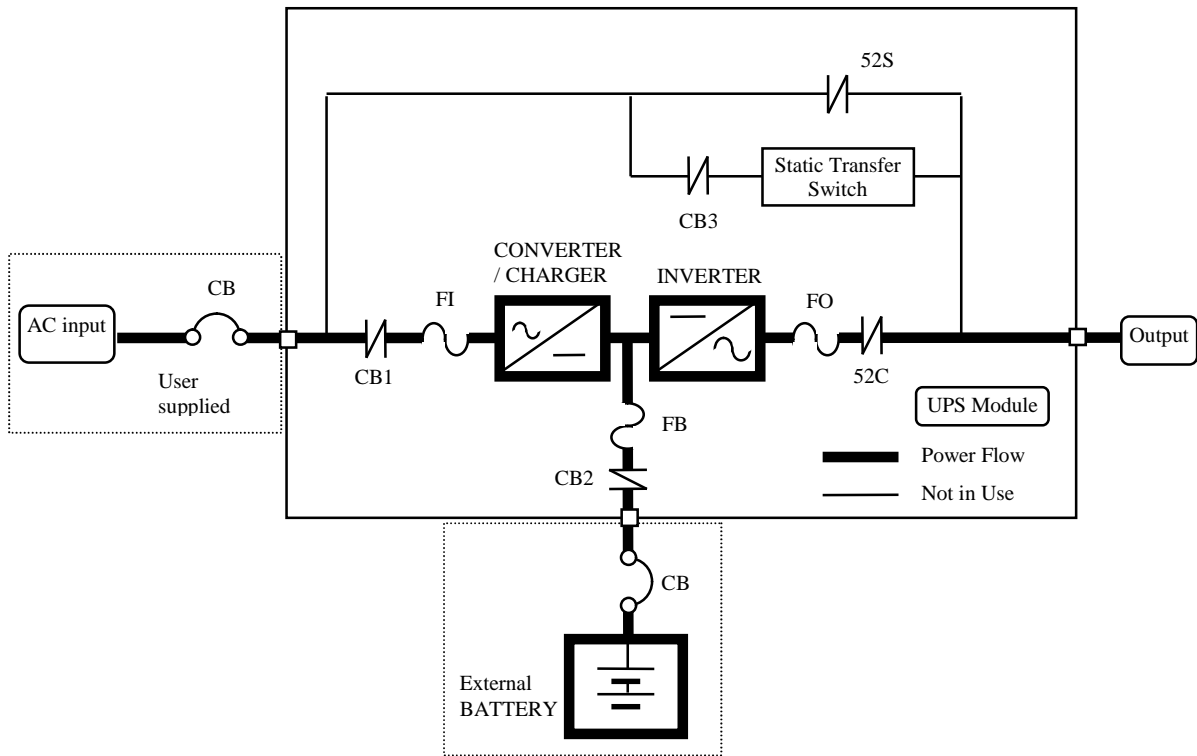
AC INPUT POWER - Power provided by the electrical utility company, or auxiliary generator, which is connected to the UPS for supplying the critical load and recharging the battery.

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.

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.

FIGURE 1.1 Single Line Diagram - Normal Operation. Load powered by inverter.



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

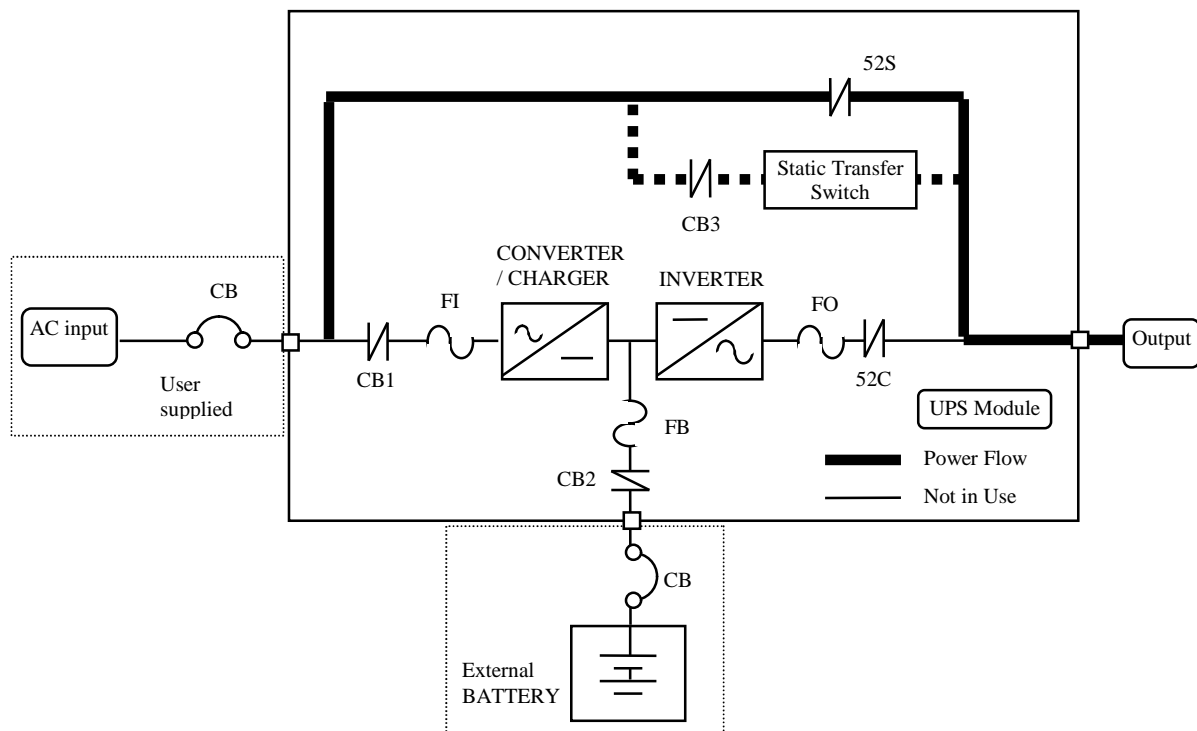
Referring to Figure 1.1: Input AC power is converted to DC by the Converter. DC power is utilized to charge the UPS battery and to provide power to the Inverter. The Inverter converts the DC power to clean AC power to supply the critical load.

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



** The Input circuit breakers (MCCB) for protection of the UPS and cables are field supplied and field installed. (See WARNING 4 in section 1.1).*

FIGURE 1.2 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 unconditioned bypass input power to the critical load. 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.

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

Referring to Figure 1.3, in the event of AC input power failure or abnormal condition, the battery will immediately supply the DC power required by the Inverter to maintain continuous AC power to the critical load until a) The battery capacity expires and the inverter turns off. (This means a state called a low battery shutdown.) b) AC input power is restored after which the converter will power the inverter and simultaneously recharge the batteries.

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

When AC input power is recovered after a low battery shutdown, the Internal Bypass line supplies the unconditioned bypass input power to the critical load. Simultaneously, the Converter automatically restarts operation, recharges the batteries and the Inverter automatically restart its operation. And then the UPS transfers the power supply from Bypass line to Inverter output without operator intervention.

FIGURE 1.3 Single Line Diagram - Battery Operation

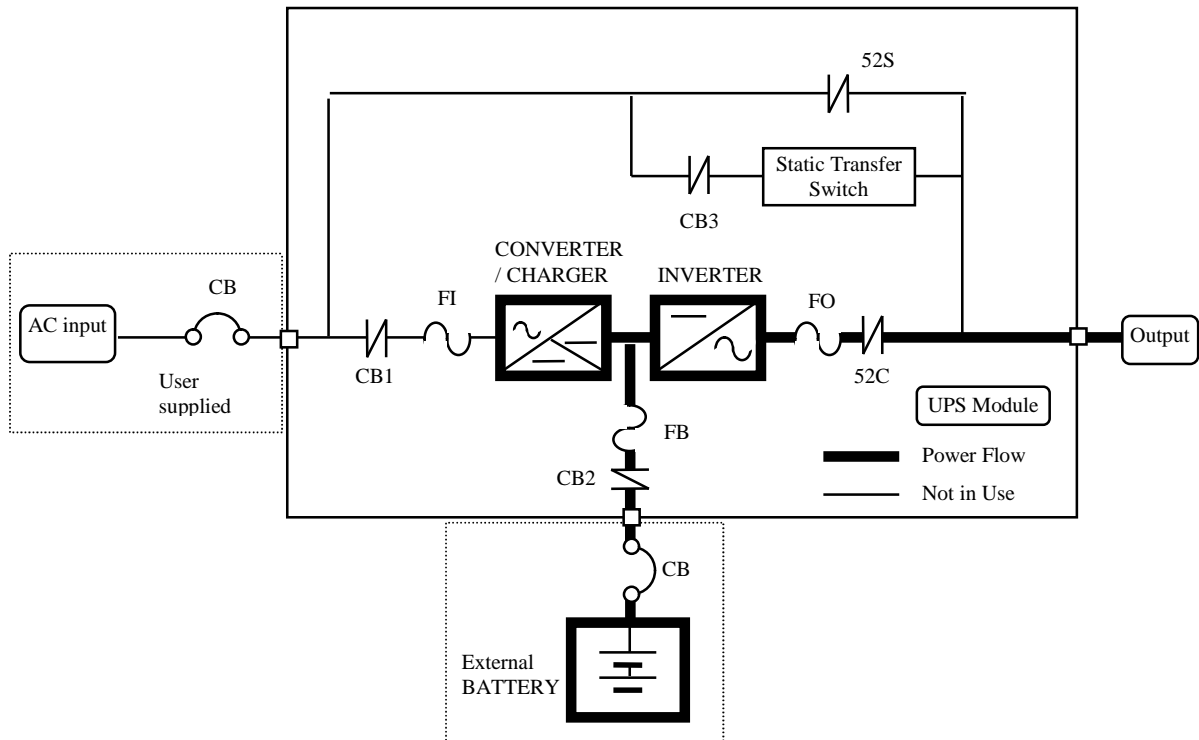


FIGURE 1.4 UPS Parts Location (30kVA, 50kVA) UPS module FRONT VIEW

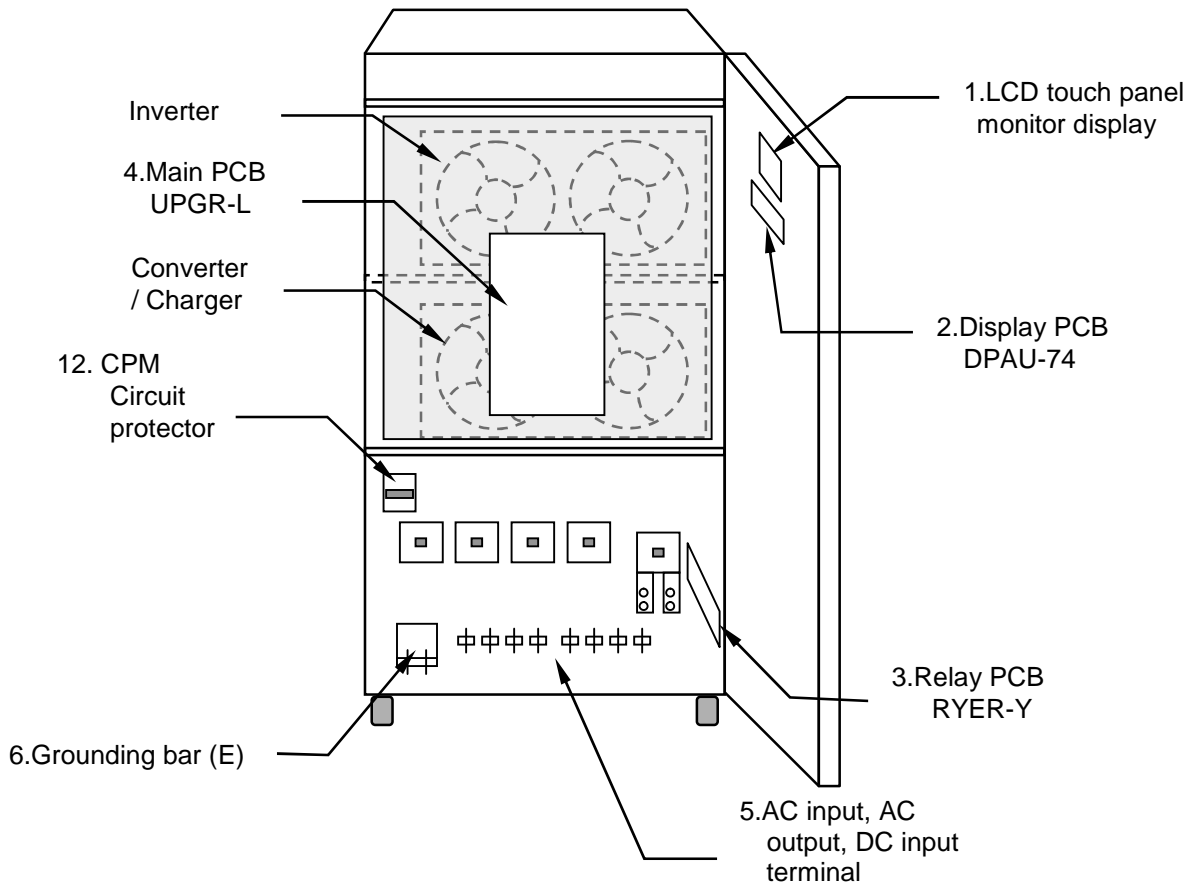


FIGURE 1.5 Display PCB DPAU-74

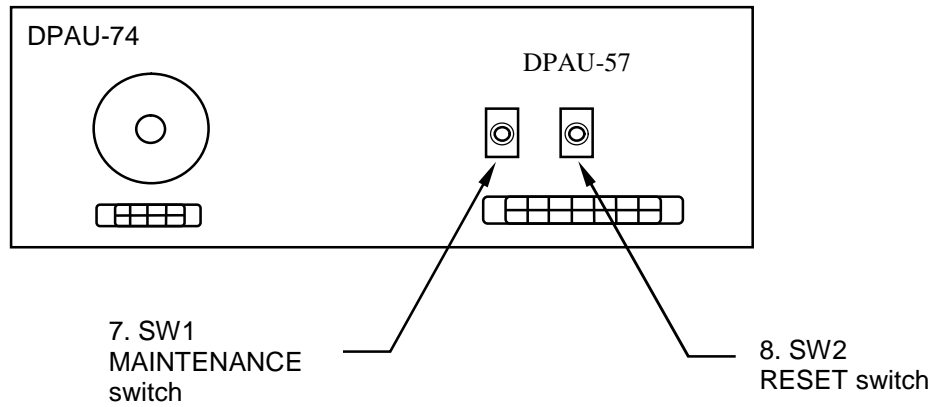


FIGURE 1.6 External I/F PCB RYER-Y

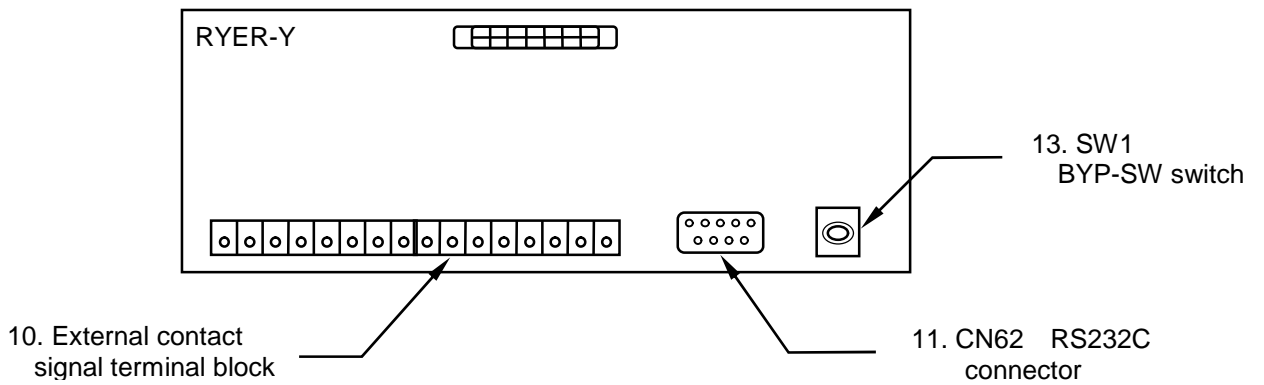
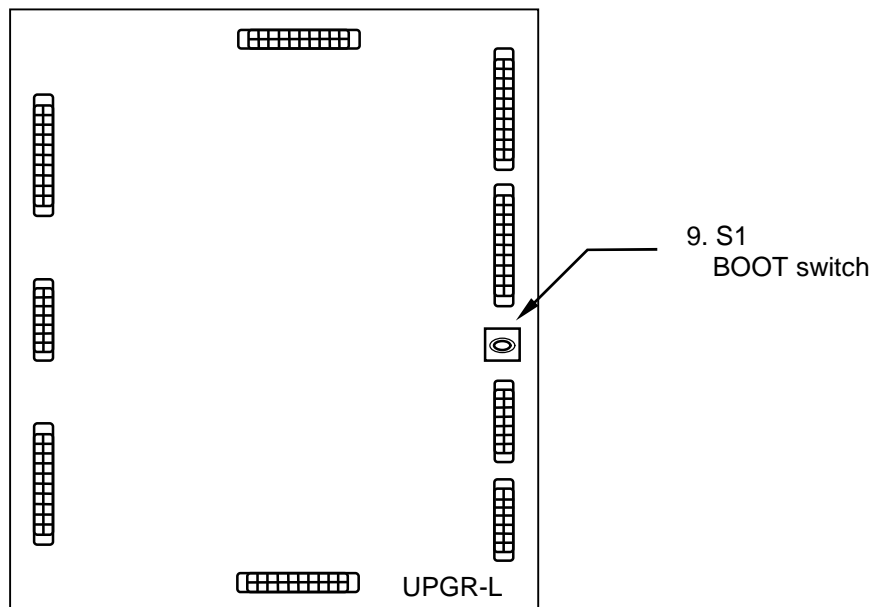


FIGURE 1.7 Main control PCB UPGR-L



1. LCD Touch Panel Monitor Display

The Liquid Crystal Display (LCD) Touch Panel Monitor Display indicates power flow, measured values and fault and error messages via user selectable display screens.

2. Display PCB DPAU-74 (Figure 1.6):**Switches on DPAU-74 board : FOR SERVICE PERSONNEL ONLY**

- (7) SW1 (MAINTENANCE switch)
- (8) SW2 (RESET switch)

3. Relay PCB RYER-Y board : (Figure 1.7):**Switch on RYER-Y board : FOR SERVICE PERSONNEL ONLY**

- (13) SW1 (BYP-SW switch)

Signal I/F on RYER-Y board

- (10) External contact signal terminal block
- (11) CN62 (RS232C communication connector)

4. Main PCB UPGR-L : (Figure 1.8):**Switches on UPGR-L board : FOR SERVICE PERSONNEL ONLY**

- (9) S1 (BOOT switch).

5. AC input, AC output, DC input terminal

Refer to Figure 3.2 for details

6. Grounding bar (E)**7. "MAINTENANCE" switch (FOR SERVICE PERSONNEL ONLY)**

This switch changes system operation to the test-mode. This switch is mounted on Display PCB. (This switch should not be operated by personnel other than an Authorized Service Engineer).

8. "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).

9. "BOOT" switch (FOR SERVICE PERSONNEL ONLY)

This switch boots the processor on the main control circuit board following alarm conditions. (Do not operate this switch while inverter and converter are in operation).

10. External contact signal terminal block

Terminal block to connect contact signal input/output lines to and from external dry contacts. Refer to FIGURE 2.5 for details.

11. RS232C connector (CN62)

Refer to Figure 2.8 for detail.

12. Circuit protector ("CPM")

Used to manipulate control power-on.

13. "BYP-SW" switch (FOR SERVICE PERSONNEL ONLY)

This switch forcefully turns on the Bypass contactor "52S" when the Inverter stops operation on condition that the bypass circuit is energizing. (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 interior side of the UPS front door.

TABLE 1.3 Power Specifications

Rated output Power	Input voltage 3 phase / 4 wire	Output voltage 3 phase / 3 or 4 wire
30kVA/24kW	208	208
50kVA/40kW	208	208

TABLE 1.4 UPS Module Information

UPS (kVA)	CABLE ENTRY	WIDTH (in/mm)	DEPTH (in/mm)	HEIGHT (in/mm)	WEIGHT (lb./kg)	HEAT LOSS @ 208V (kBTU/h)
30	BOTTOM	27.6 / 700	31.5 / 800	59.0 / 1500	530 / 240	14.4
50	BOTTOM	27.6 / 700	31.5 / 800	59.0 / 1500	665 / 301	22.7

TABLE 1.5 Detail of Specifications

Rated Output kVA	30	50
Rated Output kW	24	40
AC INPUT CHARACTERISTICS		
Configuration	3 phase, 4 wire	
Voltage	120/208 V +15% ~ -25%	
Frequency	60 Hz +/- 5%	
Reflected Current THD	4% typ. at 100% load; 7% typ. at 50% load	
BATTERY		
Type	VRLA	
Nominal Voltage	432 Vdc	
Minimum Voltage	367 Vdc	
Number of Cells	216	
AC OUTPUT		
Configuration	3 phase, 4 wire	
Voltage	120/208 V	
Voltage Stability	+/-2%	
Frequency	60 Hz	
Frequency Stability	+/-0.01% in free running mode	
Power Factor	0.8 nominal	
Power Factor range	0.8 ~ 1.0 lagging (within output kW rating)	
Voltage THD	2% typical THD at 100% Linear Load 5% typical THD at 100% non-linear load	
Transient Response	+/-5% typical at 100% load step +/-2% typical at loss/return of AC power +/-5% typical at load transfer to/from static bypass	
Transient Recovery	16.7 ms	
Voltage Unbalance	3% typical at 100% unbalanced load	
Phase Displacement	1deg. typical at 100% load	
Inverter Overload	150% for 1 minute	
Bypass Overload	150% for 1 minute, 1000% for 1 cycle	
Crest Factor Capabilities	3:1	
ENVIRONMENTAL		
Cooling	Forced Air	
Operating Temperature	32° F ~ 104° F (0° C ~ 40° C). Recommended 59° F ~ 77° F (15° C ~ 25° C)	
Relative Humidity	5% ~ 95% Non Condensing	
Altitude	0 ~ 7400 feet No De-rating	
Location	Temperature-controlled, indoor area free of conductive contaminants	
Paint Color	Munsell 5Y7/1 (Beige)	

TABLE 1.6 Rating of Contactors, Circuit protector and Fuses

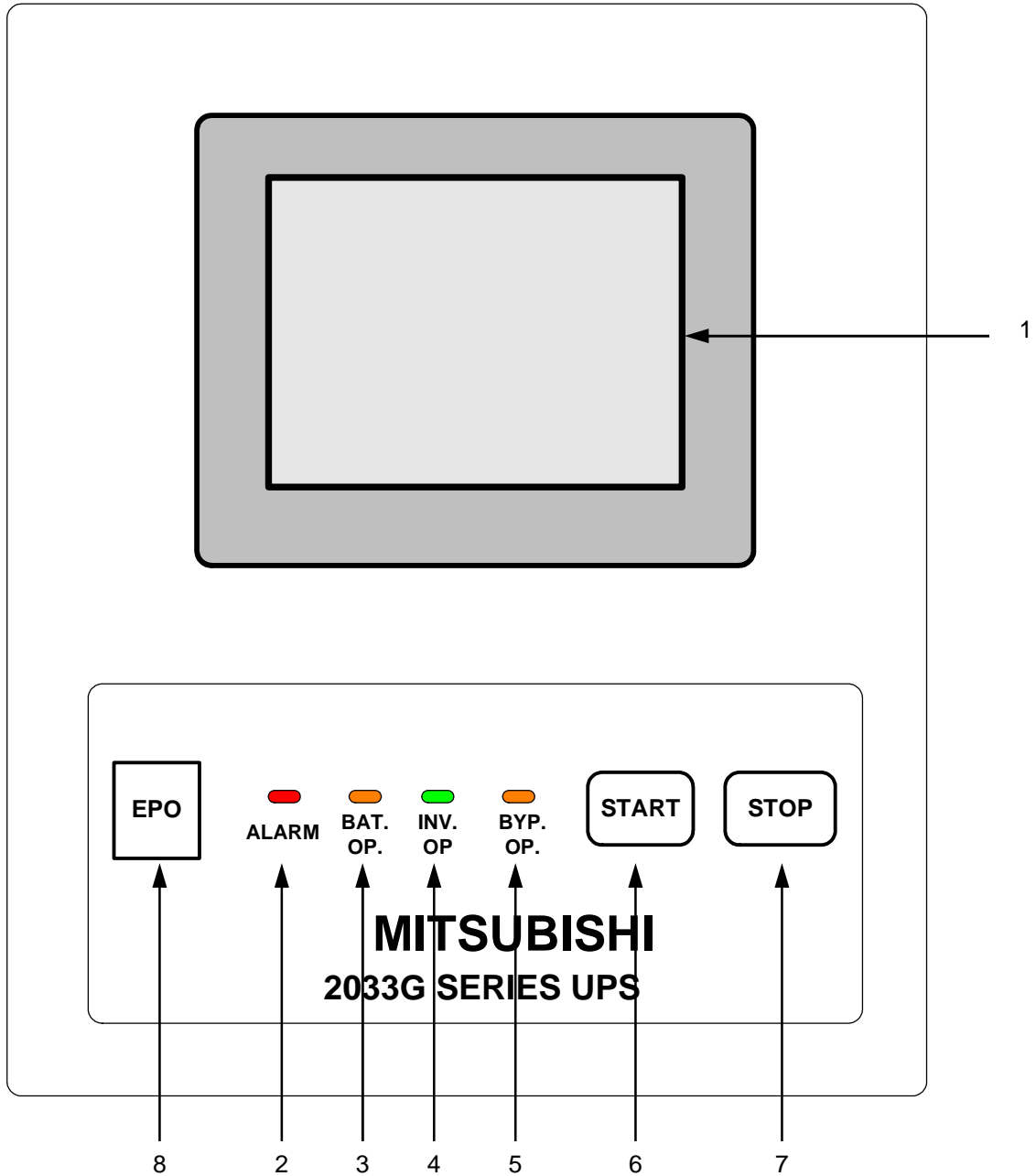
Component	Description	Component Rating @ 208V,3 phase, 60 Hz	
		UPS Rating (kVA)	
		30	50
CB1	AC Input Contactor	95A	150A
CB2	DC Input Contactor	135A	135A
CB3	STS Contactor	95A	150A
52C	AC Output Contactor	95A	150A
52S	Bypass Contactor	95A	150A
CPM	Control Circuit protector	15A	15A
User supply	AC input breaker (Recommended)	125A	200A
User supply	AC output breaker (Recommended)	125A	200A
FIU-W	AC Input Fuse	180A / AC690V (DC500V)	280A / AC690V (DC500V)
FBP, FBN	Battery Input Fuse	180A / AC690V (DC500V)	280A / AC690V (DC500V)
FOU-W	AC Output Fuse	180A / AC690V (DC500V)	280A / AC690V (DC500V)
FUR,S,U,V	DIAU-01	7A / AC500V	7A / AC500V
FUF1-3	FM1,2	5A / AC600V	5A / AC600V

**Rating would be changed.*

2.0 OPERATOR CONTROLS AND INDICATORS

The 2033G Series operator controls and indicators are located as follows (Door exterior) :

FIGURE 2.1 Operation/Display Panel (Front panel)



2.1 LCD Touch Panel Monitor Display and Keypad

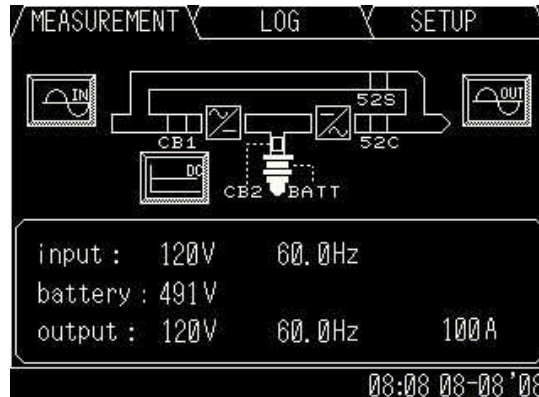
1) LCD Touch Panel Monitor Display

The Liquid Crystal Display (LCD) Touch panel Monitor Display indicates power flow, measured values and fault and error messages via user selectable display screens.

MAIN MENU SCREEN

The MAIN MENU Screen is shown in Figure 2.2. The MAIN MENU screen displays the system Mimic diagram, and allows you to shift from one menu category to another in the individual mode that is selected three items in Measurement, History (Log), and Setup. Date and Time are displayed at the bottom of the display.

FIGURE 2.2 MAIN MENU Screen



MEASUREMENT SCREENS

Pressing the MEASUREMENT Screen Touch icons on the system Mimic diagram will display each specific MEASUREMENT Screen that is selected three items in Input measurement, Output measurement, and Battery (DC) measurement.

Input measurement

- Input line rms voltage (A-B, B-C, C-A)
- Input frequency

Battery (DC) measurement

- Battery voltage

Output measurement

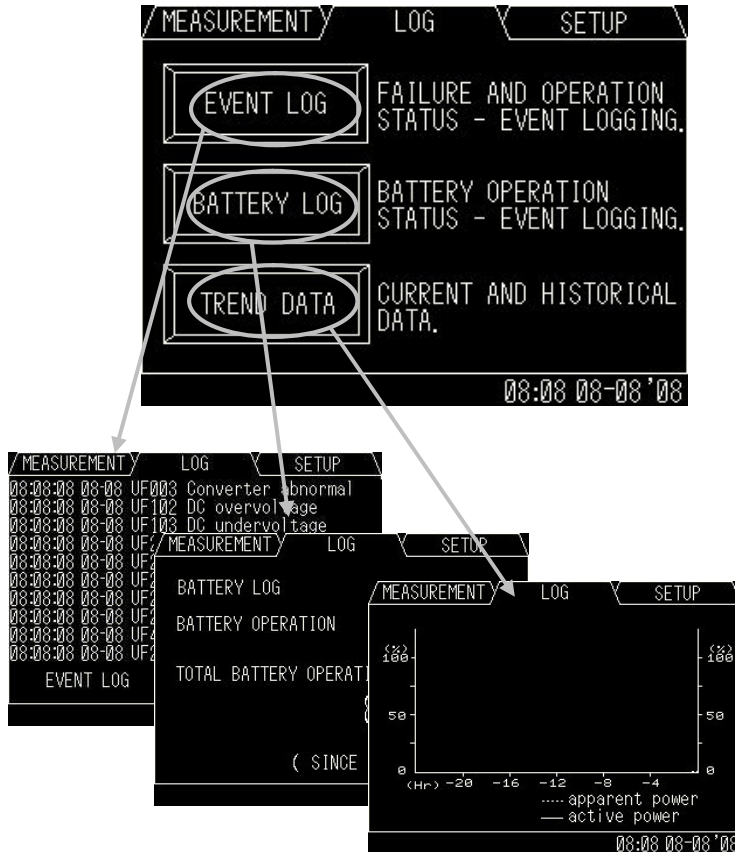
- Output line rms voltage (A-B, B-C, C-A)
- Load rms current (A, B, C)
- Load % current (A, B, C)
- Output active power
- Output apparent power
- Output frequency
- Power factor

On pressing MAIN Touch icon at the top, the display returns to the MAIN MENU Screen or goes to the History (Log) screen or Setup screen.

HISTORY (LOG) SCREENS

Pressing the LOG Screen Touch icon on the MAIN MENU Screen will display three Touch icons in Event log, Battery log, and Trend data. The History screens are shown in Figure 2.3.

FIGURE 2.3 History Screens



Event log screen

You can trace up to 50 condition/operation records that are stored. Press ▲ or ▼ button for page turning.

Battery log screen

The following historical data are recorded:

- Number of battery operations
- Total battery operation times

Trend data screen

You can check/view load trend in graphic form. The horizontal axis represents time (hr) in a 24-hour period and the vertical axis represents apparent power (%) and active power (%).

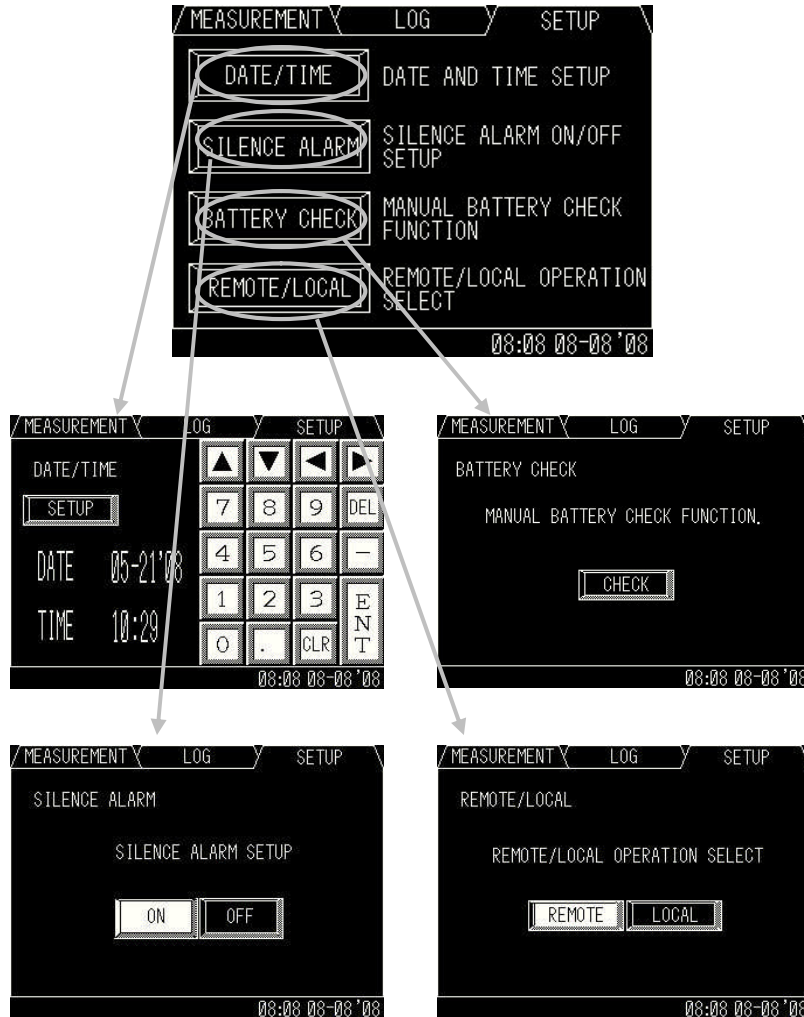
* Because apparent power and active power are expressed as a percentage in the trend graph, there are cases where they are displayed upside down. This is a normal part of display.

On pressing MAIN Touch icon at the top, the display returns to the MAIN MENU Screen or goes to the History screen or Setup screen.

SETUP SCREENS

Pressing the SETUP Screen Touch icon on the MAIN MENU Screen will display four Touch icons in Date/Time, Silence alarm, Battery check, and Remote/Local. The Setup screens are shown in Figure 2.4.

FIGURE 2.4 Setup Screens



Date/Time screen

Press the Input button, and enter date and time. Press the Input button again to confirm your entry.

Silence alarm screen

This feature lets you specify whether an alarm should be sounded. If “no” is selected, an alarm will not be sounded but alarm message remains displayed and the alarm LED lamp remains lit.

Battery check screen

This feature permits you to perform a battery check. Pressing the Test button causes battery check to be run for roughly 20 seconds. Check system mimic diagram on the MAIN MENU Screen or Battery log screen to make sure that the feature works properly.

Remote/Local screen

This feature enables you to set the UPS module for remote operation or direct (local) operation.

On pressing MAIN Touch icon at the top, the display returns to the MAIN MENU Screen or goes to the History (log) screen or Setup screen.

2) UPS failure [ALARM] (Red)

Illuminated when UPS is in fault mode.

3) Battery operation [BAT OP.] (Orange)

Illuminated when the battery is operating following an AC power failure.

4) Load on inverter [INV OP.] (Green)

Illuminated when power is supplied from inverter to the critical load.

5) Load on bypass [BYP OP.] (Orange)

Illuminated when power is supplied to load devices by bypass line.

6) Inverter start [START] (Green)

Inverter start button.

When pressed, the load will transfer from the bypass line to the inverter.

7) Inverter stop [STOP] (Orange)

Inverter stop button. When pressed, the inverter can be stopped.

The load will transfer from the inverter to the bypass line.

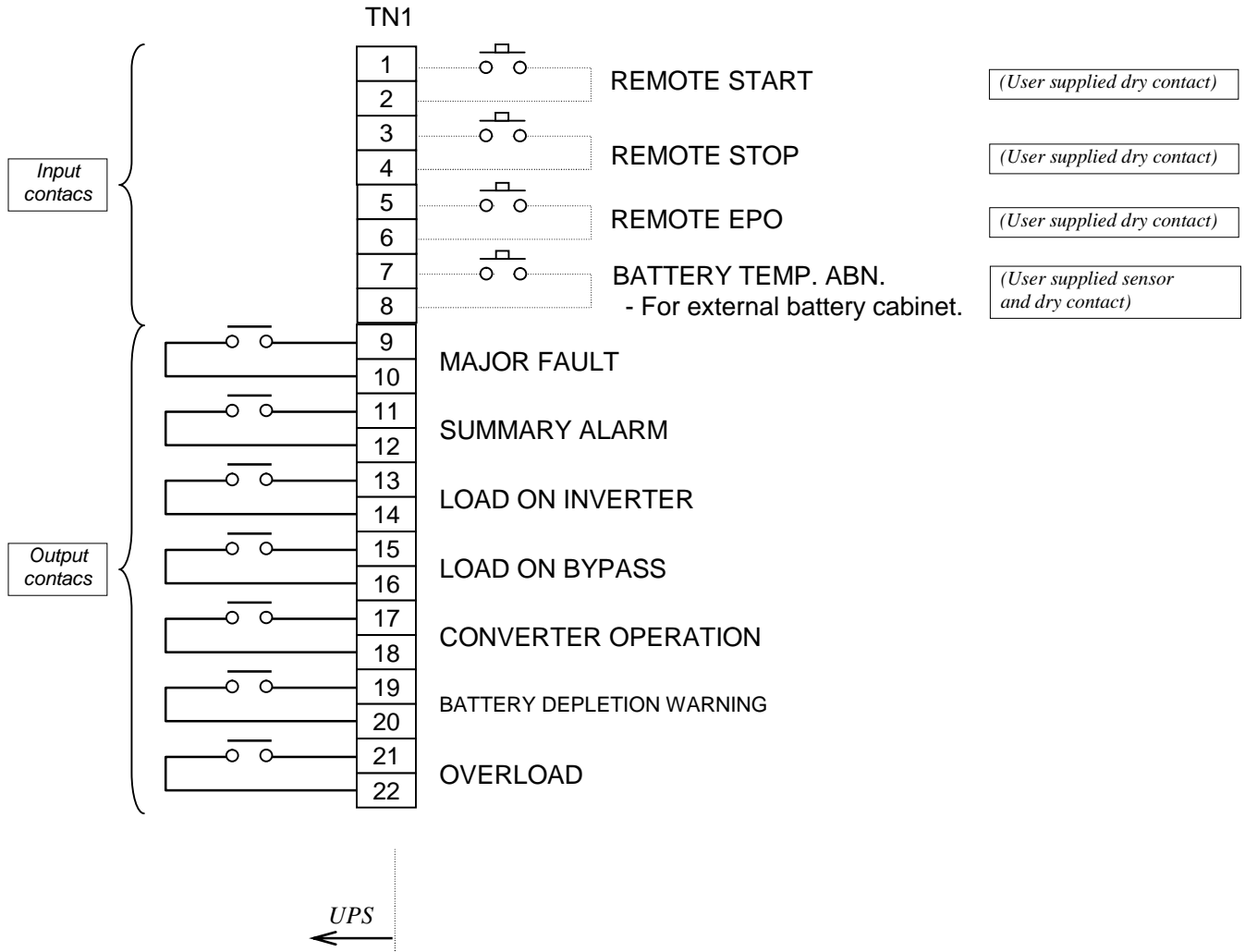
8) Emergency Power Off [EPO] (Red)

Shuts down UPS when pressed. Load is dropped.

2.2 External Signal Terminal Block

The UPS is equipped with a series of input/output terminals for the external annunciation of alarms and the remote access of certain UPS functions. Layout of terminals is shown in Figure 2.5, with a functional description of the input/output port presented:

FIGURE 2.5 External Signal Terminal Block on RYER-Y board (NEC Class2)



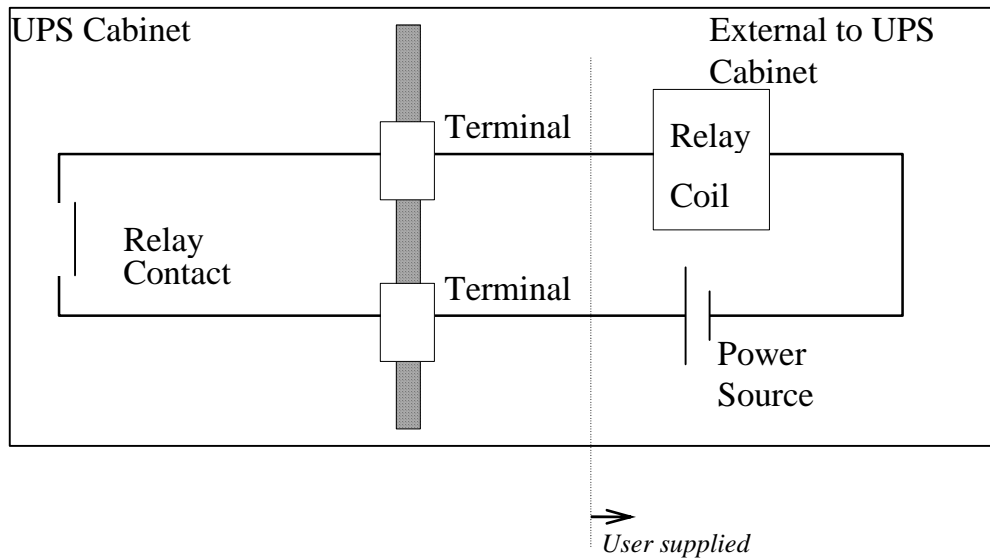
A) Output Contacts (for external alarm annunciation)

Output contacts consist of form “A” dry type contacts. The rated capacities of all output contacts are shown in Table 2.1. All dry contacts must be operated within their rated capacities. Figure 2.6 illustrates a typical installation.

TABLE 2.1 Rating of Output Contacts

Terminal No.	Rating of contact output
[9] - [10]	DC30V/5A M3 screw Minimum current: 10mA
[11] - [22]	DC30V/2A M3 screw Minimum current: 5mA

FIGURE 2.6 Control Wiring for External Contacts



Details of output contacts :**Terminals 9 to 10 “Major Fault” contact**

Activated when a Major fault occurs.

Terminals 11 to 12 “Summary Alarm” contact

Activated when the fault alarm occurs.

Terminals 13 to 14 “Load on Inverter” contact

Activated when the inverter supplies the power.

Terminals 15 to 16 “Load on Bypass” contact

Activated when the bypass line supplies the power.

Terminals 17 to 18 “Converter Operation” contact

Activated when the converter is operating.

Terminals 19 to 20 “Battery Depletion Warning” contact

Activated when battery voltage drops below discharge end voltage level during inverter operation (i.e. During AC failure conditions).

Terminals 21 to 22 “Overload” contact

Activated when a system overload occurs.

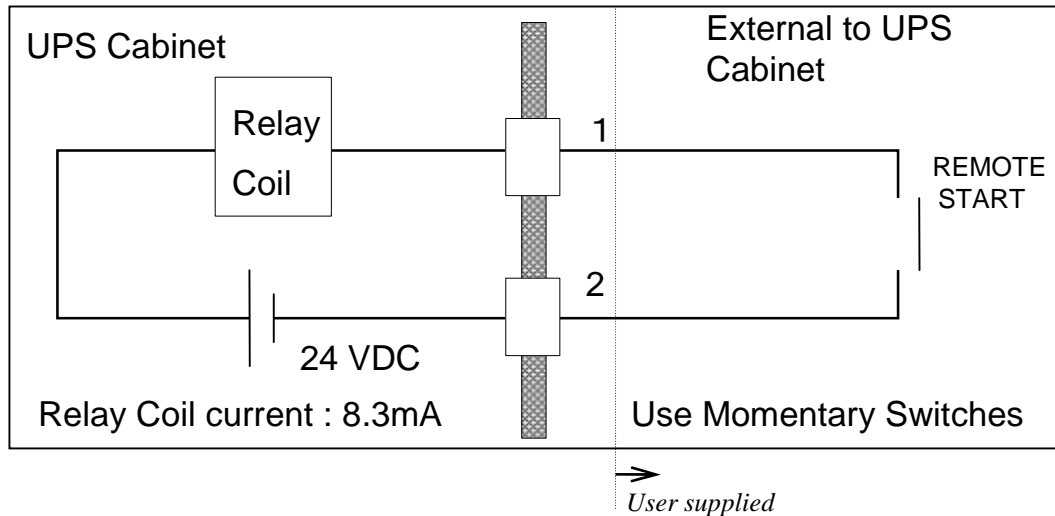
B) Input Contacts (for remote access of UPS)

External contacts are provided by the user of the UPS system. The terminal voltage at the UPS is 24Vdc (8.3mA M3 screw). External dry contacts are to be provided accordingly.



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

Refer to Figure 2.7 for a typical wiring configuration. Although this figure shows the REMOTE START configuration, the same wiring arrangements are used for another Input contacts.

FIGURE 2.7 Remote "Start" Contact Connections

Details of input contacts :
Terminals 1 to 2 "Remote Start" contact

Used to perform a remote UPS (Inverter) start.

The inverter supplies the power to the critical load.

Terminals 3 to 4 "Remote Stop" contact

Used to perform a remote UPS (Inverter) stop.

The bypass line supplies the power to the load.

Or the load will be dropped when the Bypass line power is failure.

Terminals 5 to 6 "Remote EPO" contact

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

Terminals 7 to 8 "Battery Temp. Abn." contact

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

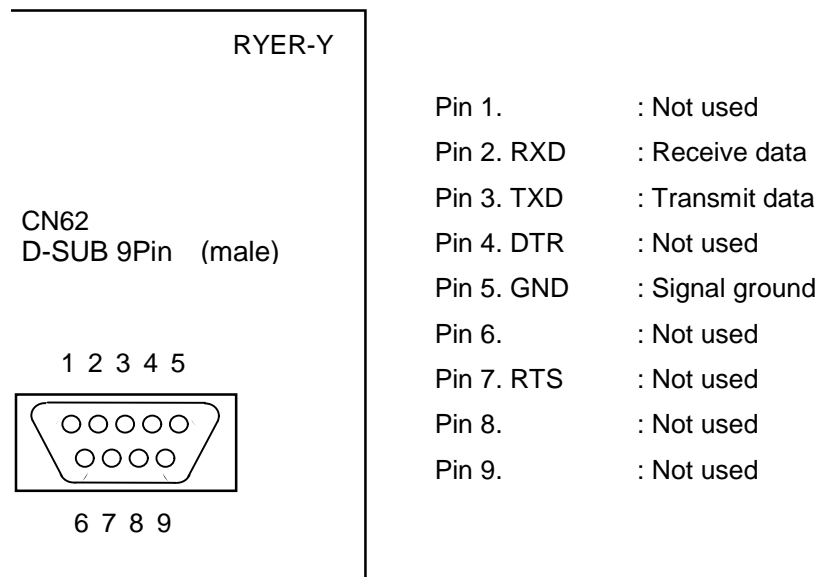


NOTE : *In all cases, a switch having a protective cover is recommended in order to reduce possibility of accidental operation.*

2.3 External communication connector

This is an RS232C port for “DiamondLink”^{*} monitoring software. The layout of the connector is shown in Figure 2.8.

FIGURE 2.8 External communication connector on RYER-Y board (NEC Class2)



** Consult MITSUBISHI ELECTRIC POWER PRODUCTS, INC. for detail on “Diamond Link” monitoring software and its capabilities.*

3.0 INSTALLATION AND OPERATION

3.1 Transportation and Installation

TABLE 3.1 How to transport and install the system

Transportation	Installation
Transport unit with forklift.	Pull out the UPS cabinet as shown in Figure 3.1 Fix the UPS unit in place using the four (4) leveling feet. Using the four (4) fastening hardware (with pre-drilled hole (0.47" Diameter)), anchor the UPS using appropriate hardware (Not provided).

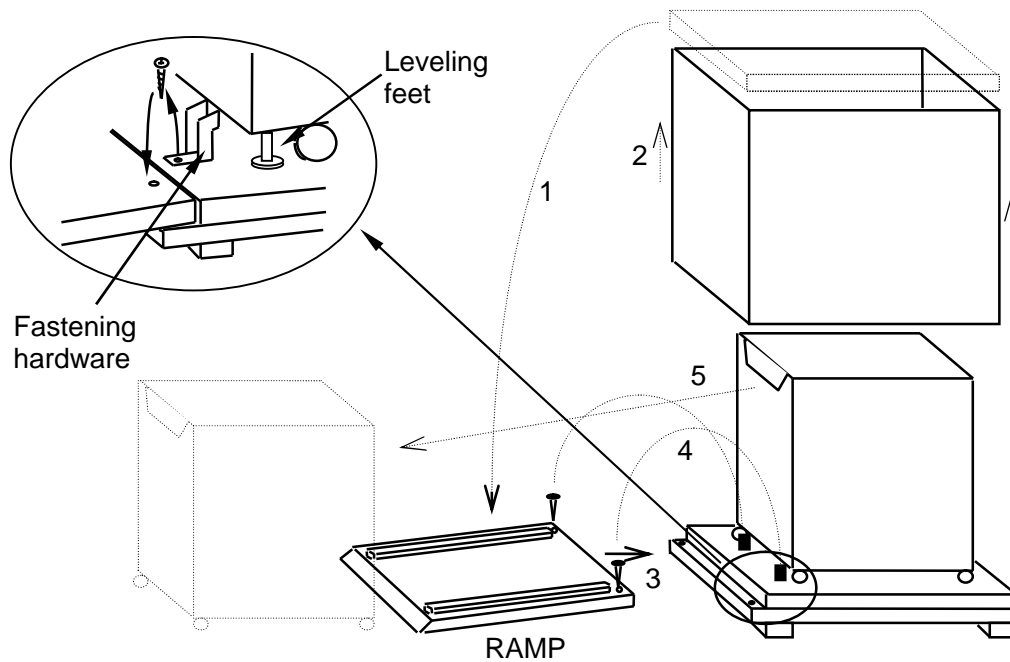


Note : *Do not transport in a horizontal position. Cabinets should be maintained upright within +/- 15° of the vertical during handling.*

3.2 Handling

The UPS is shipped in export packaging. Remove the UPS from the package only when it is ready for installation.

FIGURE 3.1 Handling



3.3 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)	30	50
Weight (lb.)	530	665

Note: UPS have batteries external to module cabinet.

Please refer to the remote battery supply installation manual.

B) Minimum clearance required for ventilation

Right side 1.0" (25 mm) (not required when sidecars are used)

Left side 1.0" (25 mm) (not required when sidecars are used)

Back side 7.8" (200 mm)

Top side 39.4" (1000 mm)

C) Space requirement for routine maintenance

Allow for the following space at the time of installation.

Front 39.4" (1000 mm)

Sides 1.0" (25 mm)

Rear 7.8" (200 mm)

D) External Battery Supply

Please refer to the following when installing and maintaining batteries:

1. Refer to the External Battery Supply installation manual.
2. Servicing of batteries should be performed or supervised by personnel knowledgeable of batteries and the required precautions. Keep unauthorized personnel away from batteries.
3. When installing or replacing batteries, install or replace with the same number and type per the External Battery Supply installation manual.



3.4 Procedure for Cable Connections

- I. Confirm the capacity of the UPS being installed. Identify the input/output power terminal blocks as shown in Figure 3.2.
- II. Connect the grounding conductor from the input service entrance to the UPS grounding bar.
- II. Confirm that an external input circuit breaker is installed and its current rating is appropriately. (Refer to Table 1.2 in Section 1.1)
- III. Connect the AC/DC power cables from the input service entrance to the UPS' power terminals identified in Figure 3.2. The cables must be sized for an ampere rating larger than the maximum current capacity of the system. (Refer to Table 3.3 for recommended cable sizes)
- V. Connect external signal terminal block as needed. Refer to section 2.2 and Figure 2.5 for functional description. 12 AWG, or less, shielded conductor is recommended.

NOTES: 1. *Confirm that all UPS internal contactors (breakers) "CB1", "CB2", and "CB3" are open before energizing UPS.*



2. *UPS power terminals are attached to the bolts and nuts. It is recommended that compression lugs be used to fasten all input/output power cables. Refer to Table 3.4 for recommended compression lugs and appropriate crimping tool*

TABLE 3.3 Recommended Cable Size and Torque Requirements

UPS Capacity (kVA)	Input / Output Side		DC Input Side	
	Cable Size (AC208V)	Torque (in. lbs)	Cable Size (DC 491V)	Torque (in. lbs)
30kVA	1/0 AWG	100-135	4 AWG	100-135
50kVA	4/0 AWG	100-135	1/0 AWG	100-135

*1 - The cables must be selected to be equal to the sizes listed in the table.

*2 - Voltage drop across power cables not to exceed 2% of nominal source voltage.

*3 - Allowable ampere ratings based on 75° C insulation at an ambient temperature of 40° C.

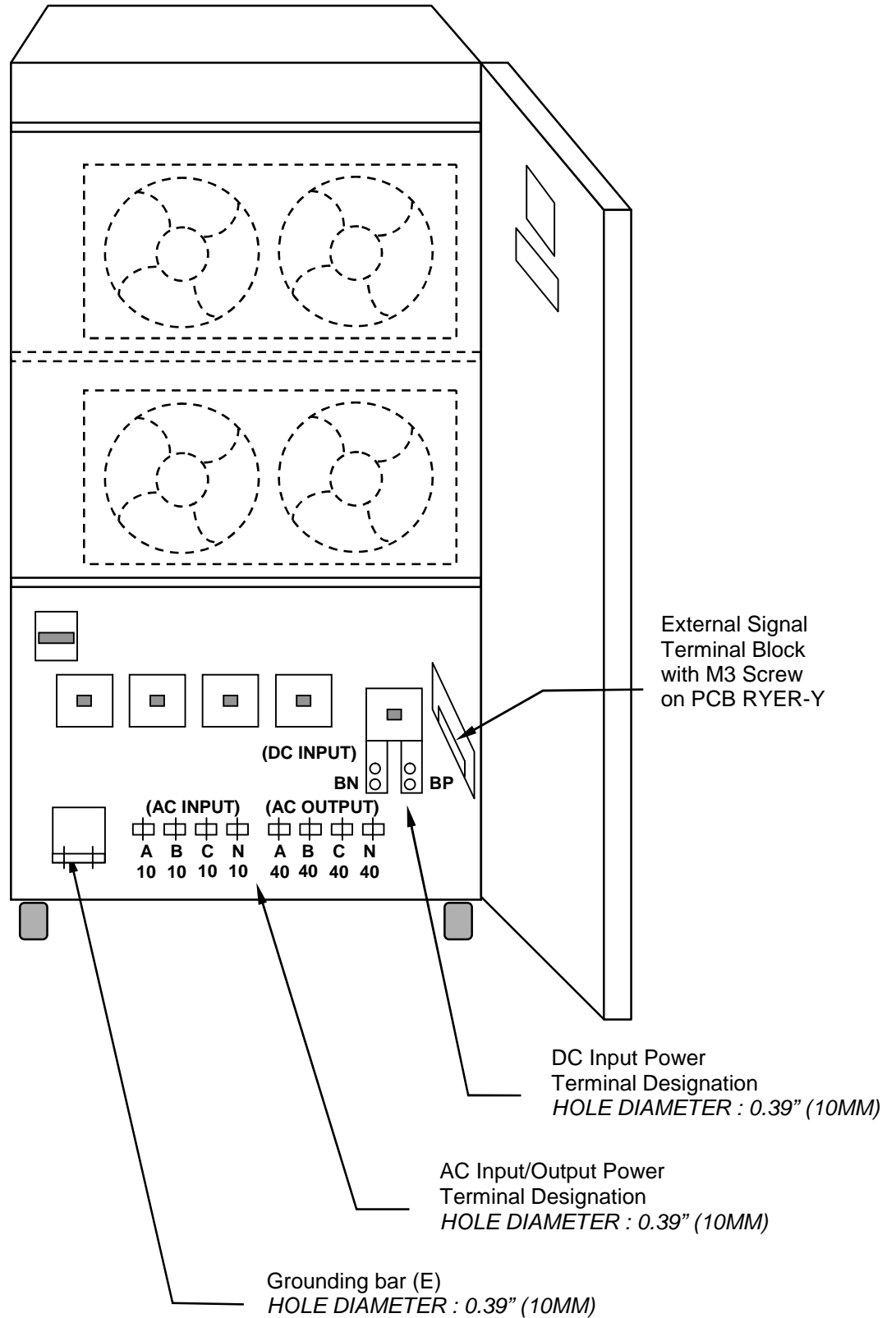
No more than 3 conductors in a raceway without de-rating. Copper conductors assumed.

TABLE 3.4 Recommended compression lugs and appropriate crimping tool

WIRE SIZE (CODE)	WIRE STRAND CLASS	RECOMMENDATION		CRIMPING TOOL REQUIRED BURNDY TYPE Y35 OR Y46	
		VENDOR	CAT. NO.	COLOR KEY	DIE INDEX
4	B	BURNDY	YA4C	GRAY	8 / 346
1/0	B	BURNDY	YA25	PINK	12 / 348
4/0	B	BURNDY	YA28	PURPLE	15

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 3.2 Input/Output Power Terminals (30kVA, 50kVA)



3.5 Operating Procedures

A) UPS 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 Circuit Breaker is closed. Be extremely careful with closing the External input Circuit Breaker.*

1. Close External Input Circuit Breaker (User supplied. Refer to Warning 4 in Section 1.1).
2. Close "CPM" Circuit Protector. Within Twenty (20) seconds, "CB1" AC Input Contactor is closed, Converter is operated, and then "CB2" DC Input Contactor is closed automatically.
3. The Inverter automatically starts its operation, and then the UPS transfers the power supply to the critical load without operator intervention from the internal bypass line to Inverter output. The "INV.OP." LED illuminates.

B) UPS (Inverter) Shutdown Procedure

1. At the time when UPS module (inverter) shutdown is required, press the "STOP" button on the front panel for (0.3) seconds continuously. LCD Touch Panel Monitor displays a CAUTION for an acknowledgement for Inverter stop.
2. Repress the "STOP" button on the front panel for (0.3) seconds continuously. The UPS will transfer the load to the bypass line. The "BYP.OP." LED will illuminate ("INV.OP." LED disappears).

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.*

3. If turning off all power to the critical load is desired, open the "CPM" Control Circuit Protector, then open the External Input Circuit Breaker (User supplied.).



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.*

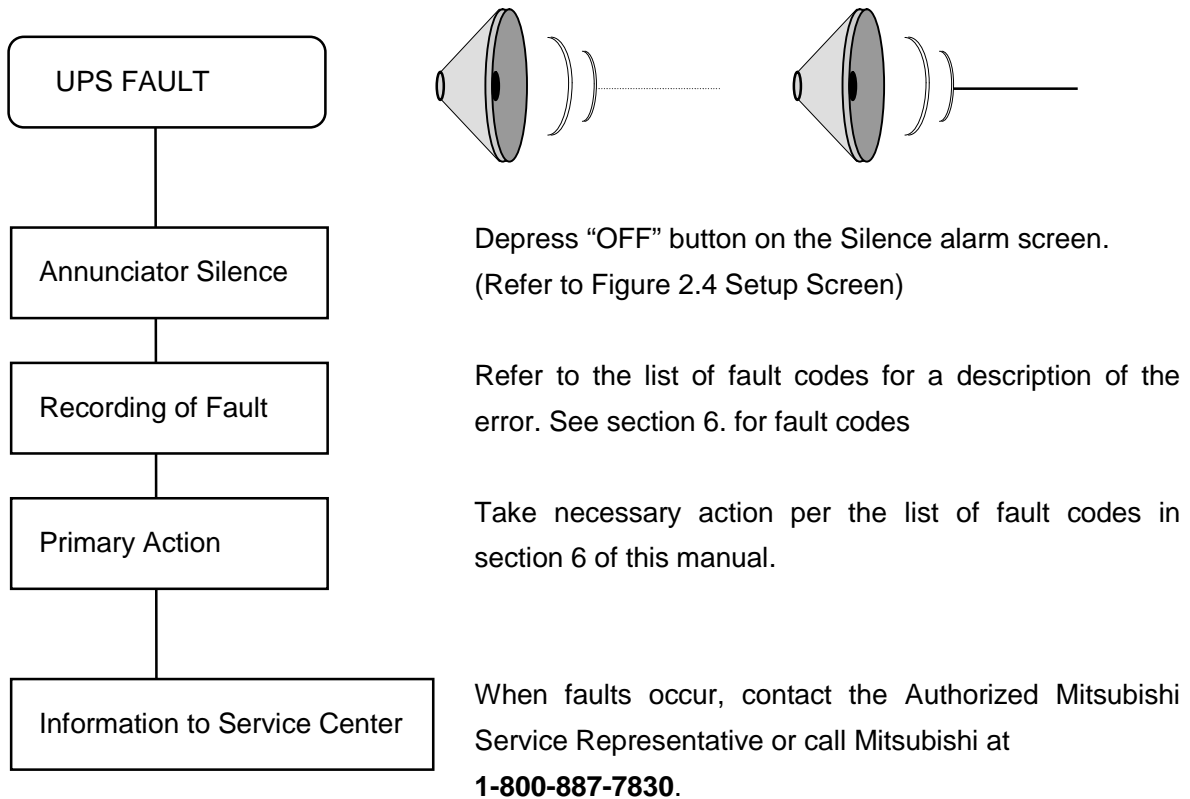
C) EPO (Emergency Power Off) Procedure

If an all power supply shutdown is required in an emergency situation, press the "EPO" button on the front panel. The UPS will be shutdown and no power is supplied to the load.



WARNING : *With EPO operation, although all output power from the UPS is shutdown, it is necessary to manually open the External Input Circuit Breaker (user supplied) and DC Circuit Breaker (user supplied), to remove the input power to the UPS.*

4.0 RESPONSE TO UPS FAILURE



Note :

The error code indicated on the EVENT LOG SCREEN (refer to Figure 2.3) of the LCD Display at the time of UPS alarm condition is very important. In order to minimize repair time, please include this information along with the operation status and load status, on all correspondence with Mitsubishi's field service group.



5.0 PARTS REPLACEMENT

Contact Mitsubishi or its Authorized Service Center 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. Battery end of 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 capacity is within this percentage.

B) UPS Component Parts

UPS components have a defined life expectancy (Fans, Capacitors, Filter, etc). Contact Mitsubishi or its Authorized Service Center for a complete parts replacement schedule. Recommended replacement time interval varies with operating environment. Contact Mitsubishi or its Authorized Service Center for specific application recommendations.



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

6.0 FAULT CODES

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

At time of error :



- A) Verify and record the occurrence of the alarm. Note fault code on the EVENT LOG SCREEN of the LCD Display.

Contact Mitsubishi Electric Power Products, Inc. at 1-800-887-7830.

- B) If the External AC Input Circuit Breaker (MCCB) is in the trip state, depress the toggle to reset the breaker before re-closing.

TABLE 6.1-a Failure Code List

Code No.	Status message	Content	Guidance / Message	Buzzer	Level	Failure lamp
UF003	Converter abnormal	Preliminary charge impossible	CALL SERVICE ENGINEER	[2]	Major	Lit on
UF056	Converter overcurrent	Converter over-current	CALL SERVICE ENGINEER	[1]	Minor	Flicker
UF059	I/P circuit abnormal	Converter current control error	CALL SERVICE ENGINEER	[1]	Minor	Flicker
UF102	DC overvoltage	Over voltage of DC voltage	CALL SERVICE ENGINEER	[2]	Major	Lit on
UF103	DC undervoltage	Low voltage of DC voltage	CALL SERVICE ENGINEER	[2]	Major	Lit on
UF151	DC voltage abnormal	DC voltage abnormal	CALL SERVICE ENGINEER	—	Minor	Flicker
UF153	CB2 abnormal	CB2 status signal error	CALL SERVICE ENGINEER	[1]	Minor	Flicker
UF157	Batt. overtemperature	Battery temperature abnormality	CHECK BATTERY	—	Minor	Flicker
UF162	Battery abnormal	Battery abnormality detected by self test	CALL SERVICE ENGINEER	—	Minor	Flicker
UF171	DC voltage abnormal	DC over voltage or DC reversal voltage detected	CALL SERVICE ENGINEER	[1]	Minor	Flicker
UF184	DC unbalanced	DC capacitor voltage unbalance	CALL SERVICE ENGINEER	[1]	Minor	Flicker
UF201	Output overvoltage	Output over voltage duling load on inverter	CALL SERVICE ENGINEER	[2]	Major	Lit on
UF202	Output undervoltage	Output low voltage duling load on inverter	CALL SERVICE ENGINEER	[2]	Major	Lit on
UF209	52C abnormal	52C does not turn on	CALL SERVICE ENGINEER	[2]	Major	Lit on
UF218	Inv. Volt. (DC) abn.	Output voltage contain DC content	CALL SERVICE ENGINEER	[2]	Major	Lit on
UF219	Power unit error	IGBT unit error during load on bypass	CALL SERVICE ENGINEER	[2]	Major	Lit on
UF255	52C abnormal	52C turned off during load on inverter	CALL SERVICE ENGINEER	[1]	Minor	Flicker
UF261	Inv. control abnormal	Inverter current control error	CALL SERVICE ENGINEER	[1]	Minor	Flicker
UF271	Inverter overcurrent	Inverter over current	CALL SERVICE ENGINEER	[1]	Minor	Flicker
UF281	Fin temp. abnormal	IGBTunit (fin) temperature abnormality	CALL SERVICE ENGINEER	[1]	Minor	Flicker
UF302	Control circuit error	Control microprocessor abnormality	CALL SERVICE ENGINEER	[2]	Major	Lit on
UF303	Control circuit error	Control microprocessor abnormality	CALL SERVICE ENGINEER	[2]	Major	Lit on
UF305	Control circuit error	Control clock lost	CALL SERVICE ENGINEER	[2]	Major	Lit on
UF310	Control circuit error	Control circuit abnormality	CALL SERVICE ENGINEER	[2]	Major	Lit on
UF312	Control circuit error	A/D converted voltage abnormality	CALL SERVICE ENGINEER	[2]	Major	Lit on
UF313	Control circuit error	D/A converted voltage abnormality	CALL SERVICE ENGINEER	[2]	Major	Lit on
UF351	Control power abn.	Isolated 24V power supply for external input relay abnormality	CALL SERVICE ENGINEER	[1]	Minor	Flicker
UF352	Control power abn.	Backup power supply (+5V) abnormality	CALL SERVICE ENGINEER	[1]	Minor	Flicker
UF361	Control power abn.	Control power supply abnormality	CALL SERVICE ENGINEER	[1]	Minor	Flicker
UF364	Control circuit error	Driven IC of pulse transformer on Gate drive PCB abnormality	CALL SERVICE ENGINEER	[1]	Minor	Flicker

TABLE 6.1-b Failure Code List

Code No.	Status message	Content	Guidance / Message	Buzzer	Level	Failure lamp
UF402	52S abnormal	52S not turned off, or turned off without any command	CALL SERVICE ENGINEER	[2]	Major	Lit on
UF404	Load abnormal	Auto transfer of frequent occurrence based on overload	CHECK LOAD	[2]	Major	Lit on
UF451	52S abnormal	52S not turned on, or 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
UA801	I/P Volt out of range	AC input voltage out of range	ALARM	[1]	Alarm	Flicker
UA803	I/P phase rotation	AC input phase rotation error	ALARM	[2]	Alarm	Lit on
UA806	Overload > 100%	Inverter overload	ALARM	[1]	Alarm	Flicker
UA810	OL or PowerUnit error	Momentary inverter over-current	ALARM	[1]	Alarm	Flicker
UA812	Byp.Volt Out of range	Bypass voltage out of range	ALARM	—	Alarm	—
UA814	Byp. freq. abnormal	Bypass frequency out of range	ALARM	—	Alarm	—
UA815	Transfer prohibition	Transfer prohibition	ALARM	—	Alarm	—
UA817	EPO	Emergency stop applied	ALARM	—	Alarm	Flicker
UA831	Emergency byp. SW on	Emergency bypass switch turned on	ALARM	—	Alarm	Flicker
UA832	Interrupted transfer	Interrupted bypass transfer applied	ALARM	—	Alarm	Flicker
UA834	Battery depleted	Battery depleted Inverter stopped	ALARM	—	Alarm	Flicker
UA836	Overload (kW)	Inverter kW overload	ALARM	—	Alarm	Flicker
UA837	Batt. dep. warning	Warning prior to battery depletion	ALARM	—	Alarm	Flicker
UA838	Rec. overload warning	Converter overload	ALARM	—	Alarm	Flicker

(Note 1)

Buzzer: [1] intermittent sound, [2] continuous sound.

(Note 2)

- "Major" is defined as a major failure. Load transferred from inverter to the static bypass line;
- "Minor" is defined as a minor failure. UPS continues to operate normally, but cause of alarm must be identified;
- "Alarm" is defined as a notification of the change in status or the condition that is desirable to notify.

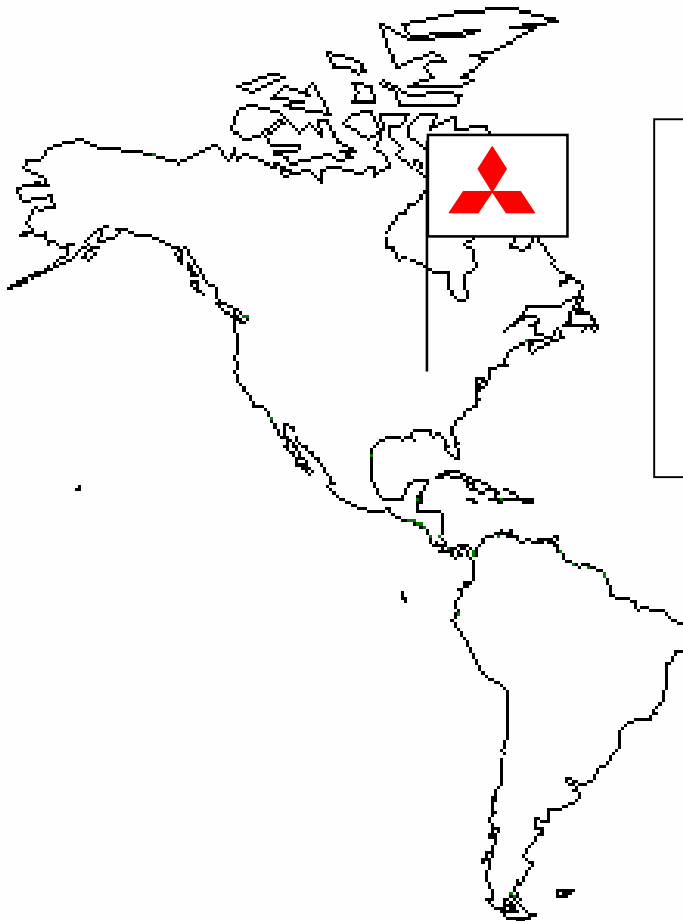
(Note 3)

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

7.0 WARRANTY & OUT OF WARRANTY SERVICE

The Mitsubishi Electric UPS Division Service Department has many Authorized Service Centers place strategically throughout the US, Canada and Latin America. For both in warranty and out of warranty service, please contact Mitsubishi Electric Power Products, Inc. at (724) 772-2555. To register your UPS for warranty purposes, please complete the warranty registration form and fax it to the Mitsubishi Electric UPS Division Service Department fax line shown on the registration form. (Next page)

For warranty purposes, it is essential that any and all service work that may be required on your Mitsubishi brand UPS equipment is performed by a Mitsubishi Electric Authorized Service Center. The use of non-authorized service providers may void your warranty.



Mitsubishi Electric Power Products, Inc
UPS Division Service Department

530 Keystone Drive,
Warrendale, PA 15086, USA
Phone: (724) 772-2555
Fax: (724) 778-3146


Mitsubishi Electric Power Products, Inc.
UNINTERRUPTIBLE POWER SUPPLIES

530 Keystone Drive, Warrendale, PA 15086

Phone: (724) 772-2555, Fax: (724) 778-3146

UPS Warranty Registration

 Register UPS for Warranty

 Address Change

To validate the Warranty on your UPS this form must be filled out completely by Customer and returned.

CUSTOMER INFORMATION		
Your Name:	Job Title:	
Company Name:		
Division / Department:		
Address:		
City:	State:	Zip Code:
Country:	Province:	
Business Phone:	Ext:	Fax:
E-Mail:	@	Internet Address:
UPS Model #:	Capacity (kVA):	UPS Serial #:
Start-Up Date: / /	Authorized Mitsubishi Service Company (if known):	
Signature:	Date: / /	

**Which ONE of These Best Describes Your Organization's
Primary Business Classification?**
Number of Employees at This Location is:
{Energy Producer}

-
- Utility
-
-
- Alternate Energy

Education/Univ. Service

- {Service}**
-
-
- Consulting
-
-
- Engineering

 1 - 19

 20 - 49

 50 - 99

 100 - 249

 250 - 499

 500 - 999

 1000 or more

{Manufacturing Co.}

-
- OEM
-
-
- Process

 Engineering

 Outsourcing

 Financial/Legal/Insurance
 {Expectations}

Overall how was Start-Up performed:
 Unsatisfactory

 Satisfactory

 Exceeded

 Consumer Goods

 Electronics

 Power Quality Equipment

{Government}
 Military

 Municipals

 Federal/State/Local

**Would you like to receive future product updates and
news?**
 Yes

 No

 Commercial Business
 Electrical Contractor
 Healthcare
 Internet
 Communications
 Distributors/Reps
 Other _____

**After Start-Up has been done Fax completed Form to:
(724) 778-3146**