

**MITSUBISHI  
ELECTRIC**

MITSUBISHI ELECTRIC POWER PRODUCTS, INC.

UNINTERRUPTIBLE POWER SUPPLY SYSTEM

**MODEL**

# **7011B SERIES**

OWNER'S / TECHNICAL MANUAL

(Inclusive Parallel Operation System Application)

**UNINTERRUPTED** Peace of Mind®

# 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 important user 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.

## SAFETY PRECAUTIONS

The safety precautions are categorized as **DANGER** and **CAUTION** in this instruction manual.

**DANGER**: A dangerous situation may occur if improperly handled, leading to severe or fatal injuries.

**CAUTION**: A dangerous situation may occur if improperly handled, leading to serious injuries.

Note that some items described as **CAUTION** may lead to severe results depending on the situation. Nonetheless, important information outlined in this section must be observed at all times.

### DANGER

- Do not dispose of the batteries in a fire as they may explode.
- Do not open or break the batteries. Released electrolyte is toxic and harmful to the eyes and skin.
- A battery can present a risk of electrical shock and high short circuit current. Observe the following minimum Safety Precautions when working on the batteries.
  - 1) Verify that the UPS is off and that the input power plug or wires are disconnected.
  - 2) Remove watches, rings or other metal objects.
  - 3) Use tools with insulated handles to prevent inadvertent shorts.
  - 4) Wear rubber gloves and boots.
  - 5) Do not lay tools or metal parts on top of the batteries.
  - 6) Determine if the battery is inadvertently grounded. If so, remove source of ground. Contact with any part of a grounded battery can result in electrical shock. The likelihood of such shock will be reduced if grounds are removed during installation and maintenance.

## CAUTION

### PRECAUTIONS FOR INSTALLATION

- **Do not block the intake/exhaust ports. Install the UPS at least 8" (20cm) away from walls, etc.**
  - If the intake/exhaust ports are blocked, the internal temperature of the UPS will rise and could lead to fires from battery electrolyte leakage, fire ignition or part deterioration.
- **Follow the UPS instruction manual carefully when installing the unit.**
  - Improper installation could lead to injury such as the UPS falling over, etc.

### PRECAUTIONS FOR WIRING

- **The power supply for this unit must be single phase rated in accordance with the equipment data plate. It must be suitably grounded.**
  - Failure to ground the unit could lead to electrical shocks.

### PRECAUTIONS FOR USE

- **If a unit fault, abnormal odor or noise occurs, turn off the UPS input switch.**
  - Failure to do so could lead to fires.
- **Do not insert blunt objects or fingers, etc., in the fan.**
  - Failure to observe this could lead to injuries.
- **Do not insert blunt objects or fingers, etc., into the unit's input/output section.**
  - Failure to observe this could lead to electrical shocks.
- **Ventilate the UPS surroundings.**
  - Failure to do so could lead to container rupture or to explosions from the gas generated from the battery system.
- **Prohibit smoking and the use of fire around the unit.**
  - Failure to do so could lead to injuries, damage or fires from explosions.
- **Do not place containers that have water or any liquids on the UPS.**
  - If the container tips over and the water or liquids spills, this could lead to electrical shocks and to fires in the UPS.
- **Do not sit on, step on or lean on the UPS.**
  - Failure to observe this could lead to injuries if the UPS tips over.

## CAUTION

### PRECAUTIONS FOR MAINTENANCE AND INSPECTION

- **The inside of the UPS must be inspected or repaired only by qualified personnel.**
  - Failure to observe this could lead to electrical shocks, injuries, burns, smoke generation or fires.
- **Periodically replace the batteries (every 5 years).**
  - Batteries that have exceeded the replacement life could lead to fires from electrolyte leakage or fire ignition.
- **Contact the dealer or service company for unit maintenance and repairs, and for the replacement of defective parts.**
  - Opening the cover could lead to electrical shocks or burns.

### PRECAUTIONS FOR BATTERY

- **If the battery ignites, do not use water to extinguish the fire. Instead, use a powder (ABC) fire extinguisher.**
  - Use of water could cause the fire to grow.
- **Toxic diluted sulfuric acid in the battery.**
  - If electrolyte leaks from the unit, avoid contact with the skin or clothes.
  - If electrolyte makes contact with the skin or clothes, wash it off thoroughly with clean water.
  - If electrolyte makes contact with the eyes, rinse immediately and thoroughly with clean water, and then see a doctor. The presence of sulfuric acid in the eyes could lead to blindness, and adherence to skin could lead to burns.

### OTHER PRECAUTIONS

- **Never use or store the unit in the following types of environment:**
  - a) A location having a low or high temperature, or high humidity deviating from the ambient environment conditions described in the brochure or instruction manual.
  - b) A location submerged in water or where the unit could become wet from dripping water.
  - c) At an altitude higher than 3300 feet (1000 meters).
  - d) In direct sunlight.
  - e) Where organic solvents (gasoline, paint thinner, etc.) are stored.
  - f) A location that is dusty.
  - g) A location containing combustible gas, corrosive gas, salt or oil mist.
  - h) A location subject to vibration or impacts.
  - i) A location near devices that generate sparks or near heating elements.

## 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 7011B Series Uninterruptible Power Supply System 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 warnings and cautions in this manual.  
Failure to comply may result in serious injury or death.  
Obtain 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.**

**APPLICATION**

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

**Special considerations are required when applying this UPS to equipment (\*\*) that affects human safety and/or maintains public services.**

**Be sure to contact/inform MITSUBISHI if this is the case. These applications, without special consideration may cause serious accidents.**

- \*
  - 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
  
- \*\*
  - 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 30 and 90%. There must be no condensation due to temperature changes.	
4	Altitude	This equipment must not be applied at an altitude that exceeds 3300ft (1000m) above seal level.	
5	Dust	Dust in the room where the UPS is installed must not exceed normal atmospheric dust levels. In particular, that dust should not include iron particles, oils or fats, or organic materials such as silicone.	
6	Inflammable gas	There should be no inflammable/explosive gas.	
		Hydrogen sulfide (H <sub>2</sub> S)	No more than 0.0001 PPM
		Sulfurous acid gas (SO <sub>2</sub> )	No more than 0.05 PPM
		Chlorine gas (Cl <sub>2</sub> )	No more than 0.002 PPM
		Ammonia gas (NH <sub>3</sub> )	No more than 0.1 PPM
		Nitrous acid gas (NO <sub>2</sub> )	No more than 0.02 PPM
		Nitrous oxides (NO <sub>x</sub> )	No more than 0.02 PPM
		Ozone (O <sub>3</sub> )	No more than 0.002 PPM
Hydrochloric acid mist (HCl)	No more than 0.1 mg/m <sup>3</sup>		

**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. Circuit breaker (MCCB) 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)
6	208	26.4	35
8	208	35.2	45
10	208	44.0	60
12	208	52.8	70

**AC output and DC input overcurrent protection and disconnection devices shall be field supplied and installed.**

## **1.1 GENERAL**

The Mitsubishi 7011B 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 7011B Series UPS is available in four (4) kVA sizes: 6, 8, 10 and 12kVA. Specifications for each kVA model appear in Section 1.4. All models have batteries included in the UPS module cabinet. The principles of operation described herein are applicable to all models.

This manual provides an overview of the 7011B 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.

## 1.2 DEFINITIONS

**UNINTERRUPTIBLE POWER SUPPLY SYSTEM (UPS)** - All components within the UPS 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 CABINET** - The metal enclosure which contains Converter & Inverter Module, I/O Module, Bypass Module, batteries, and operator controls required to provide specified AC power to a load.

**CONVERTER & INVERTER MODULE** - The Converter / Charger, and Inverter assembly which, under the direction of the I/O Module and operator controls, provide specified AC power to a load.

**CONVERTER / CHARGER** - The UPS component which contains 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 component 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.

**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 whenever the UPS is not completely operational.

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

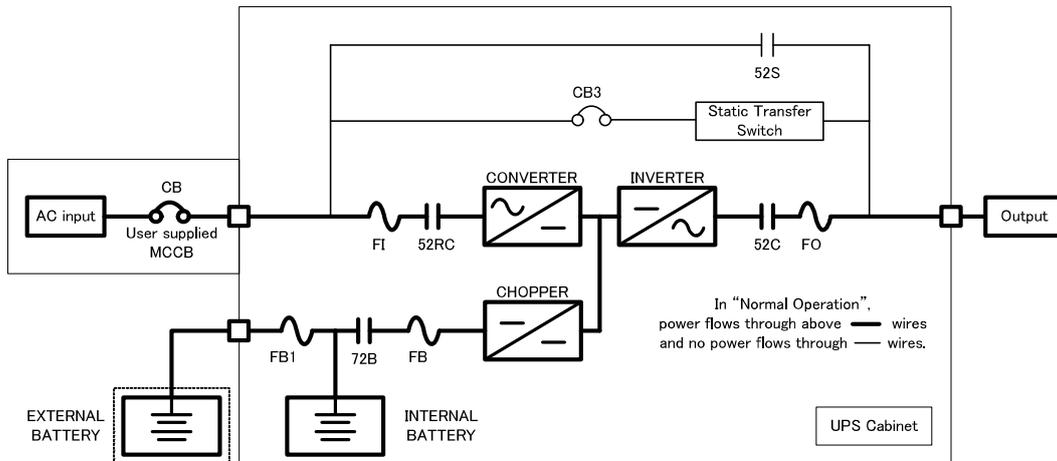
**AC INPUT POWER** - Power provided by the electrical utility company, or auxiliary generator, which is connected to the UPS for supplying critical load and recharging the batteries.

**BATTERY** - Rechargeable battery strings which supply DC power to the inverter to maintain continuous AC power to the load during AC input power failure conditions.

**1.3 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 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.

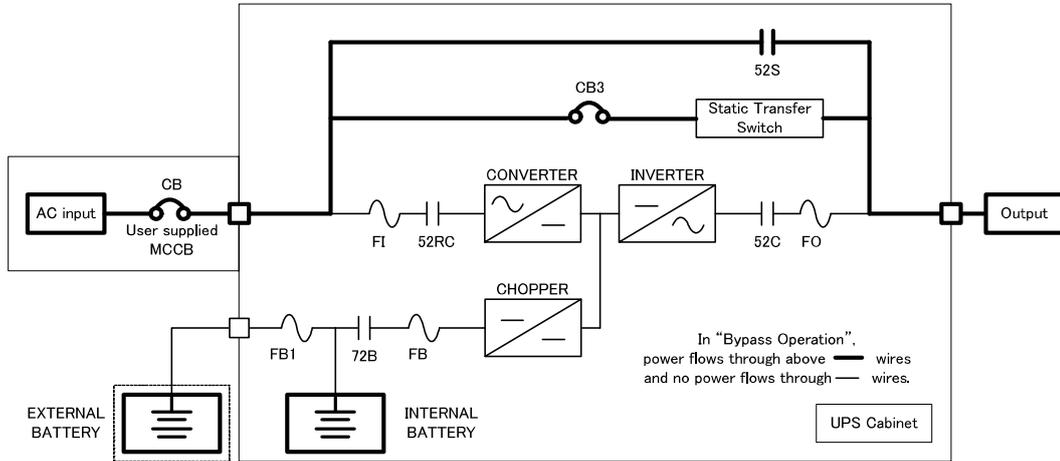
Referring to Figure 1.1: Input AC power is converted to DC by the Converter. DC power is utilized to charge the UPS battery and to provide power to the Inverter. The Inverter converts the DC power to clean AC power to supply the critical load.

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



**\* The Input circuit breaker(MCCB) for protection of the UPS and cables are field supplied and field installed. (See WARNING 4 in section 1.0).**

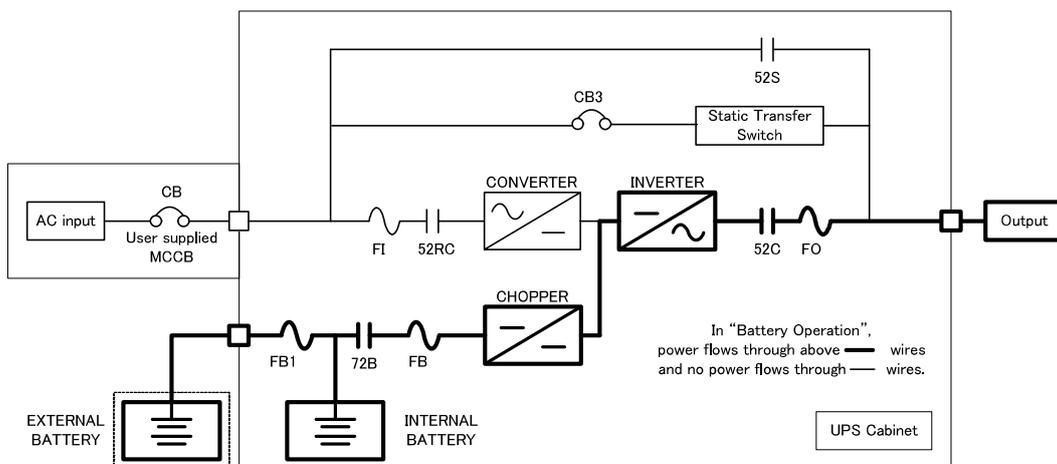
**FIGURE 1.2** Single Line Diagram - Bypass Operation. Load Fed Through the Bypass Line.



Referring to Figure 1.2, the internal bypass line is a hard-wired line through 52S which supplies the critical load with unconditioned input power. Upon switching to the internal bypass line, the static transfer switch line through CB3 supplies the power immediately, and then the internal bypass line through 52S supplies the power. In the event the unit must switch to the internal bypass line, the power to the critical load will be uninterrupted. The purpose of this 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.

**FIGURE 1.3** Single Line Diagram - Battery Operation

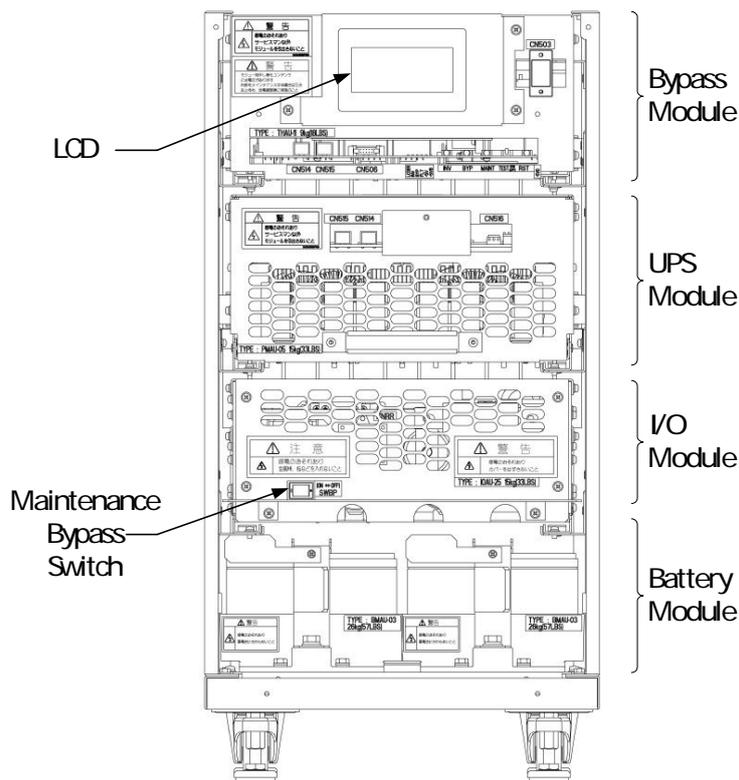


Referring to Figure 1.3, if the input power is interrupted, the batteries will immediately supply the DC power required by the Inverter to maintain continuous AC power to the load. Fully charged batteries will provide power for the specified time at the rated load, or longer at reduced load.

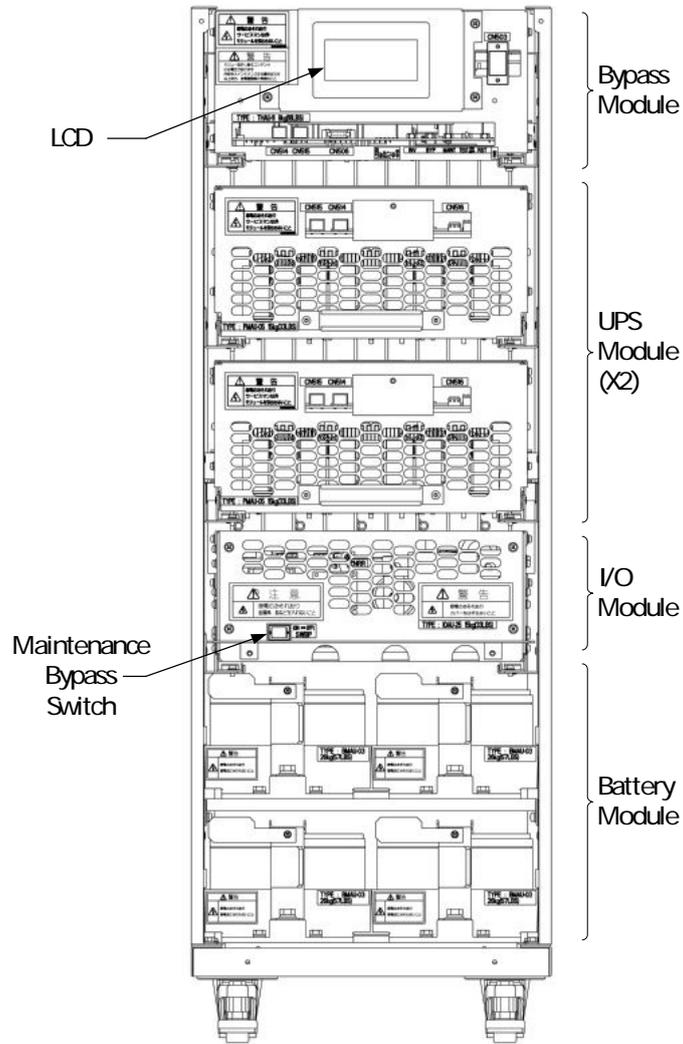
When power is restored after a low battery shutdown, the Converter automatically restarts operation, recharges the batteries and the Inverter is automatically restarted without operator intervention. The load is assumed by the inverter automatically without operator intervention.

In the event of a power failure, the Converter will de-energize and the batteries will discharge into the Inverter and maintain power to the critical load until 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 simultaneously recharge the batteries. Figure 1.3 illustrates the flow diagram during battery operation.

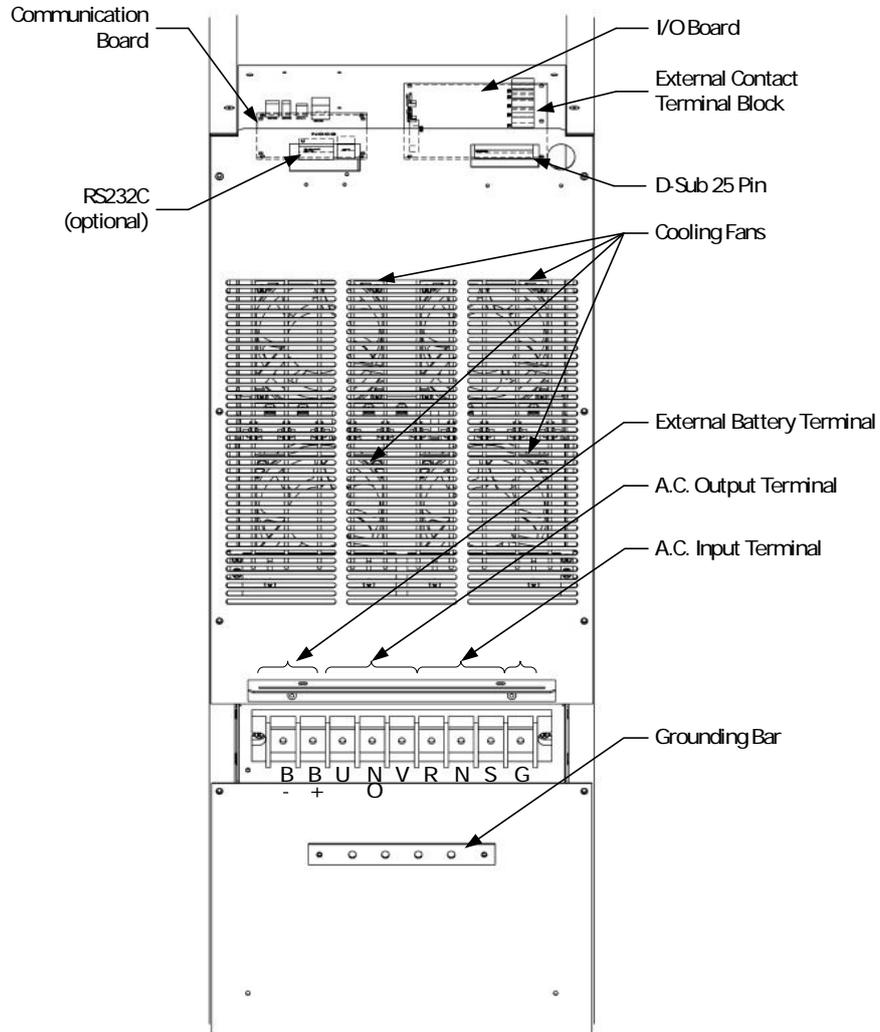
**FIGURE 1.4 UPS Parts Location Front View (6kVA)**



**FIGURE 1.5** UPS Parts Location Front View (8,10, and 12kVA)



**FIGURE 1.6 UPS Parts Location Rear View**



**Description of UPS parts, referred to in Figure 1.4 to Figure 1.6:**

- 1. Maintenance Bypass Switch (FOR SERVICE PERSONNEL ONLY)**  
This switch is used to force the load to transfer from inverter power to the bypass line. Do not operate it under normal operation.
  
- 2. External Battery terminal (FOR SERVICE PERSONNEL ONLY)**  
Terminal block to connect the external battery cabinet.
  
- 3. Field Wire Terminal Block (FOR SERVICE PERSONNEL ONLY)**  
Refer to Figure 3.3 and Figure 3.4 for details
  
- 4. Grounding Bar**
  
- 5. RS232C connector**  
Refer to Figure 2.17 for detail.
  
- 6. D-Sub 25 Pin connector**  
Refer to Table 2.1 and Figure 2.18 for detail.
  
- 7. External Contact Signal Terminal Block**  
Terminal block to connect contact signal input/output lines to and from external dry contacts. Refer to Figure 2.19 for details.

## 1.4 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	Output voltage
	1 phase 3 wire or 2 phase 3 wire	1 phase 3 wire or 2 phase 3 wire
6kVA / 4.2kW	240/120, 208/120	240/120, 208/120
8kVA / 5.6kW	240/120, 208/120	240/120, 208/120
10kVA / 7.0kW	240/120, 208/120	240/120, 208/120
12kVA / 8.4kW	240/120, 208/120	240/120, 208/120

**TABLE 1.4** UPS Information

UPS (kVA)	CABLE ENTRY	WIDTH (in/mm)	DEPTH (in/mm)	HEIGHT (in/mm)	WEIGHT* (lb./kg)	HEAT LOSS @ 208V (kBTU/h)
6	REAR	13.8 / 350	29.9 / 760	27.8 / 705	298/135	1.5
8	REAR	13.8 / 350	29.9 / 760	40.6 / 1030	496/225	1.9
10	REAR	13.8 / 350	29.9 / 760	40.6 / 1030	496/225	2.4
12	REAR	13.8 / 350	29.9 / 760	40.6 / 1030	496/225	2.9

\* Including batteries

**TABLE 1.5** Rating of Contactors and Fuses

Component(s)	Description	Component Rating @ 208V, 3 phase, 60 Hz			
		UPS Rating	6 kVA	8 kVA	10 kVA
52RC	Relay	31A	31A	31A	31A
52C	Relay	31A	31A	31A	31A
72B	DC Input Contactor	60A	60A	60A	60A
FIR, FIS	AC Input Fuse	60A/660V	60A/660V	60A/660V	60A/660V
FOU, FOV	Inverter Output Fuse	60A/660V	60A/660V	60A/660V	60A/660V
FDP, FDN	Fuse	60A/660V	60A/660V	60A/660V	60A/660V
FBP, FBN	DC Input Fuse	60A/660V	60A/660V	60A/660V	60A/660V
FB1	DC Input Fuse	80A/500Vdc	80A/500Vdc	80A/500Vdc	80A/500Vdc
CB3	Contactor	60A	60A	60A	60A
52S	Bypass Contactor	60A	100A	100A	100A

**TABLE 1.6** Detail of Specifications

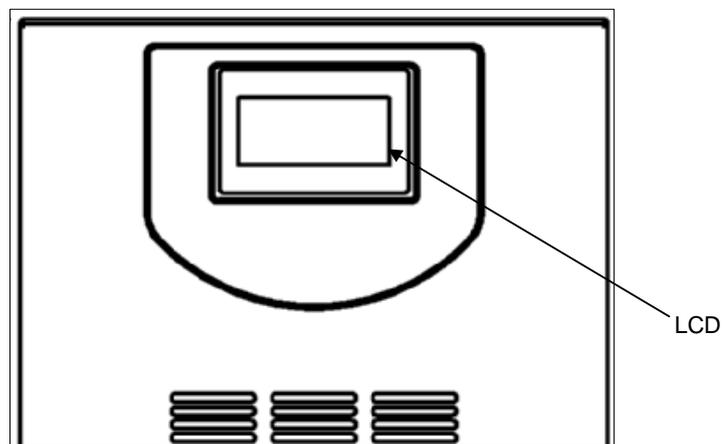
Rated Output kVA	6	8	10	12
Rated Output kW	4.2	5.6	7.0	8.4
<b>AC INPUT CHARACTERISTICS</b>				
Configuration	1 phase 3 wire or 2 phase 3 wire			
Voltage	240/120V (1 phase), 208/120V (2 phase)			
Frequency	50 / 60 Hz +/-5%			
Reflected Current THD	4% typ. at 100% load; 7% typ. at 50% load			
<b>BATTERY</b>				
Type	VRLA			
Backup Time	10 minutes			
Nominal Voltage	216 Vdc			
Minimum Voltage	173 Vdc			
Number of Cells	108			
<b>AC OUTPUT</b>				
Configuration	1 phase 3 wire or 2 phase 3 wire			
Voltage	240/120V (1 phase), 208/120V (2 phase)			
Voltage Stability	+/-2% steady state			
Frequency	50 / 60 Hz			
Frequency Stability	+/-0.05% in free running mode			
Power Factor	0.7 nominal			
Power Factor range	0.7 ~ 1.0 lagging (within output kW rating)			
Voltage THD	2.5% typical THD at 100% Linear Load 5% typical THD at 100% non-linear load			
Transient Response	+/-5% typical at 100% load step +/-5% typical at loss/return of AC power +/-5% typical at load transfer to/from static bypass			
Transient Recovery	50 ms			
Voltage Unbalance	2% typical at 100% unbalanced load			
Phase Displacement	1deg. typical at 100% load			
Inverter Overload	150% for 1 minute			
System Overload	150% for 1 minute, 1000% for 1 cycle			
Crest Factor Capabilities	3:1			
<b>ENVIRONMENTAL</b>				
Cooling	Forced Air			
Operating Temperature	32°F ~ 104°F (0°C ~ 40°C). Recommended 59°F ~ 77°F (15°C ~ 25°C)			
Relative Humidity	30% ~ 90% Non Condensing			
Altitude	0 ~ 3300 feet No Derating			
Location	Temperature-controlled, indoor area free of conductive contaminants			

## 2.0 OPERATOR CONTROLS AND INDICATORS

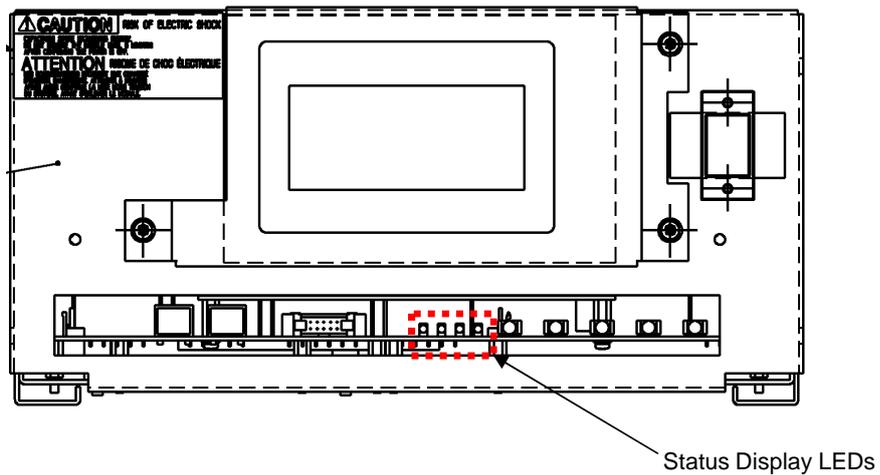
The 7011B Series operator controls and indicators are located as follows:

Maintenance Bypass Switch and Contactors	: Inside the unit
Touch Panel (LCD)	: Door exterior
UPS Status Indicators (LED)	: Bypass Module

**FIGURE 2.1** Operation/Display Panel (Front Panel)



**Figure 2.2** Bypass Module LED Section (Cover Removed)



## 2.1 STATUS INDICATORS

- 1) **Load on inverter [INV] (green)**  
Illuminated when power is supplied from inverter to the critical load.
- 2) **Load on bypass [BYP] (yellow)**  
Illuminated when power is supplied to load devices by the bypass line.
- 3) **Fault (red)**  
Illuminated when UPS is in fault mode, input abnormal, or overload. Light flashes for minor failure, stays illuminated for major failure.
- 4) **LCD Error (yellow)**  
Flashes when there is a display communication error.
- 5) **Conversion Module Error (red and green)**  
Illuminated when there is a communication error between conversion modules.

## 2.2 Liquid Crystal Display (LCD)

FIGURE 2.3 LCD Touch Panel Display During Normal Operation



The Liquid Crystal Display (LCD) touch panel indicates how the power is being supplied to the load, measured values, 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 a 3 minute period. The LCD is turned back on by touching the screen.

**Main:** Selecting "Main" will display the UPS system's power supply state.

**Measure:** Selecting "Measure" will display the measurements of internal electronics.

**Log:** Selecting "Log" will display the history of the UPS system's operations.

**Setup:** Selecting "Setup" will display the items which settings can be adjusted.

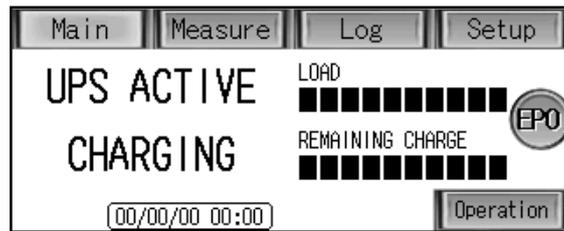
**Operation:** Selecting "Operation" will show the current operation and operation switching options.

**Main Screen**

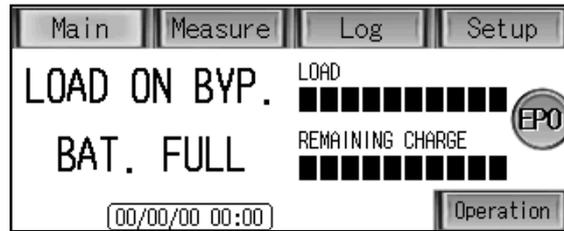
Select "Main" and the following screens will appear. On these screens the UPS system's current status can be confirmed. The first item on the main screen shows the status of the power supply. When the main screen shows "UPS ACTIVE" the UPS is supplying power to the load through the inverter. When the main screen shows "LOAD ON BYP." the bypass line is supplying power to the load.

The second item shows the status of the batteries. The battery status can read BAT. FULL, DISCHARGE, CHARGING, or STOP. "BAT. FULL" and "STOP" show the level of the batteries charge at full capacity or out of charge, respectively. "DISCHARGING" and "CHARGING" indicate whether the batteries are supplying power to the inverter, or are being charged by the converter.

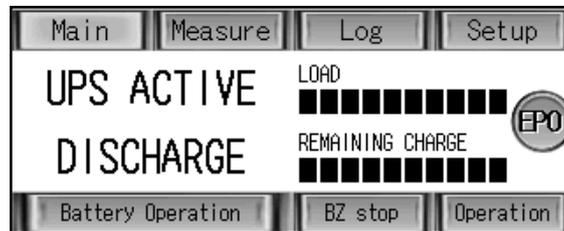
**Figure 2.4** Main Screen UPS Inverter Supplying Power (AC Operation)



**Figure 2.5** Main Screen Bypass Supplying Power



**Figure 2.6** Main Screen UPS Batteries Supplying Power (DC Operation)

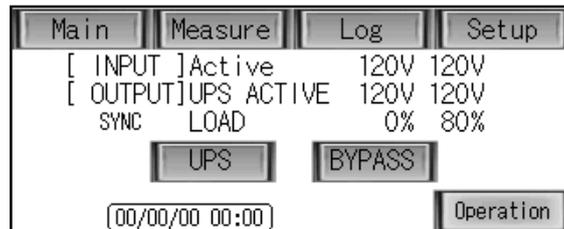


**Operation Screen**

Select "Operation" and the following screen will appear, which shows the summary of the UPS system's current operation. Select "BYPASS" while the UPS is supplying power, and the unit will switch to bypass mode and power will be supplied to the load

through the bypass line. Select "UPS" while the bypass line is supplying power, and the unit will switch to supplying power through the inverter.

**Figure 2.7** Operation Screen UPS Supplying Power



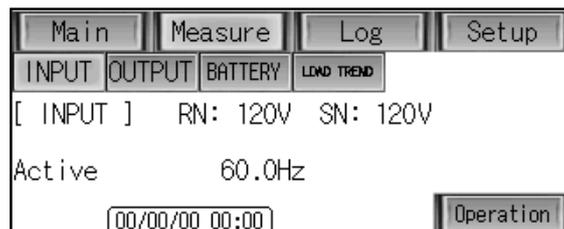
The operation screen will show the input as "ACTIVE" or "UNDER VOLT." (under voltage). This indicates whether the AC input is supplying enough power to the UPS. When the input reads "UNDER VOLT." The UPS will use the batteries to continue supplying the necessary power to the load. If the batteries do not have enough charge, the UPS will switch to bypass mode.

The output will be shown as "UPS ACTIVE," "LOAD ON BYPASS" or "OUTPUT STOP" indicating whether the load is supplied through the inverter, the bypass line, or if no power is being supplied to the load.

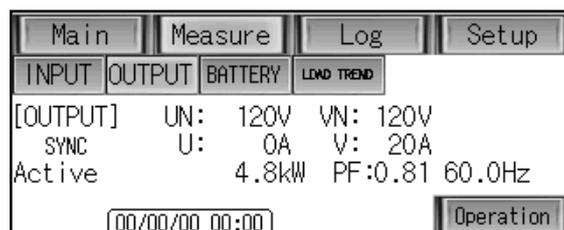
**Measurement Screen**

Select "Measure" to view various measurements from the electrical equipment inside the UPS. On the measurement screen the operator can monitor input power, output power, battery charge, and the load percentage over the past twenty four hours.

**Figure 2.8** Input Power Measurement Screen



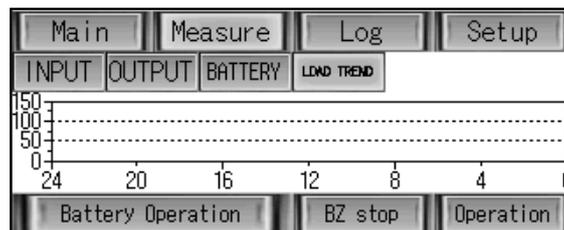
**Figure 2.9** Output Power Measurement Screen



**Figure 2.10** Battery Status Screen



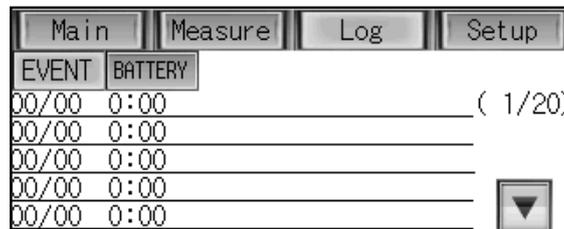
**Figure 2.11** Load Trend Screen



**Log Screen**

Select "Log" to see the history of the last 100 changes in status of the UPS system. This screen also allows the operator to view the battery storage history.

**Figure 2.12** Event Log Screen



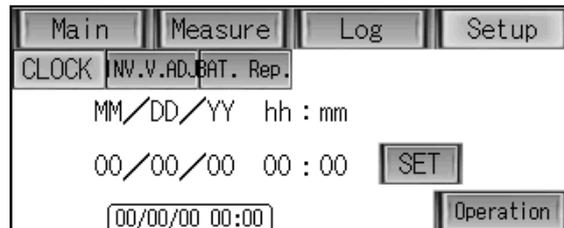
**Figure 2.13** Battery Log Screen



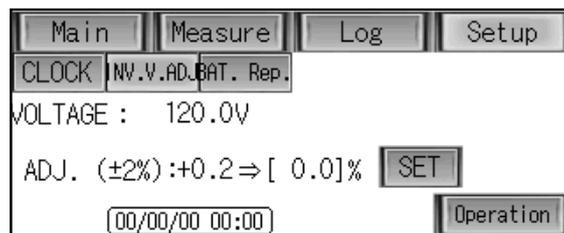
**Setup Screen**

Select "Setup" to see the UPS system's configuration settings. On this screen you can adjust the date and time, the inverter output voltage, and the battery replacement date.

**Figure 2.14** Time Setting Screen



**Figure 2.15** Inverter Output Voltage Adjustment Screen



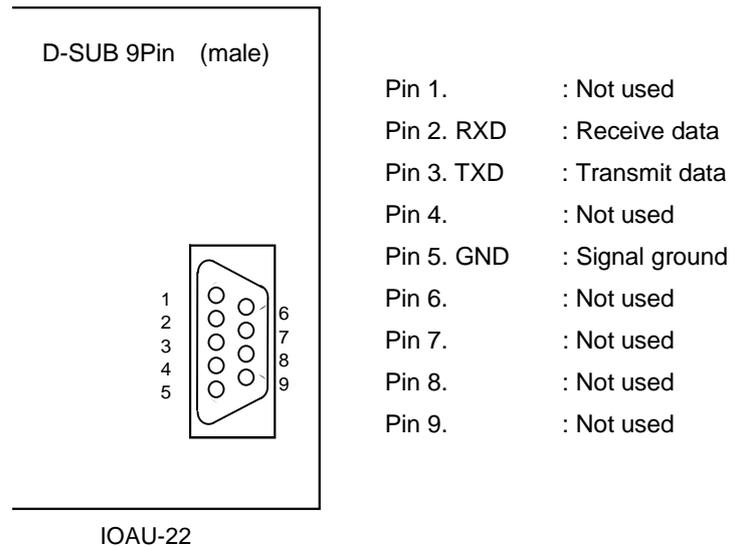
**Figure 2.16** Battery Replacement Date Screen



### 2.3 RS232C CONNECTORS (External communication connector)

This is an RS232C port for the “Diamond-Link”\* monitoring software. The layout of the connector is shown in Figure 2.17. Connections not to exceed NEC Class 2.

**FIGURE 2.17 RS-232C Connectors**



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

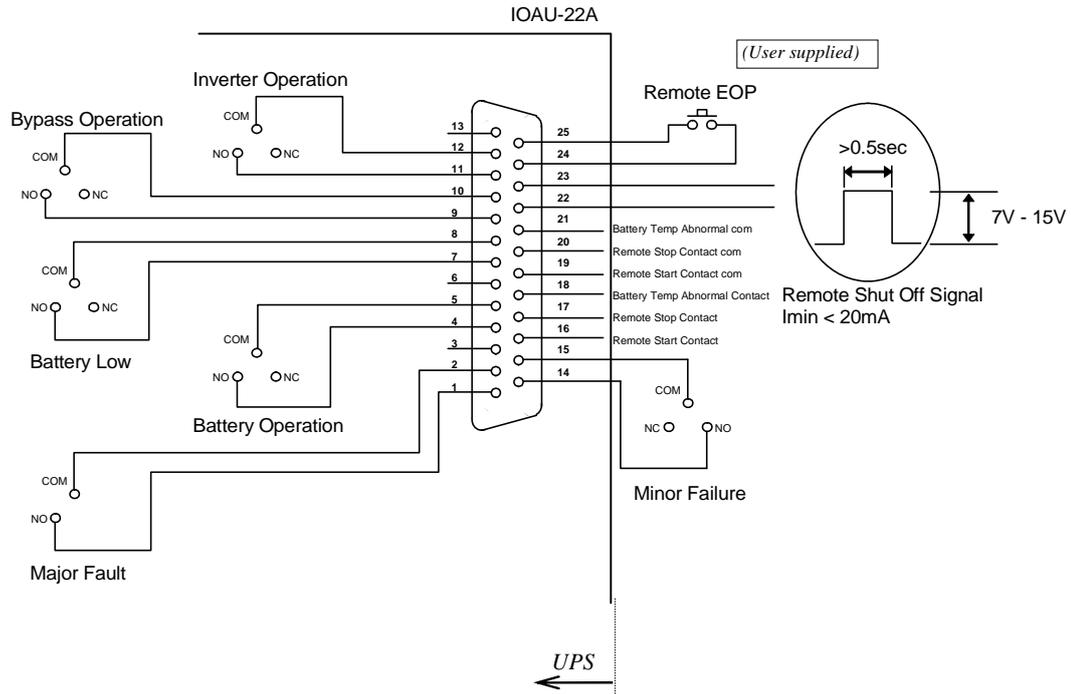
**2.4 D-SUB 25 PIN CONNECTORS**

Uses dry contact on/off to express NORMAL, FAULT, ON BATTERY, BATTERY LOW, ON BYPASS, ON INVERTER status. Connections not to exceed NEC Class 2.

**TABLE 2.1 D-Sub 25 Pin Connectors**

Pin No.	Signal	I/O	Pin No.	Signal	I/O
1	Failure A Contact	Output	14	Minor Failure Contact	Output
2	Failure A Contact com	Output	15	Minor Failure Contact com	Output
3	-	-	16	Remote Start Contact	Input
4	Battery Operation A Contact	Output	17	Remote Stop Contact	Input
5	Battery Operation com	Output	18	Battery Temp Abnormal Contact	Input
6	-	-	19	Remote Start Contact com	Input
7	Battery Low Voltage A Contact	Output	20	Remote Stop Contact com	Input
8	Battery Low Voltage A Contact com	Output	21	Battery Temp Abnormal com	Input
9	Bypass Operation A Contact	Output	22	Shut Off	Input
10	Bypass Operation A Contact com	Output	23	Shut Off common	Input
11	Inverter Operation A Contact	Output	24	RE-EPO	Input
12	Inverter Operation A Contact com	Output	25	RE-EPO common	Input
13	-	-			

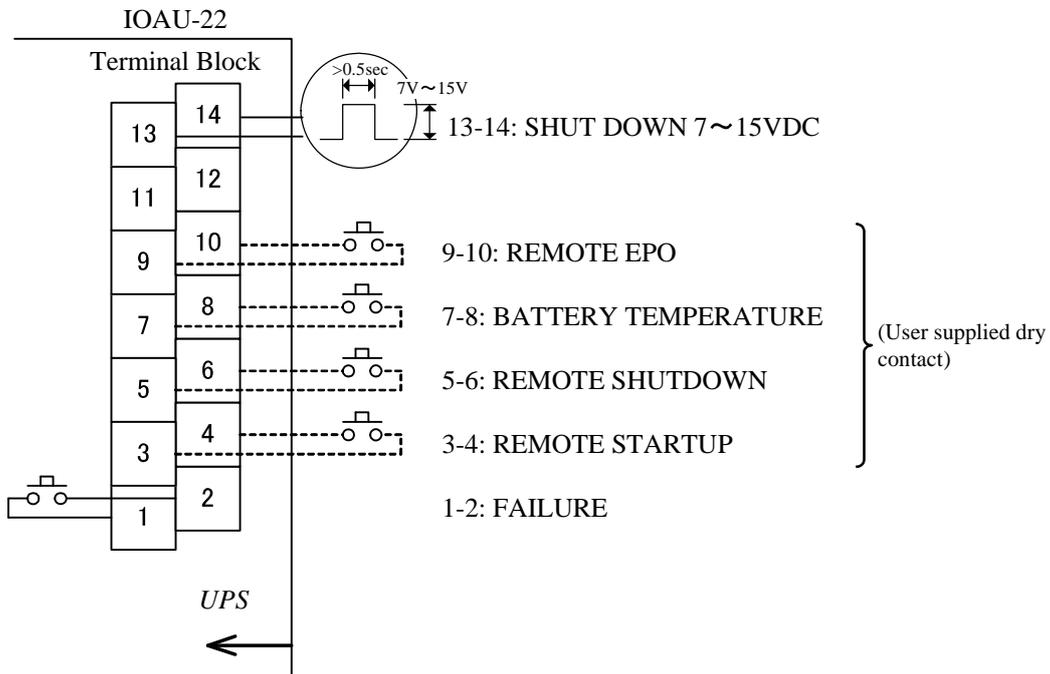
**FIGURE 2.18 D-sub 25 Pin Connectors**



**2.5 EXTERNAL SIGNAL TERMINAL BLOCK (Option)**

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. A functional description of the input/output port is presented below. Layout of terminals is shown in Figure 2.19. Connections not to exceed NEC Class 2.

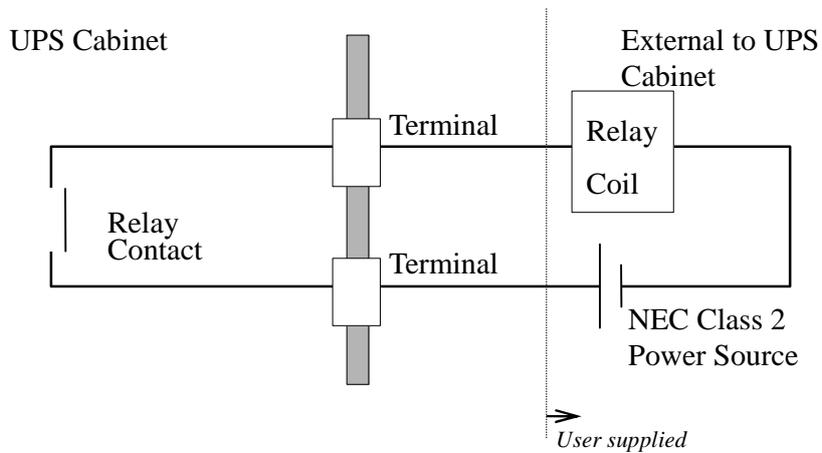
**FIGURE 2.19** External Signal Terminal Block (NEC Class2)



**A) Output Contacts(for external alarm annunciation)**

Output contacts consist of form "A" dry type contacts. Rated capacity of all output contacts is 30Vdc/1Adc. Operate all dry contacts at their rated values or lower. Figure 2.20 illustrates typical installation. The external relay can also be a lamp, LED, computer, etc.

**FIGURE 2.20** Control Wiring for External Contacts



**NOTE:** *The UPS is equipped with a selectable output contact feature. The above alarms are the default settings. Contact **MITSUBISHI ELECTRIC POWER PRODUCTS, INC.** for setup information.*

**B) Input Contacts(for remote access of UPS)**

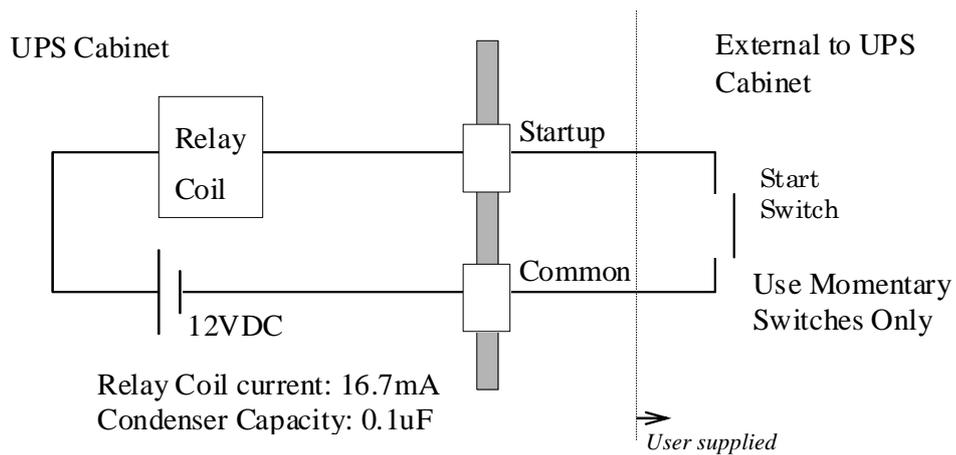
External contacts are provided by the user of the UPS system. Terminal voltage at the UPS is 12Vdc. Provide external dry contact accordingly.



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

Refer to Figure 2.21 for typical wiring configuration. Although this figure applies to the RE-STARTUP terminals, the same wiring arrangement is used for RE-EPO; RE-SHUTDOWN, Battery temperature.

**FIGURE 2.21** Remote "Startup" Contact Connections



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

### 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.

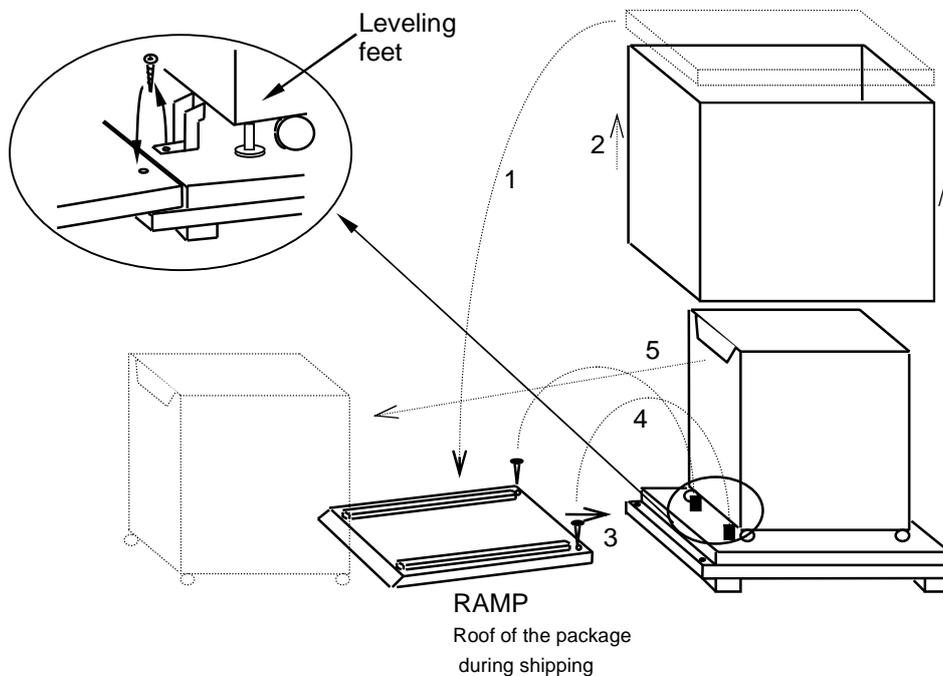


**NOTE:** Do not transport in a horizontal position. Cabinets should be maintained upright within +/- 15° of the vertical during handling.

#### 3.2 HANDLING

The UPS is shipped in export packaging. Remove the UPS from the package only when it is ready for installation. Refer to Figure 3.1 for handling.

**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:

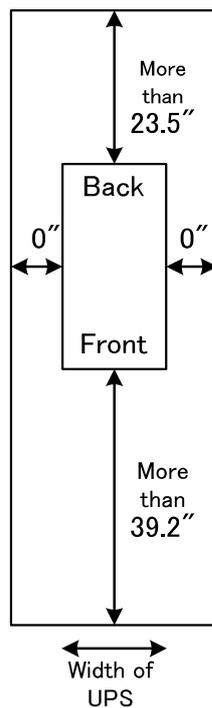
**TABLE 3.2** List of UPS Weights (lb.)

UPS Capacity (kVA)	6	8	10	12
Weight (lb.)	298	496	496	496

#### B) Minimum clearance required for ventilation and maintenance

The unit shall be installed with the ventilation and maintenance space shown in Figure 3.2. There shall also be 23.5" of clearance space above the top of the unit.

**FIGURE 3.2** Clearance for Ventilation and Maintenance



When ambient temperature is 25 °C (77 °F), expected battery life is 4.5~5.0 years. Expected battery life will be shorter if the ambient temperature is higher.

**3.4 PROCEDURE FOR CABLE CONNECTION** (Refer to Table 3.2 for cable sizes.)

- 1) Confirm the capacity of the UPS being installed. Identify the field terminal blocks as shown in Figure 3.3-Figure 3.6.
- 2) Referring to Figure 3.5-Figure 3.6., connect the grounding conductors from the input service entrance to the UPS ground bar.
- 3) Confirm that an external input circuit breaker sized to protect both the rectifier input and the bypass lines is installed. Consult equipment nameplate for current ratings.
- 4) Connect the AC power source cables from the input service entrance to the UPS INPUT power terminals identified as R, N, and S in Figure 3.3-Figure 3.6. Input cables must be sized for an ampere rating larger than the maximum current capacity of the UPS. Refer to Table 3.3 for recommended cable sizes.
- 5) Refer to Table 3.3 for recommended cable sizes. Referring to Figure 3.3-Figure 3.6, connect UPS OUTPUT load terminals U, NO, and V to load distribution panel.
- 6) UPS equipment does not employ AC output overcurrent protection or disconnection devices and must be provided at installation.
- 7) UPS equipment does not employ DC input overcurrent protection or disconnection devices and must be provided at installation.
- 8) Connect external signal terminal block as needed. Refer to section 2.5 and Figure 2.18 for functional description. 12 AWG or less, shielded conductor is recommended.
- 9) Connect internal battery connector(s).



**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. 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 Side *1		Output Side *1	
	Cable Size	Torque (in. lbs)	Cable Size	Torque (in. lbs)
6kVA (208V)	10 AWG *2 or larger	80 in. lbs	10 AWG *2 or larger	80 in. lbs
8kVA (208V)	8 AWG *2 or larger	80 in. lbs	8 AWG *2 or larger	80 in. lbs
10kVA (208V)	6 AWG *2 or larger	80 in. lbs	6 AWG *2 or larger	80 in. lbs
12kVA (208V)	6 AWG *2 or larger	80 in. lbs	6 AWG *2 or larger	80 in. lbs

\*1 - Voltage drop across power cables not to exceed 3% of nominal source voltage.

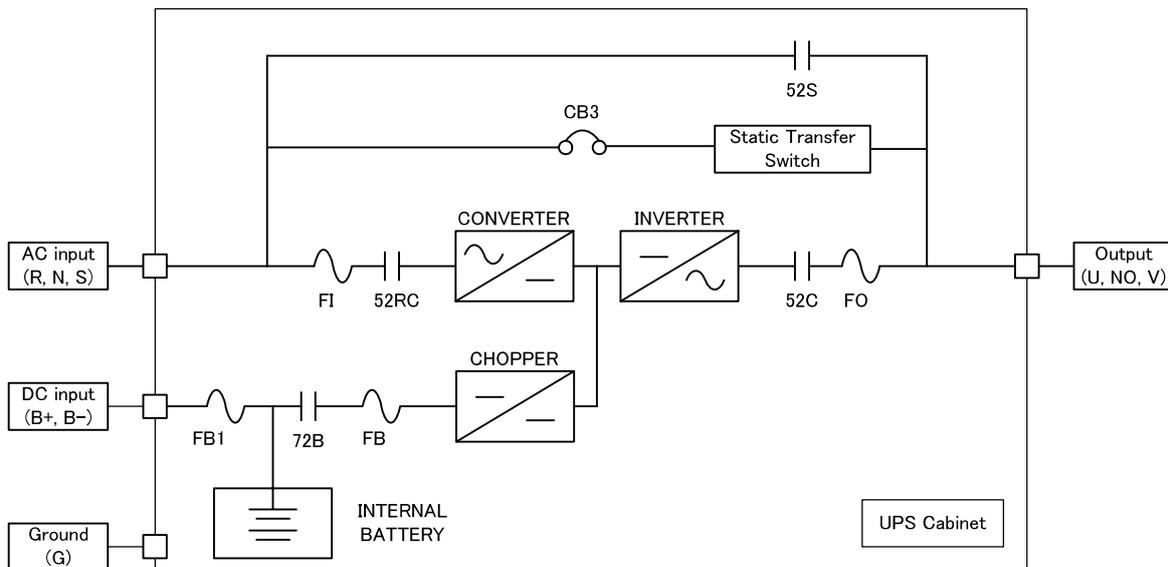
\*2 - Allowable ampere ratings based on 90 °C insulation at an ambient temperature of 40 °C.  
No more than 3 conductors in a raceway without de-rating. Use copper conductors rated 90°C.

**TABLE 3.4** Crimp Type Compression Lug

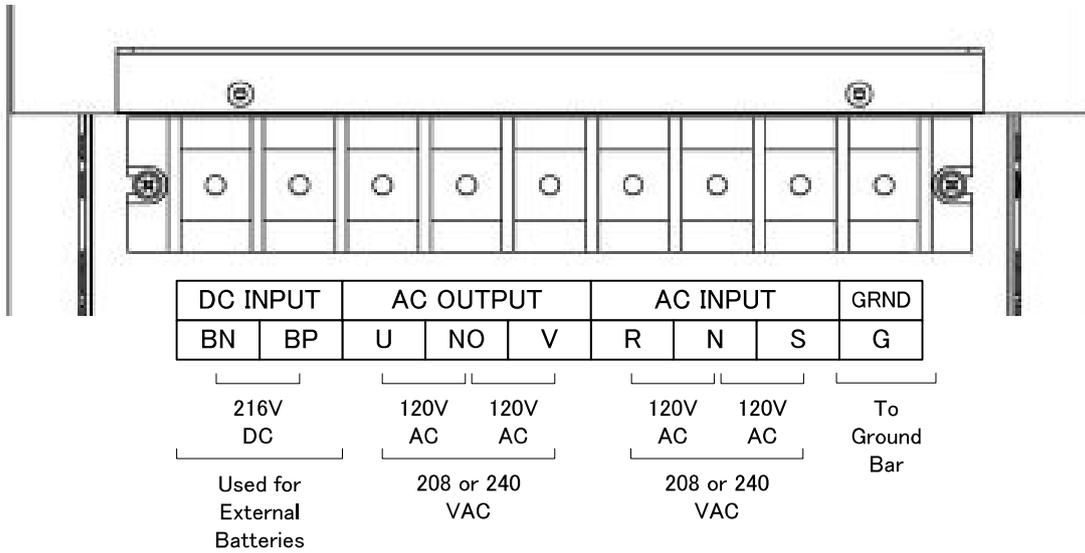
Wire Size (Code)	Wire Strand Class	Recommendation		Crimp tool required BUNRNDY type Y35 or Y46	
		Vendor	Cat. No.	Color key	Die index
10	B	BURNDY	YAV10 T3BOX	-	-
8	B	BURNDY	YA8C-L1 BOX	RED	49
6	B	BURNDY	YA6C-L BOX	BLUE	7 / 374



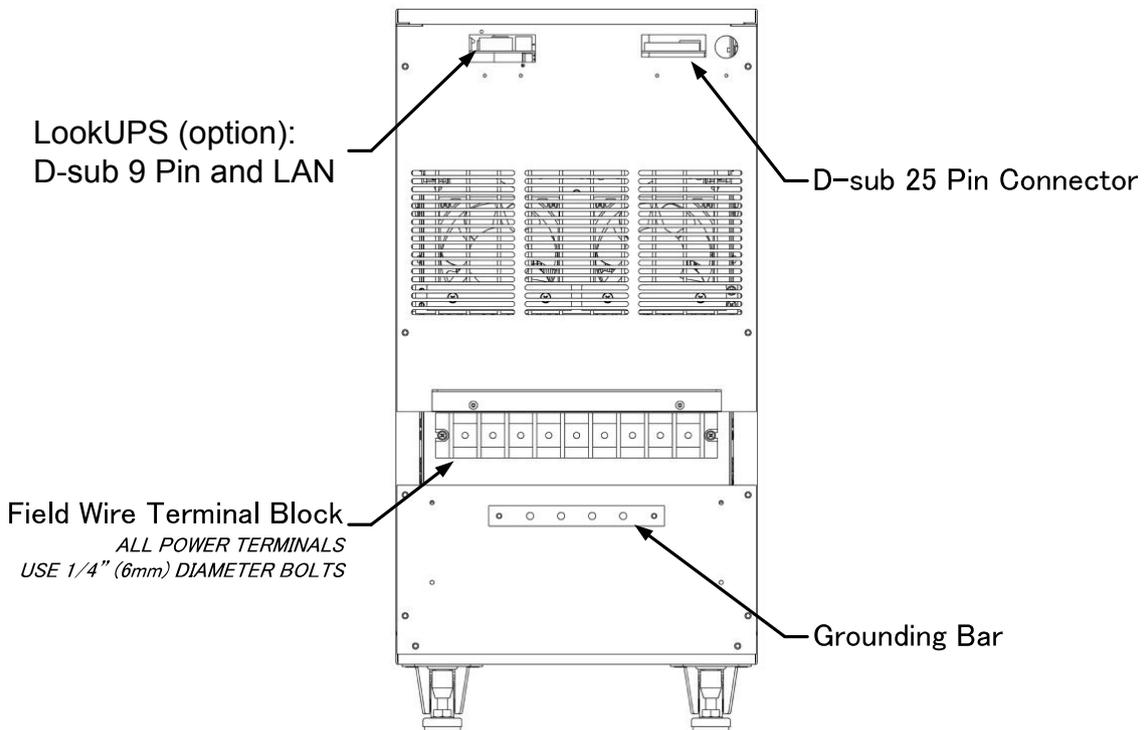
**NOTE:** When using crimp type lugs, the lugs should be crimped to the specifications given in the manufacturer's instructions for both crimp tool and lug.

**FIGURE 3.3** UPS Terminal Designation


**FIGURE 3.4 Terminal Block**



**FIGURE 3.5 Input / Output Power Terminals (6kVA) (Rear View)**



**FIGURE 3.6** Input / Output Power Terminals (8,10 and 12kVA) (Rear View)

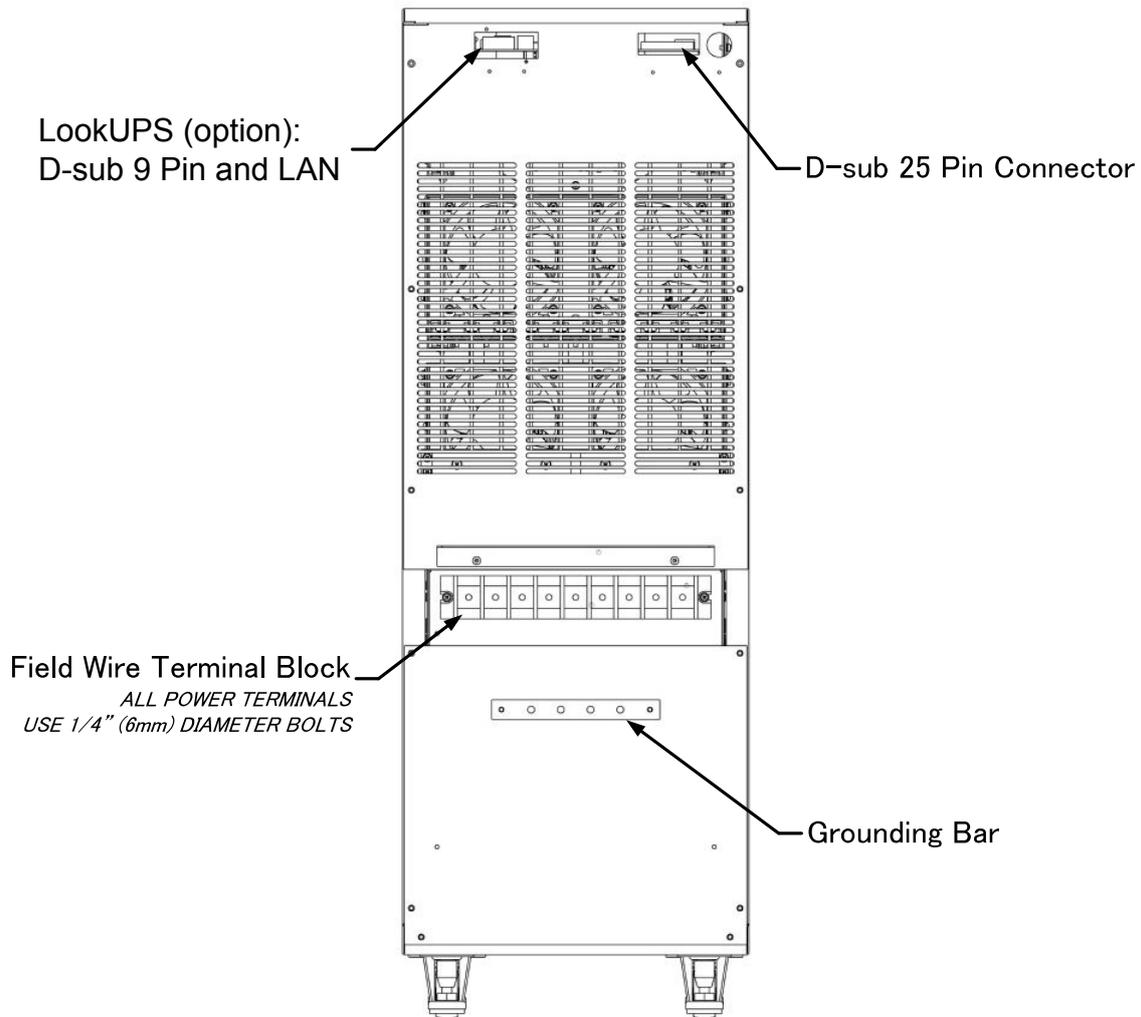




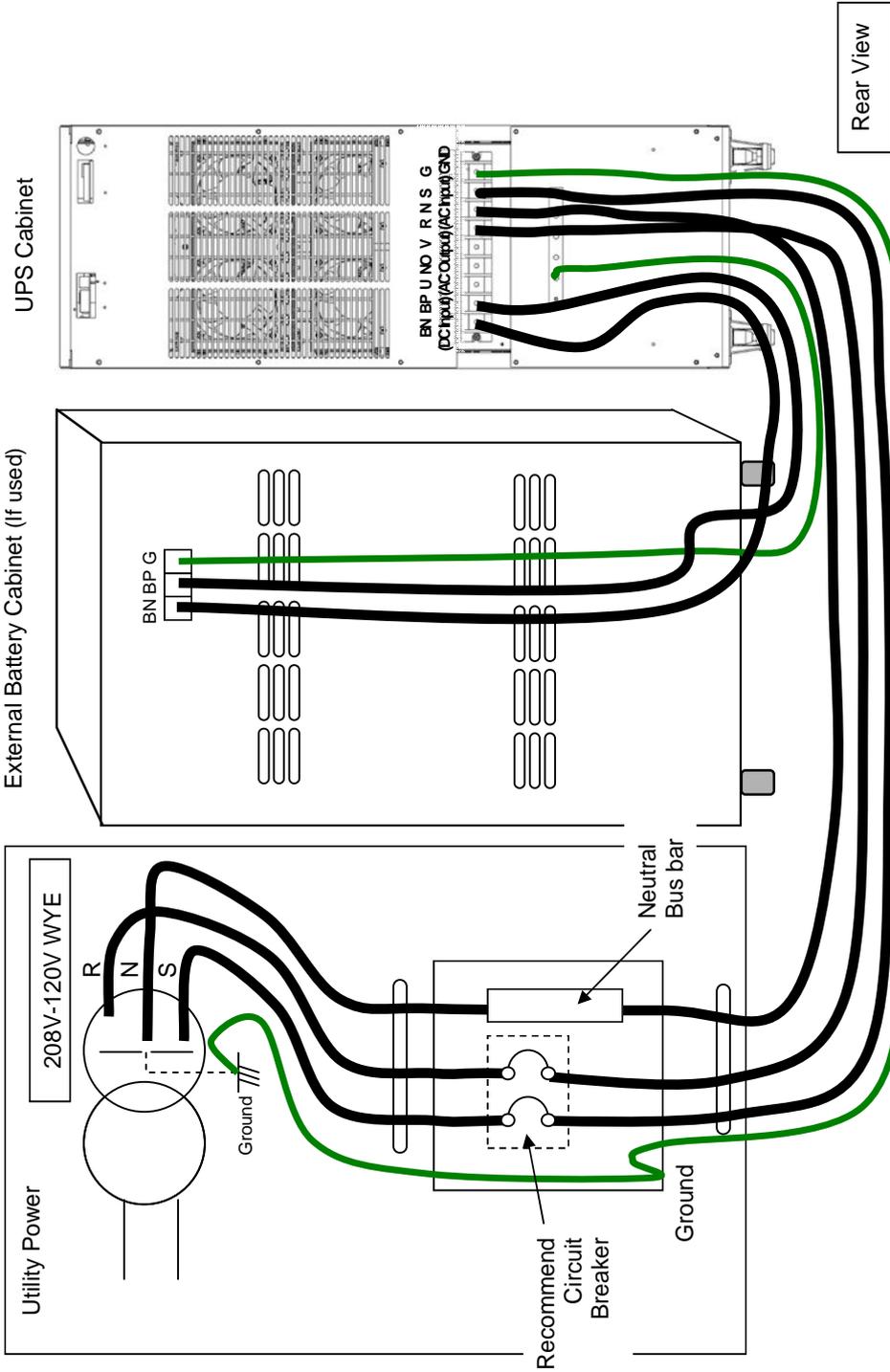
FIGURE 3.7 Field Wire Connection (208V – 120V WYE, 2 phase, 3wire)

**NOTE:** *Proper phase rotation must be observed when connecting input wires to R and S.*



If code 803 occurs  
See next page.

\*1



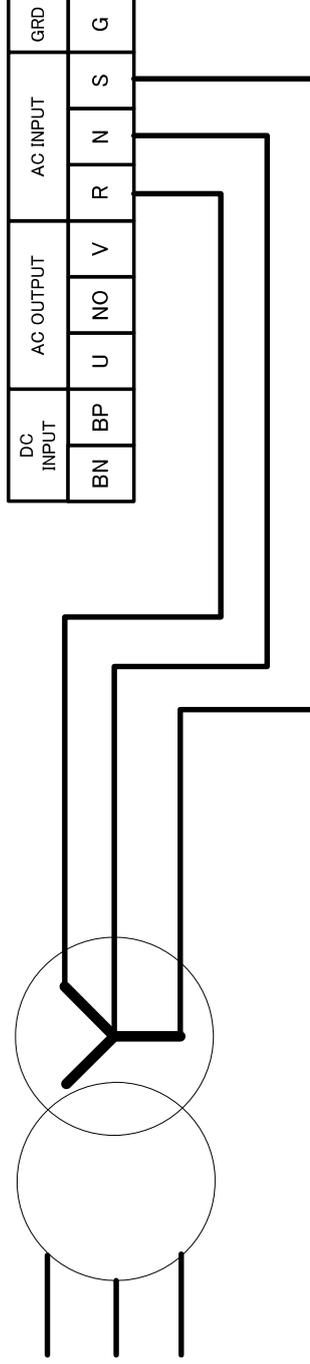
\*1 : Please refer to the page Number 3-10

Wire Connection (208V – 120V WYE, 2 phase, 3wire)

**UPS Must have Clockwise Phase Rotation if Error code 803 occurs, swap R and S. (see figure 3.8)**

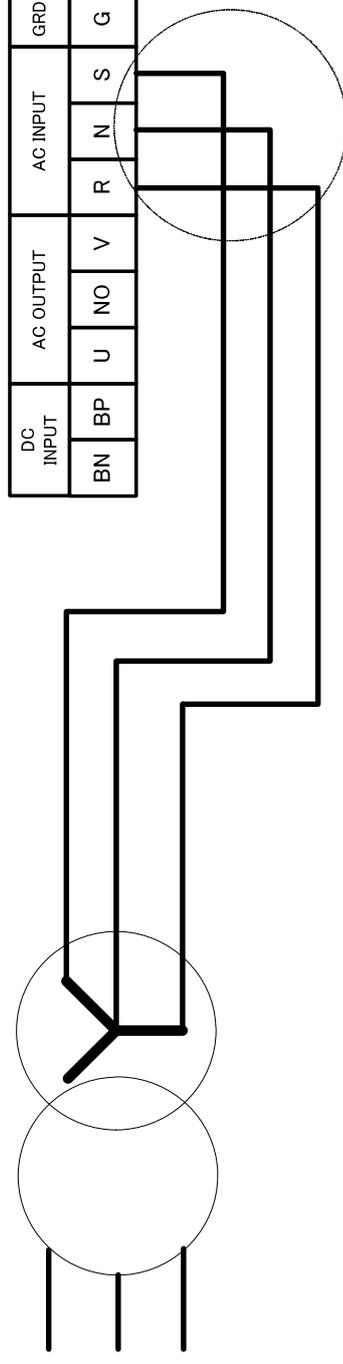
**Figure 3.8** UPS Wire Connection Error Code 803

*Correct connection*

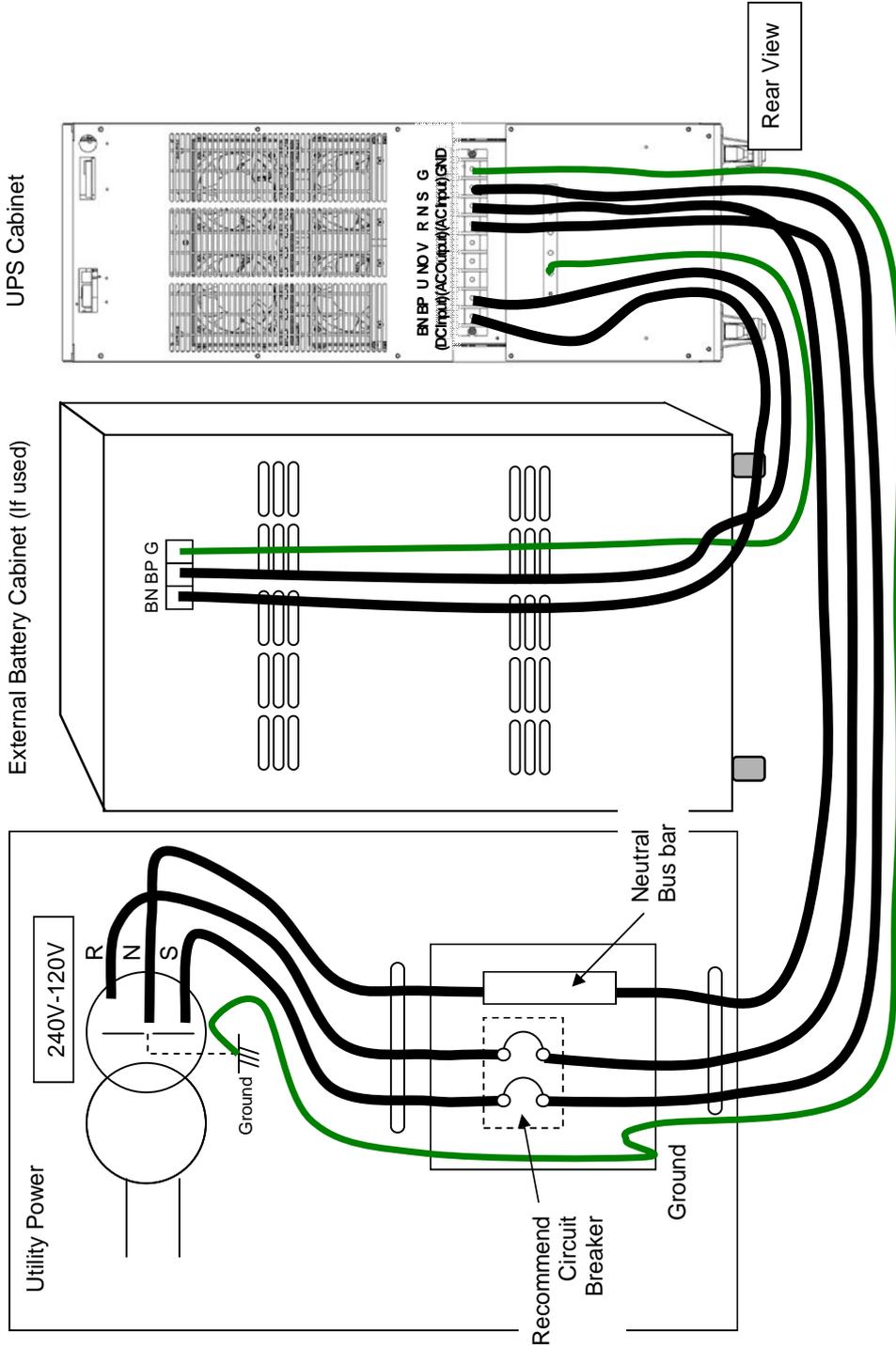


*Incorrect connection*

-> Code 803 Displayed on LCD when UPS powered up.



**FIGURE 3.9** Field Wire Connection (240V – 120V, 1 phase, 3wire) \*1



\*1: Please refer to the page 3-10

### 3.5 INSTALLATION PROCEDURE FOR BATTERY

Installation procedures of the batteries are shown on the next page.

Please refer to the following when installing and maintaining batteries:



1. Servicing of batteries should be performed or supervised by personnel knowledgeable of batteries and the required precautions. Keep unauthorized personnel away from batteries.
2. When installing or replacing batteries, install or replace with the same number and type per Table 3.5.

**TABLE 3.5** Type and Number of Battery

	Type	Manufacturer	Number
6kVA	HF7-12	Hitachi Chemical	18
6kVA	HRL1234W	HCEN (Tentative)	18
8,10 and 12kVA	HF7-12	Hitachi Chemical	36
8,10 and 12kVA	HRL1234W	HCEN (Tentative)	36



**CAUTION** - Do not dispose of battery or batteries in a fire. The battery may explode.

**CAUTION** - Do not open or mutilate the battery or batteries. Released electrolyte is harmful to the skin and eyes and may be toxic.

**CAUTION** - A battery can present a risk of electrical shock and high short circuit current. The following precautions should be observed when working on batteries:

- Remove watches, rings, or other metal objects.
- Use tools with insulated handles.
- Wear rubber gloves and boots.
- Do not lay tools or metal parts on top of batteries.
- Disconnect charging source prior to connecting or disconnecting battery terminals.

### 3.5.1 PROCEDURE FOR EXTERNAL BATTERY CONNECTION (OPTIONAL)

1. Installation procedure

Please refer to **figures 3.4, 3.5, 3.6, 3.7 and 3.9** for connecting terminals.

Must connect external battery before internal battery is connected.

2. Set-up procedure

Please confirm the capacity "Ah (ampere hour) " of the external battery cabinet.

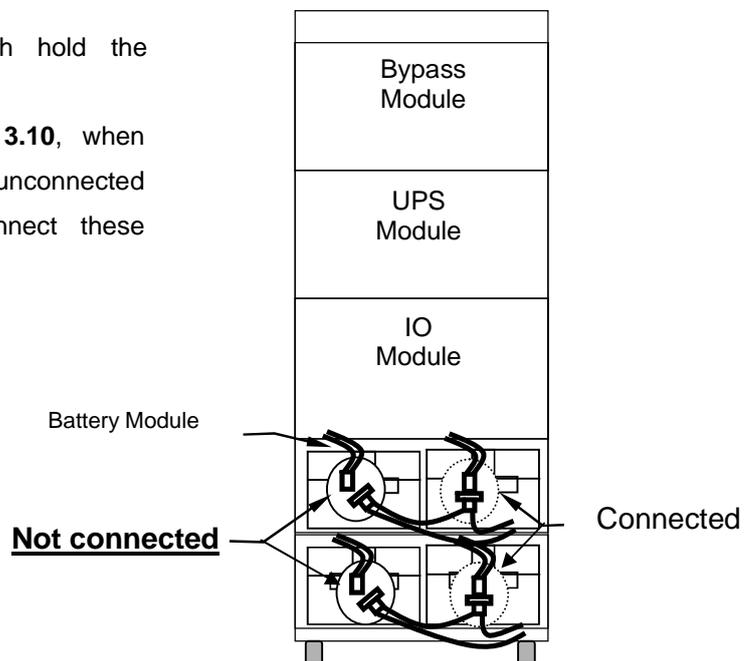
### 3.5.2 PROCEDURE FOR INTERNAL BATTERY CONNECTION

Procedures for battery connection are as follows.

Please note, these procedures **must be performed after** the external cables are connected. For procedures for external cable connection, please refer to “**3.4 PROCEDURE FOR CABLE CONNECTIONS**”.

**FIGURE 3.10** Battery Connection when shipped

1. Remove the straps, which hold the batteries.
2. As shown in the **Figure 3.10**, when shipped, there are unconnected connectors for safety. Connect these unconnected connectors.



For your safety, one side of the connectors is not connected when shipped. Connection of the battery module connectors may apply voltage to B+ / B- connectors on the Field Wire Terminal Block on the rear side of the UPS.

**Please be sure to connect the external cables before connecting the battery connectors.**

### 3.6 OPERATING PROCEDURES

#### A) UPS Startup Procedure

1. Confirm that the Load is turned off.
2. Confirm the batteries are connected in accordance with the battery connection procedures.
3. Confirm the AC Output and the Maintenance Bypass Breakers (both user supplied) are open (off).
4. Manually close the AC Input Breaker (user supplied).
5. Bypass contactor 52S will automatically close. (After an emergency stop the LCD will prompt the user to confirm closing 52S)
6. Manually close the AC Output Breaker (user supplied). UPS is supplying bypass power.
7. Input contactor 52RC will automatically close and the converter will start.
8. DC contactor 72B will automatically close and the batteries will begin pre-charging.
9. On the LCD select "Operation."
10. On the operation screen select "UPS."
11. The inverter will automatically start, output contactor 52C will automatically close and bypass contactor 52S will automatically open. The UPS is supplying power to the load.

#### B) Bypass Operation Procedure

1. In order to switch to bypass operation the bypass line must be in sync with the inverter.
2. Select "Operation" on the main screen of the LCD.
3. Select "Bypass" on the LCD's operation screen.
4. Bypass contactor 52S will automatically close, output contactor 52C will automatically open.
5. The inverter will automatically turn off. The bypass line is supplying the load.



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

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

6. If turning off all power to the critical load is desired, open the AC Input Circuit Breaker (User supplied.).



**CAUTION:** *In bypass mode, all UPS power terminals are still alive. Lethal voltages are present. De-energize all external sources of AC and DC power before handling UPS.*

### C) UPS Shutdown Procedure

1. Confirm that the load is turned off.
2. Manually open the AC Output Breaker (user supplied).
3. Select "Operation" on the main screen of the UPS.
4. On the operation screen, select "Bypass."
5. Bypass contactor 52S will automatically close, output contactor 52C will automatically open.
6. The inverter will automatically turn off, the unit is now in normal stop. The converter continues to charge the batteries. For full shutdown follow the steps below.



**WARNING:** *With this operation, although all output power from the UPS is shutdown, it is necessary to manually open the input circuit breaker (user supplied), to remove the input power to the UPS*

7. Confirm that the AC Output and Maintenance Bypass Breakers (both user supplied) are open.
8. Manually open the AC Input Breaker (user supplied).
9. Input contactor 52RC will automatically open, the converter will automatically turn off, DC contactor 72B will automatically open.
10. Full stop operation complete.

#### 4.0 RESPONSE TO UPS FAILURE

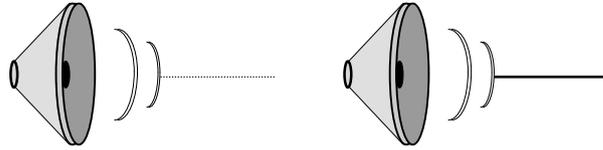
UPS FAULT

Alarm Silence

Recording of Fault

Primary Action

Information to Service Center



On the main screen of the LCD, select "BZstop" to silence the alarm.

Select "LOG" on the LCD. Record fault code on a piece of paper. Refer to the list of fault codes for a description of the error. See section 6 For fault codes

Take necessary action per the list of fault codes in section 6 of this manual.

If Service is needed contact the Authorized Mitsubishi Service Representative or call Mitsubishi at:

**1-800-887-7830.**



#### NOTE

*The error code indicated on the LCD 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 Electric Power Products, Inc. or its authorized service representatives on all issues regarding the replacement of parts.

### A) Battery

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

Replace battery if its capacity is within this percentage.

### B) UPS Component Parts

Contact Mitsubishi Electric Power Products, Inc. or its authorized service representatives for a complete parts replacement schedule. Recommended replacement time interval varies with operating environment.

Contact Mitsubishi Electric Power Products, Inc. or its authorized service representatives for application specific recommendations.

## 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 LCD.



*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 Failure Code List**

Failure Code	Status	Guidance	Note 1 Level	Note 2 Failure LED	Note 3 Buzzer	Note 4 Event Log
003	Pre-charge abnormal	Call service engineer	Major	Lit On	[2]	[3]
061	Converter1 Control Abnormal	Call service engineer	Minor	Flicker	[1]	[3]
062	Converter2 Control Abnormal	Call service engineer	Minor	Flicker	[1]	[3]
102	DC Overvoltage	Call service engineer	Major	Lit On	[2]	[3]
103	DC Undervoltage	Call service engineer	Major	Lit On	[2]	[3]
104	Discharge Fault	Call service engineer	Minor	Flicker	[1]	[3]
109	DC Voltage Unbalance	Call service engineer	Major	Lit On	[2]	[3]
112	DC Voltage Sudden Change	Call service engineer	Major	Lit On	[2]	[3]
151	Battery Float Voltage Abnormal	Call service engineer	Minor	Flicker	[1]	[4]
154	72B Abnormal	Call service engineer	Minor	Flicker	[1]	[3]
156	Battery Temperature Abnormal (72B OFF)	Call service engineer	Minor	Flicker	[1]	[3]
157	Battery Temperature Abnormal	Check battery	Minor	Flicker	[1]	[4]
161	Float Voltage Abnormal (72B OFF)	Check battery	Minor	Flicker	[1]	[3]
162	Battery Circuit Abnormal	Call service engineer	Minor	Flicker	[1]	[3]
163	Battery Voltage Abnormal	Call service engineer	Minor	Flicker	[1]	[3]
171	Battery Lifespan Notice	Information	Minor	Flicker	[1]	-
172	Battery End of Life	Information	Minor	Flicker	[1]	-
173	Disconnect Batteries End of Life	Information	Minor	Flicker	[1]	-
181	Module 1 Chopper Control Abnormal	Call service engineer	Minor	Flicker	[1]	-
182	Module 2 Chopper Control Abnormal	Call service engineer	Minor	Flicker	[1]	-
191	Module 1 DC Overvoltage	Call service engineer	Minor	Flicker	[1]	-
192	Module 2 DC Overvoltage	Call service engineer	Minor	Flicker	[1]	-
201	Output Overvoltage	Call service engineer	Major	Lit On	[2]	[3]
202	Output Undervoltage	Call service engineer	Major	Lit On	[2]	[3]
218	Inverter Voltage DC Component Increase	Call service engineer	Major	Lit On	[2]	[3]
230	Load Current Connector Abnormal	Call service engineer	Major	Lit On	[2]	-
254	Bypass Voltage Alignment Abnormal	Call service engineer	Minor	Flicker	[1]	-
256	Inverter Output Voltage Abnormal	Call service engineer	Minor	Flicker	[1]	[3]
258	Load Abnormal (overload switching)	Call service engineer	Minor	Flicker	[1]	[3]
261	Inverter1 Control Abnormal	Call service engineer	Minor	Flicker	[1]	[3]
262	Inverter2 Control Abnormal	Call service engineer	Minor	Flicker	[1]	[3]
271	Inverter1 Overcurrent	Call service engineer	Minor	Flicker	[1]	[3]
272	Inverter2 Overcurrent	Call service engineer	Minor	Flicker	[1]	[3]
281	Unit1 Heat Sink Temperature Abnormal	Call service engineer	Minor	Flicker	[1]	[3]
282	Unit2 Heat Sink Temperature Abnormal	Call service engineer	Minor	Flicker	[1]	[3]
301	Control Circuit Error	Call service engineer	Major	Lit On	[2]	[3]
302	Control Circuit Error	Call service engineer	Major	Lit On	[2]	[3]
303	Control Circuit Error	Call service engineer	Major	Lit On	[2]	[3]
305	Control Circuit Error (clock)	Call service engineer	Major	Lit On	[2]	[3]

Failure Code	Status	Guidance	Note 1 Level	Note 2 Failure LED	Note 3 Buzzer	Note 4 Event Log
306	Control Circuit Power Supply Abnormal	Call service engineer	Major	Lit On	[2]	[4]
323	Conversion Module Serial Communication Error	Call service engineer	Major	Lit On	[2]	[3]
349	Major Fault in All Conversion Modules	Call service engineer	Major	Lit On	[2]	-
351	Equipment Lifespan Notice	Information	Minor	Flicker	[1]	-
352	Bypass Switching Power Supply Abnormal	Call service engineer	Minor	Flicker	[1]	-
371	Conversion Module Serial Communication Error	Call service engineer	Minor	Flicker	[1]	[3]
372	Control Circuit Error	Call service engineer	Minor	Flicker	[1]	[3]
401	52S Abnormal	Call service engineer	Major	Lit On	[2]	[3]
402	52S Abnormal	Call service engineer	Major	Lit On	[2]	[3]
451	52S Abnormal	Call service engineer	Minor	Flicker	[1]	[3]
455	Bypass Circuit Abnormal	Call service engineer	Minor	Flicker	[1]	[3]
552	Simulated Failure	-	Major	Lit On	[2]	-
801	AC Input Voltage Out of Range	Check Input Power Source	Alarm	Flicker	[1]	[4]
802	AC Input Frequency Out of Range	Check Input Power Source	Alarm	-	[1]	[4]
803	AC Input Phase Rotation Error	Swap R and S	Alarm	Lit On	[2]	[3]
806	Inverter Overload	Warning: Decrease Load	Alarm	Flicker	[1]	[4]
807	Inverter Overload	Warning: Decrease Load	Alarm	Flicker	[1]	[4]
808	Overload Warning	Warning: Decrease Load	Alarm	Flicker	[1]	[4]
809	OverKW Warning	Warning: Decrease Load	Alarm	Flicker	[1]	[4]
810	Instant Overload	Warning: Decrease Load	Alarm	-	[1]	[3]
812	Input Voltage Abnormal	Check Bypass Input	Alarm	-	[1]	-
814	Input Frequency Abnormal	Check Bypass Input	Alarm	Flicker	[1]	[4]
817	Emergency Stop Activated	-	Alarm	Flicker	[2]	[3]
831	Emergency Bypass Switch Activated	Call service engineer	Alarm	-	[1]	-
834	Battery Depleted	-	Alarm	Flicker	-	[3]
835	Battery Depletion Warning	Reduce load	Alarm	Flicker	-	-
840	Shutdown Complete (Battery charging - terminal block)	-	Alarm	-	-	-
841	Shutdown Complete (Battery charging - RS-232C)	-	Alarm	-	-	-
845	Serial Communication Path Abnormal	Call service engineer	Alarm	-	[1]	-
860	Remote Start/Stop Abnormal	Call service engineer	Alarm	-	[1]	-
861	INV/BYP SEN1 abnormal	Call service engineer	Alarm	-	[1]	-

**Note 1) Level**

"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.

**Note 2) Failure LED**

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

**Note 3) Buzzer (Audible annunciator)**

[1]:Intermittent Sound [2]:Continuous Sound

**Note 4) Event log: In case of major failures, log 10 items after the failure.**

[3]: Log time and item name at time of fault. In some cases, it isn't logged.

[4]: Log time and item name at time of fault and clear.

## 7.0 WARRANTY INFORMATION

### Important Warranty Information

- For customers purchasing a new Uninterruptible Power Supply (UPS) directly from Mitsubishi Electric Power Products, Inc., the Limited Warranty of your Uninterruptible Power Supply (UPS) was provided to you at the time of sale.
- For customers purchasing a new Uninterruptible Power Supply (UPS) from a Reseller, the Limited Warranty of your Uninterruptible Power Supply (UPS) was provided to the Reseller at the time of sale. Please contact Mitsubishi Electric Power Products Inc. immediately if formal documentation of the warranty transfer was not provided to you.
- To ensure prompt support please update your Product Registration information [www.mitsubishicritical.com/registration](http://www.mitsubishicritical.com/registration) at completion of startup and whenever the registered contacts responsible for your UPS change.
- Additional copies of our Limited Warranty and your Product Registration are available upon request at [www.mitsubishicritical.com/registration](http://www.mitsubishicritical.com/registration) or calling 1-800-887-7830 or 1-724-772-2555.

## **8.0 MAINTENANCE CONTRACTS**

For information on maintenance contracts and other service offerings, please visit [www.mitsubishicritical.com/services](http://www.mitsubishicritical.com/services).

