

MITSUBISHI ELECTRIC AUTOMATION, INC.

UNINTERRUPTIBLE POWER SUPPLY SYSTEM

9700 SERIES

OWNERS / TECHNICAL MANUAL
(100 - 225kVA)

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INTRODUCTION

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

IMPORTANT SAFETY INSTRUCTIONS SAVE THESE INSTRUCTIONS

This manual contains important instructions for the 9700 Series Uninterruptible Power Supply Systems that should be followed during installation and maintenance of the UPS and batteries.

WARNING 1

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

WARNING 2

This UPS does not include a Bypass Input circuit breaker (MCCB). The Bypass Input contactor (CB3) does not protect against load induced short circuits. The bypass input circuit breaker (MCCB) is field supplied and installed. Breaker(MCCB)'s Specifications are as follows:

| Capacity (kVA) | Bypass Voltage (VAC) | Maximum Bypass Rating (AAC) | Recommended Breaker (A) |
|----------------|----------------------|-----------------------------|-------------------------|
| 100 | 208 | 278 | 350 |
| 100 | 480 | 120 | 150 |
| 100 | 600 | 96 | 100 |
| 150 | 208 | 416 | 500 |
| 150 | 480 | 180 | 225 |
| 150 | 600 | 144 | 150 |
| 225 | 208 | 625 | 700 |
| 225 | 480 | 271 | 300 |
| 225 | 600 | 217 | 225 |
| 300 | 480 | 361 | 400 |
| 300 | 600 | 289 | 300 |
| 375 | 480 | 451 | 500 |
| 375 | 600 | 361 | 400 |

WARNING 2

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| 150 | 480 | 180 | 225 |
| 150 | 600 | 144 | 150 |
| 225 | 208 | 625 | 700 |
| 225 | 480 | 271 | 300 |
| 225 | 600 | 217 | 225 |
| 300 | 480 | 361 | 400 |
| 300 | 600 | 289 | 300 |
| 375 | 480 | 451 | 500 |
| 375 | 600 | 361 | 400 |

1.0 GENERAL

The Mitsubishi 9700 Series UPS is designed to provide continuous, clean electrical power to your critical load and to monitor power conditions affecting that load. In the event of an input power failure, the UPS will supply power to the critical load for the specified battery time.

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

The 9700 Series UPS is available in five kVA sizes-100, 150, 225, 300, 375kVA. Specifications for each kVA model appear in Section 1.3. The principles of operation described herein are applicable to all models.

This manual provides an overview of the 9700 Series components and their functions. It describes the appearance and purpose of operator controls and indicators. It contains procedures for operation, start-up, shutdown, and basic maintenance.

1.1 Definitions

UNINTERRUPTIBLE POWER SUPPLY SYSTEM (UPS) - All components within the UPS Module Cabinet includes the 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, the Inverter, the Static Transfer Switch, the Internal Bypass line, the operator controls, and the internal control system required to provide specified AC power to a load.

UPS MODULE - The 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 UPS module cannot supply continuous power.

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

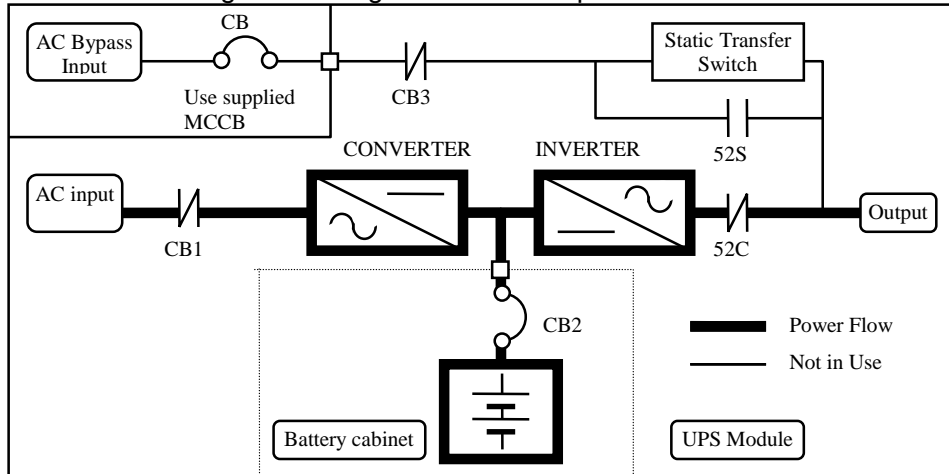
INPUT POWER - Power provided by the electrical utility company, or auxiliary generator, which is connected to the UPS for supplying the critical load.

1.2 Overview

The UPS provides two power paths between the utility source and the critical load as shown in figures 1.1 and 1.2.

A) Through the UPS Module (FIGURE 1.1)

FIGURE 1.1 Single Line Diagram - Normal Operation



When the load is on the Inverter, the internal control system determines which of the two paths supplies power to the load. During normal operation, the path through the UPS module is used.

Input AC power flows through the UPS where it is converted to DC by the Converter / Charger. This 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.

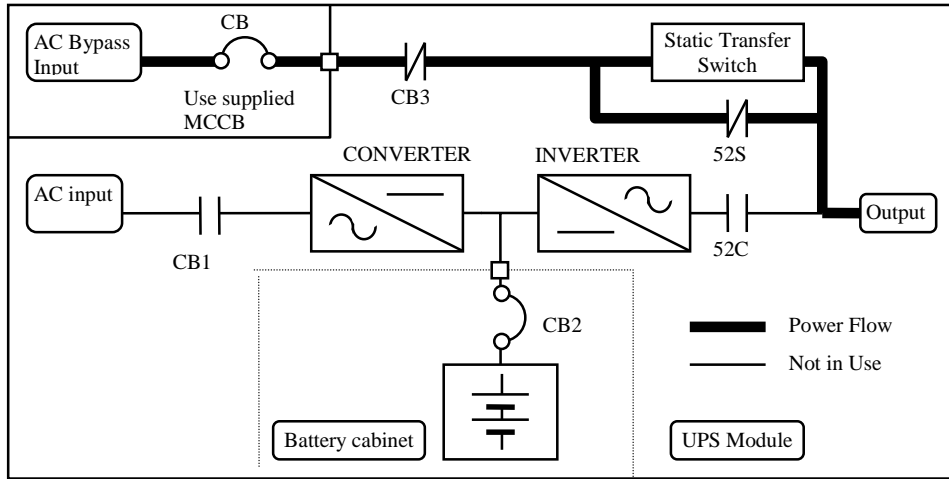
The conversion - inversion process eliminates any voltage transients or fluctuations existing in the input power before it reaches the critical load.

* The Bypass Input circuit breaker (MCCB) for protection of the UPS and cables is field supplied and field installed. (See WARNING 2 on page iv)

B) Internal Static Bypass Line (FIGURE 1.2)

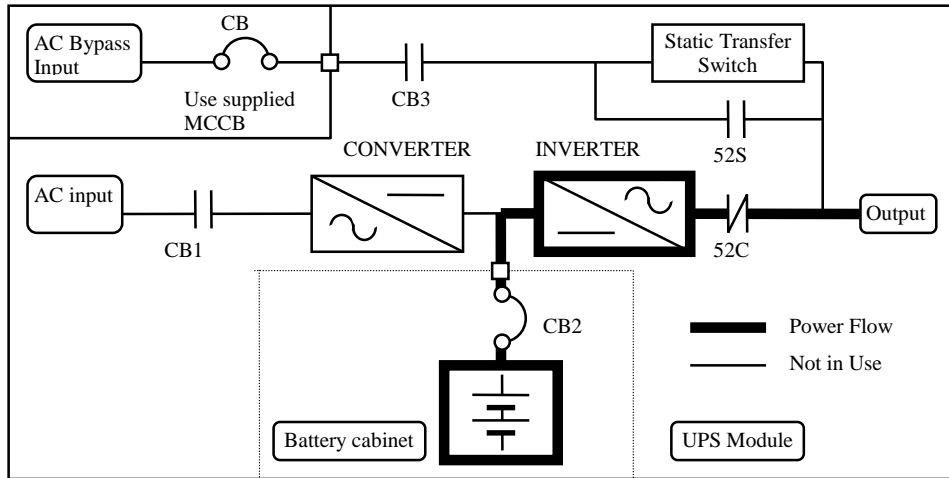
The Internal Static Bypass line is a Hard wired line through CB3, contactor 52S which supplies the critical load with unconditioned input power. The purpose of this line is to route power to the critical load while the UPS module is de-energized during Start-up before the system is fully operational.

FIGURE 1.2 Single Line Diagram- Bypass Operation



C) Inverter supply at battery operation (FIGURE 1.3)

FIGURE 1.3 Single Line Diagram - Battery Operation



If the input power is interrupted, the battery will immediately supply the DC power required by the Inverter to maintain continuous AC power to the load. A fully charged battery will provide power for the specified time at the rated load, or longer, at a reduced load.

When power is restored after a low battery shutdown, the 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 rectifier will de-energize and the batteries will discharge into the inverter and maintain power to the critical until a) the battery capacity expires and the inverter turns off, or b) input power is restored after which the converter will power the critical load and simultaneously recharge the batteries. Figure 1.3 illustrates the flow diagram during battery operation.

FIGURE 1.4-a UPS Parts Location (100kVA)
UPS module
FRONT VIEW

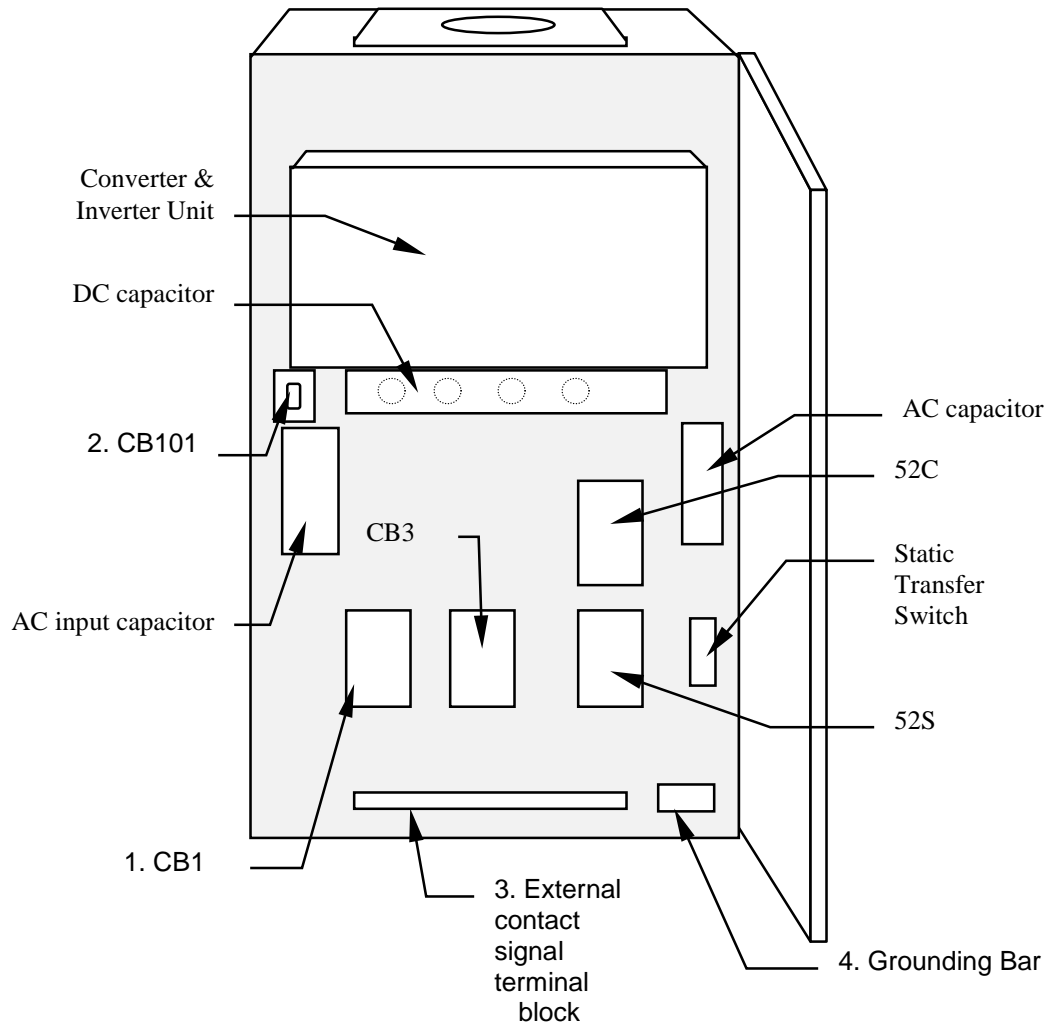
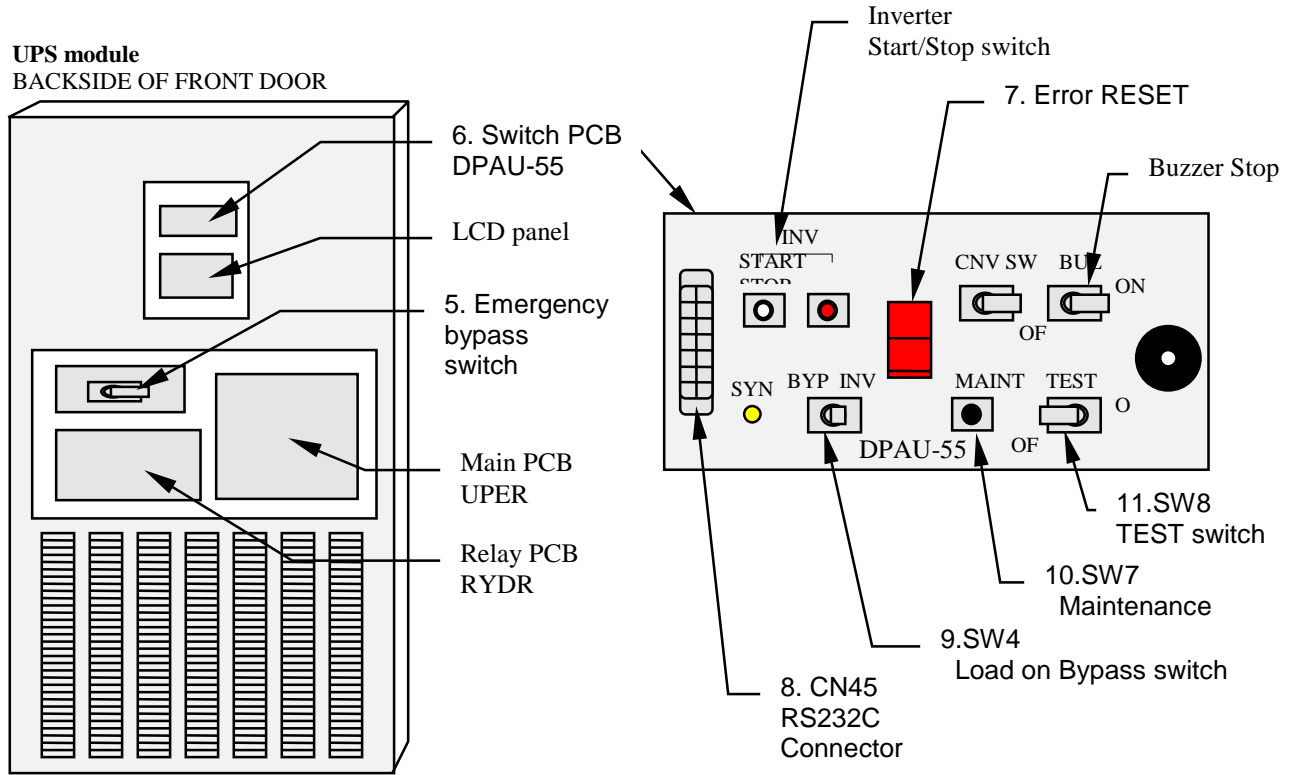


FIGURE 1.4-b UPS Parts Location (Continued)



Description of Figure 1.4:

1. **AC Input circuit breaker (CB1)** Circuit breaker for converter input power .
2. **Control Power circuit breaker(CB101)**
3. **External contact signal terminal block** Terminal block to connect contact signal input/output lines to and from the external devices. Refer to FIGURE 2.4 for details.
4. **Grounding bar (E)**
5. **Emergency bypass switch.** This switch activates bypass power supply for emergency reasons if the UPS is turned off. Normal position is "TRANSFER is PERFORMED"
6. **Switches on the DPAU-54(PCB) (FOR SERVICE PERSONNEL ONLY)**
Normally the customers do not have to operate those switches.
 - SW4 (Load on Bypass switch) (9)
 - SW3 (Maintenance Set button) (10)
 - SW5 (TEST Switch): Normal = "Off" side. ()
 - SW6 (Error RESET) (11)
7. **"Error reset" switch** This switch resets errors resulting from alarm conditions.
(Do not operate this switch while inverter and converter are in operation.)
8. **RS232C connector (CN45)**
9. **Bypass manual change-over button (FOR SERVICE PERSONNEL ONLY)**
This switch is used to transfer the UPS from inverter to static bypass for maintenance purposes. Do not operate it under normal operation. Transfers will be lock-out if the bypass voltage is more than +10%,-10% of nominal.
 - 1) Uninterrupted switching is made at the time of synchronous operation. Switching is impossible at the time of asynchronous operation.
 - 2) Return to "Normal" after use.
10. **Maintenance (Set) button** This switch sets the UPS menu parameters.
11. **"Test mode" switch** This switch should be operated by Authorized Service Personnel only.

1.3 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 1.1 Power Specifications

| Rated output Power | Input voltage 3 Φ / 3 wire | Output voltage 3 Φ / 3 or 4 wire |
|-----------------------|------------------------------------|------------------------------------------|
| 100kVA / 80kW | 208V, 480V or 600V | 208V, 480V or 600V |
| 150kVA / 120kW | 208V, 480V or 600V | 208V, 480V or 600V |
| 225kVA / 180kW | 208V, 480V or 600V | 208V, 480V or 600V |
| 300kVA / 270kW | 208V, 480V or 600V | 480V or 600V |
| 375kVA / 338kW | 208V, 480V or 600V | 480V or 600V |

TABLE 1.2 UPS Module Information

| UPS [kVA] | CABLE ENTRY | WIDTH [in / mm] | DEPTH [in / mm] | HEIGHT [in / mm] | WEIGHT [lb./ kg] | HEATING [kBTU/h] |
|--------------|----------------|--------------------|--------------------|---------------------|---------------------|---------------------|
| 100 | BOTTOM | 35.4 / 900 | 29.9 / 759 | 79.7 / 2025 | 1900 / 860 | 31.0 |
| 150 | BOTTOM | 47.2 / 1200 | 29.9 / 759 | 79.7 / 2025 | 2350 / 1065 | 45.3 |
| 225 | BOTTOM | 55.1 / 1400 | 29.9 / 759 | 79.7 / 2025 | 3300 / 1495 | 63.0 |
| 300 | TOP | 94.5 / 2400 | 38.3 / 974 | 79.7 / 2025 | 4950 / 2240 | 113.8 |
| 375 | TOP | 94.5 / 2400 | 38.3 / 974 | 79.7 / 2025 | 5550 / 2515 | 149.4 |

TABLE 1.3 Input Cabinet Information

| UPS [kVA] | INPUT VOLTAGE[V] | CABLE ENTRY | WIDTH [in / mm] | DEPTH [in / mm] | HEIGHT [in / mm] | WEIGHT [lb./ kg] |
|--------------|---------------------|----------------|--------------------|--------------------|---------------------|---------------------|
| 100 | 480 | TOP | 36.0 / 910 | 29.9 / 759 | 79.7 / 2025 | 1275 / 580 |
| 150 | 480 | TOP | 44.0 / 1118 | 29.9 / 759 | 79.7 / 2025 | 1325 / 600 |
| 225 | 480 | TOP | 44.0 / 1118 | 29.9 / 759 | 79.7 / 2025 | 2000 / 910 |
| 300 | 480 | TOP | 44.0 / 1176 | 38.3 / 973 | 79.7 / 2025 | 2600 / 1180 |
| 375 | 480 | TOP | 54.0 / 1320 | 38.3 / 973 | 79.7 / 2025 | 3000 / 1360 |

TABLE 1.4 Detail of Specifications

| | | | | | |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----------------------|-------------|-----|
| Rated Output kVA | 100 | 150 | 225 | 300 | 375 |
| Rated Output kW | 80 | 120 | 180 | 270 | 338 |
| AC INPUT CHARACTERISTICS | | | | | |
| Configuration | 3 phase, 3 wire | | | | |
| Voltage | 208 V, 480 V, 600 V +10% ~ -15% | | | | |
| Input Power Factor | 0.98 Typical | | | | |
| Frequency | 60 Hz \pm 5% | | | | |
| Reflected Current THD | 3% max. at 100% load; 5% max. at 50% load | | | | |
| STATIC BYPASS INPUT | | | | | |
| Configuration | 3 phase, 3 or 4 wire | | | | |
| Voltage | 120/208 V, 277/480 V, 346/ 600 V \pm 10% | | | | |
| Frequency | 60 Hz (\pm 3% Tracking window) | | | | |
| BATTERY | | | | | |
| Type | VRLA, Flooded Lead Acid, Nickel Cadmium | | | | |
| Ride Through | Application Specific | | | | |
| Nominal Voltage | 360 VDC | | | | |
| Minimum Voltage | 290 VDC | | | | |
| Number of Cells | 176 ~ 185 | | | | |
| AC OUTPUT | | | | | |
| Configuration | 3 phase, 3 or 4 wire | | | | |
| Voltage | 120/208 V, 277/480 V, 346/ 600 V | | | | |
| Voltage Stability | \pm 1% | | | | |
| Frequency | 60 Hz | | | | |
| Frequency Stability | \pm 0.01% in free running mode | | | | |
| Power Factor | 0.8 nominal | | | 0.9 nominal | |
| Power Factor range | 0.8 ~ 1.0 lagging (within output kW rating) | | | | |
| Voltage THD | 2% maximum THD at 100% Linear Load 5% maximum THD at 100% non-linear load | | | | |
| Transient Response | \pm 2% maximum at 100% load step \pm 1% maximum at loss or return of AC power \pm 5% maximum at load transfer to/from static bypass | | | | |
| Transient Recovery | Less than 1 line cycle | | | | |
| Voltage Unbalance | 1% maximum at 100% unbalanced load | | | | |
| Phase Displacement | 1% maximum at 100% unbalanced load | | | | |
| Inverter Overload | 125% for 10 minutes; 150% for 1 sec | | | | |
| System Overload | 500% for 2 cycle (with bypass available) | | | | |
| Bypass Overload | 125% for 10 minutes | | | | |
| Withstand Rating | 65kA* | | *:with optional fuses | | |
| ENVIRONMENTAL | | | | | |
| Cooling | Forced Air | | | | |
| Operating Temperature | 2° F ~ 104° F (0° C ~ 40° C). Recommended 68° F ~ 86° F (20° C ~ 30° C) | | | | |
| Relative Humidity | 5% ~ 95% Non Condensing | | | | |
| Altitude | 3300 Feet (1000 meters); 5000 feet @ 0.99 derating | | | | |
| Location | Indoor (free from corrosive gases and dust) | | | | |
| Paint Color | Munsell 5Y7/1 (Beige) | | | | |

TABLE 1.5 Rating of Circuit Breakers (MCCB) and Fuses

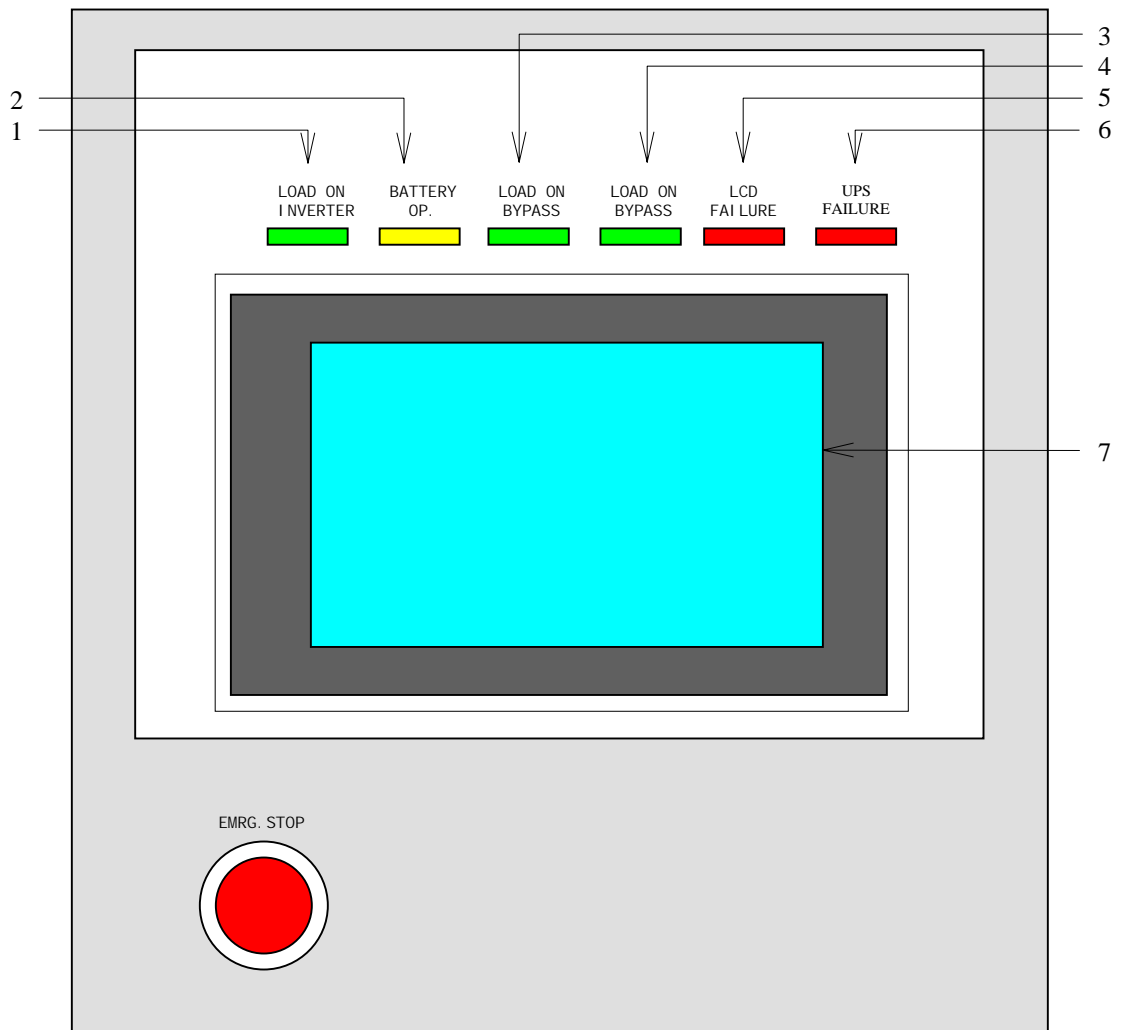
| | NUMBER | APPLICATION | OUTPUT CAPACITY OF EQUIPMENT | | | | | | | | | | | | |
|---|---------------------------------|------------------------------------|------------------------------|------|------|------------|------|------|------------|------|------|------------|------|------------|------|
| | | | 100kVA | | | 150kVA | | | 225kVA | | | 300kVA | | 375kVA | |
| | | | 208V | 480V | 600V | 208V | 480V | 600V | 208V | 480V | 600V | 480V | 600V | 480V | 600V |
| M | CB1 | AC input circuit breaker | - | - | - | - | - | - | - | - | - | 600A | 400A | 800A | 600A |
| C | 52RC | AC input contactor | 350A | | | 420A | | | 660A | | | - | | - | |
| C | CB2 | Battery disconnect circuit breaker | 400A | | | 600A | | | 800A | | | 1200A | | 1600A | |
| B | CB101 | Control circuit breaker | 15A | | | | | | | | | 30A | | | |
| F | FCU, FCV, FCW, FCX, FCY, FCZ | Converter main circuit fuse | 450A | | | 630A | | | 900A | | | 900A | | 800A | |
| U | FIU, FIV, FIW, FIX, FIY, FIZ | Inverter main circuit fuse | 450A | | | 630A | | | 900A | | | 900A | | 800A | |
| | (OPTION) FSU, FSV, FSW | Bypass main circuit fuse | 450A | - | | 630A | - | | 900A | - | | - | | - | |
| S | FUD1, 2 | Control power fuse | DC500V 3A | | | DC500V 3A | | | DC500V 3A | | | DC500V 3A | | DC500V 3A | |
| E | FUS1, 2, 3 | Bypass input ZNR fuse | AC600V 10A | | | AC600V 10A | | | AC600V 10A | | | AC600V 10A | | AC600V 10A | |
| S | FZS1, 2, 3 | Bypass input ZNR fuse | AC600V 30A | | | AC600V 30A | | | AC600V 30A | | | AC600V 30A | | AC600V 30A | |
| | FBS1, 2 | CB3 control circuit fuse | AC600V 5A | | | AC600V 5A | | | AC600V 5A | | | AC600V 5A | | AC600V 5A | |
| | FZC1, 2, 3 | AC input ZNR fuse | AC600V 30A | | | AC600V 30A | | | AC600V 30A | | | AC600V 30A | | AC600V 30A | |

2.0 OPERATOR CONTROLS AND INDICATORS

The 9700 Series operator controls and indicators are located as follows:

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

FIGURE 2.1 Operation/Display Panel (Front panel)



2.1 LED Display

1) **Load on inverter (green)**

Turned on when power is supplied from inverter to the critical load.

(Indicates the state of transfer switch "52C" of inverter.)

2) **Battery operation (yellow)**

Turned on when the battery is operating following an AC power failure..

3) **Load on bypass (yellow)**

Turned on when power is supplied through bypass to load devices.

(Indicates the state of transfer switch "52S" of bypass.)

4) **Overload(yellow)**

Turned on when an overload has occurred to the system.

5) **LCD failure [LCD FAIL](red)**

Turned on when an error occurs on the LCD.

6) **UPS failure [UPS FAIL](red) [Annunciator: intermittent or constant tones]**

Turned on when an error occurs on the system. In this case, the details of error are indicated on the display panel.

2.3 Liquid Crystal Display (8)

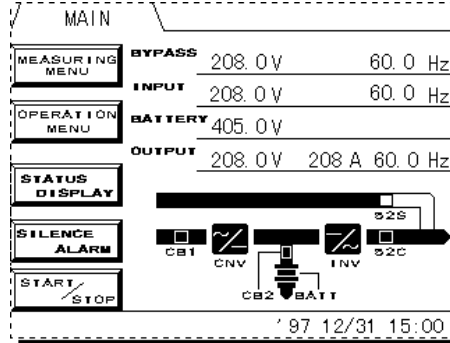
The Liquid Crystal Display (LCD) panel indicates the power flow, measured values, operational guidance, data record and error messages. The LCD panel is back-lit to facilitate viewing in different ambient lighting conditions. The LCD will automatically clear if the keyboard is not activated for 3 minutes. The ERROR indicator is cleared after 24 hours and can be reproduced by pressing any key on the panel.

2.3.1 Menu's

A) MAIN MENU (FIGURE 2.2)

The LCD panel indicates the power flow, measured values and remote operation mode. The LCD panel shows the power flow. This allows the user to verify the status of the UPS Module.

FIGURE 2.2 Main screen

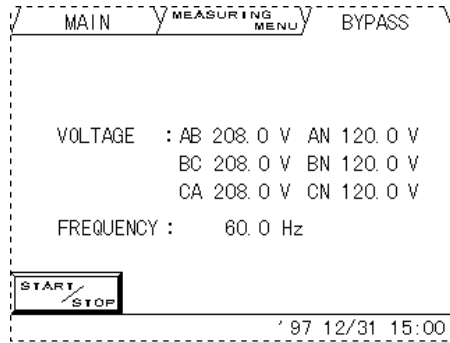


The following will be displayed when the measuring point button on LCD panel is pressed.

1) Bypass Voltage (FIGURE 2.3)

The voltages displayed are the Bypass input voltages (line-to-line) between phases A-B, B-C, C-A and frequency of the Bypass line. Line to neutral voltages A-N, B-N, C-N are measured on 4 wire systems only.

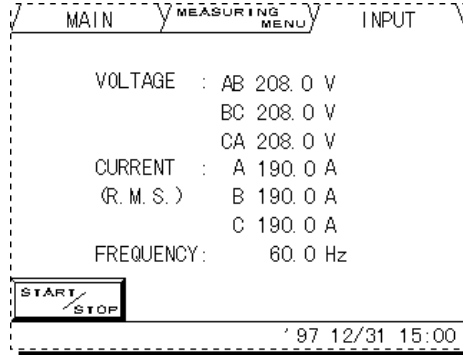
FIGURE 2.3 Bypass screen



2) Input Voltage and Current (FIGURE 2.4)

The voltages displayed are the RMS AC input voltages (line-to-line) between phases A-B, B-C C-A and frequency of the AC input line. The RMS values of Phases A, B and C currents are also displayed.

FIGURE 2.4 Input screen



3) Output Voltage, Output Current and Trend Graph

The voltages displayed on the LCD include the inverter output voltages A-B, B-C, C-A. Line to neutral voltages A-N, B-N, C-N are displayed on 4 wire systems only. Inverter output frequency is also displayed. (FIGURE 2.5)

The current displayed and the RMS values and Peak Values of Phases A, B, C, N-current (Neutral) is display on a 4 wire system only. (FIGURE 2.6)

The Trend Graph displays the Effective power values and the Reactive power values. (FIGURE 2.7)

FIGURE 2.5 Output voltage screen

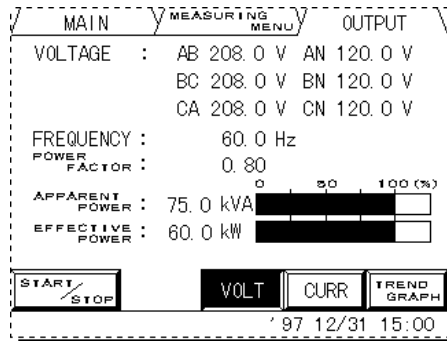


FIGURE 2.6 Output current screen

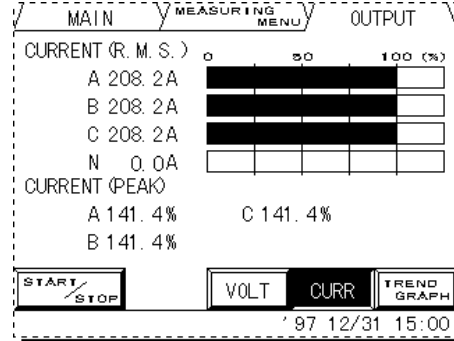
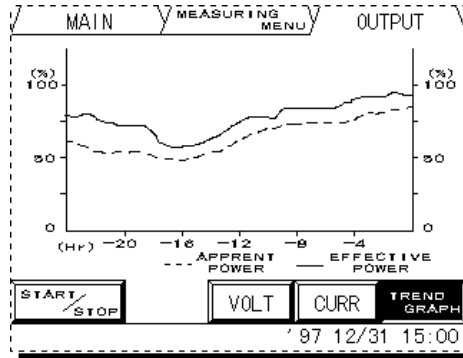


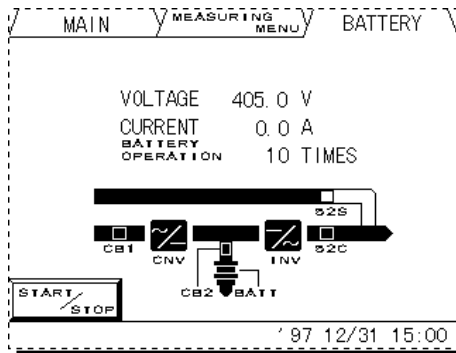
FIGURE 2.7 Trend graph screen



4) Battery (FIGURE 2.8)

This displays the charging, discharging or float mode of the battery, battery current and battery voltage.

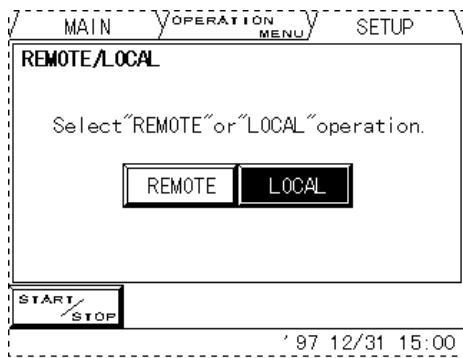
FIGURE 2.8 Battery screen



5) Remote / Local Selection (FIGURE 2.9)

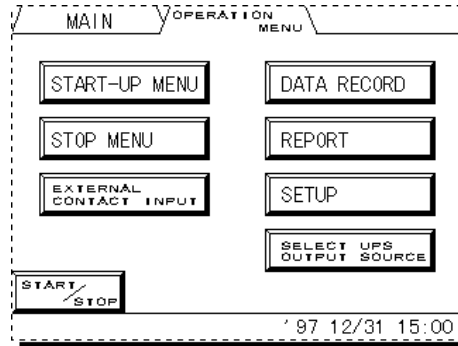
The system asks user to select whether the start & stop operation will be performed by a local or remote operation.

FIGURE 2.9 Remote / Local selection



B) OPERATION MENU (FIGURE 2.10)

The following will be displayed when the OPERATION MENU button is pressed on the LCD

FIGURE 2.10 Operation menu screen**1) START-UP MENU**

The display indicates the operation from closing circuit breakers to starting the inverter. When the inverter is started, the display shows the MAIN MENU. When the display changes, the annunciator sounds 3 times requesting user to perform next procedure.

2) STOP MENU

The display indicates the operation of how to stop the inverter and to shutdown the UPS system.

3) EXTERNAL CONTACT INPUT

The input of external contacts is indicated by closed or open contacts.

4) DATA RECORD

Operation data and events is indicated.

5) REPORT

Record data is indicated.

6) SETUP

Time, Remote/Local selection and Equalizing charge are set.

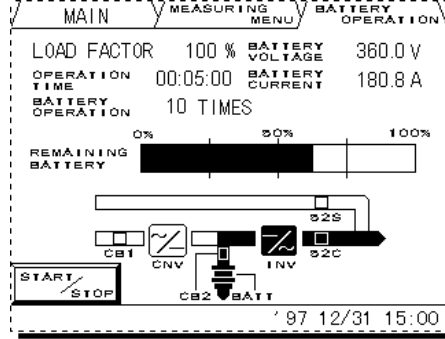
7) SELECT UPS OUTPUT SOURCE

This display is used to transfer the UPS from inverter to static bypass for maintenance purposes.

2.3.2 INPUT POWER FAILURE

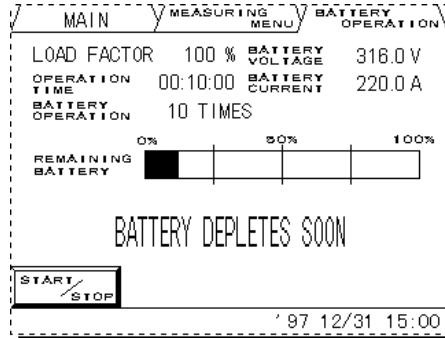
During an Input Power Failure the UPS will run on the Batteries. The following will be displayed. The indication of battery operation, load factor, and bar graph.

FIGURE 2.11 Battery Operation Screen



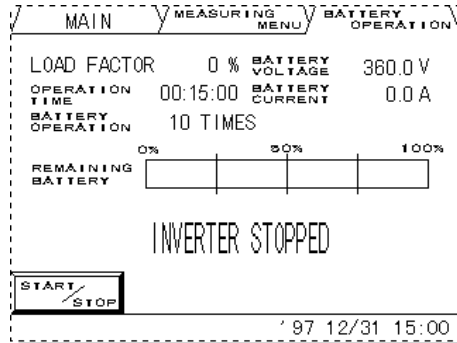
The LCD will display a battery low voltage announcement when battery capacity is near depletion.

FIGURE 2.12 Battery Low Voltage Screen



The End of Battery Discharge announcement is displayed when the battery end voltage is reached. At that time, the inverter will perform an electronic shutdown to prevent battery loss of life typical of extreme deep discharge conditions. The inverter will automatically restart to power the load and the batteries will be simultaneously recharged after input power is restored. Details of the End of Battery announcement is shown in Figure 2.13.

FIGURE 2.13 Discharge Termination Screen

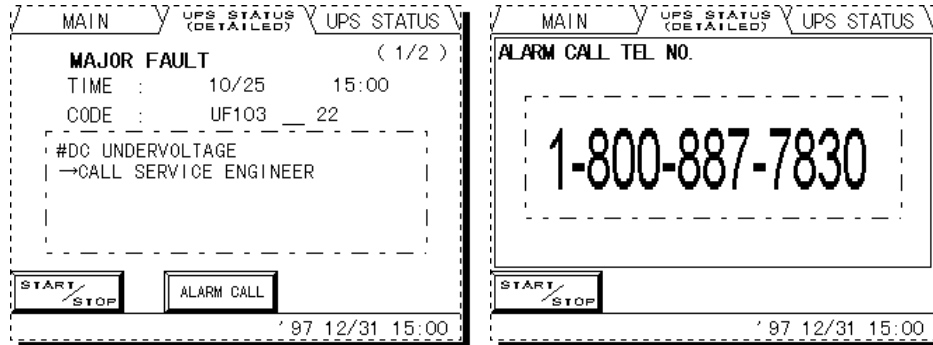


2.3.3 FAULT INDICATION (FIGURE 2.14)

The display shows a fault code, description of fault and a guidance of what action is to take place by the user. A maximum of 10 faults are displayed at the same time.

When an input power failure occurs during the fault Indication, the fault indication and input power failure are alternatively displayed at 5 second intervals.

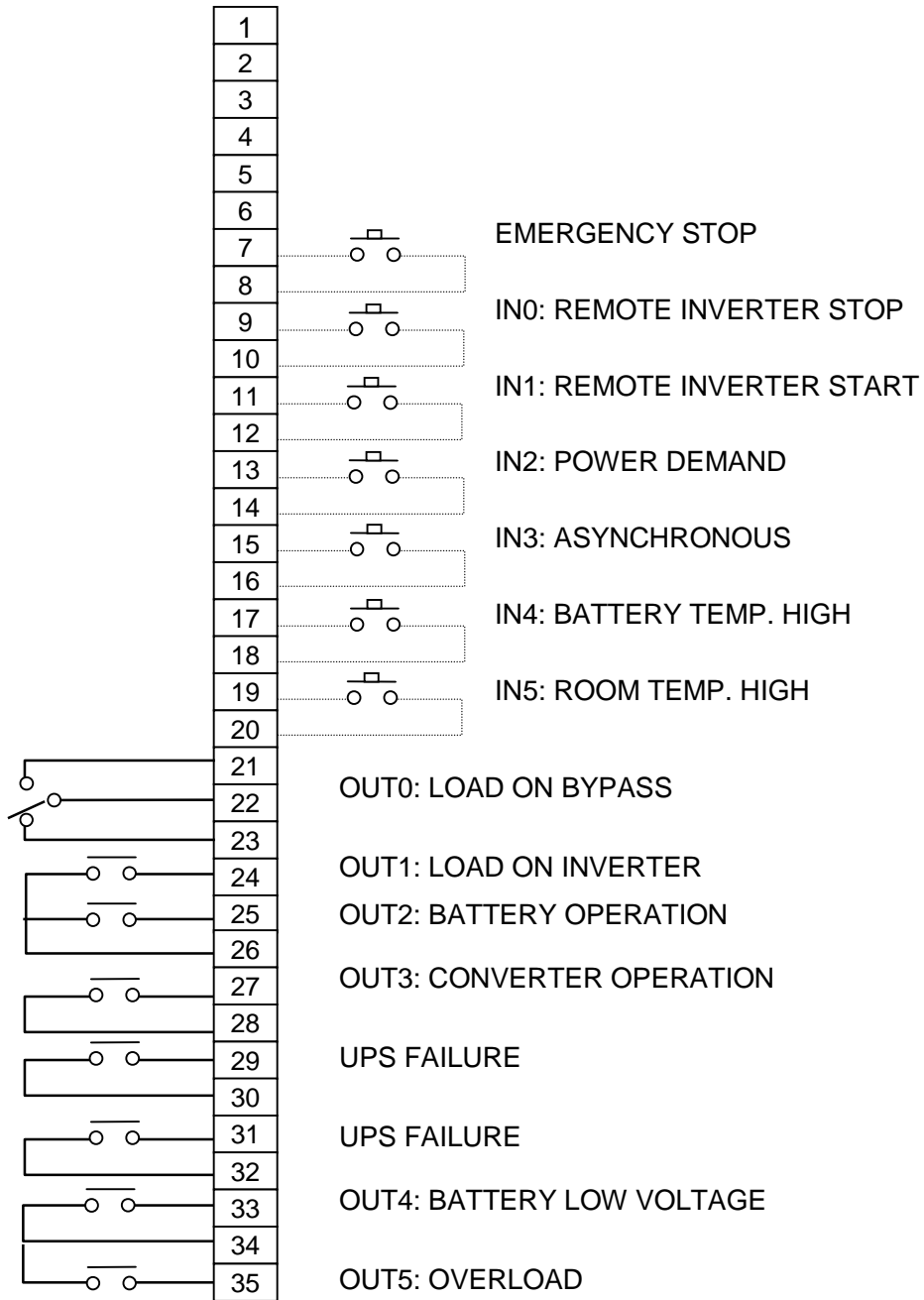
FIGURE 2.14 Failure indication screen



2.4 External Signal Terminal Block

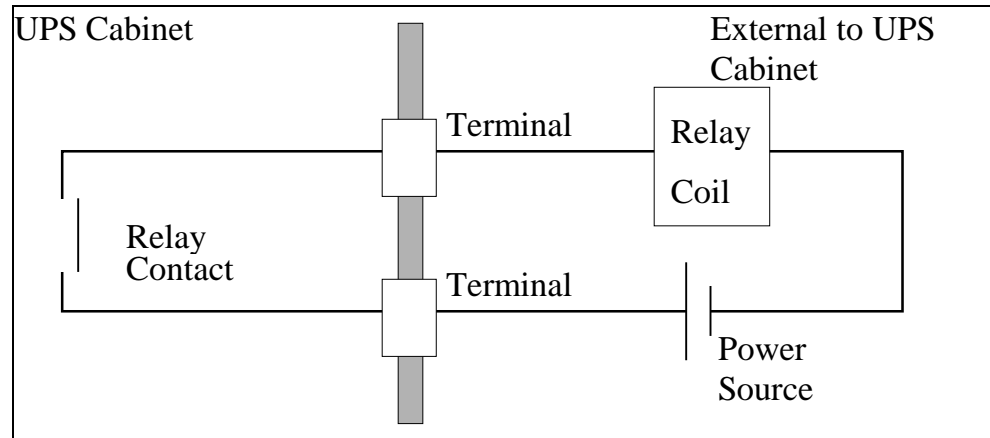
The UPS is equipped with a series of input/output terminals for the external annunciation of alarms and the remote access of certain UPS functions. A functional description of the input/output port is presented below. Layout of terminals is shown in Figure 2.15

FIGURE 2.15 External Signal Terminal Block



A) Output Contacts(for external alarm annunciation)

Output contacts consist of form "A" dry type contacts. Rated value of all output contacts is 120Vac/0.5Aac or 30Vdc/1Adc. Operate all dry contacts at their rated values or lower. Figure 2.16 illustrates typical installation. The external relay can also be a lamp, LED, computer, etc.

FIGURE 2.16 Control Wiring for External Contacts

Details of output alarm contacts :
Terminals 22 to 21 "Load on Bypass" contact (OUT0)

Activated when the power is supplied from the static bypass input.

Terminals 24 to 26 "Load on Inverter" contact (OUT1)

Activated when the power is supplied by the inverter.

Terminals 25 to 26 "Battery Operation" contact (OUT2)

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

Terminals 27 to 28 "Converter Operation" contact (OUT3)

Activated when the converter is operating.

Terminals 29 to 30 "UPS failure" contact

Activated when a major fault has occurred to the system.

Terminals 31 to 32 "UPS failure" contact

Activated when a major fault has occurred to the system.

Terminals 34 to 33 "Battery Low Voltage" contact (OUT4)

Activated when DC voltage dropped below discharge end during inverter operation.

Terminals 35 to 34 "Overload" contact (OUT5)

Activated when an overload has occurred to the system.

NOTE: *The UPS is equipped with a selectable output contact feature. The above alarms are the default settings. Contact **MITSUBISHI ELECTRIC AUTOMATION, INC.** for set-up information.*

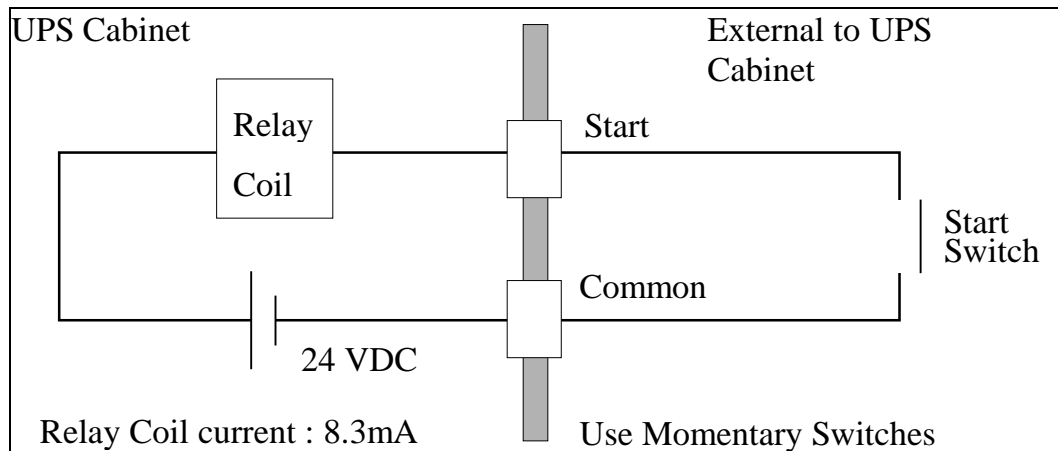
B) Input Contacts(for remote access of UPS)

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

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

Refer to Figure 2.17 for typical wiring configuration. Although this figure applies to the remote start/stop terminals, the same wiring arrangement is used for emergency stop; asynchronous command; power demand; battery temperature high.

FIGURE 2.17 Remote "Start" Contact Connections



Details of input contacts for remote access :

Terminals 7 to 8 "Emergency Stop" contact input

Used to perform a remote UPS emergency power off (EPO).
The load will be dropped.

Terminals 9 to 10 Remote "Inverter Stop" input terminal (IN0)

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

Terminals 11 to 12 Remote "Inverter Start" input terminal (IN1)

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

Terminals 13 to 14 "Power Demand Command" contact input (IN2)

Used to control the input current limit to the UPS converter (usually during

generator operation). Power demand is turned ON when the contact is closed. Power demand is turned OFF when the contact is open.

Terminals 15 to 16 "Asynchronous Command" contact input (IN3)

Used to create an asynchronous condition between the static bypass source and the inverter. Asynchronous condition is enabled when the switch is closed. Asynchronous condition is disabled when the switch is opened.

Terminals 17 to 18 "BATTERY TEMP. HIGH" contact input (IN4)

Input fed by a thermocouple that monitors battery temperature. The converter float voltage level is reduced for battery over-temperature conditions. Use battery manufacture recommended thermocouple.

Terminals 19 to 20 "ROOM TEMP. HIGH" contact input (IN5)

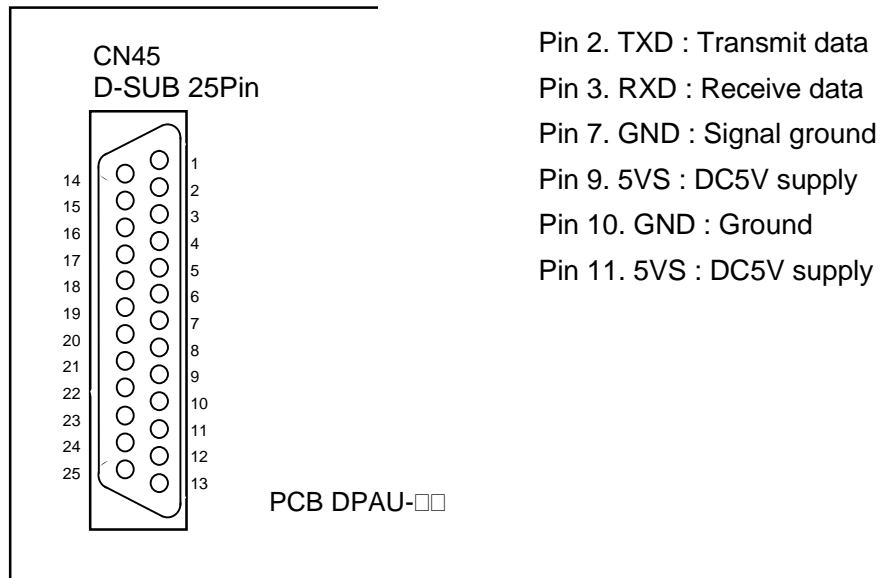
Input fed by a thermocouple that monitors room temperature. External thermocouple is user supplied.

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

2.5 External communication connector

This is a RS232C port for "DiamondLink". Layout of connector is shown in Figure 2.18.

FIGURE 2.18 External communication connector



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. Use eye bolts (supplied) to carry with overhead crane. | Using the holes (4 - 24) pre drilled into the UPS channel base, anchor the unit using appropriate hardware. |

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

3.2 Installation Procedure

A) Note the load tolerance of the floor

Refer to Table 3.2 for list of weights of UPS's.

TABLE 3.2 List of UPS weights

| UPS Capacity (kVA) | 100 | 150 | 225 | 300 | 375 |
|--------------------|------|------|------|------|------|
| Weight (lb.) | 3060 | 3810 | 4960 | 5890 | 6620 |

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 0.0" (0.0 mm)

Top side 23.6" (600 mm) (for air flow)

C) Space requirement for routine maintenance

Allow the following space at the time of installation.

Front 39.4" (1000 mm)

Sides 0.0" (0.0 mm)

Rear 0.0" (0.0 mm)

D) External Battery Supply

Please refer to the following when installing batteries:

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

TABLE 3.3 Maximum Permitted Fault Current

| UPS CAPACITY (kVA) | DC VOLTAGE RATING (V) | MAXIMUM PERMITTED FAULT CURRENT (A) |
|-----------------------|--------------------------|----------------------------------------|
| 100 | 360 | 35000 |
| 150 | 360 | 25000 |
| 225 | 360 | 25000 |
| 300 | 360 | 25000 |
| 375 | 360 | 25000 |

3.3 Procedure for Cable Connections

- A) Required metric tools – 19mm wrench, 19mm socket.
- B) Confirm the capacity of the UPS being installed. Identify the input/output power terminal blocks as shown in the appropriate Figure 3.1 through Figures 3.2-a~h.
- C) Connect the internal control wire and power wire.
 - i) Control wire Inter-connect
 - a) AC input cabinet (300, 375kVA only)
 - (1) CB1-UVR to terminal 45, 46 in bypass cabinet section.
 - (2) CB1 Alarm to terminal 43, 44 in bypass cabinet section.
 - (3) CB1 Auxiliary connect to terminal 41, 42 in bypass cabinet section.
 - (4) Input transformer Over-temperature to terminal 52, 54 in bypass cabinet section.
 - (5) Control power A, B, C phases (Terminal block) to A00, B00, C00 in UPS converter section.
 - b) DC breaker cabinet or battery cabinet
 - (1) CB2-UVR to terminal 59, 60 (300, 375kVA) / 5, 6 (100, 150, 225kVA) in bypass cabinet section.
 - (2) CB2 Alarm to terminal 57, 58 (300, 375kVA) / 1, 2 (100, 150, 225kVA) in bypass cabinet section.

- (3) CB2 Auxiliary to terminal 55, 56 (300, 375kVA) / 3, 4 (100, 150, 225kVA) in bypass cabinet section.
- ii) Power wire Inter-connect
- a) Output of transformer cabinet
- (1) X1 (A-phase) to A10 bus bar in UPS converter section.
- (2) X2 (B-phase) to B10 bus bar in UPS converter section.
- (3) X3 (C-phase) to C10 bus bar in UPS converter section.
- b) DC Input to UPS
- (1) Positive cable to BP bus bar in UPS converter section.
- (2) Negative cable to NP bus bar in UPS converter section.
- D) Connect the grounding conductor from the input service entrance to the UPS ground bar.
- E) Two (2) sources feeding the UPS:
- i) Connect the converter input power cables from the input service entrance to the converter input power terminals identified as A00, B00, C00 or A10, B10, C10 in Figures 3.2-a~h. Input cables must be sized for an ampacity larger than the maximum input drawn by the converter. Refer to Table 3.4 for recommended cable sizes.
- ii) Confirm that an external bypass input circuit breaker (MCCB) is installed (refer to WARNING 2). Connect the bypass input power cables from the input service entrance to the bypass input power terminals identified as A40, B40, C40 and N40 in Figures 3.2-a~h. Bypass input cables must be sized for an ampacity larger than the maximum output current capacity of the UPS. Refer to Table 3.4 for recommended cable sizes.
- F) One (1) source feeding the UPS:
- i) Confirm that an external input circuit breaker sized to protect both the converter input and the bypass lines is installed. Consult equipment nameplate for current ratings. Connect the bypass input power cables from the input service entrance to the bypass input power terminals identified as A40, B40, C40 and N40 in Figures 3.2-a~h. Input cables must be sized for an ampacity larger than the maximum current capacity of the UPS. Refer to Table 3.4 for recommended cable sizes.
- ii) Using adequately sized conductors per Table 3.4 and referring to the appropriate figure identified in Figures 3.2-a~h, jumper bypass terminals A40, B40, C40 to converter input power A00, B00, C00 or A10, B10, C10 identified Figures 3.2-a~h.

- G) Referring to Figures 3.2-a~h, connect UPS load terminals A50, B50, C50 and N50 to load distribution panel. Refer to Table 3.4 for cable sizes.
- H) Connect external signal terminal block as needed. Refer to section 2.4 and Figure 2.15 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 supplied with bus bar and hardware (12mm diameter Nut/Bolt assembly). It is recommended that compression lugs be used to fasten all input/output power cables. Refer to Table 3.5 for recommended compression lugs and appropriate crimping tool.*
 - 3. If three wire source for input and bypass input is utilized, the neutral conductor is the UPS must be banded to ground.*

Table 3.4 Recommended cable size and torque requirements

| kVA Capacity | Input Voltage | Output Voltage | Input Side * 1, 2 | | Output Side * 1, 2 | | Bypass Side * 1, 2 | | DC Input Side * 1, 2 | |
|--------------|---------------|----------------|---------------------|--------------------|---------------------|--------------------|---------------------|--------------------|----------------------|--------------------|
| | | | Cable Size | Torque in. lbs. | Cable Size | Torque in. lbs. | Cable Size | Torque in. lbs. | Cable Size | Torque in. lbs. |
| 100kVA | 208V | 208V | 300 MCM or larger | 347 - 469 in. lbs. | 300 MCM or larger | 347 - 469 in. lbs. | 300 MCM or larger | 347 - 469 in. lbs. | 250 MCM or larger | 347 - 469 in. lbs. |
| | 480V | 480V | 1/0 AWG or larger | 200 - 269 in. lbs. | 1/0 AWG or larger | 200 - 269 in. lbs. | 1/0 AWG or larger | 200 - 269 in. lbs. | 250 MCM or larger | 200 - 269 in. lbs. |
| | 600V | 600V | 3 AWG or larger | 200 - 269 in. lbs. | 3 AWG or larger | 200 - 269 in. lbs. | 3 AWG or larger | 200 - 269 in. lbs. | 250 M] or larger | 200 - 269 in. lbs. |
| 150kVA | 208V | 208V | 600 MCM or larger | 347 - 469 in. lbs. | 600 MCM or larger | 347 - 469 in. lbs. | 600 MCM or larger | 347 - 469 in. lbs. | 500 MCM or larger | 347 - 469 in. lbs. |
| | 480V | 480V | 3/0 AWG or larger | 347 - 469 in. lbs. | 3/0 AWG or larger | 347 - 469 in. lbs. | 3/0 AWG or larger | 347 - 469 in. lbs. | 500 MCM or larger | 347 - 469 in. lbs. |
| | 600V | 600V | 1/0 AWG or larger | 347 - 469 in. lbs. | 1/0 AWG or larger | 347 - 469 in. lbs. | 1/0 AWG or larger | 347 - 469 in. lbs. | 500 MCM or larger | 347 - 469 in. lbs. |
| 225kVA | 208V | 208V | 3x250 MCM or larger | 347 - 469 in. lbs. | 3x250 MCM or larger | 347 - 469 in. lbs. | 3x250 MCM or larger | 347 - 469 in. lbs. | 2x300 MCM or larger | 347 - 469 in. lbs. |
| | 480V | 480V | 300 MCM or larger | 347 - 469 in. lbs. | 300 MCM or larger | 347 - 469 in. lbs. | 300 MCM or larger | 347 - 469 in. lbs. | 2x300 MCM or larger | 347 - 469 in. lbs. |
| | 600V | 600V | 4/0 AWG or larger | 347 - 469 in. lbs. | 4/0 AWG or larger | 347 - 469 in. lbs. | 4/0 AWG or larger | 347 - 469 in. lbs. | 2x300 MCM or larger | 347 - 469 in. lbs. |
| 300kVA | 208V | 480V | 3x350 MCM or larger | 347 - 469 in. lbs. | 500 MCM or larger | 347 - 469 in. lbs. | 500 MCM or larger | 347 - 469 in. lbs. | 2x600 MCM or larger | 347 - 469 in. lbs. |
| | 480V | | 600 MCM or larger | 347 - 469 in. lbs. | 500 MCM or larger | 347 - 469 in. lbs. | 500 MCM or larger | 347 - 469 in. lbs. | 2x600 MCM or larger | 347 - 469 in. lbs. |
| | 600V | 600V | 400 MCM or larger | 347 - 469 in. lbs. | 300 MCM or larger | 347 - 469 in. lbs. | 300 MCM or larger | 347 - 469 in. lbs. | 2x600 MCM or larger | 347 - 469 in. lbs. |
| 375kVA | 208V | 480V | 3x500 MCM or larger | 347 - 469 in. lbs. | 700 MCM or larger | 347 - 469 in. lbs. | 700 MCM or larger | 347 - 469 in. lbs. | 3x400 MCM or larger | 347 - 469 in. lbs. |
| | 480V | | 2x250 MCM or larger | 347 - 469 in. lbs. | 700 MCM or larger | 347 - 469 in. lbs. | 700 MCM or larger | 347 - 469 in. lbs. | 3x400 MCM or larger | 347 - 469 in. lbs. |
| | 600V | 600V | 600 MCM or larger | 347 - 469 in. lbs. | 500 MCM or larger | 347 - 469 in. lbs. | 500 MCM or larger | 347 - 469 in. lbs. | 3x400 MCM or larger | 347 - 469 in. lbs. |

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

*2 - Allowable ampacities based on 90 degree C insulation at an ambient temperature of 30 degree C

Not more than 3 conductors in a raceway without derating.

TABLE 3.5 Crimp Type Compression Lug

| WIRE SIZE (CODE) | WIRE STRAND CLASS | RECOMMENDATION | | CRIMP TOOL REQUIRED BURNDY TYPE Y35 OR Y46 | |
|------------------------|-------------------------|----------------|-----------|-----------------------------------------------|-----------|
| | | VENDOR | CAT. NO. | COLOR KEY | DIE INDEX |
| 2 | B | BURNDY | YA2C | BROWN | 10 |
| | I | ILSCO | CRB-2L | BROWN | 10 |
| 1 | B | BURNDY | YA1C | GREEN | 11 / 375 |
| | I | ILSCO | CRA-1L | GREEN | 11 / 375 |
| 1/0 | B | BURNDY | YA25 | PINK | 12 / 348 |
| | I | ILSCO | CRA-1/OL | PINK | 12 / 348 |
| 2/0 | B | BURNDY | YA25-LB | BLACK | 13 |
| | I | ILSCO | CRA-2/OL | BLACK | 13 |
| 3/0 | B | BURNDY | YA26 | BLACK | 13 |
| | I | ILSCO | CRA-2/OL | BLACK | 13 |
| 4/0 | B | BURNDY | YA27 | ORANGE | 14 / 101 |
| | I | ILSCO | CRB-3/OL | ORANGE | 14 / 101 |
| 250 MCM | B | BURNDY | YA28 | PURPLE | 15 |
| | I | ILSCO | CRB-4/OL | PURPLE | 15 |
| 300 MCM | B | BURNDY | YA29 | YELLOW | 16 |
| | I | ILSCO | CRA-250L | YELLOW | 16 |
| 350 MCM | B | BURNDY | YA30 | WHITE | 17 / 298 |
| | I | ILSCO | CRA-300L | WHITE | 17 / 298 |
| 400 MCM | B | BURNDY | YA31 | RED | 18 / 324 |
| | I | ILSCO | CRA-350L | RED | 18 / 324 |
| 500 MCM | B | BURNDY | YA32 | BLUE | 19 / 470 |
| | I | ILSCO | CRA-400L | BLUE | 19 / 470 |
| 600 MCM | B | BURNDY | YA32-LB | BROWN | 20 / 299 |
| | I | ILSCO | CRA-500L | BROWN | 20 / 299 |
| 750 MCM | B | BURNDY | YA34 | BROWN | 20 / 299 |
| | I | ILSCO | CRA-500L | BROWN | 20 / 299 |
| 1000 MCM | B | BURNDY | YA38-LB | GREEN | 22 / 472 |
| | I | ILSCO | YA36 | GREEN | 22 / 472 |
| 1000 MCM | B | BURNDY | YA39-LB | PINK | 300 |
| | I | ILSCO | ----- | ----- | ----- |
| 1000 MCM | B | BURNDY | YA39 | BLACK | 24 / 473 |
| | I | ILSCO | CRA-750L | BLACK | 24 / 473 |
| 1000 MCM | B | BURNDY | YA44-LB | WHITE | 27 |
| | I | ILSCO | CRA-1000L | WHITE | 27 |
| 1000 MCM | B | BURNDY | ----- | ----- | ----- |
| | I | ILSCO | ----- | ----- | ----- |

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.*

Fig.3.1-1 UPS Terminal Designation (100, 150, 225kVA)

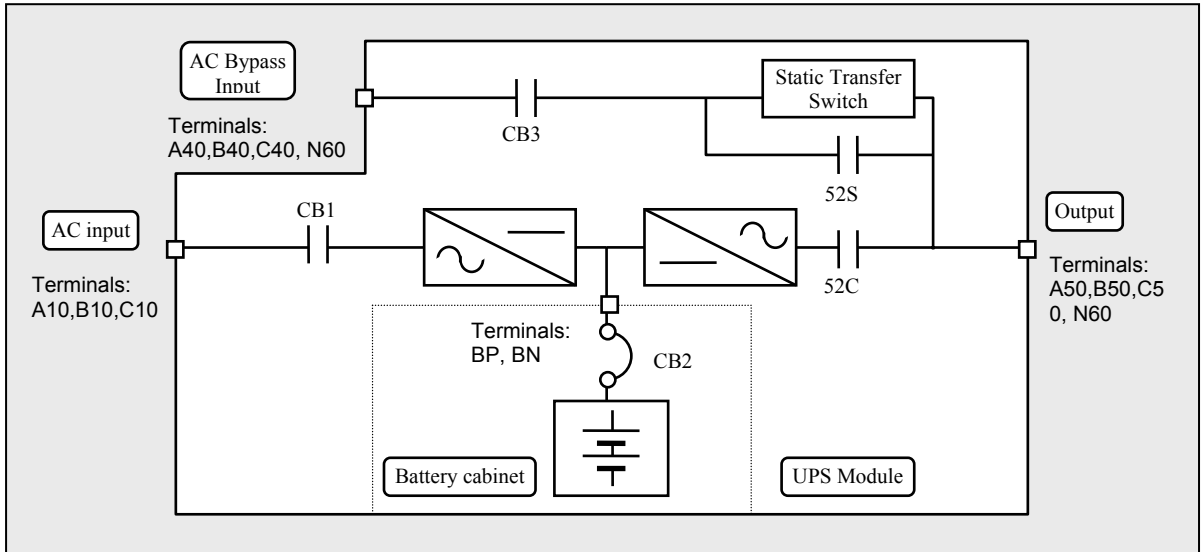


Fig.3.1-2 UPS Terminal Designation (300, 375kVA)

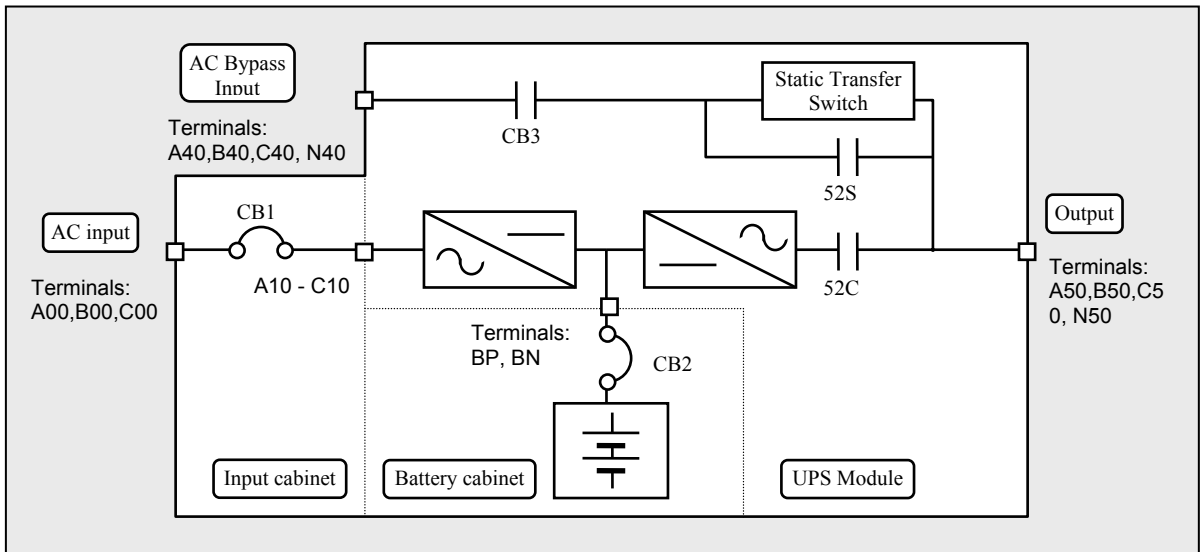




Fig. 3.2-a-1 Diagram of input/output bus bars and terminal blocks (100kVA UPS, Input voltage 208VAC)

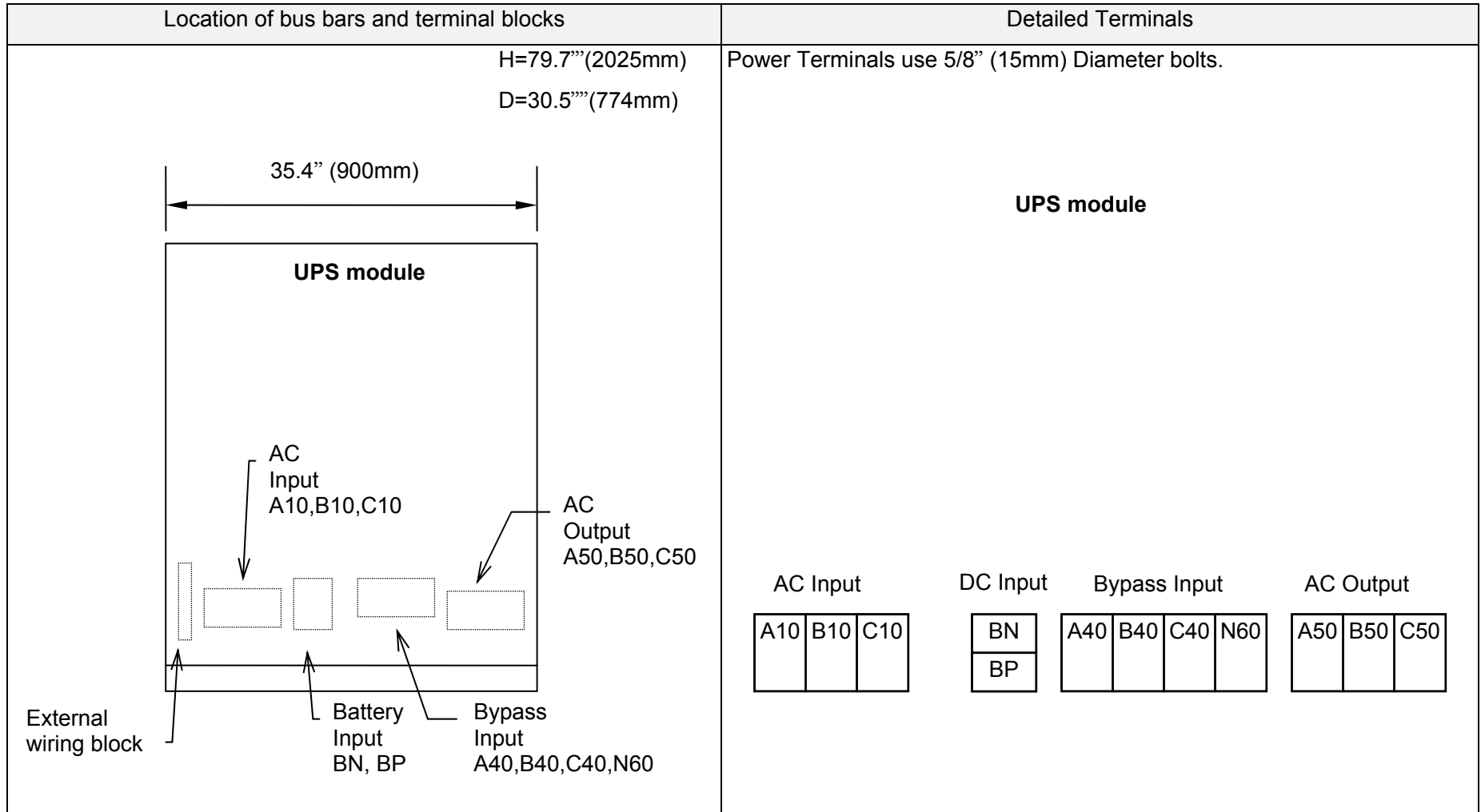




Fig. 3.2-a-2 Diagram of Power Wire & Control Wire Inter-Connect (100kVA UPS, Input voltage 208VAC)

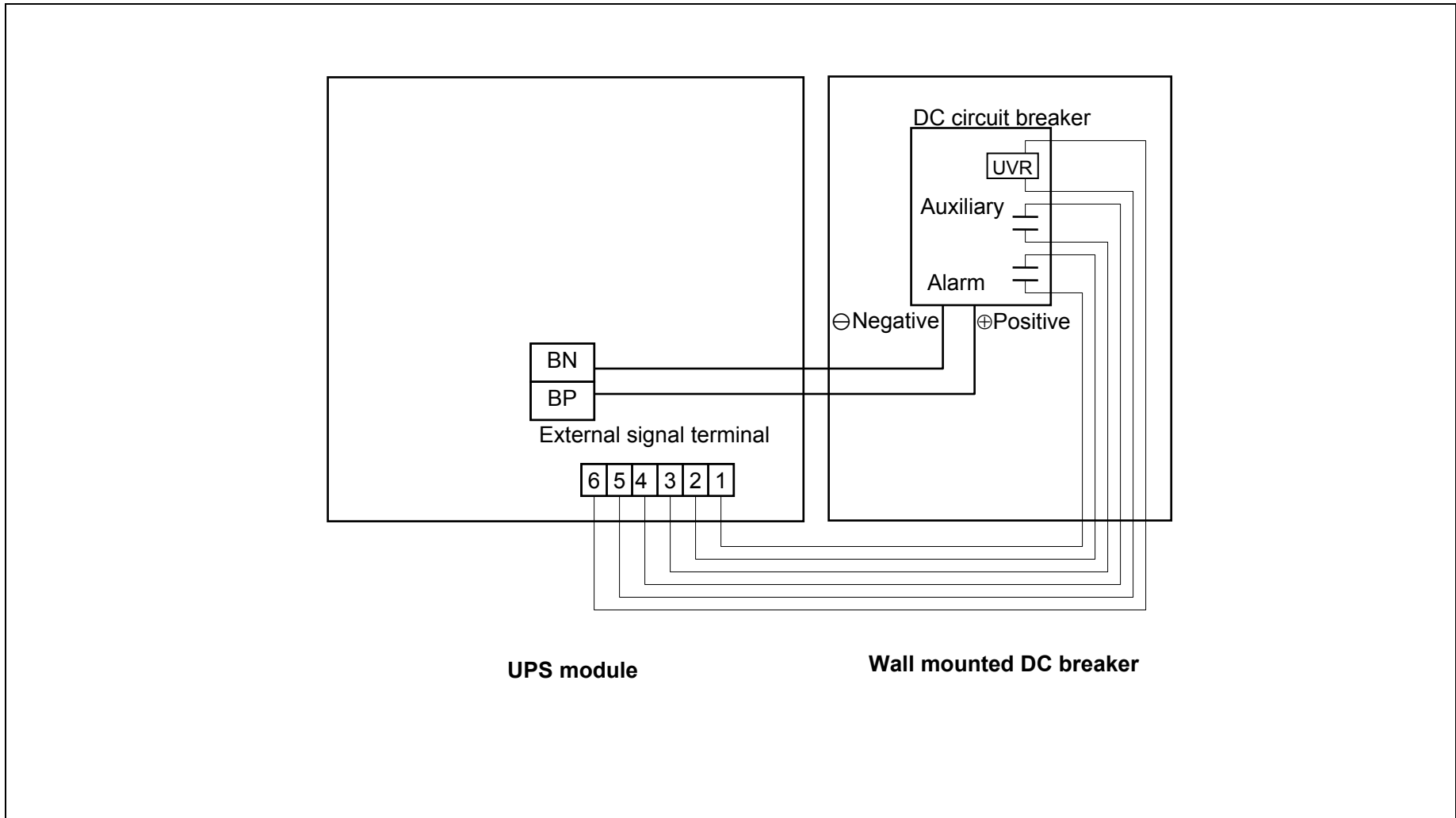




Fig. 3.2-b-1 Diagram of input/output bus bars and terminal blocks (100kVA UPS, Input voltage 480VAC)

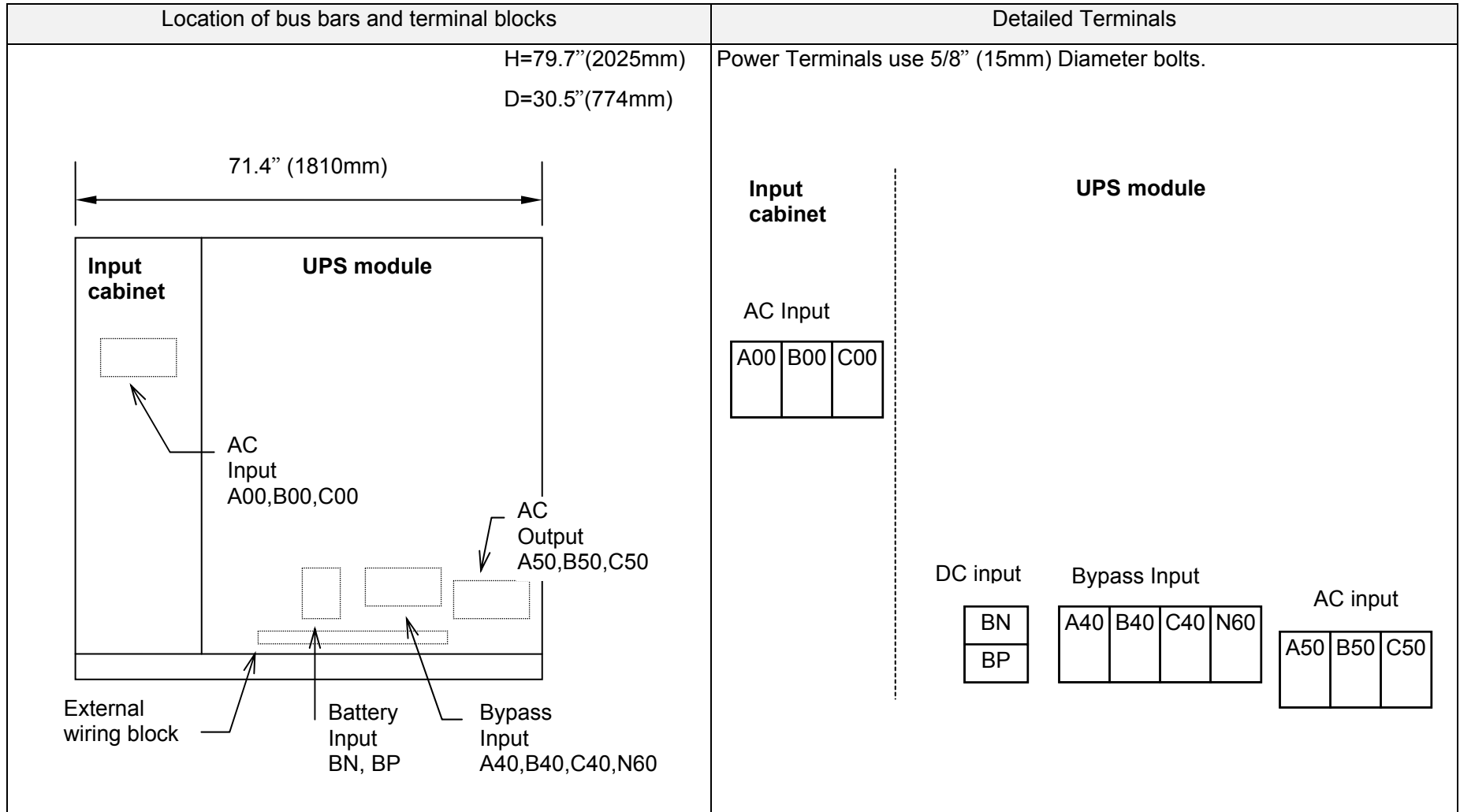




Fig. 3.2-b-2 Diagram of Power Wire & Control Wire Inter-Connect (100kVA UPS, Input voltage 480VAC)

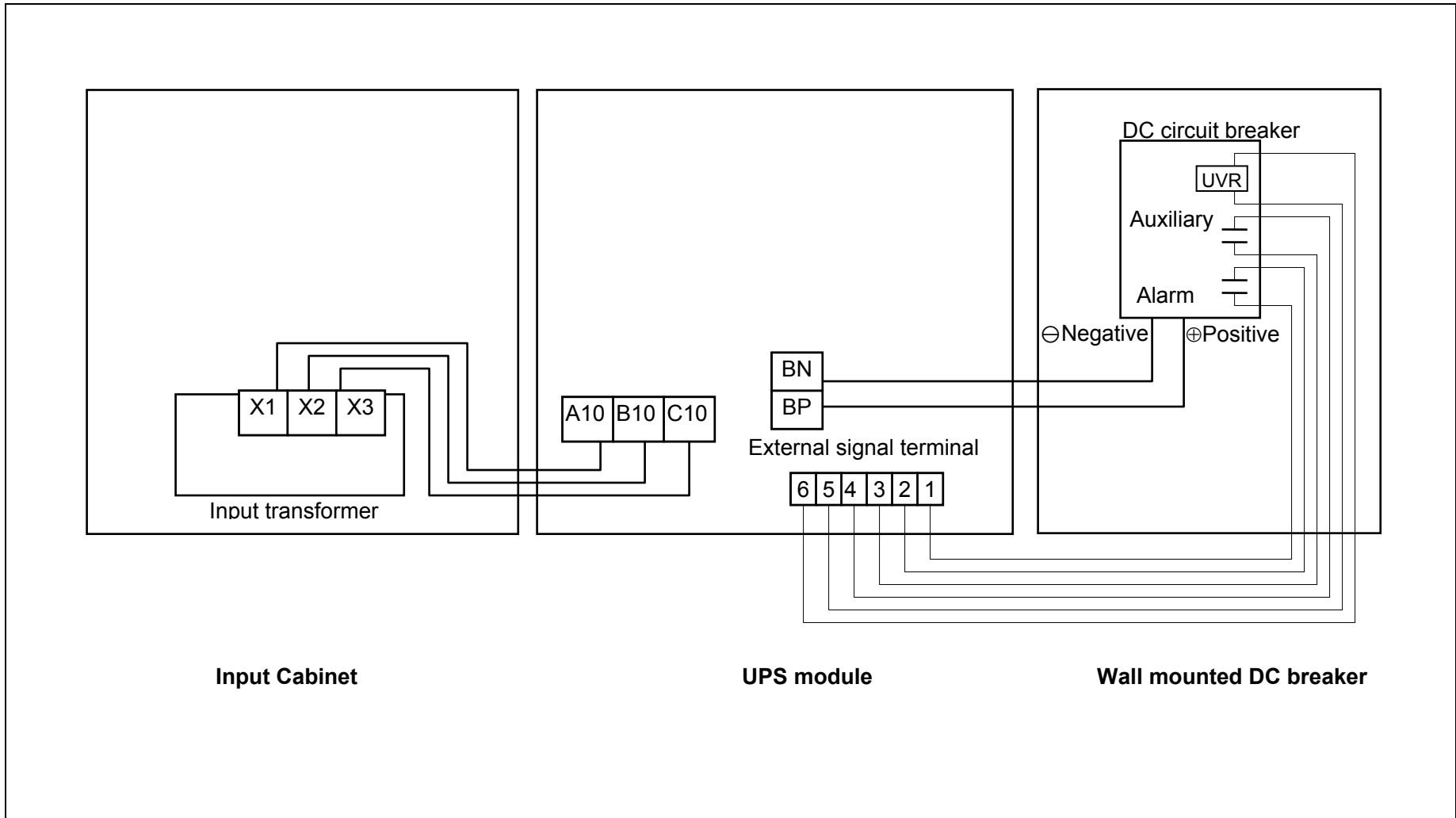




Fig. 3.2-c-1 Diagram of input/output bus bars and terminal blocks (150kVA UPS, Input voltage 208VAC)

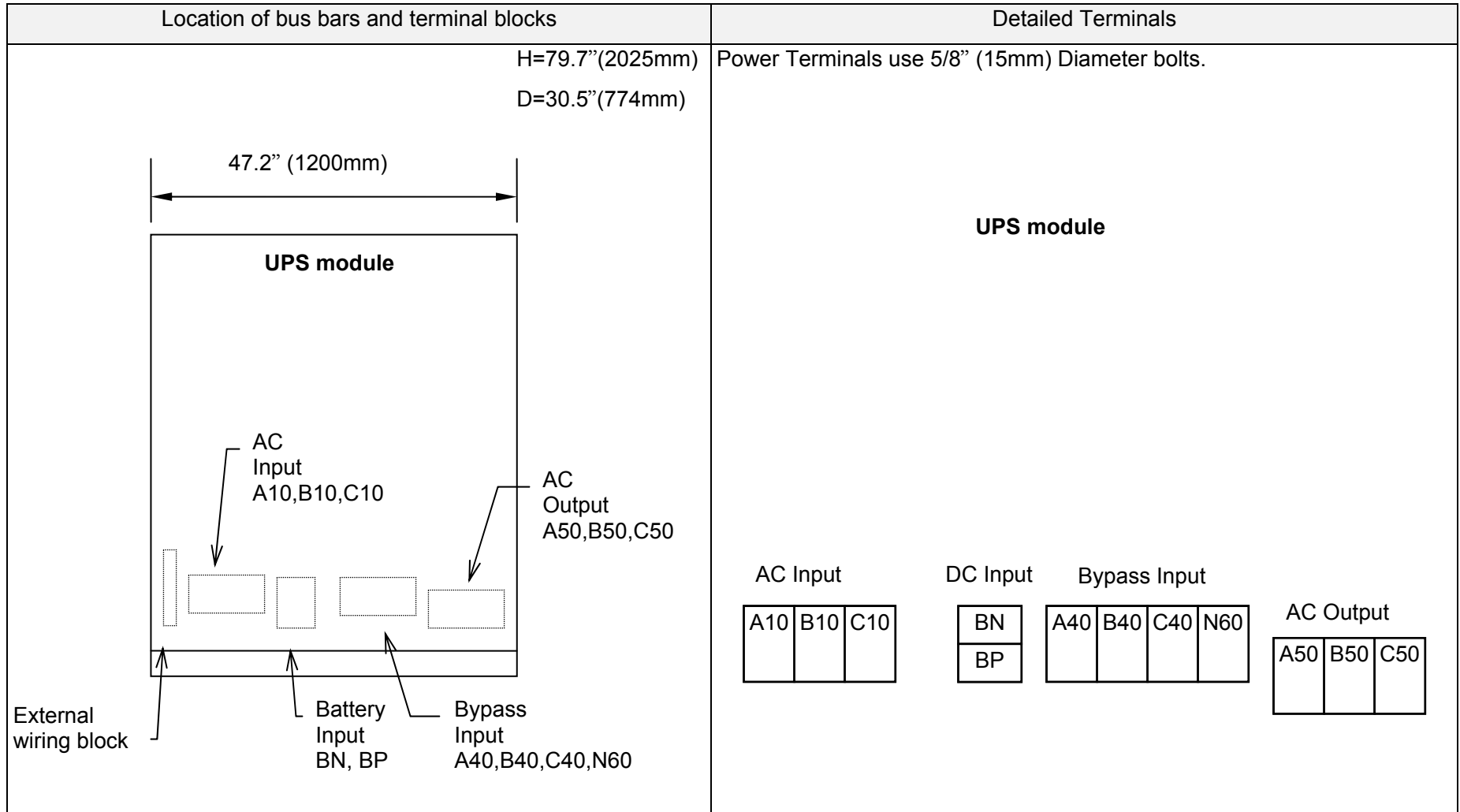




Fig. 3.2-c-2 Diagram of Power Wire & Control Wire Inter-Connect (150kVA UPS, Input voltage 208VAC)

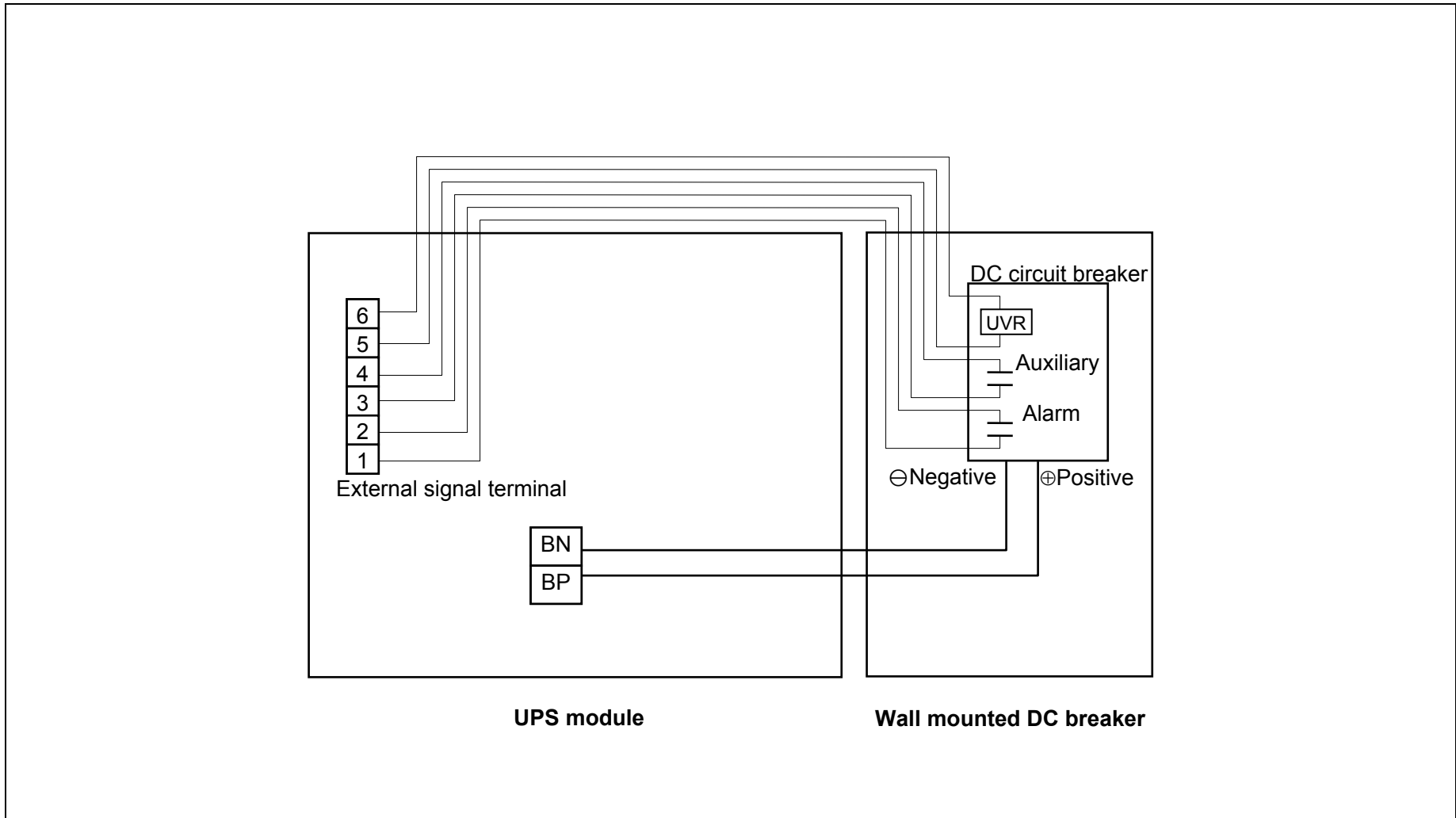




Fig. 3.2-d-1 Diagram of input/output bus bars and terminal blocks (150kVA UPS, Input voltage 480VAC)

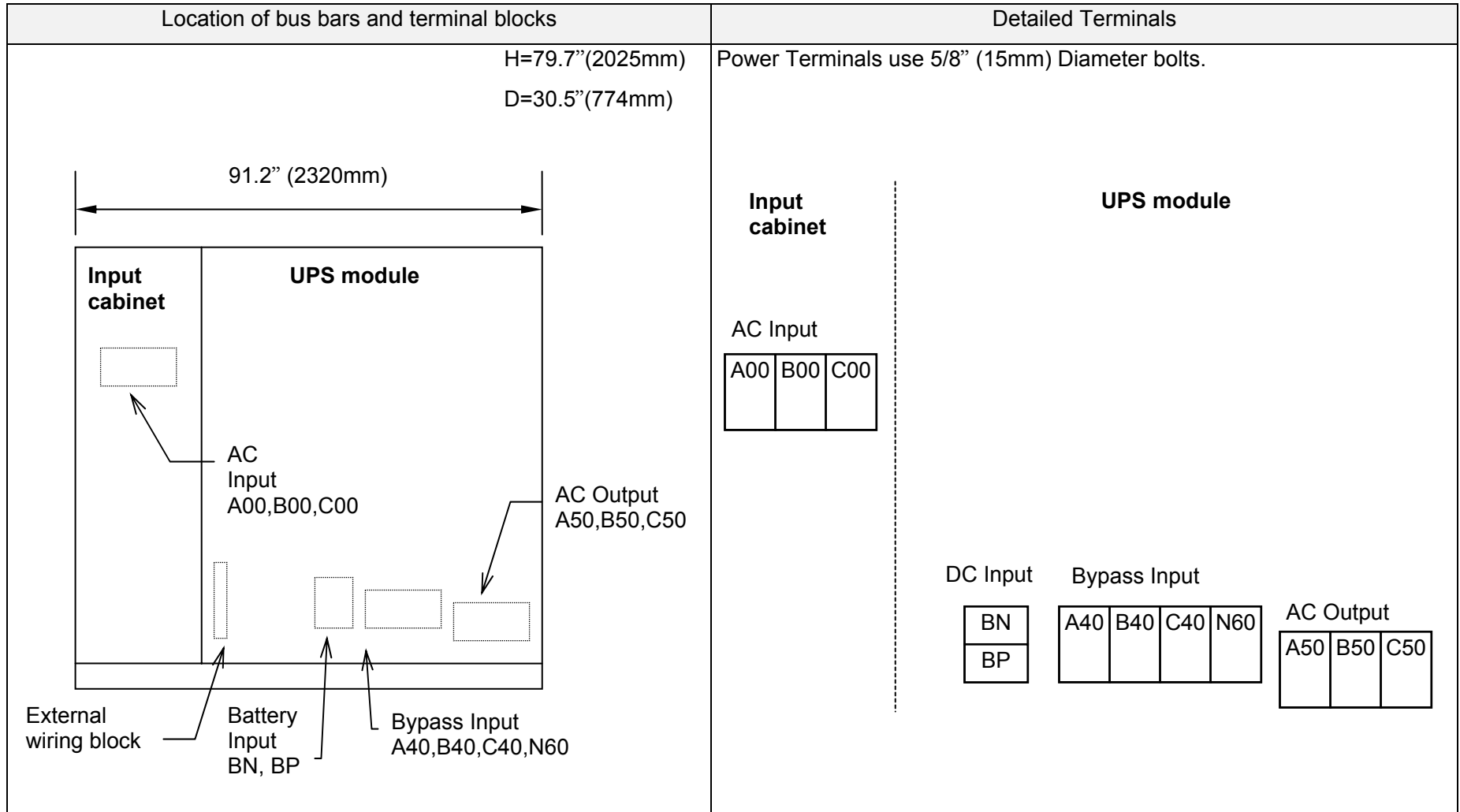




Fig. 3.2-d-2 Diagram of Power Wire & Control Wire Inter-Connect (150kVA UPS, Input voltage 480VAC)

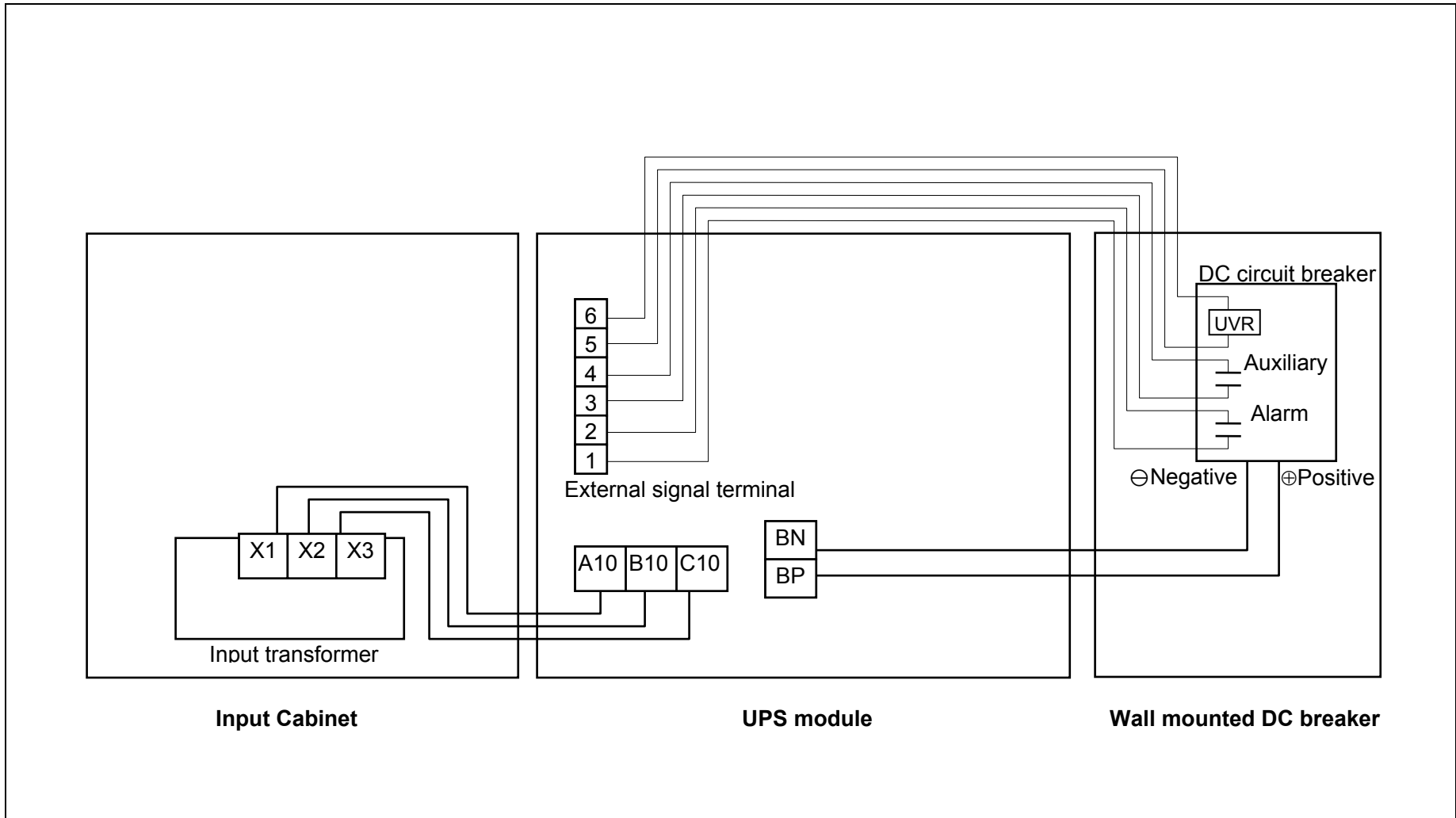




Fig. 3.2-e-1 Diagram of input/output bus bars and terminal blocks (225kVA UPS, Input voltage 208VAC)

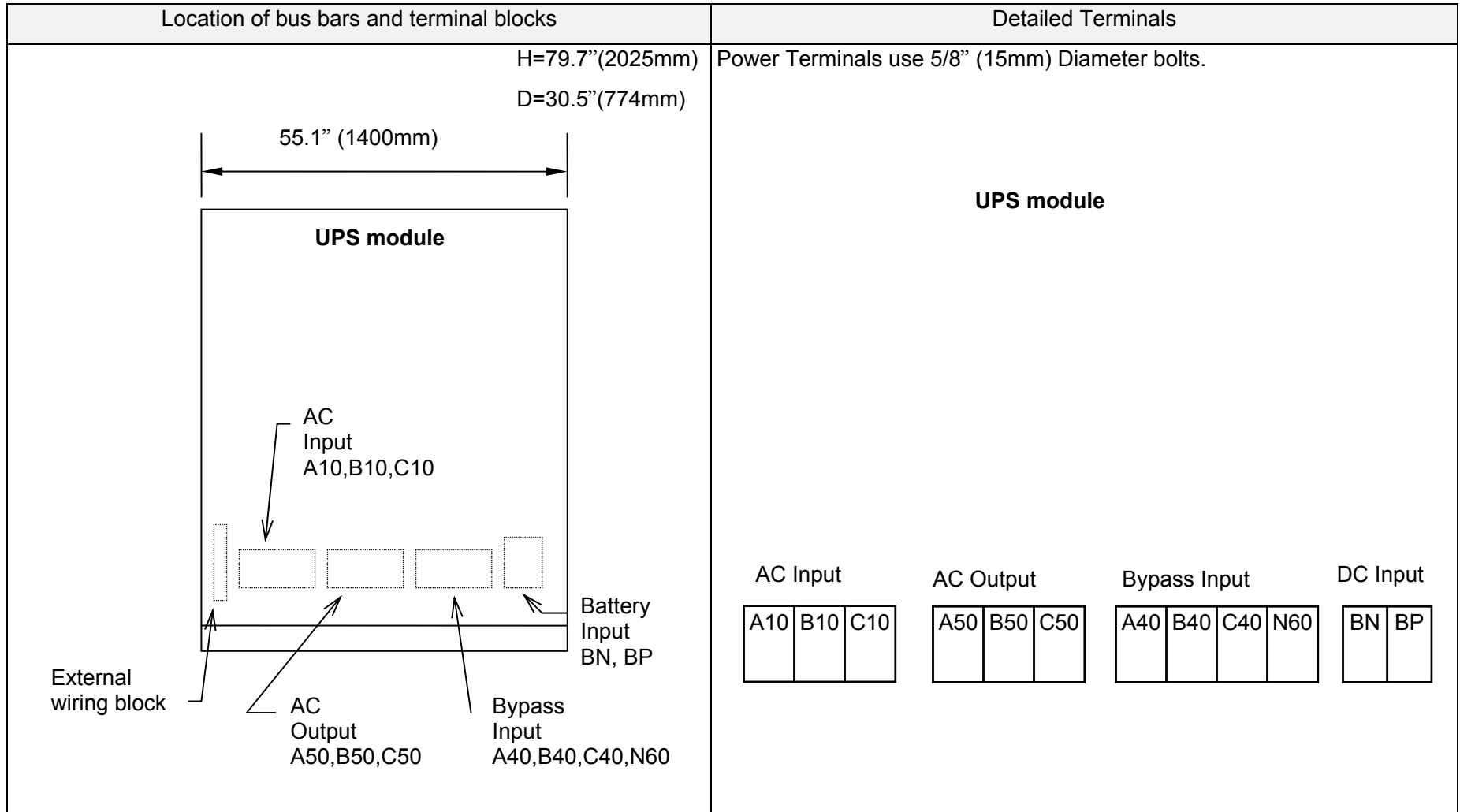




Fig. 3.2-e-2 Diagram of Power Wire & Control Wire Inter-Connect (225kVA UPS, Input voltage 208VAC)

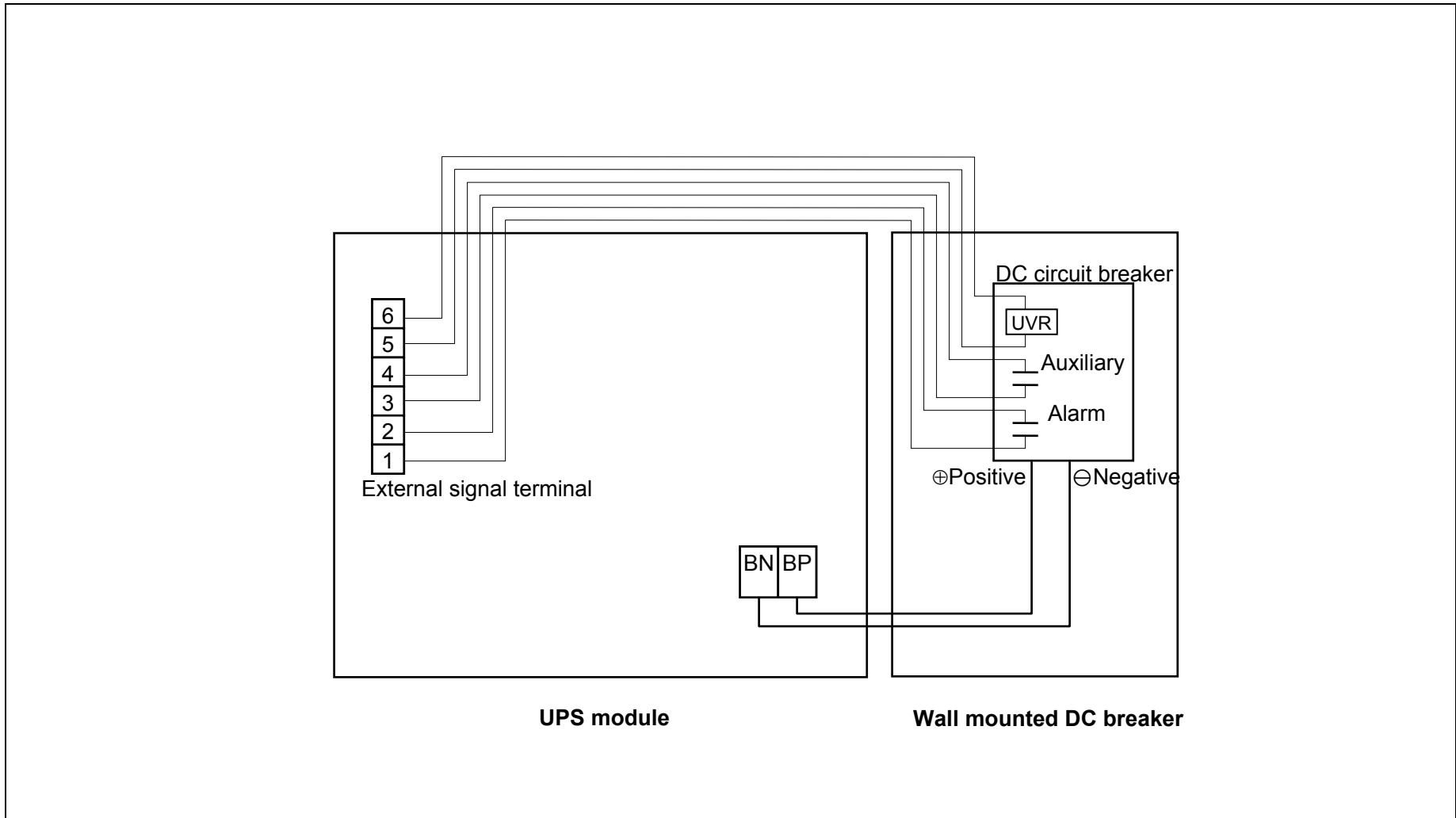




Fig. 3.2-f-1 Diagram of input/output bus bars and terminal blocks (225kVA UPS, Input voltage 480VAC)

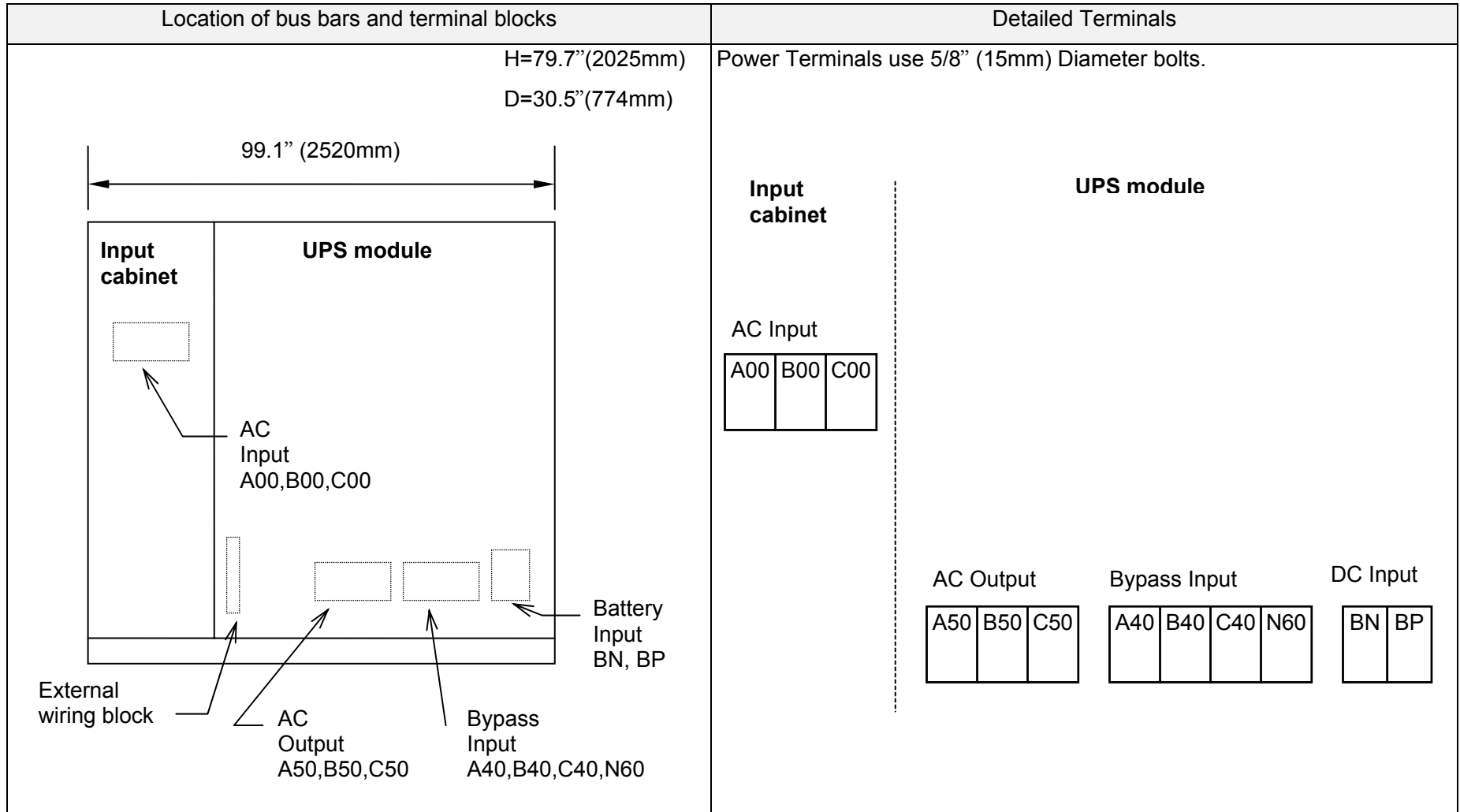




Fig. 3.2-f-2 Diagram of Power Wire & Control Wire Inter-Connect (225kVA UPS, Input voltage 480VAC)

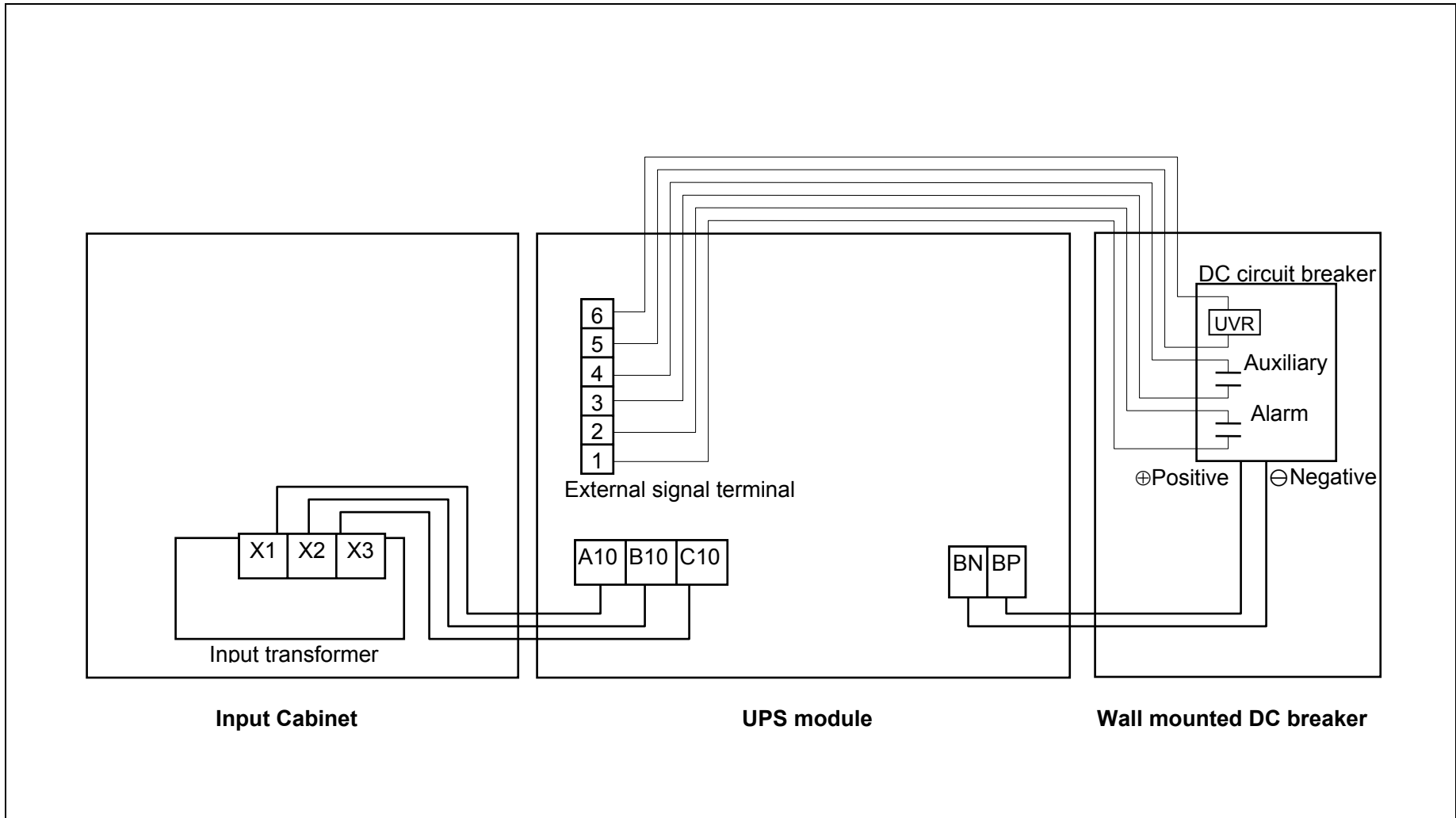




Fig. 3.2-g-1 Diagram of input/output bus bars and terminal blocks (300kVA UPS)

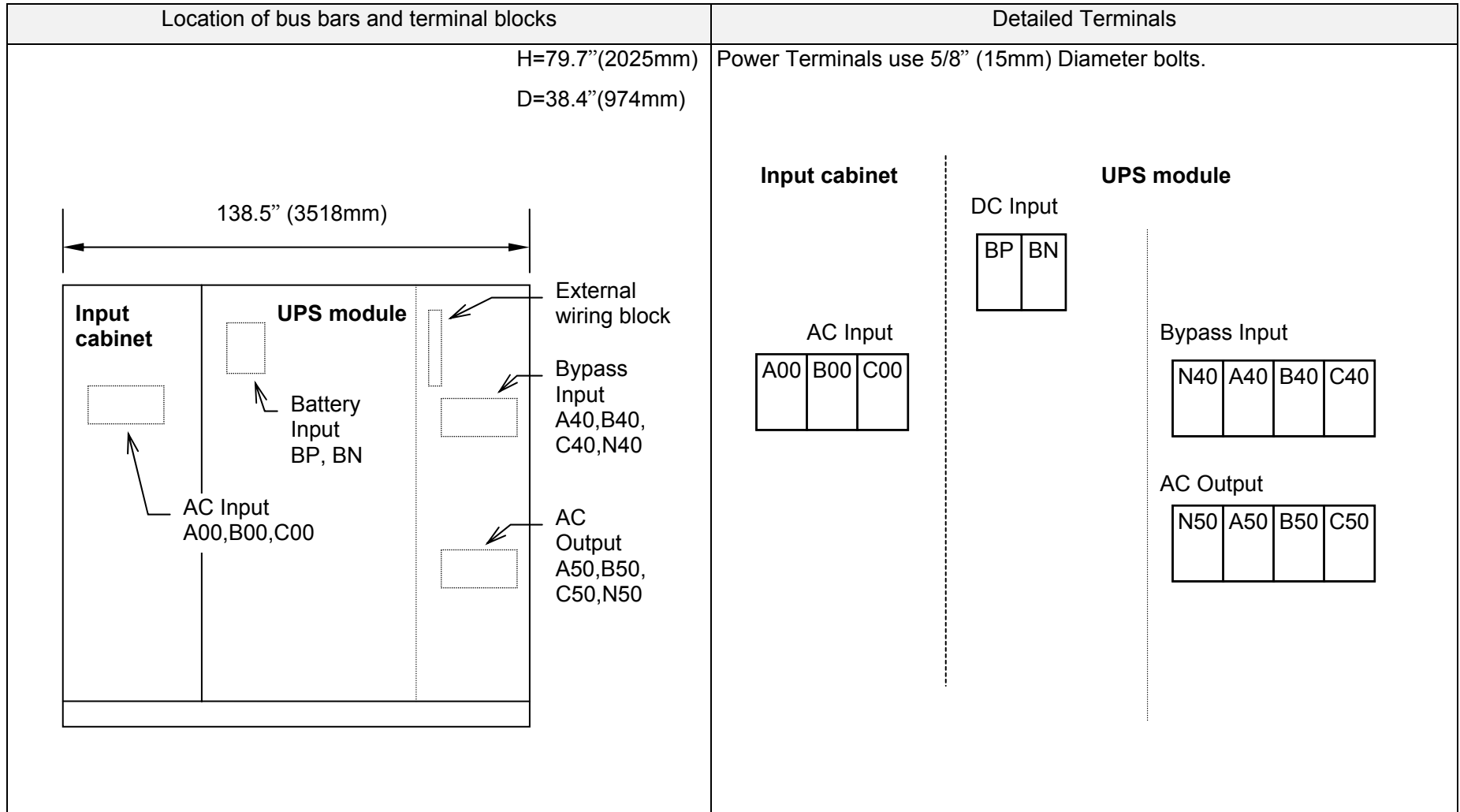




Fig. 3.2-g-2 Diagram of Power Wire & Control Wire Inter-Connect (300kVA UPS)

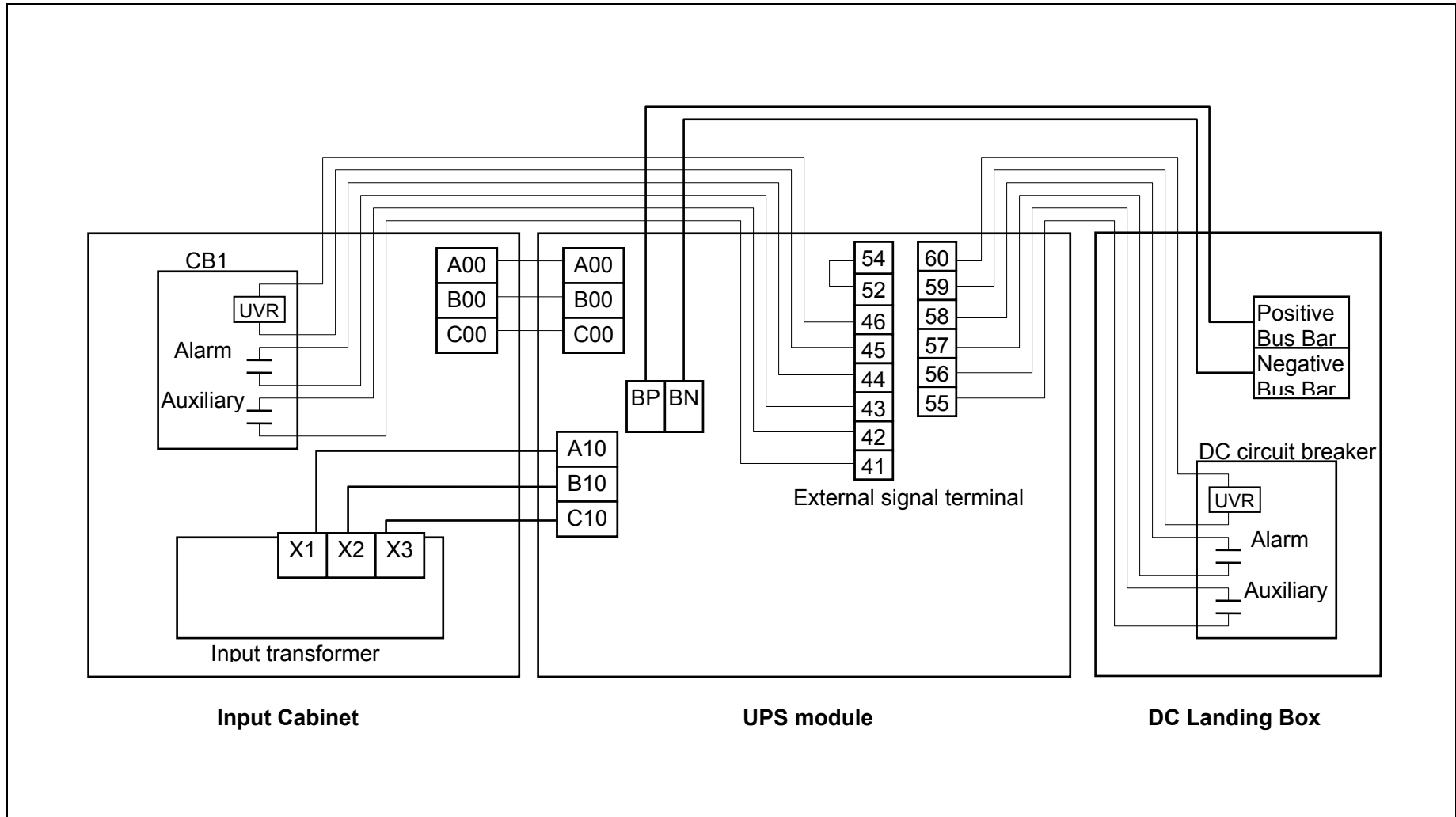




Fig. 3.2-h-1 Diagram of input/output bus bars and terminal blocks (375kVA UPS)

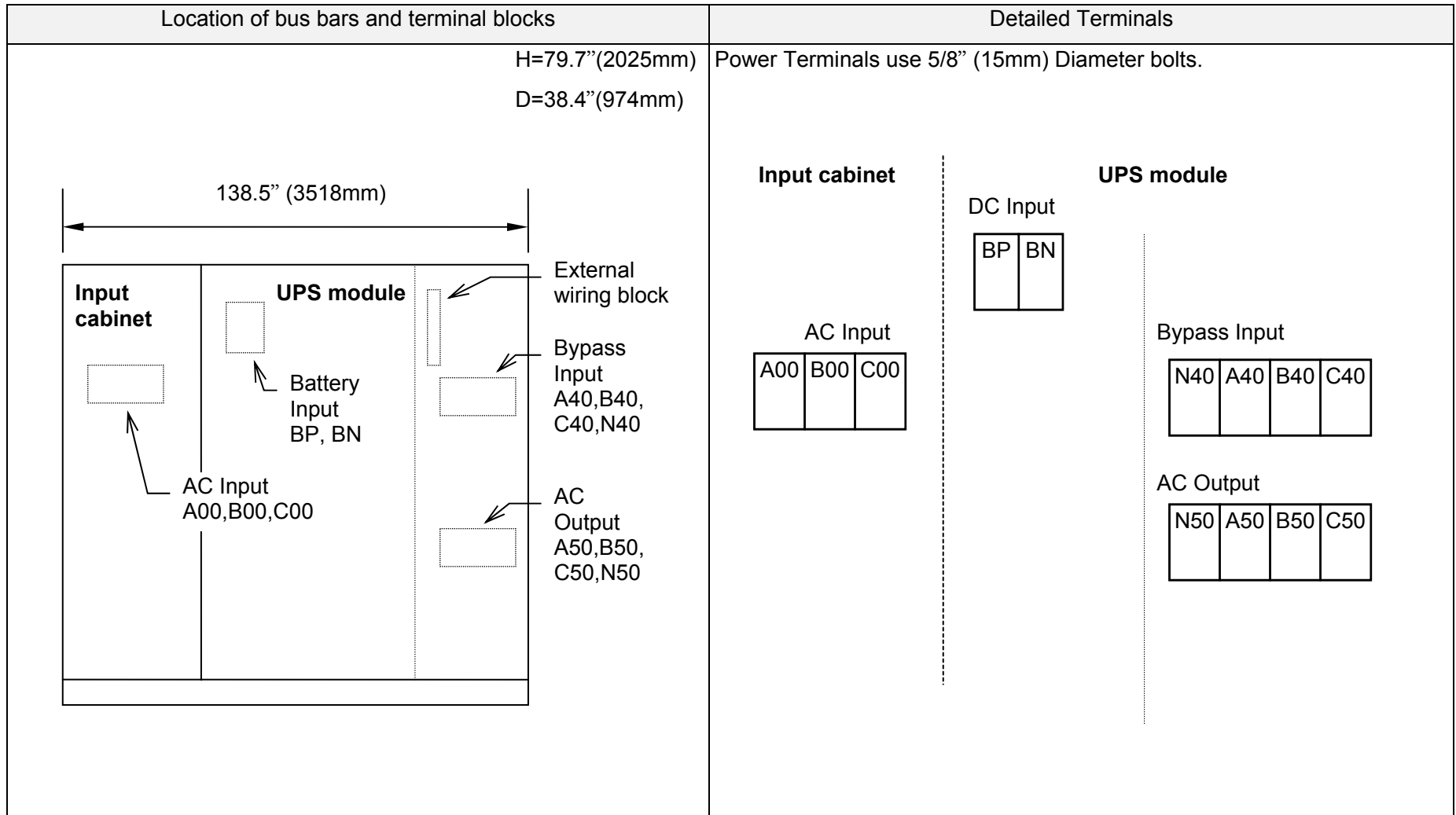
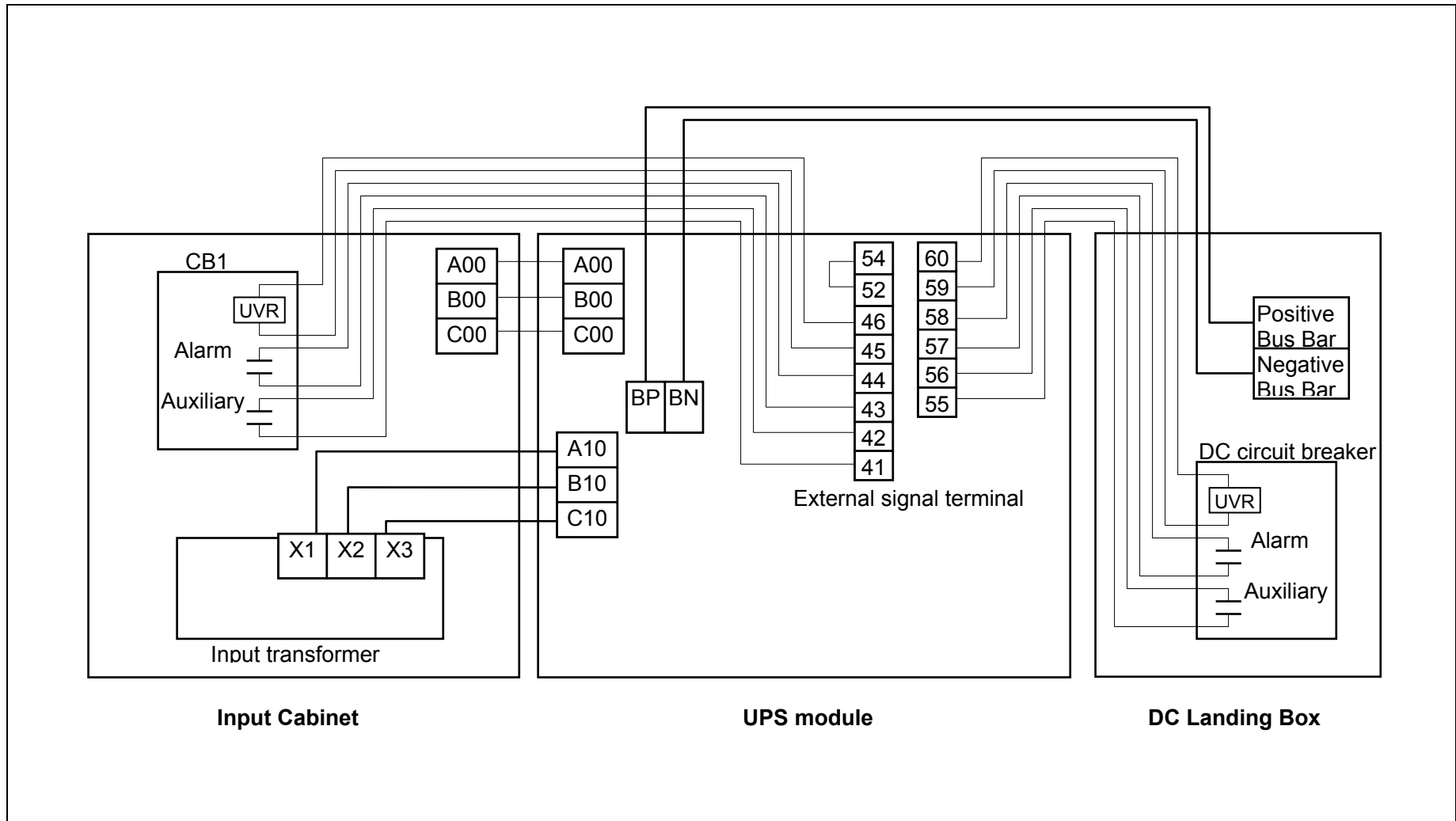




Fig. 3.2-h-2 Diagram of Power Wire & Control Wire Inter-Connect (375kVA UPS)



3.4 Operating Procedures

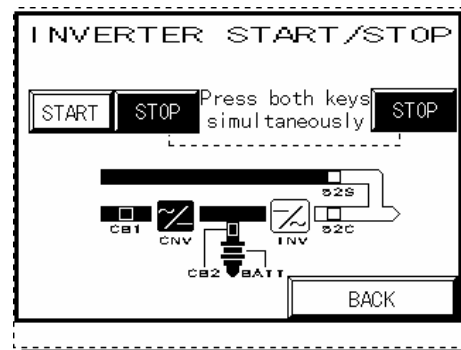
A) UPS Start-up Procedure

1. Verify that the External Bypass input Circuit Breaker(user supplied. Refer to warning 2) is closed.
2. Close Control Circuit Breaker (CB101).
3. After a few seconds, an audible annunciator will sound and the AC Input Circuit Contactor (CB1) will automatically close.
4. The audible annunciator will sound and the instruction "RESET CB2" will be displayed on the Liquid Crystal Display (LCD) panel.
5. Reset the Battery Disconnect Circuit Breaker (CB2). To reset CB2, press the handle down until the handle stays in the off position.
6. Close the Battery Disconnect Circuit Breaker (CB2).
7. The audible annunciator will sound and the instruction "PRESS START / STOP KEY" will be displayed on the LCD panel. (Figure 3.3)
8. Press the "Inverter Start" key in the START/STOP menu on the LCD panel. (Figure 3.4)

FIGURE 3.3 START-UP MENU



FIGURE 3.4 INVERTER START/STOP



9. When the message "LOCAL" is displayed on the LCD panel, the inverter start operation can only be performed locally at the UPS front panel. When the message "REMOTE" is displayed on the LCD pane, the inverter start operation can be started by remote operation only. Lock-out of one inverter start mode is inherent and cannot be.
10. If a local inverter start operation is required (at the UPS), select "Local" in "Remote/Local" function via the Operation menu. Select "LOCAL" mode.
11. Within five (5) seconds, the Inverter will start-up and begin supplying power to the critical load.
12. If power is not supplied to the load, follow the instructions on the LCD panel.

B) UPS Shutdown Procedure

1. If a total UPS shutdown is required, verify that the critical load is OFF.
2. Select "STOP MENU" from the Operations menu.
3. Press the "INVERTER STOP" key in the START/STOP menu on the LCD panel. The UPS will transfer the load to the static bypass line.
4. When the "LOCAL" is displayed on the LCD panel, the operation can be performed at the UPS front panel. When the "REMOTE" is displayed on the LCD panel, the Inverter can be stopped by remote operation only. If the inverter stop operation is required locally (at the UPS), select to "LOCAL" from the "Remote/Local" selection in the Operations menu. Select "Local" mode.
5. Generally, the Inverter alone will be stopped and the Converter will remain energized to float-charge the batteries.
6. If stopping the Converter is required, The operation instruction "TURN OFF CB2" will be displayed on the LCD panel.
7. Open the Battery Disconnect circuit breaker (CB2) manually. The operation instruction "TURN OFF CB101" will be displayed on the LCD panel.

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

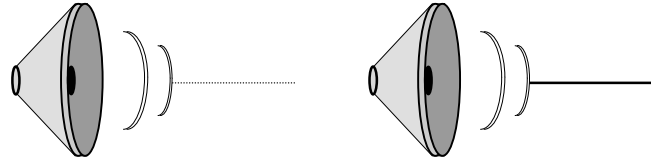
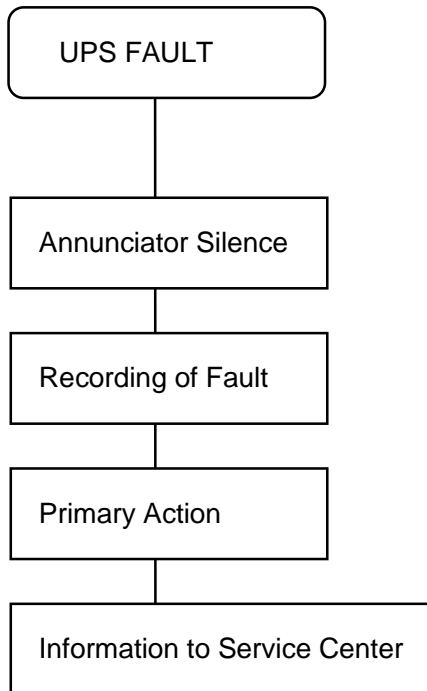
8. Open the control circuit breaker (CB101).
9. Open the AC Input circuit contactor (CB1) automatically.

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

10. If turning off all power to critical load is desired, open the Bypass input Circuit Breaker(MCCB inside the user's cabinet) manually.
11. Contactor CB3 will open automatically.

CAUTION : *All UPS power terminals are still live. Lethal voltages present. De-energize all external sources of AC and DC voltages before handling UPS.*

4.0 RESPONSE TO UPS FAILURE



Depress Silence Alarm Key on MAIN menu.

Refer to the list of fault codes for the description of the error.

Take necessary action per the guidance on the display.

When faults occur continuously contact the Authorized Mitsubishi Service Representative or call Mitsubishi at **1-800-887-7830**.

Note

The error code indicated on the LCD display panel at the time of UPS alarm condition is very important. In order to reduce 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

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 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 details of alarm message on the LCD display panel.

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

- B) If a circuit breaker (MCCB) is in the trip state, depress the toggle to reset the breaker before closing it again.

Fault Code List

| Note 11. Code indication | Status message | Contents | Note 1 Guidance | Note 2 Buzzer | Note 3 External send-out contact | Note 4 Failure lamp | Code No. |
|-----------------------------|---------------------------------------|------------------------------------------------------------------------------------|--------------------|------------------|-------------------------------------|------------------------|----------|
| UF003 | CONVERTER ABNORMAL | Preliminary charge impossible | 1 | [2] | Major | Lit up | 64 |
| UF007 | SENSOR ABNORMAL | Converter input current sensor circuit abnormality | 1 | [2] | Major | Lit up | 1 |
| UF052 | CB1 TRIPPED | Input circuit breaker CB1 has tripped | 1 | [1] | Minor | Flicker | 97 |
| UF053 | CB1 ABNORMAL | Input circuit breaker CB1 abnormal | 1 | [1] | Minor | Flicker | 96 |
| UF056 | CONVERTER OVERLOAD | Converter input overcurrent | 1 | [1] | Minor | Flicker | 192 |
| UF057 | CONVERTER OVERTEMPERATURE | Overheating of converter circuit parts | 1 | [1] | Minor | Flicker | 194 |
| UF058 | COOLING FAN ABNORMAL | Abnormality of cooling fan (converter circuit) | 1 | [1] | Minor | Flicker | 193 |
| UF059 | CONVERTER ABNORMAL | Converter control circuit abnormality | 1 | [1] | Minor | Flicker | 198 |
| UF102 | DC OVERVOLTAGE | Overvoltage of DC voltage | 1 | [2] | Major | Lit up | 5 |
| UF103 | DC UNDERVOLTAGE | Low voltage of DC voltage | 1 | [2] | Major | Lit up | 6 |
| UF105 | SENSOR ABNORMAL | DC voltage sensor circuit abnormality | 1 | [2] | Major | Lit up | 2 |
| UF106 | DC CAPACITANCE ABNORMAL | Electrolytic capacitor abnormality | 1 | [2] | Major | Lit up | 77 |
| UF107 | CB2 ABNORMAL | Battery disconnect circuit breaker CB2 abnormal | 1 | [2] | Major | Lit up | 66 |
| UF151 | DC VOLTAGE ABNORMAL | Does not return to float voltage after power supply is resumed (24 hours) | 2 | [1] | Minor | Flicker | 116 |
| UF152 | DC VOLTAGE ABNORMAL | Does not return to equalizing voltage after power supply is resumed | 2 | [1] | Minor | Flicker | 117 |
| UF153 | CB2 TRIPPED | Battery disconnect circuit breaker CB2 has tripped. | 1 | [1] | Minor | Flicker | 100 |
| UF156 | CB2 TRIPPED (BATTERY OVERTEMPERATURE) | Battery temperature abnormality (UF157) lasted a long time (Note 6) | 1 | [1] | Minor Note 5 | Flicker | 107 |
| UF157 | BATTERY OVERTEMPERATURE | Battery temperature abnormality | 2 | [1] | Minor Note 5 | Flicker | 106 |
| UF158 (Note10) | BATTERY LIQUID LEVEL LOW | Battery solution level drop (Note 7) | 2 | [1] | Minor Note 5 | Flicker | 105 |
| UF159 | DC GROUND FAULT | Grounding of DC circuit | 1 | [1] | Minor | Flicker | 112 |
| UF160 | SENSOR ABNORMAL | Sensor abnormality of battery circuit | 1 | [1] | Minor | Flicker | 114 |
| UF161 | CB2 TRIPPED (DC VOLTAGE ABNORMAL) | Does not return to float voltage after power supply is resumed (48 hours) (Note 6) | 2 | [1] | Minor | Flicker | 196 |
| UF162 | BATTERY ABNORMAL | Battery abnormal detected by battery self test. | | | | | |
| UF201 | INVERTER OVERVOLTAGE | Output overvoltage during inverter power supply (+ 15%) | 1 | [2] | Major | Lit up | 12 |
| UF202 | INVERTER UNDERVOLTAGE | Output low voltage during inverter supply (- 15%) | 1 | [2] | Major | Lit up | 13 |
| UF203 | INVERTER OVERCURRENT | Inverter output overcurrent | 1 | [2] | Major | Lit up | 26 |
| UF209 | 52C ABNORMAL | 52C not turned ON | 1 | [2] | Major | Lit up | 75 |
| UF210 | 52C ABNORMAL | 52C not turned OFF | 1 | [2] | Major | Lit up | 76 |
| UF212 | FAN ABNORMAL | Fan power source abnormality during operation | 1 | [2] | Major | Lit up | 65 |
| UF213 | INVERTER OR CONVERTER OVERTEMPERATURE | Overheating of main circuit parts | 1 | [2] | Major | Lit up | 69 |
| UF214 | COOLING FAN ABNORMAL | Abnormality of cooling fan inside panel | 1 | [2] | Major | Lit up | 67 |
| UF215 | FREQUENT OVERLOAD! | Load switching was made frequently during overload | 4 | [2] | Major Note5 | Lit up | 86 |
| UF216 | SENSOR ABNORMAL | Inverter output current sensor abnormality | 1 | [2] | Major | Lit up | 11 |



| | | | | | | | |
|----------------|------------------------------------|------------------------------------------------------------------------------|----|-----|--------|---------|-----|
| UF254 | 88C ABNORMAL | Fan power source abnormality during operation | 1 | [1] | Minor | Flicker | 197 |
| UF255 | 52C ABNORMAL | 52C turned OFF during inverter power supply | 1 | [1] | Minor | Flicker | 128 |
| UF256 | OUTPUT VOLTAGE ABNORMAL | Inverter output voltage fell out of +/- 5% | 1 | [1] | Minor | Flicker | 109 |
| UF257 | 52C ABNORMAL | 52C not turned OFF when manual transfer | 1 | [1] | Minor | Flicker | 98 |
| UF301 | UPS CONTROL CIRCUIT ERROR | Control microcomputer abnormality | 1 | [2] | Major | Lit up | 19 |
| UF302 | UPS CONTROL CIRCUIT ERROR | Control microcomputer abnormality | 1 | [2] | Major | Lit up | 28 |
| UF303 | UPS CONTROL CIRCUIT ERROR | Control microcomputer abnormality | 1 | [2] | Major | Lit up | 29 |
| UF304 | UPS CONTROL CIRCUIT ERROR | Control microcomputer abnormality | 1 | [2] | Major | Lit up | 31 |
| UF305 | UPS CONTROL CIRCUIT ERROR | Control circuit abnormality | 1 | [2] | Major | Lit up | 21 |
| UF306 | UPS CONTROL CIRCUIT ERROR | Control power source circuit abnormality | 1 | [2] | Major | Lit up | 16 |
| UF309 | INVERTER VOLTAGE ABNORMAL | Inverter output voltage abnormality before inverter power supply | 1 | [2] | Major | Lit up | 83 |
| UF351 | CONTROL FUSE BLOWN | Battery circuit's fuse burnt | 1 | [1] | Minor | Flicker | 115 |
| UF352 | SUPPLY OF CONTROL CIRCUIT ABNORMAL | Control circuit abnormality | 1 | [1] | Minor | Flicker | 111 |
| UF355 (Note10) | UPS CONTROL CIRCUIT ERROR | Control circuit abnormality | 1 | [1] | Minor | Flicker | 130 |
| UF356 | UPS CONTROL CIRCUIT ERROR | Control circuit abnormality | 1 | [1] | Minor | Flicker | 123 |
| UF357 | "INVERTER START " BUTTON ABNORMAL | "INVERTER START" button is abnormal (Local) | 1 | [1] | Minor | Flicker | 124 |
| UF358 | "INVERTER STOP " BUTTON ABNORMAL | "INVERTER STOP" button is abnormal (Local) | 1 | [1] | Minor | Flicker | 125 |
| UF359 | "INVERTER SUPPLY" BUTTON ABNORMAL | "INVERTER SUPPLY" button is abnormal | 1 | [1] | Minor | Flicker | 126 |
| UF360 | "BYPASS SUPPLY" BUTTON ABNORMAL | "BYPASS SUPPLY" button is abnormal | 1 | [1] | Minor | Flicker | 127 |
| UF362 | UPS CONTROL CIRCUIT ERROR | 52S control circuit abnormality (Note 8) | 1 | [1] | Minor | Flicker | 195 |
| UF401 | 52S ABNORMAL | 52S not turned ON, or 52S turned ON without any command | 1 | [2] | Major | Lit up | 84 |
| UF402 | 52S ABNORMAL | 52S not turned OFF, or 52S turned OFF without any command | 1 | [2] | Major | Lit up | 85 |
| UF451 | 52S ABNORMAL | 52S not turned ON, or 52S turned ON without any command when manual transfer | 1 | [1] | Minor | Flicker | 99 |
| UA801 | AC INPUT VOLTAGE OUT OF RANGE | AC input voltage fell out of +/- 18% range | 3 | [1] | Note 5 | | 239 |
| UA802 | AC INPUT FREQUENCY OUT OF RANGE | Ac input frequency fell out of converter synchronization follow-up range | 3 | [1] | Note 5 | | 161 |
| UA803 | AC INPUT PHASE ROTATION ERROR | Phase rotation is inverted when input voltage is normal | 3 | [1] | Note 5 | | 236 |
| UA804 (Note10) | BATTERY ABNORMAL | Battery abnormal (External input) | 1 | [1] | Note 5 | | 238 |
| UA805 (Note10) | AMBIENT TEMPERATURE ABNORMAL | Temp. abnormality in room where installed | 11 | [1] | | | 237 |
| UA806 | INVERTER OVERLOAD > 100% | Overload exceeded 105% (Note 9) | 4 | [1] | Over | Flicker | 216 |
| UA807 | INVERTER OVERLOAD > 110% | Overload exceeded 110% (Note 9) | 4 | [1] | Over | Flicker | 217 |
| UA808 | INVERTER OVERLOAD > 125% | Overload exceeded 125% (Note 9) | 4 | [1] | Over | Flicker | 218 |
| UA809 | INVERTER OVERLOAD > 150% | Overload exceeded 150% (Note 9) | 4 | [1] | Over | Flicker | 219 |
| UA810 | OVERLOAD | Momentary over-current during Inverter power. | 4 | [1] | Over | Flicker | 220 |
| UA811 | BYPASS VOLTAGE OUT OF RANGE | Bypass voltage fell out of +/- 15% range at manual transfer | 5 | [1] | Note 5 | | 240 |



| | | | | | | | |
|-------|---------------------------------------------------------------------|-------------------------------------------------------------------------|----|-----|--------------|---------|-----|
| UA812 | BYPASS VOLTAGE OUT OF RANGE | Bypass voltage fell out of +/- 20% range | 5 | [1] | Note 5 | | 231 |
| UA813 | BYPASS PHASE ROTATION ERROR | Phase rotation is inverted when bypass voltage is normal | 5 | [1] | | | 242 |
| UA814 | BYPASS FREQUENCY OUT OF RANGE | Bypass frequency fell out of inverter synchronization follow-up range | 5 | [1] | Minor Note 5 | | 243 |
| UA816 | EXTENDED BYPASS OPERATION | Bypass power supply continued for many hours | | [1] | | | 244 |
| UA817 | EMERGENCY STOP ACTIVATED | Emergency stop applied | 13 | [2] | Minor | Flicker | 232 |
| UA819 | REMOTE SWITCH ON(START) | There is an error with the remote start switch. | 12 | [1] | | | 229 |
| UA820 | REMOTE SWITCH ON(STOP) | There is an error with the remote stop switch. | 12 | [1] | | | 230 |
| UA821 | UPS STOPPED (TRANSFER INHIBITED - INVERTER AND BYPASS ASYNCHRONOUS) | Transfer cannot be permitted because Bypass voltage abnormal | 5 | [1] | | | 249 |
| UA822 | GENERATOR OPERATION , INHIBITED BYPASS OPERATION | Transfer cannot be permitted because Generator operation contact is ON | | [1] | | | 246 |
| UA823 | CB1 OFF | AC input circuit breaker CB1 turned OFF | 6 | [1] | | | 224 |
| UA824 | CB2 OFF | Battery disconnect circuit breaker CB2 turned OFF | 7 | [1] | | | 225 |
| UA826 | CB101 OFF | Control power source breaker CB101 turned OFF during inverter operation | 8 | [1] | | | 226 |
| UA827 | 52C NOT PERMITTED | "52C PERMISSION" switch turned to OFF | 9 | [1] | | | 233 |
| UA830 | AC INPUT UNDERVOLTAGE | AC input voltage fell out of - 10% range | 3 | [1] | | | 234 |
| UA831 | EMERGENCY BYPASS SWITCH ON | Emergency bypass switch turned to <Emergency> | 10 | [1] | | | 245 |
| UA832 | INTERRUPTED TRANSFER OCCURRED WHEN TRANSFERRING TO BYPASS SOURCE | When transfer to the bypass supply, occurs interrupted transfer. | 5 | [1] | | | 248 |
| UA834 | BATTERY DEPLETED | DC voltage dropped below discharge end during inverter operation | 10 | [2] | Note 5 | | 255 |
| UA835 | UPS STOPPED (TRANSFER INHIBITED - BYPASS INPUT ABNORMAL) | Transfer cannot be permitted because Bypass voltage is abnormal | | [1] | | | 250 |

(Note 1) Numbered guidance:

- 1: Contact Mitsubishi. 1-800-887-7830
- 2: Verify battery is operating within recommended voltage and temperature ranges.
- 3: Verify input power source is properly connected.
- 4: Reduce load.
- 5: Verify bypass power source is within amplitude and frequency.
- 6: Close CB1.
- 7: Close CB2.
- 8: Close CB101.
- 9: Reduce load, and restart.
- 10: Press the reset button.
- 11: Reduce room temperature to within specified UPS operating limits
- 12: Verify remote switch is properly connected and/or functional.
- 13: Place switch in OFF position.

(Note 2)

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

(Note 3)

- "Major" is defined as major failure. Inverter transferred to the static bypass line;
- "Minor" is defined as a minor failure. UPS continues to operate normally, but cause of alarm must be identified;
- "Over" is defined as an overload condition. UPS will transfer to the static bypass line and may or may not return to the inverter. Return to inverter will occur only if overload corrects itself and output load is within rating of UPS.

(Note 4)

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

(Note 5)

External send-out possible by option setting.

(Note 6)

Trips the battery breaker CB2.

(Note 7)

For other than sealed-type battery.

(Note 8)

Place UPS Emergency Bypass switch in the BYPASS position. Contact Mitsubishi.

(Note 9)

If the specified time passes, will transfer to the bypass power supply.

(Note 10)

Shows only when corresponding option settings are made.

(Note 11)

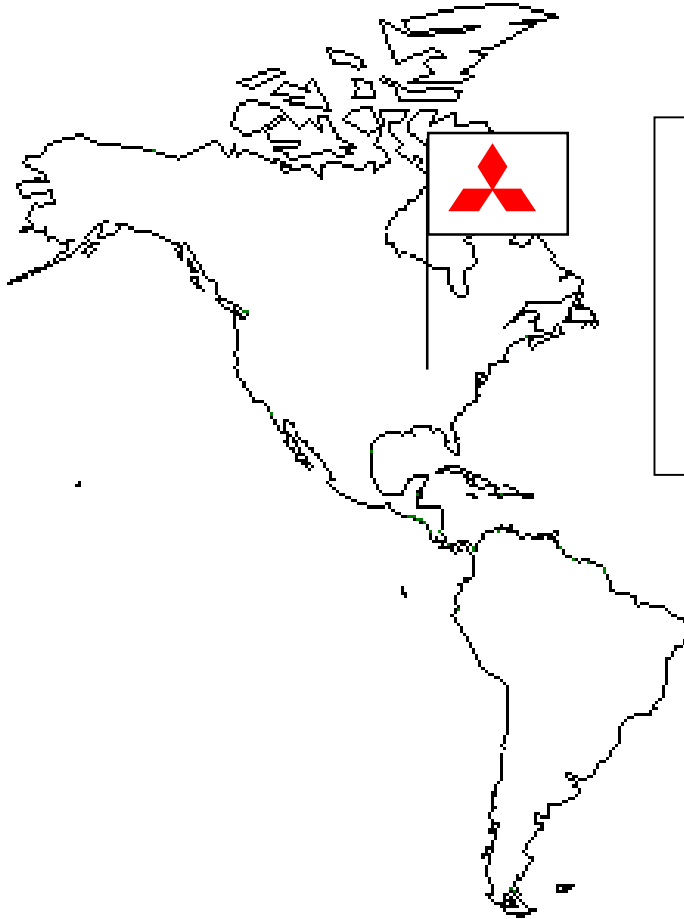
Code indication means:

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

7.0 Warranty & Out of warranty Service

The Mitsubishi Electric UPS Systems Group 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 Automation, Inc. at (847) 478-2500. To register your UPS for warranty purposes, please complete the warranty registration form and fax it to the Mitsubishi Electric UPS Systems Group, 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 Automation Inc,
UPS Systems Group Service Department

500 Corporate Woods Parkway,
Vernon Hills, Illinois 60061, USA

Phone: (847) 478-2500

Fax: (847) 478-2290


Mitsubishi Electric Automation, Inc.
UNINTERRUPTIBLE POWER SUPPLIES

500 Corporate Woods Parkway, Vernon Hills, IL 60061 Phone: (847) 478-2643, Fax: (847) 478-2290

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?
{Energy Producer}

-
- Utility
-
-
- Alternate Energy

{Manufacturing Co.}

-
- OEM
-
-
- Process
-
-
-
- Consumer Goods
-
-
- Electronics
-
-
- Power Quality Equipment

 Commercial Business
 Electrical Contractor
 Healthcare
 Internet
 Education/Univ. Service
{Service}

-
- Consulting
-
-
- Engineering
-
-
- Outsourcing
-
-
- Financial/Legal/Insurance
-
- {Expectations}**

{Government}

-
- Military
-
-
- Municipals
-
-
- Federal/State/Local

 Communications
 Distributors/Reps
 Other _____

Number of Employees at This Location is:

-
- 1 – 19
-
- 100 - 249
-
- 1000 or more
-
-
- 20 – 49
-
- 250 - 499
-
-
- 50 – 99
-
- 500 - 999

Overall how was Start-Up performed:

-
- Unsatisfactory
-
- Satisfactory
-
- Exceeded

Would you like to receive future product updates and news?

-
- Yes
-
- No

**After Start-Up has been done Fax completed Form to:
(847) 478-2290**