

Protector 3

Three Phase Uninterruptible Power System

10 – 62.5 kVA

User Manual

Installation

Operation

Maintenance

Doc #. 6002-1874

Rev. B

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REVISION HISTORY

<u>REV</u>	<u>DATE</u>	<u>PRIMARY REASON FOR CHANGE</u>
A	Mar. 05, 2007	Production Release.
B	Jan 19, 2009	Production Release.

LIST OF EFFECTIVE PAGES

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Congratulations on selecting one of the fine products from OnLine Power, the leader in power protection technology. Our wide product offering includes UPS (Uninterruptible Power Systems), power conditioners, automatic voltage regulators and specialty transformers (e.g., computer-grade, medical-grade). Since our founding in 1972, OnLine Power has shipped many of these fine products to discerning customers around the world for use on sensitive equipment and in critical applications.

One of our goals is to make our manuals both comprehensive and easy to use. The new format of our user manual is the result of ideas and inputs from customers like you who have taken an active interest in our continued success. We invite and appreciate your feedback on our products and documentation via e-mail, fax, mail, or telephone.

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SERVICE

If you require assistance, please call our 24-hour toll free hot line **800-PWR-SRVC** (800-797-7782). Please have the following information from your unit's nameplate available to speed assistance:

Serial Number:

kVA/Power Rating:


Input Voltage:


Output Voltage:



Manufacturer Date:

SECTION 1 - SAFETY

Following safety precautions is important when operating or servicing electrical equipment. The symbols shown are used extensively throughout this manual. Always heed these precautions since they are essential to the safe operation and servicing of this product.

Boxes labeled with the “ **Danger!**” symbol indicate that there is a high risk of personal injury or death if instructions are not followed.

Warnings labeled with the  **Caution** symbol indicate that there is a high probability of equipment failure, damage, or destruction if instructions are not followed.

 Danger!
ONLY FACTORY TRAINED OR AUTHORIZED PERSONNEL SHOULD ATTEMPT TO INSTALL OR REPAIR THE UPS OR ITS BATTERY SYSTEM. IMPROPER INSTALLATION HAS PROVEN TO BE THE SINGLE MOST SIGNIFICANT CAUSE OF START-UP PROBLEMS. HIGH AC AND DC ELECTRICAL VOLTAGES ARE PRESENT THROUGHOUT THE UNIT(S) AND INCORRECT INSTALLATION OR SERVICING COULD RESULT IN ELECTROCUTION, FIRE, EXPLOSION, OR EQUIPMENT FAILURE.
 Danger!
READ THIS MANUAL IN ITS ENTIRETY BEFORE PERFORMING THE INSTALLATION, START-UP, OPERATION, OR MAINTENANCE OF THE UPS (Uninterruptible Power System) OR BATTERY SYSTEMS. FAILURE TO DO SO COULD RESULT IN ELECTROCUTION, FIRE, EXPLOSION, OR EQUIPMENT FAILURE.

If you require assistance, call toll free 800-PWR-SRVC (800-797-7782). Please have the following information from your unit's nameplate available to speed assistance:

Serial Number:	_____
kVA/Power Rating:	_____
Input Voltage:	_____
Output Voltage:	_____
Manufacturer Date:	_____

Danger!

ALL POWER CONNECTIONS MUST BE COMPLETED BY A LICENSED ELECTRICIAN WHO IS EXPERIENCED IN WIRING THIS TYPE OF EQUIPMENT. WIRING MUST BE INSTALLED IN ACCORDANCE WITH ALL APPLICABLE NATIONAL AND LOCAL ELECTRICAL CODES. IMPROPER WIRING MAY CAUSE DAMAGE TO THE EQUIPMENTS, INJURY OR DEATH OF PERSONNEL. VERIFY THAT ALL HIGH AND LOW VOLTAGE INPUT POWER CIRCUITS ARE DE-ENERGIZED AND LOCKED OUT BEFORE INSTALLING CABLES OR MAKING ANY ELECTRICAL CONNECTIONS.

Danger!

EXERCISE EXTREME CARE WHEN HANDLING UPS AND BATTERY CABINETS TO AVOID EQUIPMENT DAMAGE OR INJURY TO PERSONNEL. CABINETS WEIGH SEVERAL HUNDRED POUNDS.

Danger!

TEST LIFT AND BALANCE THE CABINETS BEFORE MOVING. MAINTAIN MINIMUM TILT FROM VERTICAL AT ALL TIMES. THE BOTTOM STRUCTURE WILL SUPPORT THE UNIT ONLY IF THE FORKLIFT FORKS ARE COMPLETELY UNDERNEATH THE UNIT.

Danger!

OBSERVE ALL BATTERY SAFETY PRECAUTIONS DURING INSTALLATION OR SERVICE OF THE UPS OR BATTERIES. EVEN WITH THE BATTERY CIRCUIT BREAKER IN THE OFF POSITION, THE DANGER OF ELECTROCUTION MAY STILL BE PRESENT. THE BATTERY POWER TO THE UNIT MUST BE LOCKED AND TAGGED "OFF" BEFORE PERFORMING ANY SERVICE OR WORK ON THE UNIT. THE BATTERY MANUFACTURER'S SAFETY INFORMATION AND MATERIAL SAFETY DATA SHEET IS LOCATED IN A POCKET ATTACHED TO THE INSIDE OF LEFT DOOR OF EACH UPS. FAILURE TO FOLLOW THOSE INSTRUCTIONS AND THE INSTRUCTION LISTED ABOVE AND ELSEWHERE IN THIS MANUAL COULD RESULT IN AN EXPLOSION, FIRE, EQUIPMENT FAILURE, OR ELECTROCUTION.

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Danger!

ALL POWER TO THE UNIT MUST BE LOCKED AND TAGGED "OFF" BEFORE PERFORMING ANY SERVICE OR WORK ON THE UNIT. FAILURE TO DO SO COULD RESULT IN ELECTROCUTION.

Danger!

IN CASE OF FIRE INVOLVING ELECTRICAL EQUIPMENT, ONLY CARBON DIOXIDE FIRE EXTINGUISHERS, OR THOSE APPROVED FOR USE ON ELECTRICAL EQUIPMENT, SHOULD BE USED. USE OF WATER ON FIRES INVOLVING LIVE HIGH VOLTAGE ELECTRICAL CIRCUITS COULD PRESENT AN ELECTROCUTION HAZARD.

Danger!

EXTREME CAUTION IS REQUIRED WHEN PERFORMING MAINTENANCE. 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 INSTRUCTED.

Danger!

BE CONSTANTLY AWARE THAT THE UPS SYSTEM CONTAINS HIGH DC AS WELL AS AC VOLTAGES. WITH INPUT POWER OFF AND THE BATTERY, DISCONNECTED, HIGH VOLTAGE AT THE FILTER CAPACITORS AND POWER CIRCUITS SHOULD DISCHARGE WITHIN 30 SECONDS. HOWEVER, POWER CIRCUIT FAILURES CAN OCCUR, SO YOU SHOULD ALWAYS ASSUME THAT HIGH VOLTAGE MIGHT STILL EXIST AFTER SHUTDOWN. VERIFY THAT POWER IS OFF USING AC AND DC VOLTMETERS BEFORE MAKING CONTACT.

Danger!

SOME COMPONENTS WITHIN THE CABINETS ARE NOT CONNECTED TO CHASSIS GROUND. ANY CONTACT BETWEEN FLOATING CIRCUITS AND THE CHASSIS IS A LETHAL SHOCK HAZARD.

Danger!

INTERNAL BATTERY STRAPPING MUST BE VERIFIED BY THE CUSTOMER PRIOR TO MOVING THIS UNIT.

THIS UNIT CONTAINS NON-SPILLABLE BATTERIES. KEEP THE UNIT UPRIGHT. DO NOT STACK. DO NOT TIP. ALWAYS FOLLOW THE BATTERY MANUFACTURER'S SAFETY INFORMATION LOCATED IN A POCKET ATTACHED TO THE INSIDE OF THE LEFT DOOR OF YOUR UPS TO PREVENT AN ACCIDENT THAT COULD RESULT IN INJURY OR DEATH.

Danger!

LEAD-ACID BATTERIES CONTAIN HAZARDOUS MATERIALS. BATTERIES MUST BE HANDLED, TRANSPORTED, AND RECYCLED OR DISCARDED IN ACCORDANCE WITH FEDERAL, STATE, AND LOCAL REGULATIONS. BECAUSE LEAD IS A TOXIC SUBSTANCE, LEAD-ACID BATTERIES SHOULD BE RECYCLED RATHER THAN DISCARDED.

DO NOT DISPOSE OF BATTERIES IN A FIRE, THE BATTERIES MAY EXPLODE.

DO NOT OPEN OR MUTILATE THE BATTERIES. RELEASED ELECTROLYTE IS HARMFUL TO THE SKIN AND EYES AND MAY BE TOXIC.

A BATTERY CAN HAVE A HIGH SHORT CIRCUIT CURRENT AND PRESENT A RISK OF ELECTRICAL SHOCK. THE FOLLOWING PRECAUTIONS SHOULD BE OBSERVED WHEN WORKING ON BATTERIES:

1. REMOVE WATCHES, RINGS OR OTHER METAL OBJECTS.
2. USE TOOLS WITH INSULATED HANDLES.
3. WEAR RUBBER GLOVES AND BOOTS.
4. DO NOT LAY TOOLS OR METAL PARTS ON TOP OF BATTERIES.
5. DISCONNECT CHARGING SOURCE PRIOR TO CONNECTING OR DISCONNECTING BATTERY TERMINALS.
6. DETERMINE IF BATTERY IS INADVERTENTLY GROUNDED. IF SO, REMOVE THE SOURCE OF THE GROUND. CONTACT WITH ANY PART OF A GROUNDED BATTERY CAN RESULT IN ELECTRICAL SHOCK. THE LIKELIHOOD OF SUCH SHOCK WILL BE REDUCED IF SUCH GROUNDS ARE REMOVED DURING INSTALLATION AND MAINTENANCE.
7. LEAD-ACID BATTERIES CAN PRESENT A RISK OF FIRE BECAUSE THEY GENERATE HYDROGEN GAS. THE FOLLOWING PROCEDURES SHOULD BE FOLLOWED:
 1. DO NOT SMOKE WHEN NEAR BATTERIES.
 2. DO NOT CAUSE FLAME OR SPARK IN BATTERY AREA.
8. DISCHARGE STATIC ELECTRICITY FROM YOUR BODY BEFORE TOUCHING BATTERIES BY FIRST TOUCHING A GROUNDED SURFACE.

SECTION 2 – OVERVIEW

2.1 INTRODUCTION

The Protector 3 UPS system is designed for switch mode power supplies, computer loads, with no derating, drawing sine-wave input current that is power factor corrected. The Protector 3 meets or exceeds life safety codes of UL1778. These codes were established to allow the UPS to provide power during a power failure.

When input power to the Protector 3 is lost during a power outage, the system will automatically draw power from its internal battery supply without any interruption. The critical load will receive only clean sine wave power. The optional output transformer allows multiple output voltages as well as input voltages that are different than output voltages. The internal VRLA (valve regulated lead-acid), maintenance-free batteries provide specified time of backup power.

Upon restoration of input power, the Protector 3 automatically resumes normal operation, and immediately begins to recharge the batteries.

The Protector 3 has an internal bypass circuit, which maintains the power to the load in case of internal UPS failure.

The Protector 3 provides comprehensive monitoring capabilities. In addition to the LCD display, it provides five dry relay contacts for remote monitoring capabilities. The Protector 3 contains, as standard features, an AS 400, RS 232 protocol interface, RS485 data transmission ports and many other communication options.

The Protector 3 is an on-line three phase PWM inverter available in output rating of 10, 15, 20, 25, 30, 40, 50, and 62.5 kVA. The Protector 3 is listed for compliance to UL1778, UL924A and CSA107.1 Standards. The Protector 3 is available with an input or output voltages of 480Y/277 or 208Y/120 VAC, three phase. This information is provided on the nameplate located on the inside front door of the UPS. See Appendix A for a complete listing of the Protector 3 specifications.

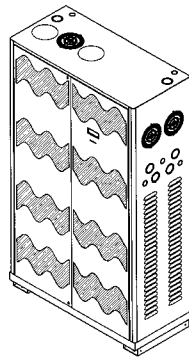


ILLUSTRATION 2-1 PROTECTOR 3

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2.2 BENEFITS

Electrical disturbances can come from practically anywhere: from the incoming power lines and even from within a building. Outside electrical disturbances include lightning strikes, utility switching, brown-outs, and accidents. Electrical disturbances in a facility can be caused by load cycling (elevators, HVAC systems, etc.), fault conditions, welders, and other electrically noisy equipment. Whether the electrical disturbances are generated outside or within the facility, the following power problems can occur:

- Complete power outages;
- Brown-outs including momentary sags;
- Voltage surges;
- Transients including common-mode and transverse-mode noise;
- Frequency shifts and fluctuations.

Sensitive equipment needs protection from power problems. Without power protection, users of sensitive equipment may experience:

- Loss of data;
- Database corruption;
- Rebuilding of files;
- Equipment and component deterioration;
- Premature equipment failures;
- Unexpected equipment malfunctions;
- Missed deadlines, especially during batch processing;
- Loss of real time transaction processing;
- Loss of employee productivity

It offers significant advantages over other alternatives.

The convection cooled, OnLine PWM inverter system, is virtually silent and can be installed anywhere.

On-line PWM technology provides switchover from utility to battery power without any interruption.

The Protector 3 is designed to fit the needs of virtually all power conditioning and UPS applications. It has been designed to power all forms of modern data processing, communication, and process control equipment. The Protector 3 does not require any de-rating, as other UPS products may, when powering 100% electronic loads including switching mode power supplies.

The Protector 3 protects sensitive electrical equipment, such as computer servers, telecommunication networks, LANs, multi-user, and instrumentation systems from electrical interference including problems associated with poor quality AC power sags and complete power outages.

2.3 PRODUCT FEATURES

The following describes the major blocks within the Protector 3. Please refer to Illustration 2-3 Subassembly Component Location to find specific items.

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2.3.1 Input Contactor K1 (Illustration 2-3, Item 20)

The input contactor is multifunctional. First, it provides connections for the input power to the UPS. Secondly, the contactor disconnects the input line when an outage occurs so that there is no back feeding of power into the power line. Finally, the contactor allows for automatic UPS operation upon a complete discharge of the batteries. No operator intervention is required when power to the UPS is restored after a complete battery discharge.

2.3.2 Input Transformer (T3) (Illustration 2-2, Item 2)

The input transformer adjusts the input voltage for proper rectifier DC voltage, depending on UPS rated power and back-up capacity.

2.3.3 Battery Charger (Illustration 2.3, Electronics Tray)

The battery charger maintains the batteries at full charge. After a battery discharge, the charger will automatically recharge the batteries upon restoration of input power. This circuit is on the Power Board.

2.3.4 Power Board Assembly with IGBT's (Illustration 2.3, Item 3)

The Power Board is bolted onto the IGBT (Insulated Gate Bipolar Transistor) blocks that are mounted on a heat sink. The complete Heat Sink Assembly with IGBTs and Power Board is replaceable as a single part. This FRU (Field Replaceable Assembly) converts all the power, i.e. input AC power converted to DC bus, battery power boosted to DC bus, and finally DC bus power converted to output AC power using PWM technology for a smooth AC sine wave. In case of a catastrophic failure, the complete Heat Sink Assembly is easily replaceable using only a screwdriver. The Power Board also contains the housekeeping power supplies and drivers for the IGBTs. The entire assembly provides the landing place for all internal input, output, DC cables and metering devices for control and monitoring of the unit input and output currents.

2.3.5 Control Board (Illustration 2.2, Item 10)

The microprocessor with unit specific firmware and control circuitry is located on the Control Board. The Control Board is mounted on the cabinet door and communicates with the Power Board (A2) via a ribbon cable. It monitors the input and output voltages and generates the command to close or open the input contactor and to sense and change the status of the bypass static switch. The Control Board sends data to the LCD panel located on the door where actual status and parameters are displayed. It additionally has AS400, RS232 and RS485 output capabilities and supports various communication options.

2.3.6 Output Static Switch (Illustration 2.3, Item 18)

This SCR solid-state switch connects the output of the inverter (UPS) to the load. It is connected on the primary side of the optional output isolation transformer. This switch shuts off in case of a problem or failure within the UPS and transfers the load directly to the utility input via the bypass static switch. It maintains its status opposite to that of bypass switch.

2.3.7 LCD Display Panel (Illustration 2.2, Item 11)

The LCD (Liquid Crystal Display) panel provides all the input, output, battery metering and alarm data, and UPS status for customer use on a constantly scrolling set of 2 default screens with continuous update.

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2.3.8 Output Isolation Transformer (Illustration 2.2, Item 1)

The output isolation transformer provides isolation between the inverter and protected output. The power to the primary of this transformer is received from UPS and is transformed to required output voltage levels.

2.3.9 Maintenance Bypass Switch (Illustration 2.2, Item 28)

The MBS (Maintenance Bypass Switch) removes the UPS from the power grid providing utility input directly to the load in case of a problem with the UPS.

2.3.10 Battery Bank – located in External Battery Cabinet(s)

The battery bank consists of sealed, maintenance-free batteries. The batteries provide emergency power during power outages. The battery bank includes a breaker for over current protection and DC disconnect.

2.3.11 System Component Layout

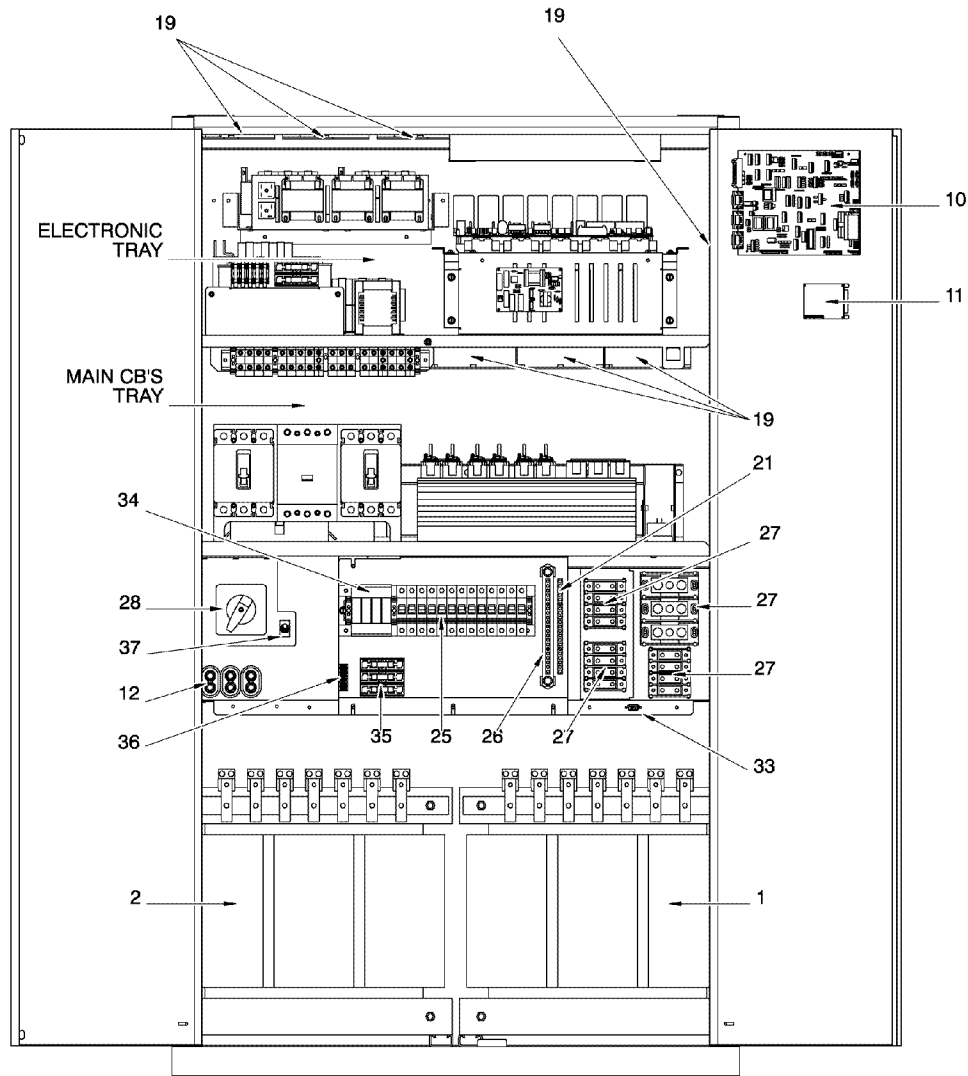


ILLUSTRATION 2-2: COMPONENT LAYOUT

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1. Output Transformer (T1)
2. Auto-Transformer (T3)
3. Power Board Assembly (A1)
4. Input/Output/Battery/DC Buss Terminal Block
5. Output Inductor (L2)
6. Diode Bridge
7. DC Choke (L4)
8. Input Inductors (L1)
9. High Frequency Noise Filter Capacitors, Output and Battery Power
10. Control Board (A2)
11. LCD Display Board
12. Output High Frequency Filter (Optional) (C5, C6, C7)
13. Terminal Block to remove heat sink assembly (TB4)
14. Control Power Transformer (T2A)
15. Fan Fuse (F3 - F6)
16. IGBT Heat Sink Assembly
17. Control Fuses (F2, F1)
18. Heat Sink (Bypass SCR)
19. Fan(s) (B1 - B6)
20. Input Contactor (K1)
21. Ground Terminal
22. Input Breaker (CB1)
23. Battery Breaker (CB2)
24. Output Breaker (CB3)
25. Output Distribution Breakers (Optional)
26. Neutral Bus
27. Customer Input/Output Connection Terminal Blocks
28. Maintenance Bypass Switch (SW1)
29. SCRs and Snubbers
30. Contactor Coil Transformer (T5)
31. Fan Transformer (T4)
32. Inverter Test Switch
33. RS232 (Option)
34. TVSS (Option)
35. TVSS Fuse (Option)
36. 5 Form "C" Alarm Terminal (Option)
37. MBS S -1 Toggle Switch

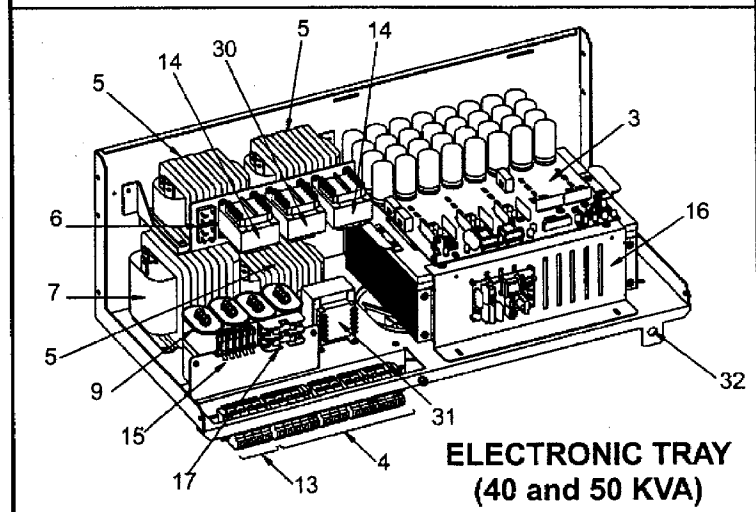
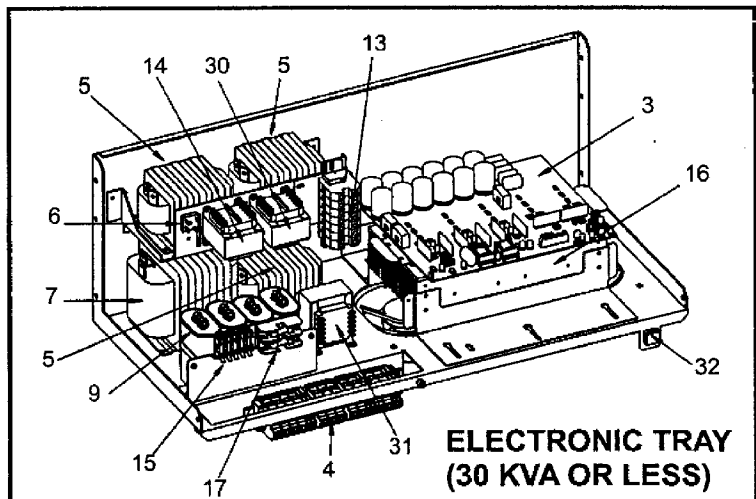
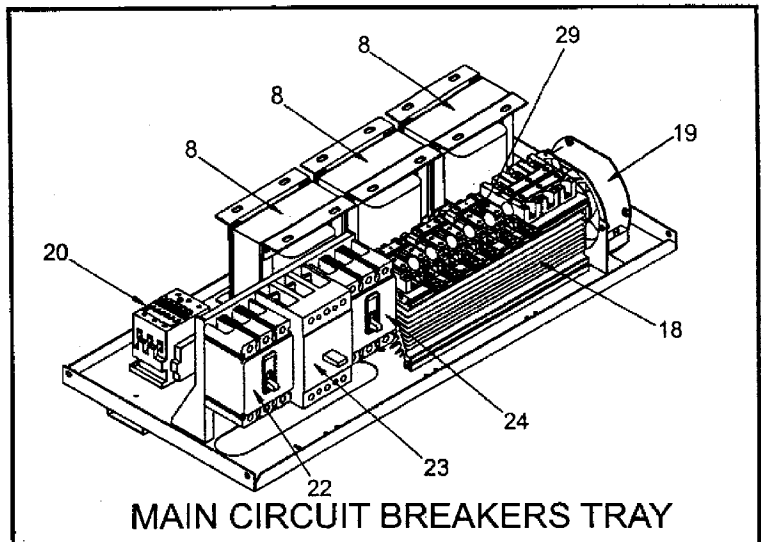


ILLUSTRATION 2-3: SUB-ASSEMBLY COMPONENT LOCATION

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2.4 FUNCTIONAL DESCRIPTION

Illustrations 2-4 thru 2-7 depict functional block diagrams of the Protector 3. These diagrams provide an excellent tool for identifying the major building blocks within the Protector.

2.4.1 Main input circuit breaker - optional

The main input circuit breaker provides Protector 3 with incoming power isolation and input overcurrent protection.

2.4.2 Input Contactor

Input contactor controls power applied to the unit. The microprocessor control circuit verifies that the UPS is in "normal" and not at a "fault" condition and that the input voltage and frequency are within an acceptable range. Only then it energizes the contactor closing coil via control transformer and fuse.

2.4.3 Input Inductors

The input inductors are a 3 phase input filter.

2.4.4 Inverter

When the AC input power is not available to power the load, the inverter converts the energy stored in the battery bank to AC power to supply power to the load. The pulse width modulated (PWM) inverter utilizes high speed, high efficiency IGBTs for fast response, sinusoidal power.

2.4.5 Battery charger

The battery charger converts AC power into regulated DC power to re-charge and to maintain the charge on the battery bank. The charger is fully automatic with a current tapering feature so that battery damage will be prevented in case of a charger malfunction or increased battery temperature. The charger is sized to maintain a full charge even when the input voltage is at the low line limit for indefinite periods of time.

2.4.6 Battery

The battery bank, consists of 16, 24, 26 or 46, 12 Volt batteries, providing the reserve energy to sustain the load when suitable AC input power is not present. The batteries are sealed, maintenance-free, VRLA (Valve Regulated Lead Acid) construction.

2.4.7 DC Choke

The DC choke helps boost battery voltage to a higher internal DC bus voltage.

2.4.8 Output AC Inductor

The Output AC Inductor acts as a filter circuit component to reduce high frequency noise to the output transformer.

2.4.9 Output Transformer

The Output Transformer performs two critical functions. First, it provides excellent common mode and normal mode noise isolation of the load from the input or inverter power. Secondly, it provides voltage transformation and tight regulation of the output voltage while the Protector is operating from its internal inverter.

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2.4.10 Inverter Test Switch

The Inverter Test Switch is a momentary push button for testing the Protector #3 and its batteries for proper operation. With Protector 3 in operation, test switch is pushed and held, the unit will automatically transfer to battery operation. The UPS will continue to run on batteries until the switch is released. Upon release, the Protector 3 transfers back from battery to inverter and resumes normal operation.

2.4.11 DC Supply Transformer

The step down transformer, protected with fuse supplies DC rectifier which produces voltages for power system boards. The primary of this transformer has various taps that need to be matched to the actual main input voltages.

2.4.12 Maintenance bypass switch

This MBS can be used for maintenance when the inverter fails or PM is required. This MBS will transfer the input power directly to critical load. Before switching the MBS to maintenance position, first turn on S1 (toggle switch), then switch to maintenance (MAN) position. Refer to the operation label on the unit. After repair or PM, the MBS can be switched to UPS position. First turn-off S1 (toggle switch), then switch MBS to UPS (AUTO) position.

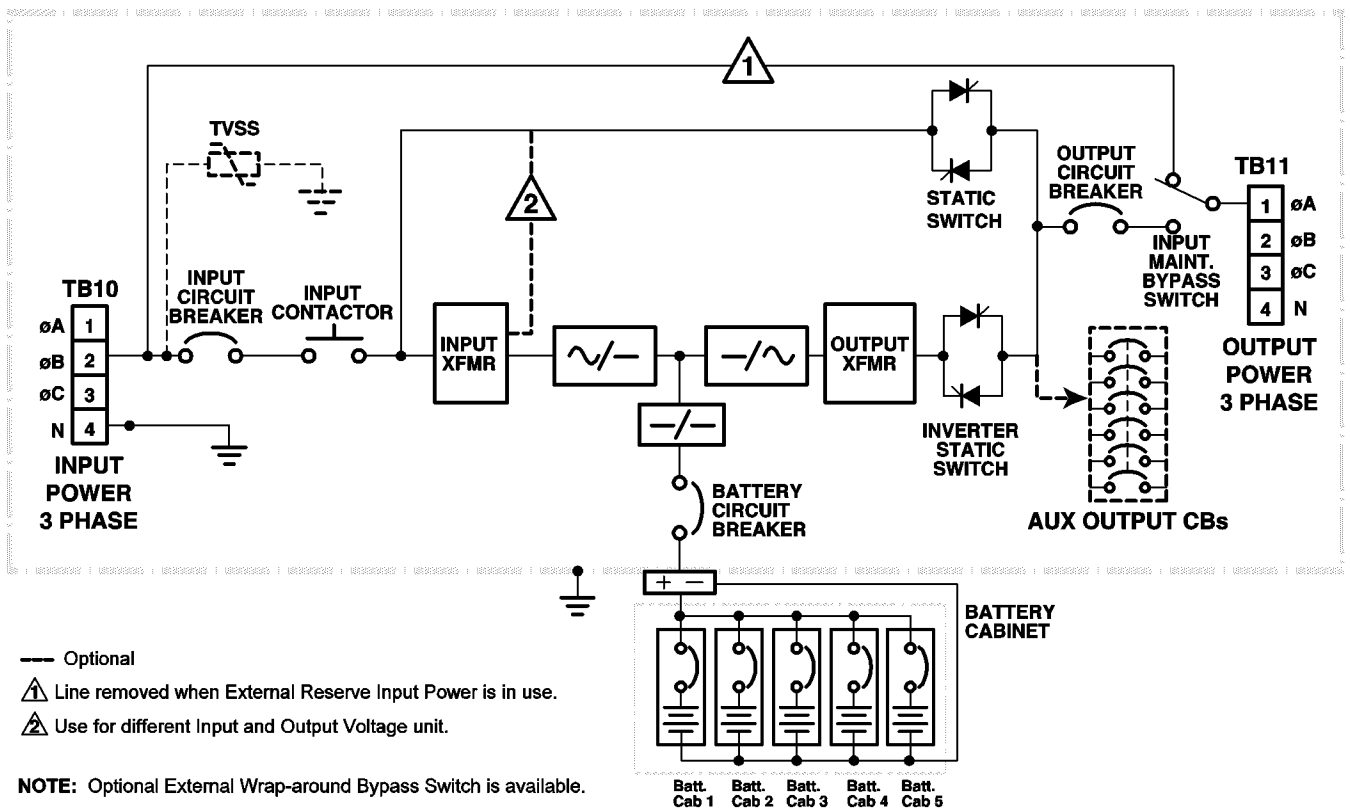


ILLUSTRATION 2-4: FUNCTIONAL BLOCK DIAGRAM FOR SINGLE INPUT POWER

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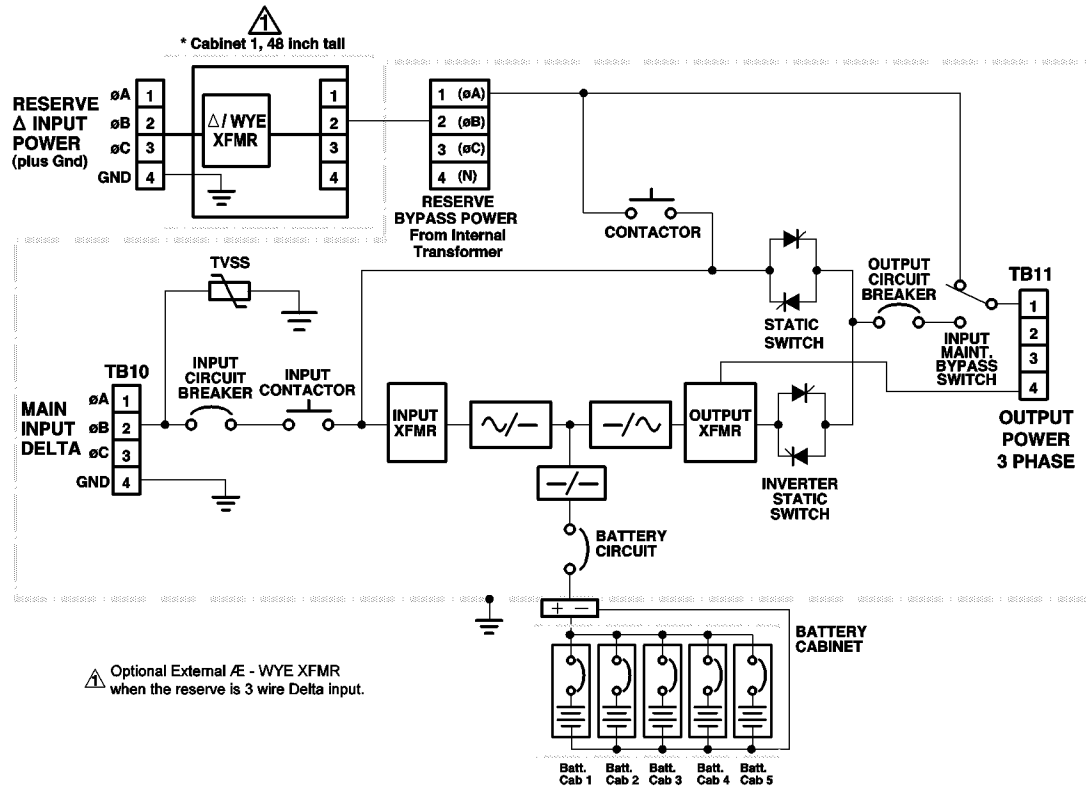


ILLUSTRATION 2-5: FUNCTIONAL BLOCK DIAGRAM FOR DUAL DELTA INPUT POWER

OnLine Power

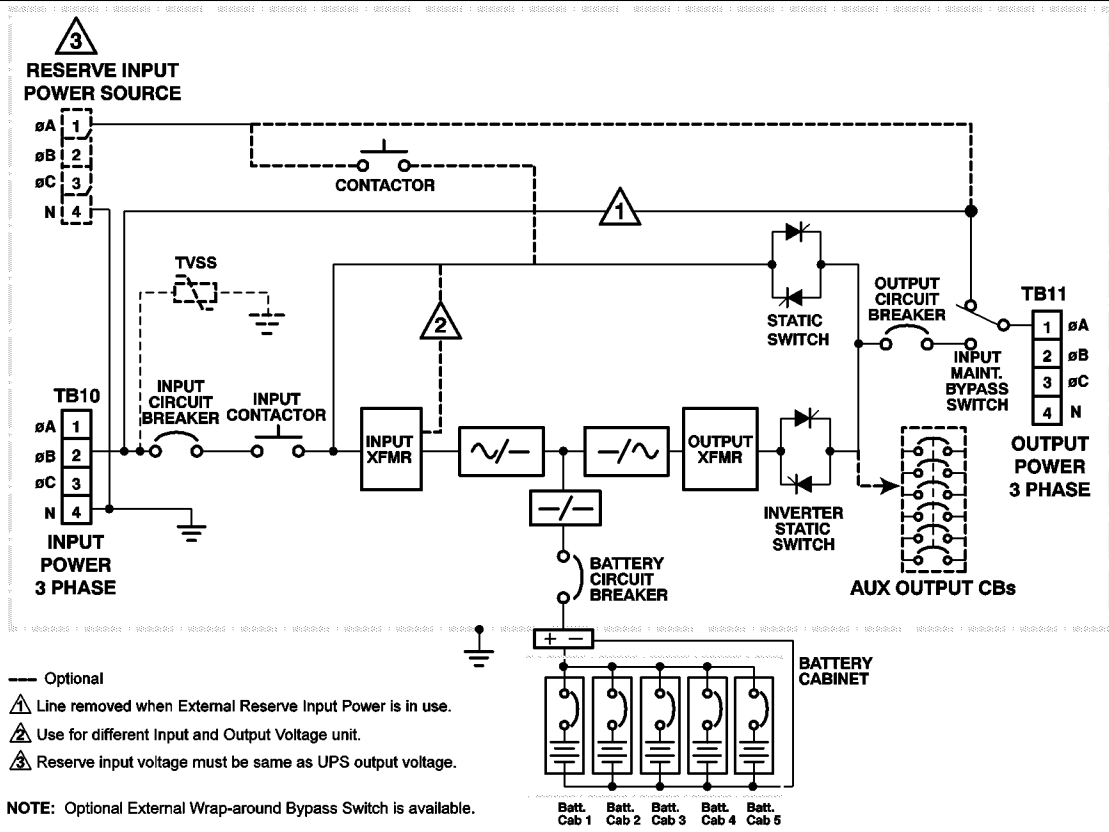


ILLUSTRATION 2-6: FUNCTIONAL BLOCK DIAGRAM FOR DUAL WYE INPUT POWER

OnLine Power

2.5 THEORY OF OPERATION

2.5.1 Standby Mode

After power is applied, the system is placed in STANDBY mode and a self-check starts. During this period, the start subroutine checks for the input voltage and proper operation of the inverter and bypass SCR's. After the routine is completed and check confirmed OK, the system goes into the NORMAL mode.

2.5.2 Normal Mode

The input contactor K1 receives a closing signal, connecting input power to the DC supply transformer. The DC rectifier supplies the battery charger, Control Board and the DC/AC inverter circuit. The battery charger is then activated allowing the batteries to be continuously charged. The on-line DC/AC inverter converts the DC voltage to a pulse-width-modulation (PWM) waveform. This waveform is filtered and reconstructed back to a desired AC output.

2.5.3 Response To Input Power Failure

If the system controller senses a change in input frequency of more than ± 3 Hz or an out of range input voltage, it will consider it an input failure and will immediately open the input contactor, isolating the UPS from the facility. At the same time, the charger is turned off and the battery bank becomes a DC supply source to the inverter circuit, maintaining an uninterrupted AC supply to the protected load. The LCD screen will display a "UPS PROBLEM" message. When the facility power returns, stabilizes and is in phase with the backup power, the system controller closes the input contactor and the system returns to NORMAL. If the battery voltage drops below 16% of its nominal value and the facility power remains off, then the system will assume a FAILURE mode.

2.5.4 UPS Failure

The System controller will issue a FAILURE message on the LCD screen if any of the following conditions happen:

- Internal failure
- System overheats
- Battery bank undervoltage

During a FAILURE, the system stops its backup operation, inverter SCRs are switched OFF, and bypass SCRs are switched ON. A summary alarm 5V signal is sent to the hardwired interface. The system remains in this mode until power is cycled or the system has been repaired when needed. (See page 3-6)

2.5.5 UPS Problem

The System controller will issue a UPS PROBLEM message on the LCD screen if any of the following conditions occur:

- Input power failure
- Output overload

During a PROBLEM mode, inverter IGBs remain on and an alarm signal may be sent to the signal interface. The system will reset itself as soon as the problem disappears.

OnLine Power

2.6 OUTPUT LOADS

The Protector 3 delivers computer-grade, sine-wave power; the preferred power source for all electronic equipment. There are, however, certain types of loads that exhibit an excessive inrush current when first turned on or at other times during operation.

The capacity of the Protector 3 may need to be greater than what would be estimated based on the nameplate requirements of loads previously discussed. Contact your OnLine Power dealer or the factory directly if you have any questions about powering unusual loads from your Protector 3.

2.7 OPTIONS (See section 6 for details)

The following options are available with the Protector 3:

Normally ON output CB's

Normally OFF output CB's

Auxiliary Output Circuit Breaker

Various size, type, and quantity of output distribution breakers for emergency circuits

Input Circuit Breaker with High KAIC rating

High Temperature Alarm

Output Overload Alarm

Remote Meter Panel

AS400

LED Indicators

Extended Battery Run Times

GMS – Global Monitoring System

SECTION 3 – INSTALLATION

3.1 SITE PLANNING AND PREPARATION

The Protector 3 is designed for installation indoors and meets NEMA specifications for operating temperature, humidity, and utility voltage. These cabinets are rugged and corrosion resistant. The footprint of the Protector 3 is less than 6 square feet. Listed below are the environmental specifications for the Protector. Adequate clearance in the front of the equipment **MUST** be provided for service access.

3.1.1 Operating Environment

- AMBIENT TEMPERATURE 0° to 40° C
- OPERATING ALTITUDE 1,829 M (6,000 FT) DERATE 10% FOR EACH ADDITIONAL 305 M (1,000 FT) UP TO 2,744 m (9,000 FT)
- RELATIVE HUMIDITY 0% to 95% (non-condensing)

Operating the Protector and batteries at either extreme of the temperature range may affect the long-term reliability of the system. This is especially true of the sealed, maintenance-free batteries. Sealed, maintenance-free batteries are designed to operate at normal room temperatures (72 to 77 °F).

3.1.2 Storage Environment

Provide a storage environment which meets the following conditions:

- AMBIENT TEMPERATURE -20°C to 68°C
- RELATIVE HUMIDITY 0% to 95% non-condensing
- NOTE System should be stored in its original packaging

3.1.3 Location Considerations (Illustration 3-1)

Site Planning Specifications: Refer to details in Table A-3

KVA	INPUT - OUTPUT VOLTAGE	MODEL NUMBER (0.8 Power Factor)	CABINET SIZE W" X H" X D"	BATTERY VOLTAGE
10	208Y/120 - 208Y/120	PT010B0500T3-VA	39 X 68 X 18	192
10	480Y/277 - 480Y/277	PT010H0900T3-VA	39 X 68 X 18	192
15	208Y/120 - 208Y/120	PT015B0500T3-VA	39 X 68 X 18	192
15	480Y/277 - 480Y/277	PT015H0900T3-VA	39 X 68 X 18	192
20	208Y/120 - 208Y/120	PT020B0500T3-VA	39 X 68 X 18	192
20	480Y/277 - 480Y/277	PT020H0900T3-VA	39 X 68 X 18	192
25	208Y/120 - 208Y/120	PT025B0500T3-VA	39 X 68 X 18	288
25	480Y/277 - 480Y/277	PT025H0900T3-VA	39 X 68 X 18	288
30	208Y/120 - 208Y/120	PT030B0500T3-VA	39 X 68 X 18	288
30	480Y/277 - 480Y/277	PT030H0900T3-VA	39 X 68 X 18	288
40	208Y/120 - 208Y/120	PT040B0500T3-VA	39 X 68 X 18	312
40	480Y/277 - 480Y/277	PT040H0900T3-VA	39 X 68 X 18	312
50	208Y/120 - 208Y/120	PT050B0500T3-VA	39 X 68 X 18	552
50	480Y/277 - 480Y/277	PT050H0900T3-VA	39 X 68 X 18	522
62.5	208Y/120 - 208Y/120	PT062B0500T3-VA	39 X 68 X 18	552
62.5	480Y/277 - 480Y/277	PT062H0900T3-VA	39x68x18	522

OnLine Power

3.1.4 Cable Access

Blocking vents may cause equipment malfunction and failure.

The Protector 3 Cabinet Installation Diagrams for 10~62 KVA models provide cable/conduit openings on the top and sides of the cabinet. Refer to Illustration 3-2.

Caution

Caution

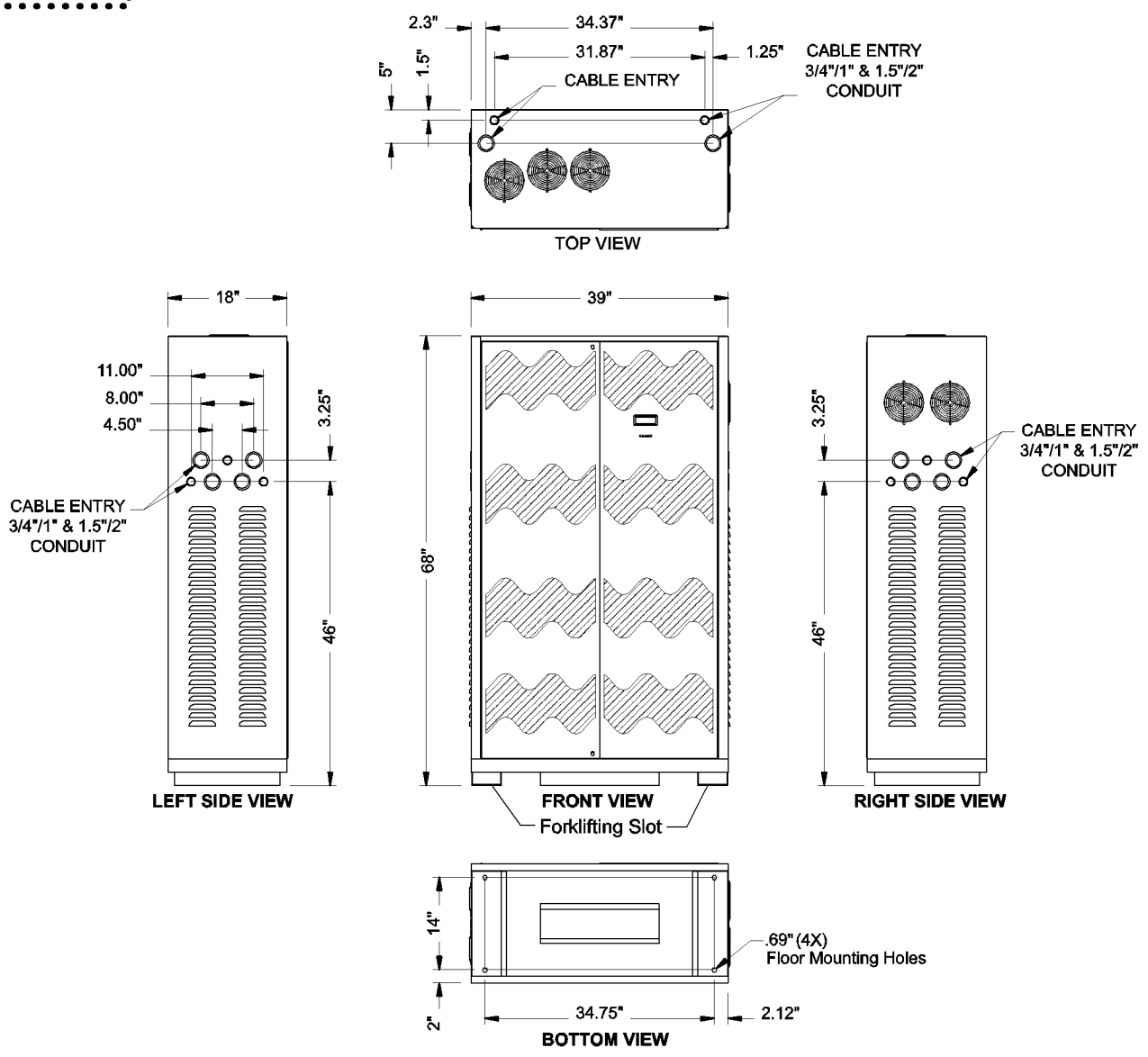


ILLUSTRATION 3-1: CABLE ACCESS AND MOUNTING

OnLine Power



Each model of the Protector 3 is designed to supply a maximum load which is determined by its kVA (1000's of volt-amperes) and kW rating. It is very important that the load is within the rating of this Protector to ensure that the connected loads will be properly supported. Each electrical device to be powered by the Protector 3 should have a specification sheet attached to it, which specifies the amount of power it requires. In addition, this information should be listed in the manual supplied with each piece of equipment. The device's nameplate should also list the electrical requirements of the device. The total load to be powered by the Protector 3 must not exceed its kVA rating. If the total load is exceeded, the Protector monitoring will sense an overload condition and a summary alarm will occur.

3.1.5 Pre-Installation

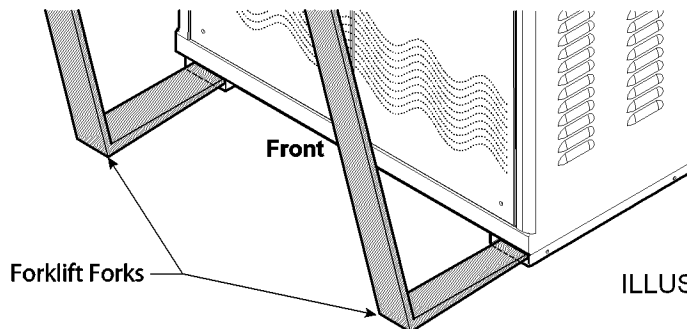
All customer connections are brought through knockouts located on the top or on the sides of the unit. The Protector 3 consists of one electronics and one or more battery cabinets. Before unpacking the equipment, inspect the exterior, the shipping container, and the equipment itself for damage that may have occurred during transit. If the shipping container or equipment itself shows evidence of damage, note the damage on the receiving document before signing for receipt of the equipment. Damage claims should be filed directly with the carrier.

3.2 EQUIPMENT UNPACKING



Danger!

EXERCISE EXTREME CARE WHEN HANDLING UPS AND BATTERY CABINETS TO AVOID EQUIPMENT DAMAGE OR INJURY TO PERSONNEL. CABINETS WEIGH SEVERAL HUNDRED POUNDS. TEST LIFT AND BALANCE THE CABINETS BEFORE MOVING. MAINTAIN MINIMUM TILT FROM VERTICAL AT ALL TIMES. THE BOTTOM STRUCTURE WILL SUPPORT THE UNIT ONLY IF THE FORKLIFT FORKS ARE COMPLETELY UNDERNEATH THE UNIT.



Remove the equipment from the shipping carton. Since the Protector is designed for pad mounting installations, there are no casters. It is suggested that a forklift be used to remove the Protector from its shipping pallet. See illustration 3-2 for the location of forklift slot.

ILLUSTRATION 3-2: FORKLIFTING

OnLine Power

3.3 UNIT INSTALLATION

3.3.1 Mechanical Installation - Preparing to Install UPS Unit

- 1) Before placing the Protector onto the mounting bolts (where it will be installed), the conduit knockouts need to be removed. The conduit knockouts are located on the sides and top of the cabinet. (See illustration 3-2) **NOTE: If site restrictions prevent routing of conduit to the locations where conduit knockouts are located, do not drill holes in the cabinet without first consulting OnLine Power at 800-PWR-SRVC (800-797-7782). The conduit knockouts provided are positioned to prevent airflow disruptions that could cause the unit to overheat. Our engineers will be happy in assisting you in locating the conduit to maintain unit reliability.**
- 2) Determine which knockouts will be used to bring cables into and out of the unit. Only remove the conduit knockouts that are to be used.
- 3) Measure the locations for the conduits on the conduit knockouts.
- 4) Punch holes in the conduit knockouts for the conduits.
- 5) Anchor the Protector to the mounting pad at the four (4) mounting locations (Shown on illustration 3-1).
- 6) Anchor the conduits to the conduit knockouts


If equipment is not ready for normal operation, it must be protected from dust to prevent damage to equipment. This concludes the mechanical installation.

3.3.2 Electrical Connection Arrangements B-9, B-10, and B-11



Danger!

VERIFY THAT ALL CUSTOMER-SUPPLIED WIRING IS DE-ENERGIZED BEFORE PERFORMING ANY ELECTRICAL WORK. FAILURE TO DO SO COULD RESULT IN ELECTROCUTION, INJURY OR DAMAGE TO EQUIPMENT.



Danger!

EVEN WHEN THE POWER WAVE IS OFF, THERE ARE POTENTIALLY DANGEROUS VOLTAGES WITHIN THE POWER WAVE UNIT DUE TO THE BATTERIES. EXTREME CARE MUST BE TAKEN WHEN WORKING WITHIN THE POWER WAVE ENCLOSURE TO AVOID THE POSSIBILITY OF ELECTROCUTION, INJURY OR DAMAGE TO THE EQUIPMENT.

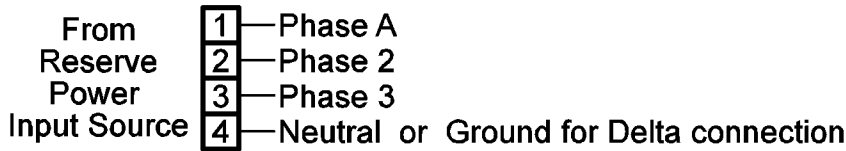


VOLTAGES ON INPUT TERMINAL BLOCK TB10 MUST HAVE CORRECT PHASE ROTATION (CLOCKWISE A, B, C)

OnLine Power

3.3.3 Customer Connections (Input and Output)

- 1) Verify that the main input circuit breaker, battery circuit breaker, and output circuit breaker(s), if provided, are in the "OFF" position. See illustration 2-2 for the location of the circuit breakers.
- 2) Run the wire through the space between shelf and cabinet using provided knockouts.
- 3) Connect the input wires to the input terminal block, TB10. Five (5) wires total: Phase A, Phase B, Phase C, neutral, and ground.
 - Connect Phase A, B, C.



- Please refer to the functional diagram for Dual Input Power System Illustration 2-4
- 4) Connect the output wires to the output terminal block, TB12. Five (5) wires total: Phase A, Phase B, Phase C, neutral, and ground.
 - 5) Connect the battery wires from external battery cabinet (if provided) to battery terminal block, TB6, three (3) wires total for (+), (-), and Ground.

This concludes the electrical connections.



Do not apply power to the Protector 3 at this time.

REFER TO BATTERY CONNECTION DIAGRAM

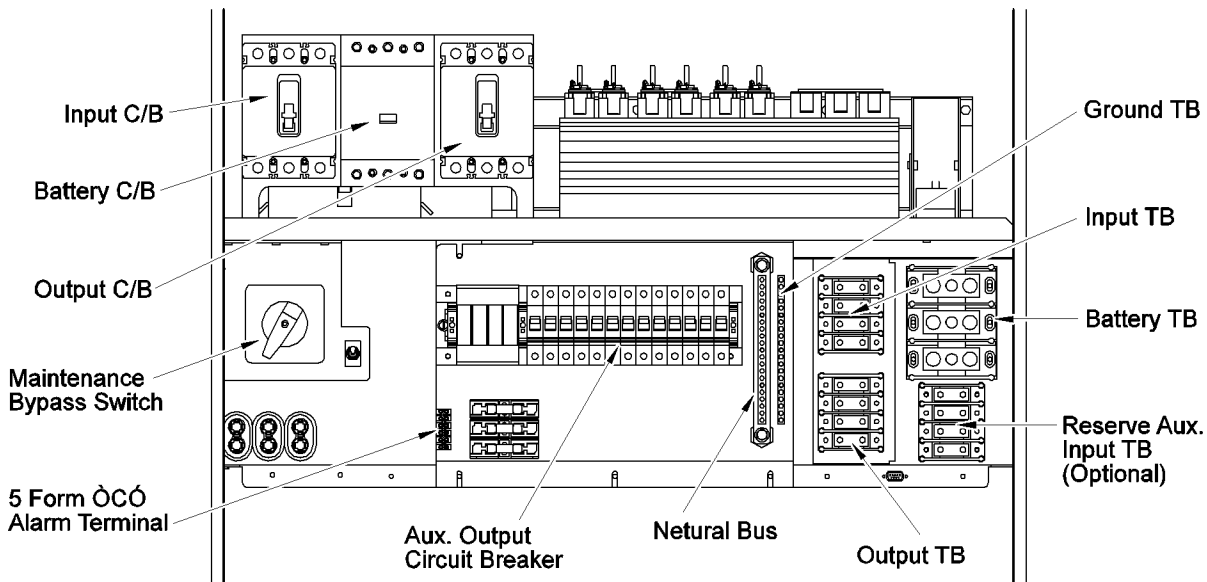


ILLUSTRATION 3-3: Protector 3 Customer Connection

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- CONNECT INPUT POWER TO INPUT POWER T/B.
Phase A, Phase B, Phase C, Neutral as shown above
- CONNECT BATTERY WIRES
Positive (+) to Battery C/B (Left side)
Negative (-) to Battery C/B (Right side)
Verify the polarity prior to connect. Refer to above.
- FOR MULTIPLE BATTERY CABS
Positive (+) to TB5-1
Negative (-) to TB5-2
- CONNECT OUTPUT POWER TO OUTPUT POWER T/B.
Phase A, Phase B, Phase C, Neutral as shown above

If there are no requirements for remote signaling, section 3.4 may be skipped.

3.4 REMOTE SIGNALING CONNECTIONS (OPTION)

The Protector 3 includes the feature of providing dry relay contacts for remote signaling capabilities. Signals available for remote annunciation are:

“**INPUT FAILURE**” - N/O contact that closes upon loss of input power.

“**LOW BATTERY**” - N/O contact that closes when the unit is on battery operation and the batteries approach inadmissible discharge status.

“**BYPASS ON**” - N/O contact that closes when the unit transfers the load to static by-pass.

“**SUMMARY ALARM**” - N/O contact that closes when the unit has any one of the following alarm conditions. internal failure, system overheat, battery undervoltage.

3.4.1 Dry relay contacts for remote signaling are provided via connector (P2) on Control Board (A2), located on the inside of the right door of the enclosure. See illustration 1-2 for location of Control PCB.

3.4.2 Dry relay contacts have the following maximum ratings:

125 volts (AC or DC) maximum

1.25 amperes maximum

30 watts / 50 VA maximum

It is important that contact ratings are observed to prevent damage to the relays and the Control Board.

3.4.3 Determine which signals will be used. Connect wires (customer-supplied) to the connector.

3.4.4 See illustration 1-2 for location of dry C contacts terminal.

This concludes the installation procedure. Please proceed to Section 4 - Start-Up.

OnLine Power

3.5 STORAGE

The Protector 3 can be placed in storage while not in use. Provide a protected environment which meets the environmental parameters listed below.

- AMBIENT TEMPERATURE -4° to 140°F
-20° to 60°C
- RELATIVE HUMIDITY 0% to 95% non-condensing

If the Protector 3 will be stored for three months or longer, it should be serviced by charging the batteries for 24 hours at regular, three-month intervals. While in storage, service the unit using the procedures in this section.

3.5.1 Battery Maintenance

During long-term storage, the batteries are subject to aging and deterioration. After visual inspection, if the batteries need to be replaced, contact your OnLine Power dealer or the OnLine Power factory directly to purchase new batteries. Batteries matching sequence numbers used should be purchased to set-up a string.

If the UPS is stored in its original packaging, unpack UPS using unpacking procedures outlined in Equipment Unpacking Section 3.2.

If the UPS is not connected to a source of power, first connect the UPS to an appropriate power source using the procedures in Unit Installation Section 3.3.

Then recharge batteries as follows:

- 1) Unlock and open front doors.
- 2) Set AC input power source to ON.
- 3) Close input circuit breaker and wait for 1 minute,
- 4) Close battery circuit breaker, only when UPS Normal is displayed on screen.
- 5) The UPS automatically recharges batteries. The LCD panel will indicate the battery voltage and charging current.
- 6) Allow UPS to run for 24 hours to fully charge batteries.
- 7) When batteries have reached partial charge, the battery charging current will be under 1 Amp on LCD panel.
- 8) Open CB2 Battery Breaker
- 9) Turn OFF input power to the UPS.
- 10) Close and lock front door.

SECTION 4 – OPERATION

4.1 START-UP PROCEDURES

Initial start-up must be performed by OnLine Power service personnel or an authorized representative. To request start-up, fax a completed Request for Turn-On form to OnLine Power at 323-721-5017. The Request for Turn On form is attached in this manual as Appendix E. The start-up procedure described in this manual refers to a start up of the Protector 3 after a maintenance shutdown or rectified fault.

4.1.1 Verify that the main input circuit breaker, battery breaker, and output circuit breaker(s), are in the "OFF" or "down" positions. Refer to illustration 2-2 for the location of the circuit breakers.

4.1.2 Check all cable connections are firmly secured.

Caution If during the start-up procedures anything unusual occurs, immediately turn off the input circuit breaker, and contact OnLine Power at (800) 797-7782 for technical assistance. Also, use this number for any other questions or additional information.

Caution The main input power and reserve input power should be available at the same time when dual input power sources are used.

4.1.3 Apply input power to the Protector.

- Input Circuit Breaker remains open.
- Verify that the voltage measured on the input circuit breaker is 208V or 480 VAC and is the same as nameplate voltage rating. If the voltage is not the same as on nameplate within +15% to -10% tolerance, do not proceed any further. Contact OnLine Power at (800) 797-7782 for technical assistance.
- Verify that there are no voltages measured on the output terminal block.

4.1.4 Turn on the main input circuit breaker.

4.1.5 After turning on the system, wait one (1) minute while the Protector runs through its internal diagnostic routines.

- Hear the sound of contactor closing.
- See the fan(s) running.
- See the LCD display screen showing UPS Normal message.

OnLine Power

Line 1	UPS NORMAL @ 15 kVA
Line 2	INPUT OK @ CHRGR ON
Line 3	BATTERY OK @ DC OK
Line 4	ON INVERTER @ OUT OK

- Verify that the LCD display panel indicates all correct parameters - see Appendix D for details.
- Verify that the output voltage is 120/208/277/480 VAC per the nameplate.

4.1.6 Close battery breaker in the UPS cabinet [and in battery cabinet(s)].

4.1.7 At this time, the Protector should be providing AC line power. If the Protector is not operating in the normal mode, turn off the input circuit breaker. Contact OnLine Power at (800) 797-7782 for technical assistance.

4.1.8 Recheck that the output voltage is 208Y/120 or 480Y/277 VAC.

- If the output voltage is approximately the same as the nameplate, turn on the loads.

4.1.9 Verify battery operation and the inverter test switch.

- To place the Protector in battery operation (simulate loss of input power), press and hold yellow Inverter Test Push Button. With Push Button in the hold position, the Protector should be running on its internal batteries.
- Verify that the LCD panel displays is as below, where “xx” is the kVA of this unit:

Line 1	UPS NORMAL @ xx kVA
Line 2	INPUT BAD @ CHRGR ON
Line 3	BATTERY OK @ DC OK
Line 4	ON INVERTER @ OUT OK

- Release the yellow Inverter Push Button and Verify that the LCD PANEL displays “INPUT OK @ CHRGR OFF”.



Be sure to release the Push Button, after the test, so it will not deplete the batteries.

4.1.10 The Protector is now fully functional - providing clean, sine wave power to the load with battery back-up in case of an input power failure.

This concludes the start-up procedures.

OnLine Power

4.2 OPERATION

4.2.1 Turning On the Protector 3

- 1) Apply input power.
- 2) With input power available, turn on the main input circuit breaker.
- 3) Wait until you hear the input contactor closing and fan running.
- 4) Close the battery circuit breaker, only after the LCD display is lit and displays screens per Appendix C
- 5) Verify that all parameters on the LCD display panel are correct. See Appendix C for display details.
- 6) Close the output circuit breaker.
- 7) Turn On the auxiliary output circuit breakers.

4.2.2 Turning Off the Protector 3

Turn off the Output Breaker(s), Battery Breaker, and Input Breaker.

4.3 FIELD REPLACEABLE UNITS (FRUS)

Refer to Table 4-1 for ordering the replacement parts from the factory. Supply the information from the unit's nameplate, including the serial number, model number, kVA, P.F., input/output battery voltages, and date of manufacture, when ordering parts from factory. Call Toll Free (800) PWR-SRVC in North America. Replacement parts must be replaced by qualified factory trained service personnel only.



Circuit boards and IGBTs contain ESDS (ElectroStatic Discharge Susecptable) components. Handle and package ESDS devices in accordance with JEDEC standard JESD625-A. Use a grounded ESD wrist strap when handling the devices and circuit boards. Always package components and circuit boards in static-dissipative plastic bags before transporting even if a device has failed. Failure to do so could result in further damage, complicating repair and failure analysis.

4.3.1 Control Board

The Control Board is located on the inside right door at the top and mounted at 4 corners with screws and washers. Verify that all connectors are matches with their designations and pins #1, 2, etc. Unplug P1 through P15. Install the new board. Reconnect all plugs and connections maintaining them with their original orientations.

4.3.2 All Other Parts

Verify that the cables are marked before disconnecting. Replace the defective part with the new part. Reconnect wiring the same way as it was disconnected.

OnLine Power

4.3.3 Heat Sink Assembly Replacement Procedure

- 1) Disconnect and isolate all sources of power.
- 2) The Heat Sink Assembly is located on the right side of the top electronic shelf, inside the UPS cabinet (Illustration 4-1). Verify that all cables and connectors have labels and are identified as shown. This is important for reinstalling the assembly.
- 3) Disconnect connectors P7, P6, P4, P1 from the PCB, A1, which is mounted horizontally on the big black heat sink.
- 4) Disconnect 11 power cables at TB4-1 through TB4-7B using flat screw driver. Verify and install label ID for each cable before disconnecting.
- 5) Loosen 3 Phillips head screws at front holding heat sink bracket. Pull the complete assembly forward and up. Remove it from tray gently, making sure that no cables or wires are catching (See illustration 4-1).
- 6) Install the new assembly in the reverse order. Note that the rear bracket attached to the heat sink slides under the bracket secured on to the back panel. Slide the assembly back and reinstall 3 Phillips screws.
- 7) Reinstall all the cables and connectors in the reverse order. Verify per illustration 4-1.
- 8) Verify connections prior to starting up the unit.

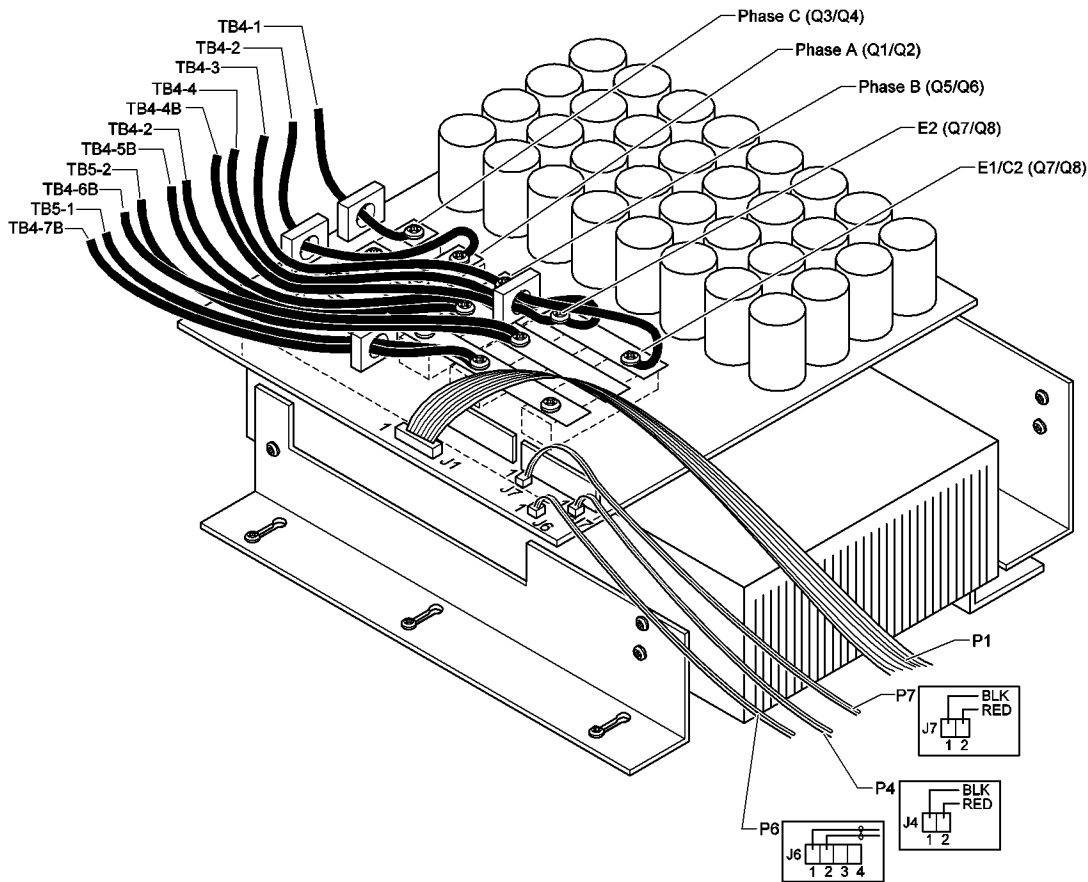


ILLUSTRATION 4-1: HEAT SINK ASSEMBLY (FRU)

OnLine Power

4.4 RENEWAL PARTS

System Parts

ITEM	QTY	DESCRIPTION	DESIGN
1	1	Bypass Static Switch	PB1
2	1	Output Static Switch	PB2
3	2	Input Choke	L1A, B,C
4	1	Output Choke	L2
5	1	DC Choke	L4
6	1	The Frequency Noise Filter Capacitors for output Power	C11, C12, C13
7	1	Control Board	A2
8	1	LCD Display Board	A5
9	1	Input Contactor	K1
10	1	SCR Driver	
11	1	Control Power Transformer	T2
12	1	Control Transformer Fuse	F4.5
13	1	Fan Fuse	F11-14
14	1	Heat Sink Assembly	HS1
15	1	Fan(s)	B1~9
16	1	NL1 (NEON LIGHT)	NL1
17	1	Input Breaker	CB1
18	1	Output Breaker	CB3

SECTION 5 – MAINTENANCE

5.1 SAFETY PRECAUTIONS

 **Danger!**

READ AND UNDERSTAND THIS SECTION THOROUGHLY BEFORE PERFORMING ANY MAINTENANCE WORK ON OR AROUND THE UPS. READ THE BATTERY MANUFACTURER'S MANUAL AND MATERIAL SAFETY DATA SHEETS BEFORE WORKING ON OR NEAR THE BATTERIES.

ONLY NORMAL SAFETY PRECAUTIONS ARE REQUIRED WHEN THE UPS IS OPERATING WITH ALL CABINET DOORS CLOSED. HOWEVER, THE UPS AND BATTERY CABINETS MUST BE KEPT FREE OF STANDING PUDDLES OF WATER, EXCESS MOISTURE, OR DEBRIS. DEBRIS CAN CONSIST OF EXCESSIVE DUST IN AND AROUND THE UNIT, AS THE COOLING FANS IN THE UPS WILL PULL THIS DUST INTO THE UNIT.

 **Danger!**

ONLY FACTORY TRAINED OR AUTHORIZED PERSONNEL SHOULD ATTEMPT TO INSTALL OR REPAIR THE UPS OR ITS BATTERY SYSTEM. IMPROPER INSTALLATION HAS PROVEN TO BE THE SINGLE MOST SIGNIFICANT CAUSE OF START-UP PROBLEMS. SERVICE PERSONNEL SHOULD WEAR INSULATING SHOES FOR ISOLATION FROM DIRECT CONTACT WITH THE FLOOR (EARTH GROUND), AND SHOULD MAKE USE OF RUBBER MATS WHEN PERFORMING MAINTENANCE ON ANY PORTION OF THE UNIT WHILE IT IS UNDER POWER. HIGH AC AND DC ELECTRICAL VOLTAGES ARE PRESENT THROUGHOUT THE UNIT(S) AND INCORRECT INSTALLATION OR SERVICING COULD RESULT IN ELECTROCUTION, FIRE, EXPLOSION, OR EQUIPMENT FAILURE.

 **Danger!**

SPECIAL SAFETY PRECAUTIONS AND LOCKOUT TAGOUT PROCEDURES ARE REQUIRED FOR ALL OPERATIONS INVOLVING THE HANDLING, INSTALLATION, OR MAINTENANCE OF THE UPS SYSTEM AND ANY ASSOCIATED BATTERY CABINETS. FAILURE TO FOLLOW SAFETY PROCEDURES COULD RESULT IN DEATH, INJURY OR DAMAGE TO EQUIPMENT.

Danger!

THIS EQUIPMENT CONTAINS CIRCUITS THAT ARE ENERGIZED WITH HIGH VOLTAGES. ONLY TEST EQUIPMENT DESIGNED FOR TROUBLESHOOTING HIGH VOLTAGES SHOULD BE USED, PARTICULARLY FOR OSCILLOSCOPES AND PROBES.

ALWAYS CHECK WITH AN AC AND DC VOLTMETER TO ENSURE SAFETY BEFORE INITIATING CONTACT OR USING TOOLS. EVEN WHEN THE POWER IS OFF, DANGEROUSLY HIGH POTENTIAL VOLTAGES MAY EXIST AT CAPACITOR BANKS. ALWAYS OBSERVE BATTERY PRECAUTIONS WHEN OPERATING NEAR ANY BATTERIES.

FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN DEATH, INJURY OR DAMAGE TO EQUIPMENT.

Danger!

OBSERVE ALL BATTERY SAFETY PRECAUTIONS DURING INSTALLATION OR SERVICE OF THE UPS OR BATTERIES. EVEN WITH THE BATTERY CIRCUIT BREAKER IN THE OFF POSITION, THE DANGER OF ELECTROCUTION MAY STILL BE PRESENT. THE BATTERY POWER TO THE UNIT MUST BE LOCKED AND TAGGED "OFF" BEFORE PERFORMING ANY SERVICE OR WORK ON THE UNIT. THE BATTERY MANUFACTURER'S SAFETY INFORMATION AND MATERIAL SAFETY DATA SHEET IS LOCATED IN A POCKET ATTACHED TO THE INSIDE OF LEFT DOOR OF EACH UPS. FAILURE TO FOLLOW THOSE INSTRUCTIONS AND THE INSTRUCTION LISTED ABOVE AND ELSEWHERE IN THIS MANUAL COULD RESULT IN AN EXPLOSION, FIRE, EQUIPMENT FAILURE, OR ELECTROCUTION.

Danger!

BE CONSTANTLY AWARE THAT THE UPS SYSTEM CONTAINS HIGH DC AS WELL AS AC VOLTAGES. WITH INPUT POWER OFF AND THE BATTERY, DISCONNECTED, HIGH VOLTAGE AT THE FILTER CAPACITORS AND POWER CIRCUITS SHOULD DISCHARGE WITHIN 30 SECONDS. HOWEVER, POWER CIRCUIT FAILURES CAN OCCUR, SO YOU SHOULD ALWAYS ASSUME THAT HIGH VOLTAGE MIGHT STILL EXIST AFTER SHUTDOWN. VERIFY THAT POWER IS OFF USING AC AND DC VOLTMETERS BEFORE MAKING CONTACT.

OnLine Power

5.2 WHEN TO CALL

Call for service if you encounter any of the following conditions:

- 1) Repeated start-up attempts are unsuccessful.
- 2) A UPS fault occurs which cannot be cleared.
- 3) Normal operation of the critical load repeatedly causes an overload condition. This is not a UPS fault but a qualified person must analyze the total load connected to the UPS to prevent unit failure. Momentary overload conditions will be handled within the parameters of the UPS Unit but sustained overloads will cause the UPS Unit to fail.
- 4) Any indicators or alarms operate abnormally or continuously.
- 5) Any other abnormal function of the system occurs.
- 6) If any abnormal battery condition is detected.
- 7) When you are unsure of what action to take.

5.3 STEPS TO TAKE

If any of the above occur:

- 1) Consult Appendix C, LCD Display Menu and Troubleshooting Guide. Record information on the LCD Display to relay to OnLine Power Customer Service and Support.

2)



LETHAL VOLTAGES ARE PRESENT INSIDE THE EQUIPMENT EVEN WHEN THERE APPEARS TO BE NO INPUT POWER TO THE UNIT. PROTECT YOURSELF FROM THE RISK OF ELECTROCUTION BY REFERRING SERVICE TO QUALIFIED PERSONNEL ONLY.

5.4 PREVENTATIVE MAINTENANCE

UPS Operator Maintenance consists of the basic tasks listed in this section. Other maintenance functions require OnLine Power Service personnel.

5.4.1 Maintaining an Operator's Log

Careful record keeping will ensure proper maintenance of the UPS Unit, and assist in the correction of any abnormal conditions.

The operator's log should contain the following information:

- Date of system start-up
- Dates that battery maintenance was performed
- Dates that input, output, and battery status readings were checked and the values displayed for these readings.
- Dates and summaries of all communications with OnLine Power Service Personnel.

OnLine Power

5.4.2 Periodic Testing of UPS

The UPS Unit should be manually exercised on a periodic basis (once every three months, for example). This forces the UPS unit to transfer to the battery and return to main power. This process activates self-diagnostic testing which may reveal conditions that require attention.

5.4.3 Maintaining the Batteries

Danger!

BATTERY CIRCUIT BREAKER OPERATES AT THE RATED BATTERY VOLTAGES AT ALL TIMES. TRIPPED BATTERY CIRCUIT BREAKER INDICATES A SERIOUS PROBLEM THAT MAY RESULT IN SERIOUS INJURY OR DAMAGE TO THE EQUIPMENT IF CLOSE THE CIRCUIT BREAKER WITHOUT KNOWING WHY IT FAILED. CHECK SHORT IN BATTERY OR CALL ONLINE POWER CUSTOMER SERVICE AND SUPPORT FOR ASSISTANCE AT 1-800-PWR-SRVC.

Danger!

THE BATTERY ELECTROLYTE IS A DILUTED SULFURIC ACID THAT IS HARMFUL TO THE SKIN AND EYES. IT IS ELECTRICALLY CONDUCTIVE AND CORROSIVE. WEAR FULL EYE AND HAND PROTECTION ALONG WITH PROTECTIVE CLOTHING. IF THE ELECTROLYTE CONTACTS THE SKIN, WASH IT OFF IMMEDIATELY WITH WATER. IF ELECTROLYTE CONTACTS THE EYES, FLUSH THOROUGHLY AND IMMEDIATELY WITH WATER. SEEK IMMEDIATE MEDICAL ATTENTION. SPILLED ELECTROLYTE SHOULD BE WASHED DOWN WITH A SUITABLE ACID NEUTRALIZING AGENT. ONE COMMON PRACTICE IS TO USE A SOLUTION OF APPROXIMATELY ONE POUND (500 GRAMS) OF BICARBONATE OF SODA TO APPROXIMATELY ONE GALLON (4 LITERS) OF WATER. THE BICARBONATE OF SODA SOLUTION SHOULD BE APPLIED TO THE SPILL UNTIL EVIDENCE OF CHEMICAL REACTION (FOAMING) HAS CEASED. THE RESULTING LIQUID SHOULD BE FLUSHED WITH WATER AND THE AREA DRIED.

Danger!

DO NOT DISPOSE OF A BATTERY OR BATTERIES IN A FIRE. THE BATTERIES MAY EXPLODE CAUSING DEATH OR SERIOUS INJURY.

OnLine Power

- Caution** Do not substitute batteries from other manufacturers without the express approval of OnLine Power Customer Service personnel.
- Power Battery PRC-12xxx is one battery manufacturer used by OnLine Power, with xxx representing the amp-hour size of the battery.
 - Universal Battery UB12xxx is another battery manufacturer authorized by OnLine Power, the xxx is the amp-hour size of battery.

Caution Lead-acid batteries contain hazardous materials and must be handled, transported, and recycled or scrapped in accordance with federal, state, and local regulations. Since lead is a toxic substance, lead-acid batteries should be recycled rather than scrapped.

- Caution** A battery can present a risk of electrical short and high short circuit current. The following precautions should be observed when working on or around batteries:
- Remove watches, rings, necklaces, or other metal objects.
 - Use only tools with insulated handles.
 - Wear rubber insulating gloves and boots.
 - Do not lay tools or metal parts on top of batteries.
 - Disconnect charging source prior to connecting or disconnecting battery terminals.
 - Verify that battery cabinets are properly grounded.



Danger!

DO NOT GROUND BATTERY POSITIVE OR NEGATIVE.

- Caution** Lead-acid batteries can present a risk of fire because they generate hydrogen gas. The following safety procedures must be followed:
- DO NOT SMOKE when near batteries.
 - DO NOT cause flame or sparks in battery areas.
 - Discharge static electricity from your body before touching batteries by first touching a grounded metal surface.

Caution When replacing batteries, use with the same number of batteries, and same manufacturer, type, and model that was supplied with the unit. To avoid system failure, replace all batteries if one or more batteries fail to perform to specifications.

OnLine Power

5.4.4 Battery Cabinets

Although the individual batteries are sealed and require only minimal maintenance, the batteries should be given a periodic inspection and electrical check. Checks should be performed annually to ensure years of trouble-free service. Tightness of battery terminal connections should be tested to recommended torque values. Battery Service Agreements are available through OnLine Power. Although the individual batteries are sealed and require only minimal maintenance, the batteries should Customer Service and Support at 1-800-PWR-SRVC (800-797-7782)...

5.4.5 Power Connections

- Check for corrosion and connection integrity. Visually inspect wiring for discolored or cracked insulation. Clean and / or re-torque as required.
- All Battery Terminal connections shall be initially torqued to 75 in/lbs. Subsequent re-torquing shall be to 65 in/lbs.

5.4.6 Battery Terminals

- Check for discoloration, corrosion, and connection integrity. Clean and tighten as necessary. Note: Initial Torque Values are greater than re-torque values.
- To access battery terminals, remove the top strapping material located at the lower front of the battery shelf. Pull the battery forward to access the battery connections. Disconnect the cables connected to the battery. Once disconnected, insulate the cables to prevent accidental shorts. (Use a protective boot or electrical tape.) Before replacing the battery connections you must clean and re-torque the connection hardware.
- OnLine Power Customer Service Personnel must approve non-Standard Batteries. Please call at 1-800-PWR-SRVC (800-797-7782).

5.5 ONLINE POWER CUSTOMER SERVICE AND SUPPORT

Start-up, UPS Maintenance, battery maintenance, and preventative maintenance programs are available through your OnLine Power sales representative or through OnLine Power Customer Service & Support.

5.5.1 Start-Up Services

Various Start-up services are available. See your sales representative or telephone OnLine Power Customer Service at 1-800-PWR-SRVC (800-797-7782).

5.5.2 Maintenance Agreements

Standard Full Service, 24/7 Full Service, and Extended On or OFF Site Maintenance agreements are available. See your sales representative or telephone OnLine Power Customer Service at 1-800-PWR-SRVC (800-797-7782).

5.5.3 Warranties

Contact OnLine Power Customer Service and Support at 1-800-PWR-SRVC (800-797-7782) if you have any questions regarding the warranty on your UPS System or the batteries.

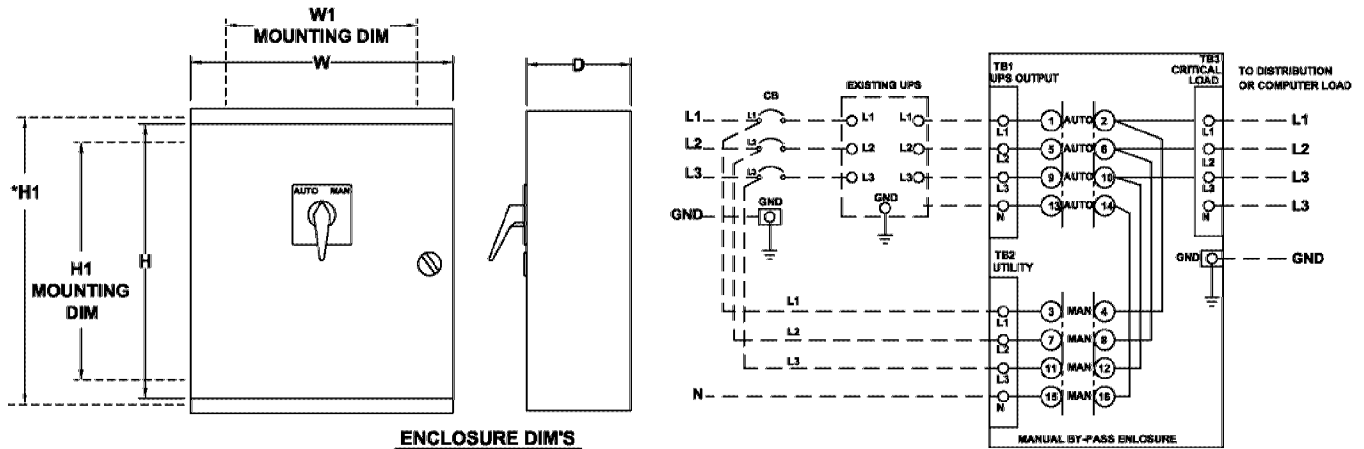
SECTION 6 – SYSTEM OPTIONS

This section describes options available with the Protector 3 phase. The following options are available:

Part Number	Options
3000-044 thru -048 and -055 thru -057	External Manual Bypass Switch
9100-1363-02	Audio Alarms with Silence Switch
9100-1020-04	Remote UPS Status Display, 3 Phase Monitor
9100-1362-02	Form "C" N/O Contacts for Alarms
9100-1440-01	TVSS (Transient Voltage Surge Suppressor), 208V
9100-1440-011	TVSS (Transient Voltage Surge Suppressor), 480V
9100-1343-01 thru -16	Normally ON/OFF Output Aux. Circuit Breakers
9100-1439-01 thru -03	External Output Aux. Circuit Breakers in Panel Board
9100-1372-01-03	10% Input Current Harmonic Filter
9100-1373-01-04	5% Input Current Harmonic Filter
See page 6-9	Higher KAIC Norm .ON/OFF Output Circuit Breaker 3 Phase
	Higher KAIC Norm. ON/OFF Output Circuit Breaker 1 Phase.
9100-1445-01 thru -05	EMI Filters
9100-1446-01 thru -03	Dual Input System WYE/WYE
9100-1446-04 thru -06	Dual Input System DELTA/WYE
See page 6-9	Dual Input System DELTA/DELTA
9100-1317-02	Seismic Mounting Bracket (Left and Right set per cabinet)
9100-1429	Rack Stack
9100-1493-02	Power Flow Mimic
	GMS (Global Monitoring System)
9100-1466-02	Local On UPS -Event Log
9100-1453-01	Local On UPS - Aux. Output CB Trip Monitor w. Event Log
9800-03-25 thru -150	Local on PC - via RS232
9800-04-150 thru -1000	Local on PC - via RS485
9100-1468-02	Remote - Dial-Up
9100-1469-01	WEB/SNMP

OnLine Power

6.1 Optional External Maintenance Bypass Switch – P/N 3000-044 thru -056




NOTES:

- 1) Switch contacts are 3 phase L-L & N "make before-break".
- 2) Contacts marked "AUTO" are closed in the "AUTO" position.
- 3) Contacts marked "MAN" are closed in the "MAN" position.
- 4) Wrap around By-pass SW should be used with same input/output voltage.
- 5) For different input/output should be used with external transformer.
- 6) Wrap around By-pass SW should be used with any built in distribution Secondary Aux Circuit Breakers.

ILLUSTRATION 6-1: EXTERNAL MAINTENANCE BYPASS SWITCH DIAGRAM

6.1.1 Installation

Allow front access to the MBS box at all times for maintenance and servicing. Electrical codes require that the MBS box be installed with no less than 3 feet at the front of the cabinet. Side and rear panels do not require service clearance, however side vents must not be blocked.



Danger!

ALL POWER CONNECTIONS MUST BE COMPLETED BY A LICENSED ELECTRICIAN WHO IS EXPERIENCED IN WIRING THIS TYPE OF EQUIPMENT. WIRING MUST BE INSTALLED IN ACCORDANCE WITH ALL APPLICABLE NATIONAL AND LOCAL ELECTRICAL CODES. IMPROPER WIRING MAY CAUSE DEATH, INJURY, EXPLOSION, FIRE OR DAMAGE TO THE EQUIPMENT. VERIFY THAT ALL INCOMING HIGH AND LOW VOLTAGE POWER CIRCUITS ARE DE-ENERGIZED AND LOCKED OUT BEFORE INSTALLING CABLES OR MAKING ANY ELECTRICAL CONNECTIONS.

Refer to Section 3.1, Site Planning and Preparation

Verify the following connections have been made per wiring diagrams: 6001-032-11, 6001-032-12, and specific application related sheets.

OnLine Power

Wiring Inspection:

- 1) Verify all power connections are tight.
- 2) Verify all control wire terminations are tight.
- 3) Verify all power wires and connections have proper spacing between exposed surfaces, phase-to-phase and phase-to-ground.
- 4) Verify that all control wires are run in individual, separate steel conduit.

6.1.2 Operation

The external maintenance bypass switch is mounted in a box which is field installed on the UPS cabinet. This box includes a rotary switch to provide a single control for transferring to and from maintenance bypass. For ratings, wiring diagram enclosure dimensions and installation refer to drawings # 6001-032-11 for 3-pole, and 6001-032-12 for 4-pole panels.

The operator control switch for external manual bypass switch can be accessed by opening the cabinet front door.



The single control simplifies the operation of the external manual bypass switch, however operating instructions must be carefully observed before using the bypass switch. Using the improper sequence in operation of the bypass switch SW-1 and toggle switch S-1 could result in unwanted action.

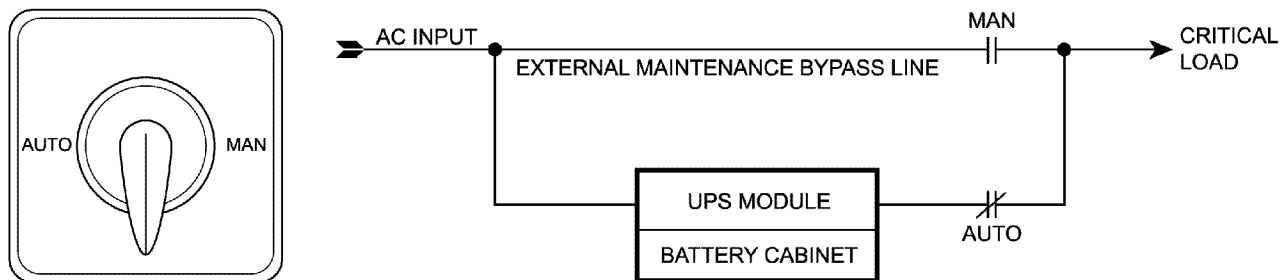


ILLUSTRATION 6-2: MAINTENANCE BYPASS SWITCH

The two Manual Bypass Switch Positions are:

- 1) **“MAN”** – Connects power to the critical load through the external maintenance bypass line. UPS needs to be de-energized for maintenance purposes.
- 2) **“AUTO”** – Connects the critical load to the output of the UPS and establishes normal operation.

OnLine Power

6.1.3 Specification. Optional External Manual Bypass Switch

Part Number	Description
3000-044	EXTERNAL MANUAL BYPASS SWITCH, MAKE BEFORE BREAK, 55AMP, 3 POLES / LINE ONLY, 14"(W) x 10.00(D) x 18.00 (H). USE FOR: 10/15KVA, 208V/480V UNIT INPUT 20/25/30/40KVA – 480V UNIT INPUT
3000-045	EXTERNAL MANUAL BYPASS SWITCH, MAKE BEFORE BREAK, 110AMP, 3 POLES / LINE ONLY, 14"(W) x 11.00(D) x 18.00 (H). USE FOR: 20/25VA, 208V UNIT INPUT 50/62.5KVA – 480V UNIT INPUT
3000-046	EXTERNAL MANUAL BYPASS SWITCH, MAKE BEFORE BREAK, 175AMP, 3 POLES / LINE ONLY, 16"(W) x 12.00(D) x 20.00 (H). USE FOR: 30/40KVA, 208V UNIT INPUT
3000-047	EXTERNAL MANUAL BYPASS SWITCH, MAKE BEFORE BREAK, 240AMP, 3 POLES / LINE ONLY, 14"(W) x 10.00(D) x 18.00 (H). USE FOR: 50/62.5KVA, 208V UNIT INPUT
3000-055	EXTERNAL MANUAL BYPASS SWITCH, MAKE BEFORE BREAK, 55AMP, 4 POLES / LINE / N ONLY, 14"(W) x 10.00(D) x 18.00 (H). USE FOR: 10/15KVA, 208V/480V UNIT INPUT 20/25/30/40KVA – 480V UNIT INPUT
3000-056	EXTERNAL MANUAL BYPASS SWITCH, MAKE BEFORE BREAK, 110AMP, 4 POLES / LINE/N ONLY, 14"(W) x 11.00(D) x 18.00 (H). USE FOR: 20/25KVA, 208V UNIT INPUT 50/62.5KVA, 480V UNIT INPUT
3000-057	EXTERNAL MANUAL BYPASS SWITCH, MAKE BEFORE BREAK, 175AMP, 4 POLES / LINE/N ONLY, 16"(W) x 12.00(D) x 20.00 (H). USE FOR: 30/40KVA, 208V UNIT INPUT
3000-058	EXTERNAL MANUAL BYPASS SWITCH, MAKE BEFORE BREAK, 240AMP, 4 POLES / LINE/N ONLY, 20"(W) x 14.00(D) x 24.00 (H). USE FOR: 50/62.5KVA, 208V UNIT INPUT

OnLine Power

6.2 OPTIONAL AUDIO ALARM WITH SILENCE SWITCH – P/N 9100-1363-02

6.3 OPTIONAL REMOTE UPS STATUS PANEL - P/N 9100-1020-04

6.3.1 Installation

The Remote UPS Status Panel is available in a console mount style box in black finish. It can also be wall mounted and comes with a 10 foot long “DB” connector signal cable or optional length cable that can be up to 1000 feet long.

6.3.2 Operation

The Remote Status Panel requires 120 VAC power, comes with 6 ft power cord, SILENCE, LED / HORN test switches and includes following status LED's.

- INPUT FAIL
- ON BYPASS
- INVERTER ON
- LOW BATTERY
- SUMMARY ALARM

6.3.3 Specifications

UPS Remote Status Panel Installation Drawing 9100-1020-10, revision A, attached at the end of System Options Section.

6.4 OPTIONAL FORM “C” CONTACTS FOR ALARMS – P/N 9100-1362-02

6.4.1 Installation

Terminal strip TB is provided on the optional alarm relay board for user connection to the individual alarm contacts.

6.4.2 Operation

The Remote Contact Board includes isolated Form C contacts for the following alarm signals:

TB-1	LOW BATTERY
TB-2	ON BYPASS
TB-3	SUMMARY ALARM
TB-4	NOT USED
TB-5	INPUT FAIL
TB-6	COMMON

OnLine Power

6.5 OPTIONAL TVSS P/N – 9100-1440-01

6.5.1 Operation

TVSS contains energy absorbing components designed for specific line configurations. The device has two-stage protection. When protection components are damaged by absorbed transients, the device will show a reserve flag indicating a need for replacement. At this time the device is still operational, due to redundant circuits. After the second spike, the device will show and alarm condition indicating replacement is mandatory. Remote indication contacts “TS” allows remote control of the protection status.

6.5.2 Specifications

Part Number	Description
9100-1440-01	TVSS OPTION. 208V, 3PH, 40KVA 8/20US, THREE PHASE, REPLACEABLE DIN RAIL, LED ALARM, AND INTERNAL DISCONNECTOR. IEC61643-1 / EN61643-11 ANSI / IEEE C62.41 / UL1449, Second Edition –Feb.2007 CULUS / UL94-V2 3PHASE PLUS NEUTRAL
9100-1440-11	TVSS OPTION, 480V, 3PHASE, THREE PHASE, REPLACEABLE DIN RAIL, LED ALARM, AND INTERNAL DISCONNECTOR. IEC61643-1 / EN61643-11 ANSI / IEEE C62.41 / UL1449, Second Edition –Feb.2007 CULUS / UL94-V2 3PHASE PLUS NEUTRAL.

6.6 OPTIONAL NORMALLY ON/ NORMALLY OFF OUTPUT AUX. CIRCUIT BREAKERS – P/N 9100-1343-01 THRU -16

These circuit breakers are 1 pole, 20 A devices for protection of customer's circuits.

Normally ON C.B. Option

Normally OFF C.B. Option

Normally OFF Delay C.B. Option

6.7 OPTIONAL EXTERNAL OUTPUT AUX. CIRCUIT BREAKERS IN PANEL BOARD – P/N 9100-1439-01 THRU -03

6.7.1 Description

A matching external panel board with 1P 20A, (QO-Square D) circuit breakers is provided for power distribution from the UPS output to critical loads. The panel board accommodates up to 42 breakers. A main circuit breaker is provided with each panel board. See drawing 6001-03-15 for panel mounting arrangement.

6.7.2 Specification

Part Number	Description
9100-1439-01	EXTERNAL OUTPUT AUX CBS OPTION IN A PANEL BOARD 1PH, CB. UP TO 24 (QO BREAKER) 125AMP.
9100-1439-02	EXTERNAL OUTPUT AUX CBS OPTION IN A PANEL BOARD 1PH, CB. UP TO 30 (QO BREAKER) 200AMP.
9100-1439-03	EXTERNAL OUTPUT AUX CBS OPTION IN A PANEL BOARD 1PH, CB. UP TO 42 (QO BREAKER) 225AMP.
2025-125	10KAIC @240V, 120/240V, APPLICATION CB, 1PH, 20AMP QO BREAKER FOR 9100-1439-xx.

OnLine Power

6.8 OPTIONAL 10% INPUT CURRENT HARMONIC FILTER – P/N 9100-1372-01-03

Part Number	Description
9100-1372-01	10% INPUT CURRENT HARMONICS FILTER USE FOR 10/15/25KVA
9100-1372-02	10% INPUT CURRENT HARMONICS FILTER USE FOR 25KVA
9100-1372-03	10% INPUT CURRENT HARMONICS FILTER USE FOR 30/40 KVA.

6.9 OPTIONAL 5% INPUT CURRENT HARMONICS FILTER P/N 9100-1373-01-04

Part Number	Description
9100-1373-01	5% INPUT CURRENT HARMONICS FILTER USE FOR 10/15/20KVA
9100-1373-02	5% INPUT CURRENT HARMONICS FILTER USE FOR 25KVA
9100-1373-03	5% INPUT CURRENT HARMONICS FILTER USE FOR 30/40KVA
9100-1373-04	5% INPUT CURRENT HARMONICS FILTER USE FOR 50KVA

6.10 OPTIONAL EMI FILTER – P/N 9100-1445-1 THRU -05

EMI FILTER EN55022, 1998 CLASS “B” RADIATED EMISSION EN55022, 1998 CLASS “B” CONDUCTED EMISSION FCC PART 15 CLASS “B” RADIATED EMISSION FCC PART 15 CLASS “B” CONDUCTED EMISSION	
Part Number	Description
9100-1445-01	EMI FILTER ASSY. 60AMP, 3PHASE, UPS FOR 10KVA/15KVA/20KVA/25KVA/30KVA/480Y/277V.
9100-1445-02	EMI FILTER ASSY. 100AMP, 3PHASE, UPS FOR 20KVA/25KVA-208Y/120V; 40KVA/50KVA/62.5KVA—480Y/277V.
9100-1445-03	EMI FILTER ASSY. 150AMP, 3PHASE, UPS FOR 30KVA/40KVA-208Y/120V
9100-1445-04	EMI FILTER ASSY. 200AMP, 3PHASE, UPS FOR 50KVA-208Y/120V
9100-1445-05	EMI FILTER ASSY. 200AMP, 3PHASE, UPS. FOR 62.5KVA-208Y/120V

6.11 OPTIONAL HIGHER KAIC NORM ON/OFF OUTPUT CIRCUIT BREAKER

6.11.1 Specifications

HIGHER KAIC NORMALLY ON/NORMALLY OFF OUTPUT AUX CBs OPTION, 1-PHASE, 20AMP

Part Number	Description
9100-1434-31~~56	42 KAIC @120/240V, Din Rail
9100-1434-61~~86	65 KAIC @120/240V ONLY. Din Rail
9100-1435-01~~26	14 KAIC @277V ONLY. Molded Case C.B.
9100-1435-61~~86	65 KAIC @277V ONLY. Molded Case C.B.
9100-1343-01~~26	22 KAIC @120/240V, 10 KAIC 277V
9100-1435-61~~86	30 KAIC @120/240V, 10 KAIC 277V

OnLine Power

6.12 OPTIONAL DUAL INPUT SYSTEM WYE/WYE – SAME INPUT/OUTPUT VOLTAGE

P/N	Voltage	
9100-1446-01	208V IN/OUT 10/15/20 kVA,	480V IN/OUT 10-50 kVA
9100-1446-02	208V IN/OUT 25/30/40 kVA	
9100-1446-03	208V IN/OUT 50 kVA	

6.13 OPTIONAL DUAL INPUT SYSTEM DELTA/WYE – SAME INPUT/OUTPUT VOLTAGE

P/N	Voltage	
9100-1446-04	208V IN/OUT 10/15/20 kVA,	480V IN/OUT 10-50 kVA
9100-1446-05	208V IN/OUT 25/30/40 kVA	
9100-1446-06	208V IN/OUT 50 kVA	

6.14 OPTIONAL DUAL INPUT SYSTEM DELTA/DELTA –DIFFERENT INPUT/OUTPUT VOLTAGE

6.14.1 Delta Input System 208V IN / 480V OUT Wye-Wye

Use 6.13 and 6.14 Dual Input System and separate Iso-Care Transformer to match the output voltages.

Consult factory for proper kVA and model number

6.15 OPTIONAL SEISMIC MOUNTING BRACKET – P/N 9100-1317-02

P/N: 5088-025 Left / Right seismic floor mounting bracket

6.16 OPTIONAL STACKABLE RACK – P/N 9100-1429-xx

Drawings: 6001-032-07 Refer to illustration on page B-8. One rack only

6.17 OPTIONAL POWER FLOW MIMIC – P/N 9100-1493-02 (illustration 6-3)

6.17.1 Operation

Power Flow Mimic allows unit power status verification at-a-glance. It has 6 LED's indicating the following conditions: GREEN – Input OK, GREEN – Inverter On, YELLOW – On Battery, YELLOW – On Bypass, RED – Low Battery, RED – Summary Alarm. The LED's are located on the pictogram below for quick status assessment.

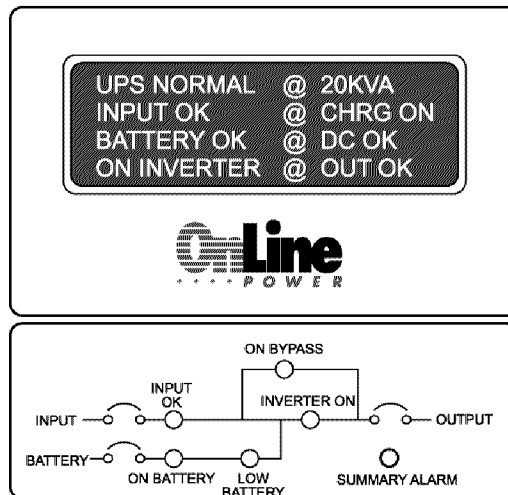


ILLUSTRATION 6-3: MIMIC PAD

OnLine Power

6.17.2 Specification

Description: POWER FLOW MIMIC OPTION – 3 PHASE
Part Number: 9100-1493-02
Color: Blue with black lettering
Dimensions: 4.25" x 4"
Mounting: Self-adhesive Scotch pad
LED's: Water clear lens, 20 mA, View Angle 140. Nicom.ZU55W-05,
Connectors: Nicomatic 8 Pin, Black

6.18 OPTIONAL GMS – GLOBAL MONITORING SYSTEM

6.18.1 Local On UPS - Event Log – P/N 9100-1466-02

6.18.1.1 Operation

Control and Monitoring PCB acquires event data and displays up to the 50 most recent Date and Time stamped events. The default setting is a scroll of monitoring and alarm screens. When the log is full, the first (oldest) events is erased from the register. System events are shown in Appendix B. Key pad functions and resulting screens are presented below:

LOG – Press one time to activate the event log display. After approximately 5-seconds, the screen will show the event log. All stored events will be continuously scrolled on the display. Press Log once again to return to the main menu.

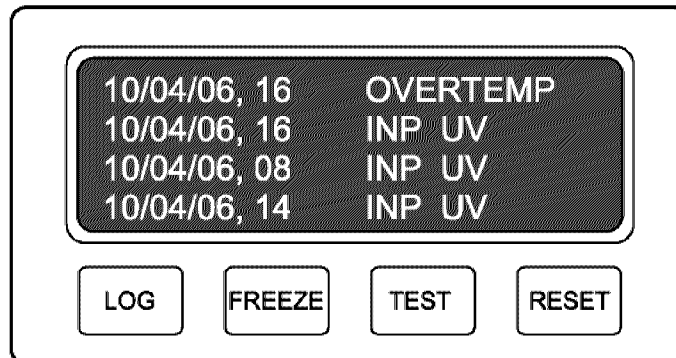


ILLUSTRATION 6-4: LOGGED EVENTS

FREEZE – Press one time. The display will freeze the next default monitoring and alarm screen. Press the Freeze key again to return the display to the initial menu with scrolling operation.

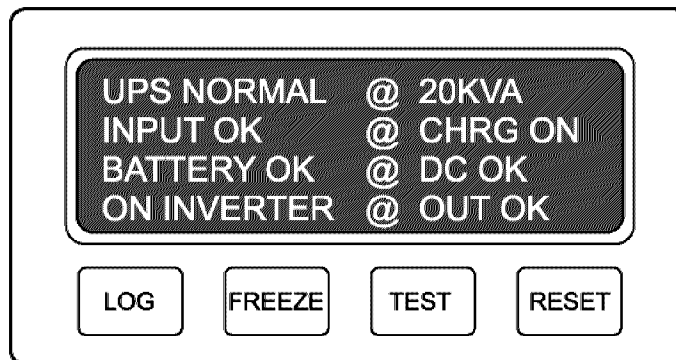


ILLUSTRATION 6-5: STATUS SCREEN

OnLine Power

TEST – Press the key one time. System data appears on the screen after few seconds. Pressing the key once again returns the display to the default screen.

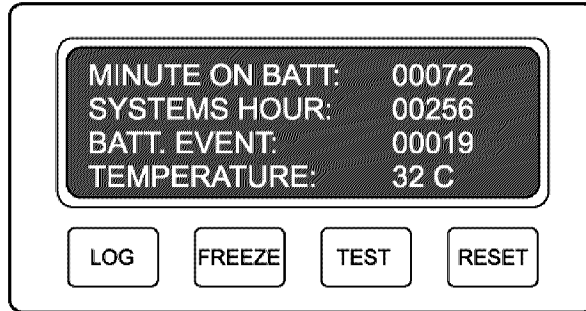


ILLUSTRATION 6-6: SYSTEM INFO

RESET – Pressing the “Reset” and “Test” keys together clears the screen and deletes the event log.

6.18.1.2 Specification

Description: Local On UPS - Event Log
Part Number: 9100-1466-02
Components:
Monitoring PCBA: P/N 1625-344-01
Power Supply: P/N 1625-339, 5, 12 VDC, 25W
Com Cable: P/N 7060-1187-01
Keypad Overlay: P/N 1250-064

6.18.2 Local On UPS - Aux CB's Trip Monitor – P/N 9100-1453-01

6.18.2.1 Operation

Trip signals coming from the breakers are displayed on the circuit breaker trip screen. The circuit breaker is a part of default monitoring and alarm display, that scrolls continuously when the unit is in operation. Below is an illustration of a typical circuit breaker trip screen.

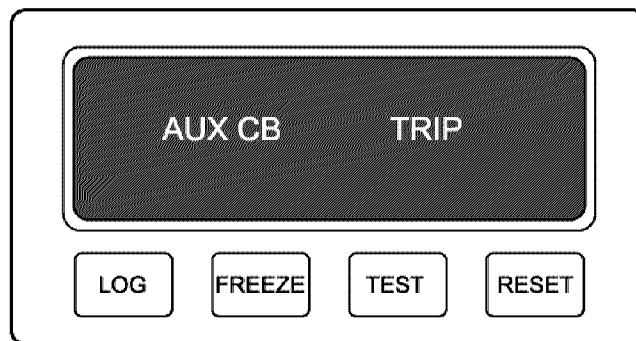


ILLUSTRATION 6-7: AUXILLIARY CB TRIP

6.18.2.2 Specification

Description: Local On UPS – Aux. CB'S Trip Monitor With Event Log
Part Number: 9100-1453-01
Components:
Event Log Option – P/N 9100-1466-02
Trip monitoring modules: ABB S2C-S/H 6R, DIN rail mount
Monitored CBs: only ABB MCB serie

OnLine Power

6.18.3 Local On PC - Via RS 232 - P/N 9800-03 – 25 THRU 150 (25-150ft)

6.18.3.1 Description

This option requires a PC and LabView monitoring software. The software is provided on a disc that is easily installed on any Windows platform. An attached cable of a specified length plugs into a PC serial port and connector J6 on the Control PCB 1625-296. LabView software must be selected for COM port 1.

6.18.3.2 Operation

LabView software translates data protocol coming to COM port 1 from an active unit via the RS232/RS485 interface and displays the parameters and active alarms on a PC monitor in the appropriate form. Below is a sample of a PC screen with measured parameters and actual unit status.

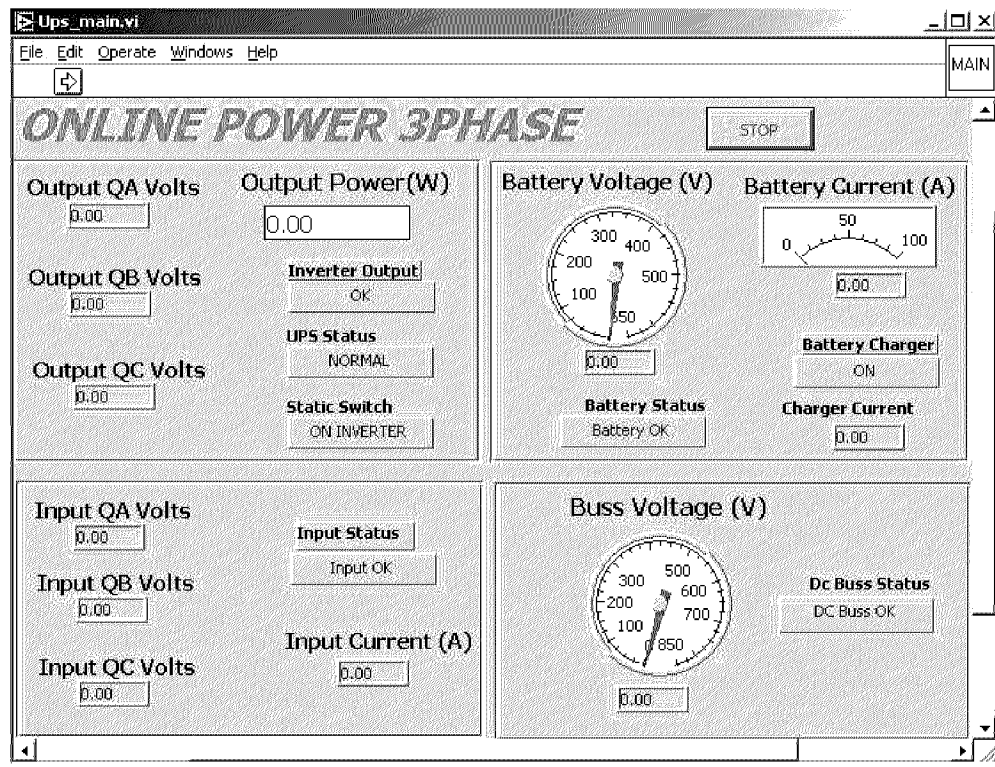


ILLUSTRATION 6-8: SAMPLE PC SCREEN

6.18.3.3 Specification

Description: Local On PC – Via RS 232
Part Number: 9800-03-25 thru 150
PC system requirements: 98 and higher Windows OS, serial port.
Viewing software: LabView, included
RS232 cable: 25 thru 150ft, as specified, included

6.18.4 Local On PC - Via RS 485 - P/N 9800-04-150 thru 1000 (150-1000 ft)

Installation, Operation, Specification as above (except RS 485 cable)

OnLine Power

6.18.5 **GMS- Remote Dial UP Monitor 2000: p/n 9100-1468-02**
 Remote Dial Up: Data, Voice, Fax, Pager, PC, E-mail, Event Log, Stats.
 For details of all fuctions and operation refer to User's Manual, 6002-1770.

6.18.5.1 Description

Monitor 2000 requires a phone line for remote operation. It comes with an interface PCB, that provides monitor inputs with isolated signals from the unit. The option comes wired and fully functional. For local PC communication, you must connect your computer serial port to the 2000 RS232 data communication port.



ILLUSTRATION 6-9: MONITOR 2000 FRONT VIEW

The Manager 2000 Windows setup program makes installation quick and easy. Picture below is an actual Manager 2000 screen.

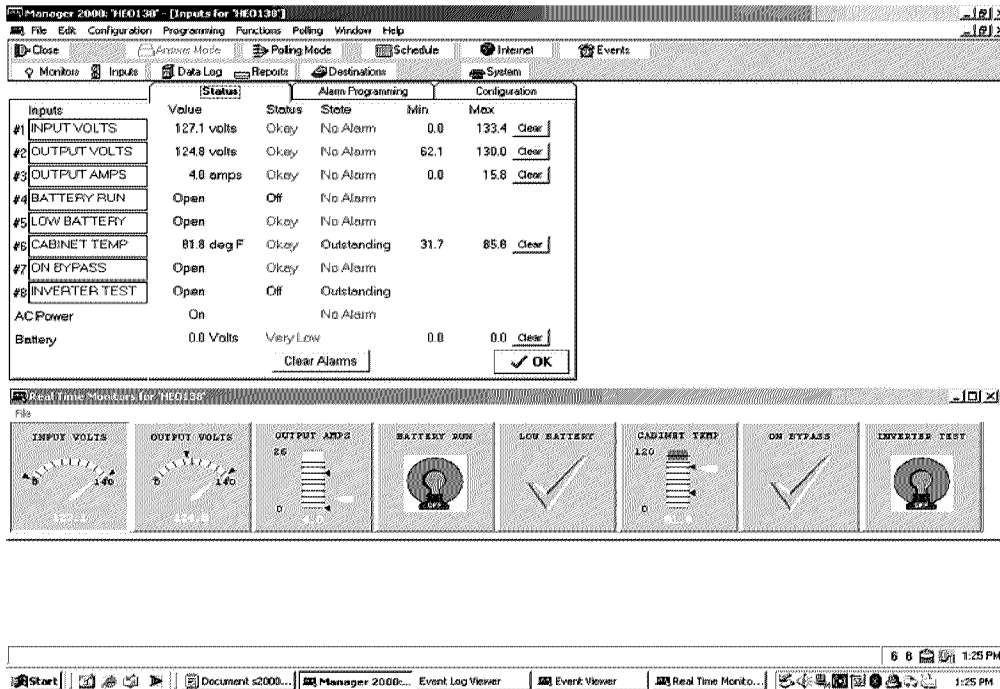


ILLUSTRATION 6-10: MANAGER 2000 SCREEN

OnLine Power

6.18.5.2 OPERATION

The dial-up Monitor 2000 measures and monitors the following set of parameters and status contacts.

1. Input Volts
2. Output Volts
3. Output AMPS
4. Battery run
5. Low battery
6. Cabinet temperature (°F)
7. On by-pass
8. Summary alarm

User can monitor all inputs in real time graphical form and can access real time input monitoring from the tool bar button labeled monitors.

The details are given in GSM 2000 Manual, refer to the 6002-1770. (GSM 2000 user's manual)

6.18.5.3 ALARMS

When an alarm occurs, the unit will dial out and send a message to all programmed destination.

GSM 2000 will call up to 32 telephone numbers or email addresses (both referred to as destinations) to report alarm conditions or send reports. Destinations can be voice calls, fax machine, computers with modems running GSM 2000 software, email addresses, numeric pagers, or alphanumeric pagers. You must be online with the unit to program the Destination parameters. Once you are online, choose Program from the main menu, then select Destinations. You can also access the Destination programming from the toolbar button labeled Destinations.

	Name	Destination	Call Zones				Call Mode	Dial Type	Intercall Delay	Send Report
			1	2	3	4				
1	John Smith	(212)555-5566	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Until Ack	Voice	30	<input type="checkbox"/>
2	Steve Jones	(301)555-8978	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Inform	Pager	30	<input type="checkbox"/>
3	Barbara Kelly	345-1122-A-0504099	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Until Ack	Alpha	30	<input type="checkbox"/>
4	Jim Halio	JHalio@AOL.com	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Inform	E-Mail	30	<input checked="" type="checkbox"/>

Dialout Destinations Form

The Dialout Destinations form allows you to program information for up to 32 destinations. The parameters and their options are listed below.

OnLine Power

Name:

This field allows you to program a description (16 characters max) for each destination. The name will appear on faxes and e-mail transmissions whenever an alarm or report is sent to destination. If you are entering a fax destination be sure to use the name of person who you intend to receive the fax.

Destination:

The actual telephone number or e-mail address GMS 200 dials to deliver its report or alarm message.

The destination field can be up to 64 characters long for e-mail addresses and 32 digits for all other Dial

Types and may consist of numbers, letters, and special dialing codes.

Numeric Pagers:

The GMS 2000 can send alarm messages to numeric pagers. It will automatically send its telephone number and the alarm input number when dialing to a numeric pager. All you have to do is enter the telephone number of your pager.

Example: (301) 565-2300

Note: If your pager service is answered by a voice-prompted message you will need to enter additional programming. See the special Dialing codes section below.

Alphanumeric Pagers:

The GMS 200 can dial alphanumeric pagers to send alarm messages. The MGS 2000 will send the unit description, tele-phone number, input name and input value. To program an alphanumeric pager destination, enter the phone followed by the letter A and then the pager ID.

Example: 1-610-555-4593 A 0504099

E-mail:

The GMS 2000 can send alarm messages and reports via email. For this to work, you must designate an email host. you can use your own computer as an email host.

Dial Type:

This is used specify the type of call GMS 2000 will make to a particular destination. The available dialout types are: Fax, Voice, E-mail, Pager, alpha Pager, and Modem.

Fax – This instructs GMS 2000 to send a fax transmission to either a fax machine or a PC with the ability to receive a fax directly.

Email – This instructs GMS 200 to deliver a message to the E-mail address programmed in the destination field.

Note: For "E-mail" Dial Types, only e-mail addresses may be programmed in the destination field, NOT telephone numbers. GMS 2000 will contact an e-mail host as designated on the System screen.

Numeric Pager – This instructs GMS 2000 to dial a numeric pager and leave the unit's ID number and alarm input numbers on the display. This will happen automatically just by entering the pager's telephone in the destination field. If you want to change the information that is sent to your pager or you are having trouble receiving the page, you may use the special dialing codes to customize the dialout to your pager.

Alpha Pager – This instructs GMS 2000 to deliver a text message to an alphanumeric pager.

OnLine Power

Modem –This instructs GMS 2000 to call a modem attached to a computer running Manager 2000 software. The software must be in Answer Mode. When the Manager 2000 software receives the alarm call, it will download the unit's Event log, execute an alarm query, and display the result on the screen. You may also have the computer print a copy of the alarm event as well as play a recorded message when an alarm is received.

Important: the unit Description on your computer must match the Unit Description stored in your GMS 2000 for Alarm and Report call-in features to work properly.

Intercall Delay:

The intercall delay is the amount of time MGS 2000 will wait after completing a call before calling the next destination . The delay is in seconds, with a default of 30.

Note: A 30-second delay is too short to allow a call back if a pager is being called. Increase the delay time enough to accommodate your pager.

Alarm Call Mode:

The three selections for destination Alarm Call Mode are Disabled, Until A Acknowledged, and Inform.

Disabled: Destinations programmed with Alarm Call Mode Disabled will never be called. This is simply a way to disable dialing to this destination if necessary.

Until Acknowledged: Destinations programmed with Alarm Call Mode " Until Acknowledged" will continue to be called until one of them acknowledges the alarm. Once acknowledged, the remaining destinations will not be called.

NOTE: Fax,E-mail and Modem destinations cannot be programmed as "Until Acknowledged" call modes.

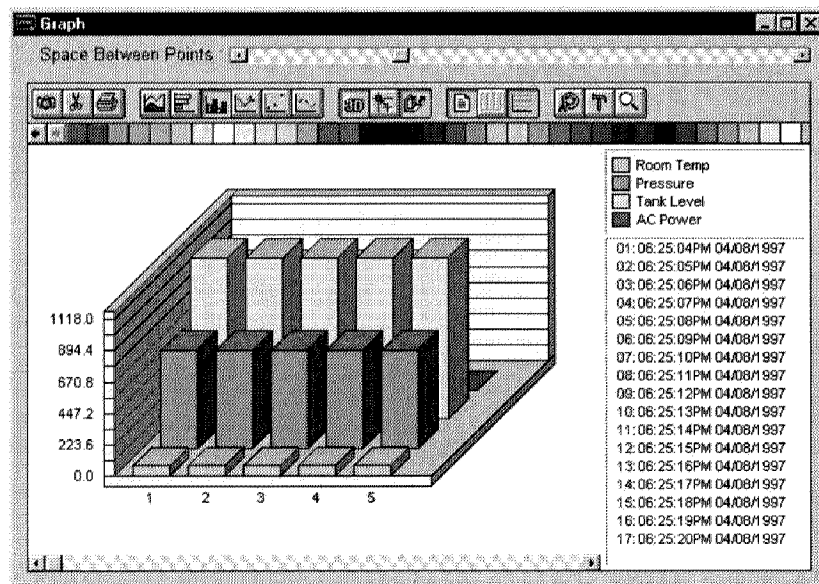
Inform: Destinations programmed with Alarm Call Mode "Inform" will be called until the alarm message has been successfully delivered one time, regardless of acknowledgment. If a transmission to an " Inform" destination was successful, that destination will not be contacted again. GMS 2000 will only make additional attempts to contact an Alarm Call Mode " Inform" destination if that destination hasn't successfully received its transmission (for example, due to a "no answer," busy signal," "no carrier" response). If a transmission fails to reach a destination after the last calling round is completed, the failure is recorded in Event Log. Calls to priority "Inform" destinations are useful for providing records of alarm events.

Important: Destinations programmed as Alarm Call Mode " Inform" cannot acknowledge alarms.

OnLine Power

6.18.5.4 GRAPH:

Once the Data Log records have been displayed, they may be viewed in graph form by clicking the "Graph" button. The graph will show all inputs selected in the query. If too many samples are selected for graphing, the software gives you the option to average values. Otherwise, you will have to perform a smaller query to avoid averaging. The graph has many features that allow to display the data graphically, including line graphs, bar charts and three dimensional views. Experimentation is the best way to learn about all of the available options. A sample graph follows.



Sample Graph

PRINT:

Once the Data Log records have been display, they may be printed by clicking this button.

EXPORT:

Once the Data Log records have been displayed, the displayed information may be saved as a comma-delimited file. This file can then be used in a spreadsheet such programs as Lotus 123 or Microsoft Excel.

Send Report:

GMS 2000 can be programmed to automatically send reports to selected destinations. Check this box to include this destination when sending reports.

Note: Reports may only be send to fax, E-mail, or Modem destinations.

OnLine Power

6.18.5.5 DATALOGGING

GMS 2000's built-in data Logger can log and store information on all 8 universal inputs, AC power and backup battery voltage. You must be on-line with the unit to program the Data logging Logging. You can also access the Data Log programming from the Toolbar button labeled Data Log.

Note that whenever you change any parameters on the Data log form the datalogger in the GMS 2000 will be reset. If you need to make changes to your programming, be sure to "Retrieve Data" first.

Viewing the Data Logger (on-line):

Once the Data Logger has been downloaded, it can be view the Data Logger, click the "View Database" button on the Data Log Programming form. The following form will appear.

Log Time	Room Temp	Pressure	Tank Level
06:25:04PM 04/08/1997	77.9	702.5	1149.5
06:25:05PM 04/08/1997	77.9	702.5	1149.5
06:25:06PM 04/08/1997	77.9	702.5	1149.5
06:25:07PM 04/08/1997	77.9	702.5	1149.5
06:25:08PM 04/08/1997	77.9	702.5	1149.5

Data Log Viewer

Viewing the Data Logger (off-line):

To view a unit's downloaded Data Logger off-line, follow the instructions for "Offline Communication". Below is a list of programming parameters for viewing the Data Logger.

OnLine Power

6.18.5.6 EVENT LOGGER

GMS 2000 keeps track of important system events with its built-in Event Logger. Each GMS 2000 unit stores the last 500 system events. System events include alarms, incoming and outgoing phone calls, and alarm acknowledgments. Once the Event Log is full, the oldest record is overwritten by the newest.

Downloading the Event Logger:

To view GMS 2000's Event Log, the unit's Event Logger must first be downloaded to your PC. You must be online with the unit to download the Event Log. Once you are online, choose "Functions" from the main menu, and then select "View Events." You can also access the Event Logger from the Toolbar button labeled Events.

The following event log form will appear:

The screenshot shows a window titled "Event Log Viewer". It has two main sections: "Available Units" and "Selected Units". The "Available Units" section is currently empty. The "Selected Units" section contains "Plant #1, Oak & Pine St.". Below these sections are "Event Types" with radio buttons for "Alarms Only" and "All Events" (which is selected). To the right of the "Event Types" are "Query Times" with "From" and "To" fields. The "From" field is set to "04/08/1997 06:25:02PM" and the "To" field is set to "04/08/1997 06:25:23PM". There are also buttons for "Inc. All" and "To Now". At the bottom of the window are buttons for "Download Events", "Reset Event Logger", "View", and "Close".

Event Log Viewer

Viewing the Event Logger:

Once the Event Logger has been downloaded, it can be viewed on the form called "Event Viewer".

Below is a list of programming parameters for viewing the Event Logger:

The screenshot shows a window titled "Event Viewer". It displays "GMS 2000 Event Logger" and "Query Information". Under "Query Information", it says "All Events are displayed" with a scroll icon. Below that, it shows "From: 4/8/1997 6:25:02PM" and "To: 4/8/1997 6:25:23PM" with scroll icons. A table with three columns: "Date & Time", "Unit Name", and "Event Description". The table contains three rows of data:

Date & Time	Unit Name	Event Description
4/8/97 6:25:23 PM	Plant #1, Oak & Pine	Datalogger: Download.
4/8/97 6:25:05 PM	Plant #1, Oak & Pine	Datalogger: Reset.
4/8/97 6:25:02 PM	Plant #1, Oak & Pine	Datalogger: Reset.

At the bottom of the window are "Print" and "OK" buttons.

Event Viewer form

OnLine Power

6.18.6 WEB/SNMP – Web Pages, Status, Alarm, Event Log, E-mail – P/N 9100-1469-01

6.18.6.1 Description

Web/SNMP option card is a web enabled monitoring device for a UPS with Internet access. RJ45 jack on the front of the card marked “Network” is the connecting point for the Ethernet cable. The unique IP internet address is pre-assigned and can be changed to fit customer network settings.

6.18.6.2 Operation

The Web/SNMP card can monitor the UPS on the network through a web browser or a Network Management System. The Alarm Viewer utility program provides monitoring of multiple units through a single console application. Entering IP address assigned to the Web card into the browser brings up the Log-In screen with password protecting the actual web site. The main, UPS Status screen has links to subsequent Web pages as depicted below.

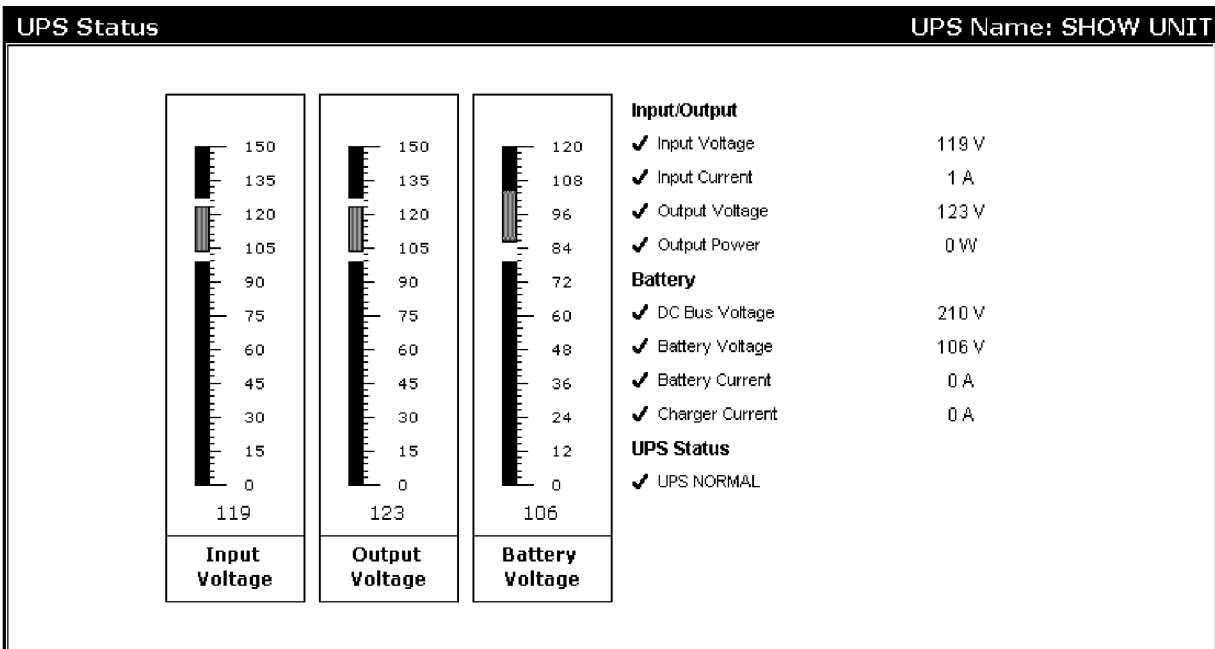


ILLUSTRATION 6-11: UPS MAIN STATUS SCREEN

OnLine Power

The Web/SNMP card IP site has the following pages:

- **UPS Status:** displays overall status of the unit
- **Identification:** provides UPS identification data, serial #, Model, start up date, last battery installation date, and customer info.
- **Variables:** displays groups of input, output and status parameters and on line measurement values
- **Event Log:** displays up to 500 events with date/time stamp
- **Configuration:** page used for date/time and page identification
- **Nominal Values:** input, output and battery voltage selection
- **SNMP Setup:** set up page for NMS and trap receivers
- **E-Mail Setup:** set up page for E-mail server and mail recipients addresses

6.18.6.3 Specification

Description: WEB/SNMP – Web Pages, Status, Alarm, EVENTS, E-mail

Part Number: 9100-1469

System requirements: Internet access with direct or network IP Web browser – IE 5.0 or higher

Power requirements: 12 VDC, 1A

Dimensions: 3.0"W x 5.5"L x 1.0"H

Weight: 0.45 lbs.

OnLine Power

6.19 OPTIONAL ECC - EMERGENCY CIRCUIT CONVERTER – P/N 9100-1501

6.19.1 Installation

Indoor use only. Simple and fast installation in ceiling or wall mounted standard single gang E-box . Installation must be performed by a qualified electrician per Installation, Operation and Maintenance Instructions, provided with the ECC.

6.19.2 Operation

When used with an inverter system, the ECC is designed to allow you the ability to turn off ALL of the lighting in a given area via the local switch, and still provide emergency lighting during a power failure. The device will provide single phase power from the emergency source to the designated emergency fixtures regardless of their current status (on or off), thereby insuring safe egress from the facility at all times. The automatic Diagnostic feature will confirm the emergency system is ready to provide back up power.

6.19.3 Specification

Description: ECC - EMERGENCY CIRCUIT CONVERTER OPTION

Part Number: 9100-1501-01 - 120 VAC

9100-1501-01- 277 VAC

Rating: 120 VAC - 20 A Ballast load, 1000 W Tungsten Lamp load, 20 A, 1 HP

277 VAC – 20 A Ballast load, 1800 W Tungsten Lamp load, 20 A, 1.5 HP

Operating Temperature: 20 to 150 F

Flame rating: UL 94V-O

Size: 2.75”W x 4.75”H x 1.75”D (overall)

Low profile – recessed portion is only 1.5” deep

Color: White

Weight: 8 oz.

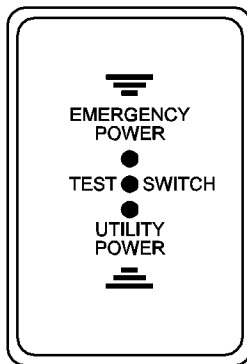


ILLUSTRATION 6-12: ECC EMERGENCY CIRCUIT CONVERTER

OnLine Power

6.20 OPTIONAL ECM - EMERGENCY CONTROL MODULE – P/N 9100-1502

6.20.1 Installation

Indoor use only. ECM is a universal mount unit. Simple and fast installation in ceiling or wall mounted standard single gang E-box, recommended box size 4". Installation must be performed by a qualified electrician per Installation, Operation and Maintenance Instructions provided with the EMC.

6.20.2 Operation

The emergency power is provided from a central lighting inverter that is automatically switched over to 24 hour emergency power distribution panel. The room switch turns on and off both regular and emergency lights simultaneously. This is accomplished by having the room switch leg power activate the Emergency Control Module. Wire input#1 is connected internally to a sensing circuit. During a power interruption, this circuit causes contact X to drop into a N.C. position. Please review wiring schematics.

6.20.3 Specification

Description: ECM - EMERGENCY CONTROL MODULE
Part Number: 9100-1502-01 - 120 VAC
9100-1502-02 - 277 VAC
Rating: Maximum Ballast load 1500 W, 120 and 277 VAC
20 A N.C. UL contact rating
High Voltage surge protectors
Approvals: UL 924, NFPA 1104-2.4.1, OSHA
NEC 700 thru 700-26, 701-717, 702-709, 705-750,
Operating Temperature: 210 to 150 F
Size: 2.75"W x 1.5"H x 1.25"D (overall)
Color: Black
Weight: 8 oz.

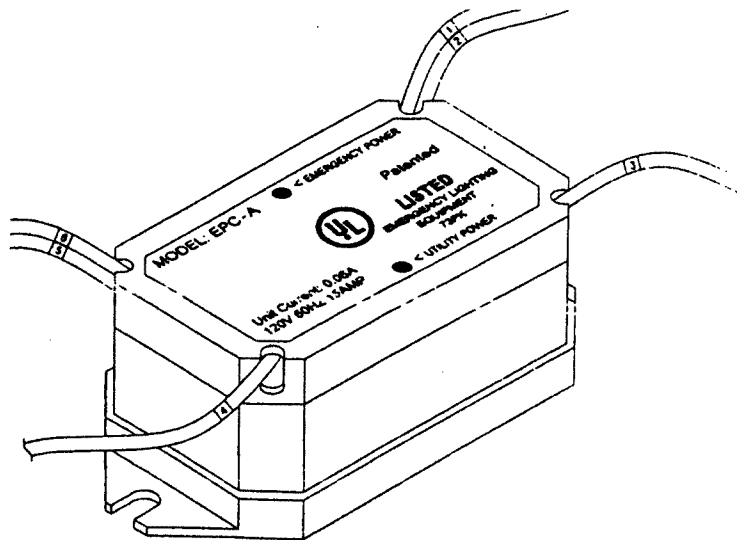


ILLUSTRATION 6-13: ECM EMERGENCY CONTROL MODULE

APPENDIX A - SPECIFICATIONS

Specifications for KVA, 0.8pf Units

POWER RATING (KVA/KW)	10/8	15/12	20/16	25/20	30/24	40/32	50/40	62.5/50
INPUT and OUTPUT								
INPUT VOLTAGE (VAC)	Three Phase, 4-Wire plus Ground, 208Y/120 or 480Y/277 VAC (-20% to +15%)							
OUTPUT VOLTAGE (VAC)	Three Phase, 4-Wire plus Ground, 208Y/120 or 480Y/277 VAC							
OUTPUT FREQUENCY (Hz)	60 Hz +0.5 Hz							
VOLTAGE REGULATION	+/-3%, Regulated within CBEMA curve							
OUTPUT WAVE FORM	Sine-Wave <5% THD.							
EFFICIENCY	Minimum 90%							
CREST FACTOR	3 to 1 Typical							
SURGE PROTECTION	The UPS will protect itself and the load against surges as defined in ANSI/IEEE C62.41 Categories A and B.							
ISOLATION	Complete from line. Output neutral bonded to ground							
NOISE ISOLATION	-120 dB Common-Mode; -60 dB Transverse-Mode							
BATTERY	Sealed maintenance-free (AGM) battery							
RECHARGE CURRENT	Conforms to UL Standards							
EXTERNAL BATTERY	Provisions for hardwire connection of optional external battery cabinets or DC source.							
BATTERY								
BATTERY RUN TIME	Consult OnLine Power							
BATTERY TYPE	Sealed, Maintenance-Free, AGM, VRLA type							
NOMINAL BATTERY VOLTAGE	192 VDC	192 VDC	192 VDC	288 VDC	288 VDC	312 VDC	552 VDC	552 VDC
OVERCURRENT PROTECTION	Circuit Breaker							
PACKAGING	Batteries not housed in Same Enclosure as electronic (See Table 2-2)							

OnLine Power

Specifications for KVA, 0.8pf Units (Continued)

MONITORING AND COMMUNICATIONS	
INDICATORS	LCD Display Panel
RELAY INTERFACE	Dry Contacts for: Sum Alarm (N.C.); Bypass On (N.O.); Loss of Input Power (N.O.); Low Battery (N.O.)
CONTACT RATING	125 Volts (AC or DC) Maximum; 1.25 Amperes Maximum; 30 Watts / 50 VA Maximum
INTERFACE CONNECTION	Hard Wired (Terminal Block)

ENVIRONMENTAL	
SURGE WITHSTANDABILITY	ANSI C62.41-1980 Categories A & B
OPERATING TEMPERATURE	Meets NEMA Requirements
OPERATING RELATIVE HUMIDITY	0 to 95% Non-Condensing
ALTITUDE	Up to 6,000 Feet (1,829 Meters) with No De-Rating
COOLING	Air Cooled-Forced Fan

PHYSICAL (KVA/KW)	10/8	15/12	20/16	25/20	30/24	40/32	50/40	62.5/50
SIZE HxWxD in. (cm)	70 x 39 x 20 (177.8 x 99.1 x 50.8)							
WEIGHT lbs (kg) Unit only	1083	1446	1679	1679	1719	2066	2463	2565
CONSTRUCTION	Painted Steel Enclosure with 3 Point Double Locking Front Door; and Full-length Door Hinge.							
ENCLOSURE	Designed for Inside Installations							
COLOR	Black							
ACCESSIBILITY	Front - All Servicing is Through the Front; No Side or Rear Access is Required.							
CABLE ENTRY	Top or sides							
MOUNTING	Four (4) Holes Provided to Anchor Enclosure to Pedestal (Supplied by Others)							

OnLine Power

Recommended Input/Output Protective Device Ratings, BTU/Hr, and Floor Loading

UPS RATING KVA/KW	INPUT VOLT	OUTPUT VOLT	INPUT CURRENT	RECOM. *OCPD	OUTPUT CURRENT	RECOM. *OCPD	BATT. VOLT	MAX. BATT. DISCH. AMP	FULL LOAD BTU/HR MAX.	TOTAL UNIT WEIGHT			FLOOR LOADING LBS/SQFT
	3PHASE	3PHASE	NORMMAX		NORMMAX								UPS CAB
10KVA / 8KW	208Y/120	208Y/120	31/38	48	28/35	44	192	56	3032	1083			222
	480Y/277	480Y/277	14/18	23	12/15	18	192	56	3032	1083			222
	480Y/277	208Y/120	14/18	23	28/35	44	192	56	3032	1083			222
15KVA / 12KW	208Y/120	208Y/120	47/59	74	42/53	66	192	84	4549	1446			297
	480Y/277	480Y/277	21/26	33	18/23	29	192	84	4549	1446			297
	480Y/277	208Y/120	21/26	33	42/53	66	192	84	4549	1446			297
20KVA / 16KW	208Y/120	208Y/120	62/78	97	56/70	88	192	112	6066	1679			344
	480Y/277	480Y/277	27/34	42	24/30	38	192	112	6066	1679			344
	480Y/277	208Y/120	27/34	42	56/70	88	192	112	6066	1679			344
25KVA / 20KW	208Y/120	208Y/120	77/76	120	69/86	108	288	85	7582	1679			344
	480Y/277	480Y/277	35/44	55	30/38	48	288	85	7582	1679			344
	480Y/277	208Y/120	35/44	55	69/86	108	288	85	7582	1679			344
30KVA / 24KW	208Y/120	208Y/120	93/16	145	83/104	130	288	102	9098	1719			353
	480Y/277	480Y/277	41/51	64	36/45	56	288	102	9098	1719			353
	480Y/277	208Y/120	41/51	64	83/104	130	288	102	9098	1719			353
40KVA / 32KW	208Y/120	208Y/120	123/154	192	111/139	174	312	169	12131	2066			424
	480Y/277	480Y/277	54/68	84	48/60	75	312	169	12131	2066			424
	480Y/277	208Y/120	123/154	192	111/139	174	312	169	12131	2066			424
50KVA / 40KW	208Y/120	208Y/120	155/194	242	139/174	217	552	120	15164	2463			505
	480Y/277	480Y/277	67/84	105	60/75	94	552	120	15164	2463			505
	480Y/277	208Y/120	155/194	242	139/174	217	552	120	15164	2463			505
62.5KVA / 50KW	208Y/120	208Y/120	194/243	303	174/218	272	552	150	18000	2565			526
	480Y/277	480Y/277	84/105	131	75/94	117	552	150	18000	2565			526
	480Y/277	208Y/120	194/243	303	174/218	272	552	150	18000	2565			526

Note: Battery run time is very, consult factor for the battery Qty and cabinet arrangement for a certain battery run time.

APPENDIX B - BATTERY CONNECTIONS



For the actual battery connection diagram for your system, refer to the diagram on each unit. The drawings below are shown for electrical connection only and do not necessarily match the actual battery layout in your unit. The arrangement may be different from drawings.

Danger!

The use of a physically damaged battery can cause a catastrophic system failure and can even result in a fire or explosion that could endanger life and property. Before accepting a battery shipment from the carrier, please read and follow these instructions:

1. Thoroughly inspect each battery for any signs of damage. If there is any damage, reject the shipment and notify the manufacturer at 800-PWR-SRVC (800-797-7782). If possible, photograph the damage for future reference.
2. As you unpack the pallet or container, check each battery box for damage on all sides, the top and bottom. If there is any sign of damage, photograph the damage if possible, and contact Online Power at 800-PWR-SRVC (800-797-7782).
3. Before you install each battery in the cabinet, remove it from its carton and thoroughly inspect it again on every side, the top and bottom for any signs of physical damage including, but not limited to, cracks, chips, leaks, bulges, and so forth.
4. If battery is dropped or makes hard contact with any object, inspect it again.
5. Batteries are heavy, so exercise care when lifting them to the shelves of a battery cabinet.
6. If at any time you have any questions regarding the condition of a battery, set it aside and notify the manufacturer at 800-PWR-SRVC (800-797-7782). **Do not use a questionable battery under any circumstances, even temporarily.**

The following diagrams show various battery connection configurations in the battery cabinets that are shipped with the UPS. Refer to **Table A-1** for nominal battery voltage information.

192 Volt Nominal

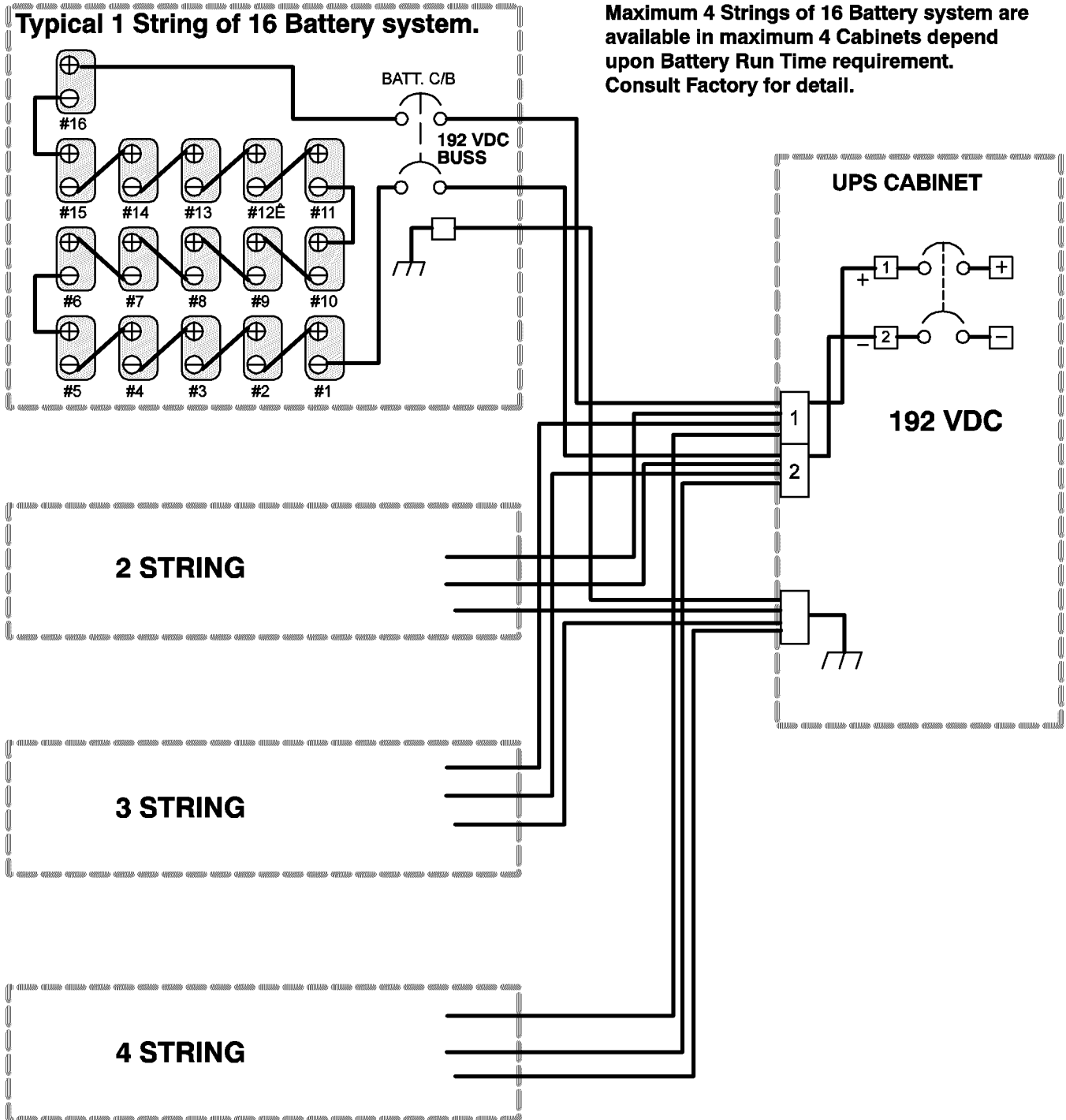


ILLUSTRATION B-1

288 Volt Nominal

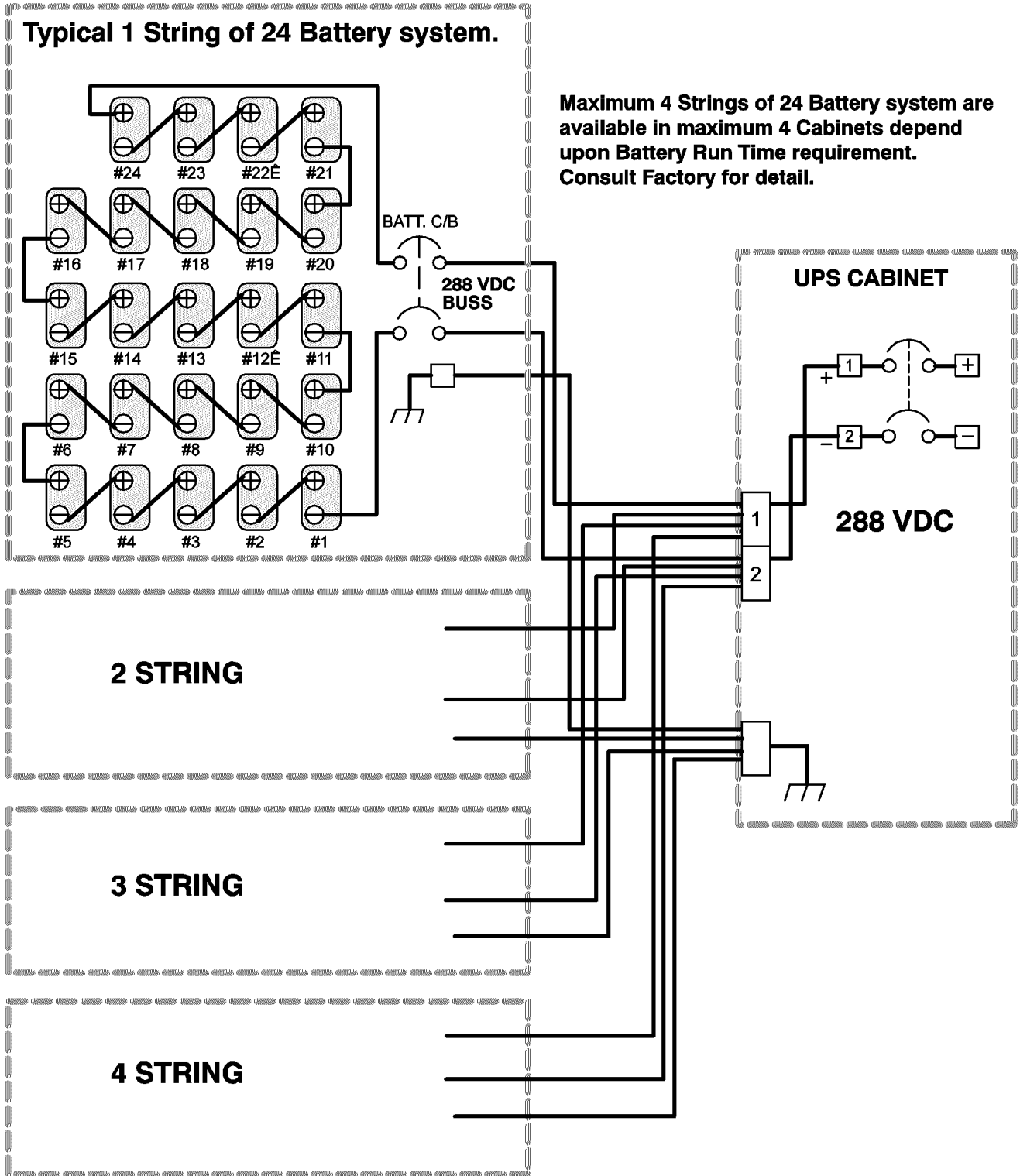


ILLUSTRATION B-2

312 Volts Nominal

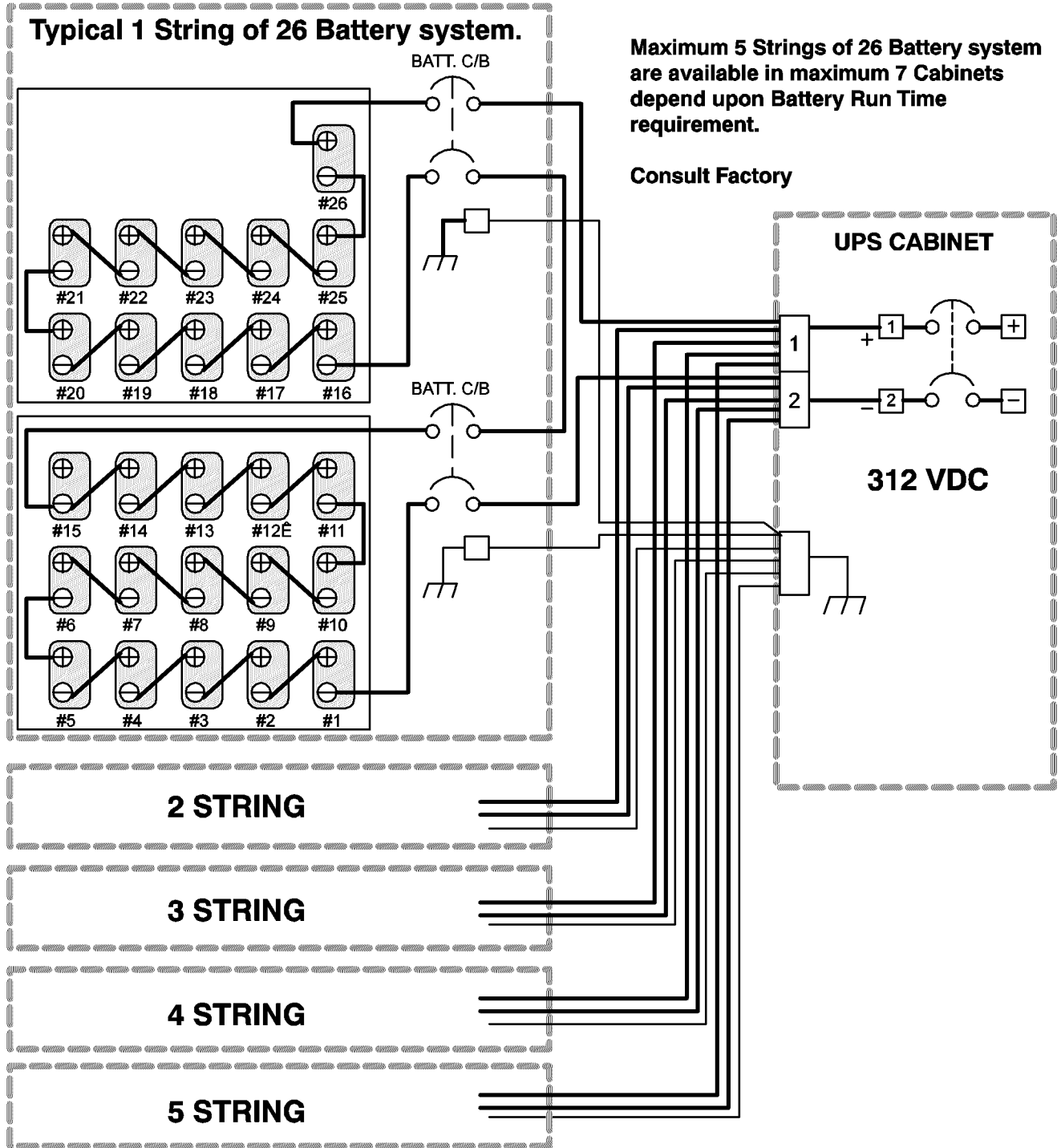


ILLUSTRATION B-3

552 Volts Nominal

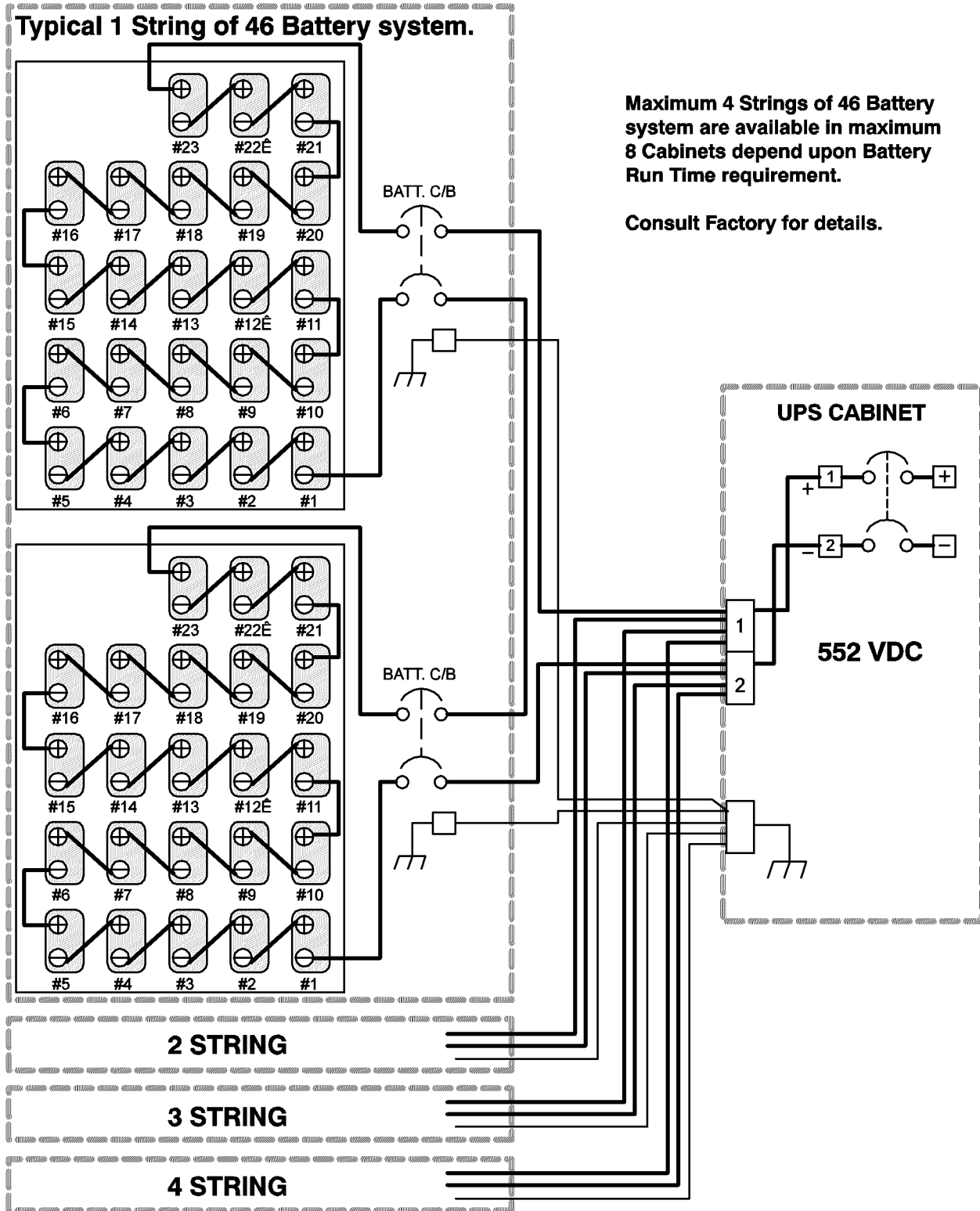


ILLUSTRATION B-4

OnLine Power

APPENDIX C - LCD DISPLAY MENU AND TROUBLESHOOTING GUIDE

Two screens (A, B) are updated continuously for units without the optional output transformer.

Three screens (A, B, C) are updated continuously for units with the optional output transformer.

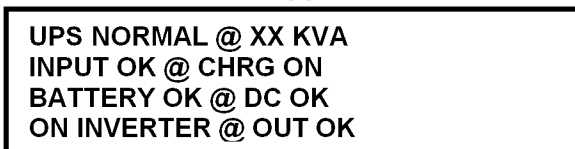
Start-up Screen

When input power is applied for the unit, LCD panel lights up and displays



If LCD display panel is not lit, the unit has problem. Contact the factory service at 1-800-PWR-SRVC (800-797-7782) at OnLine Power.

Screen A: The first default screen appears as below



The display may say:

Line 1: UPS NORMAL @ 15 KVA

15 KVA indicates the KVA rating, STAND BY or NORMAL indicating normal operating modes. STAND BY ALARM FAILURE indicates UPS alarm condition and FAILURE indicates UPS failed or had persistent alarm condition. This will require system reset by cycling power. Shut if off and wait till LCD is dark. Restart the unit.

Line 2: INPUT OK @ CHG ON

INPUT OK: Input within an acceptable range.

INPUT BAD: Input out of range.

CHRG ON: Charger on.

CHRG OFF: The charger is off. This will happen if the input capacitor is open or the system is in a failure mode. - UPS ALARM

Line 3: BATTERY OK @ DC OK

BATTERY OK: Battery voltage within an acceptable range.

BATTERY OV: Battery voltage high. This is normal when the battery is charging.

BATTERY LOW: Battery voltage low. Recharge battery.

DC OK: DC bus voltage within an acceptable range.

DC OV: DC bus voltage too high. - UPS ALARM

DC UV: DC bus voltage too low. - UPS ALARM

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NOTE: The typical DC buss voltage should be higher than the battery voltage.

SCREEN B: The second default screen appears as below

OUTPUT: _____ V @ _____ W
INPUT: _____ V @ _____ A
DC BUS: _____ V @ NA A
BATT: _____ V @ + _____ W

- Line 1: Indicates output voltage and power in watts, when an output transformer is not used. It indicates primary voltage of the output transformer (T1) (208 VAC, typically) when T1 is used.
- Line 2: Indicates input volts and Amps.
- Line 3: Indicates internal DC bus condition for factory use.
- Line 4: Indicates battery voltage. The (+) current in Amps indicates charging Amps, while (-) indicates discharging Amps.

SCREEN C: When an optional output transformer is installed, the multiple output voltages are displayed as follows:

OUTPUT: 120 V @
OUTPUT: 208 V @
OUTPUT: 277 V @
OUTPUT: 480 V @

- Line 1: Indicates L-N output voltage 1
- Line 2: Indicates L-N output voltage 2
- Line 3: Indicates L-N output voltage 3
- Line 4: Indicates L-N output voltage 4

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APPENDIX D - Input and Output Ampacity for Various Models

Input and Output Ampacity for Various Models

SIZE KVA/KW	INPUT	OUTPUT	OUTPUT		INPUT AMPS	DC	
			I TOTAL	I R		VOLT	AMP
10KVA/8KW	208Y/120	208Y/120	27.8	22	31	192	56
	480Y/277	480Y/277	12	10	14	192	56
	480Y/277	208Y/120	28	22	14	192	56
15KVA/12KW	208Y/120	208Y/120	42	33	47	192	84
	480Y/277	480Y/277	18	15	21	192	84
	480Y/277	208Y/120	42	33	21	192	84
20KVA/16KW	208Y/120	208Y/120	56	45	62	192	112
	480Y/277	480Y/277	24	19	27	192	112
	480Y/277	208Y/120	56	45	27	192	112
25KVA/20KW	208Y/120	208Y/120	69	56	77	288	85
	480Y/277	480Y/277	30	24	35	288	85
	480Y/277	208Y/120	69	56	35	288	85
30KVA/24KW	208Y/120	208Y/120	83	67	93	288	102
	480Y/277	480Y/277	36	29	41	288	102
	480Y/277	208Y/120	83	67	41	288	102
40KVA/32KW	208Y/120	208Y/120	111	89	123	312	169
	480Y/277	480Y/277	48	39	54	312	169
	480Y/277	208Y/120	111	89	54	312	169
50KVA/40KW	208Y/120	208Y/120	139	111	155	552	120
	480Y/277	480Y/277	60	48	67	552	120
	480Y/277	208Y/120	139	111	67	552	120
62.5KVA/50KW	208Y/120	208Y/120	174	139	194	552	-
	480Y/277	480Y/277	75	60	84	552	-
	480Y/277	208Y/120	174	139	194	552	-

Note: * I TOTAL: Total Amps, I R: Total Amp (Resistive load)

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APPENDIX E – Drawings (All Technical drawings are downloadable from Website: www.onlinepower.com)

1. Three Phase UPS Installation - Installation Dwg. – 6001-032-03 Rev.C
2. UPS & Battery Cabinet Installations (Battery Cabinet Layout) – Dwg. 6001-032-05 Rev. D
3. UPS & Battery Cabinet Installations (Battery Cabinet Layout) – Dwg. 6001-032-06 Rev. D
4. UPS & Battery Cabinet Installations with Stackable Rack – Dwg. 6001-032-07 Rev. D
5. 3 Phase UPS Functional Block Diagram – Single Line Diagram, Single Input Dwg. 6001-032-11-Rev. A
6. 3 Phase UPS Functional Block Diagram – Single Line Diagram, Dual Input Wye-Wye) – Dwg. 6001-032-04-Rev. C
7. 3 Phase UPS Functional Block Diagram – Single Line Diagram Dual Input Delta-Delta) – Dwg. 6001-032-10-Rev. C
8. UPS & Battery Cabinet Seismic Certification Drawing – Dwg. 04-0959A
9. 3 Ph. External Wrap Around by pass panel 3,4 Pole By-Pass Panel, 55 A – 350 A, Dwg. 6001-032-27,6001-032-27S
10. 3 Ph. External Wrap Around 3,4 Pole By-Pass Panel, 55 A – 350 A,Dwg. with optional load disconnect 6001-032-28, 6002-032-28S.
11. 3 Ph. External Wrap Around 3 Pole By-Pass Panel, 55 A – 350 A for Different Input / Output, Dwg.6001-032-11-X, rev X1, Sheet 1 & 2.
12. 3 Ph. External Wrap Around 3 Pole By-Pass Panel,55 A – 350 A with Optional Circuit Breaker, Dwg. 6001-032-11-B-X Rev X1, Sheet 1 & 2.
13. 3 Ph. External Wrap Around 4 Pole By-Pass Panel, 55 A – 350 A, Dwg. 6001-032-12 Rev. X1, Sheet 1 & 2.
14. 3 Ph. External Wrap Around 4 Pole By-Pass Panel,55 A – 350 A with Optional Circuit Breaker, Dwg. 6001-032-12B Rev. X1, Sheet 1 & 2.
15. 3 Ph. External Wrap Around 4 Pole By-Pass Panel, 55 A – 350 A for Different Input / Output, Dwg.6001-032-12-X, rev X1, Sheet 1 & 2.
16. 3 Ph. External Wrap Around 4 Pole By-Pass Panel,55 A – 350 A with Optional Circuit Breaker, Dwg. 6001-032-12B-X Rev. X1, Sheet 1 & 2.

TABLES

1. Allowable Ampacities of Insulated Conductors Rated 0-2000 V, 60 to 90 deg. C, (140 – 194 deg. F). Table 310-16 of National Electrical Code.
2. Connection Type / Wire Size Range
3. Torque Specifications (Unless Otherwise Labeled)
4. UPS Installation Data
5. Specifications