



3200 Series User's Manual

Table of Contents

1. Introduction and Safety

Important Safety Instructions.....	5-7
Note to Users.....	8-9

2. Installation

UPS Unpacking Instructions.....	10-12
UPS Installation.....	13
Clearance Guide.....	14
Wiring Guide.....	15
UPS Connector Terminals and Lug locations.....	16-19

3. Product Specifications

3200 Series Product Specifications.....	21-22
---	-------

4. Operation

UPS Operational Overview.....	23-24
UPS Operation: Normal Mode.....	24
UPS Operation: Battery Mode.....	25
UPS Operation: Bypass Mode.....	26
UPS Operation: Emergency Bypass.....	27
UPS Operation: Manual Maintenance Bypass Mode.....	28
Touch Screen Description, Calibration, Using the Touch Screen.....	29
Touch Screen Descriptions (Monitoring).....	30
UPS Startup Sequence.....	31-35
UPS Shutdown Sequence.....	36-38
UPS Maintenance Bypass Sequence.....	38-45
Monitor Functions.....	46-47

Control Functions.....	48-62
Touch Screen Menu's.....	63-80

5. Maintenance

UPS Maintenance.....	82
Battery Maintenance.....	83
Battery Replacement.....	84-97

6. Warranty

Product Warranty.....	99-100
-----------------------	--------

7. Service and Troubleshooting

Alarm Severity Definitions.....	102
Alarms Messages.....	103-106

8. Drawings

UPS Outline Drawings.....	108
Block Diagram (UPS + External Battery Cabinet).....	109
Block Diagram (UPS + Input Transformer Cabinet).....	110
Block Diagram (UPS + Output Transformer Cabinet).....	111
Block Diagram (UPS + Input/Output Transformer).....	112
Block Diagram (UPS + 3 Breaker MBS).....	113
Block Diagram (UPS + 3 Breaker MBS + Input Step-Down Transformer).....	114
Block Diagram (UPS + 3 Breaker MBS + Output Isolation Transformer).....	115
Block Diagram (UPS + 3 Breaker MBS + Input/Output Transformers).....	116
Facility Data Planning Guide.....	118

1. Introduction and Safety

*****IMPORTANT SAFETY INSTRUCTIONS*****

*****SAVE THESE INSTRUCTIONS*****

This manual contains important instructions to be followed during installation and maintenance of the UPS and batteries.

Please read all instructions before installing or operating the described equipment and **PLEASE SAVE THIS MANUAL FOR FUTURE REFERENCE!**

SPECIAL SYMBOLS: The following are examples of symbols used on the UPS, or within this manual to alert you to important information. Please familiarize yourself with these symbols.



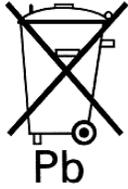
Risk of Electric Shock- observe the warnings associated with the risk of electrical shock.



CAUTION: HOT SURFACE – Do not touch! Risk of burn hazard.



CAUTION: REFER TO OPERATOR'S MANUAL—refer to operator's manual for additional information, such as specific operating and/or maintenance instructions.



Do Not Discard--this equipment utilizes components that contain lead and must be disposed of properly. For more information, contact your local recycling/refuse or hazardous waste center.



Do Not Discard-- never discard Waste Electrical or Electronic Equipment (WEEE) in the trash. For proper disposal contact your local recycling/refuse or hazardous waste center.



Information of Special Note--Specific handling or operational instructions may apply.



Phase--This is the electrical symbol for the word "phase".



Recycle—equipment or components are made of recyclable material, please contact your local recycling center for proper disposal.

NOTE TO USERS

To ensure correct operation of the UPS, please read this instruction manual carefully. Please keep this manual handy for future reference.



This UPS has dangerously high voltages on both its Input and output connections. Contact with these voltages may be life threatening. Please follow the operating instructions carefully. Please give close attention to the warnings in this manual and those posted on the UPS. There are no user serviceable parts inside the UPS. Disassembly and/or maintenance should only be done by authorized personnel.

IMPORTANT INFORMATION FOR USERS OF THIS UNINTERRUPTIBLE POWER SUPPLY

1. Before operating the UPS or connecting any load equipment, please ensure the UPS is connected to a properly grounded electrical supply.
2. This UPS has dangerously high voltages on both its input and output connections. Contact with these voltages may be life threatening.
3. Please do not disassemble the covers. There is a risk of electric shock.
4. In an emergency, immediately turn off the circuit breaker for the circuit supplying power to the UPS. Also immediately turn off the battery circuit breaker.
5. This UPS has two power sources. One is the circuit supplying the UPS with input power. The other is the UPS battery. Prior to any maintenance, both of these power sources must be disconnected to ensure that the UPS is de-energized. If only the input power is disconnected, the UPS can still operate from the battery, and hazardous voltages may still exist.
6. To prevent damage or a safety hazard, keep the UPS away from open flame and any other devices that may cause sparks.
7. Do not open or damage individual battery cases as spillage of caustic electrolyte may occur resulting in danger to life, safety, and the environment.
8. The charging characteristics of UPS batteries vary by both brand and type. For this reason, replacement batteries should be of the same brand and type as those specified by the manufacturer. Using batteries other than the brand and type specified by the manufacturer may affect the performance of the UPS. Before installing batteries of different brand or type, please consult with the manufacturer.
9. The UPS has an internal EMI filter for purposes of enhancing electromagnetic compatibility with the input mains supply. This filter produces leakage current to earth on the input mains. When selecting a circuit breaker for the branch circuit

supplying power to the UPS, ensure that the breaker selected is not an ELCB type circuit breaker that detects earth leakage current.

10. Please contact the manufacturer or an authorized distributor for any assistance with troubleshooting.
11. The UPS should only be serviced or maintained by a factory authorized service technician.
12. This UPS meets FCC Class A electromagnetic compatibility requirements.
13. Depleted batteries must be disposed of in a proper manner. Contact your local recycling or hazardous waste center or the UPS manufacturer for instructions concerning proper disposal.

2. Installation

UPS Unpacking Instructions



The POWERVAR 3200 Series comes packed in heavy cardboard with foam dividers on a heavy wooden pallet. The unit is bolted to the skid with two metal brackets. A wooden ramp is stored vertically in front of the UPS. This ramp is used to move the UPS off of its shipping pallet.



Note: POWERVAR encourages the end user to retain all shipping materials until the UPS has been inspected, installed and verified for proper operation.

The POWERVAR 3200 Series UPS utilizes internal batteries which are pre-assembled in individual trays and shipped separately from the UPS. These trays come completely wired and ready for connection to the internal battery harness of the UPS. A quick visual inspection is requested to determine if any connections were unseated during the shipping process.

Unpacking the UPS requires a 19mm wrench or socket. To remove the UPS from the packing materials:

1. Visually inspect the unit for any signs of transit damage (Fig. 2-1). Remove and retain all associated paperwork (packing list, user's manual etc.) that is affixed to the top of the unit. Remove the cardboard lid from the top of the container.
2. Remove any fasteners from the lower edge of the cardboard container.
3. With the help of an assistant, carefully lift the heavy cardboard container straight up until it is clear of the UPS. (Fig. 2-2)
4. Remove the foam dividers. (Fig. 2-3)
5. Lift the ramp clear of the alignment pin, and place it sloping downward at the front of the UPS, using the pin to hold the back of the ramp in place.
6. Remove the protective plastic cover from the UPS.
7. The UPS is attached to the shipping pallet with two shipping brackets—one on each side of the UPS. Using an adjustable wrench or 19mm socket, remove the three bolts that attach the bracket to the UPS. If your location has a Seismic requirement, please contact factory for Seismic installation instructions. (Fig. 2-4)
8. The UPS has two leveling feet. Be sure to check that the levelers are up against the bottom of the UPS to ensure it rolls freely on the ramp.

9. With the help of an assistant, carefully roll the UPS off the pallet and down the ramp to the floor of your facility. If the floor at your desired UPS location is uneven, the levelers may be used to steady the UPS, once it is in place.

Please do not install batteries in the UPS. Batteries should be installed ONLY by factory authorized personnel once the UPS is in its final location, and at the time of initial startup.

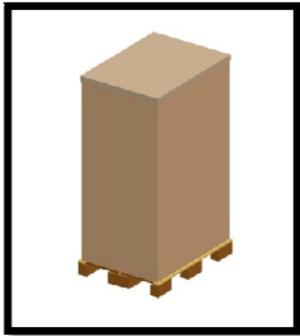


Fig. 2-1

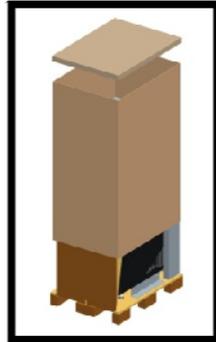


Fig. 2-2

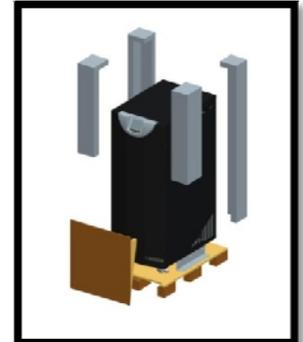


Fig. 2-3

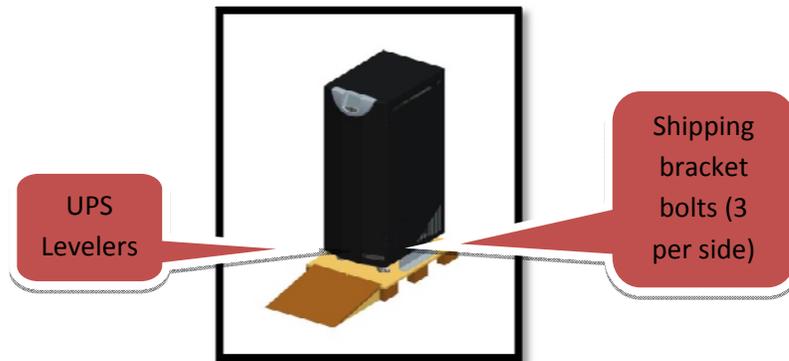


Fig. 2-4

UPS Installation



The installation of this UPS should be performed only by qualified personnel who are familiar with UPS and battery systems and the required precautions necessary for safe and proper installation. Unauthorized and /or unqualified personnel should not attempt to install or service this equipment. Any damage resulting from installation or service performed by unauthorized/unqualified personnel, or non-compliance with any pertinent local codes will void the warranty of this equipment.

Maximum operating ambient temperature is 40°C

Storage (non-operating) ambient temperature range is -20°C to 60°C

Please consult the Facility Data Planning Guide for floor loading and unit cooling characteristics.

The levelers are not designed to support the weight of the entire unit, they are to be used when the floor is not entirely level.



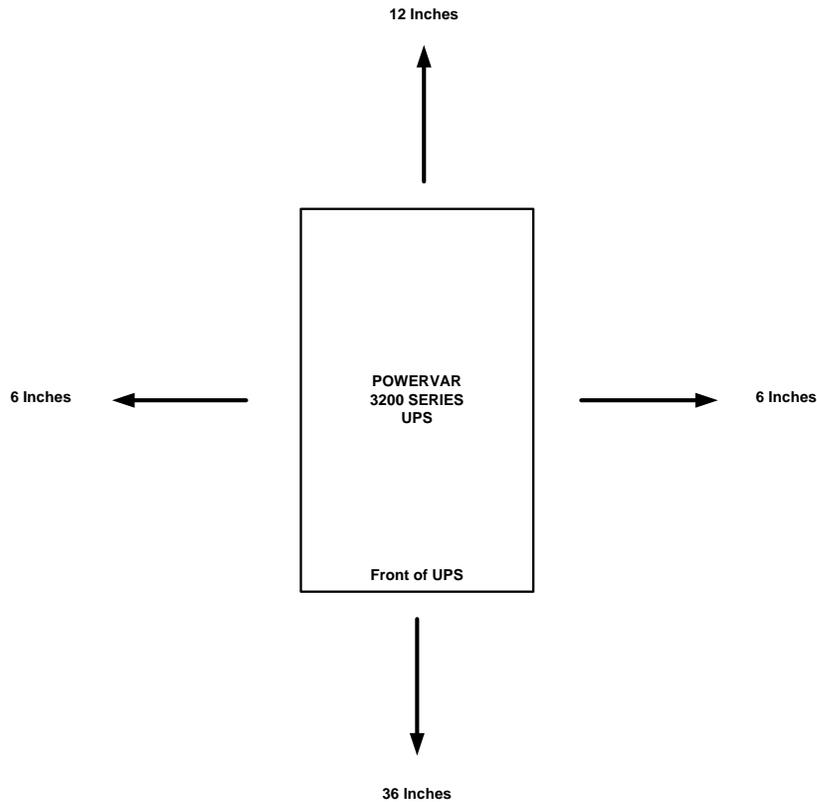
CAUTION: Please confirm that the **AC Input** switch and the **Battery Disconnect** switch are in the “Off” position, and the **Manual Maintenance Bypass** is in the “Normal” position, before making any connections to this UPS.

The POWERVAR 3200 Series requires a 208V three phase, four wire (+ ground) input for proper operation. **Input over current protection and the output disconnect are to be provided by the user.** The Facility Data Planning Guide is available as a guideline to assist with the installation of the UPS. This document however, is not intended as a substitute or to supersede any regional or local electrical codes. In the event of questions or controversy regarding the installation of this equipment, the local Authority Having Jurisdiction (AHJ) should always be consulted and will have the ultimate final approval over the installation.

POWERVAR 3200 Series Clearance Guide

Location	Minimum Clearance (Inches)
Top (Above) of Cabinet	36
Front of Cabinet	36
Rear of Cabinet	12
Sides of Cabinet	6*

*Matching peripheral cabinets are considered to be part of the UPS system, so the 6" spacing should be taken from the outside edge of the peripheral cabinet.



Minimum Clearance Guidelines

The following steps refer to bottom feed installations only.

Once the UPS has been properly unpacked (see page 9) and placed in its installation location, the leveling feet must be lowered. These levelers are located in the front of the unit below the door.

POWERVAR recommends the following overcurrent device (provided by customer) to be used as the electrical **supply** (input) to the 3200 Series UPS:

<u>UPS Model (kVA)</u>	<u>External Overcurrent Protection*</u>	<u>Recommended Wire Size</u>	<u>Terminal Wire Range (Min. – Max.)</u>	<u>Tightening Torque (Min. – Max.)</u>
10	35A	#8 AWG	#8 to #4 AWG**	1.5 Nm (min) / 1.8 Nm (max)
20	70A	#4 AWG	#4 AWG**	1.5 Nm (min) / 1.8 Nm (max)
30	110A	#1 AWG	#1 AWG to** 350 kcmil	#1 to 350 = 375 In-lbs.
40	150A	#2/0 AWG	#2/0 AWG to** 350 kcmil	#1/0 to 350 = 375 In-lbs.
Gnd. (All models)		#6 AWG	#6 -2/0 AWG**	120 In-lbs.

* To be provided by customer

** 75°C min. rated CU conductors only

The terminals for input and output connections to the UPS are accessed by opening the hinged front door of the UPS (Fig.2.6) Firmly grab the left hand side of the door and pull outward. The magnetic keepers will release and the door will open exposing the flat front of the UPS (Fig.2.7).

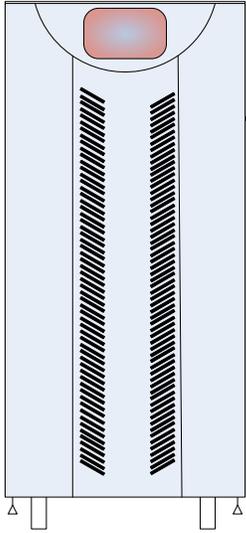


Fig. 2-6

UPS-front view

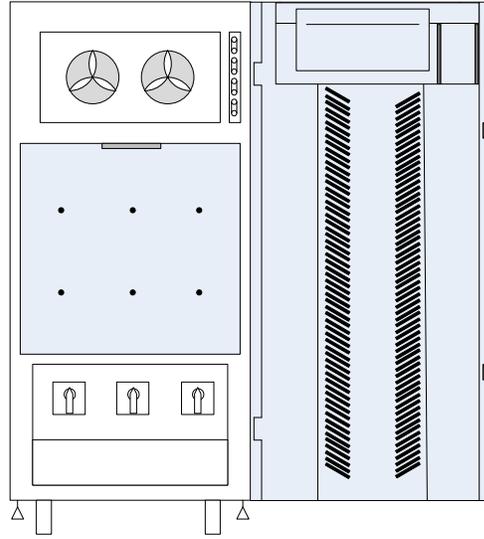


Fig. 2-7

UPS – front view with door open

Once opened, the connection terminals can be accessed by removing the screws holding the terminal safety cover in place (Fig 2.8). This cover is located just below the three rotating handles used for the operation of the UPS. (Their operation is described elsewhere in this manual)

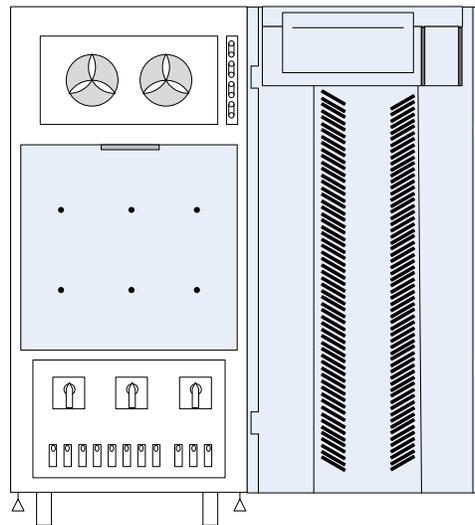


Fig. 2-8

UPS-front view with door opened and terminal safety cover removed

The terminals to accommodate the input and output conductors are laid out as follows (Fig. 2.9):

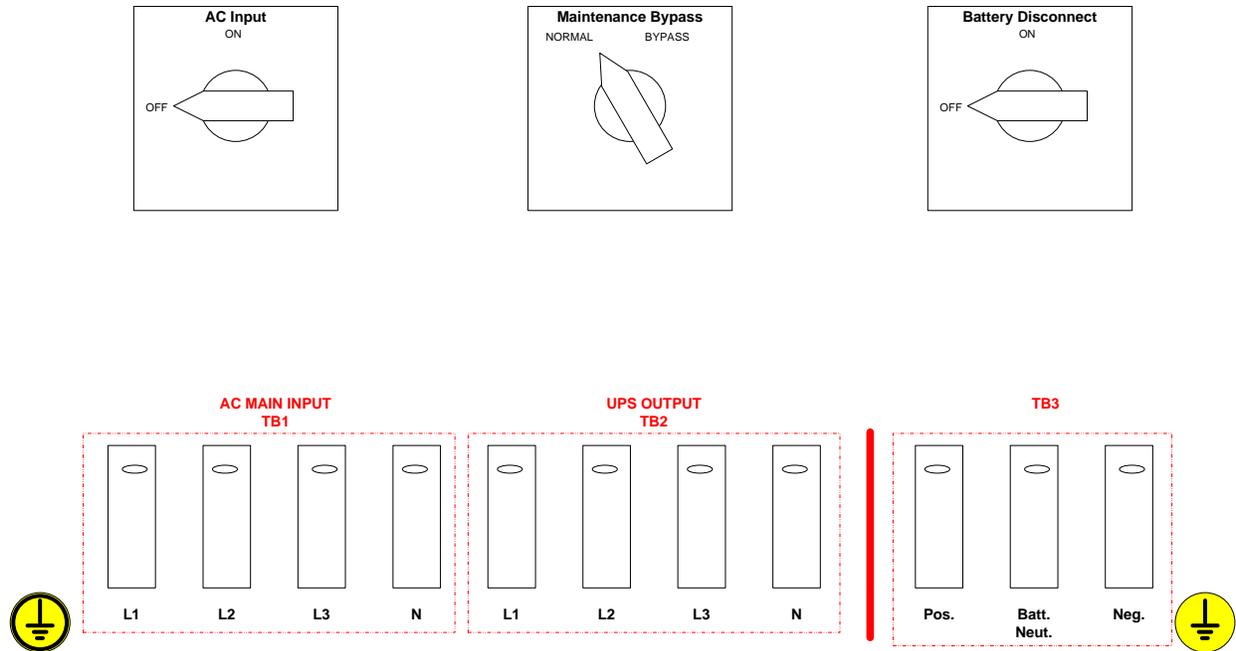


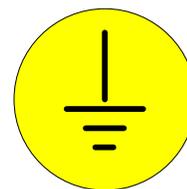
Fig. 2-9

As shown above, the input (LINE) conductors are connected to the (L-R) first four terminals. This UPS will **not** operate without an incoming neutral conductor. The required input phase rotation is **ABC**. The output (LOAD) conductors are connected to the (L-R) next four terminals. In all cases the conductors should enter the enclosure from the bottom and enter the lugs or terminals **from the bottom**. All conductors entering this terminal area **must** be kept to the left of the barrier separating terminal TB2 from TB3.

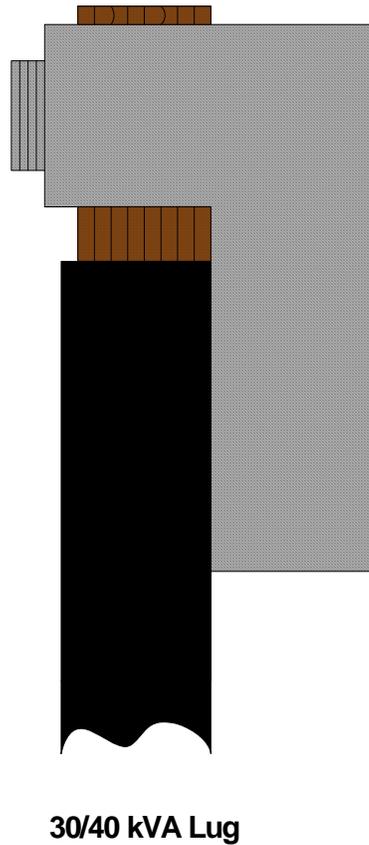
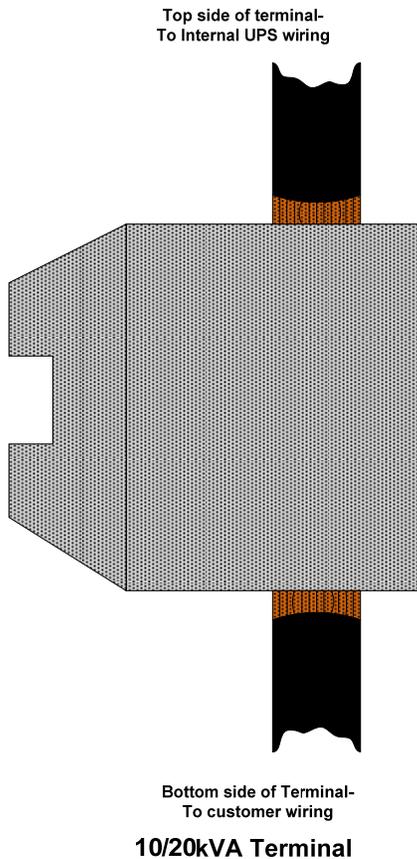
The grounding locations are marked with the following symbols:



Protected Earth (Input)



Earth (Output)



Care should be taken when installing these conductors so as to **not** confuse the input (LINE) and output (LOAD) phase conductors. Keeping in mind this UPS **requires** an input neutral for proper operation. Once all conductors are properly landed and sufficiently tightened to their respective torque specs, the terminal safety cover may be reinstalled.



Terminal safety cover **must** be installed prior to operation of the UPS.

POWERVAR recommends a disconnecting means with the following overcurrent ratings (provided by customer) to be used as the electrical **supply (output) from** the 3200 Series UPS to the critical load:

<u>UPS Model (kVA)</u>	<u>External Overcurrent Protection*</u>	<u>Recommended Wire Size</u>	<u>Terminal Wire Range (Min. – Max.)</u>	<u>Tightening Torque (Min. – Max.)</u>
10	30A	#10 AWG	#8 to #4 AWG**	1.5 Nm (min) / 1.8 Nm (max)
20	60A	#6 AWG	#6 to #4 AWG**	1.5 Nm (min) / 1.8 Nm (max)
30	90A	#4 AWG	#4AWG to** 350 kcmil	#1 to 350 = 375 In-lbs.
40	125A	#1 AWG	#1 AWG to** 350 kcmil	#1/0 to 350 = 375 In-lbs.
Gnd. (All models)		#6 AWG	#6 -2/0 AWG**	120 In-lbs.

* To be provided by customer

** 75°C min. rated CU conductors only

3. Product Specifications

POWERVAR 3200 Series Specifications

Applicable Standards:

UL1778 and CSA 22.2
 IEC, 62040 UPS Standard
 ISO 9001 Quality Assurance Program
 EMI compatibility: FCC Title 47 Part 15,
 Subpart B
 IEEE C62, 41-1991
 OSHPD Special Seismic Certification # -
 OSP-0336-10

Model:	Power Rating (kVA):	Capacity(kW):	Frequency:
3200-10	10	9	50/60Hz
3200-20	20	18	50/60Hz
3200-30	30	27	50/60Hz
3200-40	40	36	50/60Hz

System Input (Converter):

Operating Input Voltage (Nominal +15% / -15%)	208VAC (operating window = 177to 239VAC) 3 Phase 4 wire
Frequency Range	+/- 5Hz
Input Current THD	< 1 % @ 100% load, < 2 % @ 50 % load
Input Power Factor	.99 @ 100% load, .98 minimum @ 50% load
Battery Voltage	432VDC Nominal (36 batteries x 12V)
Converter Walk-in Time	20 Seconds

System Input (Bypass):

Nominal Input Voltage	208VAC, 3Phase 4 Wire
Input Synchronization Voltage Range	+/- 10% of Nominal
Input Frequency Tracking Range	+/- 3 HZ
Output Fault Clearing	400% for 10s, 1000% for ½ cycle

System Output:

Nominal Output Voltage	208VAC 3 Phase 4 Wire
Static Voltage Regulation	+/- 2%
Output Frequency (Inverter Synchronous)	60Hz (tracks frequency of static bypass source) +/- .2, .5, 1 and 2Hz (user settable)
Output Frequency Slew Rate	+/- 1 Hz per second
Frequency Regulation	60Hz +/- .01% (free running)
Output Voltage Harmonic Distortion	Less than 1% (linear load) Less than 2% with a crest factor of 2.5 to 1
Output Overload Capacity	125% for 10min., OR 150% for 60 seconds
Voltage Transient Response	+/- 2% for a 100% step load

Environmental:

Efficiency (100% load)	
Operating Ambient Temperature	DC to AC = 94% AC to AC = 92%
Storage Temp. (non-operating)	0° to 40° C (no derating required)
Relative Humidity (non-condensing)	-20° to +60° C (without batteries) Recommended: 30% to 90%
Acoustical Noise level	Maximum: 5% to 95%
Heat Dissipation (@ 208v input)	< 54dba @ 1 meter 10kVA = 3.79 kBTU / Hr. 20kVA = 7.60 kBTU / Hr. 30kVA = 9.10 kBTU / Hr. 40kVA = 12.1 kBTU / Hr.

4. Operation

UPS Operational Overview:

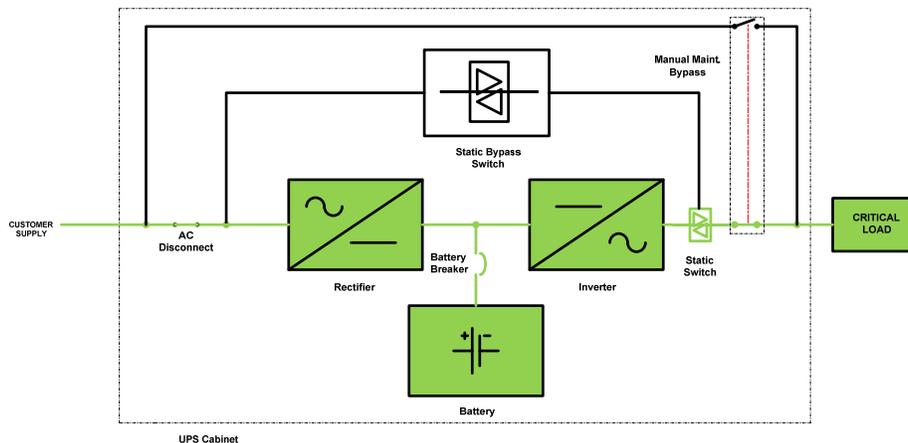
The POWERVAR 3200 Series UPS is a continuous-duty, solid state, transformerless, 208V three phase 4 wire true online double conversion system, which provides uninterruptible power to critical loads. The POWERVAR 3200 Series UPS maintains power to the critical load during commercial electrical power brownout, blackout, overvoltage, undervoltage, and out-of-tolerance frequency conditions.

The basic system consists of a rectifier, battery, and inverter, which are complemented by static bypass and manual maintenance bypass switches.

UPS Operation: Normal Mode

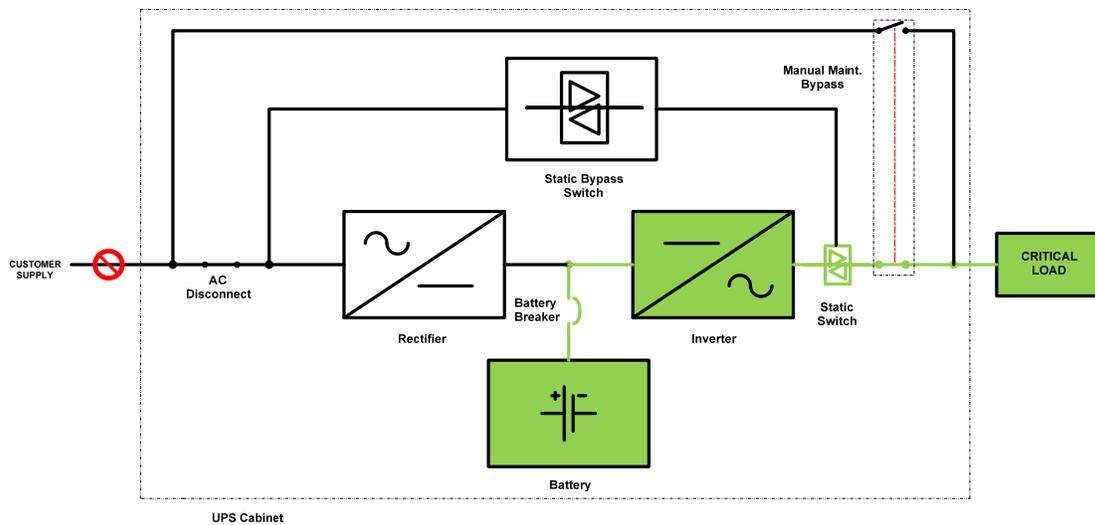
With the AC supply present, the rectifier transforms the AC input into DC, raising the DC to a suitable level to supply the inverter and to charge the batteries.

The inverter transforms the DC bus voltage into AC, providing a sine wave AC output, stabilized in voltage and frequency, to the critical load.



UPS Operation: Battery Mode

In the event of an AC input failure, the batteries provide the power necessary to supply the inverter. The inverter continues functioning as in normal mode, supplying AC power to the critical load.



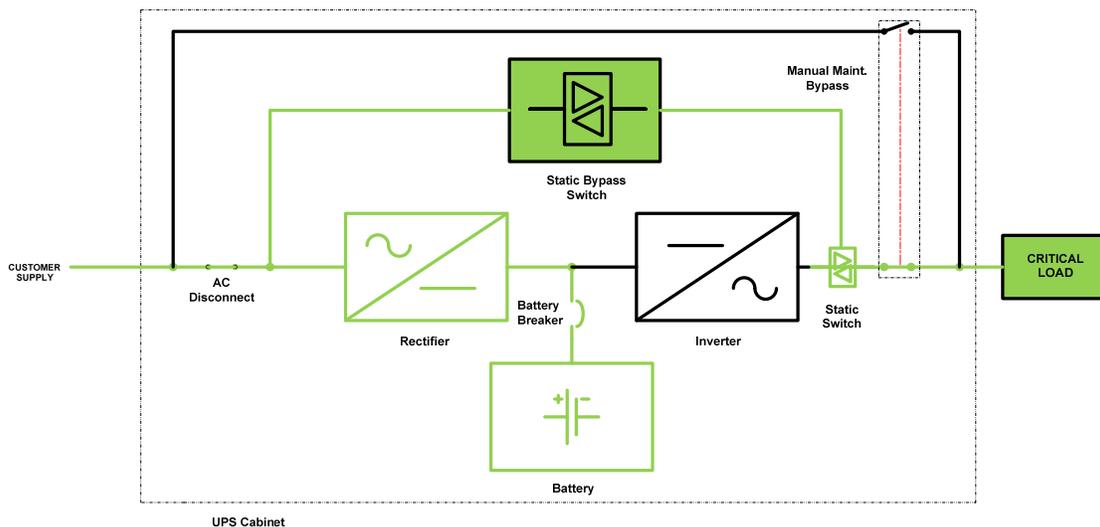
UPS Operation: Bypass Mode

The UPS comes with a static bypass switch which provides an alternate current path to the critical load. This transfer will not affect the supply of output power to the critical load, but if a power outage occurs while in this mode, the critical load will **not** be maintained. This bypass circuit can be enacted in two ways:

Normal Bypass

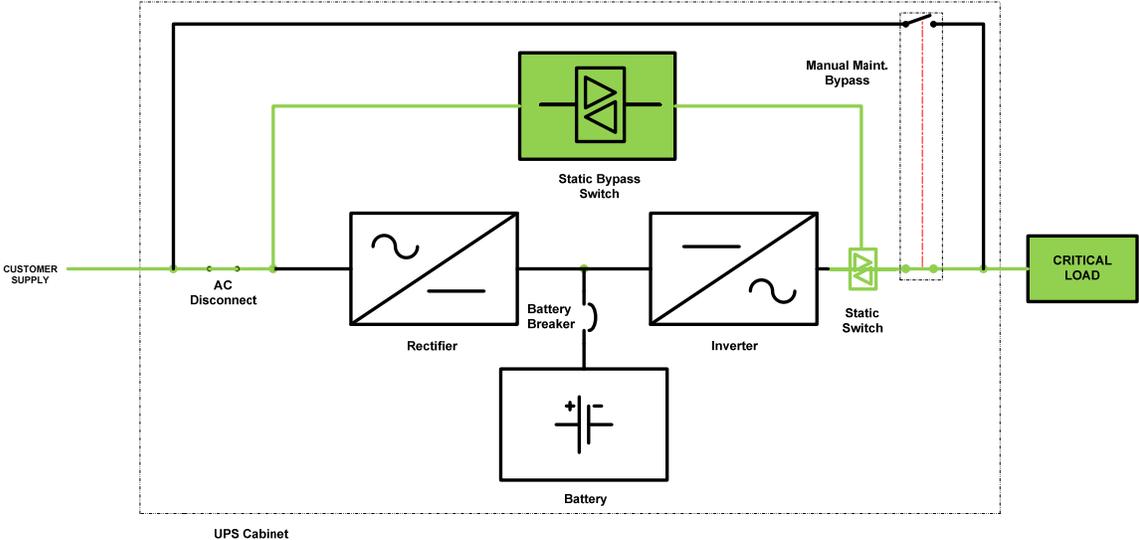
This circuit may be enacted manually by use of the “stop” button.

Note: The rectifier will continue to charge the batteries when in this state.



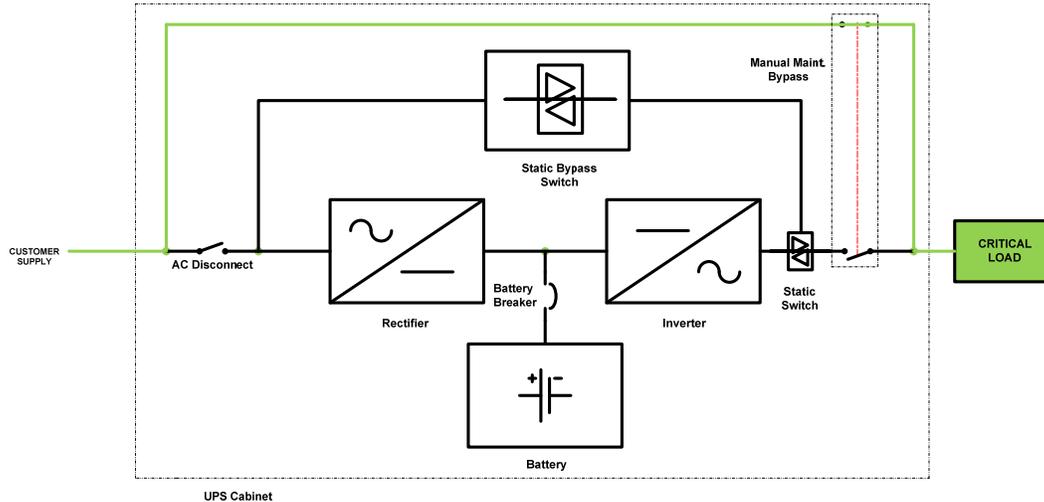
Emergency Bypass:

If an abnormal condition occurs the output to the critical load will be automatically transferred to bypass mode through the use of the static bypass switch.



UPS Operation: Manual Maintenance Bypass Mode

When it becomes necessary to perform maintenance checks on the UPS, the critical load need not be interrupted. This is accomplished by means of a “make-before-break” manual maintenance bypass switch. This same switch simultaneously isolates the output of the UPS, which will allow the rectifier and inverter to be energized for troubleshooting and repair purposes, without affecting the critical load.



THE TOUCH SCREEN

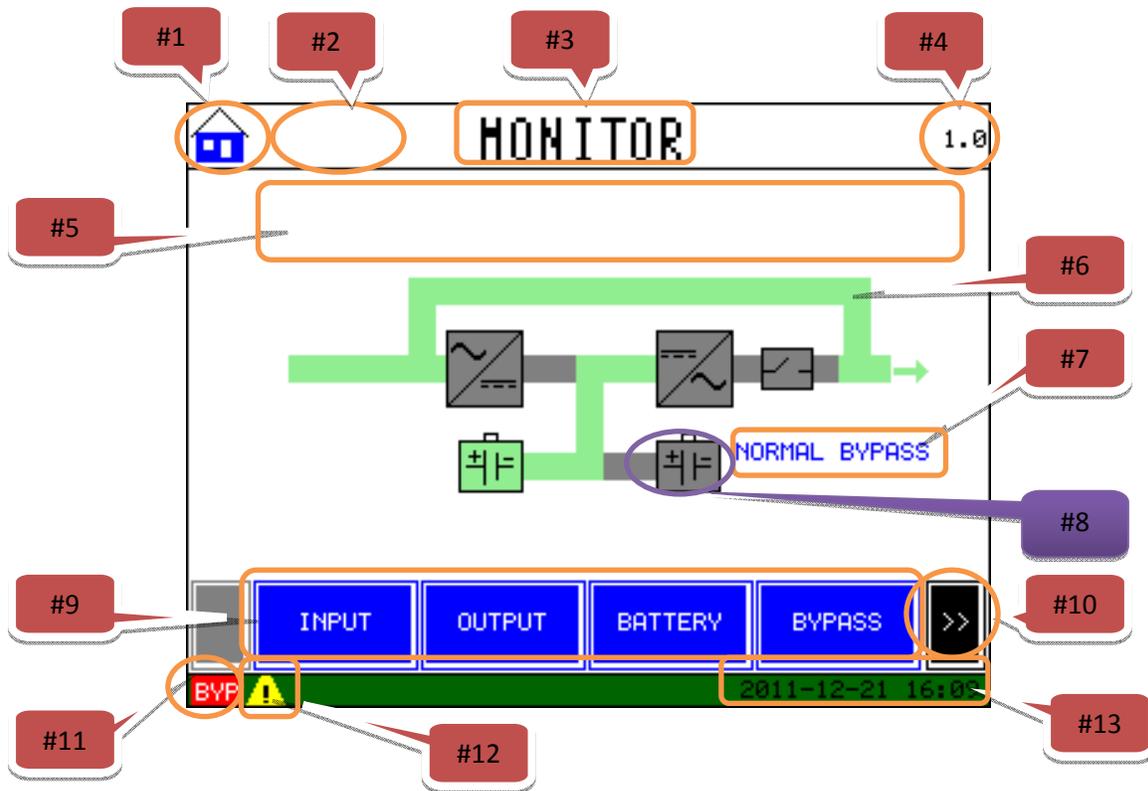
The POWERVAR 3200 Series UPS utilizes a state of the art full color (262K colors) TFT LCD 5.7" (diagonal measure) touch screen as its primary user interface. This powerful tool allows the user to observe and control all operations of the UPS by moving through a series of menu screens. The operational state of the UPS is represented in a one line format, using color changes to depict the actual current state.

Touch Screen Calibration

Upon screen initialization, you *may* be asked to calibrate the touch screen. Simply touch the plus sign (+) as it appears in different locations on the display. It is important to be directly in front of the screen during this process. Any deflective angle, however slight, will affect the accuracy of the display and subsequently the overall functionality of the UPS itself. This process may be manually initiated at any time by touching anywhere on the display continuously for >10 seconds.

Using the UPS display

The main user interface for this UPS is the touch screen display. The Home symbol in the upper left corner returns the user to the home screen from anywhere in the menu. The "back" button, will take the user to the previous screen. At the very bottom of the display (left corner) a symbol will describe the state of the UPS (INV, BYP, or BAT), plus a user information alert, and at the right is a time stamp of the current date and time. From time to time you may notice the word "**Reading**" appears next to the user information alert symbol. This indicates that the display is in the process of refreshing live data. The user should wait for this to disappear to observe the most up-to-date data.



	<u>Description</u>
1	HOME Button
2	UPS Model Size (HOME SCREEN ONLY)
3	Title Bar
4	Individual screen #, or in the case of the HOME screen only , the Firmware Revision Level
5	User information text area
6	Power flow diagram
7	User information text
8	External Battery cabinet (optional)—icon appears only when UPS is programmed for the External Battery Cabinet option
9	Action buttons
10	Scroll for hidden action buttons
11	State of UPS
12	User information alert- when touched takes user to the relevant informational screen
13	Date and Time



The following start-up sequence refers **ONLY** to the operation of this UPS **AFTER** it has been initially started by a Factory Authorized Service Representative. If your UPS has not had this original service performed, **DO NOT PROCEED. INITIAL START-UP BY NON-AUTHORIZED PERSONNEL WILL VOID YOUR WARRANTY!**

UPS User's Start-up Sequence:

The POWERVAR 3200 Series UPS utilizes a hinged front door to access its three primary switches. These switches are described as (L-R): **AC Input** which will disconnect the UPS from the AC source, the **Manual Maintenance Bypass** which will seamlessly transfer the critical load to an alternative current path allowing the UPS to be serviced, and the **Battery Disconnect** which directly connects the battery string(s) to the DC bus.

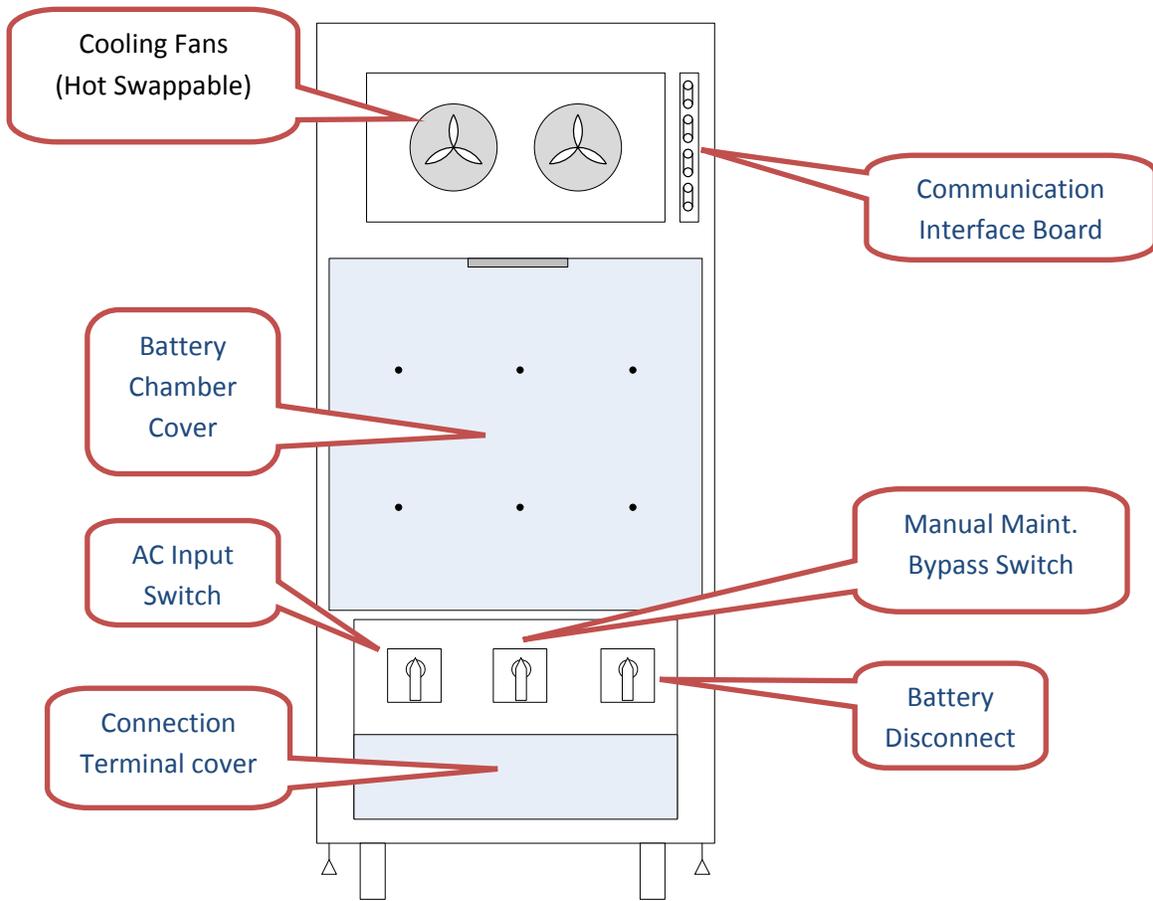


Fig. 4-6



The UPS will **NOT** start unless the Manual Maintenance Bypass Switch is in the “normal” position. The Battery Disconnect will be in the tripped /off position prior to UPS startup, and **MUST NOT** be closed until instructed to do so.

Step 1: Close the AC Input Switch. This will supply power to the UPS and cause the initializing screen to become illuminated (Fig. 4-7).

This screen should be visible for approximately 15-20 seconds, and should transition into the start-up bypass screen (Fig 4-8 & 4-9).



Fig. 4-7

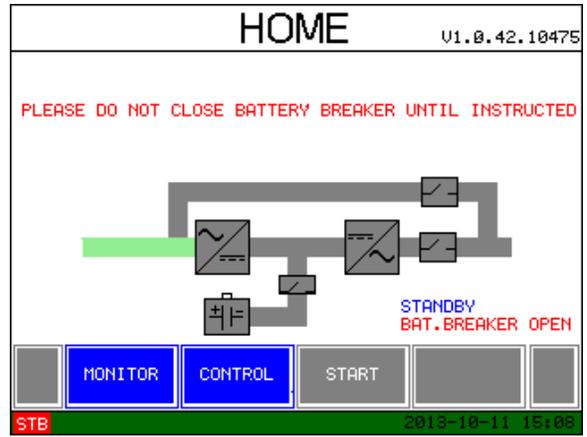


Fig. 4-8

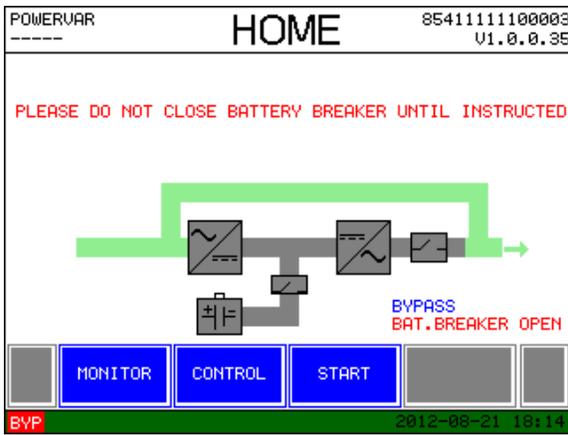


Fig. 4-9



Fig. 4-10

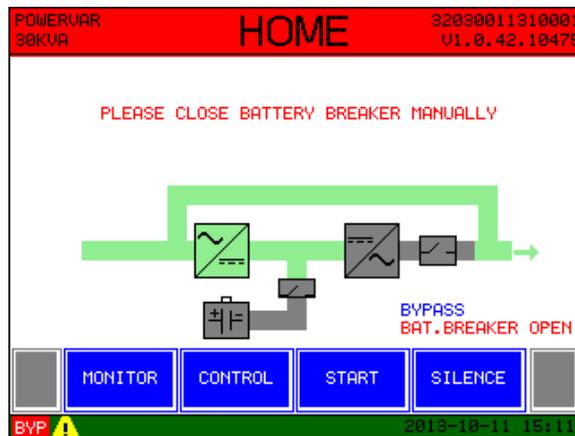


Fig.4-11

Step 2: The UPS will pre-charge the rectifier and start to energize the DC bus. Once the bus is fully charged, the unit will alarm to let the user know that the batteries are disconnected and the

battery breaker may now be closed (Fig. 4-10 & 4-11). The UPS “on Bypass” alarm state will remain until the unit is started.

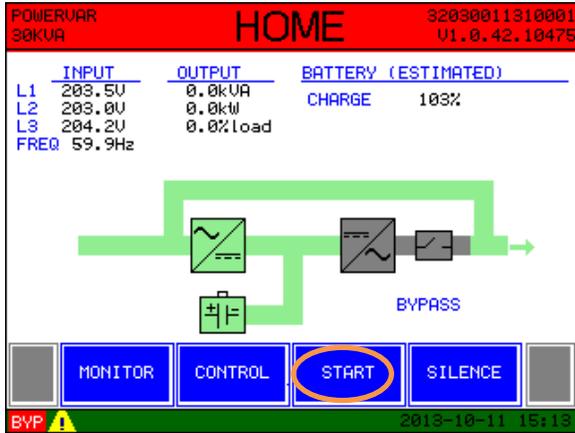


Fig. 4-12

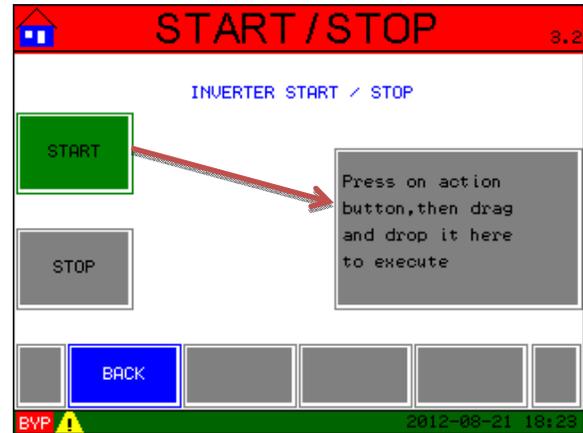


Fig. 4-13

Step 3: The UPS may now be started by pressing the “start” button at the bottom of this screen (Fig.4-12).

Step 4: The **START/STOP** screen (Fig. 4-13) will now appear. To actually execute the start sequence the “start” action button must be pressed AND dragged to the larger gray square to the right.

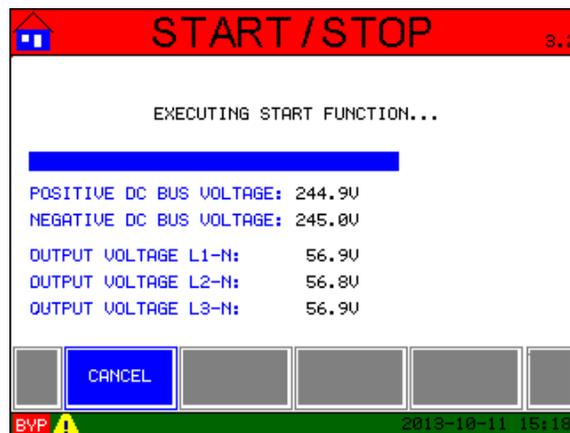


Fig. 4-14

The UPS will initialize and execute the start function to turn on the inverter (Fig. 4-14).

Upon successful completion of the internal control checks, the inverter will turn on and the “UPS on Bypass” alarm will disappear. The title bar will turn from red (meaning alarm present) to plain white (Fig. 4-15).

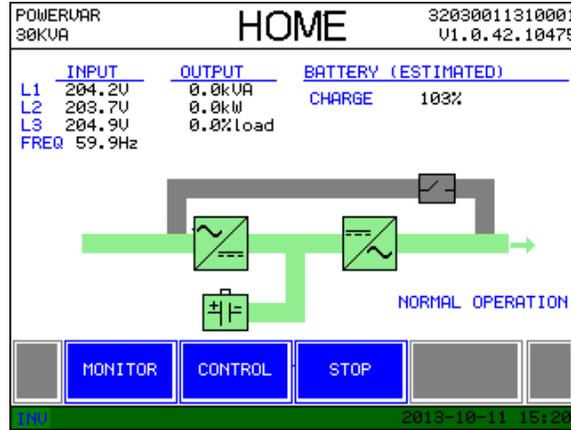


Fig. 4-15

The bypass path has now changed from green to gray and the main power path is now green.

The battery section is now green and input, output, and battery charge information has appeared in columns above the power path. Also, the words “normal operation” will appear below the power path.

To return to the “**Home**” screen from any other screen, simply press the home icon in the upper left corner. Pressing the “back” button on the bottom of various screens will take you to the previous screen only.

UPS Shutdown:

If it becomes necessary to completely turn off your UPS, please follow these simple steps:

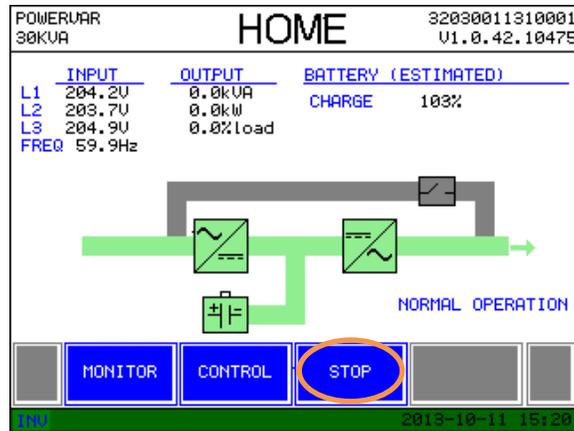


Fig. 4-16

Step 1: Perform a sequential shutdown of your applied load. Once there is no critical load, the UPS may be transferred to its static bypass state by pressing the “stop” button at the bottom of the Home screen (Fig. 4-16).

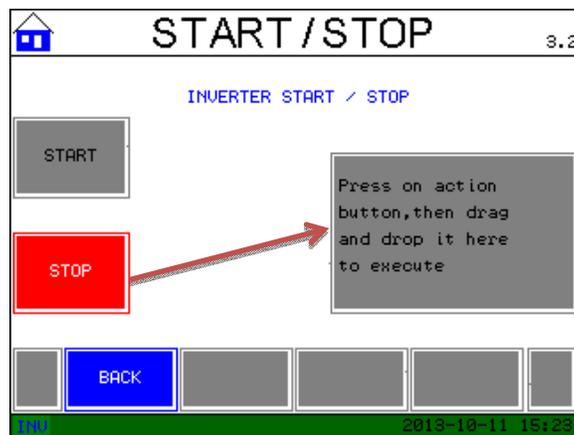


Fig. 4-17

Step 2: Drag and drop the red “stop” action square to the larger gray square to the right. The UPS will transfer to static Bypass mode (Fig. 4-17).

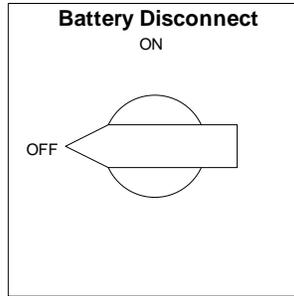


Fig. 4-18

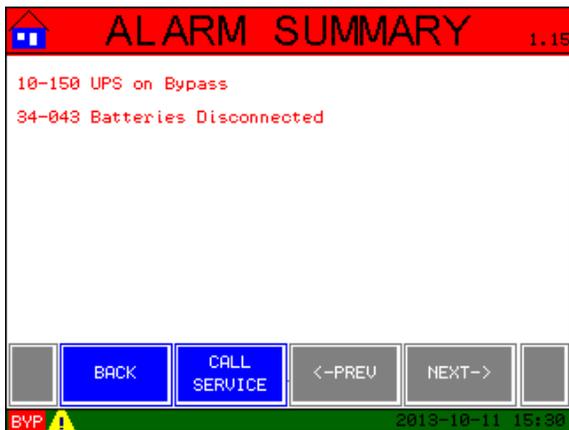


Fig. 4-19

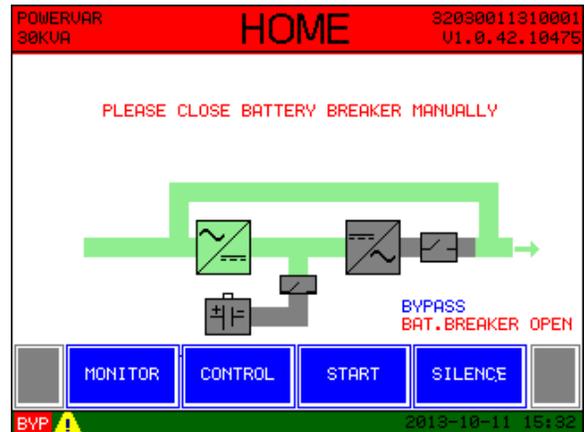


Fig. 4-20

Step 3: Open the battery disconnect switch (Fig. 4-18) which is behind the hinged front door at the lower right side. An audible alarm will sound when the breaker is open. This alerts the user to the state of the battery breaker (Fig. 4-19 & 4-20).

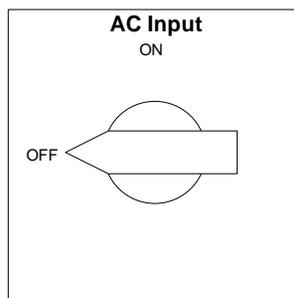


Fig. 4-21

Step 5: Open the **AC Input** breaker of the UPS (Fig. 4-21). The UPS will shut down. As an additional precaution, the AC supply feeding this UPS may now be de-energized.

Maintenance Bypass Mode

The POWERVAR 3200 Series UPS is supplied with a make-before-break maintenance bypass switch as a standard feature. This switch allows the user to transfer the UPS to an alternate current path for service or troubleshooting, without affecting the applied load. If it becomes necessary to utilize this function, please follow these steps:

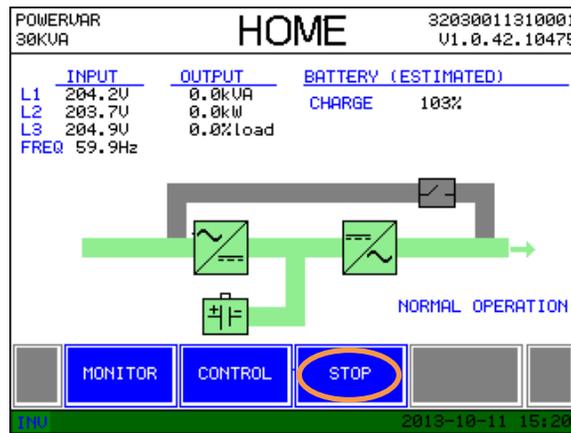


Fig. 4-22

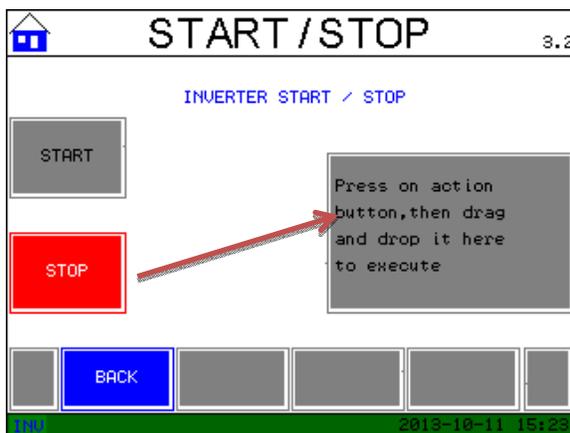


Fig. 4-23

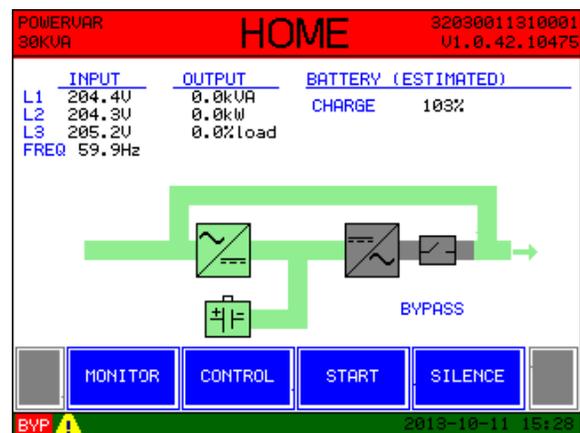


Fig. 4-24

Step 1: Transfer the UPS to Static Bypass mode by pressing the “stop” button at the bottom of the “Home” screen (Fig. 4-22). Drag and drop the red “stop” action square to the gray square at the right (Fig. 4-23). The inverter will now be offline. An alarm will alert the user to the fact the UPS is now in bypass mode and the critical load is no longer battery protected (Fig. 4-24 & 4-25).

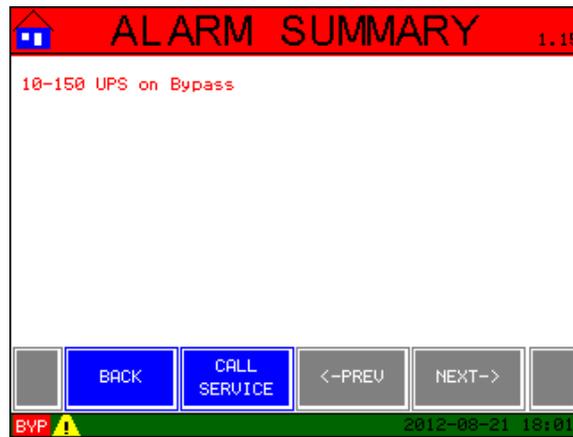


Fig. 4-25

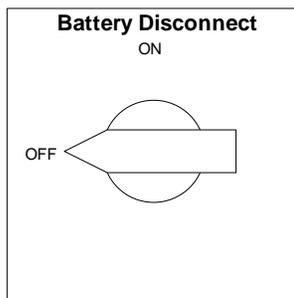


Fig. 4-26

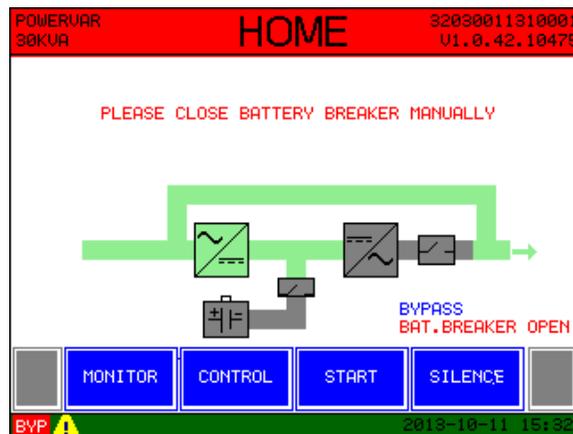


Fig. 4-27

Step 2: Once the offline state is confirmed via touchscreen, the **Battery Disconnect** breaker may be opened (Fig. 4-26). An audible warning will sound, but during this operation the warning may be disregarded (Fig. 4-27 & 4-28).

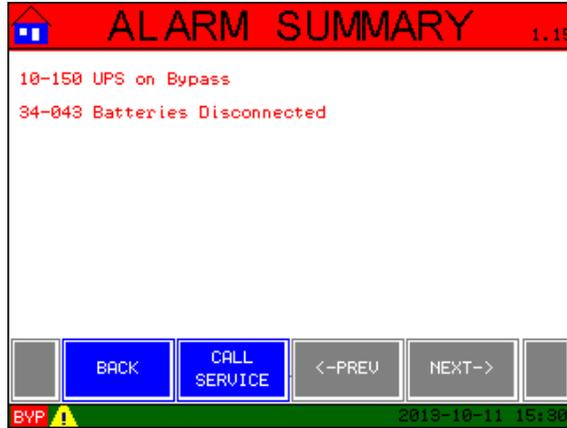


Fig. 4-28

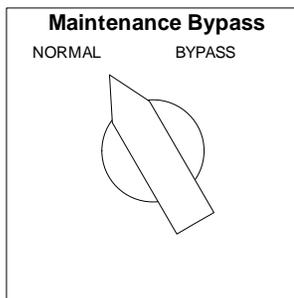


Fig. 4-29

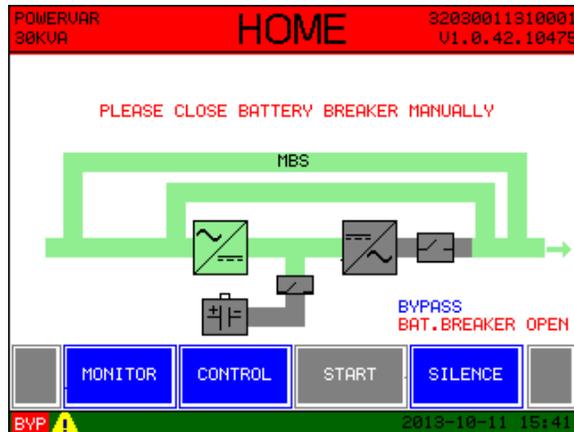


Fig. 4-30

Step 3: Rotate the **Maintenance Bypass** Switch to the “bypass” position (Fig. 4-29). The maintenance bypass path will now appear (Fig 4-30). An Alarm will appear to indicate this state (Fig 4-31).

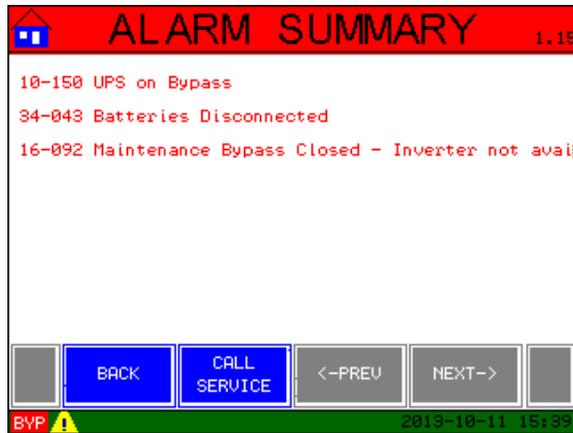


Fig. 4-31

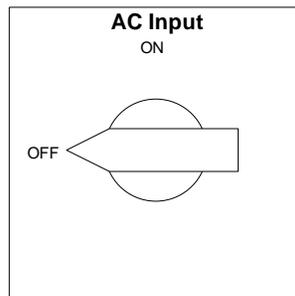


Fig. 4-32

Step 4: Open the **AC Input** breaker (Fig. 4-32). The UPS is now available for service or troubleshooting by an authorized service technician without affecting the applied critical load.

Note: opening the **AC Input** breaker will remove power to the touch screen display and cause it to go completely dark.



Live voltages are still present at the Input / Output terminals of the UPS.

Once necessary repairs or maintenance is completed, the unit may be re-transferred back to inverter for normal operation by following these steps:

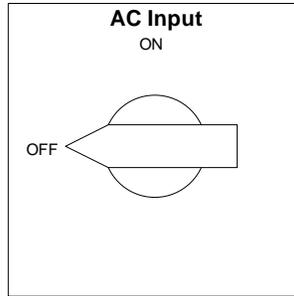


Fig. 4-33



Fig. 4-34

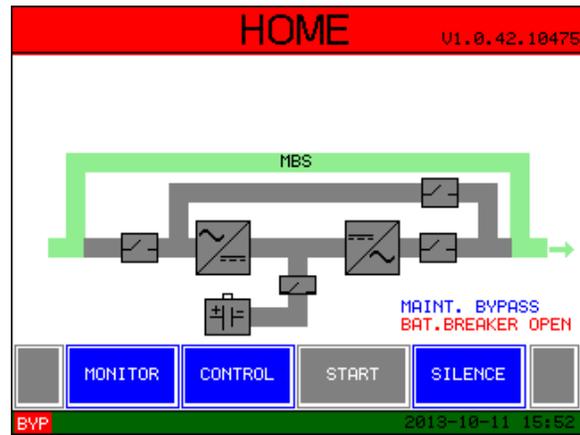


Fig. 4-35

Step 5: Close the AC Input breaker (Fig. 4-33). This will supply power to the UPS and cause the initializing screen to become illuminated (Fig. 4-34).

This screen should be visible for approximately 15-20 seconds, and should transition into the start-up bypass screen (Fig. 4-35 then Fig. 4-36).

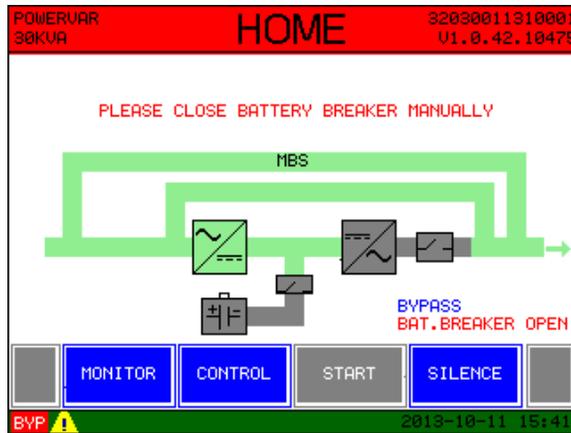


Fig. 4-36

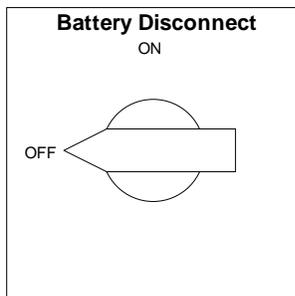


Fig. 4-37

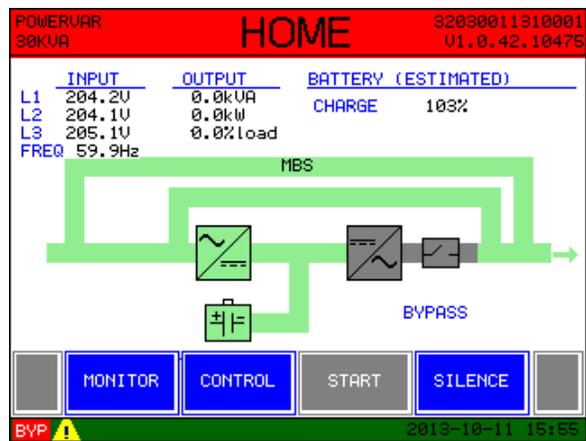


Fig. 4-38

Step 6: When prompted, close the battery breaker (Fig. 4-37). The display will confirm this operation (Fig. 4-38).

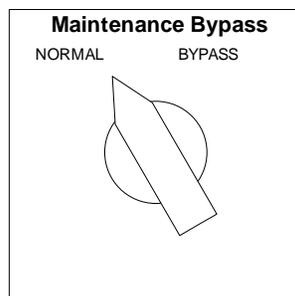


Fig. 4-39

Step 7: Rotate the **Maintenance Bypass** switch back to the “normal” position (Fig. 4-39).

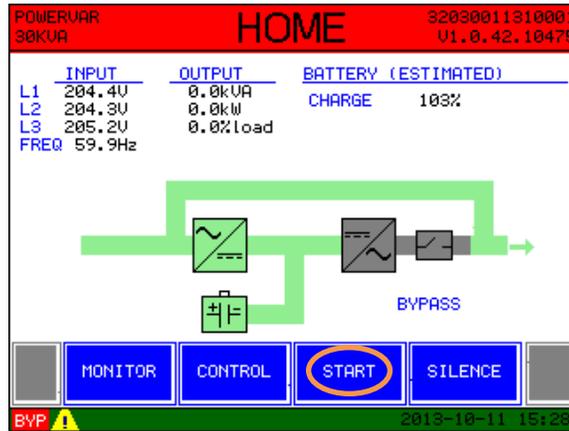


Fig. 4-40

Step 8: The UPS may now be started by pressing the “start” button at the bottom of this screen (Fig. 4-40).

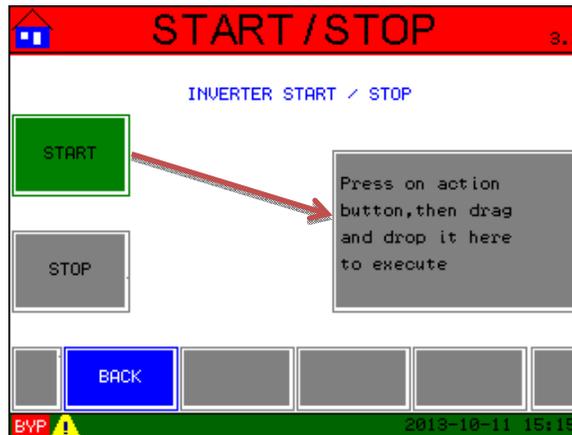


Fig. 4-41

Step 9: The “start/stop” screen will appear. To actually execute the start sequence the “start” action button must be pressed AND dragged to the larger gray square to the right (Fig.4-41).

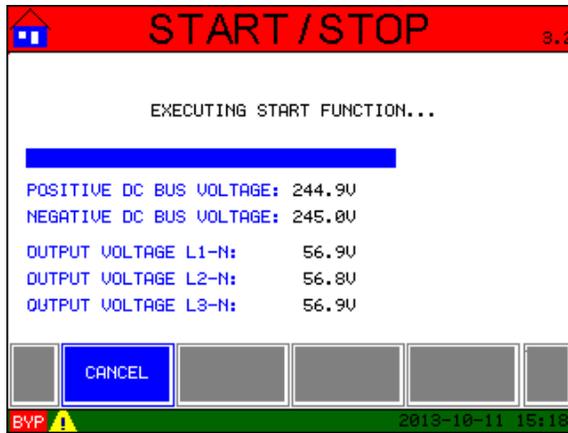


Fig. 4-42

Step 10: Upon successful completion of the internal control checks (Fig. 4-42), the inverter will turn on and the Normal Operation screen will appear.

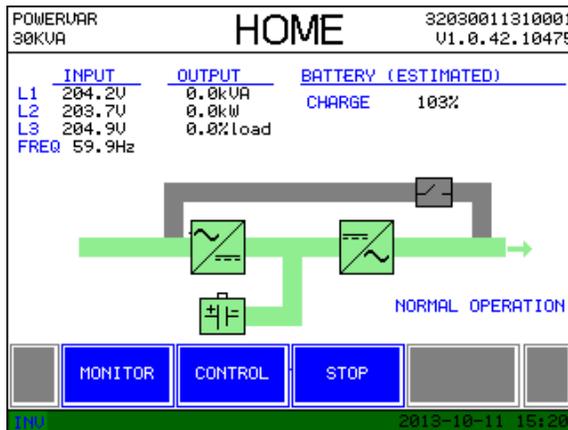


Fig. 4-43

Note: The bypass path has now changed from green to gray. The main power path is now green, the critical load will once again be battery protected (Fig. 4-43).

Using the Monitor Function

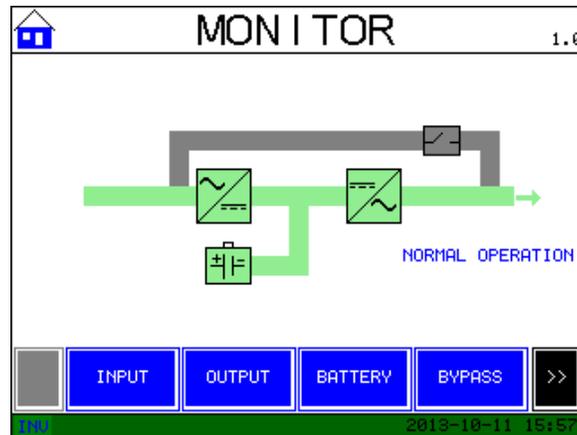


Fig. 4-44

The Monitor screen as shown above (Fig. 4-44) is designed to provide the user with real time information regarding the various operational states of the UPS. The buttons along the bottom, when pressed will render the following information to the user:

INPUT: L-L and L-N voltage and current, frequency and total real & apparent power

OUTPUT: L-N voltage and current, frequency, total effective & apparent power and power factor

BATTERY (with AC present): Battery voltage & charge current, # of times on batteries, and % of battery charge

BATTERY (when on batteries): # of times on batteries, battery voltage, discharge current and estimated runtime at current load.

BYPASS: L-L voltage, RMS phase current, and frequency of the available bypass

ALARM SUMMARY: displays details of any current alarms

OPERATION SUMMARY: # of times on batteries, inverter & rectifier run times in hours

ALARM HISTORY: gives time stamp and date plus details of last 100 alarm events

BATTERY OPERATION HISTORY: shows time stamp and date of power fail history

DATA LOG: shows summary of Input voltage & kVA, and output current. The sample rate for these values is set up in the control menu.

RELAY STATUS: shows configuration of relay contacts

Using the Control Function

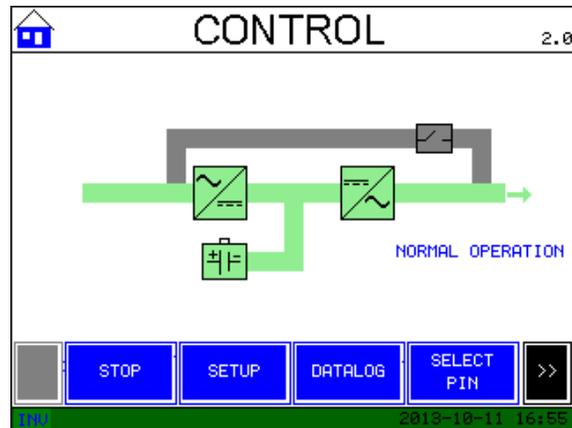


Fig. 4-45

The CONTROL screen (Fig. 4-45) allows the user to interact with the UPS and customize its functions for their specific applications. As with the MONITOR screen some blue action buttons are hidden from normal view, and the black scroll button must be utilized to bring them into view.

START/STOP: Used to initiate the START/STOP functions of the UPS. Complete functional description of these sequences is previously described within the “User’s Startup Sequence” portion of this section.

SETUP: This action button will take the user to another set of menu options to set the Date/Time, configure I/O ports and contacts and set the default language of the unit (Fig. 4-46). In addition, the user may choose to enable PIN security on certain functions of the UPS.



Fig. 4-46

Setting the Date and time:

The following screens(Figs. 4-47 to 4-53) take the user step by step through this self-explanatory process.



Fig. 4-47



Fig. 4-48

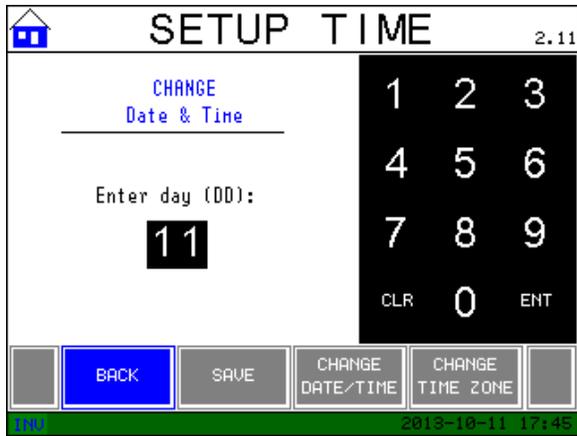


Fig. 4-49



Fig. 4-50

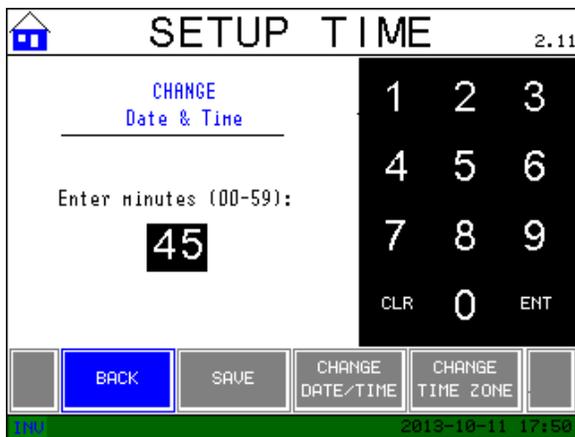


Fig. 4-51



Fig. 4-52

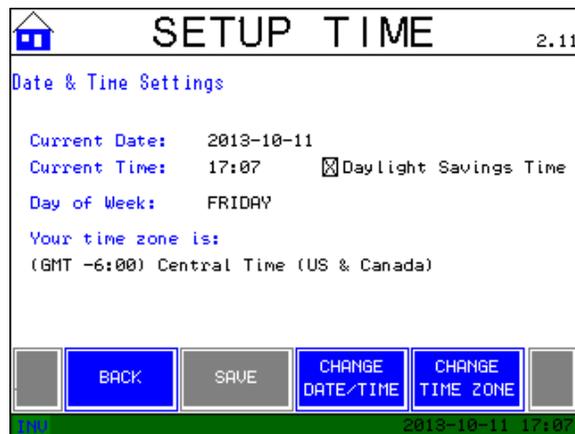


Fig 4-53

Using the “ENT” button will input the desired numbers into the box. If a number appears in the box that is not desired, pressing the “CLR” button will clear it from the box. Once confirmed, the “CHANGE” action button must be pressed to input this new information into the UPS’ internal clock.

Setting the COMM Ports:

Choosing the Comm Ports option (Fig. 4-54) from the SETUP MENU allows the user the ability to program the communication speed between the UPS and LCD and RS-232.



Fig. 4-54

Choosing the LCD COMM (Fig. 4-55) controls the communication between the UPS and the touch screen display. This allows the user to manually modify the settings if the display does not sync with the UPS (Fig. 4-56).



Fig. 4-55



Fig. 4-56

Choosing the RS-232 COMM (Fig. 4-57) option from this menu, offers the user the ability to configure the communication speed (Fig. 4-58) and contacts of the port on the Communication Interface PCB (BM505) of the UPS.



Fig. 4-57

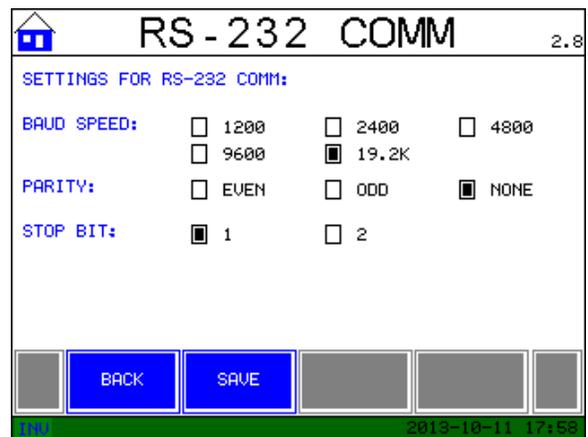


Fig. 4-58

To access BM505, open the front access door of the UPS by pulling on its left hand side. The Communication Interface board is at the top right side of the UPS, just to the right of the two intake fans in the center of the unit (Fig. 4-58).

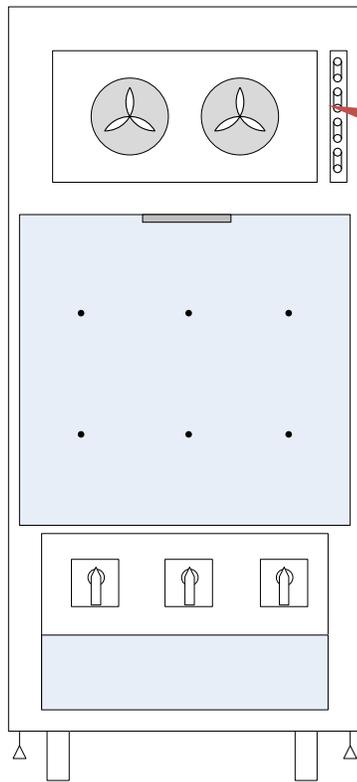


Fig. 4-58

Front of UPS with door open.

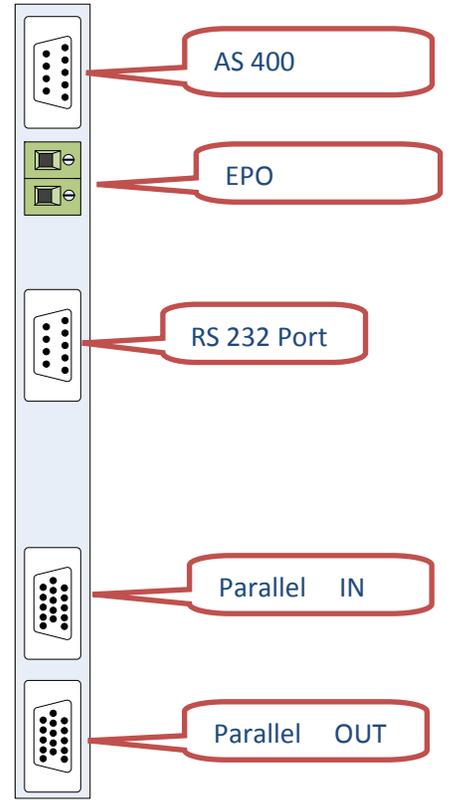
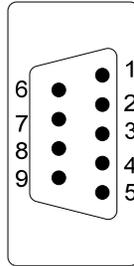


Fig. 4-59

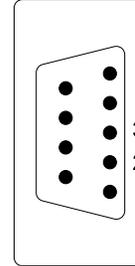
Expanded view of Communication Interface Board

The user interface for this board (Fig. 4-59) consists of (2) DB9 connectors, (2) micro terminals, and (2) DB15 connectors. The DB9 connectors are identified as (from the top) AS/400 Interface and RS232. The micro terminals are used to connect an optional external EPO switch, and come with a factory installed jumper as the default configuration. If used, the external EPO switch should have a rating of 12V 3A, be a latching type N/C contact, connected with #18AWG at a maximum length of 25'. The DB15 connectors are used exclusively for the parallel operation of two or more UPS'.

The pin configurations for the DB9 connectors are as follows



AS 400 Interface



RS 232 Port

The pin assignments for the above connectors are as follows:

<u>Pin No.</u>	<u>AS 400 Interface</u>	<u>RS 232 (Serial Comm Port)</u>
1	Shutdown +	No Connection
2	Shutdown -	RXD
3	No Connection	TXD
4	Battery Discharge - NO	No Connection
5	Common	No Connection
6	Bypass	No Connection
7	Low Battery	No Connection
8	Summary Alarm	No Connection
9	Battery Discharge - NC	No Connection



Fig. 4-60

Setting the I/O Contacts: When choosing the I/O contact option from the setup menu, it is important to remember that there are three options: Digital Inputs (Fig. 4-61), Output Contacts (Fig. 4-62), and AS/400 Interface (Fig 4-63).

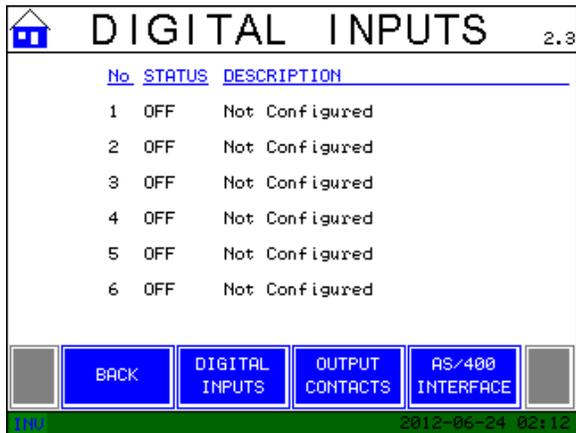


Fig. 4-61

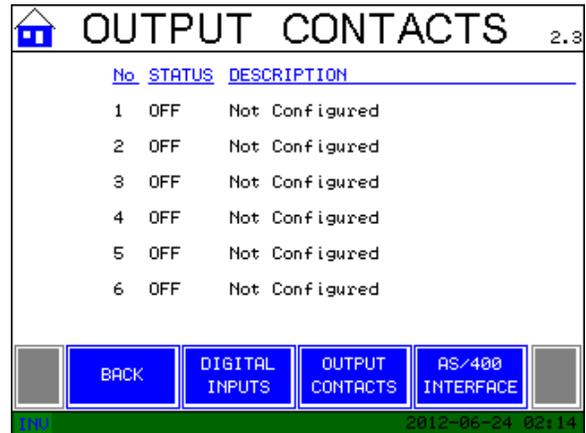


Fig. 4-62

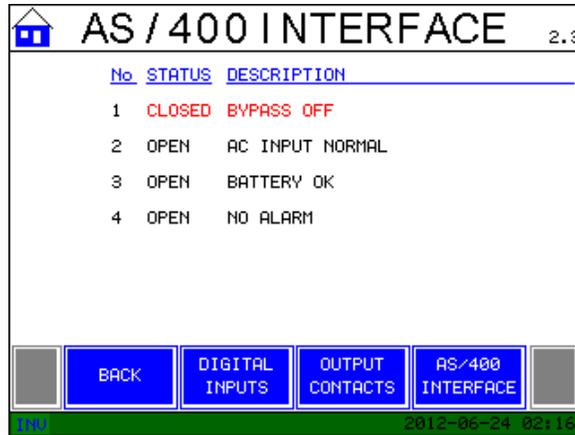
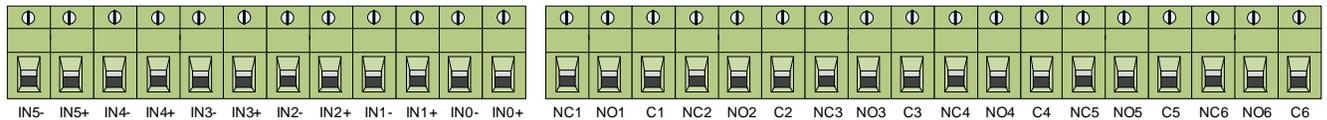


Fig. 5-63

The Front Panel I/O Contacts are physically located on the PCB mounted on the back of the front display. There are six digital inputs (12 terminals) and six output contacts (18 terminals) in a horizontal row along the bottom edge of this PCB. These terminals are designed to accept wires from 24 to 14 AWG (.2mm² to 2.5mm²) with a torque spec. of 3.5 to 4.4 inch pounds.



These terminals are labeled as follows:

INPUT = INx + and INx –

OUTPUT = NOx, NCx and Cx

The **INPUT** terminals are designed to accept an external digital +5V signal. The available programmable options for the INPUT contacts are as follows:

1. Not Configured
2. Battery Temperature Abnormal
3. Room Temperature Abnormal
4. Remote Operation enable
5. Remote Transfer to Bypass

- 6. Remote Transfer to Inverter
- 7. Asynchronous Operation
- 8. Remote Alarm

NOTE: Digital input #1 is reserved for use by POWERVAR and will have wires pre-installed on it from the factory. Please do not remove these wires without manufacturer’s consent.

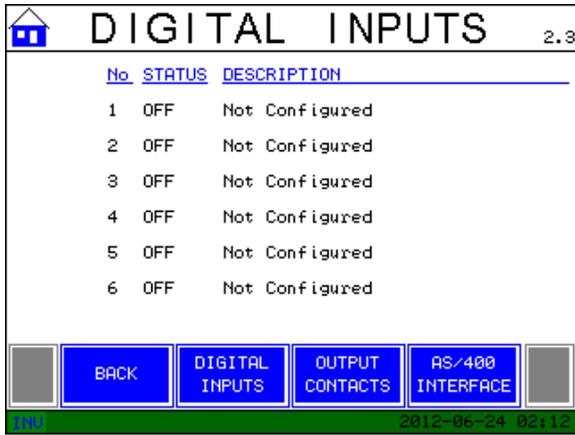


Fig. 4-64



Fig. 4-65

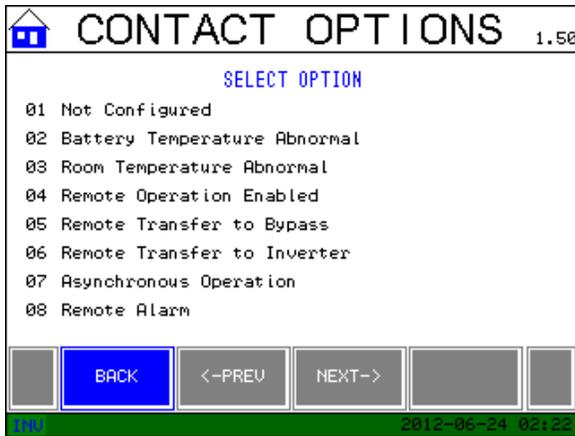


Fig. 4-66

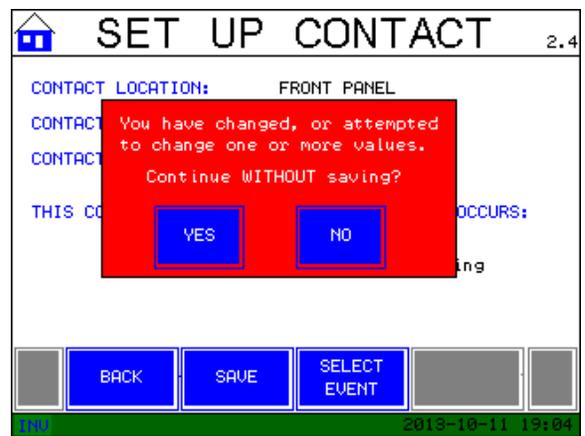


Fig. 4-67

To program Digital Inputs, select one from the list (Fig 4-64) by touching the screen. The selected input will be highlighted and the Set UP Contact screen will appear (Fig. 4-65). The location type and number should correspond to the selected input. Press the “Select Action” button and choose from the list of eight options on the “Contact Options” screen (Fig. 4-66). Once selected, the contact option can be locked in by pressing the “SAVE” button. If you

attempt to exit this screen you will be reminded to save your contact choice before proceeding (Fig. 4-67).

The **OUTPUT** contacts consist of three terminals; Normally Open (NO), Normally Closed (NC), and Common (C). These contacts when properly programmed, will change state when the appropriate signal is received from the main processor of the UPS. The available programming options for these contacts are as follows:

- | | |
|--|--|
| 1. Not Configured | 16. Inverter Overload |
| 2. Mains Failure-Battery Discharging | 17. Inverter Stopped Due to Shutdown |
| 3. Load on Bypass | 18. Maintenance Bypass- Inverter Stop |
| 4. Battery Low Level Alarm | 19. Parallel System Disconnection |
| 5. Summary Alarm | 20. Low Battery |
| 6. Rectifier Overload | 21. Emergency POWER OFF |
| 7. Inverter Overload | 22. Output Short Circuit |
| 8. Inverter Voltage Out of Margins | 23. UPS Overtemperature |
| 9. Maintenance Bypass- Inverter Not Available | 24. Rectifier Overload |
| 10. High Temperature | 25. Inverter Failure |
| 11. Asynchronous Operation | 26. UPS Online |
| 12. End of Battery Life | 27. Battery Charging |
| 13. Battery Temp. Too High | 28. Battery Abnormal |
| 14. Battery Test Fail | 29. UPS Fault |
| 15. Battery Disconnection – Shutdown & Restart | 30. Battery Temperature Abnormal via Digital Input |

To program the input/output contacts, select the desired contact from the list on the I/O CONTACTS screen. From the SET UP CONTACT screen (Fig. 4-68), press SELECT ACTION.



Fig. 4-68



Fig. 4-69

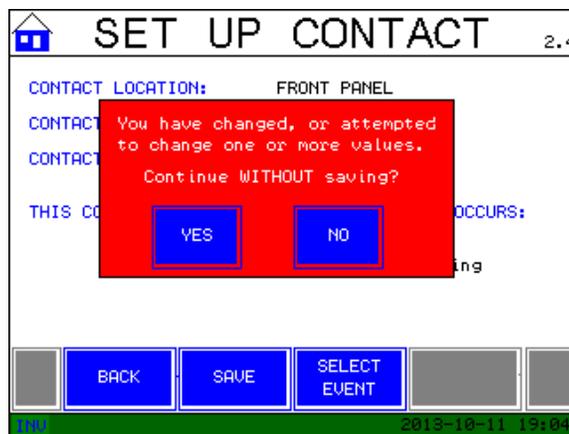


Fig. 4-70

Choose the desired action from the list of 30 available contact options (Fig. 4-69) and press SAVE. When properly programmed a SAVED! Message will appear in the lower portion of the screen. If you attempt to exit this screen you will be reminded to save your contact choice before proceeding (Fig. 4-70).

DATALOG: This function allows the user to customize the datalog feature of the UPS. This feature will track and record the input voltage & load, and output currents, over a user specified time and sampling rate. This log will record 100 events during this time period. The circular function allows for a continuous recording of the most recent 100 events, or if desired the user can choose to log and hold the data until 100 events are recorded.

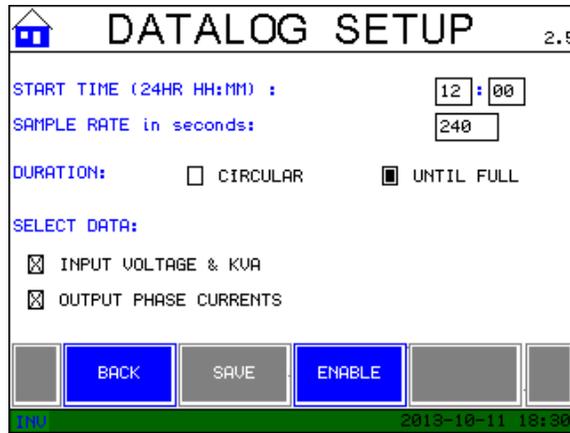


Fig. 4-71

To initiate a start time, touch DISABLE to negate any current program, and then touch the time box. A number pad will appear that will allow the input of your desired start time (Fig. 4-72).

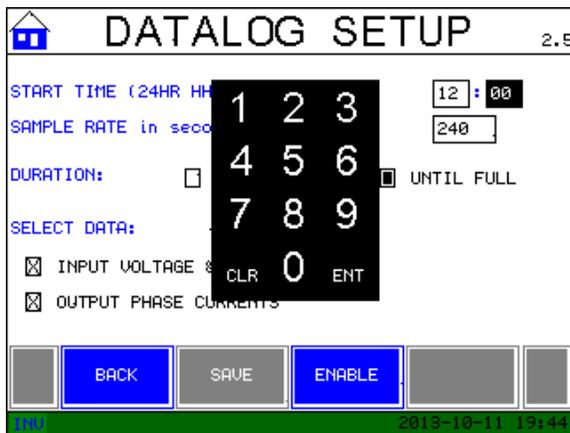


Fig. 4-72

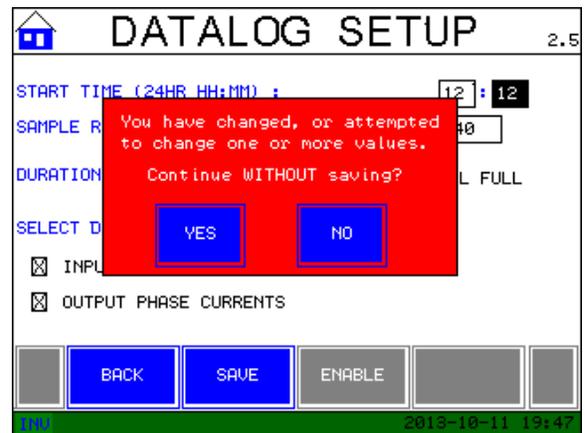


Fig. 4-73

After the hours and minutes have been programmed, you will need to input the desired sample rate; in the example shown above the unit will sample every 20 seconds. When finished programming the desired parameters, hit “SAVE”. If you want the DATALOG to program to commence you must hit “ENABLE”. As with the I/O contacts if you attempt to leave the screen without saving your program, you will be reminded to confirm your actions (Fig. 4-73).

SELECT PIN: This function allows the user to input and program their own Personal Identification Number (PIN). When the “Enable PIN Security” box is checked the Start/Stop function will not be available unless this PIN is entered (Fig. 4-74).



Fig. 4-74

BATTERY TEST: This function allows the user to immediately test the internal batteries. Once this test is completed, another test may not be executed for at least one hour (Fig.4-75a-b-c).

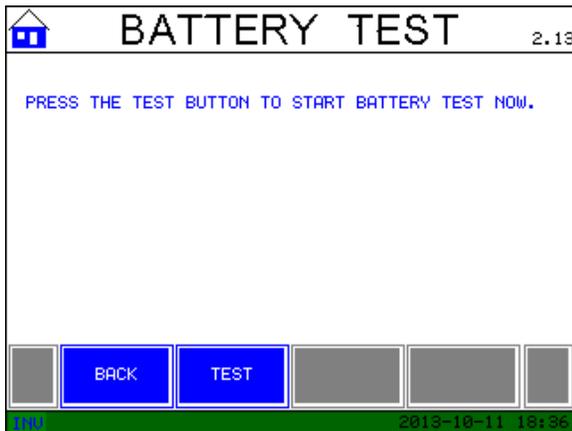


Fig. 4-75a



Fig. 4-75b

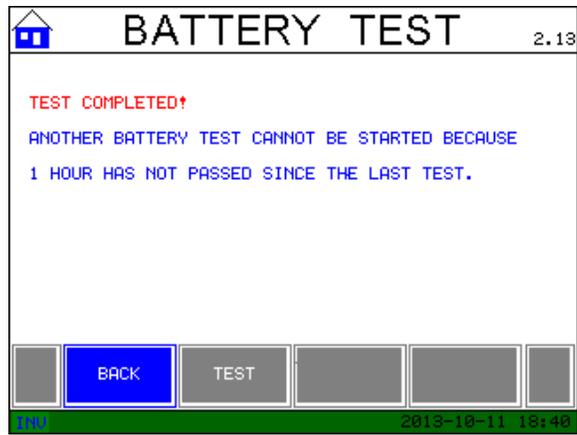


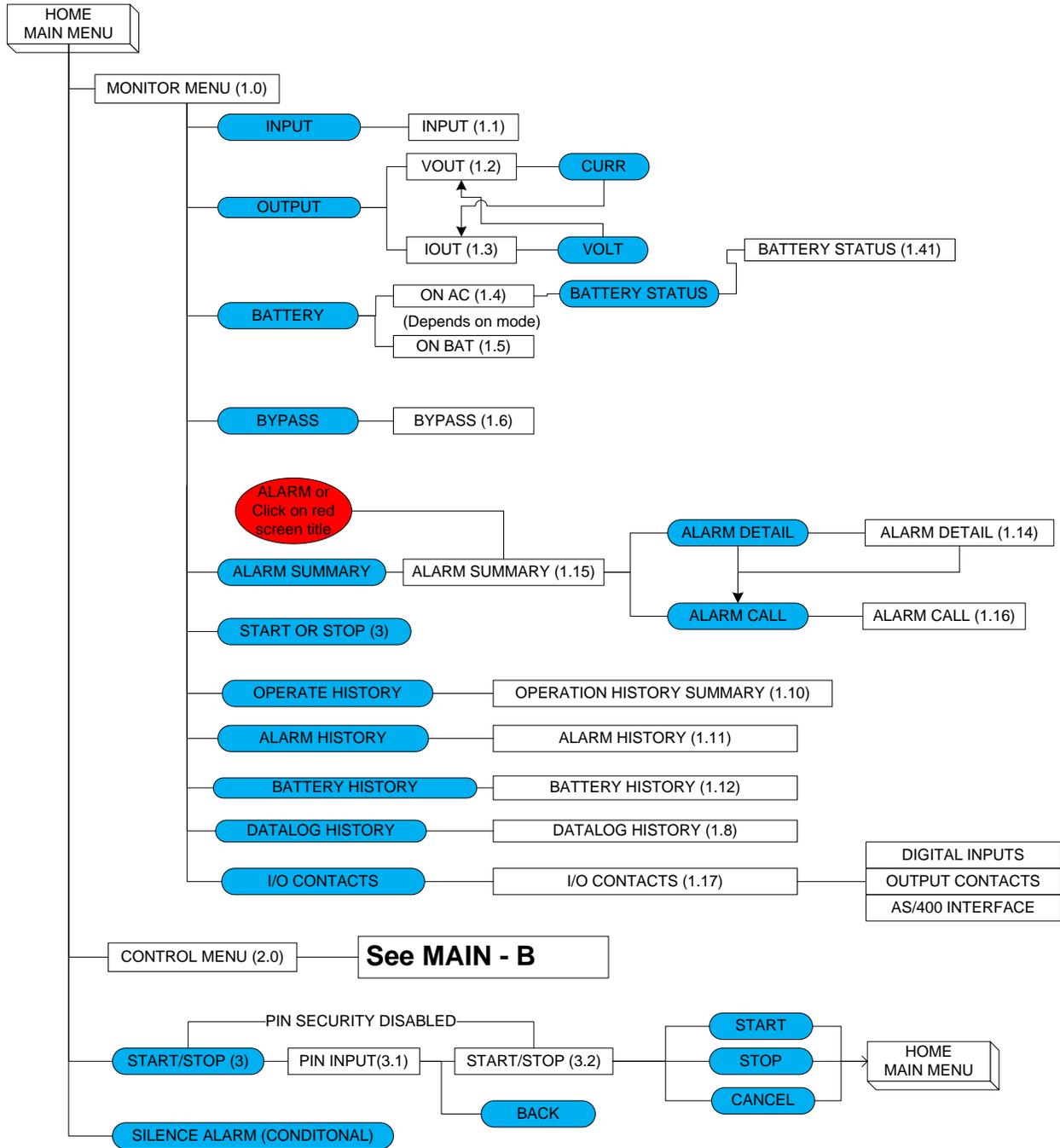
Fig. 4-75c

TOUCH SCREEN MENUS

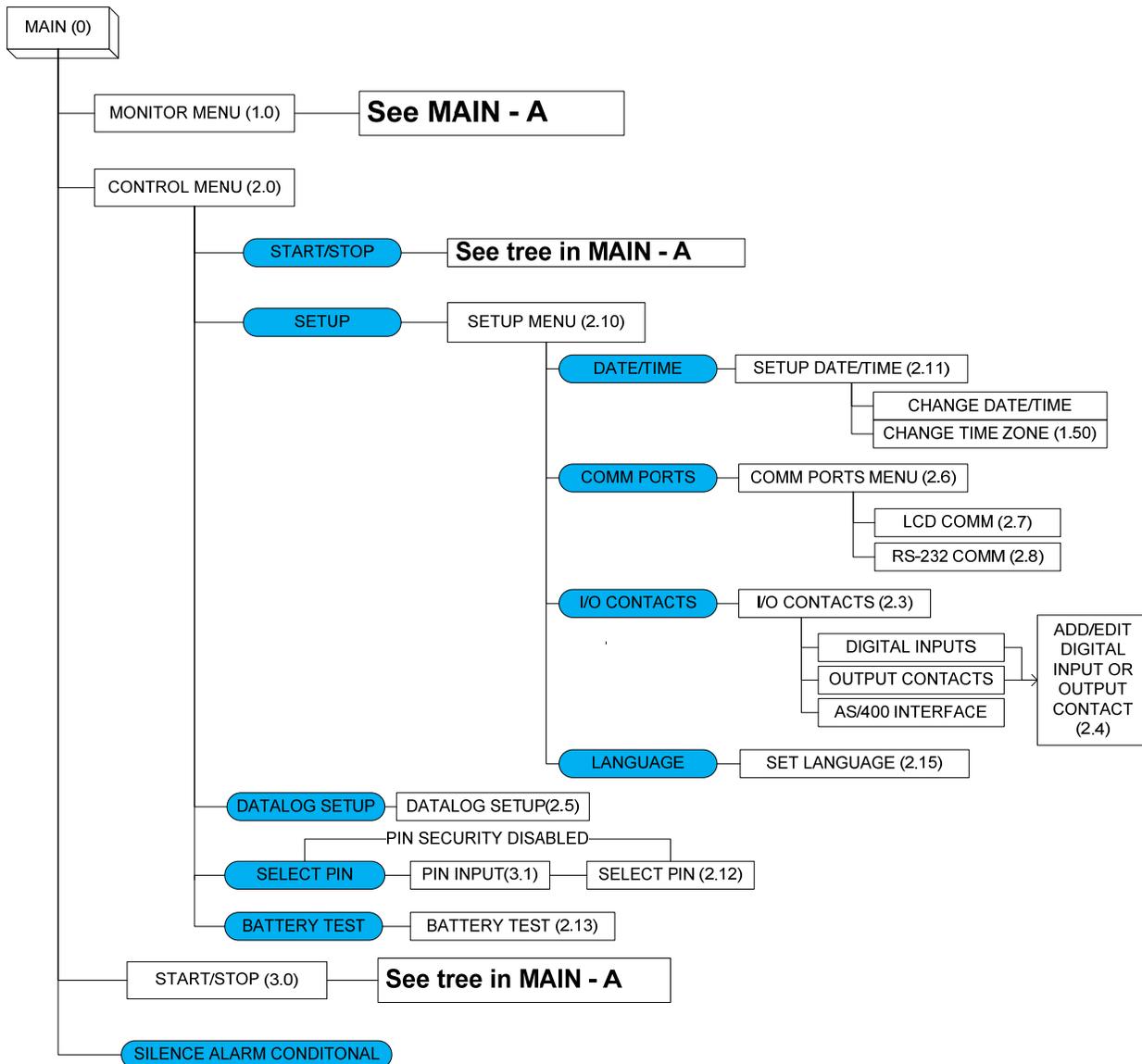
The following diagrams depict the structure of the available menus for this UPS.

For ease of understanding the menus are separated into the following:

POWERVAR 3200 Series LCD Command Tree Main Menu



POWERTVAR 3200 Series LCD Command Tree Main Menu Part B



Please note: This symbol:



Denotes active on-screen action buttons near the bottom of the touch screen display.

Home Screen # 000

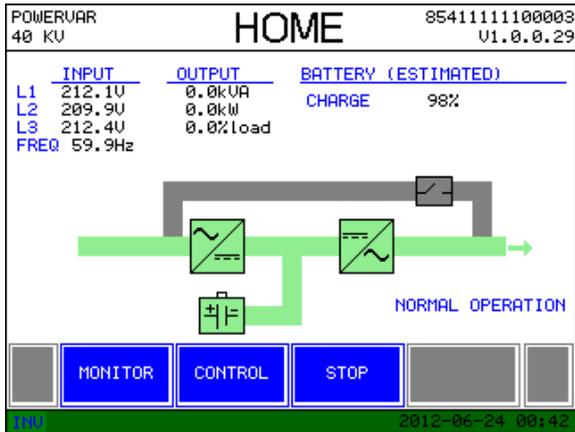


Fig. 4-76

The HOME screen and its self-explanatory start-up variations.....



Fig. 4-77

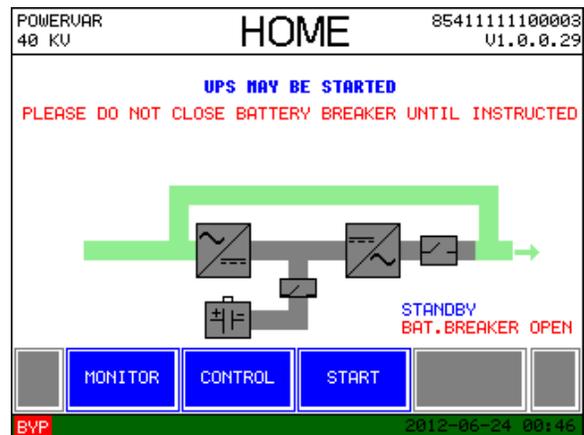


Fig. 4-78

The UPS will initialize then automatically go to static bypass. Press Start button to activate UPS.

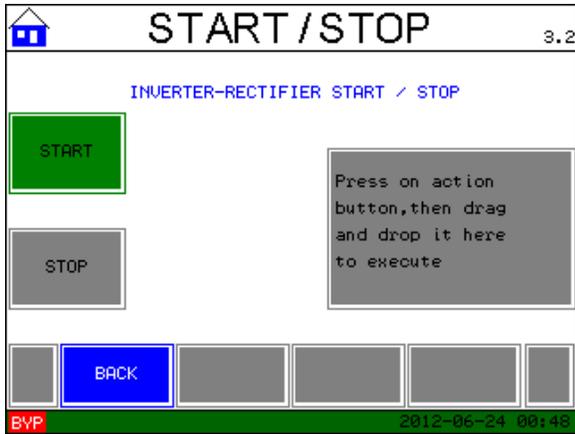


Fig. 4-79

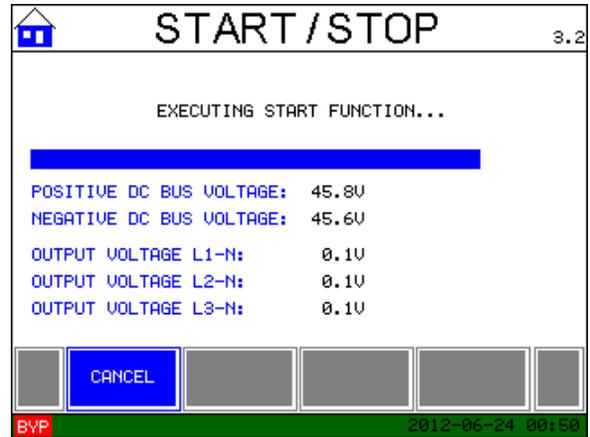


Fig. 4-80

Once START is initiated the rectifier will start, after system checks the inverter will come on line.

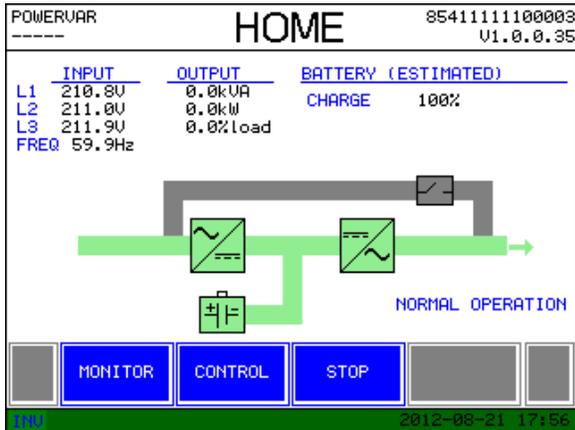


Fig. 4-81

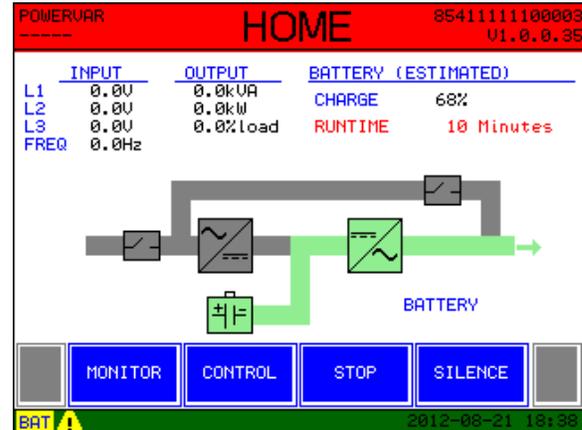


Fig. 4-82

HOME screen during “normal” and “battery” operations, once BATTERY breaker is closed

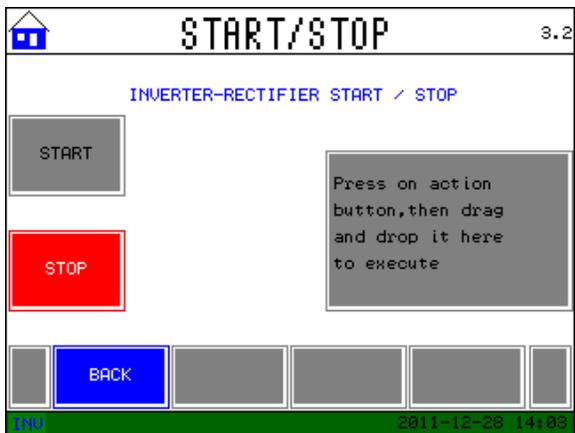


Fig. 4-83



Fig. 4-84

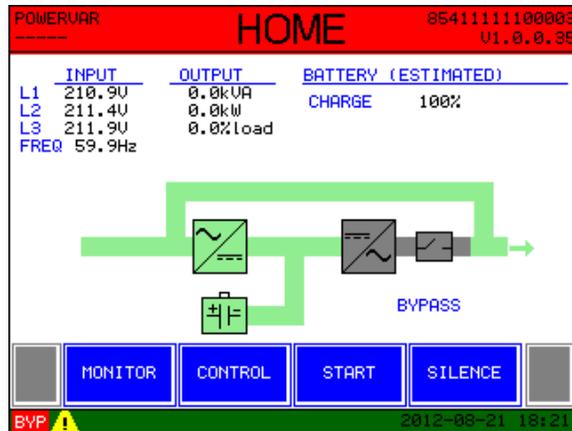


Fig. 4-85

If the “STOP” sequence is initiated, the UPS will transfer to static bypass (Fig. 4-85). If a fault condition is detected, the unit will alarm and transfer to bypass.

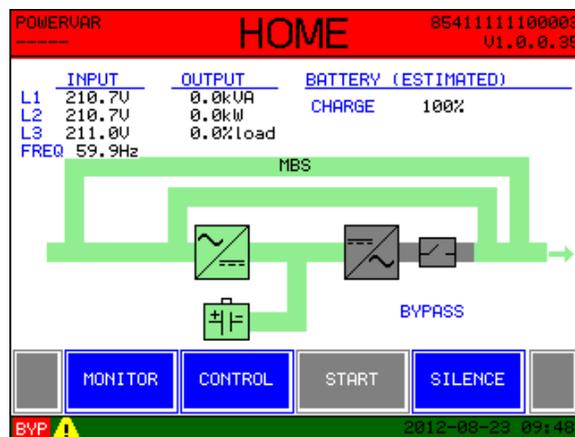


Fig. 4-86

When the “MAINTENANCE BYPASS” switch is placed in the “bypass” position, the maintenance bypass path will appear on the “HOME” screen (Fig. 4-86). **Please see procedural instructions on pg. 38 in this manual to perform this operation.**

This is the only time this path will be seen. The UPS may not be started by the user when in this state.

Monitor Screen # 1.0

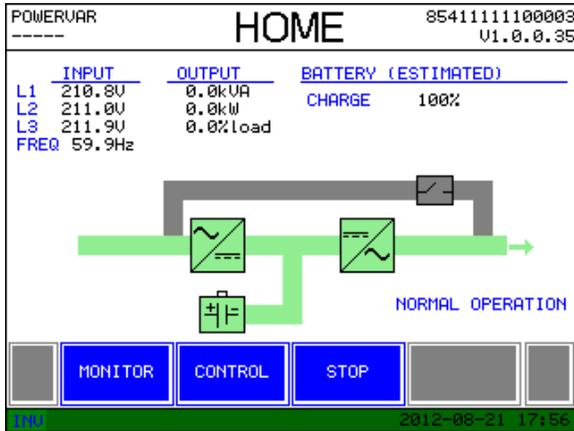


Fig. 4-87

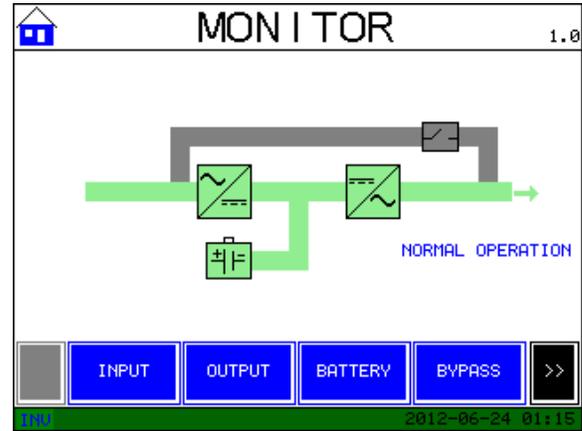


Fig. 4-88

During normal operation the MONITOR screen can be accessed by pushing the blue “MONITOR” button at the bottom of the HOME screen. Once accessed, the blue buttons at the bottom of this screen can be pushed and scrolled, or the individual sections of the power path may be touched to gain access to the following informational screens:

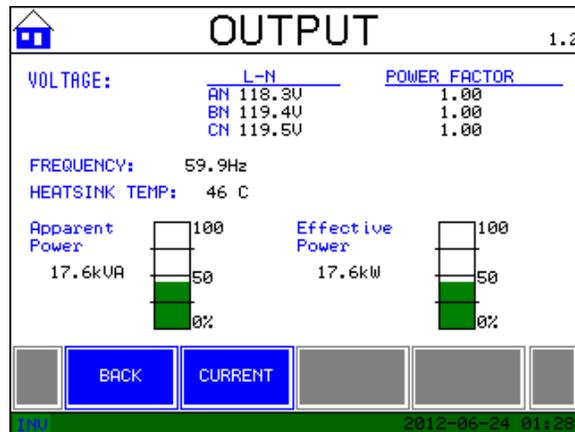


Fig. 4-89

INPUT: L-L and L-N voltage and current, frequency, and total real and apparent power

OUTPUT (VOLTAGE): L-N voltage, frequency, total effective & apparent power and power factor

Pressing the blue “CURRENT” button at the bottom will bring up the following screen:

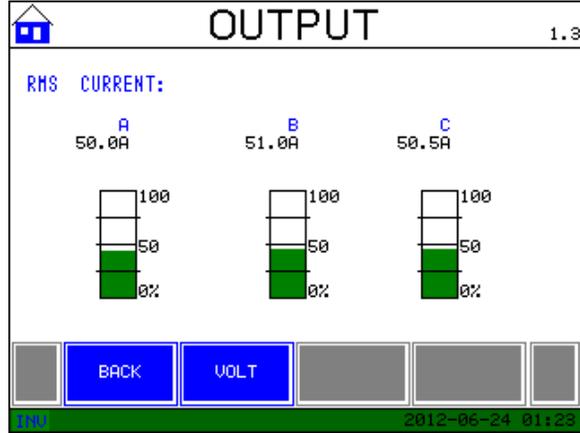


Fig. 4-90

OUTPUT (CURRENT): Individual phase current values in RMS and percentage of total available current

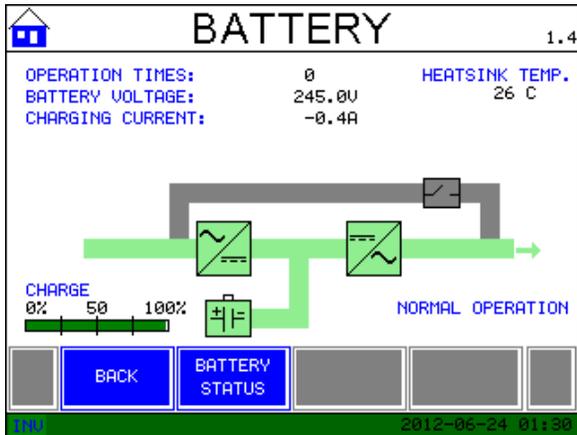


Fig 4-91

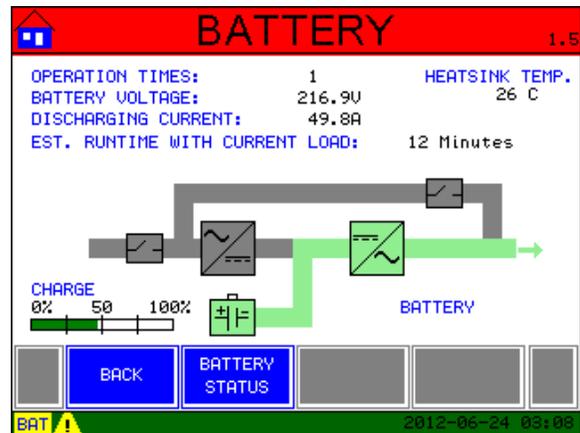


Fig. 4-92

BATTERY (With AC Present): Battery voltage and charge current, # of times on batteries, and % of battery charge

BATTERY (When on batteries): # of times on batteries, battery voltage, discharge current and estimated runtime at current load level

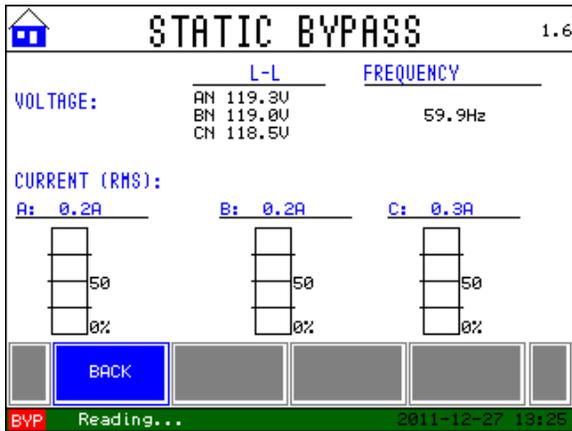


Fig. 4-93



Fig. 4-93

BYPASS: L-L voltage, RMS phase current, and frequency of the available bypass source

ALARM DETAIL: description, type, time of alarm, and code of the alarm. Pressing “ACK” (acknowledge) will silence the audible alarm. Pressing “CALL SERVICE” will display the phone # of local service provider or POWERVAR



Fig. 4-94

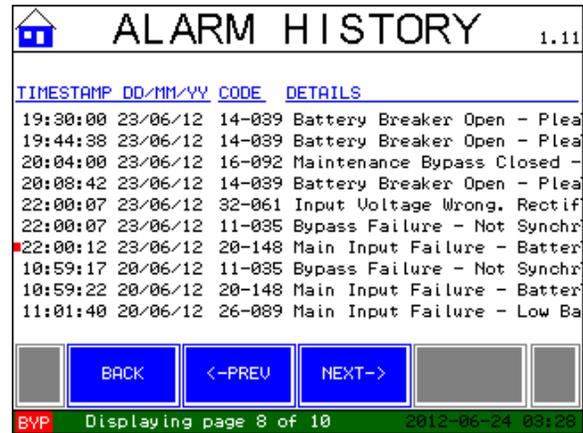


Fig. 4-95

OPERATION SUMMARY: # of times on batteries, inverter & rectifier run times in hours

ALARM HISTORY: Time stamp and date PLUS details of the last 100 alarm events



Fig. 4-96



Fig. 4-97

ALARM SUMMARY: Displays details of any current alarms

BATTERY HISTORY: shows time stamp and date of power fail history

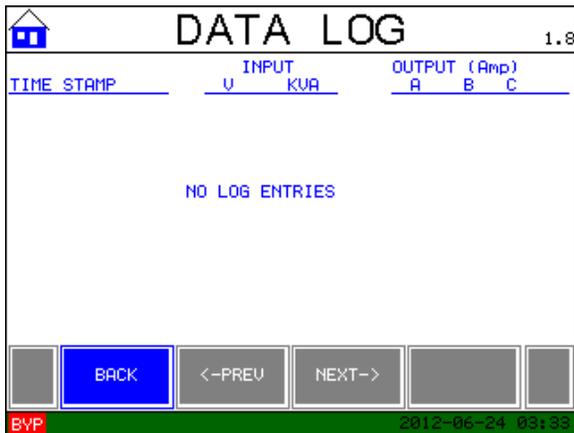


Fig. 4-98

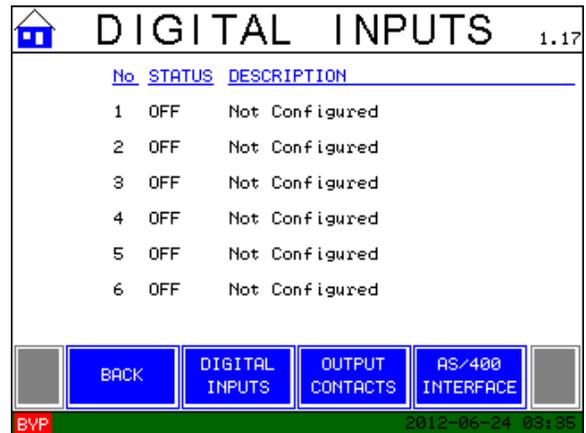


Fig. 4-99

DATA LOG: shows summary of input voltage & kVA, and output current. The sample rate for these values is set up in the control menu.

I/O CONTACTS: shows configuration of the digital inputs, the output contacts and the AS/400 interface.

CONTROL SCREEN # 2.0

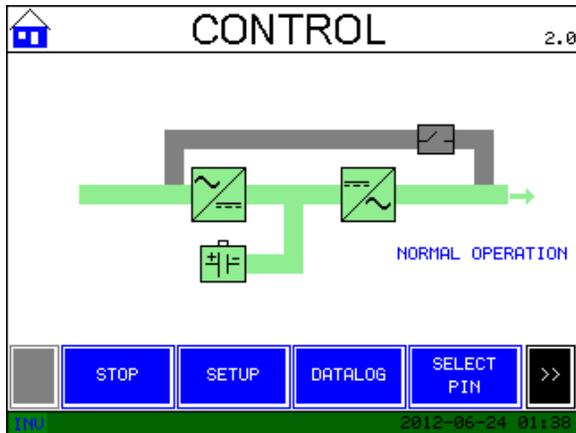


Fig. 4-100

During “normal” operation the CONTROL screen can be accessed by pushing the blue “CONTROL” button at the bottom of the HOME screen. Once accessed, the blue buttons at the bottom of this screen can be pushed or scrolled to gain access to the following interactive screens:

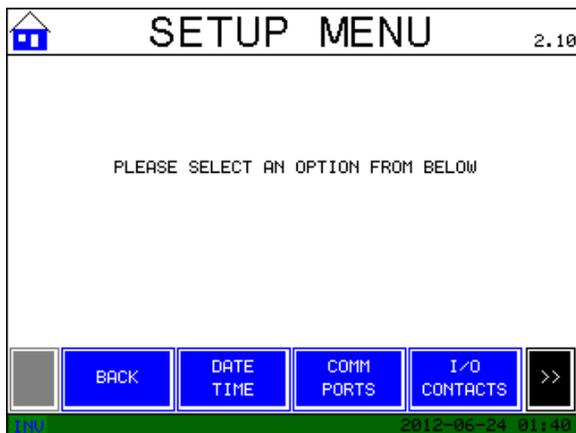


Fig. 4-101

SETUP MENU: This screen allows the user access to set the date/time, configure communication ports, the I/O contacts, and set the default language.



Fig. 4-102



Fig. 4-103

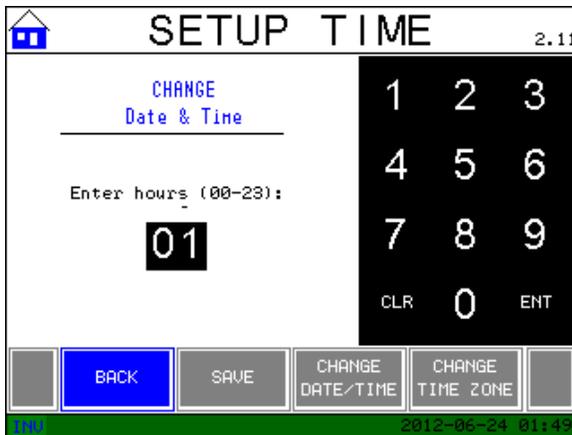


Fig. 4-104



Fig. 4-105



Fig. 106



Fig. 4-106

These screens guide the user through the process required to set the year, date, time and time zone on the internal clock in the UPS.

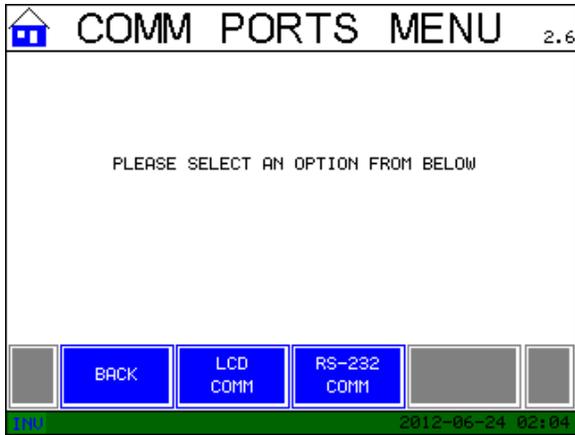


Fig. 107

COMM PORTS SETUP MENU: allows user access to the RS-232 and LCD COMM ports available on this unit



Fig. 4-108

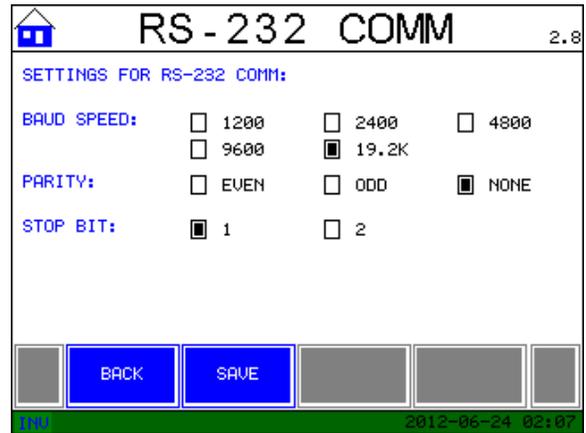


Fig. 4-109

These two screens allow the user to configure the available COMM ports.

I/O CONTACTS: Choosing this option will allow the user to custom configure the DIGITAL INPUTS, the OUTPUT CONTACTS and the AS/400 INTERFACE.

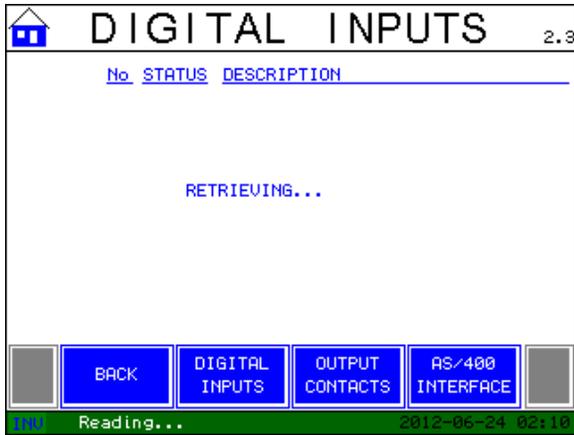


Fig. 4-110

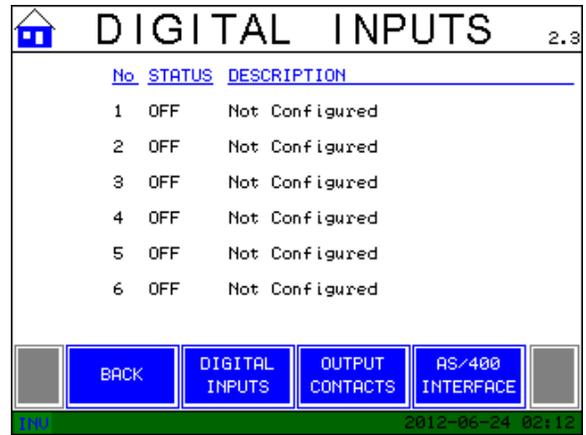


Fig. 4-111

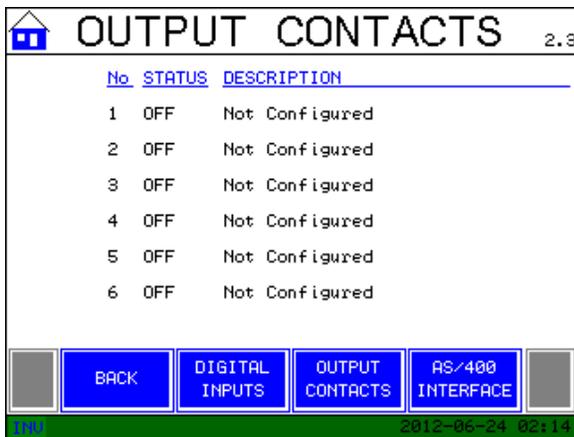


Fig. 4-112

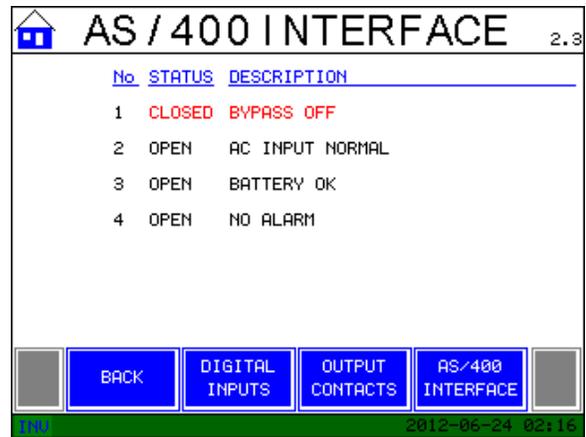


Fig. 4-113

DIGITAL INPUT: press the numbered contact to configure it from the pre-determined “SELECT ACTION” menu.

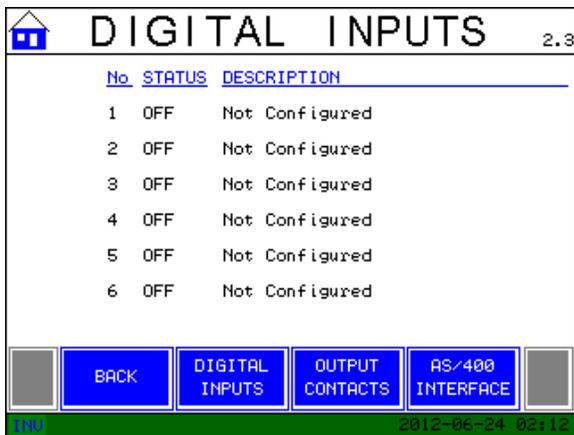


Fig. 4-114



Fig. 4-115

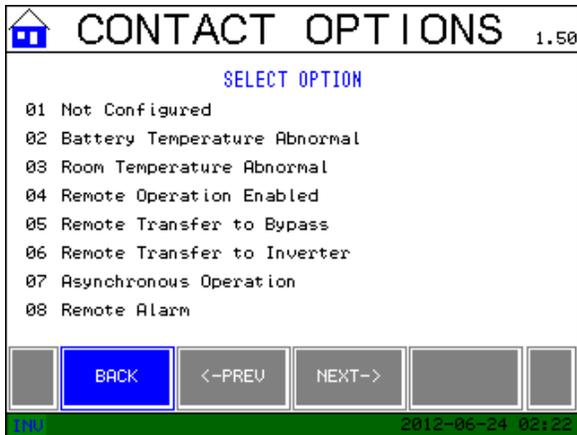


Fig. 4-116

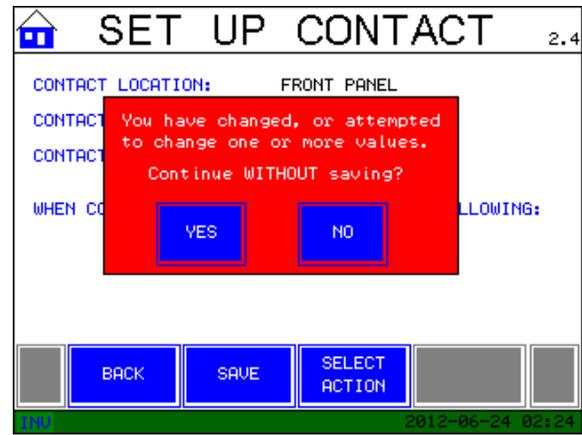


Fig. 4-117

Press the desired option, once highlighted you will be asked to SAVE the change, then reminded before exiting this screen. There are a total of eight options for the digital inputs.

OUTPUT CONTACTS: press to highlight the desired output contact, then choose from the predetermined "SELECT ACTION" menu. Press NEXT to scroll forward through the menu, PREV to scroll back. There are thirty different available options for the output contacts.

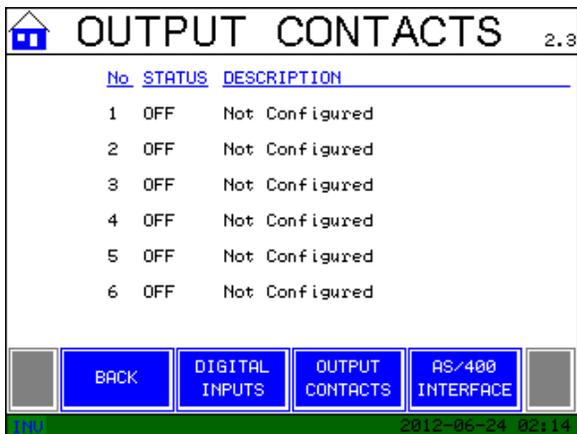


Fig. 4-118



Fig. 4-119



Fig. 4-120

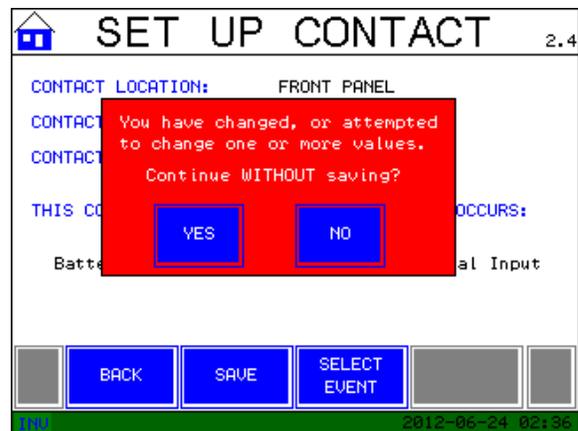


Fig. 4-121

UPS CONTACTS, COUNT = 4:

OPTIONS:

1. Mains Fail – Battery discharge
2. Load on Bypass
3. Battery Low Voltage
4. Summary Alarm

LCD CONTACTS, COUNT = 6, INPUTS

OPTIONS:

1. Not Configured
2. Battery Temperature Abnormal
3. Room Temperature Abnormal
4. Remote Operation Enable
5. Remote Transfer to Bypass
6. Remote Transfer to Inverter
7. Asynchronous Operation
8. Remote Alarm

LCD CONTACTS, COUNT = 6, OUTPUTS

OPTIONS:

1. Not Configured
2. Mains Failure-Battery Discharging
3. Load on Bypass
4. Battery Low Level Alarm

5. Summary Alarm
6. Rectifier Overload
7. Inverter Overload
8. Inverter Voltage Out of Margins
9. Maintenance Bypass- Inverter Not Available
10. High Temperature
11. Asynchronous Operation
12. End of Battery Life
13. Battery Temp. Too High
14. Battery Test Fail
15. Battery Disconnection – Shutdown & Restart
16. Inverter Overload
17. Inverter Stopped Due to Shutdown
18. Maintenance Bypass- Inverter Stop
19. Parallel System Disconnection
20. Low Battery
21. Emergency POWER OFF
22. Output Short Circuit
23. UPS Overtemperature
24. Rectifier Overload
25. Inverter Failure
26. UPS Online
27. Battery Charging

- 28. Battery Abnormal
- 29. UPS Fault
- 30. Battery Temperature Abnormal via Digital Input

As with the INPUT contacts, the desired change will not take effect until the “SAVE” button is pressed. The user will be reminded before leaving the set up screen.

LANGUAGE: Allows user to set default language of all screens. Factory default is English.



Fig. 4-122

DATALOG SETUP: accessed from the **CONTROL** screen, this allows the user to sample and log INPUT voltage and load or OUTPUT phase currents at the rate of their choosing.

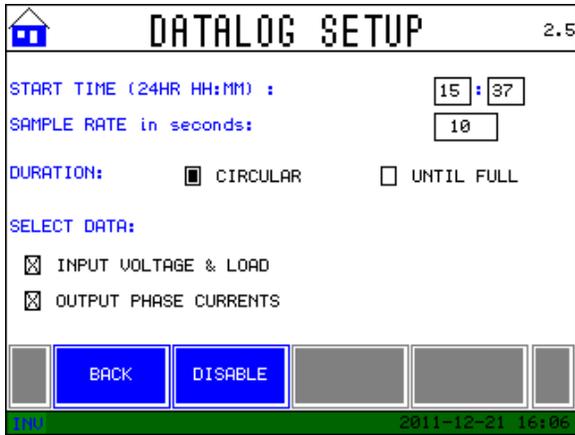


Fig. 4-123

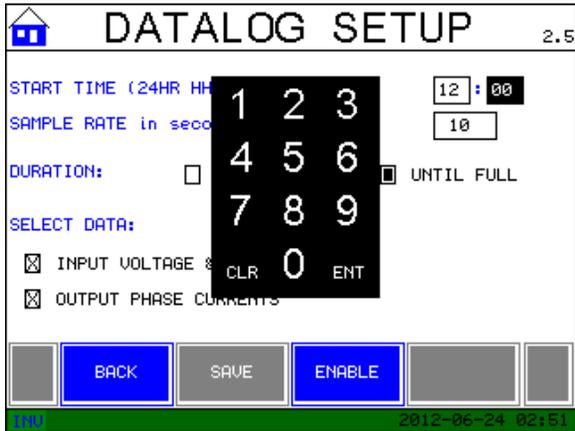


Fig. 4-124

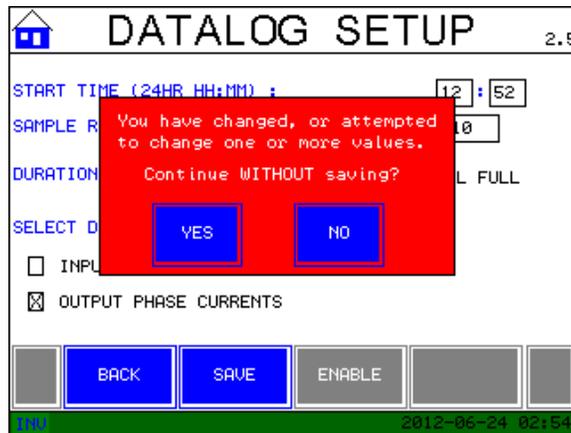


Fig. 4-125

SELECT PIN: allows user to enable password security to start/stop unit and configure the time/date stamp. Not checking the “enable” box will leave unit with no password protection.



Fig. 4-126

BATTERY TEST: allows user to immediately test batteries or set up a recurring test schedule



Fig. 4-127

5. Maintenance

UPS Maintenance

POWERVAR recommends maintenance checks of this UPS at regular intervals to ensure that it will perform within its specifications for many years.

To ensure proper operation of this UPS POWERVAR encourages daily visual inspection to affirm the following:

- Area surrounding UPS is free from clutter, allowing clear access to the unit
- Ventilation holes in the UPS are not blocked
- The operating environment of the system is within POWERVAR specifications

Annual maintenance should be performed by factory authorized personnel.



DANGER:

This UPS contains lethal voltages. Do not operate this UPS with side panels removed or safety shields not in place. DC capacitors remain charged after UPS is de-energized. Wait 5 minutes before servicing. There are no user serviceable parts inside this unit.

All repairs and service should be performed only by FACTORY AUTHORIZED SERVICE PERSONNEL.

Battery Maintenance



The Batteries in the POWERVAR 3200 Series UPS are sealed lead-acid. POWERVAR recommends the replacement of the internal UPS batteries every two years. When replacement is necessary, proper disposal and recycling is required. Please consult your local codes for disposal requirements.



Do not dispose of the batteries in a fire. Do not attempt to open or mutilate batteries. The sealed electrolyte is harmful skin and eyes, and may be toxic.



The charging characteristics of UPS batteries vary by both brand and type. For this reason, replacement batteries should be of the same brand and type as those specified by the manufacturer. Using batteries other than the brand and type specified by the manufacturer may affect the performance of the UPS. Before installing batteries of different brand or type, please consult with the manufacturer.

Battery Replacement

******IMPORTANT SAFETY INSTRUCTIONS******

******SAVE THESE INSTRUCTIONS******

This manual contains important instructions to be followed during installation of the batteries in the **POWERVAR 3200 Series UPS (10-40kVA)**.

Please read all instructions before installing or operating the described equipment and **PLEASE SAVE THIS MANUAL FOR FUTURE REFERENCE!**

The servicing and installation of batteries should be performed by factory authorized personnel. See Battery Installation insert () for specific instructions.

When replacing batteries, replace with the same type, and number of batteries.

Manufacturer: CSB Battery (www.csb-battery.com)

Quantity: 36

Model:

Rating:

Terminal Type:

HR 1234W FR* (10kVA)

12v 34W

.250 Fast ON

HR 1251W FR* (20kVA

12v 51W

.250 Fast ON

GP 12260B1 FR* (30/40kVA)

12v 26 AH

Recessed tab with M5 hole

ALTERNATE :

HR 12120W FR (30/40kVA)

12v 120W

Recessed insert to accept
M5 bolt

ALTERNATE :

Manufacturer: YUASA

NP24-12 * (30/40 kVA)

12v 24 AH

Recessed tab with M5 hole

Manufacturer: ENERSYS

NP 24-12 * (30 /40kVA)

12v 24AH

Recessed tab with M5 hole

Trays per Model:

10/20kVA = 6

30/40kVA = 12

* Use type FR (Flame Retardant) only

DC Bus voltage

+242VDC / -242VDC

Additional Precautions:



CAUTION: Do not dispose of batteries in a fire. There is a severe risk of explosion.



CAUTION: Do not open or mutilate batteries. Released electrolyte can be toxic and is harmful to the skin and eyes.



CAUTION: Batteries present risk of electric shock and high short circuit current. The following precautions should be observed when working with or on batteries:

- Remove all watches, rings, jewelry, or other metal objects
- Use tools with insulated handles
- Wear rubber gloves and boots
- Do not lay tools or metal objects on top of batteries
- Disconnect charging source prior to connecting or disconnecting battery terminals
- Determine if a battery is inadvertently grounded. If inadvertently grounded, remove source from ground. Contact with any part of a grounded battery can result in electrical shock. The likelihood of such shock can be reduced if such grounds are removed during installation and maintenance.



These trays weigh 35 and 60 lbs. respectively, assistance is recommended when lifting the trays to/from the UPS.



CAUTION: Please insure that the UPS is de-energized by confirming that the **AC Input** switch and the **Battery Disconnect** switch are in the “Off” position, and the **Manual Maintenance Bypass** is in the “Normal” position.

It is strongly recommended that the supply feeding the UPS be de-energized and locked in the “off” position.

Live voltages can be present at the input terminals of the UPS even when the AC Input switch is in the “Off” position.

For 10/20kVA UPS models:

Tools Required: A #2 Philips screwdriver, voltmeter, small pliers

Upon receipt of the battery trays, POWERVAR recommends a thorough inspection with the following in mind:

- Verify that you have received the six trays (for each unit) required for installation
- Verify that the trays that were sent are correct for the model of UPS that is to be installed; the trays for a **10kVA** utilize six 12v 34W/cell (**CSB model HR 1234 FR**) batteries, and the trays for the **20kVA** utilize six 12v 51W/cell (**CSB model HR 1251 FR**) batteries. The trays used in the 10kVA model utilize a spacer insert at the rear of the tray to account for this difference in battery size (See figure 5-1 below). **THE TRAYS FOR 10 AND 20kVA UNITS SHOULD NOT BE INTERCHANGED.**

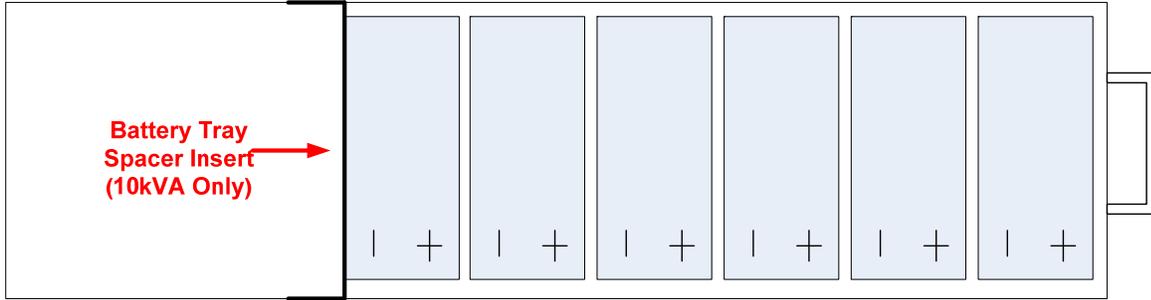


Fig. 5-1

**Battery Tray—10kVA
12V 34W/cell (QTY 6)**

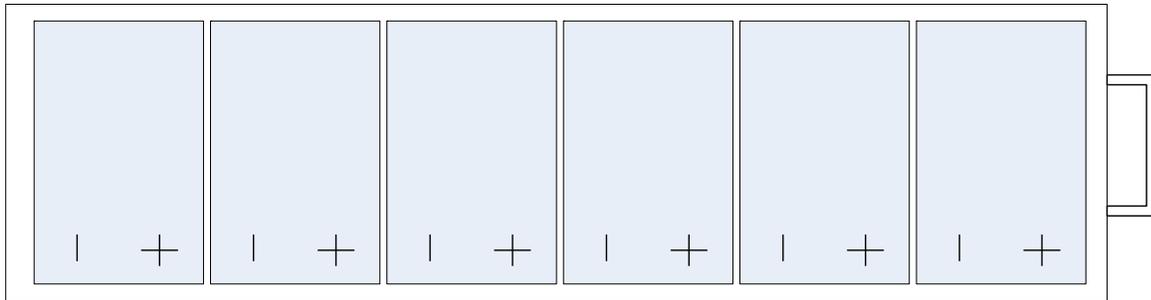


Fig. 5-2

**Battery Tray—20kVA
12V 51W/cell (QTY 6)**

Verify that all connections between the batteries within the tray are secure; if not, using the small pliers; secure these connections to the battery tabs (Fig. 5-3). If any interconnection cables are missing from the harness, please contact POWERVAR immediately.

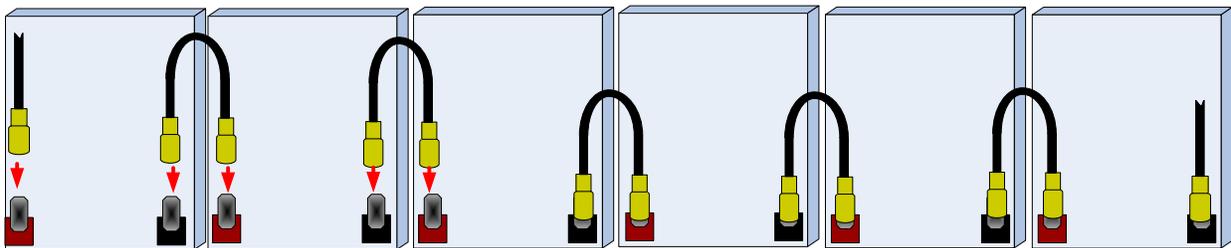
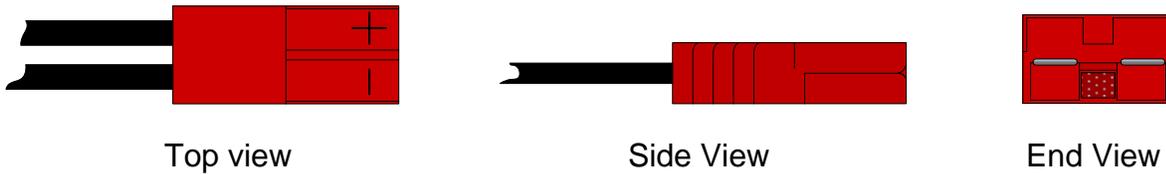


Fig. 5-3



CAUTION: Potentially dangerous DC voltages will be present at the cable connectors. Please proceed with great caution.

- Using the voltmeter, insert measuring probes into the battery tray connector to verify full tray DC voltage at the harness connector. The range of DC voltage present should be 72-81 vDC.



Typical battery tray connectors

1. Open front door of the UPS by pulling slightly on the left-hand side (Fig. 5-4).
2. Uninstall battery chamber cover by removing perimeter cover screws (eight total).

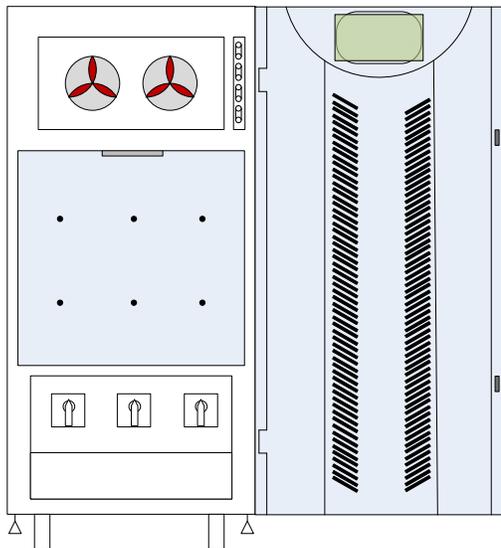


Fig. 5-4

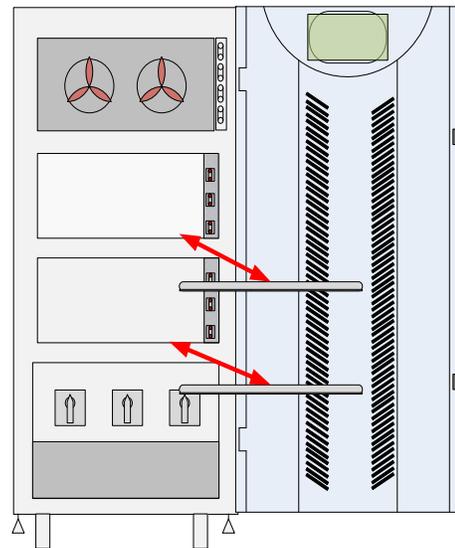


Fig. 5-5

3. Uninstall battery tray keepers by removing screws(3 each) at the front of the individual shelves. The shelves should now be clear for battery tray installation (Fig. 5-5).



These trays are heavy (35 lbs.) and it is recommended that assistance be sought if necessary.

- Slide battery trays (one at a time), onto the shelves of the UPS. The connector should face the front of the UPS. Make sure the trays are installed so that they are in contact with the tray stops located at the rear of each shelf (Fig. 5-6).

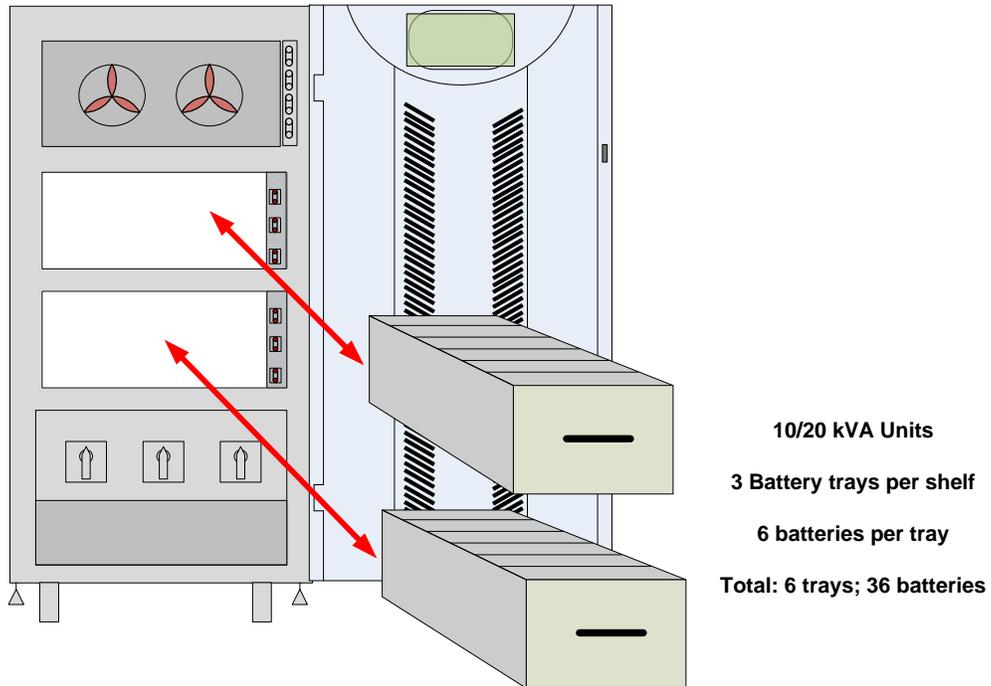
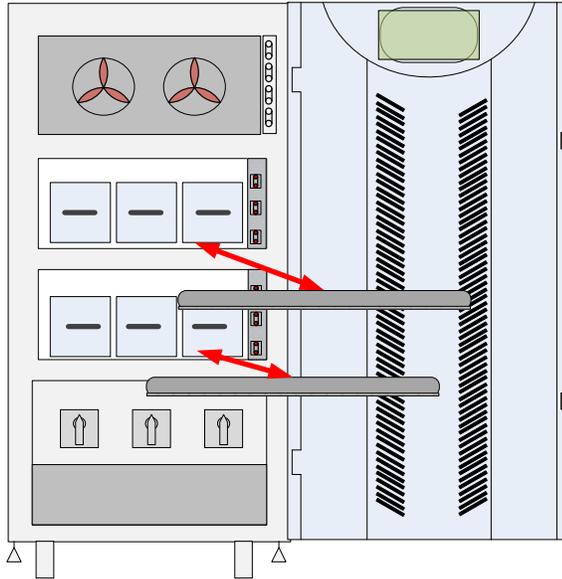


Fig. 5-6

5. Once all trays on any shelf are in place the tray keepers may be re-installed (Fig. 5-7).



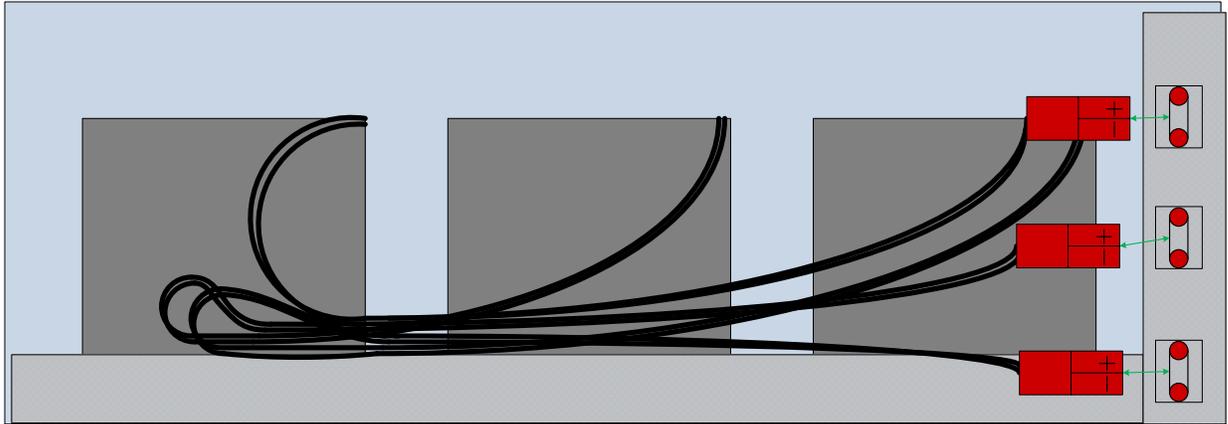
10/20 kVA Units
3 Battery trays per shelf
1 Tray Keeper per Shelf
Secure with 3 screws

Fig. 5-7

6. The individual battery trays may now be connected to the UPS' internal battery harness.



CAUTION: Once a single battery tray connection has been made, dangerous DC voltages will be present at the cable connectors. Please proceed with great caution. The connections are made to the fixed connectors at the right-hand side of the battery chamber.



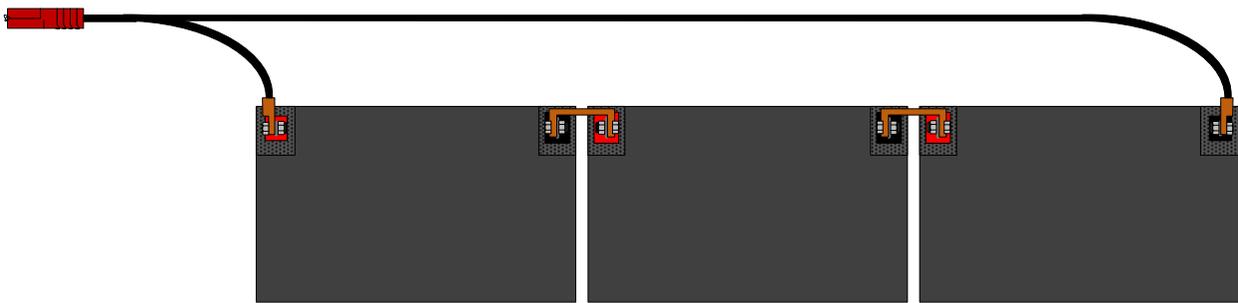
Expanded view: Single shelf—10/20kVA

7. Once all of the tray connections have been made, the battery chamber cover may be re-installed.
 8. Once secured, the UPS may be started.
-

For 30/40kVA UPS models:

Tools Required: A #2 Philips screwdriver, voltmeter, metric socket set

- Verify that you have received the twelve trays (for each unit) required for installation
- Verify that the trays that were sent are correct for the model of UPS that is to be installed; the trays for a **30/40kVA** utilize three 12v 26.0 AH (**CSB model GP 12260B1 FR**) batteries.
- Verify that all connections between the batteries within the tray are secure; secure these connections to the battery terminals. If any interconnection cables are missing from the harness, please contact POWERVAR immediately.



CAUTION: Potentially dangerous DC voltages will be present at the cable connectors. Please proceed with great caution.

- Using the voltmeter, verify full tray DC voltage at the harness connector. The range of DC voltage present should be 36-41 vDC.



Top view



Side View



End View

Typical battery tray connectors

1. Open front door of the UPS by pulling on the left-hand side (Fig 5-8).
2. Uninstall battery chamber cover by removing perimeter cover screws (eleven total).

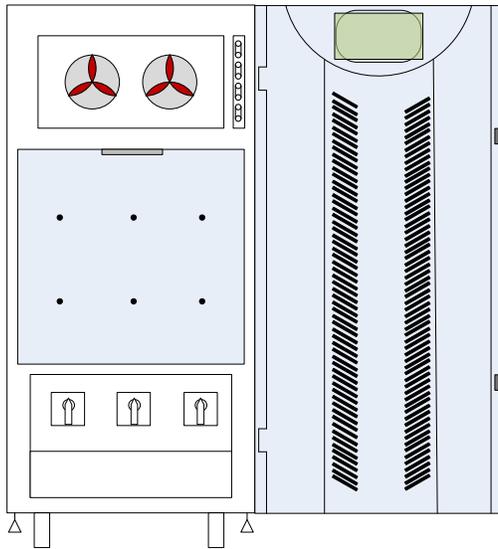


Fig. 5-8

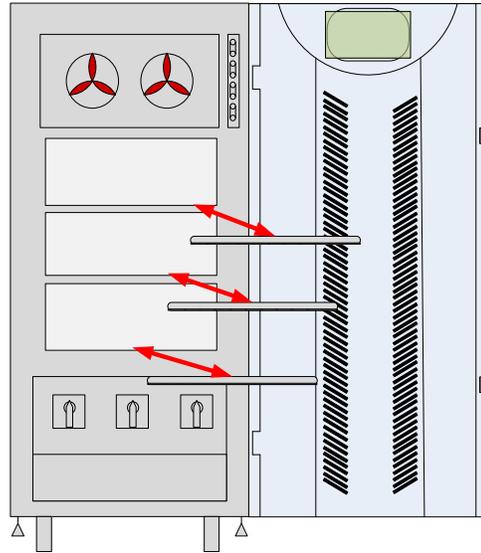


Fig. 5-9

3. Uninstall battery tray keepers by removing screws (3 total) at the front of the individual shelves. The shelves should now be clear for battery tray installation (Fig. 5-9).



These trays weigh 60 lbs. It is recommended that assistance be sought if necessary.

4. **With any necessary required assistance**, slide each battery with the connector at the front of the tray, onto the shelves of the UPS. In the 30/40kVA units, great care should be taken to avoid internal battery cable harness located near the top of the tray chambers. Make sure the trays are

installed so that they are in contact with the tray stops located at the rear of each shelf (Fig. 5-10).

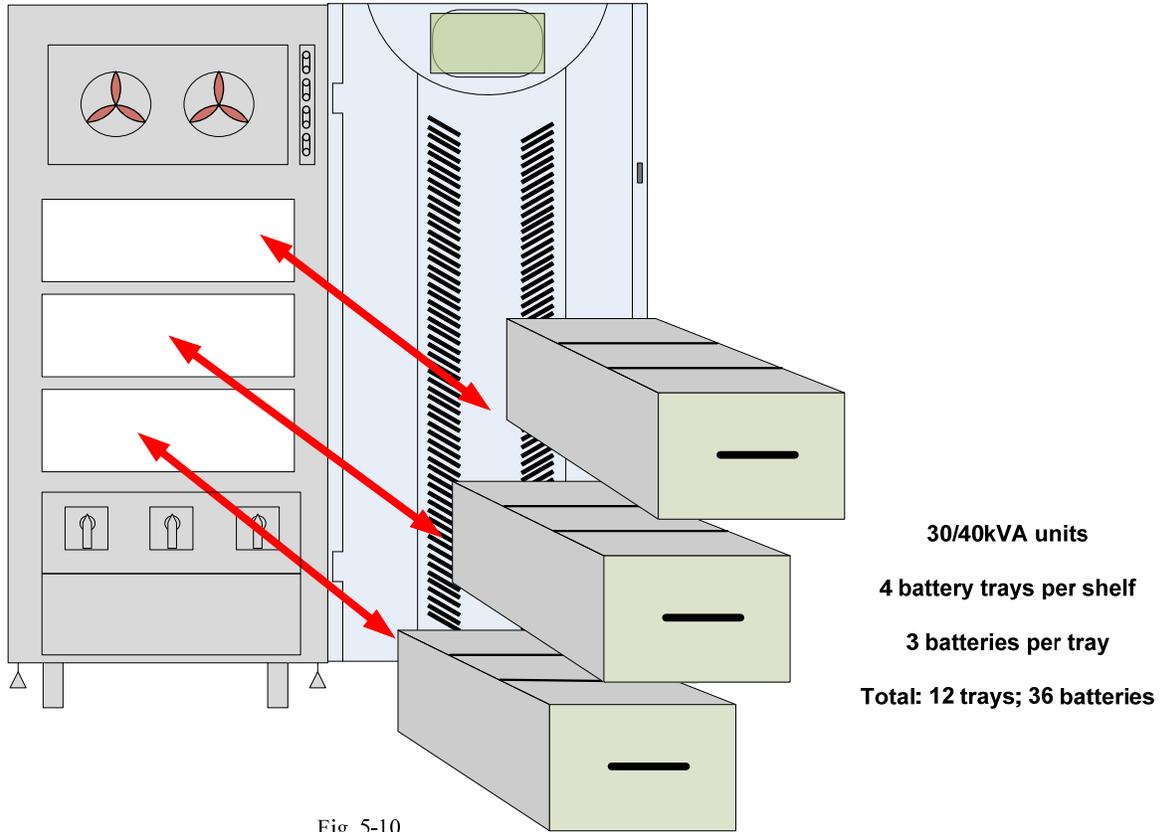


Fig. 5-10

5. Once all trays on any shelf are in place the tray keepers may be re-installed (Fig. 5-11).

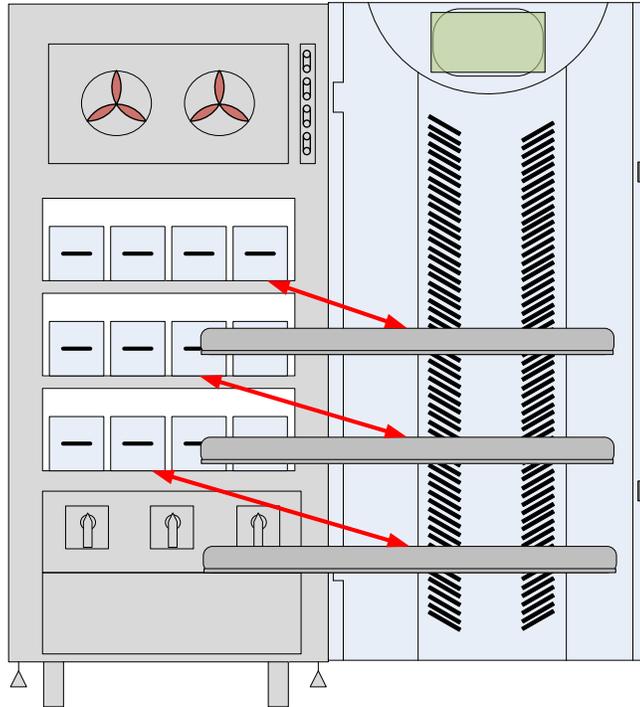


Fig. 5-11

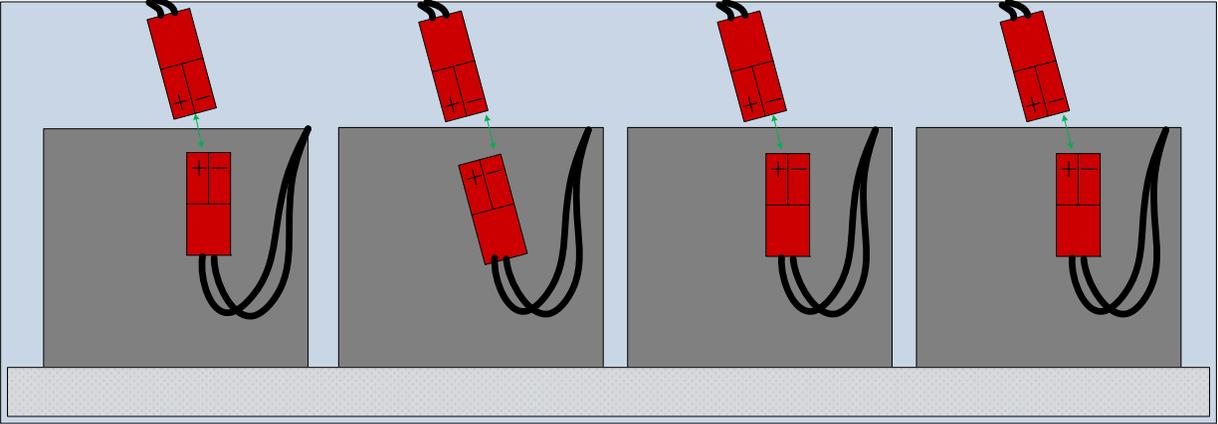
30/40kVA units
4 Battery Trays per Shelf
1 Tray Keeper per Shelf
Secure with 3 screws

6. The individual battery trays may now be connected to the UPS' internal battery harness.



CAUTION: Once a single battery tray connection has been made, dangerous DC voltages will be present at the cable connectors. Please proceed with great caution.

On the 30/40kVA units, the connections are made to the corresponding fixed connectors above the shelf in the battery chamber.



Expanded view: Single shelf—30/40kVA

7. Once all of the tray connections have been made, the battery chamber cover may be re-installed.
8. Start UPS per start up procedure.

6. Warranty

3200 Series Products

3200 Series products (hereafter referred to as “Product”) are warranted to be free from defects in material and workmanship for the lesser of **twenty four (24) months** from Product start-up or **thirty (30) months** from Product shipment from POWERVAR on the chassis, electronic components and batteries. This warranty is limited to repairing, replacing, or refurbishing, at POWERVAR’s option, any defective component, circuit board or module within the Product. For Products sold by POWERVAR to its OEM customers, USA based authorized Business Partners, Distributors, and Service Providers, this warranty will include, at POWERVAR’s sole discretion, on-site service in the USA and specified countries, or POWERVAR depot service. For Products sold by POWERVAR to its USA based Authorized Business Partners, Distributors, and Service Providers, this warranty will include, at POWERVAR’s sole discretion, on-site service in the USA or specified countries, or POWERVAR depot service. For Products sold by POWERVAR to its non-USA based Business Partners, Distributors, and Service Providers, this warranty is limited to parts only worldwide. See the Limitations of Warranty section for additional limitations & exclusions. Contact POWERVAR for a listing of specified countries.

Limitations of Warranty

This limited warranty does not cover any losses or damage resulting from shipment to or from the Customer, or from improper installation, improper application, inappropriate environment, abuse, neglect, unauthorized modifications, adjustments, or repair of the Product. Additionally, any costs related to installation or de-installation of the Product for the purpose of replacement or servicing will be the Customers sole responsibility. POWERVAR makes no warranties, expressed or implied, of merchantability, fitness for a particular purpose, performance, condition, capacity, or otherwise. POWERVAR is not liable for incidental or consequential damages, monetary loss, loss of sales, or loss of business resulting from the failure or malfunction of the Product. Warranty is void on Product where evidence of tampering exists.

Improper long-term storage may damage the UPS batteries and invalidate the battery warranty. Disconnecting a UPS from its AC utility power source for an extended period of time results in lost battery charge. To keep the batteries fully charged and maximize the life of the batteries, connect the UPS to an AC power source while it is in storage. If this is not possible, the UPS must be connected to a power source for 24 hours at least once every 4 months, or every 2 months if the ambient temperature is more than 30°C (86°F).

Additionally, POWERVAR’s warranty on batteries applies only to Products that are continuously connected to AC mains power, except during utility power outages. Products that are regularly and intentionally disconnected from AC mains power will experience battery discharge/charge cycles that are potentially far more numerous than those for which the battery was designed. As a result, Products used in such applications will experience substantially reduced battery life. Therefore, POWERVAR’s standard warranty term does not apply in these cases and is supplanted by a **90 day** warranty from time of shipment from POWERVAR. The warranty provided by POWERVAR provides for the replacement of the battery or battery

systems in the event that the batteries do not meet the performance specifications as determined by POWERVAR exclusively.

All warranty services will be performed during POWERVAR normal, non-holiday business hours (Monday through Friday, 8:00 AM – 5:00 PM CST). Any service required by Customer to be performed outside of normal business hours will be subject to POWERVAR's prevailing labor rates.

Exclusive Remedies

Except as set forth herein and except as to title, there are no warranties, express or implied, or any affirmations of fact or promises by POWERVAR for the Products, their merchantability, or fitness for any particular purpose. In no event shall POWERVAR be liable for lost profits, goodwill, or any other special or consequential damages. A POWERVAR Corporate Officer must approve any warranties, programs or policies not stated herein in writing before they will be implemented with any Customer. All terms, prices, etc., stated herein are subject to change without notice.

Life Critical Applications

While POWERVAR believes it designs and manufactures very reliable Products, many of the vendors that POWERVAR sources components from do not recommend or endorse the use of their Products in life critical applications. By extension, POWERVAR must adhere to the same business policy and does not recommend the use of our Products in life critical applications.

Disclaimer

POWERVAR Products are not designed, intended, authorized, tested, or UL Listed for use in systems intended to support or sustain life, or for any other application in which the failure of a POWERVAR Product could create a situation where personal injury or death may occur. Should Buyer purchase or use POWERVAR Products for any such unintended or unauthorized application, Buyer shall indemnify and hold POWERVAR and its officers, employees, subsidiaries, affiliates and distributors harmless against all claims, costs, damages and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim or personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that POWERVAR was negligent regarding the design or manufacture of the part.

7. Service and Troubleshooting

Troubleshooting the POWERVAR 3200 Series

The POWERVAR 3200 Series utilizes a complex proprietary firmware program to control and oversee its many functions. This program is continually monitoring the input line and output load while simultaneously running internal diagnostic checks designed to keep track of all meaningful internal behavioral parameters of the UPS. The primary objective of this powerful program is to alert the user to any adverse conditions as they happen in real time, so that the appropriate action may be taken.

The POWERVAR 3200 Series alarms are separated into three categories, each with varying levels of severity.

Message: Informational in nature- alerts the user to an operating anomaly which may require action by the user to resolve. It is recommended that the user take the appropriate follow up action indicated.

Warning: A warning indicates a condition which, if left unattended, may result in the critical load not being protected by the UPS. Upon receipt of this indication, it is recommended that the user take the appropriate follow up action indicated.

Alarm: Alerts the user to conditions which have changed the state of the UPS for reasons of self-preservation. The UPS when in this state will not protect the critical load being supplied by the UPS. It is recommended that the user call a factory authorized repair center for service.

The table in the following pages describes the **Messages**, **Warnings**, and **Alarms** that may be encountered during the operation of the UPS, along with the suggested user actions.

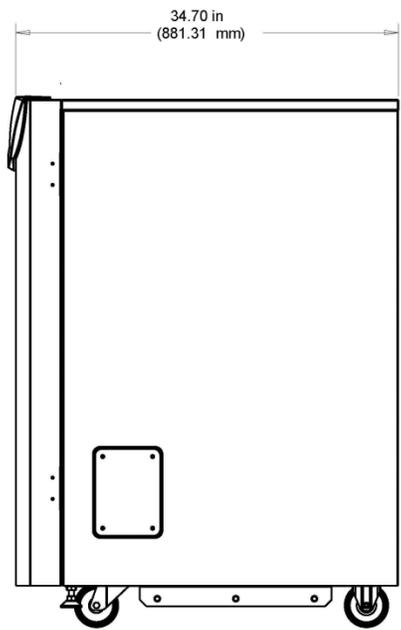
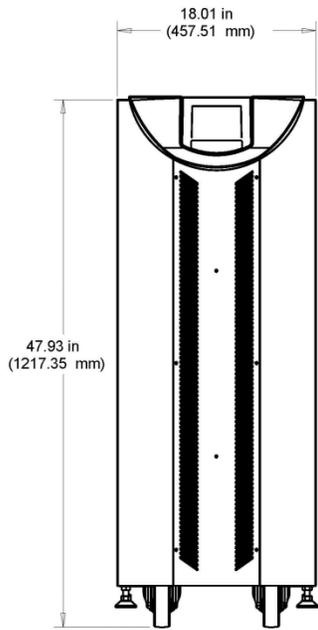
Message	Alarm Type	User Action	Description
Rectifier Overload	Alarm	Call Service	The Rectifier is Overloaded
Inverter Overload	Warning	Check Load	The Inverter is Overloaded-- possibly intermittent
Main Input Failure - Low Battery Level	Warning	Check Input Power	The input AC supply has failed and the battery voltage level is less than 11.5v/batt.
Inverter Voltage Out of Spec.	Alarm	Call Service	The Inverter output voltage (L-N) is outside of it +/- 6% margin.
DC Voltage Detected at Output	Alarm	Call Service	A DC offset voltage greater than 5v is present on any phase (L-N) of the inverter
Maintenance Bypass Closed - Inverter not available	Message	Check System Status	The Internal Maintenance Bypass Switch has been closed.
Main Input Failure - Batteries Discharging	Warning	Check Input Power	An input phase is out side of its +15%/-30% default margin, or the input frequency is out of its margin
High Temperature - Reduce Applied Load	Warning	Call Service	The Inverter or PFC temperature is greater than 70C
Battery Breaker Open - Please Close Manually	Message	Check System Status	The Battery breaker is open and the DC bus is charged to the battery voltage level
Bypass Failure - Not Synchronized With Inverter	Message	Check Input Power	The bypass voltage or frequency is out of margins with respect to the inverter
UPS on Bypass	Message	Check System Status	The UPS is in Bypass mode
End of Battery Life	Warning	Call Service	Estimated end of life of the battery bank. Battery replacement is recommended.
Battery Temperature Too High	Warning	Call Service	The temperature of the battery chamber exceeds 40C
Battery Test Failure	Alarm	Call Service	A battery test has been unsuccessfully completed
Batteries Disconnected	Alarm	Check System Status	The battery breaker has been opened.
Main Phase Rotation Error	Alarm	Check Input Power	UPS will not start due to incorrect input phase rotation.
Communication Error Parallel Master fixed	Alarm	Call Service	Communication between two parallel units has been lost.
Parallel System Redundancy Lost	Warning	Call Service	The load of a parallel system has exceeded the rating of a single UPS
Rectifier Desaturation	Alarm	Call Service	A rectifier IGBT has desaturated more than 50 times
DSP Internal Error	Alarm	Call Service	A DSP internal error has occurred in the rectifier, shutting it down.

Message	Alarm Type	User Action	Description
DC Bus Volt out of spec. Rectifier Stop	Alarm	Call Service	The DC bus voltage is too high or low
Parallel System Rectifier Stop	Alarm	Call Service	The master unit in a parallel system has detected a rectifier alarm on one of the systems
Contactor Test Fail Rectifier Stop	Alarm	Call Service	An abnormal voltage has been detected during UPS startup, causing the contactor not to close.
Inverter Desat	Alarm	Call Service	An inverter IGBT has desaturated more than 200 times
Inverter Overload	Alarm	Check Load	The inverter output has been overloaded
Shutdown Command (User Command)	Warning	Check System Status	A user shutdown command is being executed
Maintenance Bypass Closed - Inverter Stop	Alarm	Check System Status	Internal maintenance bypass switch closed during inverter operation
Parallel System Discharge	Alarm	Call Service	One of the UPS' in a parallel system has gone to battery back-up mode
Overtemperature Inverter Stop	Alarm	Call Service	An overtemp condition has been detected and the inverter has shut down
Rectifier Overload Inverter Stop	Alarm	Call Service	A rectifier overload condition has caused the inverter to shut down. The rectifier will shut down after 30s
DSP Internal Error	Alarm	Call Service	A DSP internal error has occurred in the inverter, shutting it down.
Ouput Short Circuit	Alarm		When an output short circuit is detected, the RMS current is limited to 150% of nominal
Inv. Failure/Overload	Alarm	Call Service	The inverter voltage is out of margins for a defined period, but there is no short circuit.
Voltage Ramp Error Inverter Stop	Alarm	Call Service	During initial startup the voltage ramp is detected to be out of range.
Parallel System Inverter Stop	Warning	Check System Status or Load	The master unit in a parallel system has detected an inverter alarm on one of the systems
Low Battery Inverter Stop	Message	Check Input Power	When on batteries, the battery cutoff level of 10.5v/cell has been reached.
DSP Internal Error	Alarm	Call Service	A DSP internal error has occurred in the UPS module, shutting it down. It will try to restart two times.
PFC, Inverter Stop	Alarm	Call Service	Undetermined failure causing both rectifier and inverter to stop.
Parallel System UPS Stop	Alarm	Call Service	The master unit has decided to stop all units of a parallel system

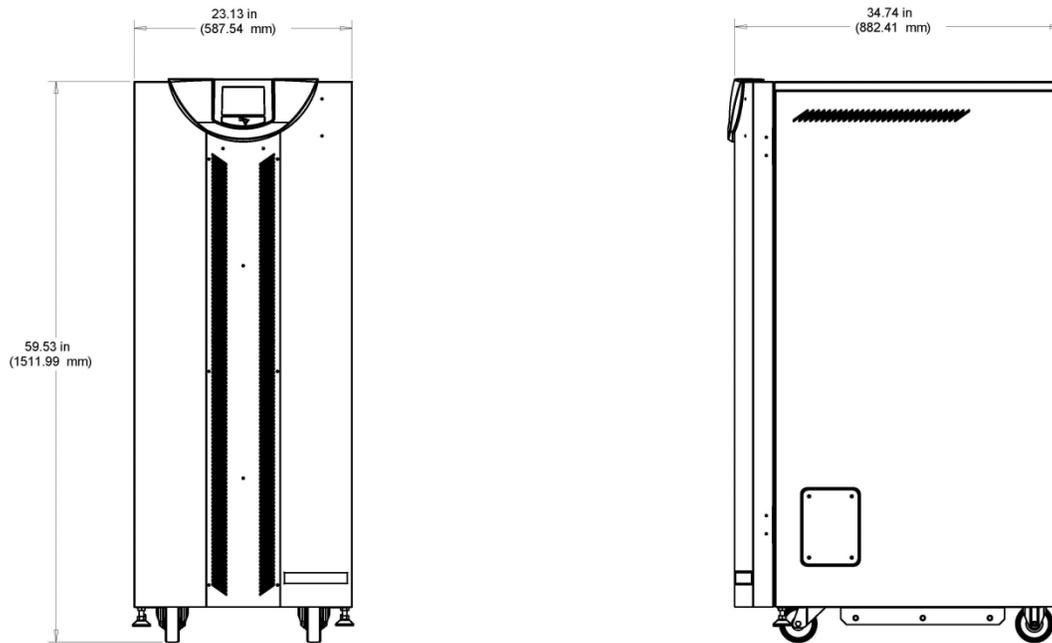
Message	Alarm Type	User Action	Description
Emergency Power Off	Message	Check System Status	The Emergency Power Off system has been activated.
Ouput Short Circuit	Alarm	Check Load	The system has detected a short circuit in the output and after three restarts, has shut down the system.
DSP Internal Error	Alarm	Call Service	A DSP internal error has occurred in the UPS module, shutting it down. Three attempts to restart have been tried.
DC Bus Volt Wrong	Alarm	Call Service	The DC bus voltage is too high or low, and the unit has attempted unsuccessfully to restart.
Rectifier Blocked	Alarm	Call Service	The UPS has been blocked, and this condition will also block the rctifier.
Rectifier Desat	Alarm	Call Service	
Voltage Ramp Error	Alarm	Call Service	If the rectifier has desaturated and attempted unsuccessfully to start this alarm will occur.
Intern Execution Error	Alarm	Call Service	A command hes been sent from the processor and there is no response.
DSP Internal Error	Alarm	Call Service	
Contactor Fail	Alarm	Call Service	Rectifier blocked due to unsuccessfull retrys of a contactor failure
Voltage Ramp Error (Only on AC Return)	Alarm	Call Service	Unsuccessfull retrys of "Voltage Ramp Error" will cause the inverter to block.
Output DC Voltage	Alarm	Call Service	Inverter blocked due to detection of an offset >8V in any phase (L-N)
Inverter Blocked	Alarm	Call Service	UPS has been blocked so inverter will also block.
Inverter Desat	Alarm	Call Service	Not Implemented
Intern Exe. Error	Alarm	Call Service	A command hes been sent from the processor and there is no response.
DSP Internal Error	Alarm	Call Service	Inverter blocked due to detection of an internal inverter DSP error.
Inverter Failure Inverter Block	Alarm	Call Service	After unsuccessful retrys of "inverter failure", the inverter will block.
UPS Blocked	Alarm	Call Service	Rectifier has been blocked for reasons also blocking the UPS.
Intern Initializing Error	Alarm	Call Service	DSP does not respond to the processor during the initial start up.
Intern Exe. Error	Alarm	Call Service	A command hes been sent from the processor and there is no response.
UPS Blocked	Alarm	Call Service	Inverter has been blocked for reasons also blocking the UPS.
Internal Communications Error	Alarm	Call Service	Error in communication channel between the processor and the DSP

Message	Alarm Type	User Action	Description
Parallel System Discharge	Alarm	Call Service	Not Implemented
UPS Over Temp.	Alarm	Call Service	UPS will block after one minute when an over temperature condition occurs in the rectifier or inverter.
Rectifier Overload	Alarm	Call Service	When the rectifier is overloaded, depending on the level of overload, the inverter will be shut down after the time default. If the condition persists with the inverter turned off the UPS will be completely blocked after 30s.
Inverter Desat	Alarm	Call Service	After the many restart attempts in an inverter desat condition, the UPS will be blocked.
DSP Internal Error	Alarm	Call Service	After many retries of "DSP Internal Error, UPS Stop", if faulty situation remains, UPS will be blocked.
PFC & INV Block	Alarm	Call Service	If a condition is present that blocks the PFC and inverter, the UPS will also block.
Parallel Communications Error UPS block	Alarm	Call Service	Complete loss of communication between units of a parallel system.

8. Drawings

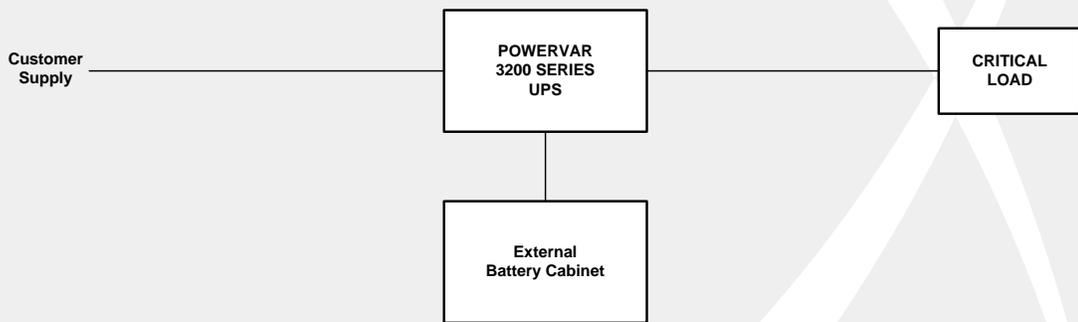


POWERVAR 3200 Series 10/20kVA Dimensions



POWERVAR 3200 Series 30/40kVA Dimensions

UPS + External Battery Cabinet (optional)



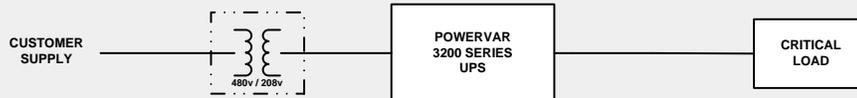
POWERVAR Inc.

Rev. 1

2/15/2011

PH

UPS w / Input Transformer



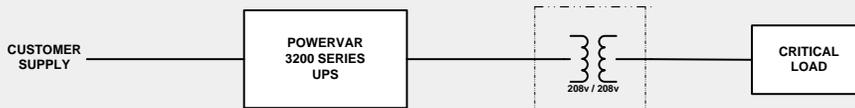
POWERVAR Inc.

Rev. 1

2/15/2011

PH

UPS w / Output Isolation Transformer



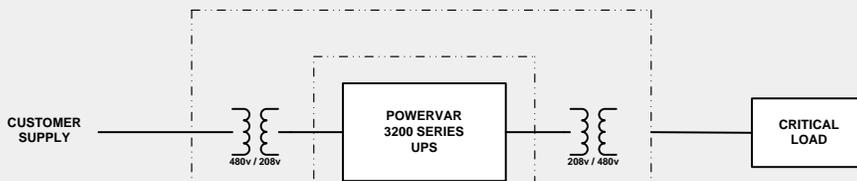
POWERVAR Inc.

Rev. 1

2/15/2011

PH

UPS w / Input & Output Transformers



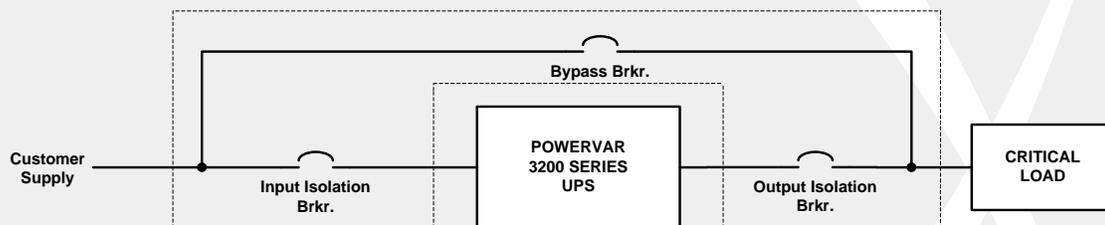
POWERVAR Inc.

Rev. 1

2/15/2011

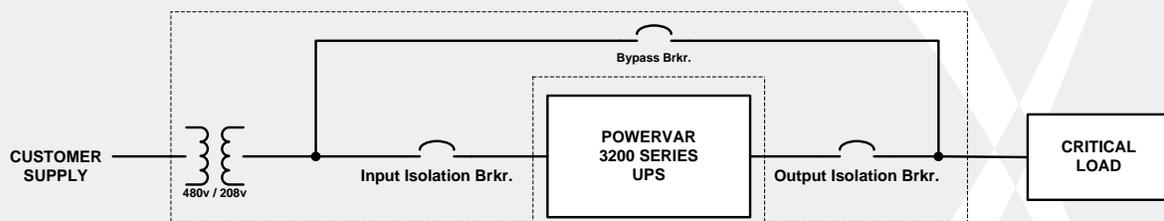
PH

3 Breaker MBS



POWERVAR Inc.		
Rev. 1	2/15/2011	PH

3 Breaker MBS w/Input Step-down Transformer



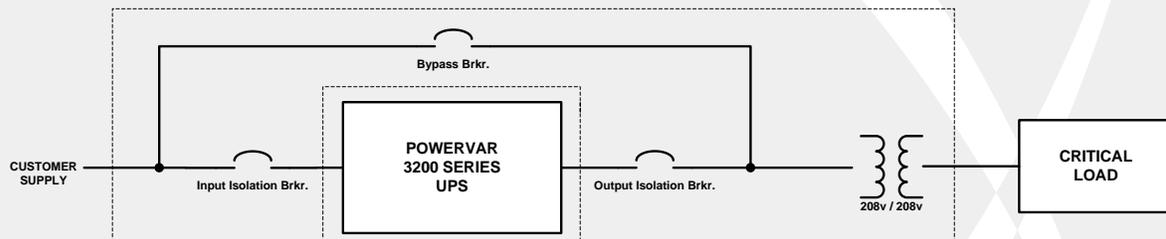
POWERVAR Inc.

Rev.1

2/15/2011

PH

3 Breaker MBS w/Output Isolation



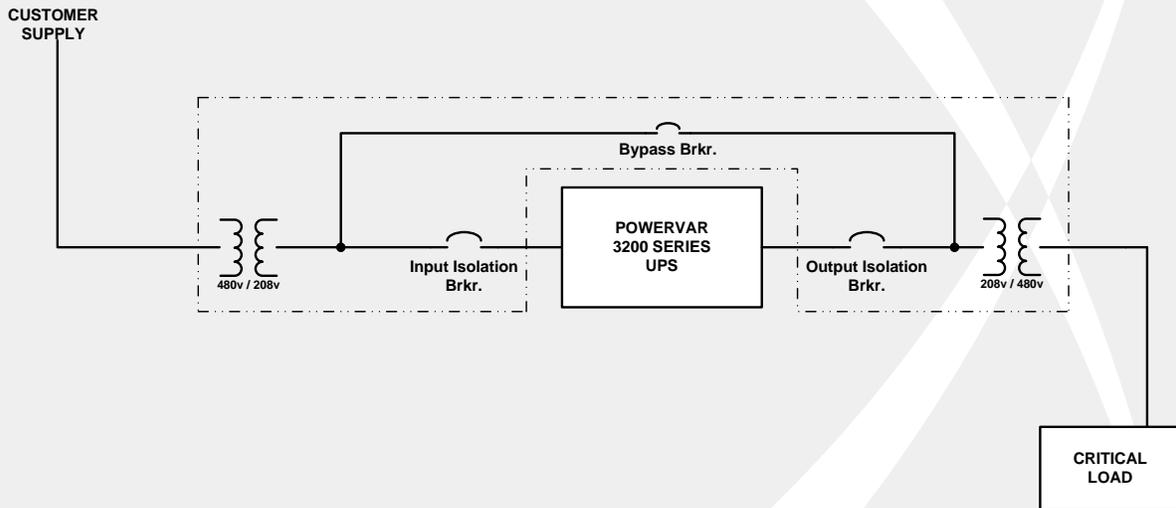
Powervar Inc.

Rev. 1

2/15/2011

PH

3 Breaker MBS w/Input & Output Transformers



POWERVAR Inc.

Rev. 1

2/15/2011

PH

POWERVAR 3200 Series Shipping Weights and Dimensions:

<u>Model</u> <u>(kVA)</u>	<u>UPS Crate</u>	<u>Battery Pallet</u>
10	24" W x 41"D x 56"H 441 lbs.	40"W x 48"D x 32"H 479 lbs.
20	24" W x 41"D x 56"H 449 lbs.	40"W x 48"D x 32"H 581 lbs.
30	29.5"W x 40"D x 66.5" H 650 lbs.	40"W x 48"D x 30"H 840 lbs.
40	29.5"W x 40"D x 66.5" H 665 lbs.	40"W x 48"D x 30"H 840 lbs.



North American addresses:

POWERVAR Inc.
1450 Lakeside Drive
Waukegan, IL 60085
Toll Free: (800) 369-7179
Inside Illinois: (847) 596-7000
FAX: (847) 596-7100

POWERVAR Mexico
Camino a la Montana No. 178-101 PB4
Fracc. Industrial La Perla
53340 Naucalpan, Edo. De Mexico
Phone: +52 55-5363-5448
FAX: +52 55-5540-4430

International address:

POWERVAR Ltd.
Unit 5, Birch-Kembrey Park
Swindon, Wilts SN2 8UU UK
Phone: +44 1793 553980
FAX: +44 1793 535350