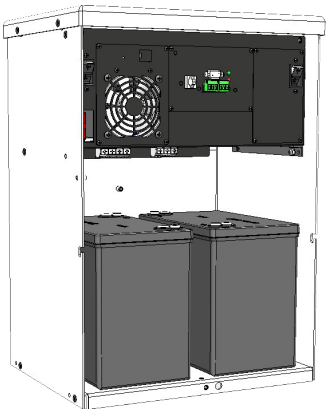
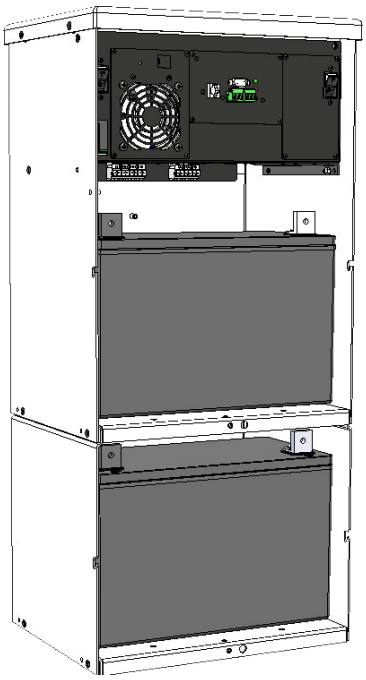
Novus Micro, Micro XL, Micro XL3

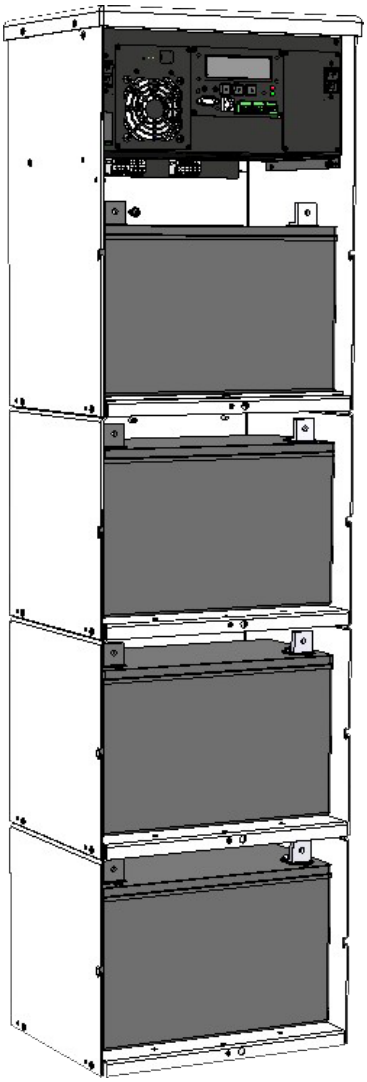
Uninterruptible Power Supply



Micro



Micro XL



Micro XL3

Operator's Manual

017-221-B0 Rev 03/07

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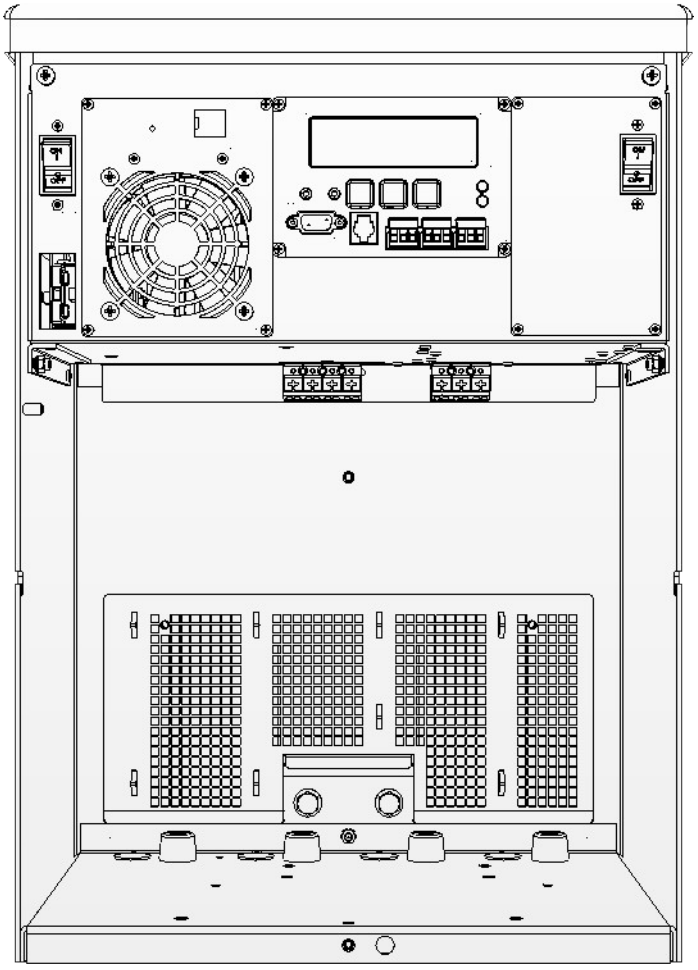
Alpha Technologies

Power

Operator's Manual

Novus Micro, Micro XL, Micro XL3



Uninterruptible Power Supplies

Alpha Technologies
www.alpha.com

017-221-B0 Rev 03/07

Save This Manual: It contains important installation and operating instructions. Keep it in a safe place.

Table of Contents

The emergency shutdown procedure is on the inside rear cover

DANGER
Risk of Electrical Shock

To reduce the risk of electrical shock and to ensure the safe operation of the Novus Micro, the symbols below are used throughout this manual. Where they appear, only qualified personnel should carry out these instructions.

A dangerous voltage exists in this area. Use extreme caution at all times.

Attention: Important operating instructions. Follow them exactly.

1 Introduction

This Section Introduces the Novus Micro Uninterruptible Power Supply (UPS)

- Safety Checklists (Section 1.1)
- Unpacking and Inspection Checklist (Section 1.2)
- A Description of the Novus Micro (Section 1.3)

1.1 Safety Checklists

1.1.1 UPS Safety Checklist

This Uninterruptible Power Supply (UPS) must be installed in a restricted access location, and by trained personnel qualified in the safe use of high-energy power supplies and their batteries. Also assumed is knowledge of the local electrical code(s) and their safe application.

DANGER: NEVER let water from rain, a hose, tap or a sprinkler's output, road splash or other water sources enter the UPS to prevent accidental shorts, shocks or electrocutions.

- ☐ Do not work alone under hazardous conditions.
- ☐ Read this manual. If you have any questions about safe installation, operation or maintenance, contact Alpha Technologies's customer service department.
- ☐ Carefully unpack the components. Report any shipping or other damage at once.
- ☐ ***CAUTION:*** Risk of electric shock and fire hazard, replace fuse with the same type and rating.
- ☐ ***Always*** assume electrical connections or conductors are live. Turn off all circuit breakers and double-check with a voltmeter before performing installation or maintenance.
- ☐ Before installation, verify the input voltage and current requirements of the load are met by the UPS's output (*See* specifications). Verify the line voltage and current meet the UPS's input requirements.
- ☐ Place a warning label on the utility panel to tell emergency personnel a UPS is installed.
- ☐ Use proper lifting techniques when lifting or moving the UPS or its components.
- ☐ This UPS has more than one live circuit. AC power may be present at the outputs even if the UPS is disconnected from line or battery power.
- ☐ This UPS can be operated to a maximum operating temperature of 55°C. *Also see* the specifications section for temperature ratings.
- ☐ At high ambient temperature conditions, the UPS's surface can be very hot to the touch.
- ☐ There is a Lithium battery inside the UPS. There is a danger of an explosion if it is incorrectly replaced. Replace it only with the same type or an equivalent battery as recommended by the manufacturer. Dispose of the old battery as instructed by the manufacturer.

1.1.2 Battery Safety Checklist

Battery Emergency Procedures

If electrolyte splashes on your skin, immediately wash the affected area with water. If electrolyte gets into your eyes, wash them for at least 10 minutes with clean running water or a special neutralizing eye wash solution. Seek medical attention at once.

Neutralize spilled electrolyte with special neutralizing solutions in a “spill kit” or a solution of 1 lb. (0.45 kg) of baking soda (bicarbonate of soda) in 1 gallon (3.9 L) of water.

- ☐ Battery installation and servicing should be done or supervised by personnel knowledgeable about batteries and the required precautions.
- ☐ ***CAUTION:*** Risk of explosion if battery is replaced by an incorrect type. Always replace the battery with the same type, numbers, and ratings.
- ☐ ***CAUTION:*** Never install old or untested batteries. One sealed lead-acid battery is rated to a maximum voltage of 12VDC.
- ☐ ***CAUTION:*** Never dispose of batteries in a fire. The batteries may explode. Follow the manufacturer’s directions for safe battery disposal.
- ☐ ***CAUTION:*** Never open or damage the batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic and hazardous to the environment.
- ☐ ***CAUTION:*** A battery can present a risk of electrical shock and high short-circuit current. The following precautions should be observed when working on batteries:
  - Remove watches, rings, or other metal objects.
  - Use tools with insulated handles.
  - Wear rubber gloves and boots.
  - Do not lay tools or metal parts on top of batteries.
  - Disconnect charging source prior to connecting or disconnecting battery terminals.
  - Determine if the 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 (applicable to equipment and remote battery supplies not having a grounded supply circuit).
- ☐ ***CAUTION:*** Never let live battery wires touch the UPS, the enclosure or any other metal objects. This can cause a fire or explosion.
- ☐ Lead-acid batteries can release Hydrogen gas. Never expose the UPS or enclosure to open flames or sparks to prevent a fire or explosion.
- ☐ Inspect the batteries once a year for signs of cracks, leaks or swells. Replace as needed.
- ☐ If you have batteries in storage, charge them at least once every three months for optimum performance and to extend their lifetime.

1.2 Unpacking and Inspection Checklist

If items are missing or damaged, contact Alpha Technologies and the shipping company at once. Most shippers have a short claim period.

Carefully remove the UPS from the shipping container. Inspect the contents and make sure the following items are included:

- ☐ 1 Novus Micro UPS.
- ☐ 1 Novus Micro Operator's Manual.
- ☐ 2 or 3 terminal blocks and labels for the dry contacts.
- ☐ 1 temperature sensor cable.
- ☐ Any ordered options.

Note: If ordered from Alpha, the batteries are shipped separately.

Save The Shipping Container
To return the Novus Micro for servicing, pack it in the shipping container. Alpha Technologies is not responsible for damage caused by improper packaging of returned units.

Read This Manual
Before installation become familiar with the Novus Micro by reviewing the procedures and drawings in this manual. If you have any questions about the safe installation, operation or maintenance of this UPS, contact Alpha's customer service department at www.alpha.com.

1.3 The Novus Micro Family

Figure 1.3.1 shows the three different enclosures, (1) the standard Micro, (2) the Micro XL, and (3) the Micro XL3. Each of these enclosures can be configured with the 300W, 600W or the 1000W power module (E-Module). Although the end system configuration may look different, the front panel connectors and circuit breakers along with the input and output terminal blocks are functionally the same. They all operate in the same way unless otherwise stated in this manual. See the *Specifications* section for more details.

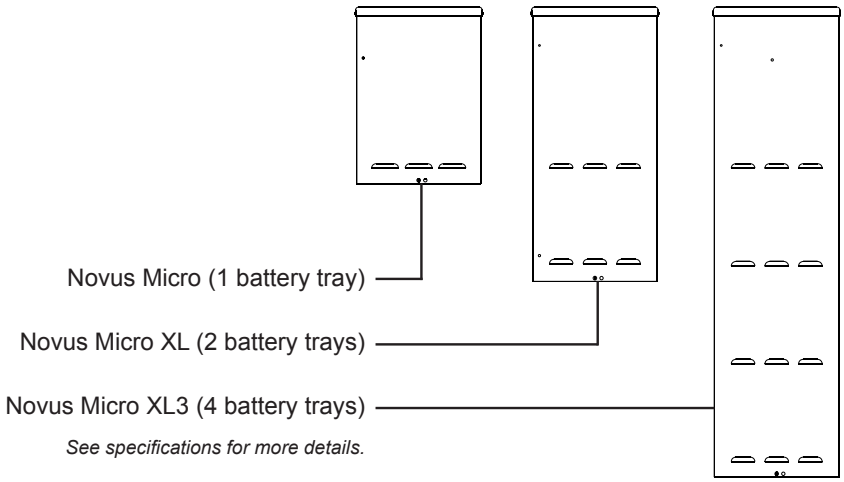


Figure 1.3.1 – Novus Micro Family

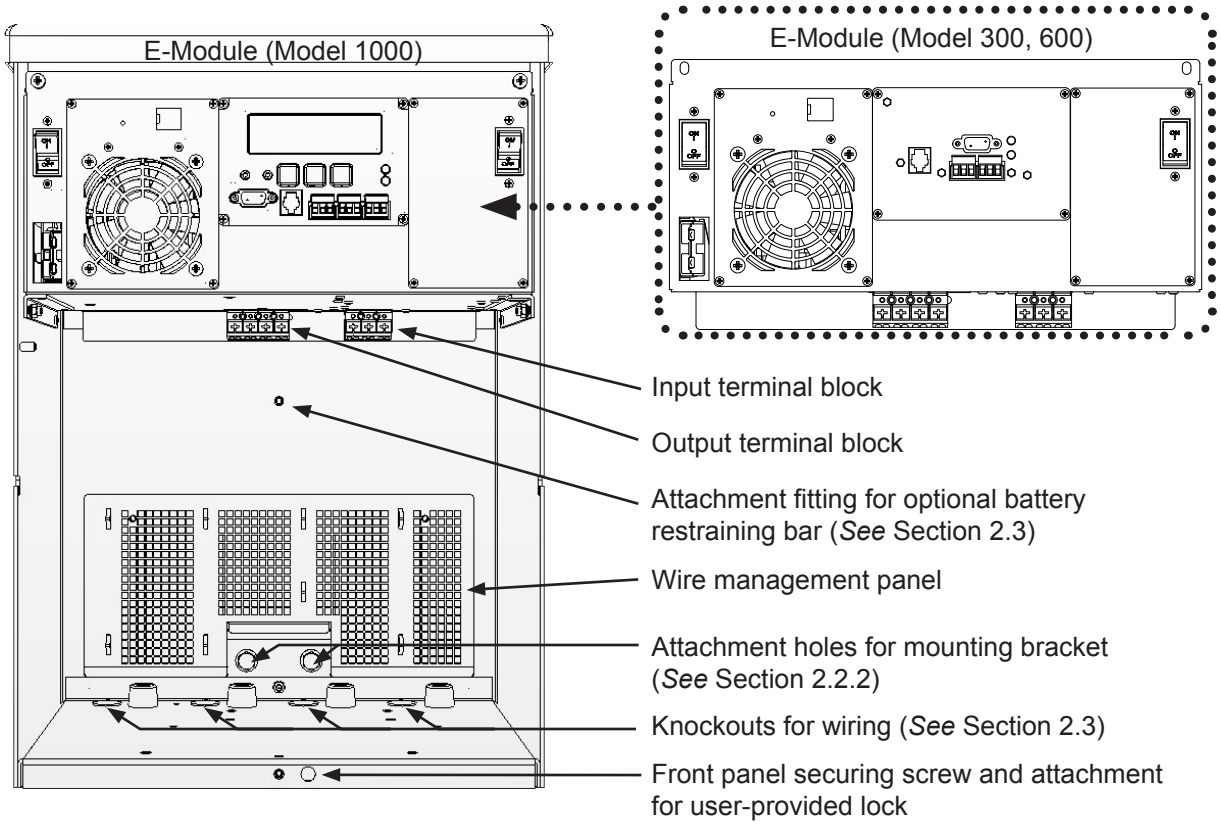


Figure 1.3.2 – Novus Micro Interior

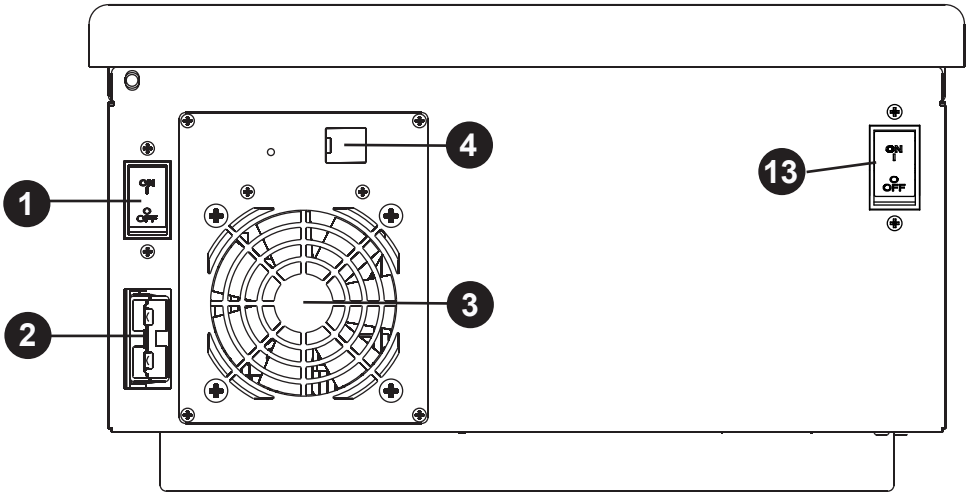


Figure 1.3.3 – E-Module Control Panel Description

1 *Battery Circuit Breaker*
This circuit breaker provides overcurrent protection and is an on/off switch for battery power. It must be on for proper UPS operation.

2 *Battery Connector*
This connects the batteries to the UPS.

3 *Internal Fan*
This microprocessor-controlled fan regulates the UPS's internal temperature for optimum performance. It must not be blocked. If the fan fails, an Alarm is generated (*See* Section 3.6, "Troubleshooting").

4 *Ethernet*
This optional, RJ-45 connector is the UPS's Ethernet connector.

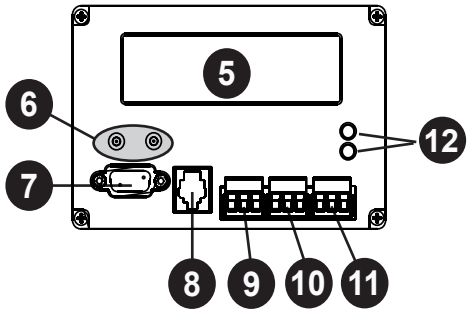


Figure 1.3.4a – E-Module Control Panel Description
(for Model 1000)

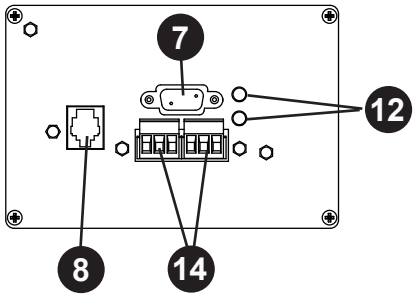


Figure 1.3.4b – E-Module Control Panel Description
(for Model 300 or 600)

5 *LCD Control Panel (1000W version only)*
This panel and the CANCEL, SCROLL and SELECT buttons below it let you monitor and control the UPS. More information is given in Section 3, “Operation.”

6 *Battery Voltage Test Points (1000W version only)*
These let you measure the battery voltage. They accept 2mm diameter test probe tips. The battery circuit breaker must be on to measure the voltage. NOTE: It is not a power outlet.

7 *RS-232 Port*
This DE-9 female connector allows you to use a straight-through DB-9 to DE-9 connector computer cable to connect the UPS to a computer for remote control and monitoring. More information is given in Section 4, “Communication.”

8 *Battery Temperature Sensor*
This connector accepts the battery temperature probe from the battery so that the UPS can monitor the battery temperature. The charging voltage is temperature dependent and the UPS’s microprocessor adjusts it for optimum charging.

The probe MUST be attached to the UPS for normal operation. Firmly attach the sensor end to the centre battery’s case with high-strength flameproof tape (such as duct tape) as shown in Section 2.3, “Wiring the UPS.” Otherwise, a “Temperature Probe Unplugged” alarm will appear on the LCD. *See* Section 3.6, “Troubleshooting”, “Temp Probe Unplugged”.

9 *User Input C7 (1000W version only)*
This optically isolated input let you attach an external switch panel for remote control of the UPS (Figure 1.3.5).

- ***19 (S1):*** *Shorting this contact starts the UPS’s self test. Also see Section 3.4, “Battery Test.”*
- ***20 (S2):*** *Shorting this contact activates an alarm. Also see Section 3.6, “User Input Alarm.”*
- ***21 (S3):*** *Shorting this contact shuts down the inverter and disconnects the input voltage. A manual restart is required to put the UPS back to normal operation.*
- ***22 (C):*** *Isolated return for contacts S1, S2 and S3.*

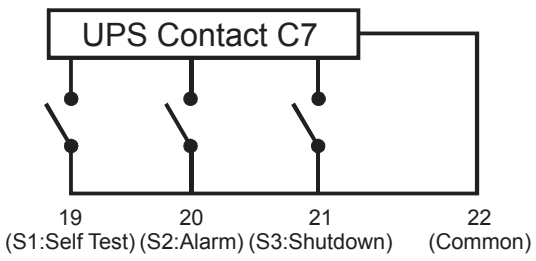


Figure 1.3.5 – User Input Layout

10 *ATS C8*

When the UPS is in Inverter mode, the normally open relay closes (Figure 1.3.6), sending 48VDC or 24VDC from the batteries to this dry contact (*See* Section 2.3).

Note: This contact can be used to power any external logic circuits or loads when the UPS is in Inverter mode.

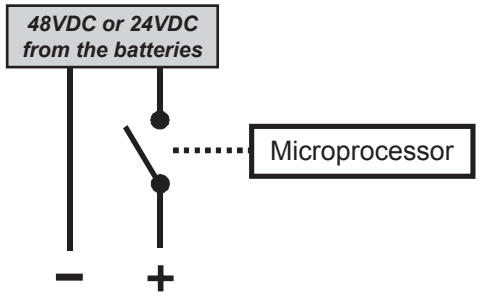


Figure 1.3.6 – ATS Contact

11 *C6*

The factory default layout for this contact is a relay that is energized when the UPS is in Line or Inverter modes (Figure 1.3.7). It provides 48VDC (500mA) or 24VDC (500mA) from the external batteries to an external fan or other equipment. It can be factory-configured as a dry contact if requested.

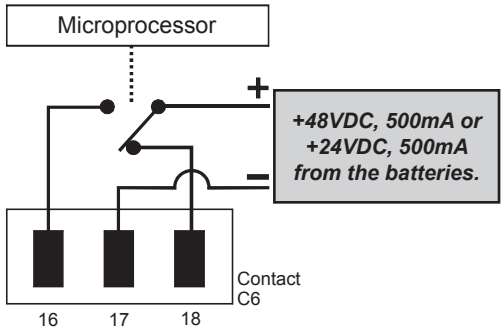


Figure 1.3.7 – Dry Contact C6 Layout
(Default Configuration, De-energized Shown)

12 *Status and Alarm LEDs*

- **Status:** When this green LED is on, the UPS is in Line mode and line power is provided to the load. When it is flashing, it is in Inverter mode and backup battery power is provided to the load (*See* Figure 3.1.2, "UPS Operating Modes").
- **Alarm:** When this red LED is on, the UPS has a fault. When it is flashing, it has an alarm (*See* Section 3.6, "Troubleshooting").

13 *Input Circuit Breaker*

This circuit breaker is an on/off switch for line power into the UPS and provides input protection. It must be on for proper UPS operation.

14 *Dry Contacts (Models 300 & 600 only)*

Contacts C1 and C2 allow you to connect the UPS to an external monitoring panel or to traffic control equipment.

The factory default settings are given below, but you can program them to meet your requirements (See Section 4.4, “Programming the Dry Contacts” or Section 4.6, “Novus Micro Graphical User Interface”.

Figure 1.3.8 shows the contact’s layout.

- C1: This contact is energized when Line power is unqualified and the UPS provides backup battery power to the load(s). It is called the “On Battery” contact.
- C2: This contact is energized when the battery drops below a preset voltage level. It is called the “Low Battery” contact. You have the option to change the pre-programmed level to match the batteries used and the actual operating conditions. See Section 4.3, “Adjusting and Controlling the UPS, #35 Low Battery Warning Voltage” for more details.

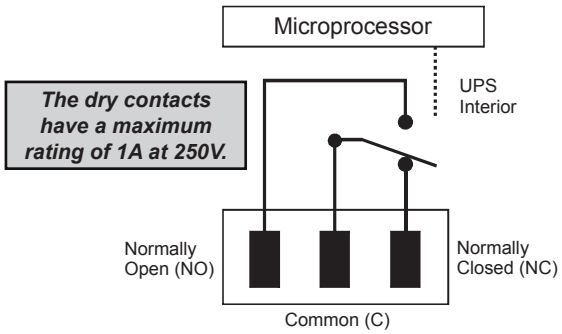


Figure 1.3.8 – Dry Contact Layout (Standard for C1 & C2)

2
Installation

This Section Tells You How to Install and Wire the Novus Micro UPS

- Site Preparation Checklist (Section 2.1)
- Mounting the UPS (Section 2.2)
- Wiring the UPS to the Line and the Load and Installing the Batteries (Section 2.3)
- ATS/GTS Option (Section 2.4)

2.1 Site Preparation Checklist

☐ Grounding

The UPS MUST be correctly grounded for proper operation.

Older facilities may have inadequate electrical grounding. Inspection must be performed by a qualified electrician before installation to ensure that grounding meets the local electrical code.

☐ Branch Circuit Breaker Protection

To reduce the risk of fire, connect to branch circuit overcurrent protection in accordance with the National or local Electrical Code per ANSI/NFPA 70.

☐ Disconnects

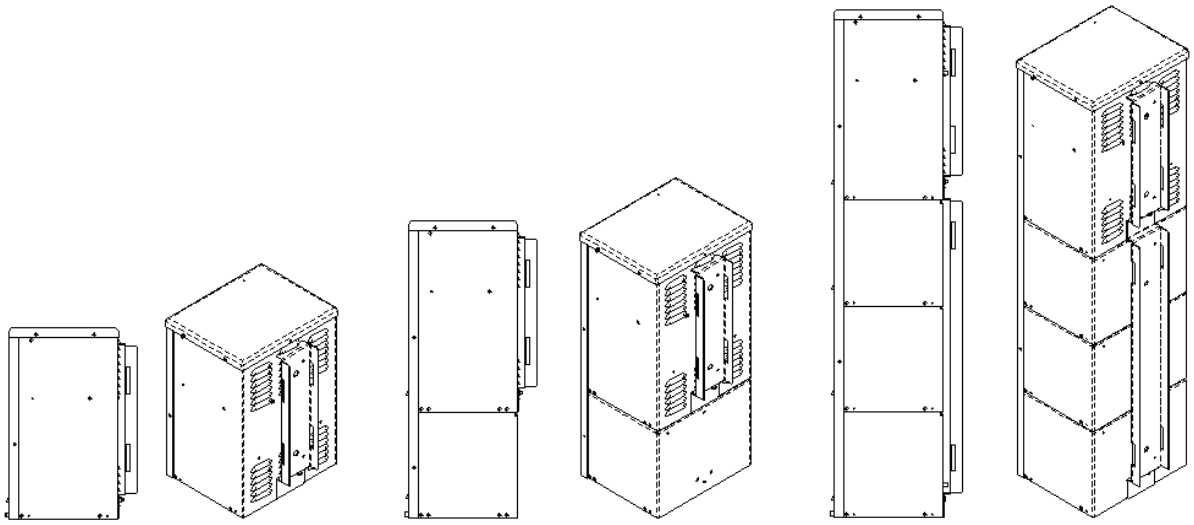
The input and output lines to and from the UPS MUST have disconnect devices attached.

☐ Site Requirements
Install the UPS and batteries in a restricted access location, and on a surface that supports the total weight. The input wiring must reach a suitably grounded power outlet and the load wiring must reach the UPS's output terminal blocks.

☐ Backup Generator (If used)
In Generator Mode, the UPS's range of acceptable input frequency and voltage is expanded to accept the fluctuations created by a generator (*See* Section 3.4, "Operating the UPS, Sense Type").
Use a generator with electronic speed and voltage controls which produces less than 10% voltage Total Harmonic Distortion (THD). Mechanical governors can force the UPS to run continuously in Battery mode.
Before installation, make sure the generator's output voltage is compatible with the UPS's input voltage requirements. To make sure the system runs smoothly, it is recommended to use a generator that supplies twice as much power as drawn by the total load.

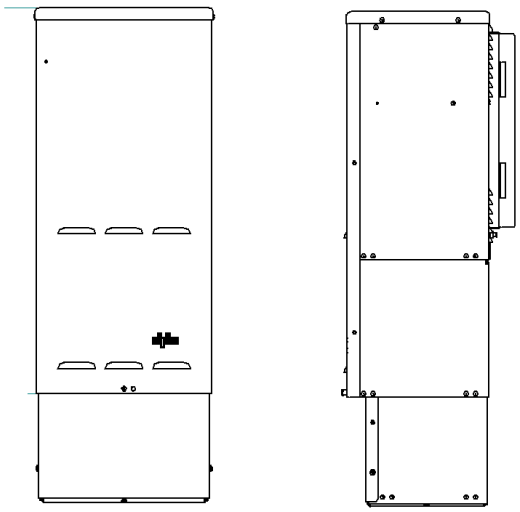
2.2 Mounting the UPS

The Novus Micro can be wall or pole mounted as shown below:



Micro Standard Micro XL Micro XL3

The optional pedestal mounting is shown below.



Novus Micro XL shown mounted on optional pedestal

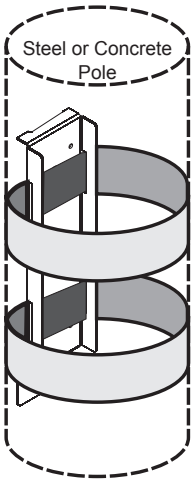
2.2.1 Steel or Concrete Pole Mounting

Tools and Materials Required:

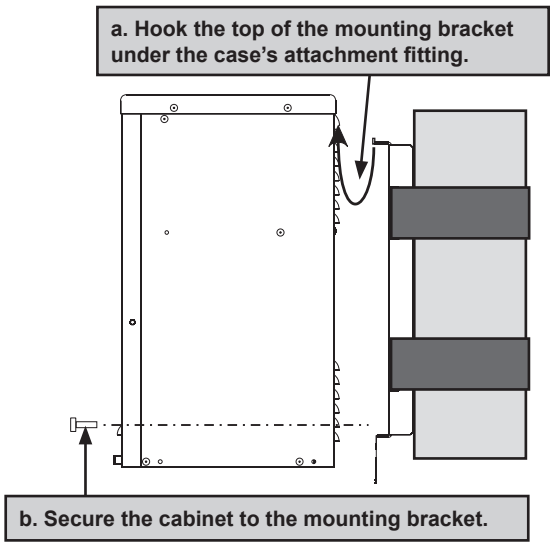
- 13 mm nut driver for the bolts that attach the cabinet to the mounting bracket.
- Two pole mount straps that fit the pole. Straps must be stainless or galvanized.
- C001 Band-It tool or equivalent.
- C206 3/4 inch stainless steel Band-It band or equivalent.
- C256 3/4 inch stainless steel Band-It buckles or equivalent.

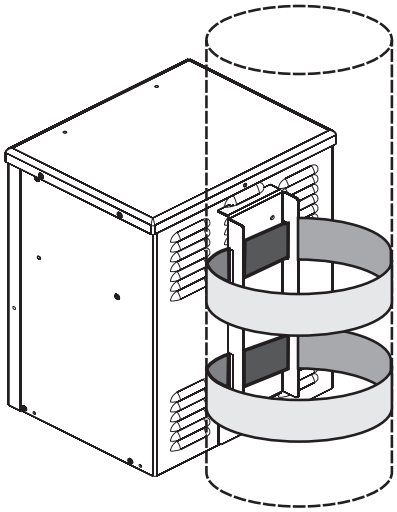
Procedure

1. Secure the mounting bracket to the pole with the straps as shown.



2. Secure the UPS cabinet to the mounting bracket as shown with the supplied bolts.





Mounting Finished

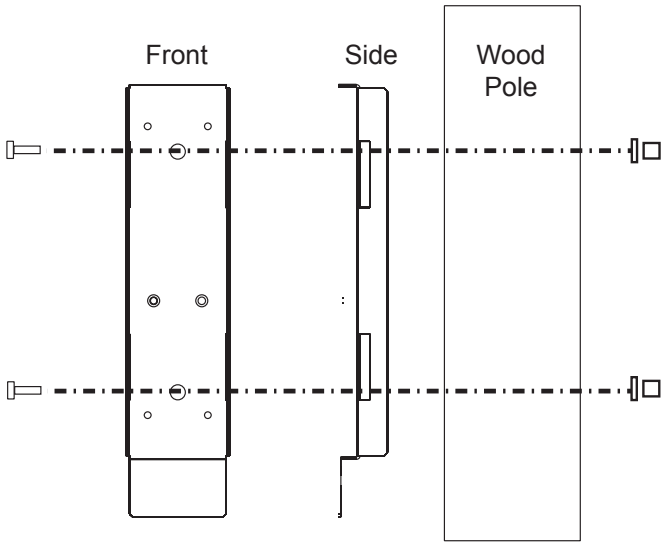
2.2.2 Wood Pole Mounting

Tools and Materials Required:

- 13 mm nut driver for the bolts that attach the cabinet to the mounting bracket.
- Two 5/8 inch diameter machine bolts (UNC tread); SAE (Grade 5 or better), length to suit the pole (not provided).
- Two 5/8 inch diameter zinc-plated flat washers.
- Two 5/8 inch diameter hex nuts (UNC thread).
- Auger or drill for boring 3/4 inch diameter holes in the wood pole.

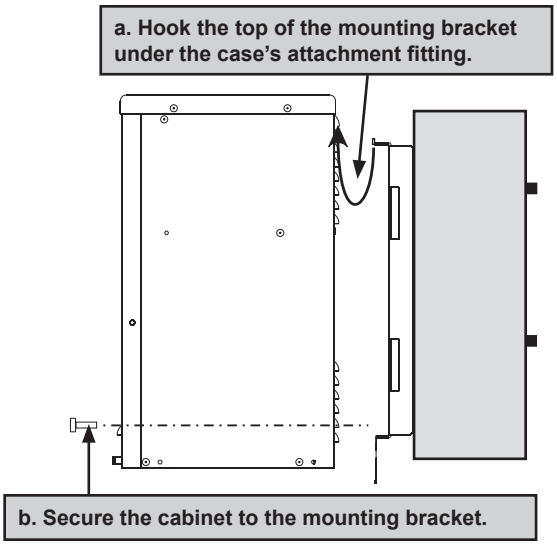
Procedure

1. Using the mounting bracket as a template, drill 2 holes into the pole to accept the machine bolts.
2. Secure the mounting bracket to the pole with the machine bolts as shown.



3. Secure the UPS cabinet to the mounting bracket as shown with the supplied bolts.

Mounting Finished



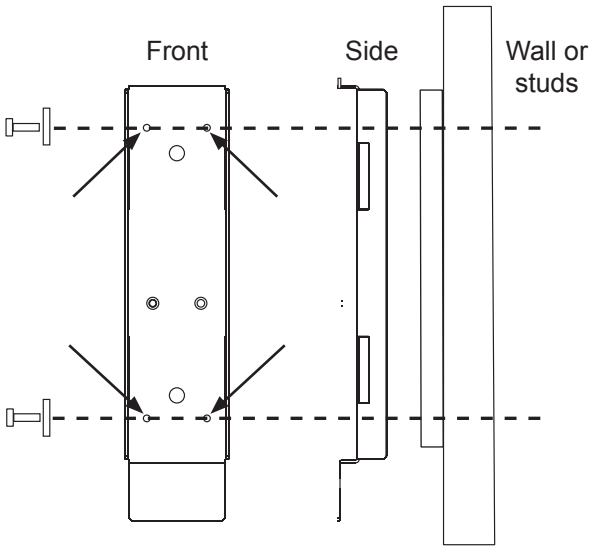
2.2.3 Wall Mounting

Tools and Materials Required:

- Secure the mounting bracket to wall studs or to a wooden backing plate that has a minimum thickness of 1-1/4 inch and a maximum width of 4 inches that is securely mounted to a wall stud or studs. The studs should be plumb and the mounting bracket installed so it is levelled.
- 13 mm nut driver for the bolts that attach the cabinet to the mounting bracket.
- Four 1/4 x 1-1/8 inch lag bolts.
- Four 1/4 inch diameter flat washers.
- Drill with 1/8 inch bit for drilling pilot holes.
- Assorted sockets and wrenches.

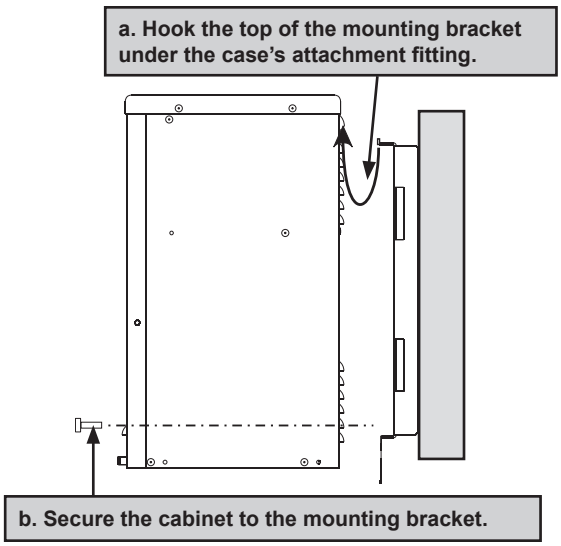
Procedure

1. Using the mounting bracket as a template, drill 4 pilot holes (indicated by the arrows in the diagram on the right) into the wall to accept 1/4 inch bolts.
2. Secure the mounting bracket to the wall with the 4 bolts and washers.



3. Secure the UPS cabinet to the mounting bracket with the supplied bolts.

Mounting Finished



2.3 Wiring the UPS

DANGER: Before starting, make sure line power is turned off and that the UPS's battery and input circuit breakers are turned off.

If stranded wires are used to connect the input and output terminal blocks, ferules or equivalent crimping terminals must be used.

Separate the Input power cables from the Output power cables within the UPS enclosure. Route them through separate conduit openings as they exit the UPS.

Separate the DC Battery cable from the AC Input and Output power cables. Route the cable through its own opening.

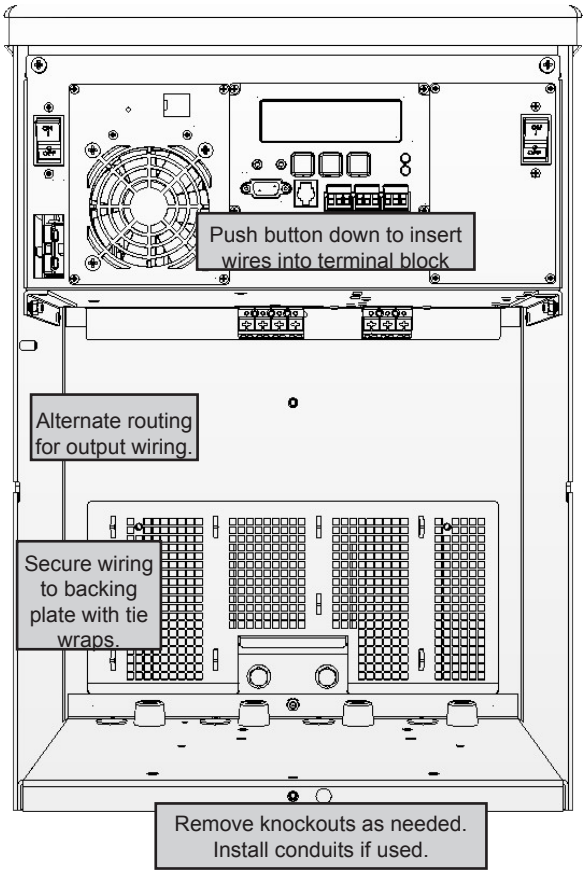
Tools and Materials Required

- Hammer for removing the knockouts.
- A slot head screwdriver to fit the front panel dry contact terminal blocks and a slot head screwdriver for removing the knockouts.
- DC voltmeter.
- High strength, water-resistant tape (such as duct tape).
- Battery terminal corrosion inhibitor (such as NOCO Company's NCP-2 or Sanchem Inc.'s No-Ox ID Grease "A").
- Maximum of 12 AWG wire for wiring the input and output terminal blocks.
- If used, $^{1}/_{2}$ inch conduit connectors to fit the knockouts ($^{7}/_{8}$ inch diameter) and armored conduit to fit.
- Optional battery heater mats.

Step 1: Connecting the UPS to the Line and Load

1. Remove the front cover (lift it up and then pull out at the bottom).
2. If necessary, remove the knockouts using a hammer and screwdriver.

   Note: If you have more than one battery cabinet installed, you will have to remove the knockouts on each shelf.
3. If used, install conduits into the holes.
4. Install the wires into the cabinet.
5. Strip the ends of the wires by $^{7}/_{16}$ inch (11mm).
6. Secure the wiring to the wiring management panel with tie-wraps provided with the UPS. Make sure that the wiring is long enough to reach the terminal blocks.

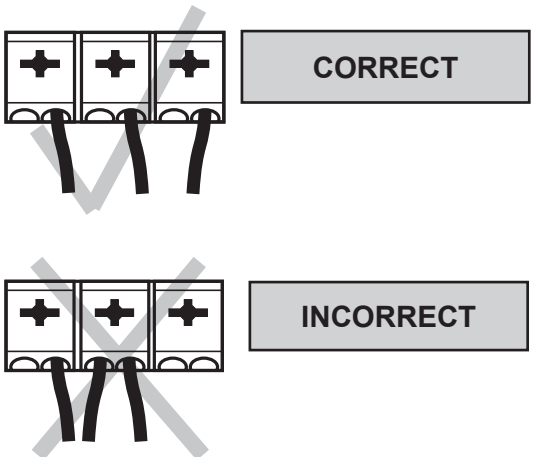


DANGER The input and output wiring must NOT touch the cabinet except for the wiring management panel.

DANGER: Each terminal block has two inputs for each pole (line, neutral and ground). Make sure you have inserted each wire into the correct position and not accidentally connected the line and neutral to the same pole.

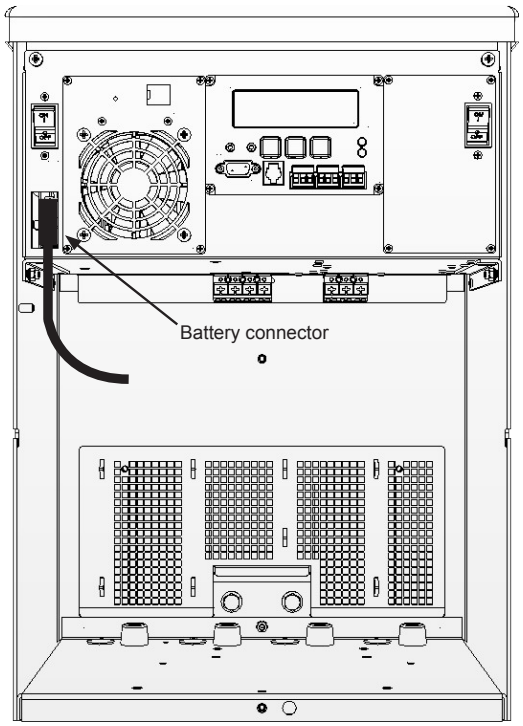
DANGER: Verify the line wire is attached to the line terminal block, the ground wire is attached to the ground terminal block and the neutral wire is attached to the neutral terminal block to prevent accidental shocks or electrocutions.

7. Push in the button on the output terminal block and then insert the wire into the terminal block until no uninsulated wire is visible. Repeat until all the wires are installed.
8. Repeat step 7 above for the input terminal block.



Proceed to Step 2: “Installing and Wiring the Batteries.”

Step 2: Installing and Wiring the Batteries

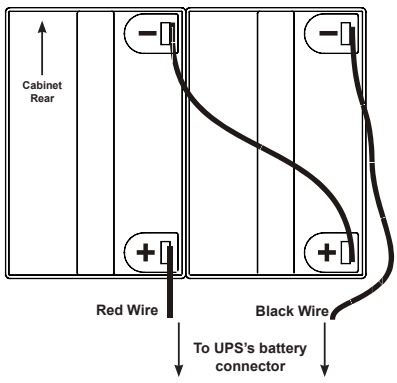


1. Install the optional battery heater mats. Connect them to the input terminal block.
2. Connect the battery cable to the Battery Connector of the UPS. Secure the cable to the backing plate with tie-wraps provided with the UPS.

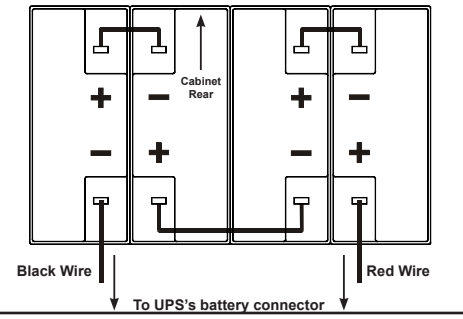
   Note: Make sure the battery cable can reach the battery terminals after they are installed.
3. Coat the battery terminals with the corrosion inhibitor.
4. Connect the batteries as shown in the diagrams below.
5. Verify the voltage and polarity of the battery string with a DC voltmeter. Perform troubleshooting if it is not correct.
6. Place the batteries into the enclosure.
7. If the optional battery restraining bar is used, install it as shown.
8. Connect the batteries to the battery cable.
9. If the Micro XL or XL3 is used, connect and install the extra shelves of batteries.

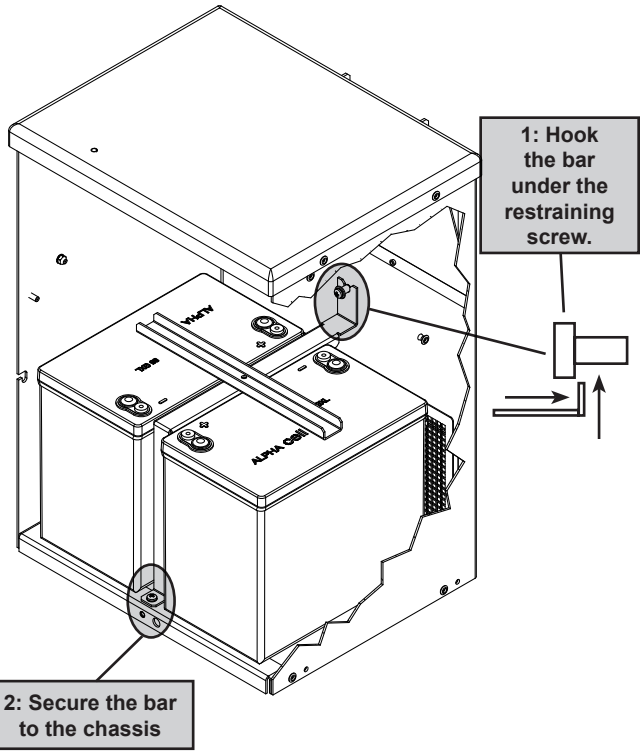
Proceed to Step 3: "Wiring the Front Panel".

33AH or 50AH battery wiring for 24VDC units.



17AH battery wiring for 48VDC units.

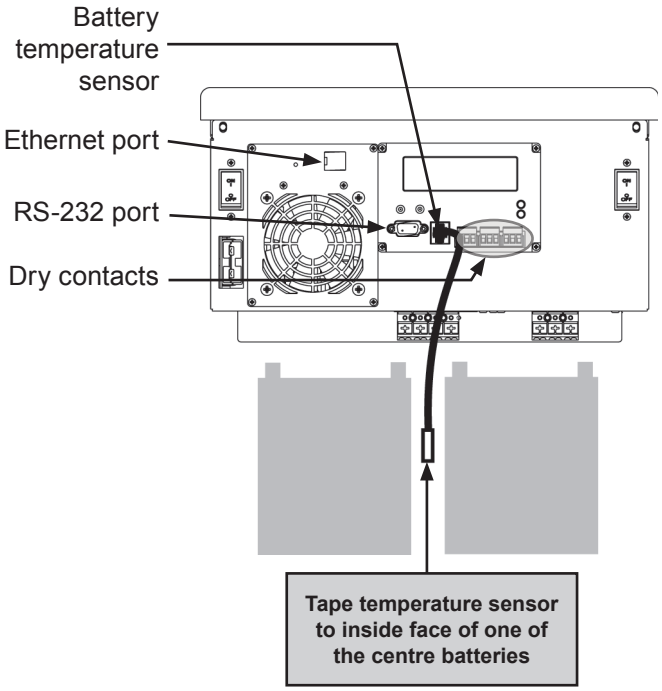




Step 3: Wiring the Front Panel

1. Connect the battery temperature sensor to the UPS. Attach the sensor end of the cable to the side of one of the centre batteries as shown.
2. If used, connect:
   - The Ethernet port.
   - The RS-232 port.
   - The dry contacts and the user inputs.

Wiring UPS Finished



2.4 ATS/GTS Option

The ATS (automatic transfer switch) and the GTS (generator transfer switch) are two separate optional add-on switching units for the Micro family. The ATS provides power and/or bypass capability (automatic or manual) so the operator may disconnect the Micro family of products from line power for easy removal and servicing. In bypass mode, the loads are directly connected to the line power without any conditioning. The ATS and GTS can be used alone or together to allow the use of 3 different back-up sources (line, batteries and or generator). Refer to the ATS/GTS Installation Manual (Alpha P/N 020-161-B0) for details.

Make sure you have read and understood the instructions given in the ATS/GTS Installation Manual before making any connection to the supply.

Installation and wiring instructions are provided on a separate installation manual (020-161-B0).

3
Operation

This Section Tells You How to Operate the Novus Micro

- Turning the UPS On and Off (Section 3.1)
- Operating the Control Panel (Section 3.2)
- Replacing the Batteries (Section 3.3)
- Operating the UPS (Section 3.4)
- Making Measurements (Section 3.5)
- Troubleshooting (Section 3.6)
- Viewing the 25-Event Log (Section 3.7)

3.1 Turning the UPS On and Off

If the UPS constantly switches between Inverter and Line modes due to a noisy line, the UPS's input parameters should be broadened from normal to generator (See Section 3.4, "Operating the UPS," "Sense Type").

In generator mode, the range of acceptable input frequency and voltage is expanded to accept the fluctuations created by a generator .

3.1.1 Turn On

This procedure assumes the line is qualified and the batteries are fully charged. If the UPS does not act as described, troubleshoot as described in Section 3.6, "Troubleshooting."

If this is the first turn on after the UPS's installation or maintenance, do steps 3 and 4, or do a battery test (*See* Section 3.4 "Operating the UPS," "Battery Test") to confirm the wiring is correct, that the batteries are charged and that the UPS functions correctly.

Before starting, make sure the UPS's battery and input circuit breakers are off.

Procedure

1. Turn on the battery circuit breaker.

   For Model 1000, the LCD displays **STANDBY**. For Models 300 and 600, ensure the LEDs operate (See Figure 3.1).

2. Turn on the input circuit breaker.

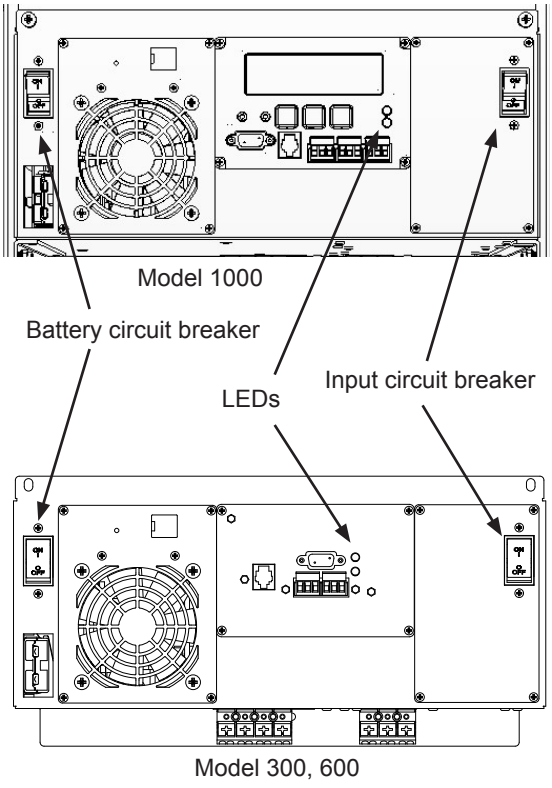
   Note: The Novus Micro series has auto-frequency sensing. When it is first turned on, it senses the line frequency and adjusts its output frequency to match.

   The LCD displays **RETRAN**, then shows **LINE**, or **BUCK** or **BOOST**. The status LED turns on.

   If there is no line power, the UPS will go to Line mode when the line is qualified. If you need to provide backup battery power to the load, do a manual start by using the inverter command (*See* Section 3.4 "Operating the UPS," "Inverter").

3. Turn off the input circuit breaker.

   The LCD shows **INVERTER**, the status LED starts flashing to show the UPS is running on backup battery power.



4. Turn on the input circuit breaker.

   The LCD displays **RETRAN**, then shows **LINE**, or **BUCK** or **BOOST**. The status LED turns on.

Turn On Finished

3.1.2 Turn Off

1. Turn off the input circuit breaker.
2. Turn off the battery circuit breaker.

   The status LED is off and the LCD panel is blank.

Turn Off Finished

LED Descriptions	
LED	Description
GREEN OFF	The UPS's inverter is turned off. Line power goes straight to the load.
GREEN ON	The UPS is turned on. Line power is provided to the load.
GREEN FLASHING	The UPS's inverter is on. Backup battery power is provided to the load.
RED ON OR FLASHING	The UPS has a malfunction. See the troubleshooting table below.

Troubleshooting	
SYMPTOM	Action
NO OUTPUT POWER	1. Is utility power connected? 2. Is the battery fuse installed? 3. Are the batteries discharged? 4. Is the input circuit breaker open?
NO BATTERY BACKUP POWER	1. Is the battery fuse connected or is it blown? 2. Are the batteries discharged?
NO POWER TO LOAD	1. Is the UPS's output properly connected to the load? 2. Is the battery fuse connected or is it blown and is the utility power connected to UPS's input connector?

NOTE: If you have the RS-232 computer communication enabled, then you can perform additional tasks such as communicating, monitoring, adusting and programming. See Section 4 for details.

Figure 3.1

3.2 Operating the Control Panel

For Model 1000, the LCD control panel has a 2x20-character backlit alpha-numeric LCD screen. It provides “at a glance” monitoring, and displays status, event, alarm, fault and control UPS functions locally. When used together with the **CANCEL**, **SCROLL** and **SELECT** buttons below it, the control panel lets you program, make measurements and troubleshoot the UPS. The layout is shown below in Figure 3.2.1 below. For Models 300 and 600, see Section 4.

The UPS is monitored and controlled with a series of menus and submenus. The menu tree and how to use the buttons to move through it is shown in Figure 3.2.3. For a tutorial on how to use this panel, see Section 3.3, “Replacing the Batteries”.

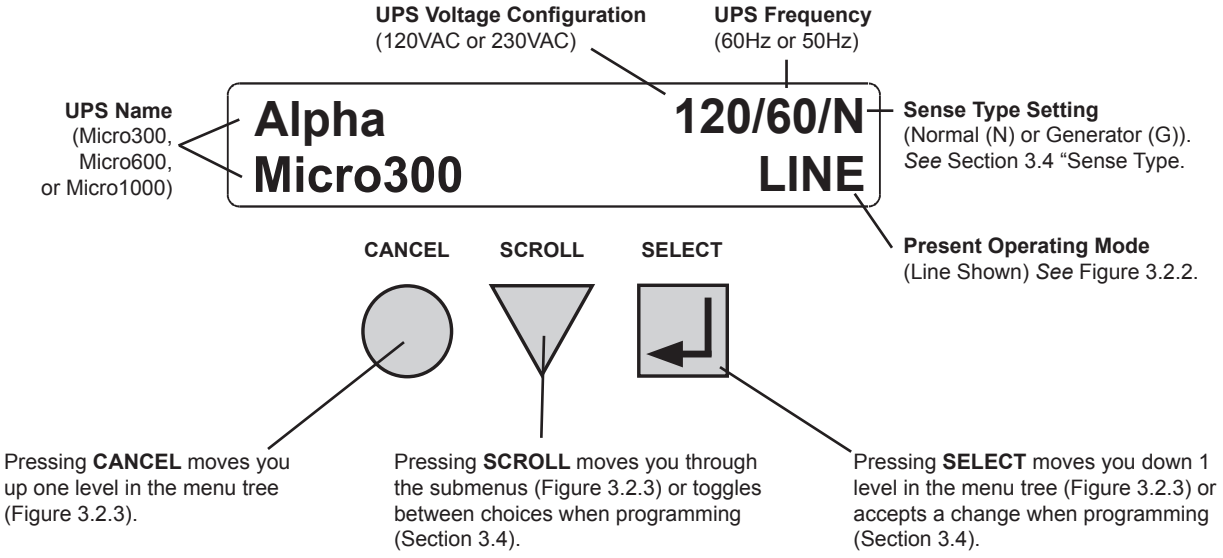


Figure 3.2.1
LCD Control Panel (Logo Screen Shown)

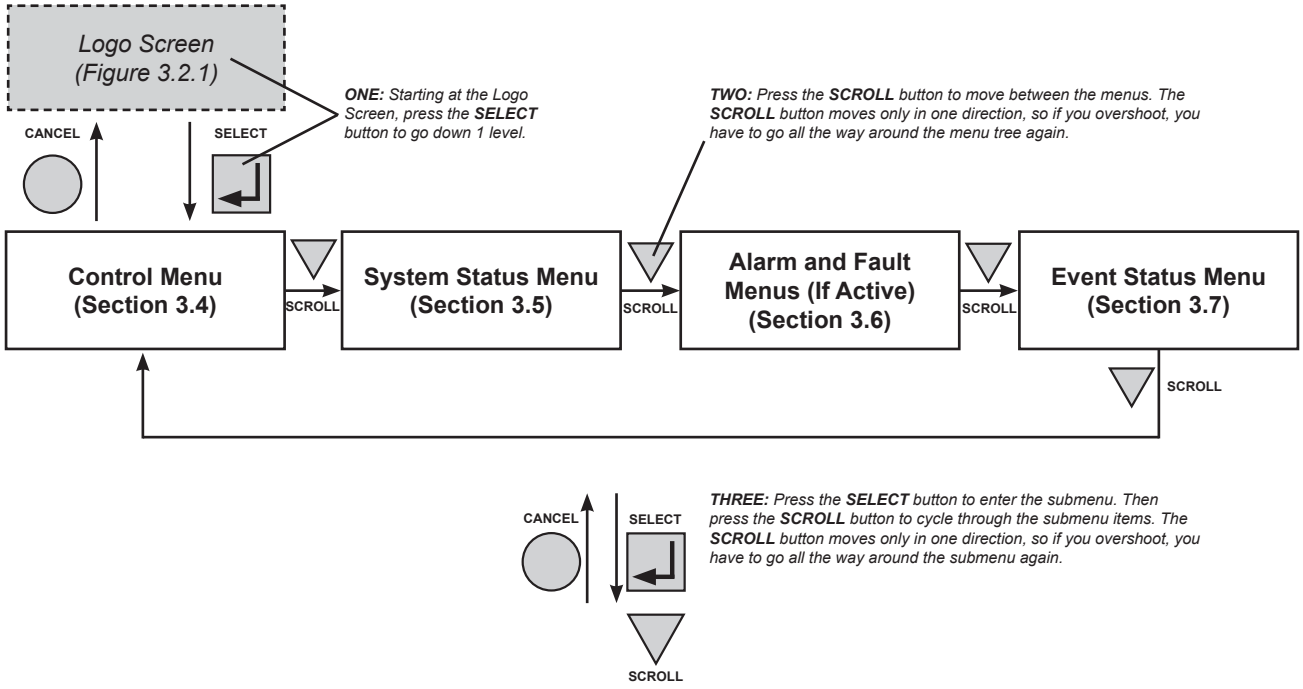
The UPS’s operating mode automatically changes as a result of changes in the line or the UPS’s operating status (Figure 3.2.2). The LCD panel automatically updates to reflect this.

UPS Operating Modes

LCD Shows	Description
SHUTDOWN	The UPS’s inverter is turned off. Line power is disconnected from the load.
LINE	The UPS is turned on. Line power is provided to the load.
BOOST1 OR BOOST2	The UPS’s transformer is raising line voltage without using the batteries. AVR is enabled (*See* Section 3.4).
BUCK1 OR BUCK2	The UPS’s transformer is lowering line voltage without using the batteries. AVR is enabled (*See* Section 3.4).
INVERTER	The UPS is providing backup battery power to the load.
RETRAN	The UPS is transferring from the state it is now in into Line mode.
TRAN	The UPS is transferring from the state it is now in into Inverter mode.
STANDBY	The UPS’s electronics are turned on but there is no output. If there is qualified line power at the input, the UPS switches into Line, Boost or Buck mode.
BYPASS	This mode is manually set with the Control Menu (See Figure 3.4.1, “Control Menu, INV BYPASS.”) This locks the unit into line mode and turns off the battery charger so the unit can work with a manual break-before-make bypass switch.

Figure 3.2.2
UPS Operating Modes (Model 1000 only)

Pressing the **CANCEL**, **SCROLL** and **SELECT** buttons let you to navigate through the menus and submenus to control, monitor and troubleshoot the UPS as shown in Figure 3.2.3 below. For a tutorial on how to use these menus, see Section 3.3, "Battery Replacement."



The **CONTROL** menu (Section 3.4) lets you control, program and adjust the UPS to meet your operating needs or to allow the UPS to be connected to traffic intersection equipment. You can control the:

- INVERTER
- INV BYPASS
- BATT TEST
- AUTO TEST
- SHUTDOWN
- SENSE TYPE
- FUNC MODE
- VOLTAGE
- FREQUENCY
- QUAL TIME
- BATT COMP
- DATE SEL
- INV RECORD
- CHARGE CUR

The **SYSTEM STATUS** menu (Section 3.5) lets you measure various inputs, outputs and other values. The available measurements are:

- VIN
- VOUT
- IOUT AC
- BATT TEMP
- FREQ IN
- OUTPUT PWR
- BATT VOLT
- CHGR CUR
- DATE
- TIME
- INV COUNT
- INV TIMER
- SHED TIMER 1, 2 OR 3
- VERSION

The **FAULT and ALARM** menus (Section 3.6) are invisible and disabled until the UPS has a malfunction.

When the front panel's alarm LED is on or flashing, press **SELECT**.

One of the malfunctions listed in Section 3.6 will appear on the LCD. Press the **SCROLL** button to see if more than 1 malfunction is present.

Fix the malfunction. Press the **SELECT** button to clear the malfunction from the screen.

If the malfunction is fixed, the malfunction is cleared from the LCD. If it isn't fixed, it will reappear on the screen.

The **EVENT STATUS** menu (Section 3.7) displays the last UPS event. This is different from the 100-event log (*See* Section 4.5).

Press the **SELECT** button to access the event screen.

Then press the **SCROLL** button to see what the specific event was. It will show one of the faults or alarms listed in Section 3.6.

Press the **SCROLL** button again to see if more than 1 fault or alarm happened at the same time.

To set the counter to zero, press the **SELECT** button for 5 seconds.

Figure 3.2.3
LCD Menu Tree

3.3 Replacing the Batteries

While the batteries are being replaced, the UPS cannot provide backup battery power. This procedure should NOT be done when critical loads are running that depend on this unit for backup power.

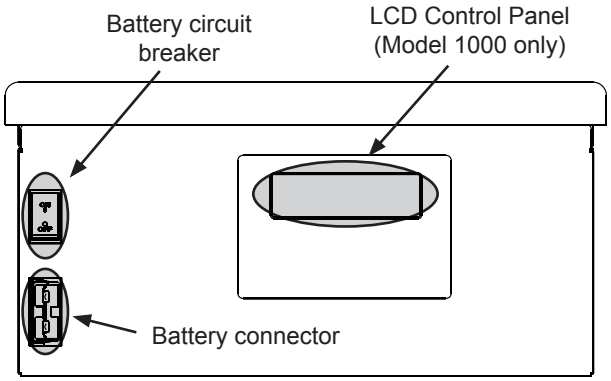
Procedure

1. For Model 1000, if the UPS is in Line, Buck or Boost mode (*See* Figure 3.2.2) go to the control submenu to switch it into **Inverter Bypass** (*See* Section 3.4 *also see* the Control Panel Tutorial in this section). If it isn't in those modes, wait until the line is qualified.

   For Models 300 & 600, you can only switch the operating mode to **Inverter Bypass** using the Novus Micro Graphical User Interface. See Section 4.6 for details.

2. Turn off the battery circuit breaker.
3. Unplug the battery string.
4. Disconnect the battery cables from the batteries.
5. Connect the battery cables to the new batteries.
6. Plug the battery connector into the UPS.
7. Turn on the battery circuit breaker.
8. Switch the UPS out of Inverter Bypass.

Battery Replacement Finished



Control Panel Tutorial

From the Logo Screen (Figure 3.2.1):

1) Press the **SELECT** button once.
   The LCD Screen shows **CONTROL**.

2) Press the **SELECT** button once.
   The LCD screen shows **INVERTER**.

3) Press the **SCROLL** button until the LCD shows **INV BYPASS**.

4) Press the **SELECT** button once.
   OFF is flashing.

5) Press the **SCROLL** button once.
   ON is flashing.

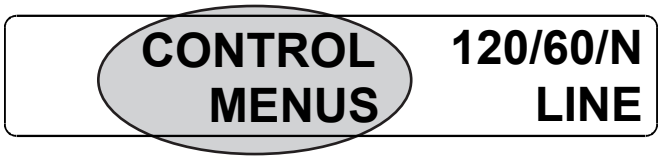
6) Press the **SELECT** button once.
   ON is on solid. The UPS has been switched into **INV BYPASS** and you can replace the batteries.

3.4 Operating the UPS

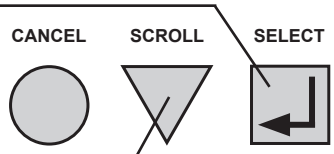
For Model 1000, the control menu (Figure 3.4.1) lets you operate the UPS or program it to suit your operating conditions. You can also use the Novus FXM Monitor software to make these adjustments (*See* Section 4.6, "Novus FXM Graphical User Interface"). For Models 300 and 600, see Section 4.

Procedure

1. From the logo screen (*See* Figure 3.2.1) go to **CONTROL MENUS** (*See* Figure 3.2.3).

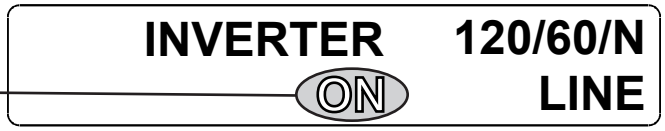


2. Press the **SELECT** button to enter the submenu (*See* Figure 3.4.1).



3. Press the **SCROLL** button to move between items in the submenu.

4. When you have reached the item you want to change, press the **SELECT** button. The item chosen is blinking.



5. To toggle between the choices, press the **SCROLL** button. Stop when you reach the choice you want.
6. To make the change, press the **SELECT** button. The blinking stops.

Programming Finished

Control Menu

LCD Shows	Meaning	Description
INVERTER	**Inverter**	When turned on, this forces the UPS to provide backup battery power to the load. This is usually activated when the UPS is turned on and there is no line power available.
INV BYPASS	**Inverter Bypass**	This function can only be turned on when the UPS is in line mode. When turned on, this locks the UPS into line mode and makes the output voltage equal to the input voltage. This is done to: Replace the batteries (*See* Section 3.3). OR Allow the use of a break-before-make manual bypass switch so the UPS can be shut off for maintenance or replacement without interrupting power to the load.
BATT TEST	**Battery Test**	This is the UPS's self test. When it is turned on, the UPS is forced to verify its proper operation by providing backup battery power to the load and then switches back to Line mode. The default setting for the run time is 2 minutes, but this can be changed in the RS-232 menus (*See* Section 4.3, #30 "Battery Test Options").
AUTO TEST	**Automatic Battery Test**	If the GUI's periodic battery test is enabled (*See* Section 4.6), this starts the test no matter when it is scheduled to take place.
SHUTDOWN	**Shutdown**	When turned on, the UPS's inverter is shut off. The line is disconnected from the load, so no line power is provided to it.
SENSE TYPE	**Sense Type**	This function can only be used when the UPS is in Standby or Shutdown mode (*See* Figure 3.2.2). This function toggles between: **NORMAL**: The UPS can operate successfully with most line conditions. OR **GENERATOR**: The UPS's input voltage and frequency parameters are expanded so the UPS can work with the fluctuations caused by a generator or noisy line.
FUNC MODE	**Functional Mode**	The functional mode can only be changed when the UPS is in Standby or Shutdown mode (*See* Figure 3.2.2). This function toggles between: **Automatic Voltage Regulation (AVR)**: The buck and boost modes are turned on. OR **QUALITY:** The buck and boost modes are turned off, the input voltage is the UPS's output voltage. The range of acceptable input voltage is narrowed to 100 ± 2VAC to 130 ± 2VAC. If you are connecting an Alpha Technologies's Automatic Transfer Switch to traffic intersection equipment, then the UPS ***MUST*** be switched to quality since most traffic equipment cannot handle the high voltage output of the UPS when it is in AVR mode.
VOLTAGE	**Voltage**	This lets you set the UPS's output voltage to 120VAC, 230VAC or 220VAC. This should ***ONLY*** be done by a qualified technician acting under the instructions of Alpha Technologies customer service department. Failure to contact Alpha technologies before doing this procedure could result in voiding of the warranty.
FREQUENCY	**Frequency**	The frequency can only be changed when the UPS is in Standby mode. This lets you set the UPS's frequency to 50Hz or 60Hz. This should ***ONLY*** be done by a qualified technician acting under the instructions of Alpha Technologies customer service department. Failure to contact Alpha technologies before doing this procedure could result in voiding of the warranty.
QUAL TIME	**Line Qualify Time**	This lets you set how long it takes for the UPS to return to Line mode after the line has become requalified. It can be set to 3, 10, 20, 30, 40 or 50 seconds. The factory default setting is 3 seconds.
BATT COMP	**Battery Temperature Compensation**	This lets you set the battery temperature compensation to match the batteries you are using. It can be set to -2.5, -4, -5 or -6 mV/°C/Cell. The factory default setting is -5 mV/°C/Cell.
DATE SEL	**Date Format Selection**	This lets you toggle the UPS's date format between YY-MM-DD or MM-YY-DD or DD-MM-YY. The factory default setting is MM-DD-YY.
INV RECORD	**Inverter Record Clear**	This clears the inverter counter and timer from the LCD's system status menu (*See* Section 3.7). This does not clear the 100-event log in the RS-232 menus (*See* Section 4.5).
CHARGE CUR	**Charger Current Setting**	This lets you select the battery charging current. It can be set to 0, 3, 6 or 10. If set to 0, the charger will be disabled.

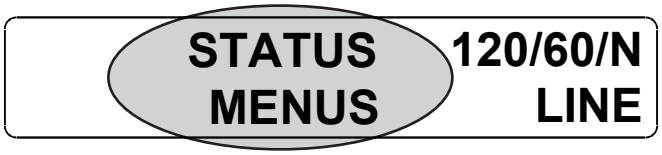
Figure 3.4.1
Control Menu

3.5 Making Measurements

The System Status Menu (Figure 3.5.1) on Model 1000 lets you make measurements of various UPS inputs, outputs, temperatures and other values. On all models, you can use the Novus FXM Monitor software to make these measurements (*See* Section 4.6, "Novus FXM Graphical User Interface").

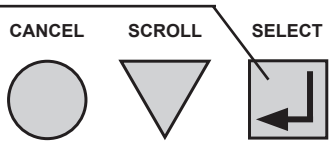
Procedure

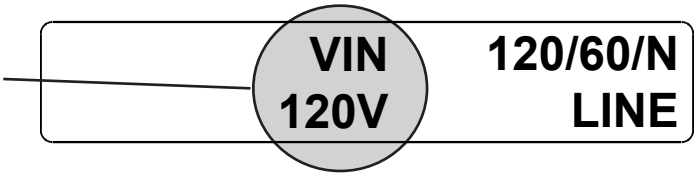
1. From the logo screen (Figure 3.2.1) go to the system status menu (Figure 3.2.3).



2. Press the **SELECT** button to enter the submenu (Figure 3.5.1).
3. Press the **SCROLL** button to move between items in the submenu. When you reach the item you want to measure, stop pressing the button.

   The measurement is automatically displayed on the LCD. It is automatically updated every 0.5 second (VIN shown).





Measurement Finished

System Status Menu		
LCD Shows	**Meaning**	**Description**
VIN	**Input Voltage**	The line input voltage into the UPS.
VOUT	**Output Voltage**	The UPS's output voltage (true RMS).
IOUT AC	**Output Current (AC)**	The UPS's AC output current (true RMS).
BATT TEMP	**Battery Temperature**	The battery's temperature (°C).
FREQ IN	**Input Frequency**	The frequency of line power into the UPS (Hz).
OUTPUT PWR	**Output Power**	The UPS's output power in VA (true RMS).
BATT VOLT	**Battery Voltage**	The battery's output voltage (VDC).
CHGR CUR	**Charger Current**	The UPS's battery charging current is set to this value (Amps).
DATE	**Date**	The date and time (24 hour clock).
TIME	**Time**	
INV COUNT	**Inverter Count**	The number of times the UPS was in inverter mode.
INV TIMER	**Inverter Time**	The total amount of time the UPS was in inverter mode.
SHED TIMER1	**Amount of time until the dry contact is activated.**	The factory default dry contact for this setting is contact C4. SHED TIMER2 and SHED TIMER3 can be field programmed (*See* Section 4.4.1, "Programming the Dry Contacts"). This display shows the amount of time left (in seconds) until the contact is activated. The factory default setting is 2 hours, but this can be changed as shown in Section 4.4.1.
SHED TIMER2		
SHED TIMER3		
VERSION	**Software Version**	The software version used in this UPS.

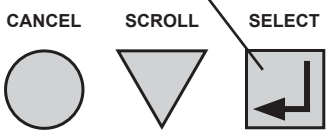
Figure 3.5.1
System Status Menu

3.6 Troubleshooting

When the front panel alarm LED is on or flashing, the UPS has a malfunction. The alarm and fault submenus (Figure 3.6.1) describe the malfunction. You can also use the Novus FXM Monitor software for troubleshooting (*See* Section 4.6, “Novus FXM Graphical User Interface”).

Procedure

1. Press the **SELECT** button.



2. One of the conditions listed in Figure 3.6.1 is displayed on the LCD (Alarm: overload shown).

3. Press the **SCROLL** button again to see if more than one malfunction is present.
4. To clear the malfunction from the screen, press the **SELECT** button for 5 seconds.

Troubleshooting Finished

Alarm Submenu

LCD Shows	Description
Over Load	The UPS is overloaded. Remove excess loads.
Batt Temp High	The battery temperature is above the specifications. Ensure that the battery fan (if used) is working.
Batt Temp Low	The battery temperature is below the specifications. Use optional battery heating mats or heater.
Batt Low Warning	The batteries are almost discharged. Also see Section 4.3, “Operating the UPS,” “#35: Low Battery Warning Voltage.”
FAN Alarm	The UPS’s fan has failed. Contact Alpha Technologies.
Temp Probe Unplug	The temperature probe is unplugged. Plug it back into the UPS.
User Input Alarm	When the user input is shorted (*See* Section 1.3, “User Input: S2”), this alarm appears.
In Freq Out Of Range	The line frequency is outside of the UPS’s qualified range.
Weak Battery	The batteries failed the self test.
Battery Test	The UPS is performing battery test.
Batt Breaker Open	The battery breaker is opened.

Figure 3.6.1
Alarm and Fault Submenus

Fault Submenu	
LCD Shows	**Description**
Overload Fault	The load draws more power than the UPS can provide. This can lead to an automatic UPS shutdown. Remove excess loads.
Short Circuit	The load has a short.
Intl Temp Fault	The UPS's internal temperature is too high and could cause an automatic UPS shutdown. Verify that the fan is not blocked and that it is working by performing a self test. *Also See* Fan Fail Alarm.
Output Over Voltage	The output voltage is above or below the UPS's specifications.
Output Voltage Low	
Battery Fail	The batteries have failed the self test. Inspect them to make sure they are properly connected and that they are in good condition. Make sure they are fully charged.
Backfeed	A relay inside the UPS has failed. It cannot be fixed in the field. Contact Alpha Technologies customer service department.
Battery Over Voltage	Battery voltage is abnormally high.
Batt Volt Low	Battery voltage is low and is close to self-kill level.

Figure 3.6.1
Alarm and Fault Submenus (Continued)

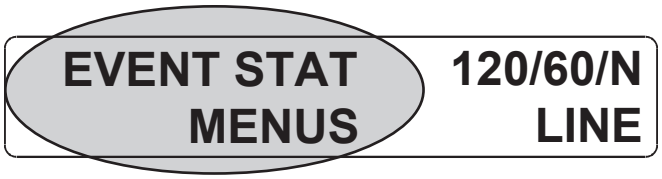
3.7 Viewing the 25-Event Log

The event menu displays on the LCD the last 25 events the UPS went through and the malfunction that triggered it. If more than 25 events occur, the oldest is overwritten. To clear this log, see Section 3.4, “Operating the UPS, INV RECORD.”.

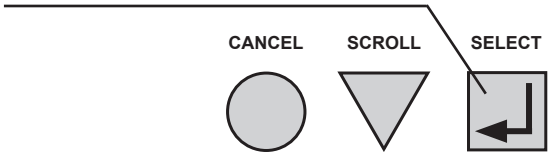
To see the last 100 events, go to the RS-232 100-event log (*See* Section 4.5, “100-Event Log” or Section 4.6, “Novus User Software, Event History”.

Procedure

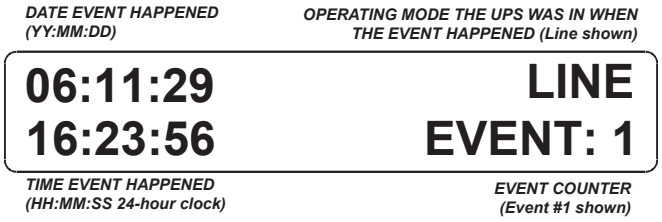
1. From the Logo Screen (Figure 3.2.1) go to the **EVENT STATUS MENUS** (Figure 3.2.3).



2. Press the **SELECT** button to enter the submenu.



3. The log screen appears on the LCD screen.
4. Press the **SELECT** button. The event counter flashes.
5. Press the **SCROLL** button to scroll through the event counter.
6. When you reach the event you want, press the **SELECT** button.



The event loading screen appears and then the log screen reappears with the details for that event.

Press the **SCROLL** button again to see if more than one fault or alarm happened at the same time. Keep pressing the **SCROLL** button until you return to the initial log screen.

Finished

4
Communication

This Section Tells You How To Operate the Novus Micro With RS-232 Computer Commands

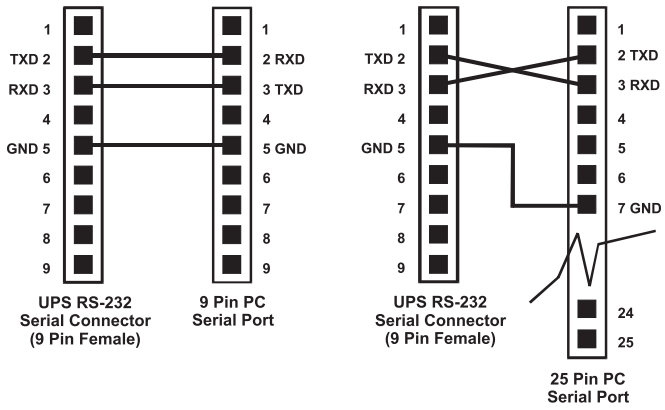
- Wiring the RS-232 Port (Section 4.1)
- Using the Main Menu (Section 4.2)
- Adjusting and Controlling the UPS (Section 4.3)
- Programming the Dry Contacts and the Clock (Section 4.4)
- Accessing the 100-Event Log (Section 4.5)
- Novus Micro Graphical User Interface (Section 4.6)

4.1 Wiring the RS-232 Port

The UPS's front panel has a DE-9 female connector. When connected to a PC with Window's HyperTerminal or other terminal emulation software, the UPS can be remotely monitored and controlled with it's command-line system (*See* Sections 4.2 to 4.4). The Novus Micro Graphical User Interface (GUI) provides a Windows or Web type of control (*See* Section 4.6).

Procedure

1. Connect a 9-pin, fully shielded, straight-through DE-9 to DE-9 connector cable between the computer's port and the UPS's port.



2. Configure the communications parameters to the values shown in the terminal set up table.

RS-232 Wiring Finished

Terminal Set Up Table			
Emulation Type	VT 100 or Compatible	**Backspace**	**N/A**
Duplex Mode	Half Duplex	**Break Length**	**N/A**
Xon/Xoff Flow Control	None	**Emulation Type**	**N/A**
RTS/CTS Flow Control	Off	**Communication Parameters**	
Line Wrap	On	**Handshaking**	Software Handshaking
Screen Scroll	On	**Baud Rate**	2400 bps
CR Translation	CR	**Data Format**	8 Data, No Parity, 1 Stop Bit

4.2 Using the Main Menu

Note: The UPS's main menu screen runs on a command line system. This program does not recognize the backspace or delete keys even if appears that way on the monitor. If you make a mistake and press ENTER, the UPS echoes the command back exactly as you typed it. Press ENTER and retype the command again.

If you choose not to use the command line system, you can use the Novus Micro Graphical User Interface (See Section 4.6) to run and monitor the UPS.

4.2.1 Main Menu Screen

The main menu screen (Figure 4.2.1) shows the UPS's current input and output values, displays if any faults or alarms are present and gives access to the submenus. It is reached from anywhere in the menu tree (Figure 4.2.2) by typing **0** and pressing **ENTER**. The UPS is controlled by submenu 3.

To access a particular submenu, type in the **submenu number** and press **ENTER**. To update the main menu screen, press **ENTER**.

The complete menu tree is given in Figure 4.2.2. Tables describing the Line Status, Output Status, Faults and Alarms displays are given in Sections 4.2.3, 4.2.4 and 4.2.5.

- ***The readings on the main menu screen do not automatically update to reflect changes in the UPS's status. Press ENTER to update the screen.***
- ***For many functions you need to enter a password. The factory set password is 1111.***

Submenu Numbers (Figure 4.2.2)

Status, Faults and Alarms Displays (Sections 4.2.3 to 4.2.5)

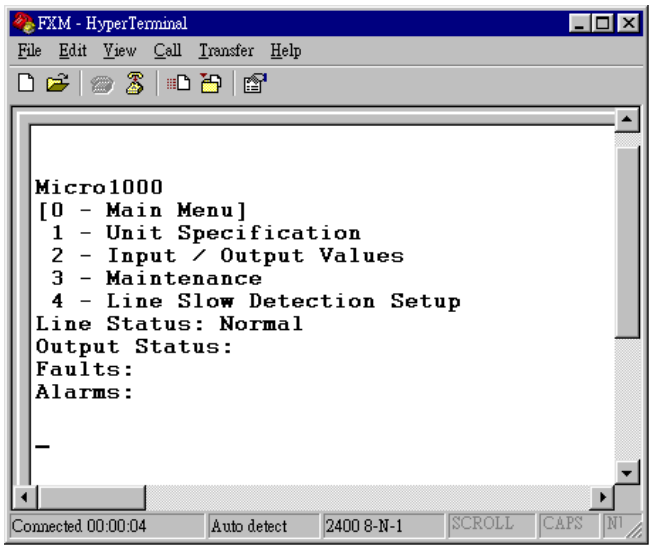


Figure 4.2.1
Main Menu Screen

4.2.2 RS-232 Menu Tree

Submenus 1, 2 and 4 provide read-only screens for monitoring the UPS. To control the UPS, use submenu #3, the Maintenance submenu.

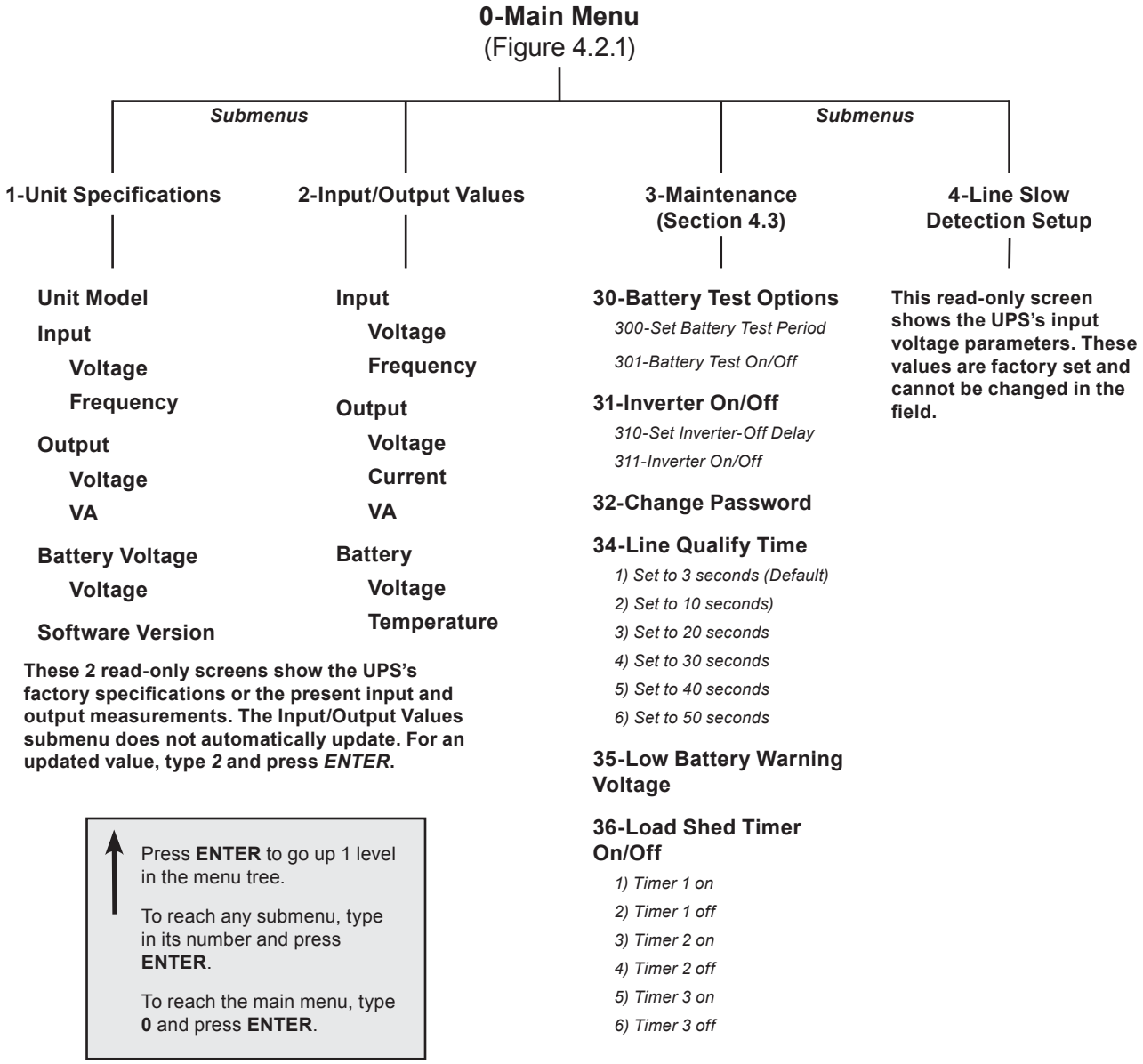
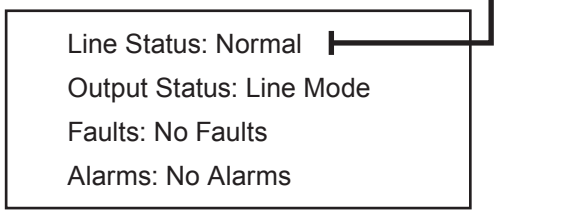


Figure 4.2.2
RS-232 Menu Tree

4.2.3 Line Status

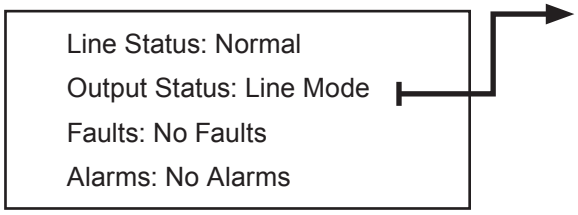
Line status tells you the line's condition (*Also see* Figure 3.2.2). For an updated value, press **ENTER**.



Line Status	
Normal	**The line is within specifications. The UPS is operating in Line mode.**
Boost	**Line voltage is out of tolerance. The UPS is operating in Boost mode.**
Boost2	**Line voltage is out of tolerance. The UPS is operating in Boost 2 mode.**
Buck	**Line voltage is out of tolerance. The UPS is operating in Buck mode.**
Buck2	**Line voltage is out of tolerance. The UPS is operating in Buck 2 mode.**
Blackout	**The line is absent.**
Freq low	**Line frequency is too low.**
Freq high	**Line frequency is too high.**

4.2.4 Output Status

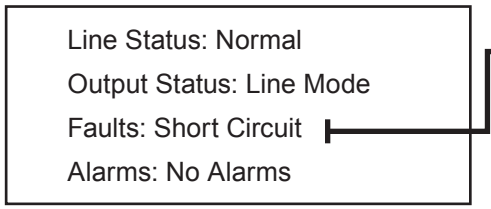
Output status tells you how the UPS is producing power (*Also see* Figure 3.2.2). For an updated value, press **ENTER**.

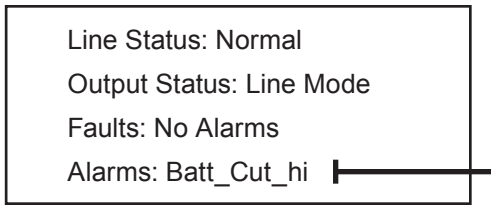


Output Status
Line mode
Battery mode
Battery mode, low bat. warning
Battery mode (testing battery)
Boost mode
Boost 2 mode
Buck mode
Buck 2 mode
Hot swap mode
Inverter off due to fault
Inverter off due to low battery
Inverter off at start-up
Shutdown due to user request

4.2.5 Fault and Alarm Displays

These display any malfunctions the UPS has (*Also see* Section 3.6).





Faults	
Short_Circuit	The load has a short.
Vout_Hi	The output voltage is above specifications.
Batt_Hi	The batteries cannot be charged.
Batt_Lo	The batteries are almost discharged.
Vout_Lo	The output voltage is below specifications.
Overload	The UPS is overloaded. Remove excess loads.
Backfeed	A relay inside the UPS has failed and it cannot be replaced in the field. Contact Alpha Technologies customer service department.
Bad_Battery	The battery has failed the self test
Temp_Hi	The UPS is operating above temperature range.

Alarms	
Overload	The UPS is overloaded. Turn off excess loads.
Temp_Hi	The ambient battery temperature is too high.
Temp_Lo	The ambient battery temperature is too low.
User_Input	The user input contact (*See* Section 1.3, User Input: S2) is shorted.
Line_Freq	The line frequency is outside of the UPS's input specifications.
No_Temp_ Probe	The battery temperature sensor has become disconnected or has failed.
Weak_ Battery	The battery has failed the self test.
Batt_Low	The battery voltage is low.
Batt_Brkr_ Open	The battery breaker is opened.
Batt_test	The UPS is performing battery test.
Fan_Fail	The UPS internal fan has failed.

4.3 Adjusting and Controlling the UPS

The Maintenance submenu (Figure 4.3.1) lets you control the UPS and change selected items to meet your operational needs.

Procedure

At the main menu (Figure 4.2.1) type **3** and press **ENTER**.

Maintenance Submenu	
30 Battery Test Options	This starts the self test and sets for how long it will run. The default setting for the test duration is 2 minutes, but this can be adjusted in 1 minute intervals with this submenu.
31 Inverter On/Off	This switches the inverter on or off to allow you to prevent a deep damaging battery discharge or to provide backup battery power to the load. You can set a delay before the inverter is turned on to allow you time to thurn critical loads off. The Set Inverter ON/OFF delay is only available when the UPS is in Battery or Standby modes. The delay can be adjusted in 1 second steps with a default of setting of 0 seconds to a maximum of 600 seconds (5 minutes). The delay is only available in Standby or Battery modes. Once the UPS returns to Line mode, the delay resets itself to 0 seconds.
32 Change Password	This changes the UPS's password. The factory set password is 1111. It can only be changed when the when the UPS is in Line mode. The password must be only 4 numbers (no letters or spaces) long.
34 Line Qualify Time	This lets you set the delay when the UPS goes from Battery mode to Line mode after the line becomes requalified. The purpose of this delay is to make sure the line is stable before the UPS switches back to it. The default setting is 3 seconds, but you can set this to 3, 10, 20, 30, 40 or 50 seconds.
35 Low Battery Warning Voltage	The lets you set the UPS's low battery warning voltage, adjusting the setting to match the batteries you are using and the actual operating conditions. The default value is 40% (47 VDC) and can be adjusted in 1% (0.05 VDC) increments between 45.0 (0 %) and 50.0 VDC (100%) by typing in the % battery voltage level where you want the warning to be triggered at.
36 Load Shed Timer On/Off	This lets you turn the timer contacts on or off.

Figure 4.3.1
Maintenance Submenu

4.4 Programming the Dry Contacts and the Clock

The UPS's front panel contacts can be programmed to meet your specifications with RS–232 communications. You can also adjust the UPS's date and time.

4.4.1 Programming the Dry Contacts (Models 300 & 600 only)

The functions of dry contacts C1 and C2 can be changed with RS-232 communications.

For example, to change contact C1:

1. To see how it is currently programmed, type **c1** (all lower case) and press **ENTER**.
2. The UPS responds with ***c1=1*** where the * shows the unit responded to your command.

   A value of 1 indicates that it is programmed to be the On Battery indicator as shown in the Dry Contact Configuration table below.

Dry Contact Configuration			
1= On Battery	3= Timer 1	5= Fault	7= Timer 2
2= Low Battery	4= Alarm	6= Disabled	8= Timer 3

3. To change the contact, type **c1=X** where X is 1 to 8 and press **ENTER**.

   The UPS responds with ***c1=(1 to 8)***. The programming is done for that contact. Repeat as necessary for the other contacts.

Each contact can only be programmed for one function at a time; it cannot show multiple conditions.

4. To reset the contacts to the factory default (C1=On Battery, C2=Low Battery), type **default** and press **ENTER**. The UPS responds with ***default***, showing it is reset.

Finished

Note: The timer contact closes after the UPS has been in battery mode for a pre-programmed amount of time. The factory default setting is 2 hours (02:00:00 or 14,400 0.5 second steps) but it can be set to a maximum value of 8 hours (08:00:00 or 57,600 0.5 second steps). You can change the timer setting after the contact has been programmed to be a timer contact.

	Enter command	UPS display	Description
Displaying the Timer	**timer** and press **Enter**	*timer=02:00:00	Returns the value of timer1
	timer1 and press **Enter**	*timer1=02:00:00	Returns the value of timer1
	timer2 and press **Enter**	*timer2=02:00:00	Returns the value of timer2

	Enter command	UPS display	Description
Setting the Timer	**timer=00:01:00** and press **Enter**	*timer=00:01:00	Sets the value of timer1 to 60 seconds.
	timer=120† and press **Enter**	*timer=120	
	timer1=00:01:00 and press **Enter**	*timer1=00:01:00	Sets the value of timer1 to 60 seconds.
	timer1=120† and press **Enter**	*timer1=120	
	timer2=00:01:00 and press **Enter**	*timer2=00:01:00	Sets the value of timer2 to 60 seconds.
	timer2=120† and press **Enter**	*timer2=120	
	default and press **Enter**	*default	Resets the timer to the factory default of 02:00:00 (2 hours); and resets contacts C1 and C2 to the factory default settings.(See Section 4.4.1, "Programming the Dry Contacts.")

Note: In the above example, the default timer setting of 2 hours is used.
* Indicates that the UPS has responded to the command you entered.
† Time can be entered in units of 0.5 second; e.g. 120 units of 0.5 seconds = 60 seconds. However, it is more intuitive to enter time in the hh:mm:ss format, such as 00:01:00 for 1 minute or 60 seconds in the above example.

4.4.2 Setting the Date and Time

Enter command	UPS display	Description
clock and press **Enter**	*clock=12/31/07 22:00:00	Returns the value of timer1
clock=010107␣120000 and press **Enter**	*clock=01/01/07 12:00:00†	Sets the date and time to Jan 01, 2007, 12:00pm.

Note: Time is displayed in the 24 hours clock format. Changing the mm/dd/yy format with DATE SEL on the LCD Control Menu (Figure 3.4.1) does not change the RS-232 mm/dd/yy format.
* Indicates that the UPS has responded to the command you entered.
† If the date or time change is invalid, the UPS will return the time and date it was set to before you tried making the change. The date and time must be entered as one complete line command; you cannot change only the time or the date alone, both must be set at the same time. If you make a mistake, press ENTER and try again.

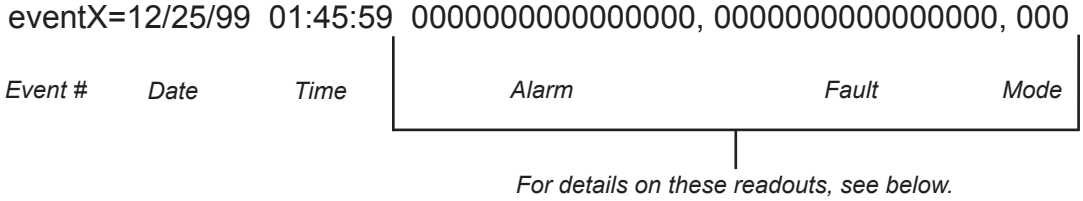
Finished

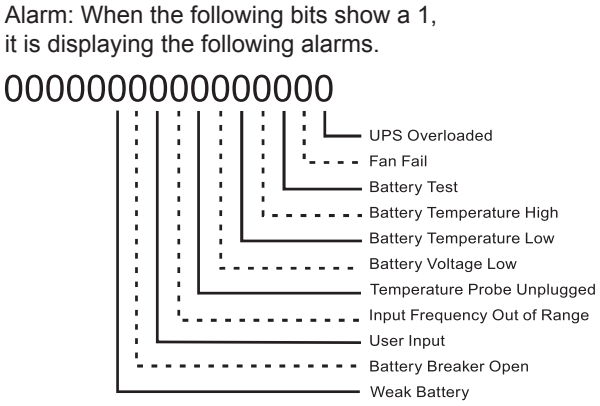
4.5 Accessing the 100-Event Log

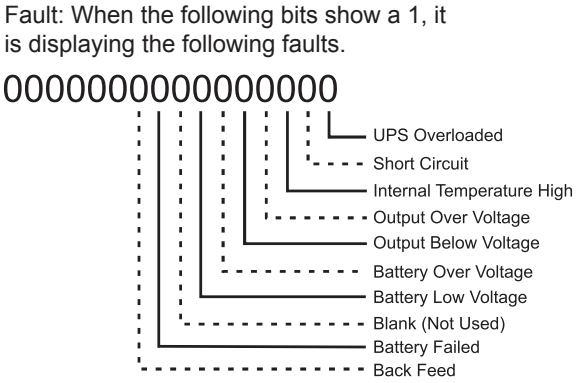
Up to 100 events are stored in the UPS's log. If more than 100 events occur, the oldest is over written.

Procedure

1. To see the log, type **event** (all lower case) and press **ENTER**. The events are listed starting with the most recent and appear as:







Code	Mode	Code	Mode	Code	Mode
000	Standby	003	Boost 1	006	Inverter
001	Line	004	Buck 1	009	Shutdown
002	Boost 2	005	Buck 2	010	Bypass

2. If less than 100 events occurred, the last entry appears as:

   eventX=00/00/00 00:00:00 0000000000000000, 0000000000000000, 000

3. To clear the log, type **eventclr** (all lower case) and press **ENTER**.

   It takes the UPS 30 seconds to clear the log. Do not enter any other commands during this time.

4. To see a specific event, type **eventX** (all lower case) where X is from 1 to 100 and press **ENTER**. To see a range of events (for example, events 20 to 30), type **eventX-X** where X are events from 1 to 100 and press **ENTER**.

Finished

4.6 Novus Micro Graphical User Interface

4.6.1 Introduction

The Novus Micro RS–232 Graphical User Interface (GUI) works like a Web or Windows© based GUI. The screen and it's features are shown below in Figure 4.6.1. With it you can monitor, control and set various parameters like the date and time, when the weekly self test is run, change the relay configurations, etc. Descriptions of all the items are given in Section 4.6.4, "Operation."

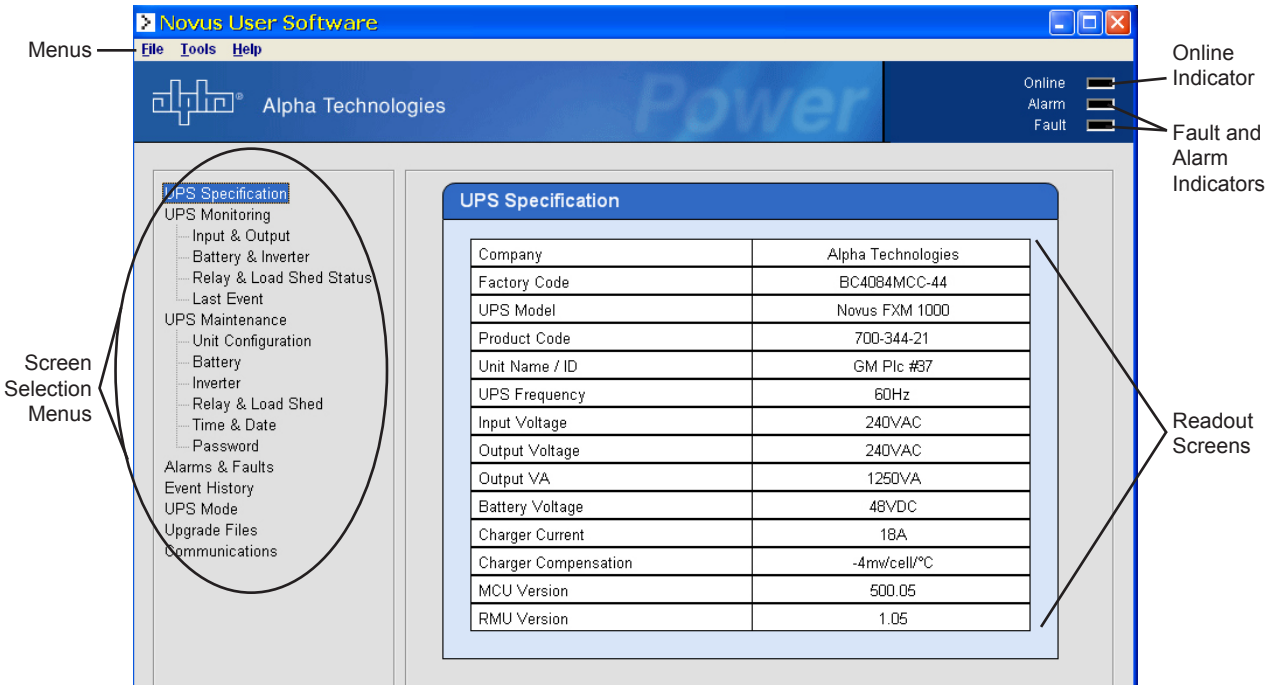


Figure 4.6.1
Novus User Software (UPS Specification Screen Shown)

4.6.2 Checking Your Computer for the .NET Framework

1. Click on the **Start** button.
2. Go to **Settings**. Click on it.
3. Click on **Control Panel**.
4. Double-click on the **Add or Remove Programs** icon.

When that window appears, scroll through the list of applications. If you see Microsoft .NET Framework listed (*See* Figure 4.6.2), the Framework is already installed and you can go ahead and install the Novus Monitor Software. If you don't see it listed, you ***MUST*** install it from the Microsoft Windows update web site before installing the Novus Monitor software.

If you are downloading from Microsoft's web site, you must have Internet Explorer installed on your computer. In addition to installing .NET, downloading from the web site updates your computer with all the latest security updates. If your computer is part of a company network,

you should ask your network administrator if you can download software from the internet.

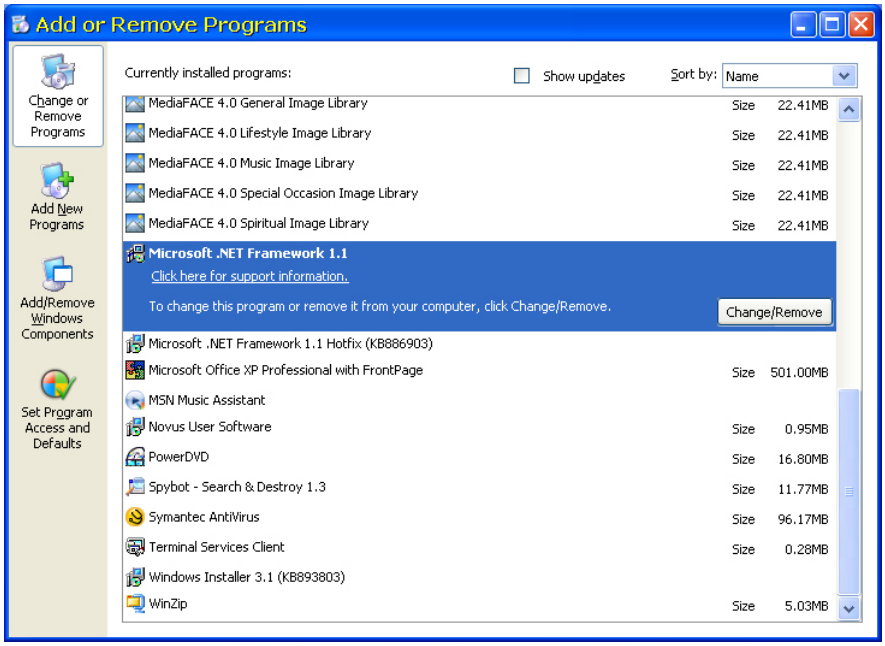


Figure 4.6.2
Microsoft .NET Framework Shown Installed

4.6.3 Installation and Set Up

Tools and Materials Required

- Novus Micro GUI software (available from www.alpha.com).
- Computer with at least Windows 98 with Microsoft's .NET framework installed.
- DB–9 serial straight-through computer cable.

Procedure

1. Install the Micro Monitor software onto your computer. Restart the computer.

   If you install the Micro Monitor on a version of Windows without the .NET framework installed (*See* Section 4.6.2), you will get an error message saying the framework is not installed. Install the framework onto your computer, restart your computer then try again to install the Micro Monitor software.

2. Connect the computer cable from any available communications port on your computer to the RS–232 port on the UPS's front panel (*See* Section 4.1, "Wiring the RS-232 Port").

3. Set the communications parameters on your computer to:

   - **COM Port:** The COM port on your computer you have selected to use.
   - **Baud Rate:** 2400.

4. To start communications between the computer and the Micro:

   Click on the screen's **online indicator**.

   OR

   In the **File** menu, click on **Connect to Micro**.

Installation Finished

4.6.4 Operation

The various screens in Micro monitoring software are described on the following pages.

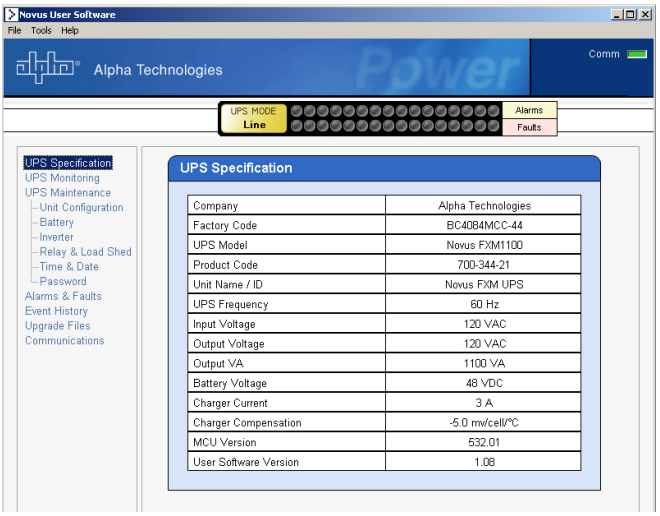
These screens (Figure 4.6.1) act like a Web or Windows-type screens. Point and click to change the various functions or fields.

The on line indicator shows if you are connected to the UPS. To turn communications on or off, click on it or, on the screen's **File** menu, click on **Connect to** [or **Disconnect from**] **Micro**.

If the Fault or Alarm Indicator is on, the UPS has a malfunction (*See* Section 3.6, "Troubleshooting").

UPS SPECIFICATIONS

This read-only screen shows the UPS's factory specifications.



UPS MONITORING

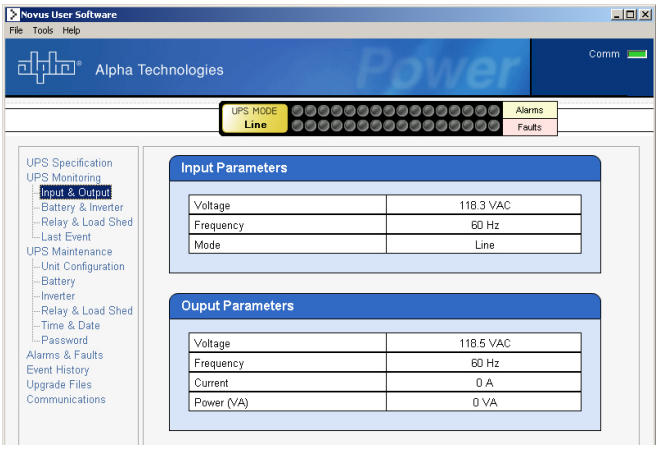
These read-only screens show the UPS's present input and output values and other settings.

Input & Output: *This shows you the present line input and UPS output values, power factor and the UPS's present operating mode.*

Battery & Inverter: *This shows you the battery string's status as well as how many times and for how long the inverter has been active.*

Relay & Load Shed: *This shows you how the front panel dry contacts are configured (Also See Section 1.3, "Dry Contacts"). If any relays are used for load shedding, it shows the time they are set to.*

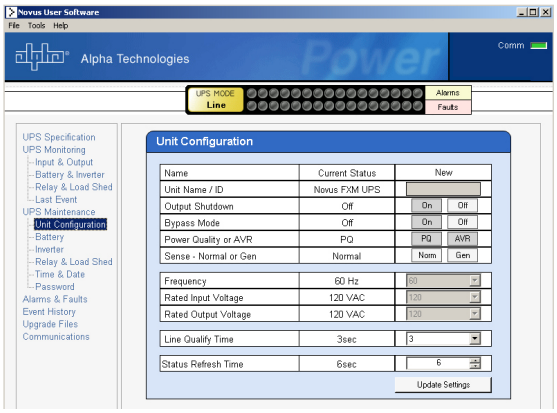
Last Event: *This shows you the last event the UPS went through (Also See Section 3.7, "Last Event Log"). It shows what fault or alarm triggered the event.*



UPS MAINTENANCE

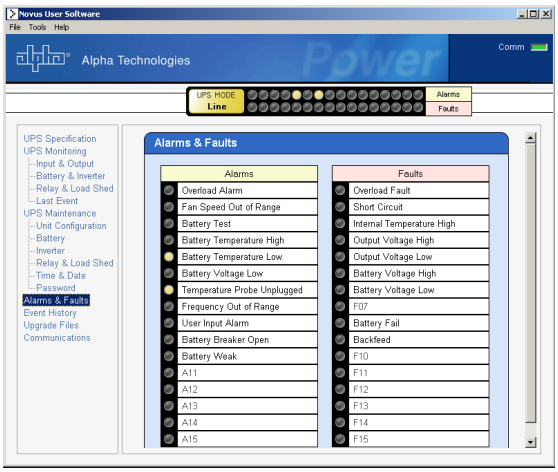
These screens let you adjust the UPS to meet your operating needs (Also See Sections 3.4, “Operating the UPS” and 4.3, “Operating the UPS”).

Unit Configuration: *This lets you set the UPS’s name, input, output and other parameters.*
Battery: *This lets you set the battery string voltage, charging parameters, when the low battery warning happens, starts the battery test and sets when the periodic battery test occurs (if used).*
Inverter: *This lets you turn the inverter on or off to provide backup battery power to the load.*
Relay & Load Shed : *This lets you set the front panel’s dry contact configuration.*
Time & Date: *This lets you set the UPS’s date and time.*
Password: *This lets you set the UPS’s password. The factory set password is 1111.*



ALARMS & FAULTS

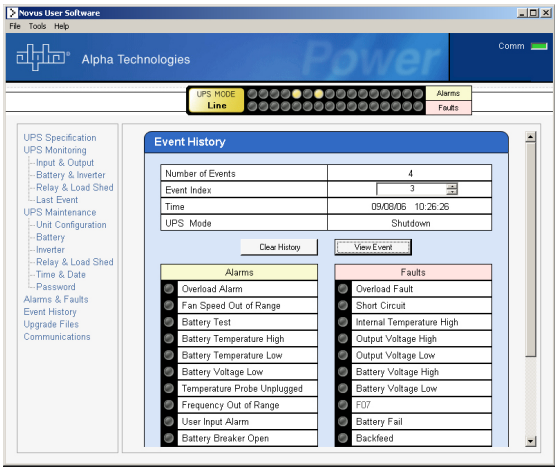
This read-only screen shows you what malfunctions the UPS has. When the fault or alarm indicators in the top right corner of the screen are lit go to this screen to learn what it is (See Section 3.6, “Troubleshooting” for descriptions of these items).



EVENT HISTORY

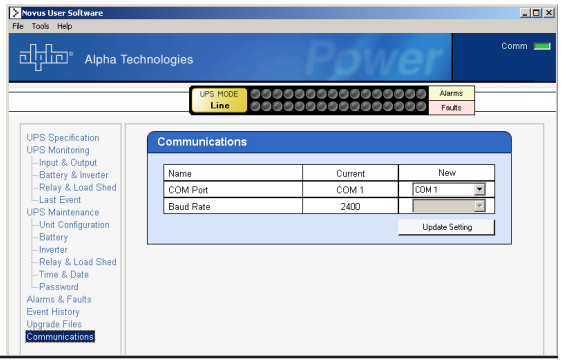
This screen shows you the last 100 events the UPS went through. Choosing a number in the Event Index list box and then clicking on the Show Event button will show you the event, when it happened and what fault or alarm caused it (Also See Sections 3.7, “Last Event Log” or 4.4, “Accessing the 100-Event Log”).

Clicking on the Clear History button clears the log. This action cannot be undone.



COMMUNICATIONS

This screen changes the UPS’s communication parameters to suit your needs.



5 Maintenance

This Section Tells You How To Maintain the Novus Micro

- Updating the Software (Section 5.1)

5.1 Updating the Software

The UPS's firmware can be reinstalled or updated to the latest version with this procedure.

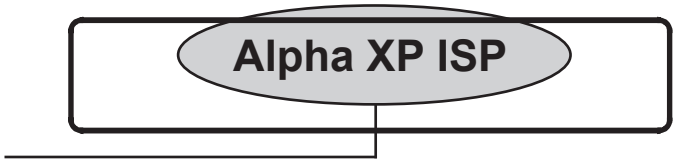
Tools and Materials Required

- RS-232 connection to UPS (*See* Section 4.1).
- uBug12 software installed on your computer (http:support/technologicalarts.ca/docs/uBug12/How%20/to%use%%20uBug12.pdf).
- Alpha Technologies firmware installed where you can access it with your computer (available at www.alpha.com). The firmware is packaged as a .zip file so you will have to un-zip it and extract the .sx firmware file.

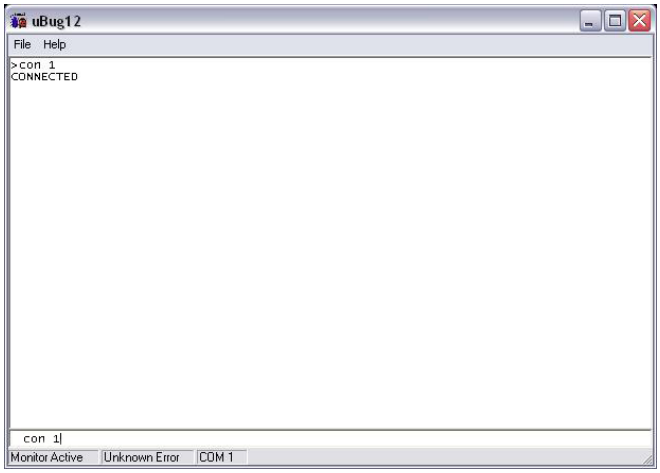
Procedure

1. Turn the UPS off (*See* Section 3.2.2). Connect RS-232 if it isn't connected.
2. Press the **SELECT** button. Turn the UPS on while pressing the button down.

   The LCD panel shows "Alpha XP ISP."

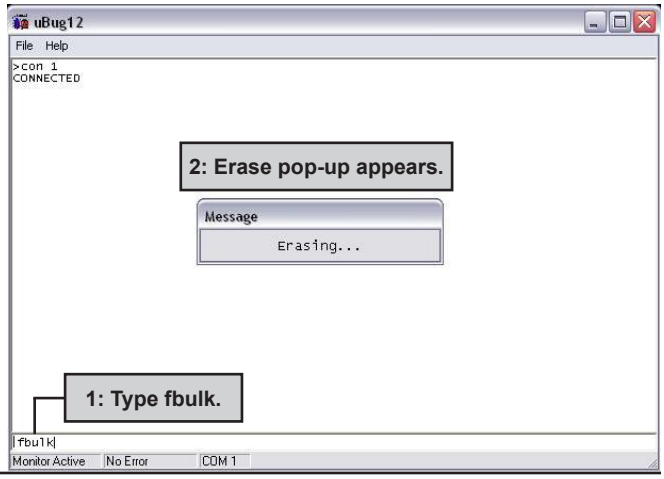


3. Start uBug12.
4. Type (all lower case) **con**(1 space)**1**(or the number of the computer's com port you are using) and press **ENTER**. The screen shows "connected" when the connection is made.



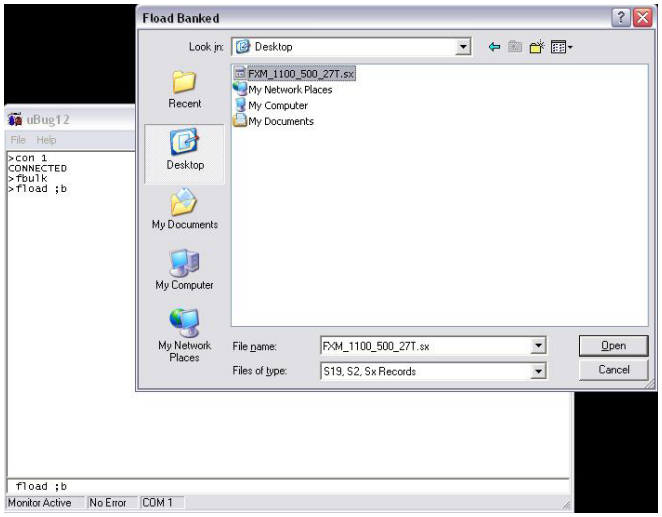
5. Type (all lower case) **fbulk** and press **ENTER**.

   The erase pop-up appears. It disappears when the UPS's memory is erased.



6. Type (all lower case) **fload**(1 space)**;b** and press **ENTER**.

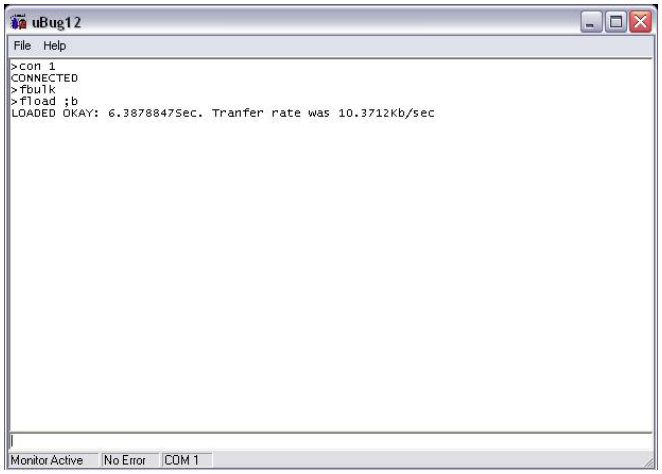
   A pop-up appears asking you to locate the new firmware. Look for a "sx record" (*.sx). Select this new firmware. The fload pop-up appears.



   When the software is finished loading into the UPS, the pop-up shows "Loaded OK: xx seconds."

7. Type (all lower case) **exit** and press **ENTER**.

   The uBug12 screen disappears. Turn the UPS off.



8. Turn the UPS on.

   If the reprogramming was successful, the LCD's logo screen appears. If it wasn't, it shows "Alpha XP ISP" as shown in step 2. Try installing the firmware again.

Firmware Replacement Finished

Mechanical Specifications

Dimensions (H x W x D) in (mm)	• Std: 19.7 (500) x 14.1 (358) x 11.6 (294) • XL: 30.6 (776) x 14.1 (358) x 11.6 (294) • XL3: 52.4 (1330) x 14.1 (358) x 11.6 (294)
Weight (without battery) lb (kg)	• Std: 43.4 (19.7) • XL: 49.8 (22.6) • XL3: 69.2 (31.4)
Color	White
Mounting	Pole, wall or pedestal (with optional pedestal mounting kit)
Humidity	• Operating, non-condensing: up to 95% • Storage: up to 95%
Temperature, °C Operating Storage	 -40 to 50 [1,2] -40 to 75 [1,2]
Altitude Operating Storage	 Up to 12,000 ft. (3658 m) [3] Up to 15,000 ft. (4572 m)
AC Input and Output Connectors	Terminal block, Wago p/n 862-0603 or equiv (maximum 10 AWG)
Dry Contact, User Input, ATS Connectors	Terminal block, mating plug JITE p/n PTB750B-03-1-03-3 or equivalent (maximum 16 AWG)
RS-232 Connector	DE-9, female
Ethernet Connector	Optional, factory installed RJ-45
Dry Contacts Micro 300 & 600	2 sets of single-pole, double-throw relays located on the front panel. They are rated at 250VAC, 1A. The factory default settings are: **C1=** ON BATT, **C2=** LOW BATT.
Model 1000	**C5:** ATS **C6:** 48VDC for an external fan. It can be factory configured as a dry contact.
Micro 1000 User Inputs	Three optically-isolated inputs are located on the front panel. When they are shorted, their functions are: **S1:** Starts the Self test **S2:** Activates an alarm **S3:** Unit shutdown
Micro 1000 User Input	2 x 20 backlit alpha-numeric LCD screen [4]. Three control buttons located below.
Battery	Anderson Power mating part SB50 or equivalent.

Electrical Specifications

Input

Voltage (nominal, VAC)	120 or 230 (optional 220)
Frequency, Hz ±5%	60/50 (autofrequency)
Current, A (@ Full load, 10A battery charger)	• **300:** 5.4/3.0 @120/230VAC • **600:** 8.0/4.2 @120/230VAC • **1000:** 14/7.2 @120/230VAC

Output

Voltage (nominal, VAC)	120 or 230
Frequency, Hz ±5%	60/50 (autofrequency)
Current, A	• **300:** 2.5/1.3 @120/230VAC • **600:** 5.0/2.6 @120/230VAC • **1000:** 8.3/4.3 @120/230VAC
Power, W/VA	300/600/1000
Waveform	Sinewave
Load Crest Factor	3:1 (load dependent)
Output Voltage Distortion	< 3% THD (resistive load)
Efficiency (typical) Normal Mode Backup Mode	 >92%, @ full load, 25°C >72% (for 300, 600), >83% (for 1000) @ full load, 25°C
Transfer Time (mS) AVR to Backup Backup to AVR	 5 (Typical) 5 (Typical)
Line Qualification Time	3 seconds (factory default), user selectable to 3, 10, 20, 30, 40, or 50 seconds.
Battery String Voltage (VDC)	• **300**: 24 • **600**: 24 • **1000**: 48
Battery Charger Current (Factory default, A)	• **300**: 3 * • **600**: 6 * • **1000**: 10* * User adjustable to 3, 6 or 10 A.
Battery Charger Temperature Compensation	-5mV/°C/Cell (factory default), user adjustable to -2.5, -4, -5 and -6mV/°C/Cell.
Battery size	Standard: 4 x 18 to 2 x 50AHr XL: 4 x 50 to 2 x 109AHr XL3: 8 x 50 to 4 x 109AHr

Others

Fuse [5] (F1)	• T4A 250V for 24V battery string voltage • T2A 250V for 48V battery string voltage

Boost/Buck/Line Transfer Thresholds

Subject to change without notice

	Model 300		Model 600		Model 1000	
Parameter	**120VAC**	**230VAC**	**120VAC**	**230VAC**	**120VAC**	**230VAC**
Buck 1 to INV	151 VAC	N/A	N/A	N/A	N/A	N/A
INV to Buck 1	146 VAC	N/A	N/A	N/A	N/A	N/A
Buck 2 to INV	N/A	325 VAC	169 VAC	318 VAC	169 VAC	325 VAC
INV to Buck 2	N/A	314 VAC	162 VAC	306 VAC	162 VAC	314 VAC
Buck 1 to Buck 2	N/A	281 VAC	151 VAC	283 VAC	148 VAC	282 VAC
Buck 2 to Buck 1	N/A	275 VAC	146 VAC	275 VAC	146 VAC	272 VAC
Line to Buck 1	131 VAC	250 VAC	132 VAC	251 VAC	129 VAC	250 VAC
Buck 1 to Line	126 VAC	244 VAC	128 VAC	240 VAC	126 VAC	236 VAC
Boost 1 to Line	116 VAC	214 VAC	115 VAC	212 VAC	114 VAC	210 VAC
Line to Boost 1	112 VAC	209 VAC	111 VAC	209 VAC	109 VAC	207 VAC
Boost 2 to Boost 1	102 VAC	186 VAC	97 VAC	182 VAC	102 VAC	182 VAC
Boost 1 to Boost 2	98 VAC	180 VAC	101 VAC	177 VAC	87 VAC	175 VAC
INV to Boost 2	92 VAC	163 VAC	92 VAC	158 VAC	93 VAC	160 VAC
Boost 2 to INV	87 VAC	158 VAC	86 VAC	152 VAC	85 VAC	153 VAC

Regulatory

Electrical Safety	UL 1778, CSA22.2#107.3, EN50091-1-2, EN60950
Emission†	FCC subpart J, level A for conducted and radiated EMI; CSPR22, EN55022 level A for conducted and radiated EMI.
Marks	$_{C}$CSA$_{US}$, CE (CE for 230VAC versions only).
Packaging	Designed to meet requirements for ISTA program

† The Novus Micro generates, uses and radiates radio frequencies if not installed and tested in accordance with the instructions in this manual. It has been tested and found to comply with the limits established for a Class A computing device pursuant to part 15 of FCC rules and CSPR 22 when it is operated alone. It also complies with the radio interference regulations of DOC which are designed to provide reasonable protection against such interference to radio to TV reception, which is determined by switching it on and off, relocate the equipment or use an electrical circuit other than the one used by the Novus Micro.

Notes:

1. Above 50°C ambient, derate output power by 1.1% per °C rise, up to 74°C max.
2. Capable of operating at fully rated power below 0°C down to -40°C after the UPS has been stabilized at 0°C for at least 1 hour.
3. Derate 2°C per 1000 ft (305 m) above 4500 ft (1372 m).
4. The LCD may not function below -15°C. It resumes normal operation when the temperature rises above -15°C. The UPS continues to operate normally.
5. ***CAUTION:*** Risk of electric shock and fire hazard, replace fuse with the same type and rating

LIMITED 24-MONTH WARRANTY

AC PRODUCTS

Alpha Technologies warrants its equipment to be free of manufacturing defects in material and workmanship for a period of 24 months from the date of manufacture. The liability of Alpha Technologies under this warranty is solely limited to repairing, replacing, or issuing credit for such equipment (at the discretion of Alpha Technologies), provided that:

1. Alpha Technologies' Customer Service Department is promptly notified, by facsimile or telephone, that a failure or defect has occurred.
2. Alpha Technologies' Customer Service Department issues a Return Materials Authorization (RMA) number, and designates the service location. The RMA must be clearly marked on the outside of the shipping container.
3. Purchaser is responsible for all in-bound shipping and handling charges (COD and freight collect will not be accepted without prior approval from Alpha Technologies); Alpha Technologies will pay out-bound surface shipping charges for return of repaired equipment.
4. A satisfactory examination of the returned UPS by Alpha Technologies' Service personnel shall disclose that defects have not been caused by misuse, neglect, improper installation, repair, alteration, or accident, or failure to follow instructions furnished by Alpha Technologies. If Alpha Technologies' Service personnel determine that the UPS has been damaged due to one of these causes, or if the UPS is free of defects, a handling or repair fee may be assessed prior to returning the UPS.

WITH RESPECT TO BATTERIES, PERIPHERAL DEVICES, ATTACHMENTS OR APPARATUS NOT MANUFACTURED BY ALPHA TECHNOLOGIES, ALPHA WILL ASSIGN TO THE PURCHASER ITS RIGHTS UNDER THE ORIGINAL MANUFACTURER'S WARRANTY OF SUCH BATTERIES, PERIPHERAL DEVICES, ATTACHMENTS OR APPARATUS, BUT OFFERS NO ADDITIONAL WARRANTIES IN CONNECTION THEREWITH.

THIS LIMITED 24-MONTH WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

IN NO CASE SHALL ALPHA TECHNOLOGIES BE LIABLE FOR ANY INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES WHATSOEVER, INCLUDING WITHOUT LIMITATION ANY CLAIM FOR LOST PROFITS OR REVENUES, EVEN IF ALPHA TECHNOLOGIES HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH, FOR BREACH OF THIS OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED.

Any action for breach of this limited 24-month warranty must be brought within a period of 24 months from date of manufacture.

This limited 24-month warranty does not extend to any UPS that has been repaired or altered by any party other than Alpha Technologies or its Authorized Service Center.

Alpha Technologies reserves the right to discontinue particular models and to make modifications in design and/or function at any time, without notice and without incurring obligations to modify previously purchased UPSs.

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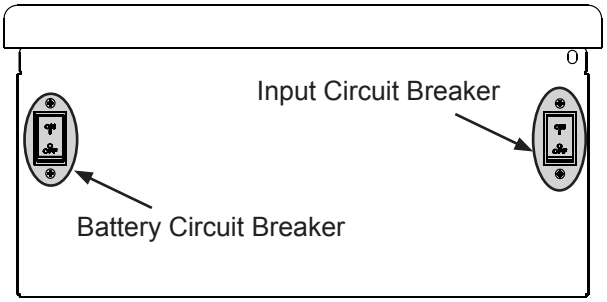
Emergency Shutdown Procedure

The Novus Micro has more than one live circuit. In an emergency, line power may be disconnected at the input, but there can still be AC power present at the output.

1. Turn OFF the Input Circuit Breaker.

2. Turn OFF the Battery Circuit Breaker.

3. Turn OFF the utility line power.



For emergency technical support 7 days a week/24 hours a day, call:

Canada/USA: 1 800 667 8743

Complete the following for your records

Serial # _____

Options _____

Purchase Date _____

This Novus Micro was purchased from

Dealer _____

City _____

State/Province_____

Zip/Postal Code_____

Country _____

Telephone # _____

Fax # _____

E Mail Address _____

Alpha Technologies

Power

Alpha Technologies
3767 Alpha Way
Bellingham, WA 98226
USA
Tel: +1 360 647 2360
Fax: +1 360 671 4936
Web: www.alpha.com

Alpha Technologies Ltd.
4084 McConnell Court
Burnaby, BC, V5A 3N7
CANADA
Tel: +1 604 430 1476
Fax: +1 604 430 8908

Alpha Technologies
Europe Ltd.
Twyford House
Thorley
Bishop's Stortford
Hertfordshire
CM22 7PA
UNITED KINGDOM
Tel: +44 0 1279 501110
Fax: +44 0 1279 659870

Alpha Technologies GmbH
Hansastrasse 8
D 91126 Schwabach
GERMANY
Tel: +49 9122 79889 0
Fax: +49 9122 79889 21

Alphatec, Ltd
P.O. Box 56468
Limassol, Cyprus
CYPRUS
Tel: +357 25 375675
Fax: +357 25 359595

AlphaTEK ooo
Khokhlovskiy Pereulok 16
Stroenie 1, office 403
109028 Moscow
RUSSIA
Tel: +7 495 916 1854
Fax: +7 495 916 1349

Alphatec Baltics
S. Konarskio G. 49
Vilnius 2009
LITHUANIA
Tel: +350 5 210 5291
Fax: +350 5 210 5292

Alpha Technologies
5 Avenue Victor Hugo
F 92140 Calmart France
FRANCE
Tel: +33 3 41 90 07 07
Fax: +33 1 41 90 93 12