![Alpha logo] | an EnerSys company

# Remote Battery Monitoring System
## (RBMS)

Installation & Operation Manual: 0370260-J0

Effective: 04/2020

# Contents

# 1. Important Information

## 1.1. Revision History

| Release | Date | Revision Description |
|---------|------|----------------------|
| Rev 1.3 | 3/31/2020 | Updated web browser interface instructions |
| Rev 1.2 | 11/10/2016 | Removed reference to PBT-PRG-USB, rewrote section on default IP address |
| Rev 1.1 | 10/9/2015 | Initial Release, Firmware Version XP 01.0b0, PIC 1.0 |

## 1.2. Safety Notes

- **High currents and voltages may be present on the equipment terminals and on the interior of the equipment. Make sure you understand and observe all appropriate safety codes and regulations. Follow prudent electrical safety practices when installing or servicing the equipment. Installation, maintenance and servicing of the equipment should only be performed by qualified, trained and authorized personnel.**

- Before installation, take measurements with a volt meter to ensure that no jar post in the system has lethal AC or DC voltages relative to earth ground.

- Except as explained in this manual, there are no user-serviceable parts inside the RBMS Plus. Opening the equipment could expose you to dangerous voltages and void the product warranty. All product servicing should be referred to factory-authorized personnel.

- Use only interconnection cables supplied by or authorized by Alpha Technologies. Use of user-made interconnection cable assemblies could result in damage to equipment and potential safety hazards, as well as voiding of equipment warranties.

- Do not exceed the voltage specifications of the product.

- Make sure the equipment is grounded properly.

- The equipment should be protected from liquids, moisture, explosives and corrosive vapors.

## 1.3. Important Symbols

**CAUTION!**
The use of CAUTION indicates safety information intended to prevent damage and/or injury.

**NOTE:**
A NOTE provides additional information to help complete a specific task or procedure.

## 1.4.    Definition of Terms

**Admittance**   The inverse of impedance in units of Siemens. Admittance is a measure of how easily a circuit or device will allow a current to flow. Resistance is a measure of the opposition of a circuit to the flow of a DC current, while impedance takes into account not only the resistance, but AC effects (known as reactance) as well. Likewise, admittance is not only a measure of the ease with which a DC current can flow (conductance, the inverse of resistance), but also takes in to account the AC effects of susceptance (the inverse of reactance).

**Battery**   A collection of jars connected in series. A battery is sometimes referred to as a battery string or string in this document.

**Cell**   A collection of plates connected to a single positive and a single negative terminal, immersed in electrolyte, in a single container. The cell may have multiple positive and negative connections, but they connect to a single set of plates. A lead acid cell produces approximately 2.1 volts.

**Jar**   A collection of one or more cells connected in series in a single housing. A 12-volt jar contains six cells. A jar is commonly and incorrectly referred to as a battery.

**String**   A collection of one or more batteries.

## 1.5.    Contact Information

If you have any questions about the installation or use of the equipment described in this manual, contact Alpha Technologies Technical Support at 1-(888)-462-7487

When contacting Alpha Technologies please have the following information available:

1. RBMS Plus model number and firmware version.
2. Battery sensor model number, hardware version and firmware version. The version numbers are shown on the RBMS Plus single jar web page.
3. The battery and string voltage.
4. The battery model number.

## 1.6.    What Comes in the Box

The RBMS Plus is typically shipped in a single carton and will contain the RBMS Plus controller, cables and options ordered. PBT recommends taking an inventory of all items to ensure that you received all the components needed for your application.

A label on the front of the carton will contain the MAC address of the RBMS Plus controller.

# 2. System Overview

The Alpha Technologies Remote Battery Monitoring System (RBMS) Plus is the first in a series of low-cost controller options designed to dramatically lower cost and provide battery health and cabinet/hut facility monitoring capabilities.

The RBMS Plus can be equipped with either an eight-battery wiring harness or a battery sensor option. The eight-battery harness allows for the lowest-cost solution monitoring, battery string and individual battery voltages. Using the sensor option provides additional battery measurements, including ohmic measurements and individual battery temperatures. Both solutions offer facilities and cabinet monitoring capabilities.

The control unit connects to a network switch, router or cable\DSL\cellular modem via an Ethernet connection. Among the facilities parameters monitored are AC line voltage (optional), equipment AC load current (optional), moisture (optional), controller internal temperature, two monitorable digital inputs and one controllable digital output.

The RBMS controller typically obtains its operating power from the battery string being monitored and supplies a 12 Vdc output to power a companion cable\DSL\cellular modem, thus eliminating the need for a separate modem power unit.

The RBMS has a built-in SNMP agent, a built-in web server and a built-in SMTP mail client. The SNMP agent supports IEEE/SCTE HMS MIBs making the RBMS compatible with virtually any management system. HMS traps are generated based on alarm conditions defined using the HMS Property MIB. The built-in web server allows the status of the monitored batteries to be analyzed from anywhere in the network using a common web browser. This eliminates the need for expensive client application software licenses. Near real-time monitoring and alarm provisioning are available via standard web browser or software. The built-in SMTP mail client can be set up to send alarm messages to another computer (via e-mail addresses) or to a mobile phone when an alarm occurs.

The RBMS is downloadable over the network, facilitating firmware upgrades and feature enhancements as they become available. The unit also contains a special "watchdog timer" that monitors the modem and automatically resets it in case of a modem "hang" situation.

## 2.1. Battery Sensor Description

Sensor modules are small, inexpensive units designed to mount in close mechanical, electrical and thermal proximity to the monitored jar's terminal posts. The sensor takes a very small amount of "idling" power from the monitored jar (typically less than 10 mA). Internally, a programmable microcontroller chip provides an optically isolated communications interface for the site control unit. Sensors are connected to the RBMS Plus using a CAT5 cable daisy chain.

The sensor continuously monitors the voltage and temperature of the jar. At user-defined intervals, the microcontroller generates a digitally synthesized AC test signal of approximately 0.5 to 6.0 amps (depending on sensor type) which drives the jar's terminals for testing purposes. This test current causes a small AC voltage, proportional to jar impedance, to be superimposed on the jar's DC terminal voltage. This AC voltage is separated from the DC terminal voltage and amplified inside the sensor module. It is then fed to an analog-to-digital converter inside the microcontroller chip. The microcontroller digitally samples the AC waveform and performs a DSP (digital signal processing) algorithm that filters out noise and measures the amplitude of the AC signal. These measurements and subsequent calculations determine the jar's internal AC impedance, which is the basis for admittance measurements.

Mechanically, the sensor consists of two wires with terminal lugs that connect to the jar's positive and negative terminal posts, and an electronics assembly that contains the test signal generation and measurement circuitry.

The two wire sensors have the advantage of working with a wide variety of jar mechanical configurations. Each sensor is shipped with a 1' CAT5 cable to connect the sensor to the daisy chain. This cable is the proper length for most applications. Longer cables are available from PBT.

### 2.1.1. "Low Voltage" Sensors

The RBMS Plus system is used in environments where string voltages are 59 Vdc and lower. Low voltage sensors are appropriate to be used in these low voltage strings.

*CAUTION: Installing low voltage sensors on a high voltage string will damage the sensors and may present a shock hazard.*

Sensors will be auto-discovered by the controller. These low voltage sensors have the advantage that their position in the string is automatically discovered. This means the sensors can be connected in any order and the controller will automatically discover which cell or jar the sensor was installed upon.

Each sensor has a bi-color red/green LED that indicates the operational state of the sensor and its communications status with the RBMS Plus. Each sensor is also is internally fused so that improper connection to the jar will not damage the jar, the jar cabling or the sensor. The sensors are fully optically isolated from the RBMS Plus.

### 2.1.2. Sensor Selector Guide

The standard RBMS Plus system 0370260-002, ships with power cable, CAT5 cable and 4 battery sensors. When two battery strings are required to be monitored then order 0370260-003.

| Model | Description |
|---|---|
| 0370260-002 <br> (PBT-RBMS Plus-12-4-4) | Mini Controller with power cable, one CAT5-7 cable, and four BS3B-12-4-EQ sensors. |
| 0370260-003 <br> (PBT-RBMS Plus-12-4-8) | Mini Controller with power cable, two CAT5-7 cables, and eight BS3B-12-4-EQ sensors. |
| Spareparts | |
| 0180055 <br> (PBT-PA-BS3B-12-4-EQ) | Battery Sensor Module,12V, High Current, Type4 |
| 8701040 <br> (PBT-PAC-0BAT) | Power Cable to power RBMS Plus Controller |

**BS3B-12-4-EQ Sensor**



This is a universal sensor with two wire connections that will work with most jars. The maximum bolt size for the terminals is 5/16 inch. When the sensor is mounted to the top of the jar, and not in the direct cooling air flow, the sensor will read the approximate jar case temperature. The sensor is equipped with a self-adhesive industrial Velcro strip for fastening the sensor to the jar.



## 2.2. RBMS Plus Description

The RBMS Plus is a small, low-cost unit that monitors batteries directly using a battery wiring harness or with optional sensor modules, and makes the data collected by them available via a local area network or the Internet. The RBMS Plus has two RJ-45 ports for connection of up to, two strings of three or four jars. Connections are available for optional features, including a current sensor, moisture sensor and line voltage monitoring transformer. Included are additional input and output capability through two general purpose digital inputs and one general purpose digital output. A USB setup port allows direct connection to a PC for configuration.

The RBMS Plus has connections on both the front and back panels.

The RBMS Plus is powered directly from a battery string voltage of 36-48Vdc. The voltage range is 24 to 59Vdc and power consumption is about 7 W, with current draw dependent on the input voltage and whether or not an external device is being powered from the rear panel power output connector (0.5 A *typical*). Power is supplied to the unit via a front-panel connector via the PBT-PAC-8BATT harness or via the PBT-PAC-0BATT harness when optional battery sensors are used.

A rear panel USB connection provides access to configure the RBMS Plus IP address and other parameters during installation. Setup can also be performed over the network connection via a Telnet connection.

| Option AC Transformer | +12V,500mA Output | Tamper Input | Moisture Sensor | Reset Button | USB Port for Configuration |

| Ethernet | Battery Harness String | Aux 1 Digital Inputs 1&2 and Digisital Output | Battery Sensor Interface String one | Battery Sensor Interface String Two |
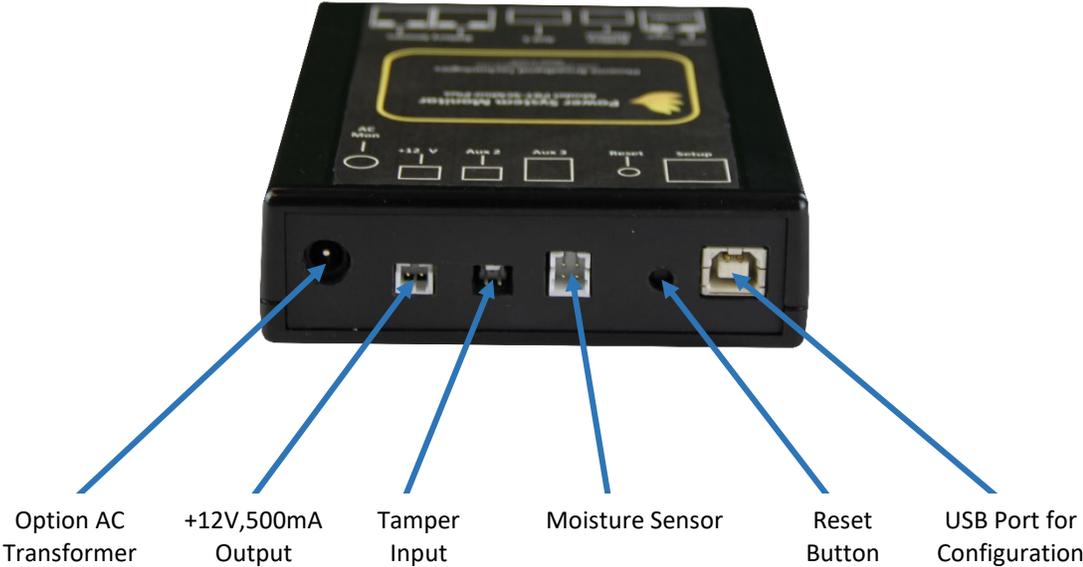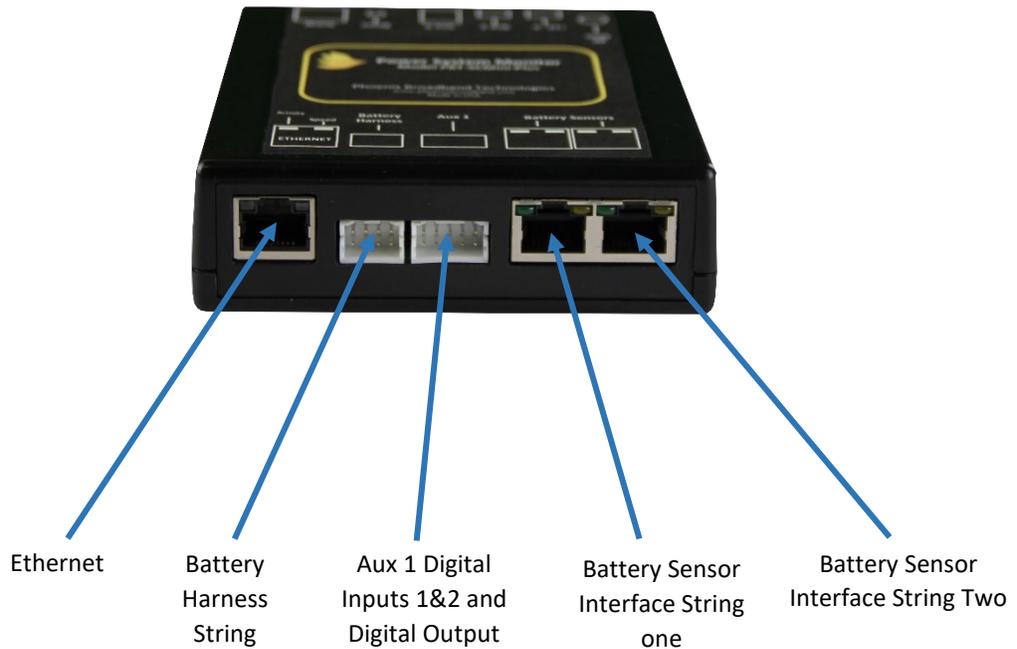
The RBMS Plus has two RJ45 connectors on the right front panel for connecting sensors, integrating up to two strings of monitored jars.

A front panel Ethernet connection provides a TCP/IP (Internet protocol) interface to a local area network or to the Internet. A built-in web server is accessible via this interface, with no need for any software other than a common PC web browser. More sophisticated monitoring and control of the RBMS Plus can be performed remotely using any SNMP-capable network management software system. These systems are described in additional detail in the SNMP section of this manual.

Upon power-up, the RBMS Plus automatically begins a search sequence to determine which of its string ports are attached to sensors and discovers each sensor module.

When a string of sensors is discovered, the controller automatically discovers each sensor and its correct position in the string. (No factory programmed address is necessary.)

Once the "auto-discovery" process is finished, the RBMS Plus can individually address each sensor, collect its readings and display those readings in the hierarchical web page display. This process is 'plug & play'. All sensor assignments and configuration information are saved in non-volatile memory, so the system automatically reconfigures itself if power is lost or if the system is turned off for maintenance.

The RBMS Plus can be mounted in any small, inconspicuous location that is available in the cabinet / enclosure.

## 2.3. Accessories

Various optional accessories are available to enhance the RBMS Plus system functionality.

### 2.3.1. Utility AC Transformer (Optional, Alpha Part# 0180059)

The RBMS Plus can monitor the utility power voltage via an optional 12Vac wall mount transformer. The transformer plugs into a jack on the RBMS Plus rear panel.

### 2.3.2. Moisture Sensor (Optional, Alpha Part# 7400162)

The PBT-PAC-MS-1 adds capability for the transponder to detect that snow and/or standing water have infiltrated the standby power supply cabinet. The kit consists of a sensor board with double-faced foam tape adhesive and a companion wire harness.

The sensor cable plugs into a Aux 3 connector on the RBMS Plus rear panel.

### 2.3.3. Current Sensor (Optional, Alpha Part# 7400583)

The model PBT-PA-CS-1 kit adds capability to measure the AC output current from the power supply. The kit consists of a current transformer module and a wiring harness.

The sensor cable plugs into a Aux 1 connector on the RBMS Plus front panel.

### 2.3.4. Using the General Purpose Interface

The RBMS Plus is based on PBT's GP series of general purpose power supply transponders with a special application module and firmware to perform the RBMS Plus functionality. The GP interface can be used to monitor and control auxiliary equipment if the interface between the GP and the monitored/controlled equipment is properly designed. This section discusses how the GP web interface screens relate to available GP input and output points, as well as electrical specifications for interfacing those points to the target equipment. Please refer to the picture below that shows the locations of the interface connection points on the GP's front panel.
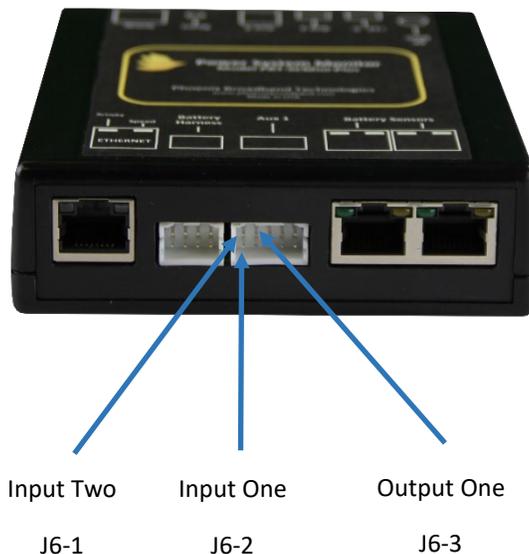
## Interface Table

| Web Description | Schematic | "Type" |
|---|---|---|
| "Auxiliary Input 1" | "Aux1"; pin-2 | Contact closure input |
| "Auxiliary Input 2" | "Aux 1"; pin-1 | Contact closure input |
| "Auxiliary Output" | "Output"; pin-3 | Contact closure output to gnd |
| Tamper | | Closed |

Mating connectors are available or may be ordered from a distributor with the part information shown. A detailed schematic diagram of the I/O circuitry in the GP is available from Alpha Technologies.

## Mating Connector Information:

J5 - TE (Tamper on back panel) Connectivity #3-644540-2; DigiKey #A3110-ND

J6 - Shell: Hirose Electric #DF1B-10DS-2.5RC; DigiKey #H3813-ND
    Pins: Hirose Electric #DF1B-2428SC; DigiKey #H8232CT-ND

# 3.  Initial Bench Evaluation

If the user has no previous experience with the RBMS Plus Battery Management System, it is recommended that a small local test and evaluation of the system components be set up prior to field deployment of the equipment. This approach will allow you to verify proper operation of the RBMS Plus's web server, Telnet configuration and DHCP client without having to troubleshoot larger network issues (firewalls, router and connectivity etc.).
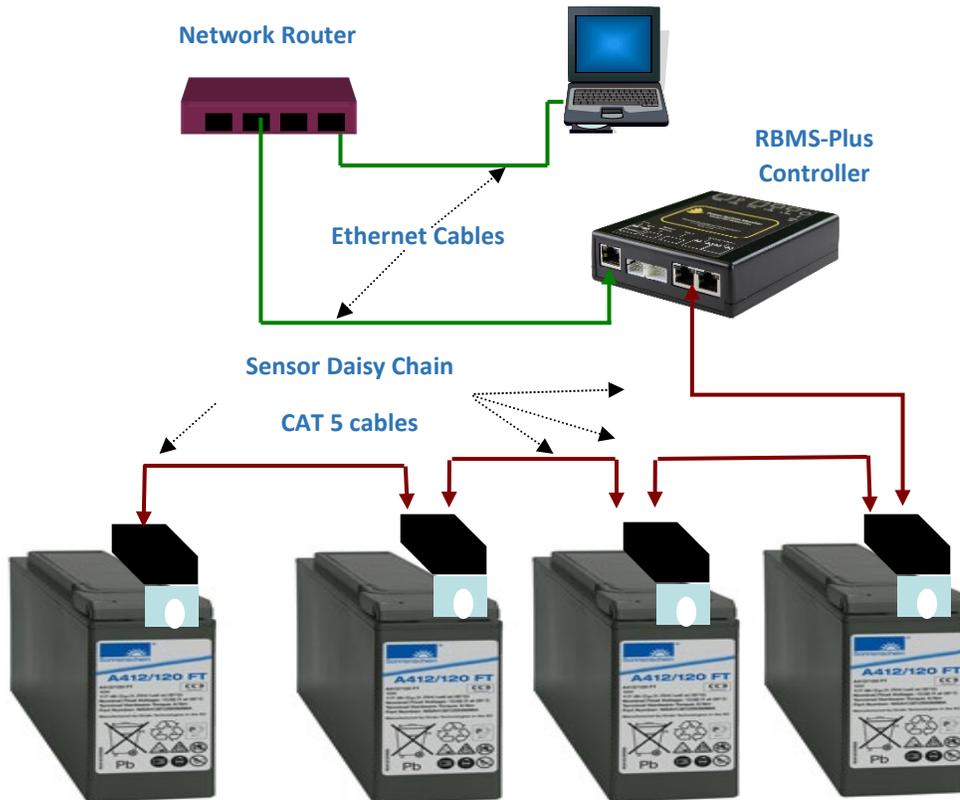


The above diagram shows a low-cost networking router (D-Link™, NetGear™ or other) connected to a laptop/desktop and the RBMS Plus. In this scenario the installation steps are as follows:

1. Power up the router.
2. Power up the laptop and connect the laptop to the router.
3. Verify that the laptop has acquired an IP address from the router. (View the router's configuration web page and write the address down.)
4. Connect the controller to the router (via Ethernet connection).
5. Power up the controller. (Upon power up, the controller will seek an IP address from the router.)
6. Battery harness - If sensors are not being used in the system, connect a PBT-PAC-8BATT harness as shown in Drawing 705-000017-00. Connect any unused lugs to the String (-) position of the battery string or tape them together. Connect the other end of the harness to the battery connector on the RBMS Plus front panel.
7. Sensors – Connect the sensors to each battery in the string. Connect the sensors to each other (via CAT5 cables daisy-chained from sensor to sensor). Connect the last sensor in the daisy chain to the String 1 input of the sensor interface module. Connect the sensor interface module to the CAT5 connector on the rear panel of the RBMS Plus. Connect the two-wire PBT-PAC-0BATT harness to the RBMS Plus and to the battery String+ (Red) and String- (Black) terminals.
8. View the router's web page to determine which IP address has been given to the controller. (Write it down.)

9.  Type the IP address of the controller into your laptop's web browser and verify that the web page displays properly. Verify that all battery voltages and number of strings or optional sensors have been auto-discovered. Verify that the parameter information displayed in the web page appears reasonable.
10. Verify Telnet connectivity by connecting to the controller via Telnet (remember Alpha Technologies uses port 9999 for our Telnet connection.)
11. If you are using an SNMP manager, verify proper SNMP operation (gets, sets and traps).


This bench evaluation can also be performed using the free Lookout software described in the SNMP section of this manual.

# 4. Sensor Installation

⚠ **CAUTION!** *Lethal voltages may be present on the battery strings. If you are not fully trained to work safely around batteries and our monitoring system, leave the installation to a certified technician. Read the sensor installation instructions carefully.*

⚠ **CAUTION!** *Be sure to disconnect the rectifier or charger before installing the sensors. Failure to do so could result in sensor damage.*

## 4.1. Installation

This section provides installation information common to installing sensors on a battery string. The cables used to connect the sensors to each other and to the RBMS Controller are standard CAT5 cables. A cable is provided with each sensor and we recommend that you order the appropriate Cable Kit for each battery string. We recommend that you do not make your own sensor cables. A single improperly made cable can destroy an entire string of sensors. The sensor uses all 8 wires in the cable. Many cable testers do not test all 8 wires and we have found cables that were tested as good and still damaged the sensors. The use of an improperly made cable may void the warranty. If you need cables of a length other than those provided, please contact Alpha Technologies.

⚠ **CAUTION!** *Be certain that the battery string is isolated from earth ground, and that no lethal voltages are present during this operation. The battery circuit breaker should be switched off or the string should be isolated from the DC power bus and the charger.*

☑ **NOTE:** *The sensor module is supplied with a red plastic insulating sleeve over the lug that will connect to the jar's positive terminal. Do not remove this sleeve until instructed to do so. Failure to observe this could result in the lug accidentally contacting another electrical point in the battery system during installation. This could damage the sensor and void the warranty.*

☑ **NOTE:** *NOTE: To obtain consistent admittance readings, it is recommended that the sensor lugs be located in the same position on each jar terminal. Generally, the sensor should be installed on top of the existing strap or lug and under the washer.*

⚠ **CAUTION!** *DO NOT ATTEMPT TO INSTALL THE SENSORS WHILE THE UPS IS ONLINE OR WHILE THE TRAYS ARE ASSEMBLED. ATTEMPTING TO DO SO COULD CAUSE AN INADVERTANT SHORT CIRCUIT THAT MIGHT LEAD TO ELECTRIC SHOCK OR EXPLOSION.*
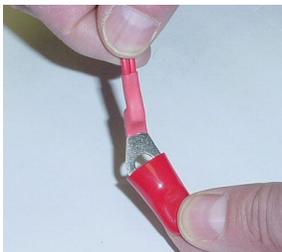


Do not remove the plastic cap on the end of the sensor wire(s) until instructed to do so. The cap prevents the sensor wire from shorting to battery terminals or other metal parts and damaging the sensor.

Loosen the negative terminal bolt on the first jar which will have a sensor installed and place the black wire of the two-wire sensor on the negative terminal. If the sensor is connected with the wrong polarity the sensor fuse will blow. Tighten the terminal bolt to the jar manufacturer's recommended torque setting (typically 100-120 inch/oz).

⚠ **CAUTION!** *Failure to tighten the connections to the manufacturer's recommended torque can result in jar terminal failure during a power outage, damage to the terminal, or inconsistent admittance measurements.*

Loosen the positive terminal bolt on the same jar. Remove the red plastic insulating cap that covers the lug at the end of the red wire on the sensor. Place the lug between the washer and the positive cable on the positive jar terminal. Use caution to be sure that the positive and negative terminals are on the same jar. Tighten the terminal bolt to the jar manufacturer's recommended torque setting (typically 100-120 inch/oz). At this point, the green LED on the sensor will flash at about a one second rate. If the LED is not flashing confirm that the sensor is connected with the correct polarity.

☑ **NOTE:** The sensors can be connected to the daisy chain in any order. Choose an order that is aesthetically pleasing and minimizes the cable clutter.

Be sure that you have read the general sensor installation section above before proceeding. Every High Voltage sensor module has a unique factory-programmed address built into it. At installation and system initialization time, the site controller 'discovers' each sensor module's factory address and assigns the sensor to a jar. The specific jar that the sensor gets assigned to depends on the order in which the sensors were discovered.

If the jars are in a cabinet start with a top shelf and work down, one shelf at a time. In most cases it will be necessary to remove the jars from the UPS cabinet to gain access to the Jar terminals. As each jar is reinstalled connect a sensor to each jar, as described above in the general installation instructions. Pay attention to the sensor LED, tightening torque, and be sure to point the LED to the front of the cabinet for easy viewing. The LED should be flashing green when the jar is reinstalled.
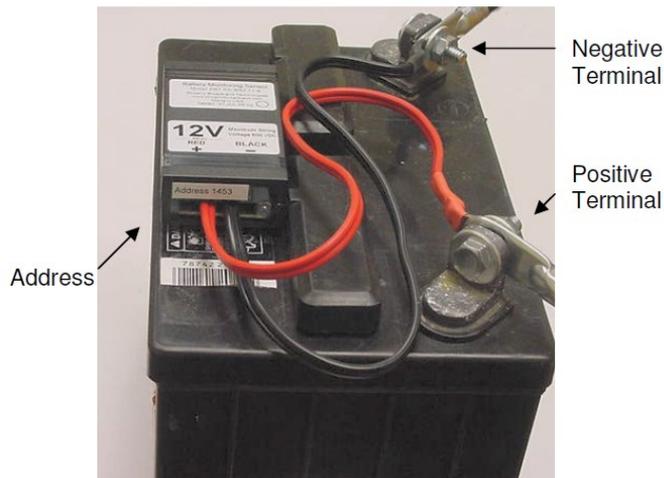


## 4.2. Sensor LED

Once the sensor is installed successfully on the jar the green LED on the sensor will begin to blink periodically (roughly once per second). When the interconnection daisy-chain containing the sensor string is connected to the site controller, the auto discovery process will begin. As each sensor is discovered by the site controller, its LED will stop the 1 second green flashing, flash red momentarily, and will illuminate solid green. Shortly after the sensor is discovered and its LED changes to solid on green, the sensor will make an admittance measurement. During this measurement the LED will be switched off until the measurement is complete. (Early sensors flashed the green LED very rapidly during the measurement).

After this initialization sequence, the sensor's LED will stay on green until it is polled by the Site Controller. Upon receiving a poll, the sensor LED flashes off briefly and then comes on solid green.

The sensor LED will flash red if the sensor is reporting an alarm as defined by the Site Controller configuration.

The sensor LED will flash alternately red and green if the sensor flash function is activated from the Site Controller Web page.

The state of the LED can also be controlled through SNMP by the SNMP Manager.

**Important Advisory:**

Each Sensor is powered from the battery that it is connected to. Sensor current consumption is very low (~10ma average) and has virtually no effect on the battery during normal battery plant operation. However, batteries are subject to potential damage if left discharged or not connected to a charger for an extended period of time. To avoid possible long-term battery damage, we recommend disconnecting sensors from any batteries that will not be recharged for 30 days or more.

## 4.3. Field Wiring Diagrams

The wiring scenarios for 48VDC and 24VDC systems are found below.

**48VDC System Wiring**
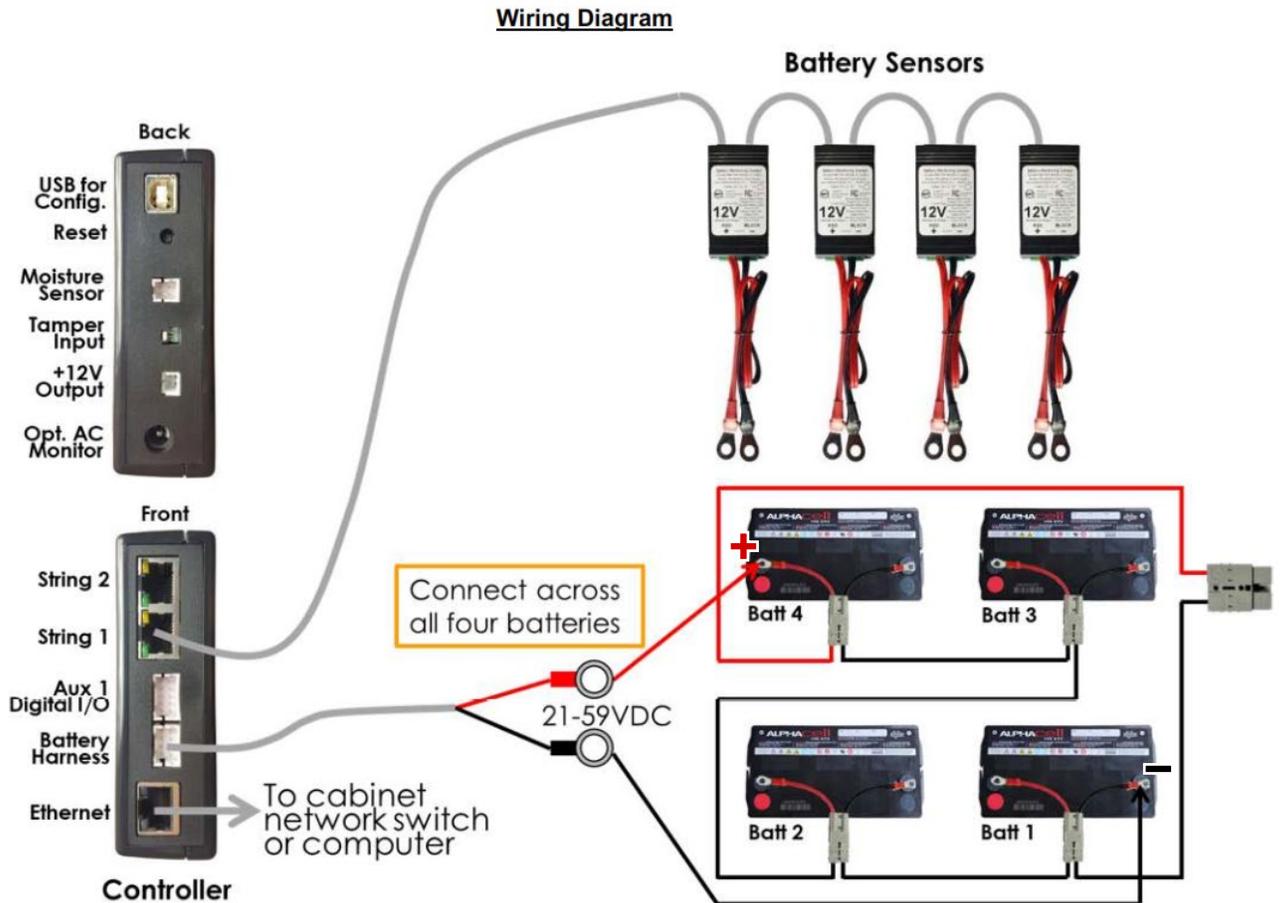
**24VDC System Wiring**



Wiring Diagram
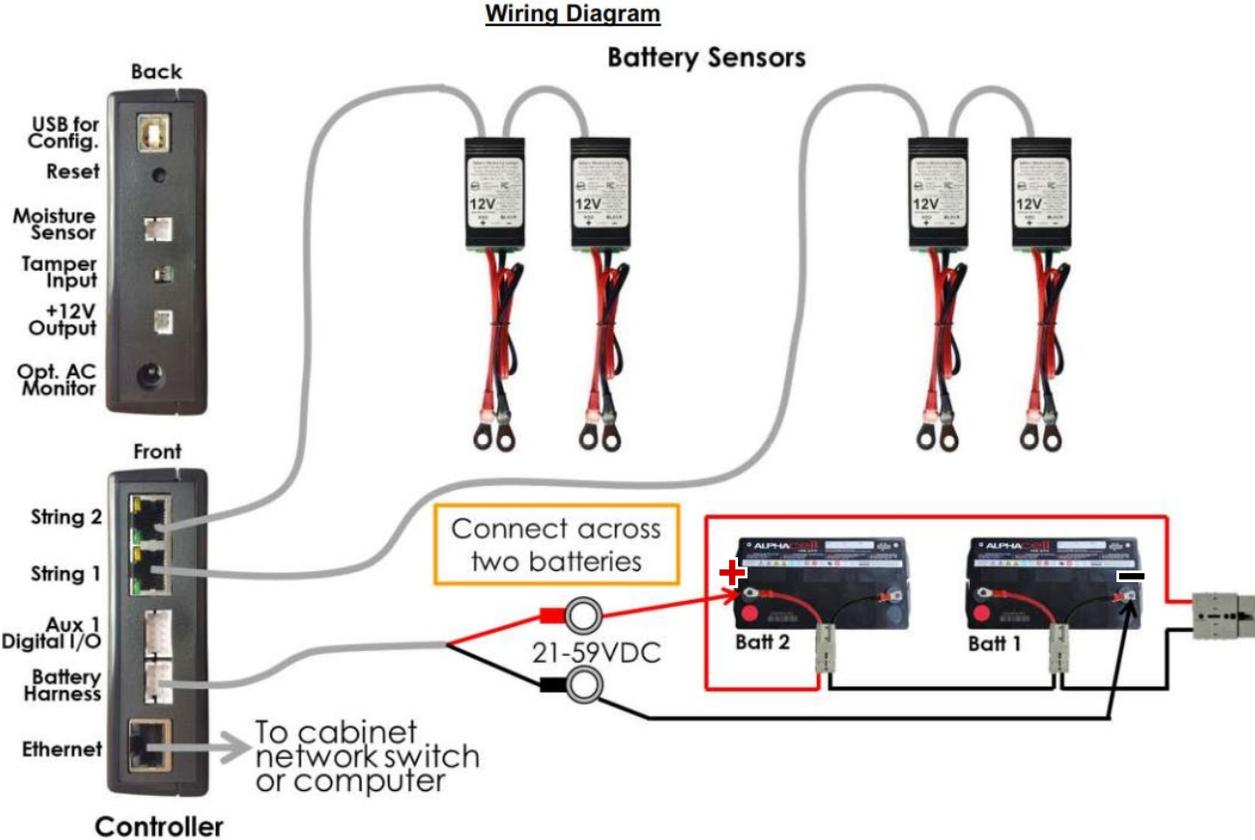
# 5.   RBMS Plus Installation

☑ **NOTE:** Before any sensor strings are connected to the RBMS Plus, connections should be made to the network (Ethernet connection) and it should be powered up and checked for network connectivity.

Select a location for the RBMS Plus. The location should be central to the strings being monitored and the modem (if used) or router. It should be dry and free of corrosive or explosive vapors.

## 5.1.   Powering

The RBMS Plus is powered by the battery string via the PBT-PAC-0BATT or PBT-PAC-8BATT harness. Connect the appropriate harness to the batteries, verify correct wiring and then connect the connecter end of the harness to the RBMS Plus battery string connector. The connectors are keyed and will only fit into one of the RBMS Plus female connectors.

**NOTE:** If the 8 BATT harness is used, the battery strings and the RBMS Plus must share a common negative ground

## 5.2.   Network Connections

Connect the rear panel Ethernet connector to the router (or modem).

Set the IP address of the RBMS Plus as described in the following section.

Verify network communications by accessing the web page and Telnet setup menu over the network.

## 5.3.   Connecting Sensors

Connect the cable from the string one sensor daisy-chain to the String 1 RJ-45 connector on the sensor interface input labeled string one front panel. If two battery strings are being used, connect the second string of sensors to the String 2 input on the RJ-45 String 2 sensor interface.

☑ **NOTE:** We strongly recommend that you order the appropriate cable kit for each string and not make your own sensor cables. A single improperly made cable can destroy an entire string of sensors.

The RBMS Plus will auto-discover the sensors connected in each of the daisy-chains. Once a string has been discovered, it will be visible in the web pages.

## 5.4.   Connecting Current Sensor (Optional)

Follow the detailed instructions included with the PBT-PA-RBMS Plus-CT kit. The installation process requires interrupting the output of the power supply during installation of the sensor. Plan accordingly when installing this option. The sensor measures power supply AC output current in the range of 0 - 20 A.

Connect the current sensor harness to the RBMS Plus front panel connector.

## 5.5.   Setting the IP Address

In order to communicate over the network, the RBMS Plus must be assigned an IP address.

There are several ways the IP address can be assigned.

- You can pre-configure your DHCP server to assign a reserved IP address to the RBMS Plus based on the RBMS Plus MAC Address. The MAC address is printed on the RBMS Plus label. This method is commonly used for field installations.
- You can let your DHCP server assign an address and then interrogate the DHCP server to determine what address was used. This technique works well in the lab environment where the DHCP server may be in a router. This method is not very practical for field installations since the IP address can change if the RBMS Plus resets or the DHCP server decides there is a reason to change the address.
- You can program a static IP address in the RBMS Plus using a temporary connection to a router with a built-in DHCP server and the RBMS Plus Telnet configuration port.
- You can program a static IP address in the RBMS Plus directly using the USB interface and a PC as described in the next section.
- You can program a static IP address in the RBMS Plus using an Ethernet crossover cable and a PC as described in the next section.

Generally, static IP addresses are used so that the network manager can associate the IP address with a physical location. Contact your network administrator or IT department to obtain a static IP address, gateway address and subnet mask that will work on your network.

The RBMS Plus is shipped from the factory configured with Static IP static IP address of 192.168.0.91. To set a default static IP address, press and hold the RBMS Plus reset button for a minimum of 5 seconds. When all the string port LEDs light and the RBMS Plus resets it will have a static IP address of 192.168.0.91. This IP address can be changed using the techniques described in the following sections.

## 5.6.    Configuring the RBMS Plus

The RBMS Plus can be configured over the network through a Telnet connection or through a USB connection directly from a PC using standard USB cable. Support of Telnet is a standard capability of Windows, so virtually any PC can configure the RBMS Plus.

☑  **NOTE:** For Windows, Telnet is disabled by default. To enable, go to Add/Remove Programs, Turn Windows Features On or Off, and check the box next to Telnet Client.

There are several ways of connecting your PC to the RBMS Plus to access the configuration program.

### 5.6.1.   Direct USB Connection

This method can always be used to connect to the RBMS Plus and is required when the RBMS Plus has been programmed with an unknown static IP Address.

The RBMS Plus is equipped with a local interface that allows a PC to be connected to the RBMS Plus through a standard USB cable to access the configuration program. A PC with a USB port, and a serial communications program such as HyperTerminal, TeraTerm, or Putty is required. The SC-Mini kit includes a USB cable, 3' USB network cable and instructions.

☑  **NOTE:** HyperTerminal, which has been part of Microsoft Windows since inception, is no longer included with Microsoft Vista or Windows 7. HyperTerminal can be downloaded from the Internet and added to these systems. There are many other terminal programs available on the Internet that will work. We recommend TeraTerm which can be downloaded for free at http://www.ayera.com/teraterm/. Be sure to comply with all licensing requirements.

### 5.6.2. USB Port Selection

Identify which COM port is being used for the USB serial communications.

1. Open the PC's "Control Panel" and click on the "System" icon.
2. Select the "Hardware" tab and click the "Device Manager" button.
3. Navigate down the tree of Devices and expand the "Ports (COM & LPT)" item.
4. Find the item labeled "Site Controller Com Port (COM#)". The Com Port that was installed on is shown in the parenthesis (COM7 in the example).
5. To change the Port, right-click the Device and select "Properties". Select the "Port Settings" tab and click on the "Advanced" button. A new Port # may now be selected and applied from the "Advanced Settings" Window.
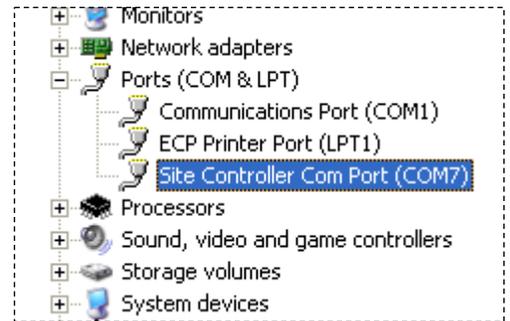
When configuring your Serial Communications program use the COM port number identified above. If you program only supports low number COM ports, change the port number as described in step 5.

### 5.6.3. Accessing the Setup Menu

To access the RBMS Plus setup menu connect the serial communications program to the RBMS Plus using the USB interface as described above. Open the serial communications program, select the COM port identified above and set the data rate to 9600, 8 data bits, one stop bit, no parity and no flow control. Press the rear panel reset button while holding down the x (lower case) for about 5 seconds. A message "-- Device Reset, hold 'x' key down until prompted. --" will appear. Continue to hold the x key until the setup menu appears and then follow the setup instructions below.

To restore the default IP address, press and hold the reset button for five seconds until the 4 LEDs on the string port light.

### 5.6.4. Ethernet Crossover Cable Method

This method can be used when the RBMS Plus IP address is set to a known static IP address. Connect an Ethernet crossover cable between the PC and the RBMS Plus. Set your PC IP address to the RBMS Plus address + or – 1. Follow the Telnet setup instructions below.

### 5.6.5. Router Method

This method can be used when the RBMS Plus is set for DHCP operation (factory default). Connect the RBMS Plus to a router that supports DHCP. This is generally done with a router designed for home use, but this process can also be used with most commercial routers and DHCP servers if the proper access is available. The DHCP server will automatically assign an IP address to the RBMS Plus which will enable network access to the RBMS Plus for configuration. Your router should have a built-in web server or some other method of determining what IP address was assigned to the RBMS Plus. (Refer to the router manual). Once the IP address is known, the RBMS Plus can be configured through a Telnet connection as described below.

## 5.7.    Running the RBMS Plus Telnet Setup
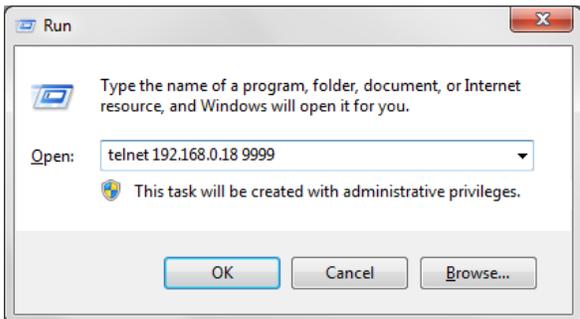
To open a Telnet connection to the RBMS Plus, select "Run" from the Windows Start menu. Enter "Telnet" followed by a space, then the IP address of the RBMS Plus followed by a space and then the port number "9999" followed by "Enter". If the RBMS Plus is online and the Telnet password is enabled, the following screen will be displayed. If the Telnet password is not enabled, skip to the next step. Note that the screens in this document may be slightly different than your RBMS Plus screens.

The RBMS Plus will not ask for the password when using the direct USB connection or if the password is not set.
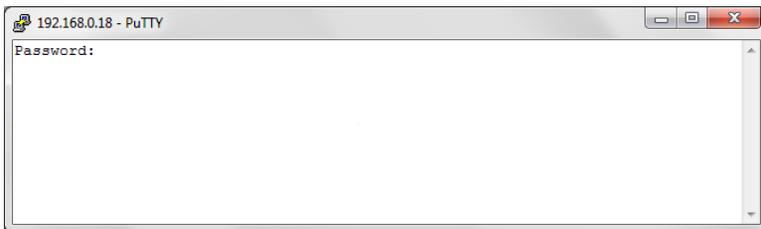
Enter the password. You only have a few seconds before the session times out. If the password is accepted, the following screen will be displayed, if the password is not accepted the Telnet session will be terminated.
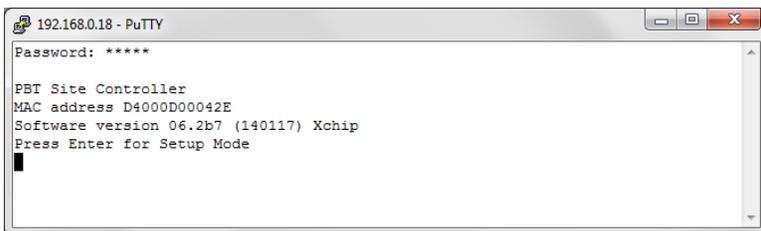
Type "Enter", to display the setup menu shown in the next section. For security purposes, if "Enter" is not typed in a few seconds, the Telnet session will be terminated by the RBMS Plus.

## 5.8.    RBMS Plus Setup Menu

No matter what method of access was used, the setup menu will then be displayed as shown below. These screen shots were captured from a Telnet client, but they will look the same in a serial program.

```
PBT PowerAgent SCmini
MAC address 00204ACD9C66
Software version V0120 (140227) CPK_680_XPTEX

Press Enter for Setup Mode

PIC ver 2.0  SnmpTimer 7200, PicTimer 3163, ModemTimer 1963

*** basic parameters
Hardware: Ethernet TPI
IP addr 192.168.0.102, gateway 101, netmask 255.255.255.248

SNMP Community String, Set: , Get: public, Trap: public
Trap Receivers:   1: 192.168.0.102   2: --- not set ---   3: --- not set ---
Reset after 2 hours with no SNMP Messages: Disabled

SMTP Server:
Resolved Server IP: 0.0.0.0
Name:
Password:
To Addr 1:
To Addr 2:
To Addr 3:
From Addr:
DNS, Primary: 4.2.2.2, Secondary: --- not set ---

NTP Servers, Pri: 132.163.4.103, Sec: 129.6.15.29
Time Offset -300 Minutes

05 Jul 2014 04:47:27

0 Server Setup
1 Web Password Setup
2 Power Supply Setup
3 SNMP Setup
4 HMS defaults
5 Email Setup
6 NTP Setup
7 Restore factory defaults
8 exit
9 save changes and Reset
13 Erase String and Battery Database
14 Reset All Sensors
15 Erase String
19 Firmware Server
? _
```

The top two thirds of the screen display the present configuration. The menu at the bottom of the screen displays the setup menu.

☑ **NOTE:** Closing the Telnet window will terminate the Telnet session and reset the RBMS Plus. To avoid resetting the RBMS Plus, exit by pressing "8" followed by "Enter".

### 5.8.1. Server Setup (0)

Various options can be controlled by setting the IP address. For static IP address operation, the IP address should be set to the address assigned by the IT department or other authority. Other IP address options are as follows:

If the IP address is set to 0.0.0.0 – DHCP is enabled.
If the IP address is set to 0.0.1.0 – DHCP is enabled and AutoIP is disabled.
If the IP address is set to 0.0.9.0 – DHCP is enabled, DHCP option 81 is disabled, and AutoIP is disabled.
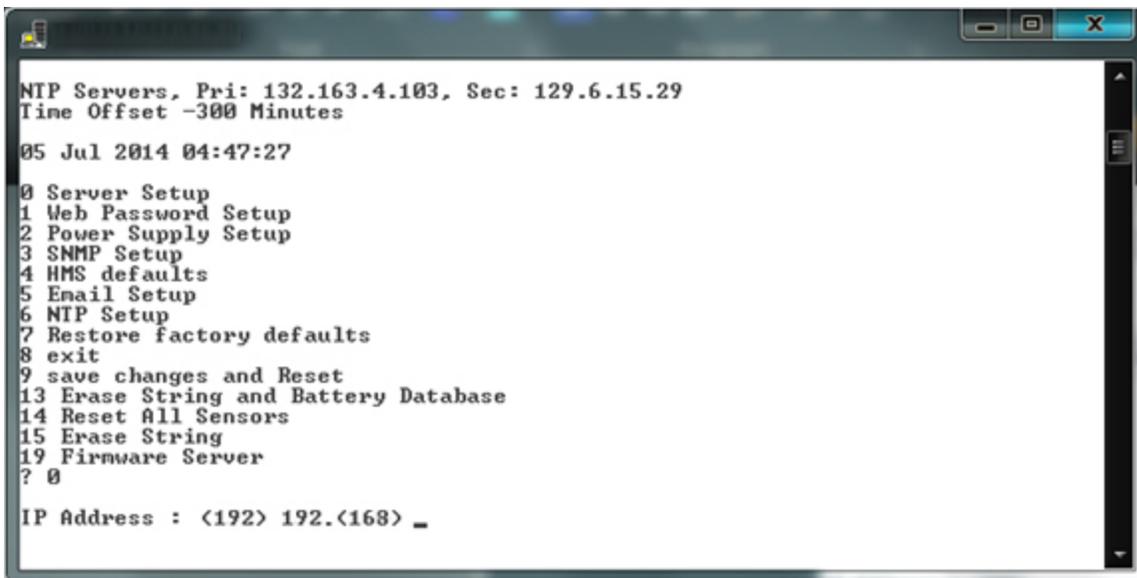
To change the IP address, select option 0 from the setup menu by typing a 0 followed by "Enter". The following screen will appear.

The current value of the first octet of the IP address will be shown in parenthesis. This indicates that the first octet of the IP address is 0. To change the octet, type the new number followed by "Enter". To move on without making any changes, just type "Enter".

In this example the first octet of the IP address was kept at 192.

Continue entering each octet of the IP address until all four octets have been entered. To skip any entry without making any changes, type "Enter" without typing any numbers.
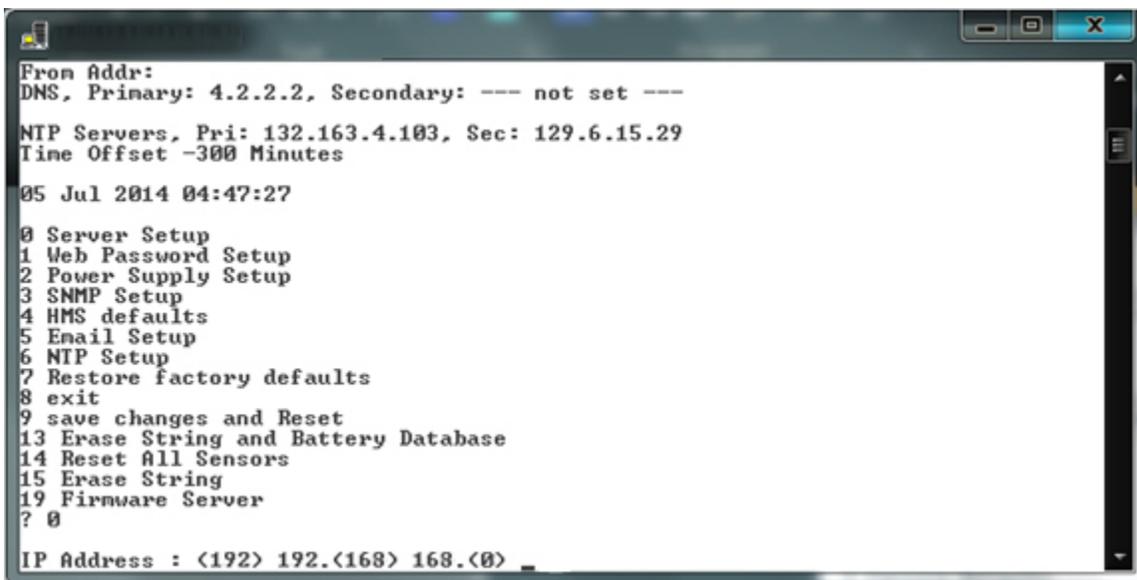
Next the RBMS Plus will ask if you would like to set the Gateway IP Address. The gateway address is required for the RBMS Plus to initiate communications with other devices on the network, such as the time or e-mail servers. This address is obtained automatically when running with DHCP, however when a static IP address is assigned to the RBMS Plus the gateway address must be set manually. The gateway address is normally set to the IP address of the first router encountered by outbound network traffic. To change the address, type a "Y" and enter the IP address as described above. To skip the address, type an "N".
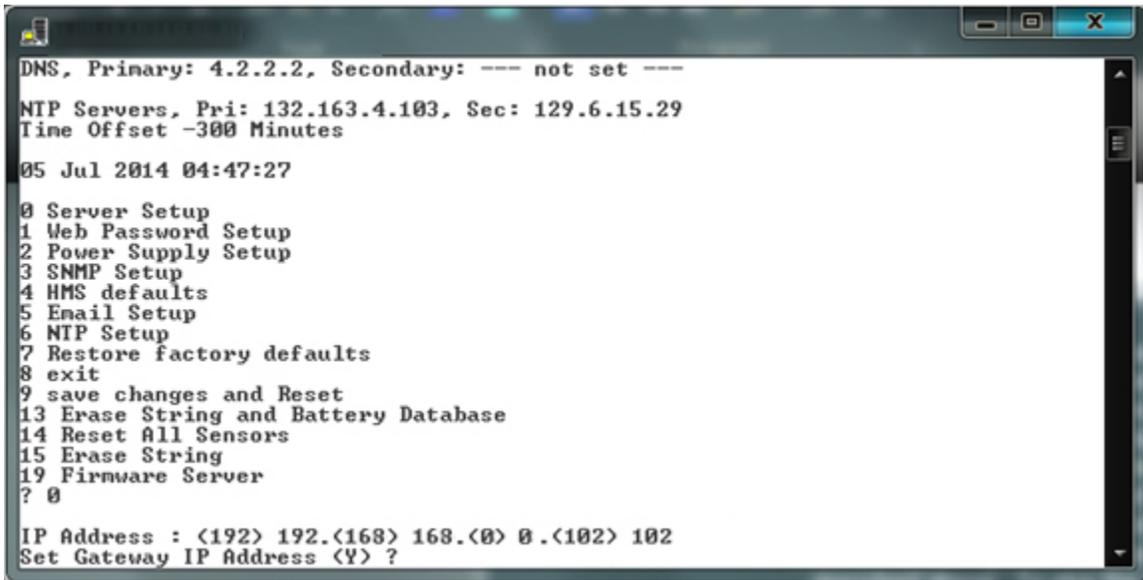


The RBMS Plus will now ask for the network mask. To change the mask, enter the number of bits required for the local host. Example: for 255.255.255.0 enter 8, for 255.255.252.0 enter 10. Verify the Netmask was set correctly by observing the displayed value when the menu returns to the screen. The table below shows the value to be entered for common Netmasks.
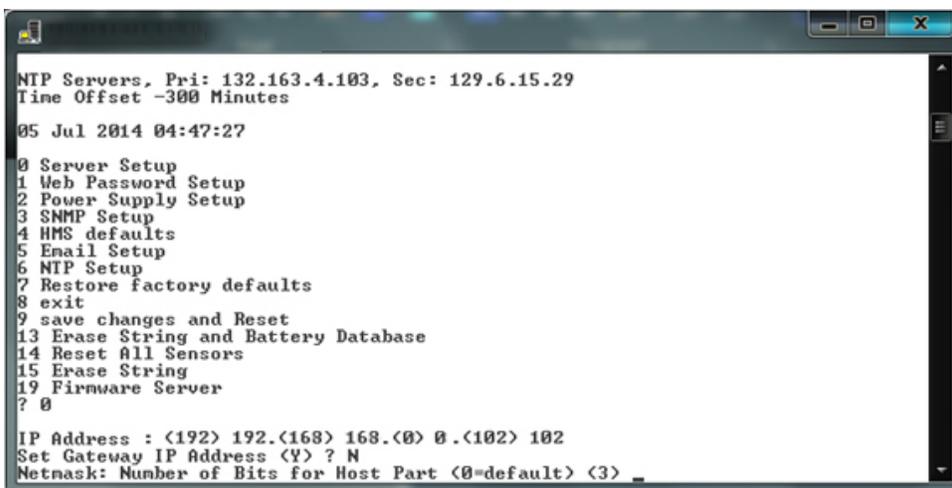


| Value | Netmask |
|-------|-----------------|
| 2 | 255.255.255.252 |
| 3 | 255.255.255.248 |
| 4 | 255.255.255.240 |
| 5 | 255.255.255.224 |
| 6 | 255.255.255.192 |
| 7 | 255.255.255.128 |
| 8 | 255.255.255.0 |
| 9 | 255.255.254.0 |
| 10 | 255.255.252.0 |
| 16 | 255.255.0.0 |

Next the RBMS Plus will ask if a Telnet password is desired. A four-character password can be selected to secure Telnet access to the agent. Use caution when selecting a password. If you forget the password or enter it incorrectly the RBMS

Plus must be accessed using the USB cable to reset the password. To set the password, enter a "Y" and then the password, following the prompt. To remove a password enter a "Y" and then hit enter at the prompt.
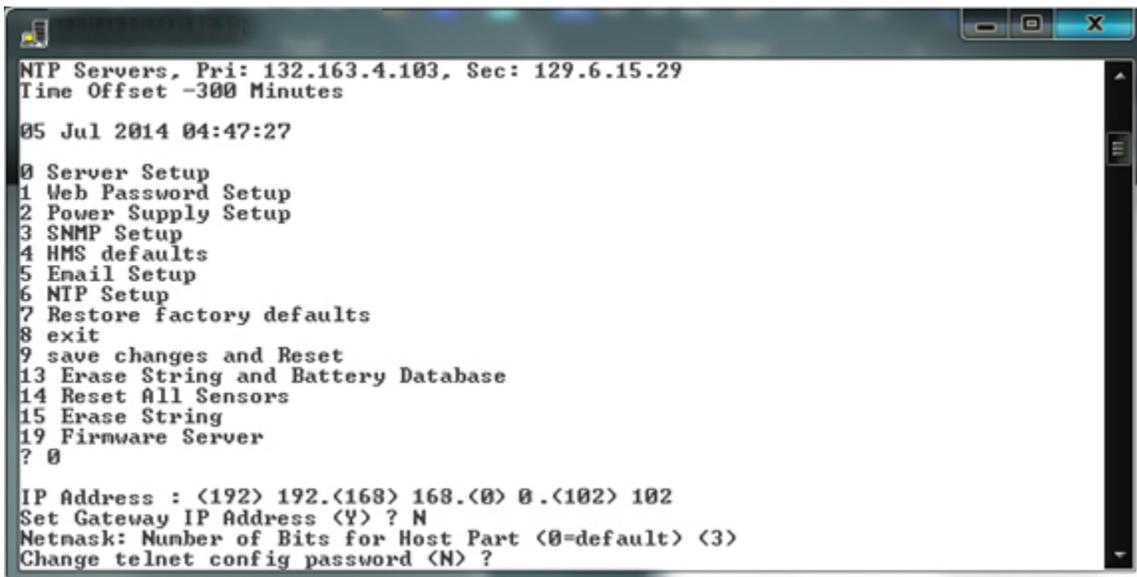


Telnet will return to the main menu.

Once at the main menu, type "9" to save your changes. The changes will be saved in nonvolatile memory, the Telnet session will be terminated and the RBMS Plus will reset.
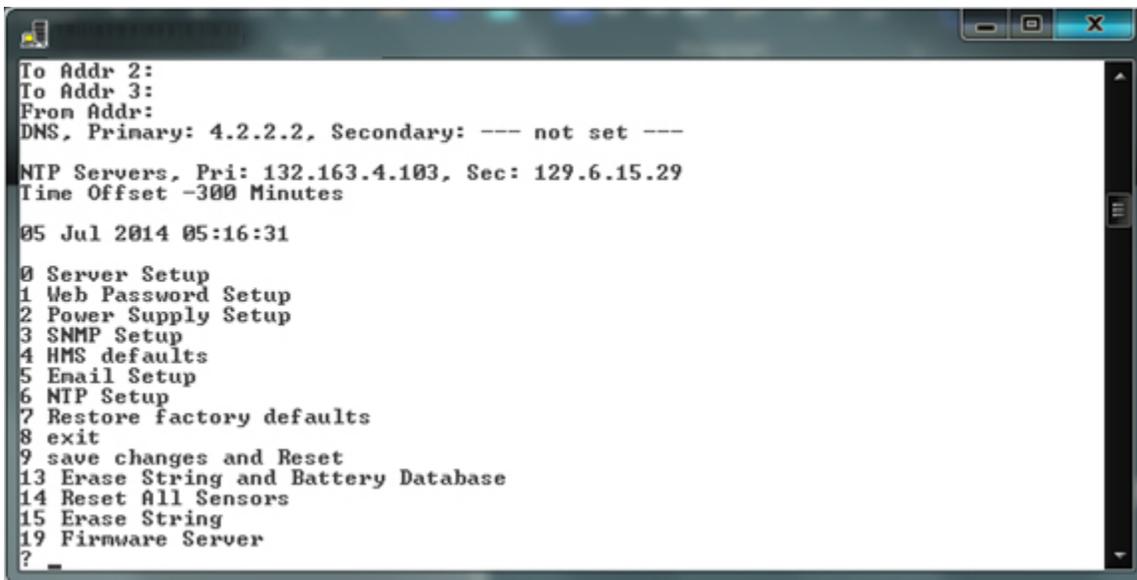


### 5.8.2. Password Setup (1)

To change the Passwords used for the web page access, type "1" followed by "Enter".

There are two web passwords. Web password 1 is for user access that will allow the operator only to view alarm thresholds and not make changes. Web password 2 is for admin access and will allow changes to alarm thresholds and site setup configurations. To change either password, type the new password followed by "Enter". To keep the present password, type "Enter". Passwords can be 20 characters long and are case sensitive. The default for Web password 1 is "user" and the default for Web password 2 is "admin". The password changes will immediately be saved to nonvolatile memory and become effective.
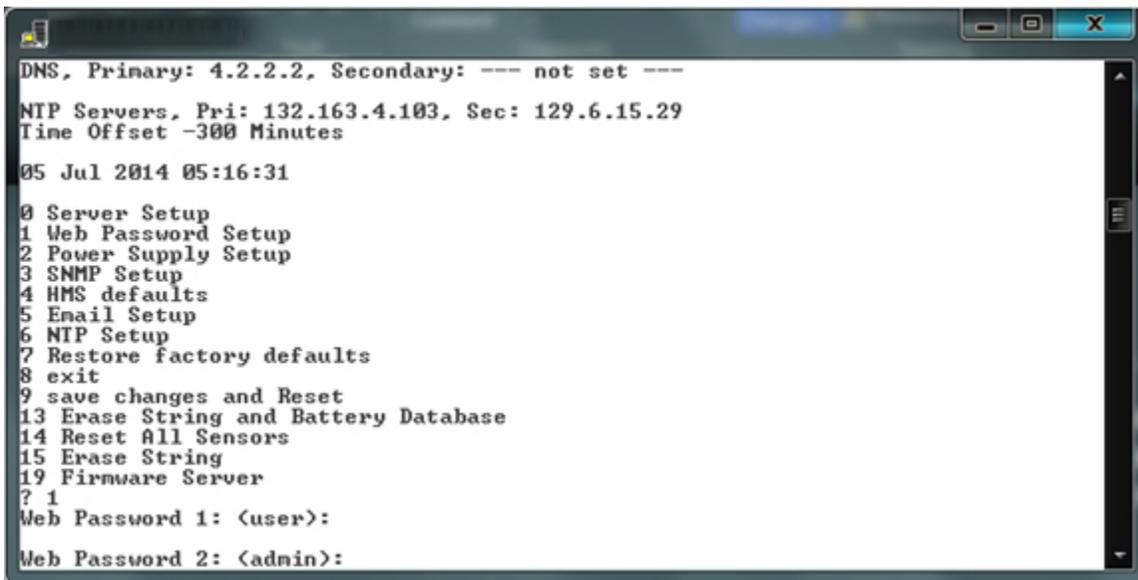


Type "8" followed by "Enter" to close the Telnet session without resetting the RBMS Plus**.**

### 5.8.3.  SNMP Setup (3)

The SNMP community strings and trap destinations are configured from the SNMP Setup.
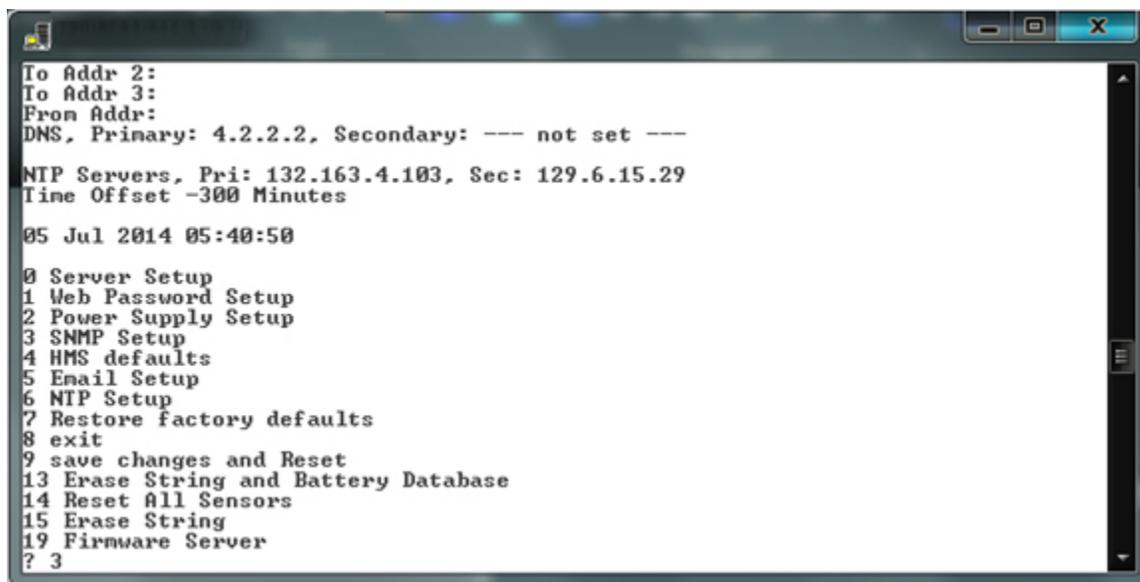


To configure SNMP on the RBMS Plus, type "3" followed by "Enter".

```
From Addr:
DNS, Primary: 4.2.2.2, Secondary: --- not set ---

NTP Servers, Pri: 132.163.4.103, Sec: 129.6.15.29
Time Offset -300 Minutes

05 Jul 2014 05:40:50

0 Server Setup
1 Web Password Setup
2 Power Supply Setup
3 SNMP Setup
4 HMS defaults
5 Email Setup
6 NTP Setup
7 Restore factory defaults
8 exit
9 save changes and Reset
13 Erase String and Battery Database
14 Reset All Sensors
15 Erase String
19 Firmware Server
? 3

Set Community ():
```

The default community strings are set to "public". You now have the option of changing the community strings. The present community string will be displayed in parenthesis as shown.



```
From Addr:
DNS, Primary: 4.2.2.2, Secondary: --- not set ---

NTP Servers, Pri: 132.163.4.103, Sec: 129.6.15.29
Time Offset -300 Minutes

05 Jul 2014 05:40:50

0 Server Setup
1 Web Password Setup
2 Power Supply Setup
3 SNMP Setup
4 HMS defaults
5 Email Setup
6 NTP Setup
7 Restore factory defaults
8 exit
9 save changes and Reset
13 Erase String and Battery Database
14 Reset All Sensors
15 Erase String
19 Firmware Server
? 3

Set Community (): public
```

To change any community string, type the new string followed by "Enter". To move to the next item without changing the community string, type "Enter".

☑ **NOTE:** Community strings are case sensitive.

After setting the community strings, you have the option of setting up to three trap receivers. The IP addresses of the trap destinations are set similar to the IP address described above. To disable sending traps to any of the three IP addresses, enter zeros for the IP address.

After entering the last trap receiver address, press "Enter".
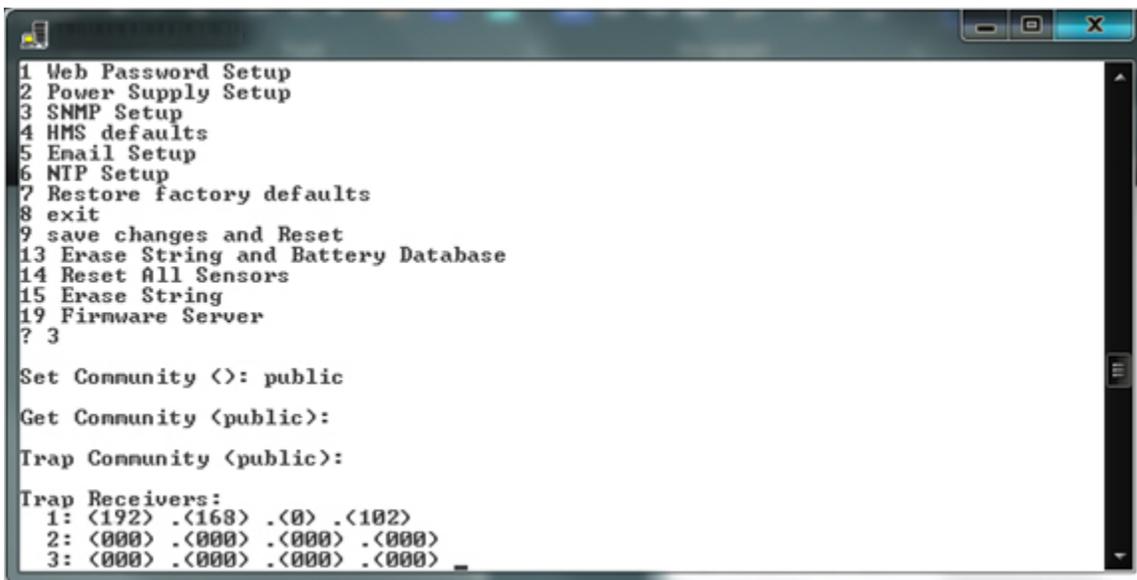


The RBMS Plus includes a feature that will reset the device if an SNMP message is not received for approximately two hours. This safety feature is primarily used when the device is located in a remote unmanned location. If the SNMP firmware or cable modem hangs, this may recover the device without a visit to the remote location. The default setting is disabled. To enable the reset, type a "Y"; to disable the feature, type an "N" or "Enter".
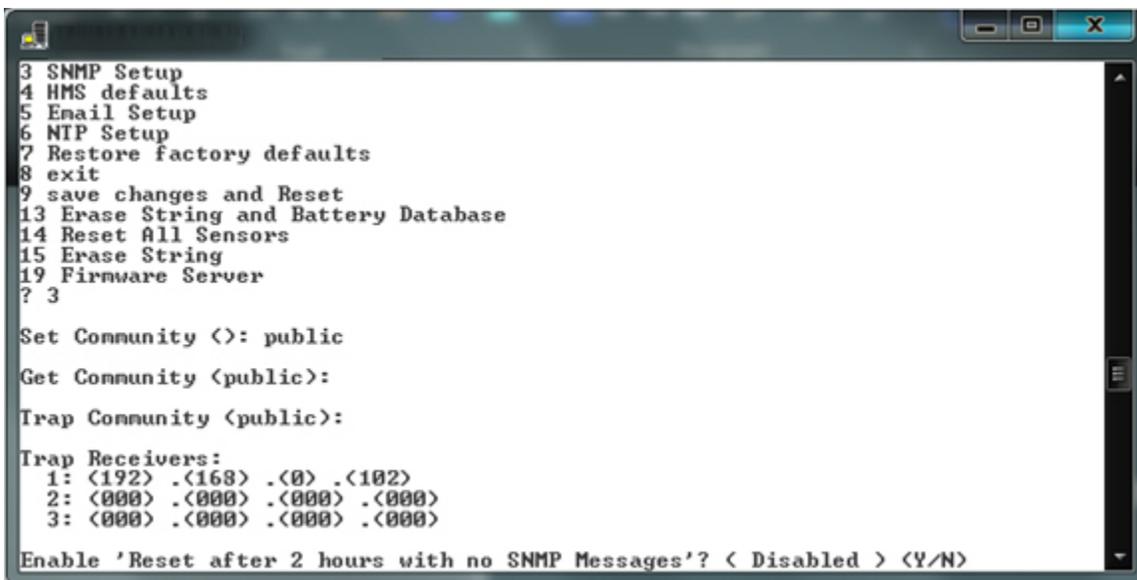


The menu will be redisplayed at the end of the SNMP configuration. Select "9" to save the changes and close the Telnet session.

### 5.8.4.   HMS Defaults (4)

To restore the factory default settings for all SNMP objects, type a "4" followed by "Enter". The e-mail, NTP, Gateway, Netmask, and IP address will not be changed. The Telnet session will be closed and the RBMS Plus will be reset.

### 5.8.5.   E-mail Setup (5)

The e-mail system will send alarm messages to a maximum of three e-mail addresses.

```
From Addr:
DNS, Primary: 4.2.2.2, Secondary: --- not set ---

NTP Servers, Pri: 132.163.4.103, Sec: 129.6.15.29
Time Offset -300 Minutes

05 Jul 2014 05:58:26

0 Server Setup
1 Web Password Setup
2 Power Supply Setup
3 SNMP Setup
4 HMS defaults
5 Email Setup
6 NTP Setup
7 Restore factory defaults
8 exit
9 save changes and Reset
13 Erase String and Battery Database
14 Reset All Sensors
15 Erase String
19 Firmware Server
? 5

SMTP Server Name ():
```

If your server requires a username and password enter the username followed by "Enter". If the username is left blank, the RBMS Plus will not send the username and password to the mail server. To keep the present name type "Enter".

To setup the e-mail system, type a "5" followed by "Enter" from the setup main menu. Enter the outgoing e-mail server name. If there is no server name, the e-mail system is disabled. If a server name was previously entered, it will be shown. To change the server name, type the new name followed by "Enter". To keep the server name shown, type "Enter". To remove the server name (or the contents of any other text field) type any character, then "Backspace" followed by "Enter". The IP address of the mail server can be entered in place of the server name if the server is unnamed.

```
NTP Servers, Pri: 132.163.4.103, Sec: 129.6.15.29
Time Offset -300 Minutes

05 Jul 2014 05:58:26

0 Server Setup
1 Web Password Setup
2 Power Supply Setup
3 SNMP Setup
4 HMS defaults
5 Email Setup
6 NTP Setup
7 Restore factory defaults
8 exit
9 save changes and Reset
13 Erase String and Battery Database
14 Reset All Sensors
15 Erase String
19 Firmware Server
? 5

SMTP Server Name (): smtp.comcast.net

Server User Name (): alarms@phoenixbroadband.com_
```

Now enter the server password followed by "Enter".

```
Time Offset -300 Minutes

05 Jul 2014 05:58:26

0 Server Setup
1 Web Password Setup
2 Power Supply Setup
3 SNMP Setup
4 HMS defaults
5 Email Setup
6 NTP Setup
7 Restore factory defaults
8 exit
9 save changes and Reset
13 Erase String and Battery Database
14 Reset All Sensors
15 Erase String
19 Firmware Server
? 5

SMTP Server Name (): smtp.comcast.net

Server User Name (): alarms@phoenixbroadband.com

Server Password (): password
```

Up to three e-mail address may now be entered. The addresses are changed the same as the server name.
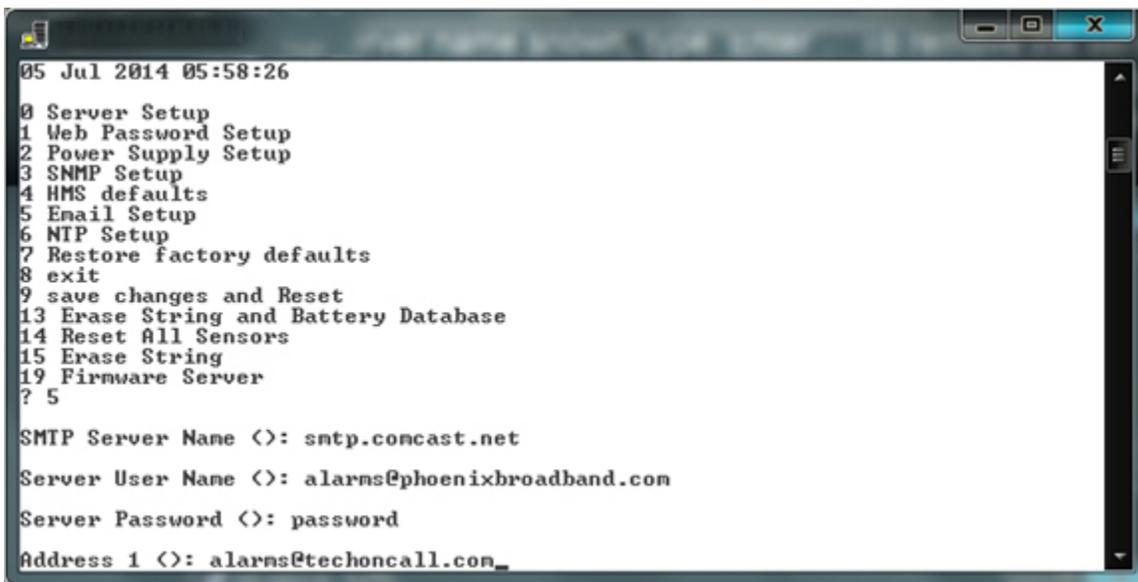


Next enter the From address. This is the address that will be indicated in the e-mail when it is received.

☑ **NOTE:** The From address should generally be set to an address that is registered on the SMTP server. Many servers use this to authenticate the outgoing e-mail.
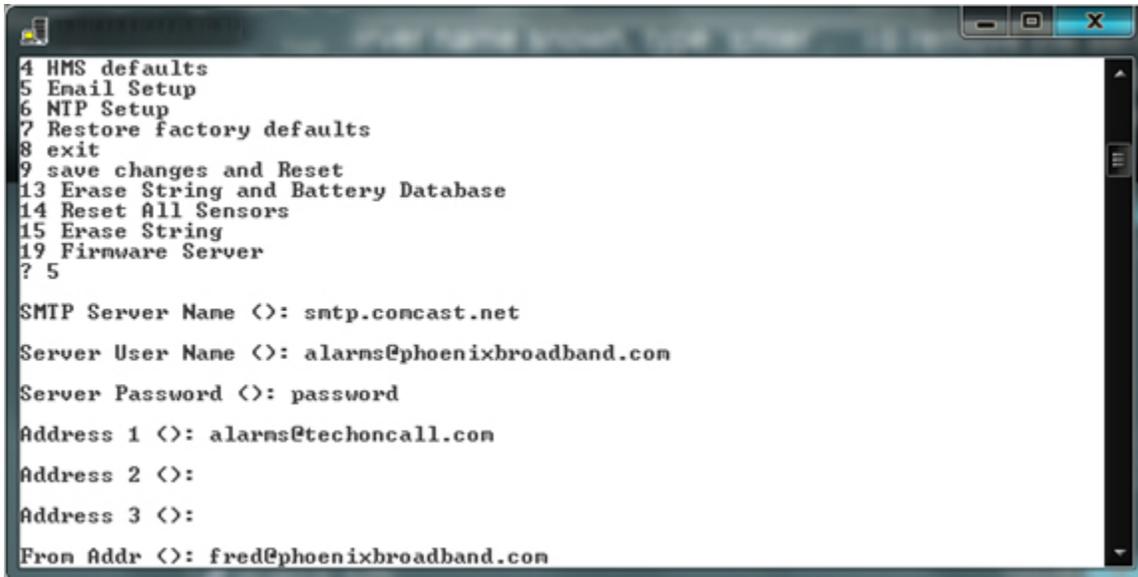
Finally, set the domain name server (DNS) IP address. The DNS allows the e-mail application to obtain the IP address of the specified server from the server name so that it can send the mail. There are fields for a primary and secondary DNS.

```
6 NTP Setup
7 Restore factory defaults
8 exit
9 save changes and Reset
13 Erase String and Battery Database
14 Reset All Sensors
15 Erase String
19 Firmware Server
? 5

SMTP Server Name (): smtp.comcast.net

Server User Name (): alarms@phoenixbroadband.com

Server Password (): password

Address 1 (): alarms@techoncall.com

Address 2 ():

Address 3 ():

From Addr (): fred@phoenixbroadband.com

Primary DNS: (004)
```

The IP addresses are set as described in the IP address section of this document. The default is a commonly used DNS (4.2.2.2). Change this to your local DNS if you prefer. As long as the RBMS Plus can see the Internet, the default DNS will work.

```
6 NTP Setup
7 Restore factory defaults
8 exit
9 save changes and Reset
13 Erase String and Battery Database
14 Reset All Sensors
15 Erase String
19 Firmware Server
? 5

SMTP Server Name (): smtp.comcast.net

Server User Name (): alarms@phoenixbroadband.com

Server Password (): password

Address 1 (): alarms@techoncall.com

Address 2 ():

Address 3 ():

From Addr (): fred@phoenixbroadband.com

Primary DNS: (004) .(002) .(002) .(002) _
```

To save your changes, type "9" from the main menu and hit "Enter". The changes will be saved in nonvolatile memory, the Telnet session will be terminated and the RBMS Plus will reset.

### 5.8.6. NTP Setup (6)

The RBMS Plus can set its internal clock from any Internet time server that supports network time protocol (NTP). There are many such servers around the world. Many of these servers are operated by government standards organizations. Most private networks also have time servers.
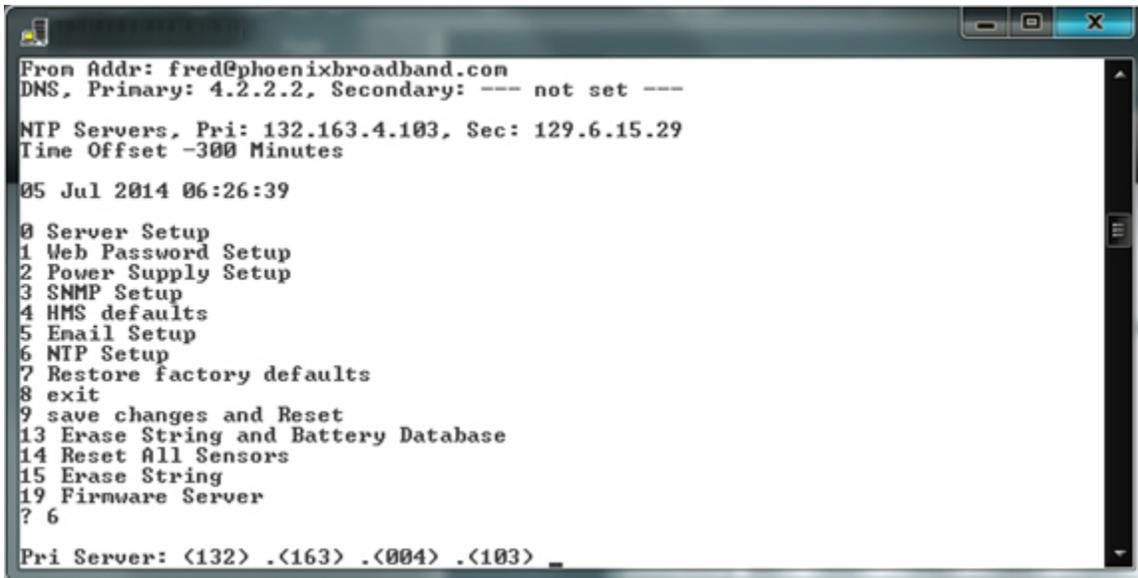


The RBMS Plus is shipped with the NTP configuration set to get the time from two different US National Institute of Standards (NIST) time servers. The IP addresses of these servers can be changed in the NTP configuration. If the time server addresses are not configured or the RBMS Plus is unable to contact either time server, the RBMS Plus will initialize the time to 00:00:00 1/1/2018. If communication is not established with a time server, the internal clock will run from this point.
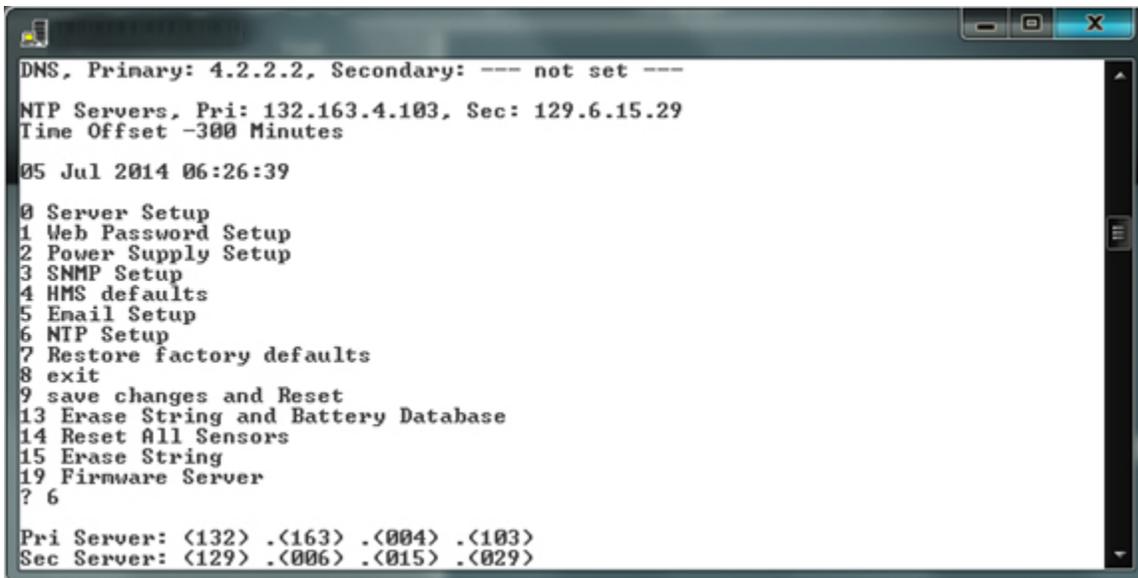


The time provided by most time servers is Greenwich Mean Time (GMT). The RBMS Plus will convert this to local time using a time offset that can be entered in the NTP configuration.

```
NTP Servers, Pri: 132.163.4.103, Sec: 129.6.15.29
Time Offset -300 Minutes

05 Jul 2014 06:26:39

0 Server Setup
1 Web Password Setup
2 Power Supply Setup
3 SNMP Setup
4 HMS defaults
5 Email Setup
6 NTP Setup
7 Restore factory defaults
8 exit
9 save changes and Reset
13 Erase String and Battery Database
14 Reset All Sensors
15 Erase String
19 Firmware Server
? 6

Pri Server: (132) .(163) .(004) .(103)
Sec Server: (129) .(006) .(015) .(029)
Local Time offset from GMT (Minutes):   (65236) ?
```

| Time Offset from GMT | Time Zone | Time Offset |
|---|---|---|
| 12 | NZST | 720 |
| 11 |  | 660 |
| 10 | GST | 600 |
| 9 | JST | 540 |
| 8 | CCT | 480 |
| 7 |  | 420 |
| 6 |  | 360 |
| 5.5 | IST | 330 |
| 5 |  | 300 |
| 4 |  | 240 |
| 3 | BT | 180 |
| 2 | EET | 120 |
| 1 | CET | 60 |
| 0 | GMT | 0 |
| -1 | WAT | 65476 |
| -2 | AT | 65416 |
| -3 |  | 65356 |
| -4 | AST | 65296 |
| -5 | **EST** | 65236 |
| -6 | **CST** | 65176 |
| -7 | **MST** | 65116 |
| -8 | **PST** | 65056 |
| -9 | YST | 64996 |
| -10 | AHST | 64936 |
| -11 | NT | 64876 |
| -12 | IDLW | 64816 |

To configure the NTP select option 6 from the configuration main menu. Enter the IP addresses as described in the IP address section of this manual. There are two time server addresses. The RBMS Plus will use the primary server unless it fails to respond and then it will switch to the secondary. It will not switch back unless the secondary server fails to respond or the RBMS Plus is reset. To change a default time server IP address to undefined, enter zeros for the IP address.

The RBMS Plus will reset itself if there is no communication with either time server for approximately two hours. To disable the reset function, enter zero for all four octets of the primary time server IP address. The RBMS Plus will use the secondary time server to set the time if the second IP address is valid.

The time read from the time server is GMT. There is an option in the NTP setup to enter a time offset to correct the time to read local time. If the time offset is positive, east of the UK, simply enter the offset in minutes. If the time offset is negative, west of the UK, the offset must be entered in 2's compliment form. To compute the value, subtract the time offset in minutes from 65536 and enter the result. For example, the offset to Eastern Daylight Time is 4 hours. 65536 - 240 = 65296. Enter 65296 as the time offset for Eastern Daylight Time. The table to the left contains the offset value for each major time zone.

To save your changes, type "9" from the menu and hit "Enter". The changes will be saved in nonvolatile memory, the Telnet session will be terminated and the RBMS Plus will reset.

### 5.8.7.  Restore Factory Defaults and Reset (7)

To restore the factory default settings type a 7. All SNMP, e-mail, NTP and HMS values will be set to the factory defaults. The IP address will not be changed, however the gateway and netmask settings will be set to the factory default values.

☑ **NOTE:** Be careful. Changing the gateway and netmask settings could prevent communications with the RBMS Plus, requiring a site visit.

### 5.8.8.  Exit Without Resetting (8)

Type "8" followed by an "Enter", to exit the setup program and close the Telnet window without saving the changes to nonvolatile memory and without resetting the RBMS Plus. Some changes will take effect (SNMP) others will not (e-mail).

### 5.8.9.  Save Changes and Reset (9)

Type "9" followed by an "Enter", to save all changes to nonvolatile memory, close the Telnet window, exit the setup program and reset the RBMS Plus so all changes take effect.

### 5.8.10. Erase String and Battery Database (13)

Typing "13" followed by "Enter" will erase all of the string and jar data from the RBMS Plus' nonvolatile memory and then reset the RBMS Plus. All user-entered data for the strings and jars, including names and alarm setups, will be lost. The other settings will not be changed.

### 5.8.11. Reset All Sensors (14)

Typing "14" followed by "Enter" will reset all the Sensors. The Telnet session will remain open and no settings will be changed. The reset will force all of the sensors to be rediscovered.

### 5.8.12. Erase String (15)

Typing "15" followed by "Enter" will erase a specified string. You will be prompted for the string number. The Telnet session will remain open and no settings will be changed.

### 5.8.13. Setup Firmware Server (19)

Typing "19" followed by "Enter" will allow you to enter an IP address of a firmware server. The IP address should be set as described in the IP address section of this document. If an IP address is entered for the firmware server, then the RBMS Plus (at random times) will send the firmware server its IP address, date/time stamp, MAC Address, unit type and firmware version. This feature is used in conjunction with a dedicated firmware server to enable automatic updates of firmware and web pages to Alpha Technologies units.

```
DNS, Primary: 4.2.2.2, Secondary: --- not set ---

NTP Servers, Pri: 132.163.4.103, Sec: 129.6.15.29
Time Offset -300 Minutes

05 Jul 2014 06:41:52

0 Server Setup
1 Web Password Setup
2 Power Supply Setup
3 SNMP Setup
4 HMS defaults
5 Email Setup
6 NTP Setup
7 Restore factory defaults
8 exit
9 save changes and Reset
13 Erase String and Battery Database
14 Reset All Sensors
15 Erase String
19 Firmware Server
? 19

Firmware Server:
IP<000> .<000> .<000> .<000> _
```

Press 9 then "Enter" to save the server IP.

## 5.9.    Web Server

The RBMS Plus contains a Web Server that provides a complete set of web pages to observe and configure the monitoring system from a web browser without having to install any software. RBMS Plus firmware needs to be v1.61 and web page to be v1.03 and up, to have HTML 5 based web pages.

☑    **NOTE:** Check the website for notifications on the latest available firmware.

### 5.9.1.   Accessing the Web Server

To access the RBMS Plus Web page type your RBMS Plus' IP address in the format "http://192.168.0.91" from your web browser. This IP address is an example; substitute your RBMS Plus' IP address in place of "192.168.0.91".

### 5.9.2.   Ports

The RBMS Plus web server uses Port 80 to receive requests from the PC. The ports on the PC are selected automatically. Port 80 is the normal HTTP port.

# 6.  Navigating the Web Pages

Use Chrome or Edge web browsers to view the RBMS. Be sure your computer is on the same IP scheme as the RBMS, connect using an Ethernet cable, and enter the default IP of 192.168.0.91 or the IP address you changed to into the browser. The below page will load. To change settings, click the "Login" button and type "admin".
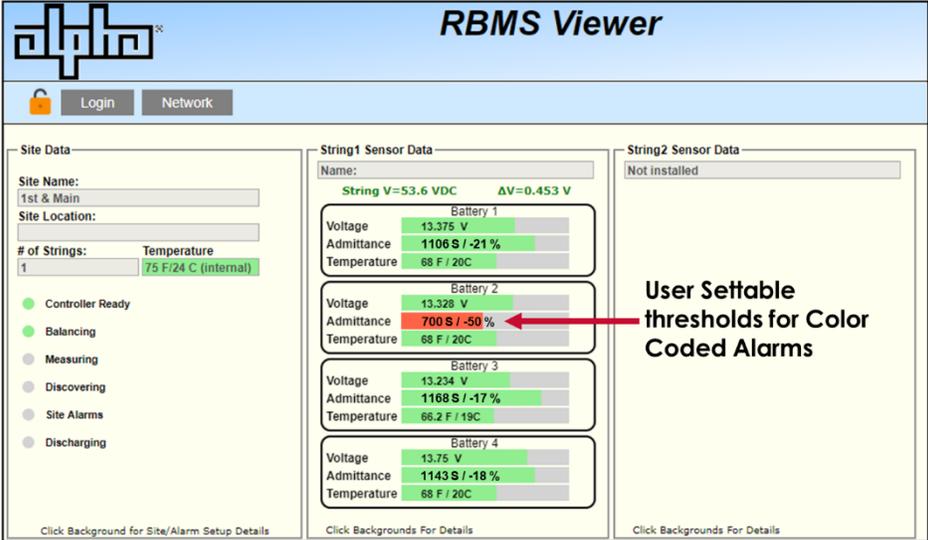


- Instantly shows battery status:
  - Voltage
  - Admittance
  - Temperature
  - String Voltage
  - Battery ΔV

## 6.1. Battery Sensor Detail

Clicking a battery subsection will show the window to the right. Change the battery name to give you good reference information for the future. Change to Model, Initial Siemens, Date Installed, Battery Number. It is helpful to have the original siemens value logged in case you were to ever have a warranty claim, and this is a good place to keep it.

**Battery Sensor Details: String 1, Battery 1**

| | |
|---|---|
| Name | 240XTV, 1426S, 5/23/16, Batt 1 |
| Voltage | 13.391 V |
| Temperature | 72 F / 22 C |
| Admittance (Battery/Cell) | 184 S / 1106 S |
| Admittance Change (%) | -4 |
| Baseline Admittance | 1400 |
| Baseline Admittance Date | 11-18-2019; 01:04:30 |
| Last Admittance Date | 12-18-2019; 00:01:31 |
| Balancing Status | Balancing |
| SensorStatus | Normal |
| Flash Sensor LED | ☐ |

Update Battery Settings

Selecting the "Flash Sensor LED" will make that battery sensor flash Green/Red, which is helpful for battery identification. Leave unchecked until needed.

## 6.2. String Details

Clicking in the String Sensor Data section (but not the battery subsection) will bring up the String Details pop-up. In this pop-up you can change the string name, Reset Sensors, and Re-Discover String.

**String 1 Details**

| | |
|---|---|
| String Name | String 1 |
| Sensor String Voltage | 53.3 |
| String Delta Voltage | 0.062 |
| Number of Batteries | 4 |
| String Discharge Status | 1 |
| Sensor Communication Status | Normal |

Update String Name
Reset Sensors
Re-Discover String

## 6.3. Site Details

Clicking the background of the Site Details section will pop-up the below window. In the top section you can change the Site Name, Site Location and the admittance interval. After you make your changes click the "Update Details" button to save. The firmware and web pages versions are also shown.

## 6.4. Analog Alarm Settings

The center section of the Site Details pop-up is where alarms for the RBMS Plus are provisioned. Clicking the dropdown arrow opens a window to select which alarm you would like to provision. If an alarm is enabled and a threshold triggers an alarm, the battery value bars or item will change color to show the alarm. Major alarms (HIHI & LOLO) will be in red and minor alarms (HI & LO) will be in yellow. A triggered alarm will also generate emails and SNMP traps if the controller is setup to do so.



**Battery Admittance Change (%)** is the most commonly used alarm. The Admittance value is the state of health of your battery. When the batteries are new, compare their values and use an average Siemens value for the Baseline Admittance value. All batteries will refer to this value. Typically, the LO and LOLO alarms are enabled. To enable the alarm the checkbox must be checked as shown below. The default thresholds are -20% and -40%. Change these as you see fit. Proper records should be kept on conductance readings as they are meant to be measured over time to establish battery health trends and not in a fixed point in time to see battery health. Any battery with sudden large drop in value, or below 50% of reference conductance value is a suspect and should be evaluated further based on battery manufacture recommendations. Be sure to click "Update Analog Alarms" after you have made any changes to the default settings.

**Analog Alarm Specs**

| | | | |
|---|---|---|---|
| Alarm Group: | All Sensors: Battery Admittance Change (%) ▼ | | |
| All Sensors: Adm Change HIHI | 40 | % | ☐ |
| All Sensors: Adm Change HI | 20 | % | ☐ |
| Baseline Admittance | 1150 | S | |
| All Sensors: Adm Change LO | -20 | % | ☑ |
| All Sensors: Adm Change LOLO | -40 | % | ☑ |

Disable All | Enable All
Update Analog Alarms

### 6.4.1. System Controls

At the bottom of the Site Details pop-up are the System Controls. These allow further control of the system.

**Measure Now** – Invokes the system to take new admittance readings. If you or the system has just taken a reading, you will have to wait 5 minutes until the next reading will be taken. The controller starts a timer if it recently took a reading and "Measure Now" is clicked.

**Stop Balancing** – The system by default will balance the batteries in the string to provide maximum life for each battery. This feature can be disabled by clicking "Stop Balancing" and it restarts when clicked again.

**Reset Controller** – Resets the controller when clicked.

**Turn Output On** – Turns on the digital output at the Aux 1 connector.

**System Controls**

| Measure Now | Reset Controller |
|---|---|
| Stop Balancing | Turn Output ON |

**NOTES:**

**Controller date/time** – The controller date/time which is acquired by a network or internet time server. This value is used to date/time stamp admittance baseline and when readings are taken.

**Up time** - The time the RBMS Plus has been running since the last reset.

**String Status** – The below active status values are shown in the String Details pop-up

| String Status | Description |
|---|---|
| Normal | The status of all sensors on this string are normal. |
| Disabled | The string is disabled through SNMP. |
| Shorted | The RBMS Plus output is shorted somewhere in the sensor daisy chain. |
| MissingSensors | More sensors were expected. |
| TooManySensors | More sensors are present than the string can handle. |
| SensorFault | One or more sensors are not communicating. |
| Alarms | One or more sensors have alarms. |
| Initializing | The string is initializing. |
| SensorDisabled | One or more sensors are disabled through SNMP. |
| StringDisconnected | Nothing is connected to the RBMS Plus string port. |
| NoSensorCom | Something is connected to the port, but no sensors are communicating. |

**Jar Voltage** Delta – This reading displays the difference between the highest and lowest jar voltage in the string. Too much variation in jar voltages could be an indication that there are problems with some jars. Alarms may be provisioned for this voltage in the Analog Alarms section.

**Conductance & Equalization** - Are automatically disabled on *all* strings when a discharge event is detected on *any* string.

**Jar Voltage** - Measurements are made and reported each time the sensor is polled.

**Jar Temperature** - Measurements are made and reported each time the sensor is polled. When battery balancing is enabled, temperature measurements are recorded once per hour near the half hour.

**Sensor Status** - Provides an indication of what is happening at the sensor. The table below lists the possible values of the **Sensor Status** and is displayed in each battery subsection.

| Sensor Status | Description |
|---|---|
| Normal | This sensor is operating normally. |
| Fault | There is no communications with this sensor. |
| Measuring | This sensor is making an admittance measurement. |
| SensorDisabled | This sensor was disabled through SNMP. |
| StringDisabled | This string was disabled through SNMP. |
| Missing | This sensor was expected based on the string voltage, but is not present. |
| MeasurementFailed | The last admittance measurement failed. |

# SNMP

The Alpha Technologies battery monitoring system provides an SNMP interface for third party software management. The advantage of our approach is that it allows operators to choose the software with which they wish to use as opposed to being locked into one software offering. Many operators will have their own SNMP management software and will want to integrate the controller into their existing network management infrastructure. SNMP is a well-known communication protocol which provides a standard interface to different management software platforms.
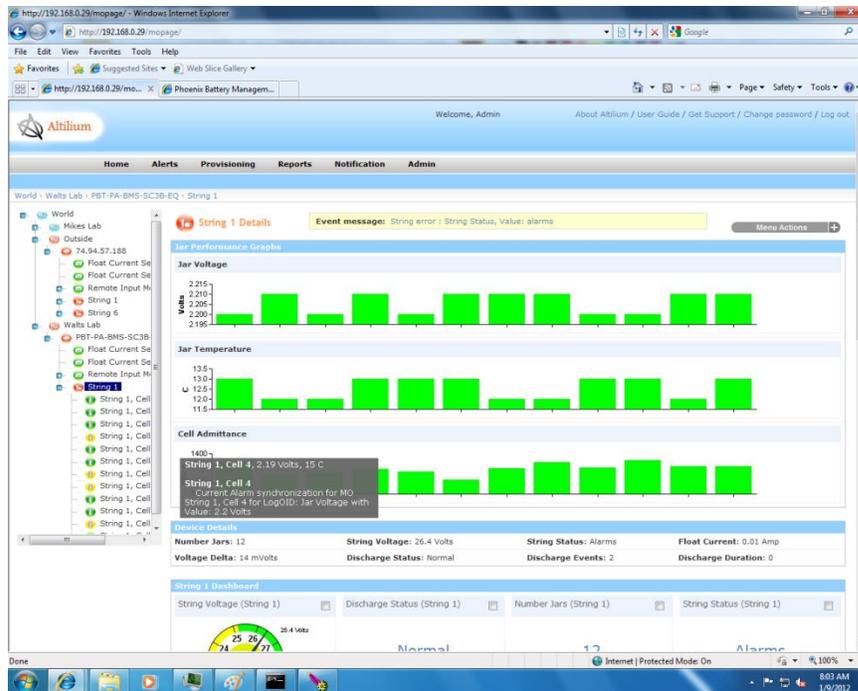


Alpha Technologies offers an enterprise-class software package designed specifically for monitoring DC power plant and UPS back up batteries. The Altilium software platform is an SNMP manager which provides many features users will require, including a friendly web-based user interface, friendly controller provisioning (labels and alarms, etc.), reporting tools, flexible notification plans and administration privileges.

Other commercially available SNMP managers such as NetCool or FirmSuite could be used to manage the RBMS Plus.

Alpha Technologies also offers a simple software tool that can be used to manage the RBMS Plus. While not an enterprise-class management system the Alpha Lookout software provides a convenient tool to manage a small group of systems. Lookout is available at www.alpha.ca and is provided for free without a warranty of any kind. Refer to the Lookout manual included with the download for additional details.

## 6.5.    MIBs

All the information presented on the web pages and complete configuration capability is available from SNMP.

SNMP uses the standard UDP ports 161 and 162. If the device does not respond to SNMP Requests or does not appear to send traps, confirm that these ports are not blocked.

The RBMS Plus uses a combination of standard and proprietary MIBs. Contact Alpha Technologies for more details.

The RBMS Plus requires the following standard SNMP MIBS to compile the MIBs below:

SNMP-FRAMEWORK-MIB
SNMP-NOTIFICATION-MIB
SNMP-TARGET-MIB
SNMPv2-SMI
SNMPv2-TC
ENTITY-MIB

**The RBMS Plus supports the following SNMP MIBS:**

SCTE 36 2002 (HMS028) Root MIB
SCTE 37 2002 (HMS072) Tree MIB
SCTE 38-1 (HMS026) Property MIB
SCTE 38-11 (HMS-114) Headend Ident MIB
SCTE 84-1 (HMS-111) HE Common MIB
pbtRootMIB Phoenix Root MIB
pbtBatteryAgentMIB Phoenix Battery Agent MIB
pbtSCMini.mib
pbtEntityStatusMIB Phoenix Extensions to the Entity MIB

**These MIBS should be compiled in the order listed.**

The battery agent MIB contains tables of objects for each string and jar. These tables contain name, status and control objects as well as all of the voltage admittance and temperature readings. All of the settable objects are stored in RBMS Plus nonvolatile memory.

The digital alarms are configured using the discreteAlarmEnable object in the discretePropertyTable. There are two objects for each input. The first object (.1) is used to enable alarms on the low state of the input. The second object (.2) is used to enable alarms on the high state of the input. Each alarm can be set to one of three states: Disabled(1), EnableMajor(2) or EnableMinor(3). Major Alarms appear in red on the web page, and Minor Alarms appear in yellow.

The analog alarms are configured using the objects in the property table. There are four objects to set the thresholds for each of the alarm capable object. Each alarm limit can be individually enabled or disabled.

## 6.6.    Community Strings

The community strings are configured from the Telnet interface described in the configuration section of this document. The default community strings are set to "public".

If the device does not respond to SNMP Requests or does not appear to send traps, confirm that the community strings are set properly in the SNMP Manager.

## 6.7.    Traps

Whenever an alarm occurs, SNMP traps are sent to up to three trap receivers. The trap destinations are configured from the Telnet interface described earlier in this document. The traps are defined in the He Common MIB. Each trap includes a text field that describes the trap.

## 6.8.    MIB Browsers

SNMP devices are normally managed by a software system containing a SNMP Manager. The simplest method of evaluating SNMP operation is with a MIB Browser. A free evaluation version of a MIB browser can be downloaded from http://www.ndt-inc.com/SNMP/MIBrowser.html or http://www.mg-soft.com/download.html.

# 7. Firmware

The RBMS Plus firmware can be updated remotely using TFTP. To perform this update you will need a TFTP Client. A free TFTP Client can be downloaded from http://tftpd32.jounin.net/tftpd32_download.html. Be sure to read and comply with the licensing agreement. Other free TFTP clients are available on the Internet. This TFTP client is used in the following example.

## 7.1. Updating Firmware

Before uploading firmware to a RBMS Plus, close any web browsers or Telnet clients that are connected to the device.

## 7.2. Configure TFTP Client Software

Open the TFTP software and click **Settings** and then change the **Timeout** to 15. Click **Global** tab and only have **TFTP Client** and **Syslog Server** checked. Click OK. Don't close and restart when prompted to.
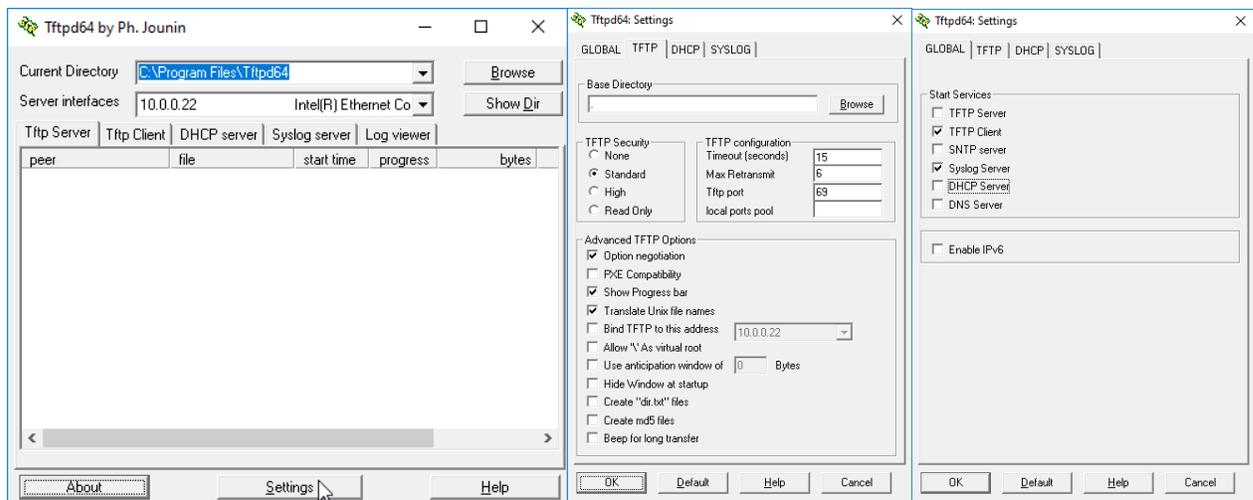
## 7.3. File Uploads

There are four files to upload. The ROM file must be uploaded first and then followed by the three WEB files, in order. **Wait 30 seconds after the ROM is uploaded before uploading the web pages**.

1. Ignore Current Directory and Server interfaces
2. Host – Enter IP address of RBMS
3. Port – Enter 69
4. Local File – Browse and select the files in order
5. Remote File – Use name from table below, **must be in Upper Case**
6. Click Put for each
7. Reset Controller after all files are uploaded. Either cycle power or Web browse to RBMS, login (admin), click Site
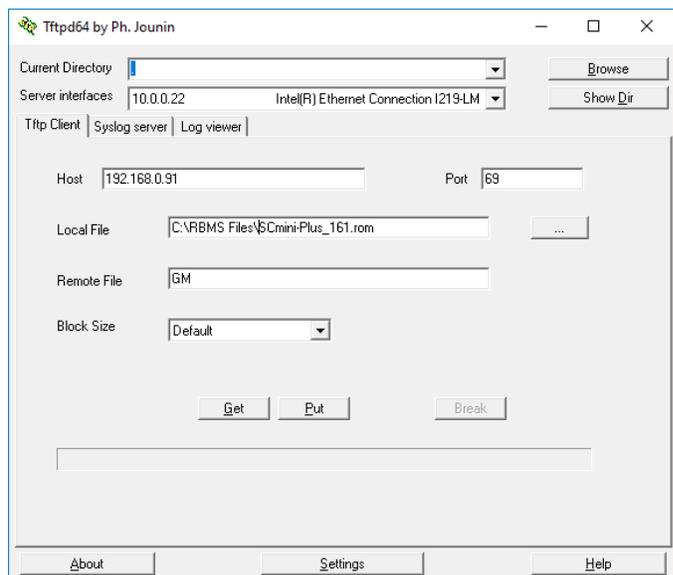
Data, Click Reset Controller button
8.  Press **OK** and continue with the next file.

The local and remote files names for the four RBMS Plus files are shown in the table below. The local file names may differ somewhat from the names shown depending on the version.

The remote file names are case sensitive.

|  | Local file name | Remote file name |
|---|---|---|
| Firmware | SCmini-Plus_161.rom | GM |
| Web files | SCmini-Plus_web1_103.cob | WEB1 |
| Web files | SCmini-Plus_web2_103.cob | WEB2 |
| Web files | SCmini-Plus_web3_103.cob | WEB3 |

☑ **NOTE:** Check the website for notifications on the latest available firmware.

TFTP uses UPD port 69. If you experience problems downloading firmware, it is possible that port 69 is blocked by a firewall or router somewhere in you network. Consult with your IT department to correct this problem.

# 8.    Summary of Port Usage

The different features of this product use a variety of ports. The following table contains a summary of the port utilization.

| Port | Protocol | Usage |
|------|----------|-------|
| 25 | TCP | SMTP – Sending e-mail |
| 69 | UDP | TFTP – Firmware updates |
| 80 | TCP | HTTP – Web page |
| 123 | UDP | NTP – Time server |
| 161 | UDP | SNMP – Gets and Sets |
| 162 | UDP | SNMP - Traps |
| 9998 | TCP | Telnet – Debug port setup |
| 9999 | TCP | Telnet – Setup |
| 30706 | UDP | Firmware server |

It may be necessary to request the network administrator to open some of these ports, in the firewall or router, for the associated feature to operate properly.

# 9.  Resolving Common Problems

1. **Problem** - The RBMS Plus resets approximately once an hour. Background – The RBMS Plus updates its real-time clock from a network time server approximately once per hour. If the RBMS Plus is unable to communicate with the time server, it will reset in an attempt to restore communications.
**Solution** – First check if the RBMS Plus is obtaining the time by looking at the time display above the Telnet setup menu. If the time is correct, the RBMS Plus is communicating with the time server and the time server is not the cause of the resetting. If the time is incorrect, verify that the time server IP addresses are correct and that port 123 is not being blocked by a firewall or router. Verify that the reset is being caused by no time server communications by setting the IP address of the first time server to zeros from the setup menu. This will disable the time server reset. Verify that the time server IP addresses are correct.

2. **Problem** – The web page opens but does not connect to the RBMS Plus. No real-time information is displayed.
**Solution** – To verify the web server in the RBMS Plus is functioning, set the RBMS Plus to a static IP address and set your PC to this address +1. Connect the RBMS Plus Ethernet connection directly to the PC Ethernet using a crossover cable. If the web page can be opened and updated when connected this way the web Server is working properly and the problem is in the network.

# RBMS Plus Quick Start Installation Guide

Refer to the product's Installation & Operation Manuals for Further Detailed Installation Instructions.
RBMS Plus Manual 0370260-J0

\* Pressing and holding the 'Reset' button for > 5 Seconds will program a static IP Address of; "192.168.0.91" to the RBMS Plus Controller. This is indicated when all of the String-Port LEDs are lit and the Controller resets.

USB Port for Device Setup

Reset Button

Optional: Moisture Sensor

Tamper Input
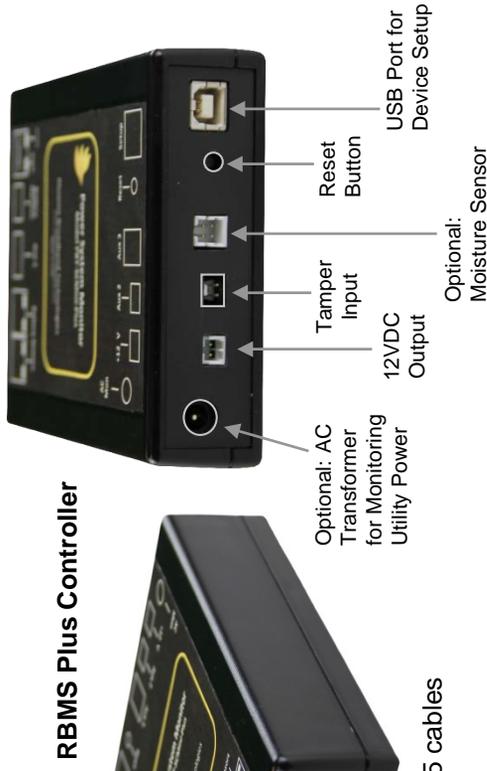
12VDC Output

Optional: AC Transformer for Monitoring Utility Power

**RBMS Plus Controller**

CAT5 cables

Ethernet Connection

Digital Inputs/Output
Optional: Current sensor Cable 7400583, (PBT-PA-CT-1)

Connect the Sensor Daisy Chain in any order

String 2 Sensor Daisy Chain
String 2 is the webpage's "B" string

String 2 Batt 4
String 2 Batt 3
String 2 Batt 2
String 2 Batt 1

When there is only one string always use the String 1 Input.

Battery 1 is the negative end of the string.

String 1 Sensor Daisy Chain
String 1 is the webpage's "A" string

String 1 Batt 4
String 1 Batt 3
String 1 Batt 2
String 1 Batt 1

## 8-Battery Harness (8700254,PBT-PAC-8BATT) Pinout

This cable is for use with 1 or 2 strings of 3 or 4 batteries.
*If 2 strings are monitored, they must be connected in parallel.*

| Pin | Color | String | Battery |
|-----|-------|--------|---------|
| 1 | Black | 1 | String - |
| 2 | Brown # | 2 | 12V |
| 3 | Orange | 1 | 12V |
| 4 | Yellow # | 2 | 24V |
| 5 | Green | 1 | 24V |
| 6 | Blue# * | 2 | 36V |
| 7 | White * | 1 | 36V |
| 8 | Red | 1 | String + |

\* These wires not used for 3-battery strings.

\# These wires not used for single-string setup. The unused wires can be connected to string "-" terminal or taped-off & stowed.

**\*** Power is supplied to the RBMS Plus via the Battery Harness. The Input Voltage range is 21-59VDC, power consumption is ≈ 7W.

String +
String - (UPS battery bus 24 or 48Vdc)

### Battery Cable Options

**8701040, PBT-PAC-BATT-10** (pictured) is used with Battery Sensors

or

**8700254, PBT-PAC-8BATT** is used without Battery Sensors.

705-000022-02 Rev 4

Alpha Technologies    **www.alpha.ca**    **0370260-J0 Rev B**