ESENSORS

Specializing in Network Sensors

Instruction Manual

Power Meter PM01

AC line voltage monitor

Version 2.0

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Introduction to the Power meter PM01

The Esensors, Inc. Power meter PM01 is an electronic device *classified* as a *Smart Sensor*. The PM01 is designed to utilize the Internet to transmit Line Voltage information from a remote acquisition point to a host computer or hosted database.

The PM01 offers built-in signal conditioning and an embedded mini-webserver. Users are able to access the sensor using Hypertext Transfer Protocol (HTTP) based commands.

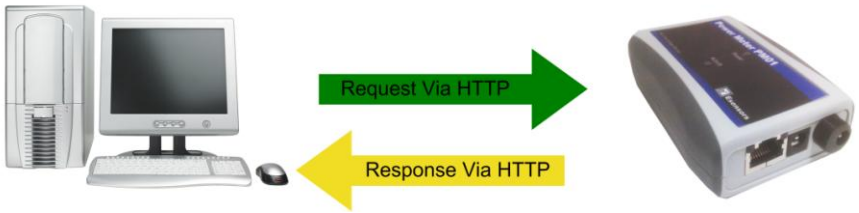

Figure 1 - PM01 HTTP: Request/Response

Figure 1 (above) shows the PM01 returning data via a HTTP: response.

How the PM01 works

Simply, the PM01's function is to send a response (by a HTTP: message) upon request from a *central website* or the *User's PC*.

The PM01 supports a user configurable *IP address.* PM01's IP address gives it uniqueness on the Ethernet based network which it is attached to. It is through the IP address, that the PM01 is able to take its' place on the Internet, becoming fully accessible to query by the user.

The PM01 consists of a base unit with one Ethernet communication port. Within the base unit are microcomputers, which handle the Internet protocol, the communication ports, and the sensor and sensor signal conditioning. The PM01 has no switches, keyboard or display because it functions as a sensor, not as a computer.

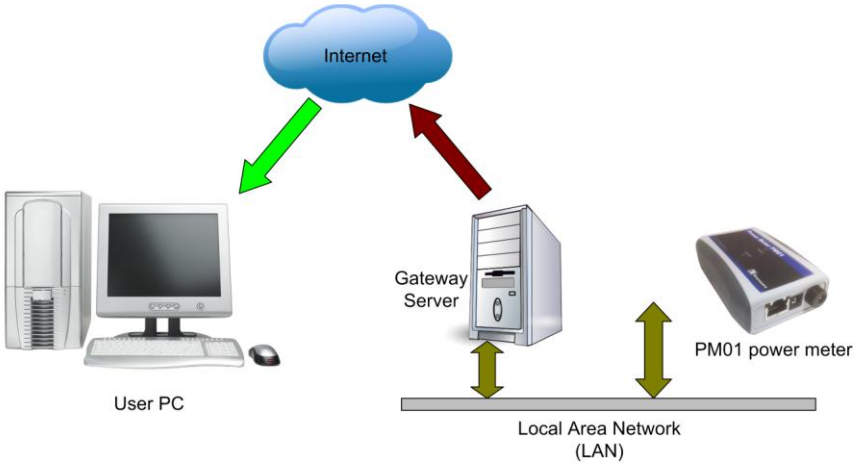

Figure 2 – How the PM01 works.

PM01 Hook-up

To configure and use a PM01 it must be powered up with the supply adaptor (And not the sensor input adaptor. See note on page 7) and connected to a PC via an Ethernet cable as shown in either figure below. If connecting directly to a PC, a **crossover** type Ethernet patch cable must be used. A crossover type Ethernet cable is included in the *Software & Documentation Package*.

PM01 Hook up

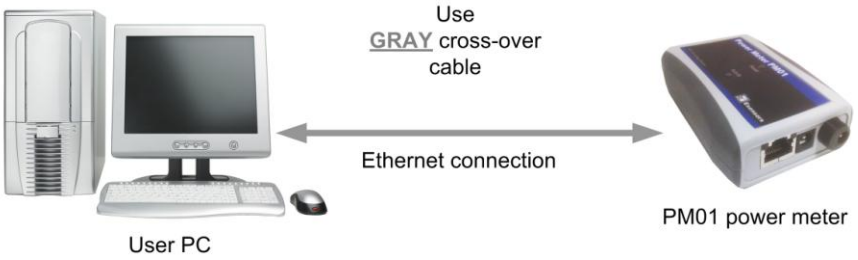

Figure 3 – PM01 connected directly to the NIC in a PC

If connecting to a PC through a HUB, a **straight** type Ethernet patch cable must be used between the HUB and the Websensor. A "straight" type Ethernet patch cable is also included with the Websensor; it is the BLUE patch cable.

Reference Figure 4 on the following page.

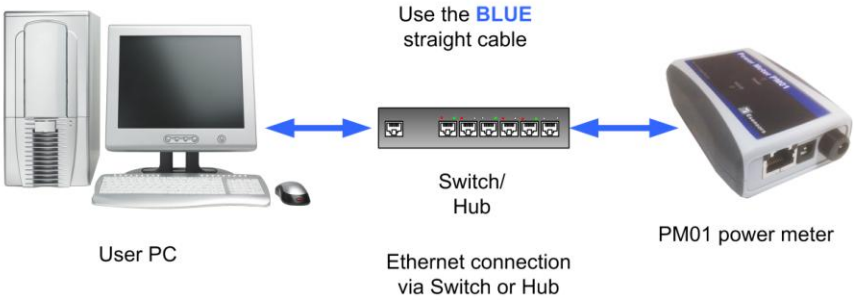

Figure 4 – PM01 connected through a HUB to the NIC in a PC.

Figures 5 and 6 below depict the locations of the connectors for the Ethernet, Wall Power Supply, Line voltage sensor input, and location of the RESET SWITCH.

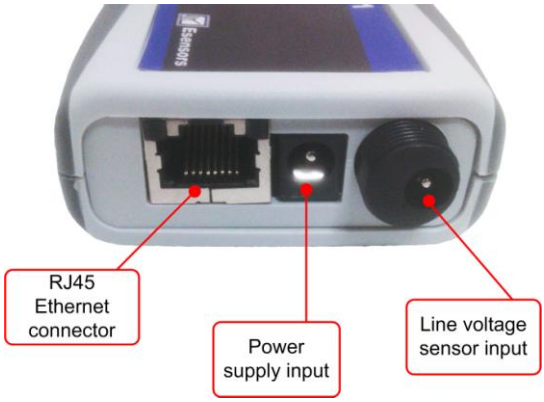

Figure 5 – Location of RJ45, Wall Supply and sensor input connectors.

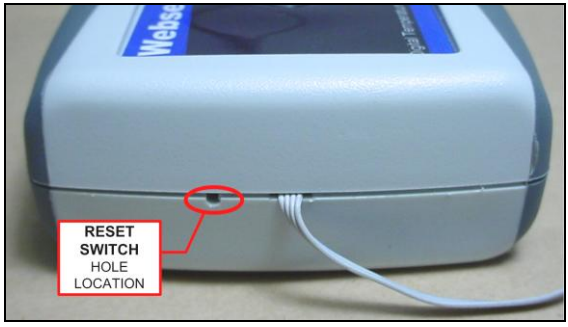

Figure 6 – Location of RESET SWITCH.

Note: Depending on your specific model, your PM01 may or may not have the sensor tail shown in the above figure. This, however, does not affect the voltage measurement function.

PM01 User Interface

Once connected to a PC and powered via the supplied DC Wall Supply, the PM01 can be queried by typing the following command into the address line of the browser.

http://192.168.254.102

Note: The default address for the PM01 is 192.168.254.102. This requires that the PC being used to program the PM01 has its "network interface card" (NIC) set with the same subnet address: 192.168.254.***

Once the default IP address is entered, the browser screen should display the "Power Meter PM01 Main Page" as shown in Figure 7 below.

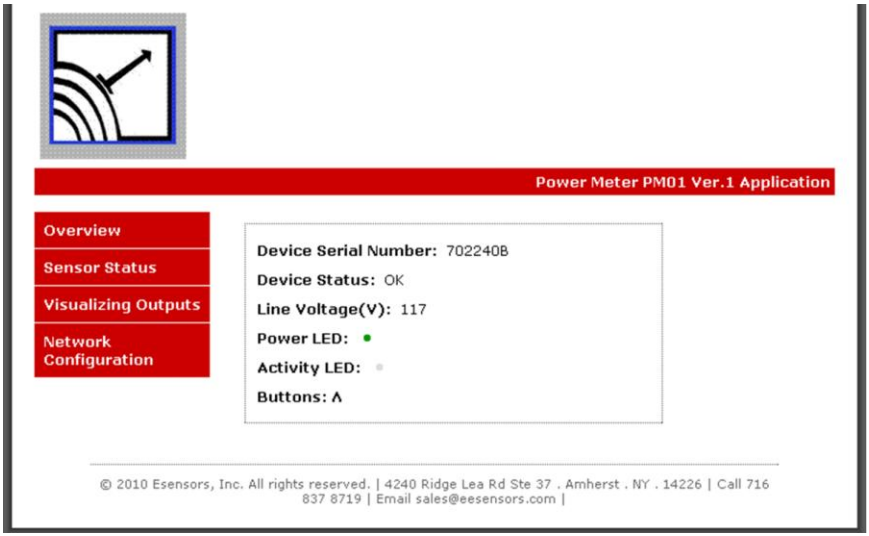

Figure 7 – PM01 Main (Home) Page display

From the MAIN Page several other options are available from the panel displayed in the left-hand-side of the screen.

- Overview
- Sensor Status
- Visualizing Outputs

- Network Configuration

Overview

The “Overview” screen depicts information specific to the PM01 such as the version of the firmware, build date of the firmware and device serial number. See Figure 8 for the Overview screen depiction.

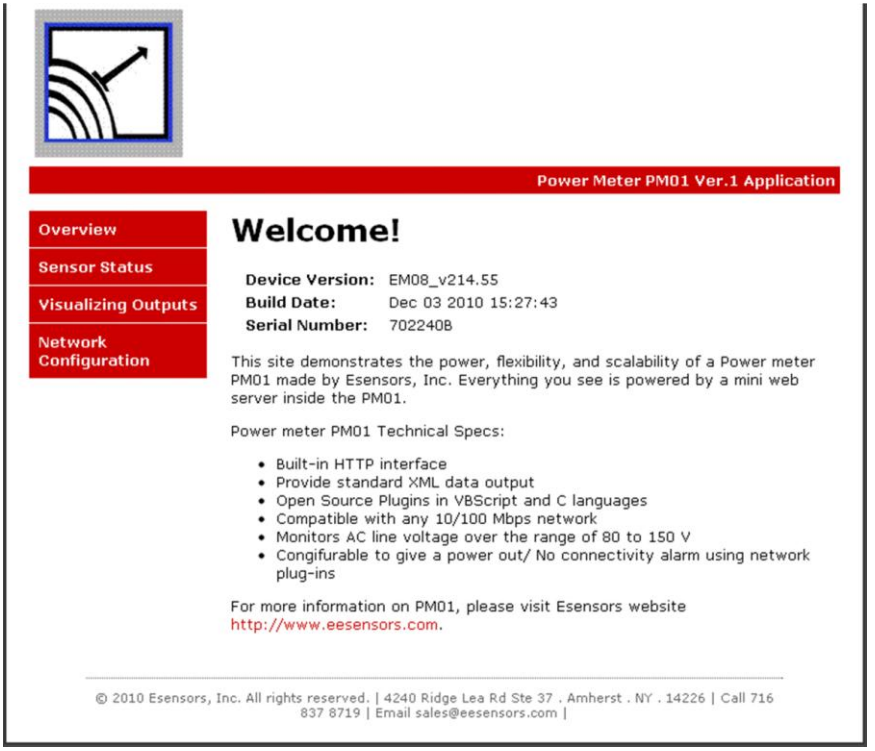

Figure 8 – The OVERVIEW Screen

Sensor Status

The SENSOR STATUS screen depicts the same information as the MAIN (HOME) page.

Voltage Measurement

The PM01 is configured to measure Line voltage from a power adaptor, other than the supply voltage. To accommodate the Line Voltage range of 80 to 150V (80 -240V available upon request), an unregulated DC power supply is provided with the PM01. This adaptor must be plugged into the Line voltage sensor input, before you can get the Line voltage data on the web interface.

Please ensure that you identify the supply power adaptor that powers the PM01 from the Line voltage sensor adaptor. They should be marked clearly on the cover. If you have any difficulty in identifying them, please call customer support and we will gladly help you out. It should be noted that interchanging them or use of a power supply other than that supplied with the PM01 may provide erroneous data readings and could potentially damage the device.

Accuracy

The accuracy of PM01 is also a function of the input transformer linearity. For the primary range of 105 to 135V (or 205-235V for a 220V Line), the device accuracy is ±3%. Accuracy is estimated at ±5% outside the primary range.

Visualizing Outputs

The VISUALIZING OUTPUTS screen permits a simple graph to be depicted for the Line Voltage data points the PM01 collects.

Altering the ranges is easily accomplished by “left clicking” in the value areas and entering the desired range numbers. Next, click on the “Update Chart” button to effect the change.

Reference Figure 10 for a typical data capture.

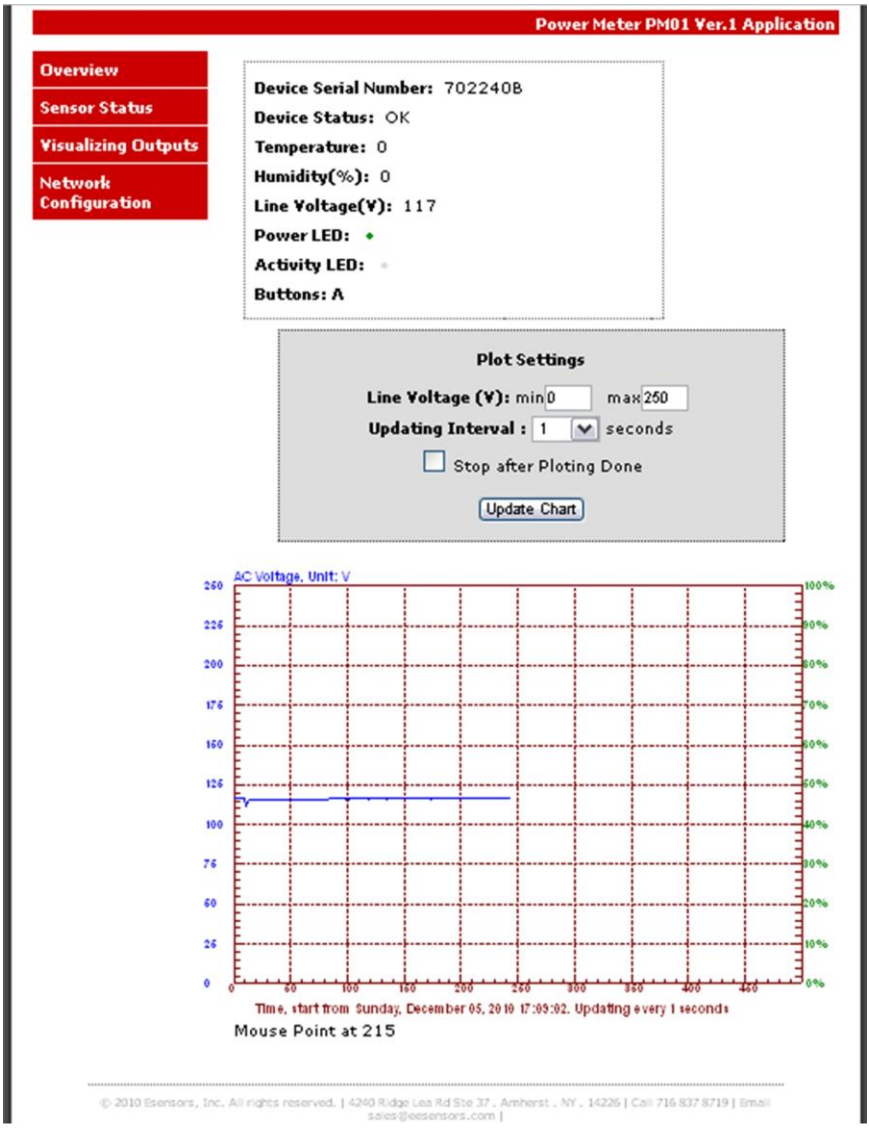

Figure 10 – Visualizing Outputs screen

Network Configuration

The NETWORK CONFIGURATION page enables the user to set up the device IP & host name using the web interface.

When the NETWORK CONFIGURATION button is clicked the NETWORK CONFIGURATION page appears; see Figure 11.

From the NETWORK CONFIGURATION screen it is possible to change the various addresses involved in any IP addressable device. Once changes are made it is necessary to “left click” on the “Save Config” button to have the changes take effect.

Note that in Figure 11, the “Save Config” button is “grayed-out”. This is because the page is “locked”.

The only time data may be changed on this page is during the first five (5) minutes after a “power-up” or by pressing the rest button (See Figure 6 for reset button location). In this way the page is protected from being changed inadvertently (or maliciously).

See Figure 12 which depicts a “timer window” showing the time available to change the settings before the CONFIGURATION PAGE becomes locked.

When you change the IP address though the webpage interface, the next page displayed is the “Reboot in Progress” page depicted in Figure 13.

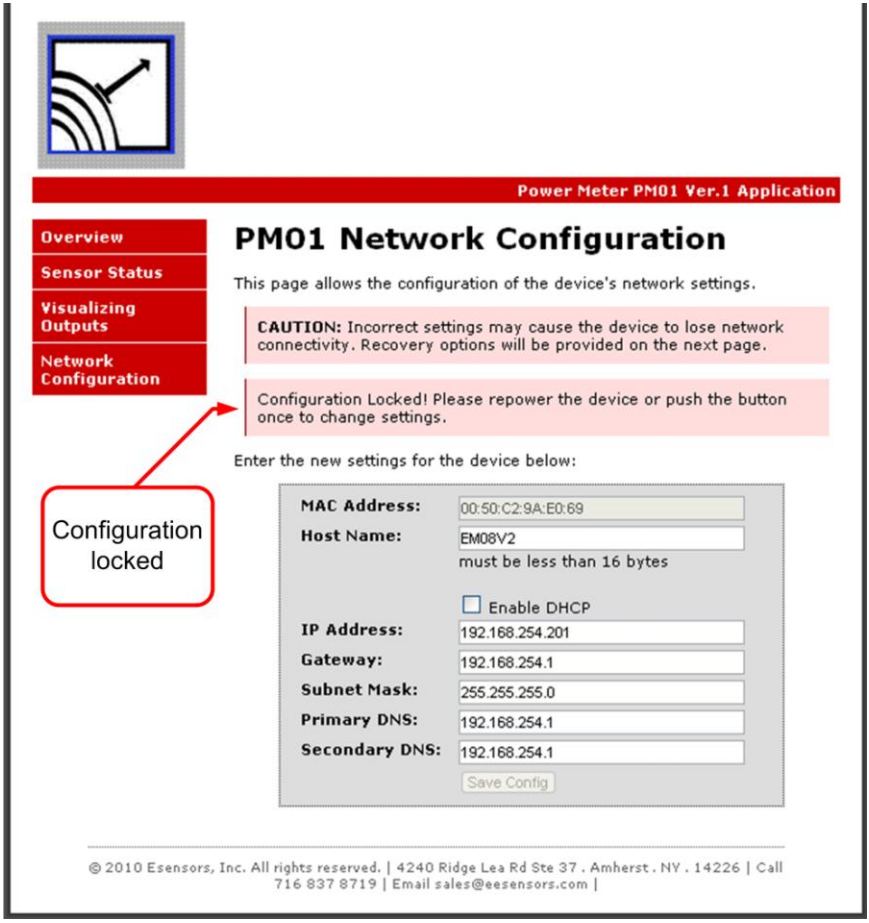

Figure 11 – Network Configuration screen.

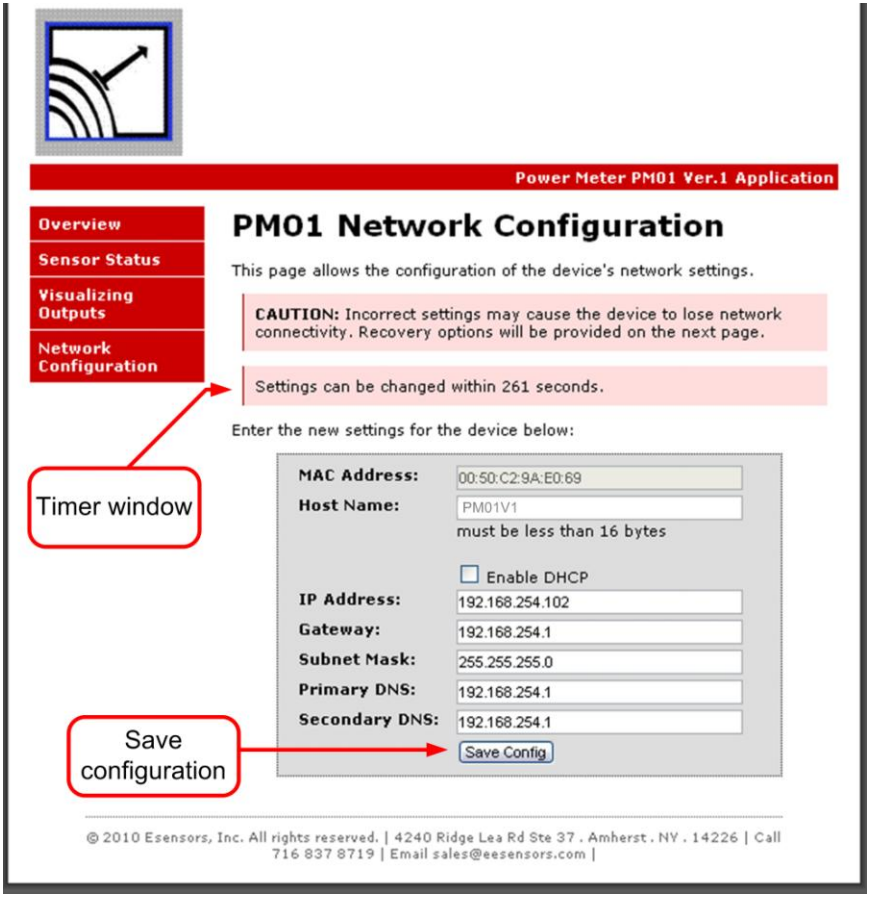

Figure 12 – Network Configuration screen (timer activated)

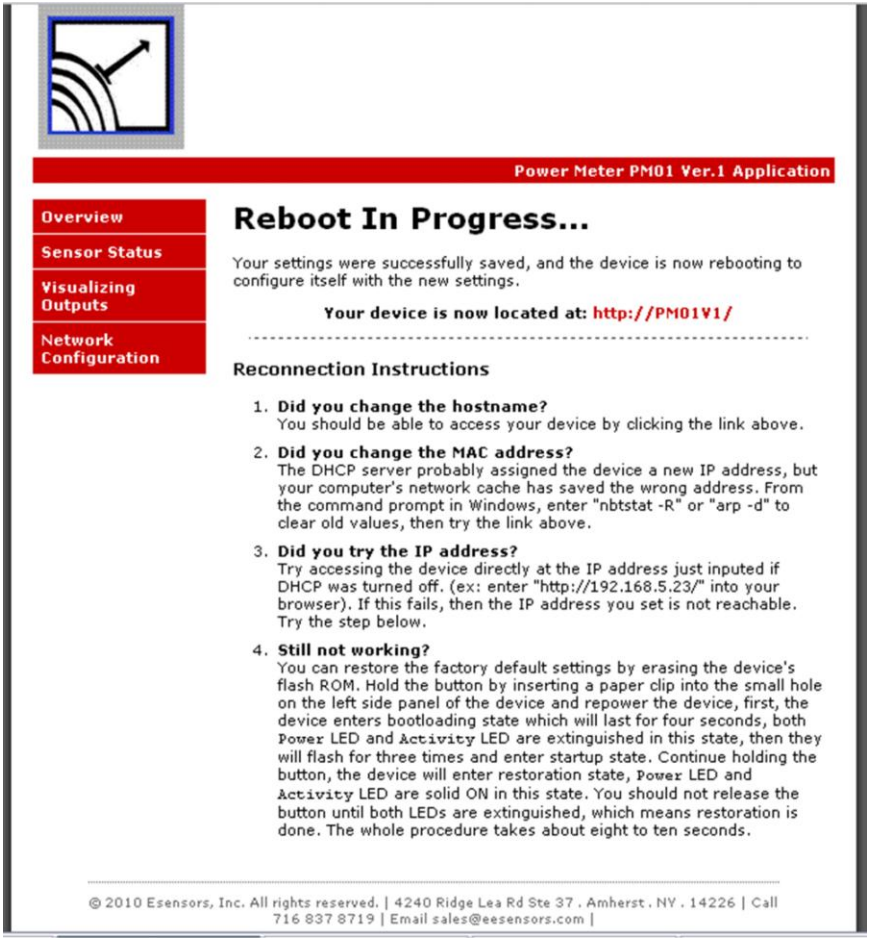

Figure 13 – “Reboot in Progress” screen

Alternative Method to Change the PM01 IP Address

Alternately, there is a “keyboard short-cut” way of changing the IP address by using following command:

http://192.168.254.102/index.htm?eipaaabbbcccddd

where: *aaabbbcccddd* is your new IP address of the PM01.

You can confirm the change by typing the new IP address on the address bar. Or, ping the new address from a command prompt screen.

Refer to the Quick Reference section for more administrative “keyboard short-cut” commands.

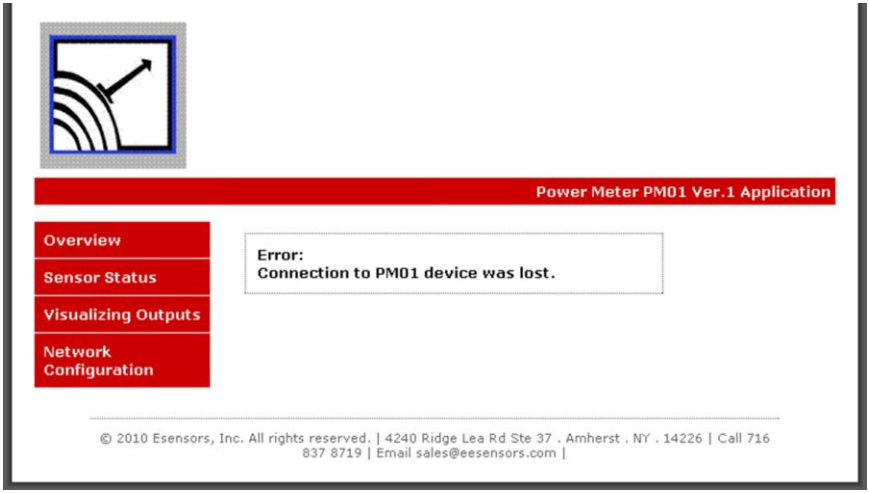

Figure 14 – Error Message – CONNECTION LOST.

The reason for the “Error: Connection to PM01 device was lost” message is because the browser still points to the former IP address. When the new IP address is entered into the address bar the screen will correctly display the PM01 MAIN (Home) Page.

Simple Http Request

The PM01 can output a data string when it receives a http request. This simple approach enables end users to develop their own application to monitor data. The data format is supported in all the plug-in’s provided on the CD including Esensors’ Data logger

program (used to monitor temperature and relative humidity & issue email alerts upon threshold violation).

The string can be obtained by typing the following command in the address bar of the browser.

http://192.168.254.102/index.htm?em

or

http://192.168.254.102/index.html?em

A Sample Return String:

}N123456TF: 0HU:0LV:116

- Where 123456 is device serial number,
- Temperature in Fahrenheit TF is 0, (maintained for compatibility)
- Relative Humidity HU is 0,(maintained for compatibility)
- **Line Voltage LV is 116**

See Figure 15 (below) for a sample screen depicting the returned string.

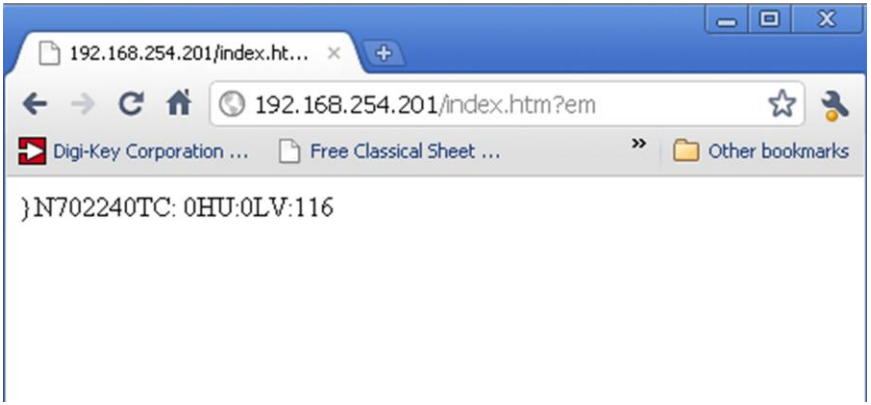

Figure 15 Sample Return String on screen

Basic Troubleshooting Instructions

1. **Did you change the IP address?**
   The DHCP server probably assigned the device a new IP address, but your computer's network cache has saved the wrong address. From the command prompt in Windows, enter "nbtstat -R" or "arp -d" to clear old values and try again. Make sure you launch the command prompt as administrator.

2. **Did you try the IP address?**
   Try accessing the device directly at the IP address just inputted if DHCP was turned off. (Example: enter "http://192.168.5.23/" into your browser). If this fails, then the IP address you set is not reachable. Accessing device via IP address is more reliable than using host name since some networks may have troubles dealing with host name. If you forgot the IP address and the host name of PM01 device, try Step 3 below.

3. **Use Ethernet Discoverer to hunt PM01 devices**
   Microchip's Ethernet Discoverer is a very nice tool to list all PM01 devices on the same subnet. Double click *Microchip Ethernet Discoverer.exe*, Click "Discover Devices" button, the IP address, Host name and MAC address of all PM01 devices will be listed. It is also helpful to check PM01's IP address when it is automatically assigned by DHCP server. *Microchip Ethernet Discoverer.exe* do not need to be installed, it can be copied to and executed from any location. (This utility program can be found on the supplied CD in the "Manual" Folder within the "PM01" Folder.)

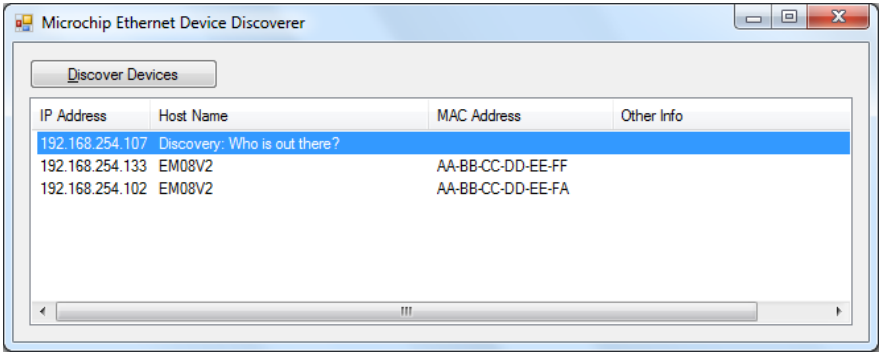

Figure 16 – Microchip Ethernet Device Discover screen

4. **Still not working? Device Reset**
   You can restore the factory default settings by erasing the device's flash ROM.

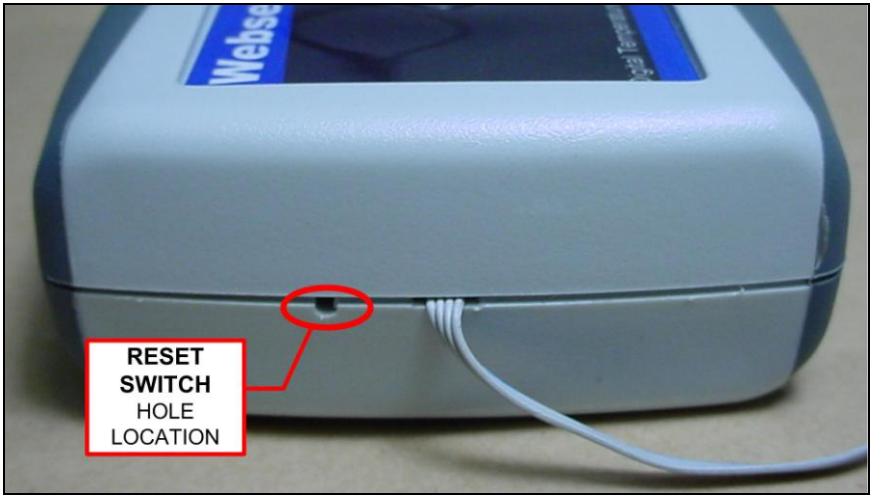

Figure 17 – Location of the RESET SWITCH

Resetting the PM01

- Hold the button by inserting a paper clip into the small hole on the left side panel of the device and then re-power the device.
- The device enters boot loading state which will last for four seconds, both Power LED and Activity LED are extinguished in this state, then they will flash for three times and enter startup state.
- Continue holding the button, the device will enter restoration state, In this state you will notice the Power LED and Activity LED are solid ON in this state.
- You should not release the button until both LEDs are extinguished, which means restoration is done.
- The whole procedure takes about eight to ten seconds. The factory default IP address is “192.168.254.102”.

Quick Reference

PM01 Keyboard Short-cuts:

Display sensor measurements, using PM01V1 as the host name:

http://pm01v1/index.htm/?em

Display sensor measurements:

http://192.168.254.102/index.htm?em

Change IP to aaa.bbb.ccc.ddd:

http://192.168.254.102/index.htm?eipaaabbbcccddd

(NOTE: no “octet-points” are required)

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