



ESENSORS

Specializing in Network Sensors

Instruction Manual

HVAC Monitor Model EM32 Websensor

Version 1.1

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Introduction to the EM32-T Websensor

The Esensors, Inc. Websensor EM32-T is an electronic device *classified* as a *Smart Sensor*. Websensor is designed to utilize the Internet to transmit temperature, relative humidity, detect contact closure, power supply voltage information and illumination data from a remote acquisition point to a host computer or hosted database.

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

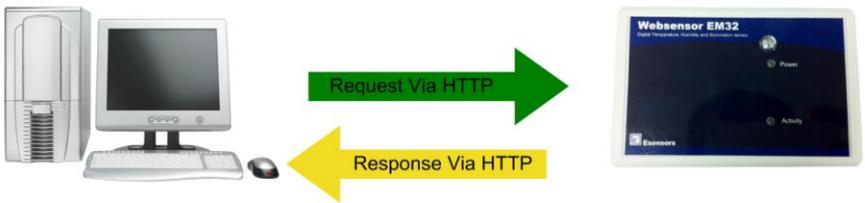


Figure 1 - EM32-T HTTP: Request/Response

Figure 1 (above) shows Websensor EM01B returning data via a HTTP: response.

How the Websensor Works

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

The Websensor EM32-T supports a user configurable *IP address*. Websensor's IP address gives it uniqueness on the Ethernet based network which it is attached to. It is through the IP address, that Websensor is able to take its' place on the Internet, becoming fully accessible to query by the user.

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

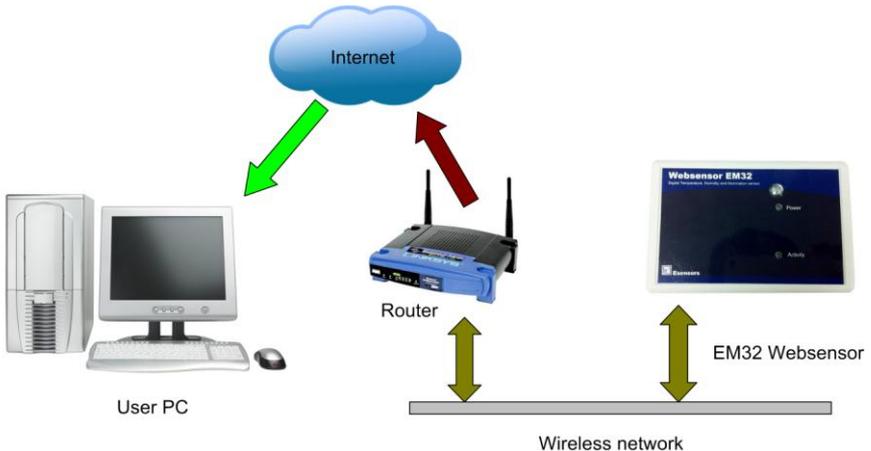


Figure 2 – How Websensor works.

Websensor Hook-up

Compatibility with Earlier Websensors

Compatibility with the earlier models of Websensor has been maintained. Any version of the Websensor will always return temperature, relative humidity and illumination data by sending:

<http://192.168.254.102/index.html?em>

Websensor Hook-up

To configure and use a Websensor it must be connected to a PC via an Ethernet cable as shown in either figure below. Whether connecting directly to a PC directly or through a router, a **straight** type Ethernet patch cable must be used.

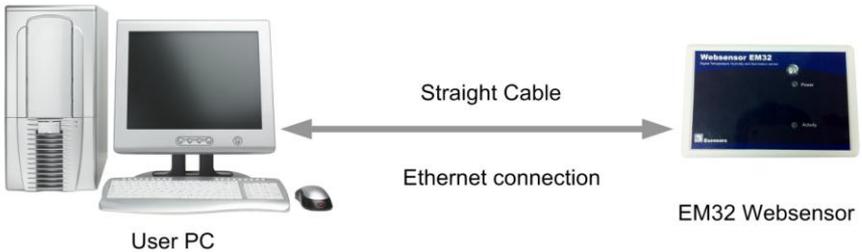


Figure 3 - Websensor connected directly to the NIC in a PC

Reference Figure 4 on the following page.

Websensor Hook-up

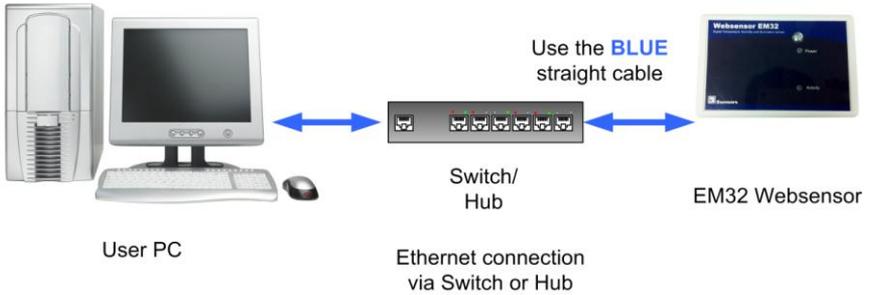


Figure 4 - Websensor connected through a HUB to the NIC in a PC.

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



Figure 5a – Location of RJ45 and Wall Supply connectors.



Figure 5b – Location of accessory connectors.

Websensor User Interface

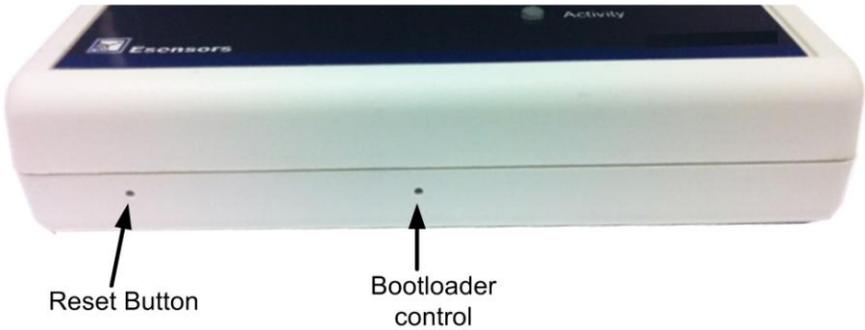


Figure 6 – Location of RESET SWITCH.

Websensor User Interface

Once the Websensor is connected to a PC and powered via the supplied DC Wall Supply, the Websensor 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 Websensor is 192.168.254.102. This requires that the PC being used to program the Websensor have 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 “Websensor EM32-T Main Page” as shown in Figure 7 below.

Websensor User Interface

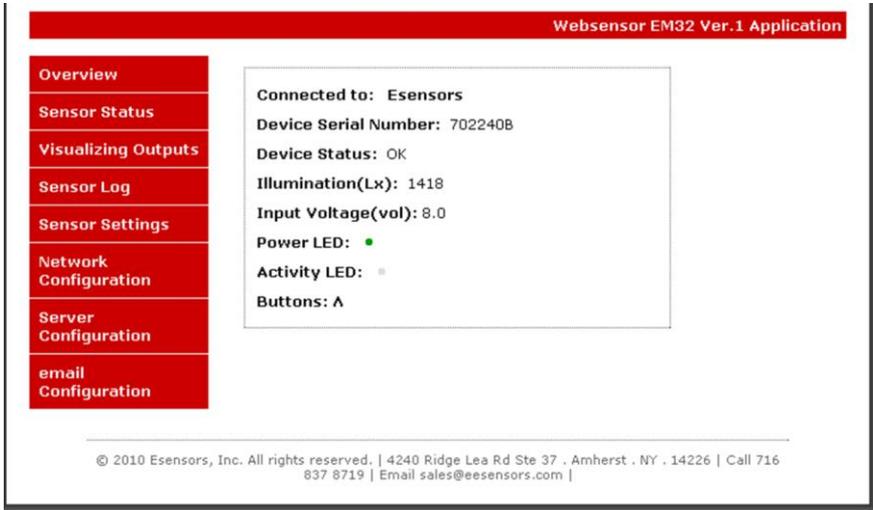


Figure 7 – Websensor EM32-T Main (Home) Page display

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 EM32-T Websensor such as the version of the firmware, build date of the firmware and device serial number. The device time can be sent form the network configuration page. See Figure 8 for the Overview screen depiction.

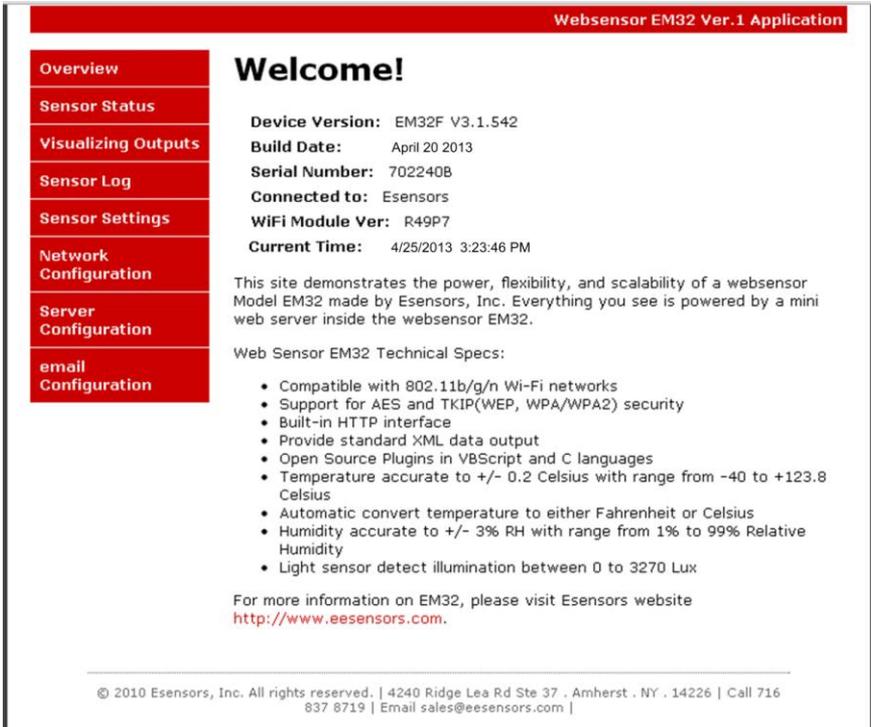


Figure 8 – The OVERVIEW Screen

Sensor Status

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

From the Sensor Status screen it is possible to alter the temperature units by clicking on the “Change Temperature Unit” button.

Visualizing Outputs

The VISUALIZING OUTPUTS screen permits simple graphs to be depicted for the temperature and relative humidity data points the Websensor 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. Note that the Temperature range has been changed to display between 50 and 100 degrees Fahrenheit.

Websensor User Interface

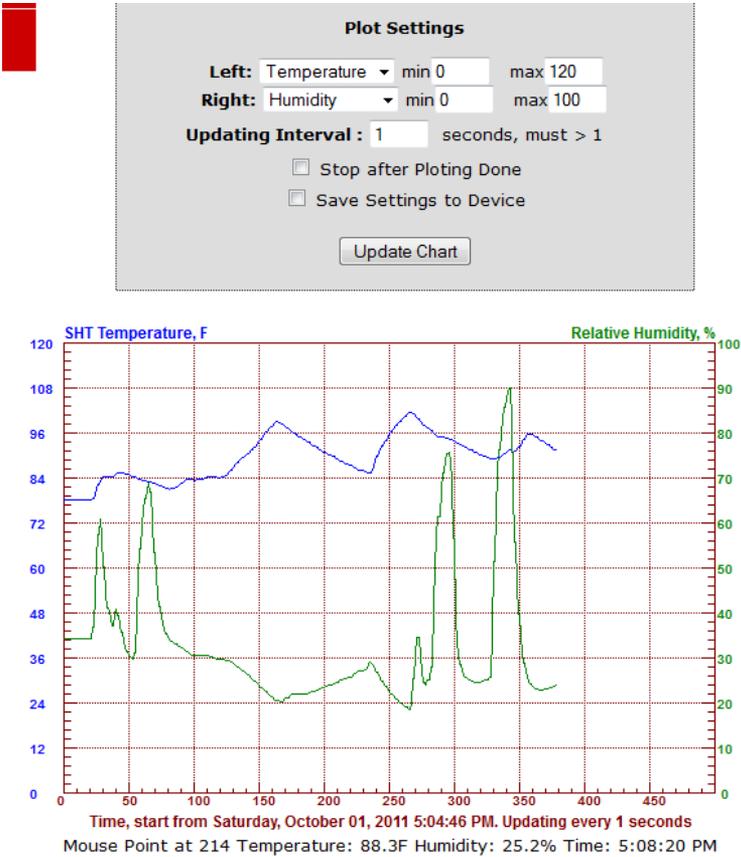


Figure 10 – Visualizing Outputs screen

Network Configuration

The network configuration page is password protected. The default username and password for the device is *admin* & *password*. 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 network settings involved in any IP addressable device, port number for the webpage, DNS, gateway, admin ID and password. The device requires an internet connection if you want to set the device time. The device uses Network time protocol to log sensor data for maximum & minimum measurement. In case of power loss the device automatically corrects the time upon the next webpage access by the user. Once changes are made it is necessary to “left click” on the “Save Config” button to have the changes take effect.

When you change the IP address though the webpage interface, the next page displayed is the “Reboot in Progress” page depicted in Figure 12.

Note: If you get the message “Error: Connection to EM32 device was lost” 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 EM32-T MAIN (Home) Page.

Websensor EM32 Ver.1 Application

EM32 Network Configuration

NOTE: This page allows the configuration of the device's network settings. Please read **this note** before changing settings.

Enter the new settings for the device below:

MAC Address: 00:1E:CD:08:6D:7F

Host Name: EM32_542G_WF
must be less than 16 bytes

Enable DHCP

IP Address: 192.168.254.195

Gateway: 192.168.254.1

Subnet Mask: 255.255.255.0

Primary DNS: 4.2.2.1

Secondary DNS: 192.168.254.1

HTTP Port No. : 80

Change WLAN Settings

WLAN Type:
 Ad hoc
 Infrastructure

WLAN SSID:

Security Type:

Figure 11 – Network Configuration screen.

Websensor EM32 Ver.1 Application

Overview	<h2 style="margin: 0;">Reboot In Progress...</h2> <p>Your network settings were successfully saved, and the device is now rebooting to configure itself with the new settings.</p> <p>Please note for WPA\WPA2 PSK authentication, due to the intensive computation requirements of computing the PSK, a significant amount of time is required to calculate the PSK (approximately 30 to 40 seconds). The device performs the calculation once and the result is stored and retrieved later when making a network connection. During the calculation, the Power LED is off and Activity LED is blinking. Please do NOT test the network connectivity until the calculation is completed (Power LED is back to solid ON and Activity LED is off or blinking).</p> <p style="text-align: center;">Your device is now located at: http://EM32_542G_WFF</p> <hr style="border-top: 1px dashed black;"/> <h3>Reconnection Instructions</h3> <ol style="list-style-type: none">1. Did you change the hostname? You should be able to access your device by clicking the link above.2. Did you change the MAC 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, then try the link above.
Sensor Status	
Visualizing Outputs	
Sensor Log	
Sensor Settings	
Network Configuration	
Server Configuration	
email Configuration	
email Configuration	
email Configuration	

Figure 12 – “Reboot in Progress” screen

Sensor Log

Sensor Log

If the device supports Sensor Log, it enables the EM32 to recording sensor alarm log and measurements' peak log (daily peak and historical peak). All logs contain recorded value and timestamp.

One can clear all log records, the daily peak log will be cleared by device every 24 hours or by clicking "Clear *Daily Peak Record*" button in *Sensor Log* webpage. The sensor alarm log and historical peak log are protected by password, they can be cleared in *Sensor Settings* webpage by clicking "*Clear Sensor Alarm Records*" or "*Clear Historic Peak Record*" button.

Note: The device's clock must be properly configured to provide correct timestamp.

Setting Device Time

There are two ways to set device's clock. One is to let device automatically synchronize its clock from Internet every day, there are no accumulated time errors in this mode. The network configurations like gateway and DNS must be properly set for this feature since device need Internet access.

Another way is to set device's clock manually. This can be done by click "*Set Device Clock*" button in *Network Configuration* webpage. Device does not need Internet access in this mode. The disadvantages are: the clock need to be set whenever device is re-powered since it can not save time when power lost; the time may have accumulated error in long running time.

Sensor Alarm Log

Sensor Alarm Record	Triggered Value	Occured Time
N/A	N/A	N/A

Daily Peak Log

Measurement	Peak Value	Occured Time
Temperature Min	77.0F	Saturday, October 01, 2011 5:37:43 PM
Temperature Max	101.4F	Saturday, October 01, 2011 5:10:04 PM
Humidity Min	18.7%	Saturday, October 01, 2011 5:10:04 PM
Humidity Max	89.9%	Saturday, October 01, 2011 5:11:33 PM
Illumination Min	127.6Lx	Saturday, October 01, 2011 5:10:39 PM
Illumination Max	1846Lx	Saturday, October 01, 2011 5:03:49 PM

Clear Daily Peak Record

Historic Peak Log

Measurement	Peak Value	Occured Time
Temperature Min	77.0F	Saturday, October 01, 2011 5:37:43 PM
Temperature Max	101.4F	Saturday, October 01, 2011 5:10:04 PM
Humidity Min	18.7%	Saturday, October 01, 2011 5:10:04 PM
Humidity Max	89.9%	Saturday, October 01, 2011 5:11:33 PM
Illumination Min	127.6Lx	Saturday, October 01, 2011 5:10:39 PM
Illumination Max	1846Lx	Saturday, October 01, 2011 5:03:49 PM

Figure 13 – Sensor Log Page

Sensor Settings

Sensor Settings

This page holds the sensor thresholds for email alerts sent by device. The trip time is the time for which the sensor data has to violate the threshold to be considered as an alert. The Return time is the time interval after which the alert status returns back to normal if the measured a data returns back within the specified threshold. Alarm interval is the minimum interval after which the send alert for the sensor will be reported if the threshold conditions still remain violated. However if an alert occurs for a different sensor within the time interval would be reporter.

Illumination Threshold, range: 0-3270 Lx	
Lower limit:	<input type="text" value=".0"/> Lx
Upper limit:	<input type="text" value="3270.0"/> Lx
Illum Trip Time:	<input type="text" value="3.0"/> Sec. Time tick is 1.5 Sec.
Return Time:	<input type="text" value="60.0"/> Sec.
Temperature Threshold, range: -40-255 F	
Lower limit:	<input type="text" value="-40.0F"/> F or C, default is F
Upper limit:	<input type="text" value="254.8F"/>
Temp Trip Time:	<input type="text" value="10.5"/> Sec. Time tick is 1.5 Sec.
Return Time:	<input type="text" value="60.0"/> Sec.
Relative Humidity Threshold, range: 0-100%	
Lower limit:	<input type="text" value=".0%"/> %
Upper limit:	<input type="text" value="100.0%"/>
Humd Trip Time:	<input type="text" value="10.5"/> Sec. Time tick is 1.5 Sec.
Return Time:	<input type="text" value="60.0"/> Sec.
<input type="checkbox"/> Enable send alarm email, Note 1	
Alarm Interval:	1638 minutes, must be <1638 min. Note 2
<input type="checkbox"/> email max/min values every day	
<input type="button" value="Save Settings"/>	
<input type="button" value="Change Temperature Unit"/>	

Figure 14 – Sensor Settings

Email Configurations

Email Configurations

The Email Configuration is selected by clicking on the “email Configuration” button displayed in the menu as shown in Figure 15 below. The email Configuration page is password protected. The default username is **admin** and password is **password**.

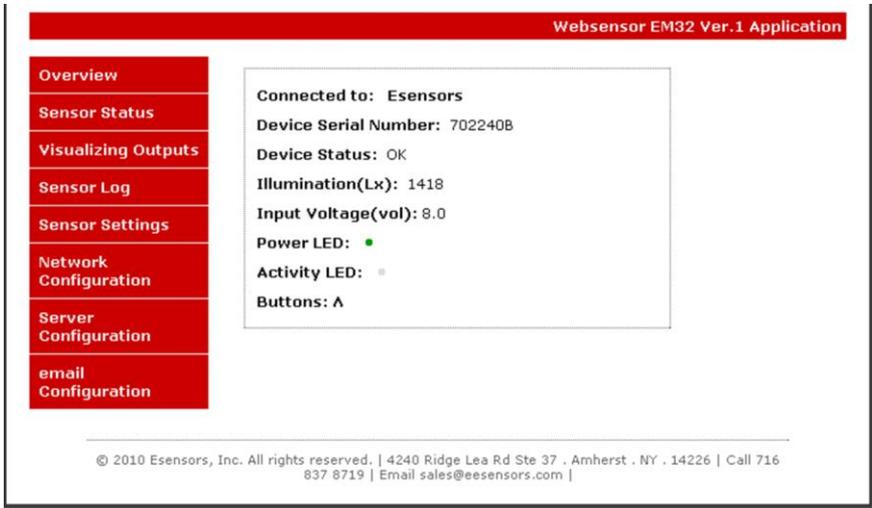


Figure 15 – Sensor Status Screen showing email Configuration button

Enter the settings for the SMTP server and port number. If SSL is used enter the user id and password for the from email address that you have created for the device. Contact your email service provider to get information about your SMTP server and port number.

Email Configurations

Enter the recipient email(s) separated by commas. The description is optional and can be customized by the user. See Figure 16 below.

Websensor EM32 Ver.1 Application

Overview

Send E-Mail

The web sensor is capable to email the alarm messages and daily report. You can be notified immediately if the input email address is associated with your mobile phone, like:

- T-Mobile: 10-digit phonenumber@tmomail.net
- AT&T: 10-digit phonenumber@txt.att.net
- Verizon: 10-digit phonenumber@vtext.com
- Sprint:
10-digit phonenumber@messaging.sprintpcs.com
- Virgin Mobile: 10-digit phonenumber@vmobl.com
- Nextel: 10-digit phonenumber@messaging.nextel.com
- Cricket: 10-digit phonenumber@sms.mycricket.com
- Alltel: 10-digit phonenumber@message.alltel.com

Above information is for reference only. Please contact with your carrier for details and fee.

Enter the appropriate settings in the fields below:
(Your SMTP server may not require a user name or password.)

SMTP Server:	<input type="text"/>	Port:	<input type="text" value="855"/>
User Name:	<input type="text"/>		
Password:	<input type="password"/>		
From:	<input type="text"/>		
To:	<input type="text"/>		
CC:	<input type="text"/>		
Device Description:	Put device description here, like Web sensor in Main Building, Room 322.		
	<div style="border: 1px solid gray; height: 40px; width: 100%;"></div>		
	<input type="button" value="Save & Send Test email"/>		

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Figure 16 Email Configuration Screen

Http Request

Simple Http Request

Websensor EM32 outputs a data string when it receives 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 device IP followed 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: 71.2HU:24.5%IL:218

Where 123456 is device serial number,

Temperature in Fahrenheit TF is 71.2,

Relative Humidity HU is 24.5%,

Illumination IL is 218

See Figure 18 (below) for a sample screen depicting the returned string.

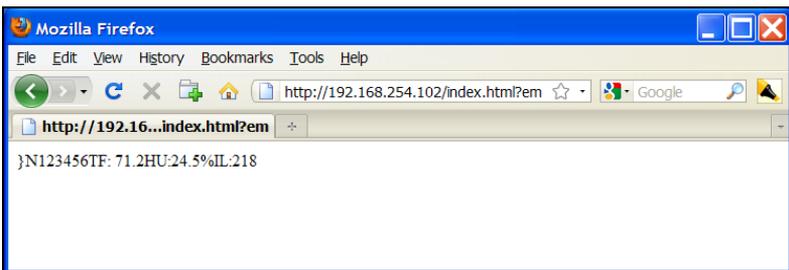


Figure 18 Sample Return String on screen

Http Request

The device also supports simple xml data output. The xml data can be obtained by typing the device IP followed in the address bar of the browser.

<http://192.168.254.102/status.xml>

<response>

<sid0>702240T</sid0>	-Device Serial Number
<stu0>OK</stu0>	- Device Status
<tm0>78.2</tm0>	- Temperature Measurement
<hu0>34.1</hu0>	- Humidity Measurement
<iI0>1725</iI0>	- Illumination Measurement
<tun0>F</tun0>	- Temperature Unit

</response>

In addition the device also features a simple text output that can be used by some software. Note

WSD:Tm[78.2]Hu[34.1]Il[1636]Th[32.0]Vi[0.0]Ci[0]

Where

Temperature in Fahrenheit Tm is 78.2,
Relative Humidity Hu is 34.1%,
Illumination IL is 1636

Note: The extra information or xml tags that may appear on the data string or xml page are reserved for future use.

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 EM32 device, try Step 3 below.

3. **Use Ethernet Discoverer to hunt EM32 devices**

Microchip's Ethernet Discoverer is a very nice tool to list all EM32 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 EM32 devices will be listed. It is also helpful to check EM32'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 "EM32" Folder.

Trouble Shooting

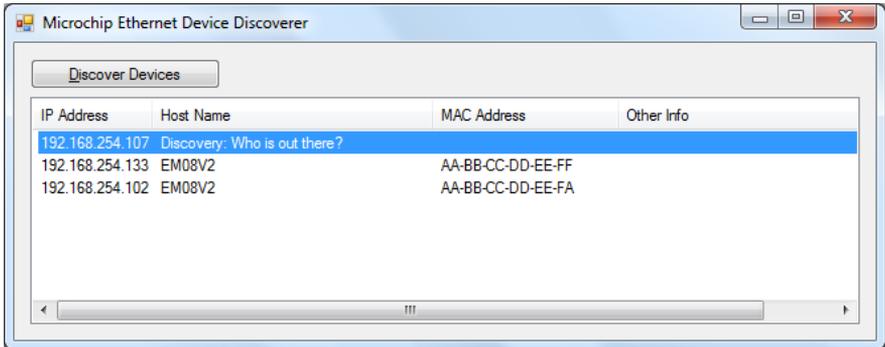


Figure 19 – Microchip Ethernet Device Discover screen

4. **Still not working? Device Reset**

You can restore the factory default settings by erasing the device's flash ROM.

Resetting the Websensor

Resetting the EM32

- 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

EM32 Keyboard Short-cuts:

Display sensor measurements, using EM32V2 as the host name:

<http://EM32v2/index.htm/?em>

Display sensor measurements:

<http://192.168.254.102/index.htm?em>

Change Temp unit to C:

<http://192.168.254.102/index.htm?etpC>

Change Temp unit to F:

<http://192.168.254.102/index.htm?etpF>

Change Temp unit from C to F or F to C:

<http://192.168.254.102/index.htm?etpX>

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