

Wireless Environmental Monitoring from NVSI®

 **EnviroPoint™ powered by accsense®**



operator manual

ENVIROPOINT Standard

revision record.

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1 TECHNICAL BOAST

EnviroPoint is a state-of-the-art wireless/ethernet environment monitoring system that can monitor several variables simultaneously from multiple points and display the data in real time. EnviroPoint is made up of

- Hardware which gathers and relays data (sensor pods and gateways);
- A Database which is installed on a network server and stores all data, changes and usage records;
- A Service which communicates between the database and the hardware, the database and Monitor; and
- A Monitor which is installed on individual computers around the network to display real time data.

This Operators Manual will guide the reader through Monitor and a little bit about the hardware. This document should be read by anyone who is responsible for operating the system in any capacity.

1.1 System Requirements

ENVIROPOINT requires the following minimum computer specifications:

Pentium 4 3.0GHz
1GB RAM
30GB HDD for Application Installation
Windows 2000/XP
1280x1024 (256 Colour) Display
1 x RS232 ports
1 x Full height PCI Extension Slot

1.2 Technical Support

Please ensure your computer meets the minimum specifications before contacting technical support. If you are still experiencing difficulties, contact NVSI Technical Support:

NVSI Technical Support
Phone : +61 2 9809 7899
Fax: +61 2 9809 7499
Email: support@nvsi.com.au

2 ENVIROPOINT MONITOR

2.1 Introduction

A number of little green and/or off-white sensor pods are placed around the site to measure things such as temperature, light, pressure, gas presence, water flow. Measurement is done by sensors within the pod or attached to the pod.

Each pod can relay data from other pods until the data gets to a gateway – a slightly larger, flatter unit. Each pod is usually placed within communication range of at least two others and is also called a node in a mesh of pods. This mesh is a self-healing mesh because, if communication is blocked between two pods, they can send data via a different route to the gateway.

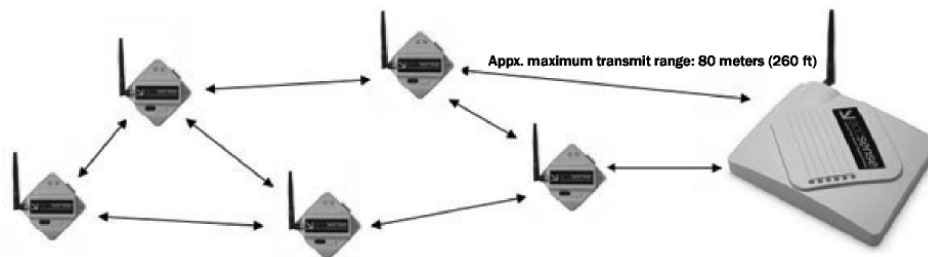


Figure 2-1 Self-healing mesh diagram

The data signal is sent over the 2.4GHz radio frequency (RF) band. Your mobile phone uses the 2.2 – 2.3 GHz band.

Two things absorb, block or attenuate the signal: water and metal. We humans are made up of over 90% water and if someone stands close to a pod directly in the path between that pod and its neighbour, the signal won't get through. Because we need to move around the areas being monitored, it's important to give the little guys another path to ensure data flow continues. They don't send data continuously; they go to sleep between data sends to save power. When the yellow light on a pod flashes that's when it is sending data. Three AA batteries should last around a year if sampling every five minutes.

In the event of a power outage, each pod has battery backup and a limited memory to store data until power is restored.

The gateway's job (the gateway runs on mains power or ethernet) is to collate the data and send it to the server where it is stored in a database. The gateway, too, has some memory in case the server crashes but has no battery backup.

The server, as you know, makes data accessible to everyone in the company who needs it. So, with a database on the server, all the readings from EnviroPoint are available to all those who need it. Simultaneously, in real time, as events occur.

There are lots of advantages in this.

- Firstly, installing a wireless system is quick and easy. There's no need for anyone to break their neck falling from a roof-space while running cable. OH&S are happy.

- Secondly, there's no need to call in a costly tradie. Accounts are happy.
- Thirdly, there's very little disruption to production. Operations are happy.
- Fourthly, the data is secure and traceable. Quality Systems are happy.

But what's the big deal for you?

1. Do you use dataloggers? Think of the time spent picking up the data cards and downloading them. Won't it be much easier and quicker to have the data on-screen at any time?
2. What about the waste? If you find the environment has gone out of spec after the fact, what can you do about it? Very little except dump or downgrade product which has to be made again, quickly, to fill the same order.
3. Isn't it easier and more efficient to know when things are getting a little out of hand so a warning can be given to the right people to stop it getting worse?
4. And if the system is set so you don't have to watch it all the time, but let's you know automatically if things start to go funny. Wouldn't that be great?

EnviroPoint can and does. Less stress.

2.2 Logging in and security



Figure 2-2 **User Name should be User ID** (My bad!)

The Login screen will look like this except you type in your User ID. Both the User ID and Password will appear as hashes on the screen as a security measure.

Immediately after logging in for the first time, the system will ask you to change your password. Another security measure so no-one else can log in as you.

The third security measure you will probably see regularly is that after five (5) minutes of no user activity, EnviroPoint will log out automatically. You will still see all the information on-screen and be notified of alarms. You just can't do

anything. EnviroPoint remains on the screen in the background while you do other work. The words "No User logged in" will appear under the directory tree on the left hand side of the screen.

2.3 Log in levels

There are three levels of log in:

- Operator;
- Technician;
- Administrator (he/she who must be obeyed).

2.3.1 Operator

An Operator may see and print data but not alter any system settings. An Operator can also acknowledge alarms. Why? Because in a large system, or at night, the Operator may be a Security Guard who may investigate the cause of an alarm but calls others to take the required action. It is important an alarm is acknowledged so we can see someone took notice.

2.3.2 Technician

A Technician may enter EnviroPoint in two different modes: Normal or Engineer. In Engineer mode, settings may be changed to run a test, e.g. to check light levels in a specific area. This data does not enter the mainstream data. When in Normal mode, a Technician may see and print data, mine the history and export data.

2.3.3 Administrator

An Administrator may do everything an Operator and Technician can do plus alter system settings including swap pods, enter calibrations, add or remove users, change user levels, add or remove maps, create groups, enter alarm levels and set up who receives alarm messages and how. In fact, an administrator has to know so much about the system they have an Administration Manual all to themselves.

Now you have logged in, this is similar to what you should see:

2.4 The main screen

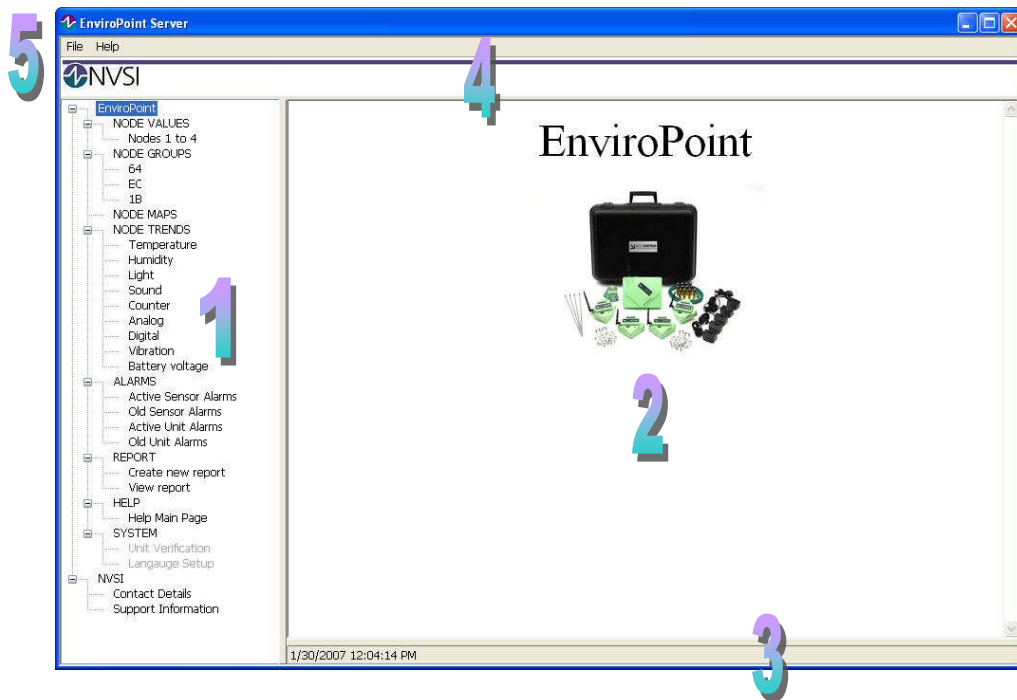


Figure 2-3: Main application screen

The main screen of the EnviroPoint Monitor application has the look and feel of a web browser. The sections numbered in Figure 2-3 are explained below.

1. *Tree directory* – lists application pages.
2. *Application page* – provides access to EnviroPoint functions and data.
3. *Status bar* – displays the current system time and indicates when EnviroPoint is performing background tasks such as loading data. On the left side is where you can see if you're logged in or not.
4. *Command bar* – displays controls specific to the application page.
5. *Menu bar* – provides access to general commands, e.g. adding a sensor pod.

2.4.1 Directory Tree

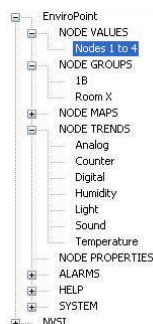


Figure 2-4 Directory Tree

Just as in Windows, the directory tree expands to show all the Application pages that may be displayed. The tree also displays alarms as flashing icons (the international alarm sign of a yellow triangle with an exclamation mark).

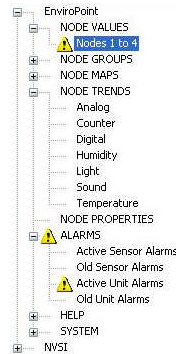


Figure 2-5 Alarm icons

Expand a branch by clicking on the “+” symbol to the left of the branch name. Now you can see a list of all the application pages available within that branch.

Click on a page name and the page will appear to the right.

To contract an expanded branch, click on the “-” symbol beside the expanded branch.

2.5 Now what?

You need to know what the application pages are telling you.

Click the “+” beside NODE VALUES on the directory tree.

2.5.1 Node values and Node groups

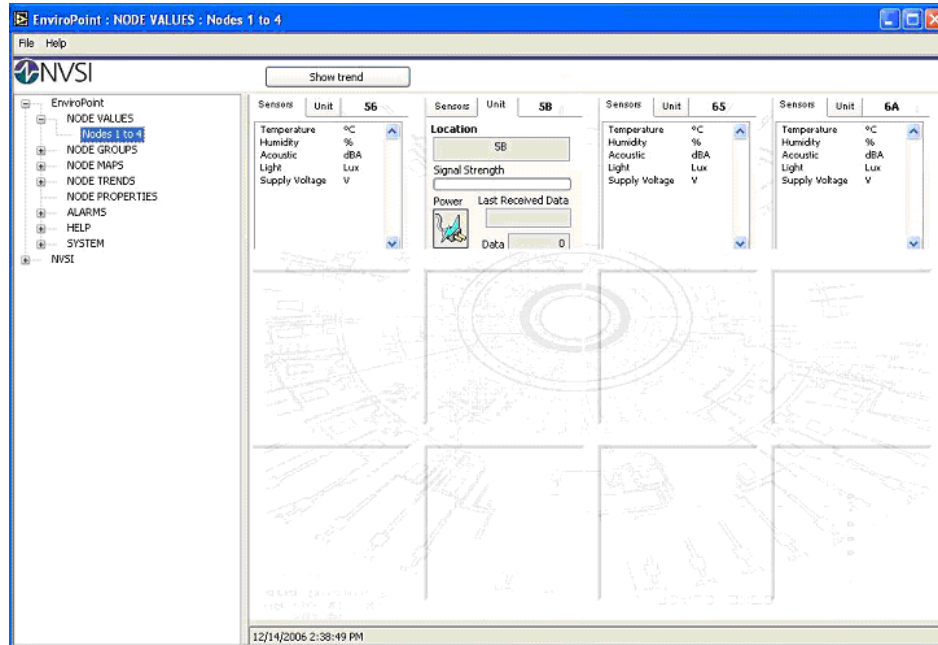


Figure 2-6 Node values page

Node Values displays the status of every 'node' or sensor pod in the system. Nodes may be grouped under specific names, e.g. First floor, Second floor. In that case you would see two sub-branches.

On the application page, each node has a name and two tabs.

Name - The name can be by position or pod serial number, whatever is appropriate and clear for the users. The name cell doubles as an indicator – it turns red in an alarm event.

Sensors – This tab displays a list of sensors attached to the node beside the last recorded value measured by each sensor. Values are given in units appropriate to each sensor type, e.g. in lux for light. External sensor connectors that remain unconnected will read as 0 units. Note there are readings for voltage and whether the pod is on mains power or battery.

Unit – This tab displays general diagnostic information about the node, such as:

- Location – description of pod placement
- Signal strength - relative signal strength 0 – 100%
- Last Received Data - the time data was last received
- Data – the total number of sensor values received since the pod last started
- Power – picture indicating the power source: mains or battery

This is a useful display to consult when setting up a system or adding pods. We'll pop in the Date of last received data in the next upgrade.

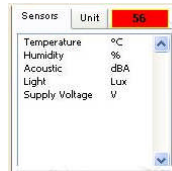


Figure 2-7 Node Alarm

The *indicator* in the top right hand corner where the node name is displayed indicates if an alarm is current for that node.

During an alarm event, the bar either flashes red or remains red.

1. Flashing red a measured parameter has breached a limit (sensor alarm). You need to check which one on the *sensor* display or trend graph.
2. Static red pod malfunction, data not getting through or loss of power (unit alarm). Check for possible causes.

While these pages are displayed the command bar has the following function (refer to Figure 2-6):

Show trend – This command opens a new application page displaying **all** trend data for all these nodes

Pass the cursor over each line to see the name of the pod and parameter measured.

Note: Viewing via the Node Trends branch of the tree will display trends for one parameter only, e.g. temperature. This may be less confusing when there are a lot of pods. The yellow triangle will be displayed beside the parameter causing the alarm.

So, the directory will indicate which parameter and either the Node values page or the graph will tell you which area has a problem.

2.5.2 Show Trend display

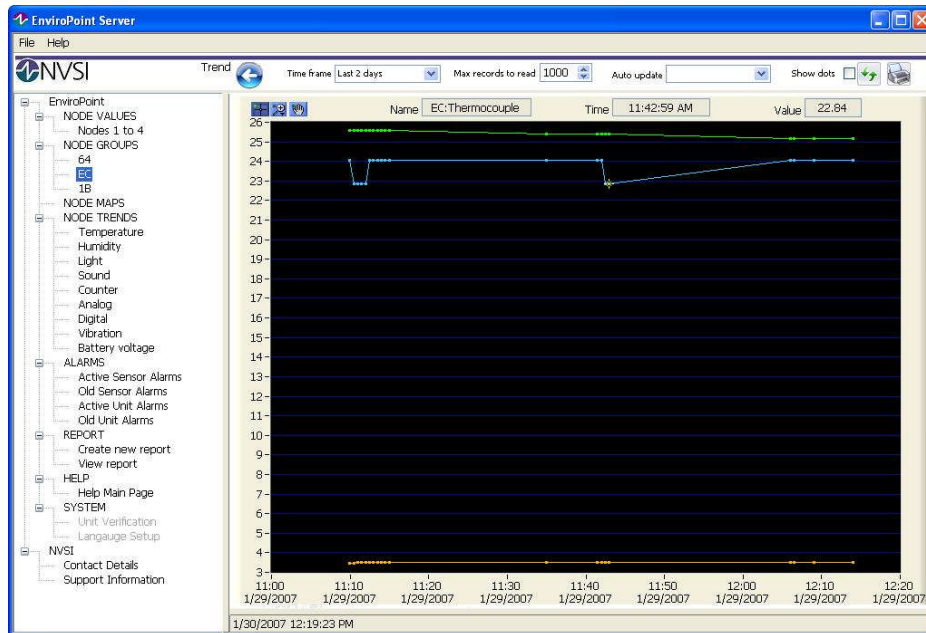


Figure 2-8 Trend application page

Features of this page are:

1. Initially shows all trends but you can select/deselect trends via right-click menu. Try it and see!
2. Zoom and pan tools – the three icons above the top left of the screen. Have a play.
3. Name and trend line labels - pass the pointer over the line and the name of the line appears.
4. Time display – according to where the pointer is placed.
5. Value – of what?
6. Back arrow – return to node values page
7. Time frame – determines graphing period for selected trends; options are 1 hour, 12 hours, 1 day, 2 days, 1 week, 1 month, 6 months, 1 year, all values recorded.
8. Max records to read – limit of number of points graphed for each trend
9. Auto update – updates with new data received
10. Show dots function – displays the actual data points.
11. Refresh button – redraws the graph, i.e. takes you back to where you started.
12. Print screen function – to default printer for your computer.

But where is the alarming pod?

2.5.3 Node Maps

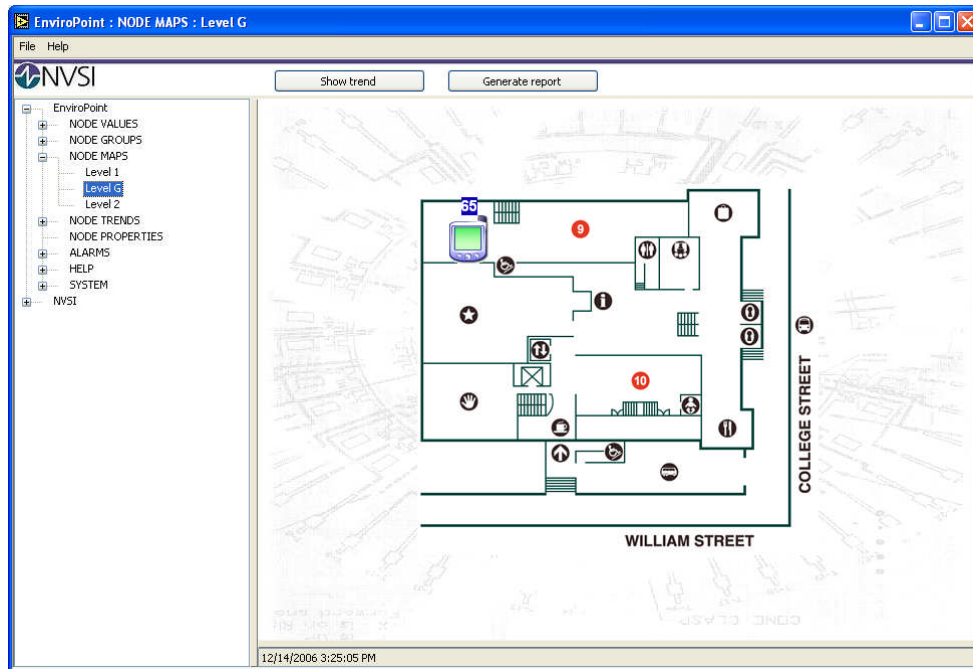


Figure 2-9 Map showing node location

Node maps are used to show the physical location of sensor pods. Each map displays an image representing an area of the site and icons showing where each sensor is located.

Your Administrator should have set this up for you but remember to tell them when pods are swapped or moved so the Administrator knows to update the maps.

In an alarm event, the specific pod name will show red. Again, it will flash for a measurement, or sensor, alarm and be solid for a mesh, or unit, failure.

The maps are the quickest way to locate where the alarm is. I recommend you:

use the map to find “where”;

then look at the trends or node values to see “what” the issue is.

Note there is a Show trend button on this screen.

Now you've investigated and, hopefully, fixed the issue which might have been the batteries running low, you need to record what the problem was and how you fixed it (there's a Troubleshooting section at the end of the Manual. Don't sweat).

2.6 Alarming events

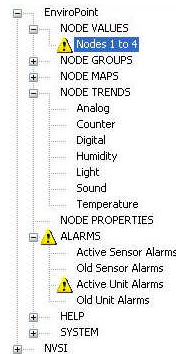


Figure 2-10

As you can see, the Alarm sign appears in several places on the directory tree. Clicking on the ALARMS branch opens up the Active and Old alarm records.

2.6.1 Acknowledging alarms

To acknowledge an alarm, open the sub-branch with the alarm sign beside it. In Figure 2-10, a unit alarm is showing. That means data is not being received from a pod.

The cause might have been a piece of equipment in the data path which has now been moved. So you can write that in the notes on the screen.

Screenshot required of Alarm acknowledgement application page.

Now, you've done your job and everyone is happy.

Okay, so there are situations which are easily rectified like equipment or people in the way. This shouldn't happen if the mesh is set up properly (remember, one pod communicating with at least two others) but there are times when a pod has to be out on it's own.

2.6.2 Sensor alarms – flashing red

What if there's a sensor alarm showing a measurement is heading outside acceptable limits? Here is where EnviroPoint helps prevent problems. You know there's an issue but it's not bad yet. If the system is correctly set up, you are the person who can do something to bring things back under proper control. If not, your processes should detail who to call before the situation gets worse. If this has been automated, then, EnviroPoint knows who to call.

If the alarm situation remains or gets worse, i.e. nothing is done about it, another alarm can be sent to someone who can take appropriate action. Alarms don't just appear on-screen and make a sound - they can be sent via email or SMS.

Sometimes there will be a simple text with no details, which means there will be a call asking what the problem is; other times the specific information will be messaged out, which means either you may get a call with instructions or the person messaged will arrive, looking hassled, to take action. Ask your Administrator. He or she will be able to tell you if further alarm levels exist, and if the text is specific.

The important thing to remember is that every alarm must be responded to (acknowledged). Having EnviroPoint installed means your company is concerned about prevention. If it's gone to a higher authority and nothing was done at your level, I can't come and rescue you!

2.6.3 Single unit alarms – static red

This means a pod is unable to communicate data. The first thing to do is check the voltage reading on Node Values. If the voltage is below 3.5V, there is not enough power to send data. The pods may be supposed to be running on mains, ethernet or batteries but, the fact is, not enough power is getting through. Put 3 fresh AA batteries in the pod and try again.

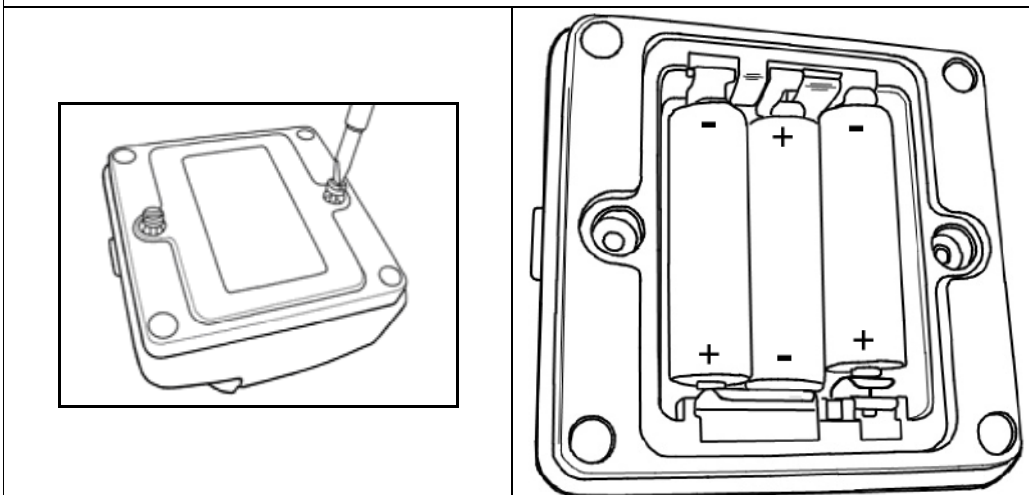


Figure 2-11 Using a flathead screwdriver, open the battery bay and install 3 AA batteries on the underside of the Sensor Pod. Replace cover. [1]

If it works, the world is okay if the pod is meant to be running on mains and rosy if the pod is meant to be running on batteries. Maybe a warning alarm should be set for when the batteries run low. Ask your Administrator and don't forget to acknowledge the current alarm.

The yellow light flashes when data is being sent but rapid flashes means it's repeatedly trying, and failing, to send.

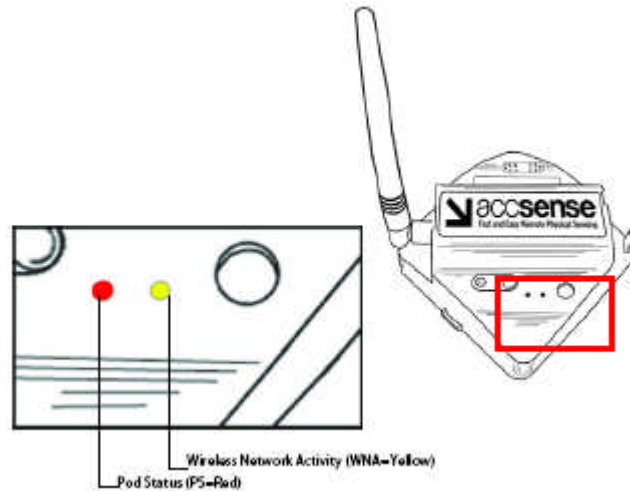


Figure 2-12 LED status indicators for Sensor Pod [1]

But was it meant to be running on mains? The pod will happily run on batteries and download stored data from memory while you check whether the power cable was connected properly (and was the pod turned on?) and the antenna is in. Still not working? Maybe you need another electric plug pack to test. Plug pack okay?

The final thing to try is re-associating the pod with its gateway. This is a handy trick to know when setting up a special test, changing the mesh to accommodate changing site conditions, e.g. new offices, and when swapping out pods for calibration.

2.6.3.1 Associating Pods with Gateways

Figure 2-13 gives details on how to associate a pod with its gateway. You need to have the pod right by the gateway to do this. Currently, up to 32 pods can be associated with each gateway.

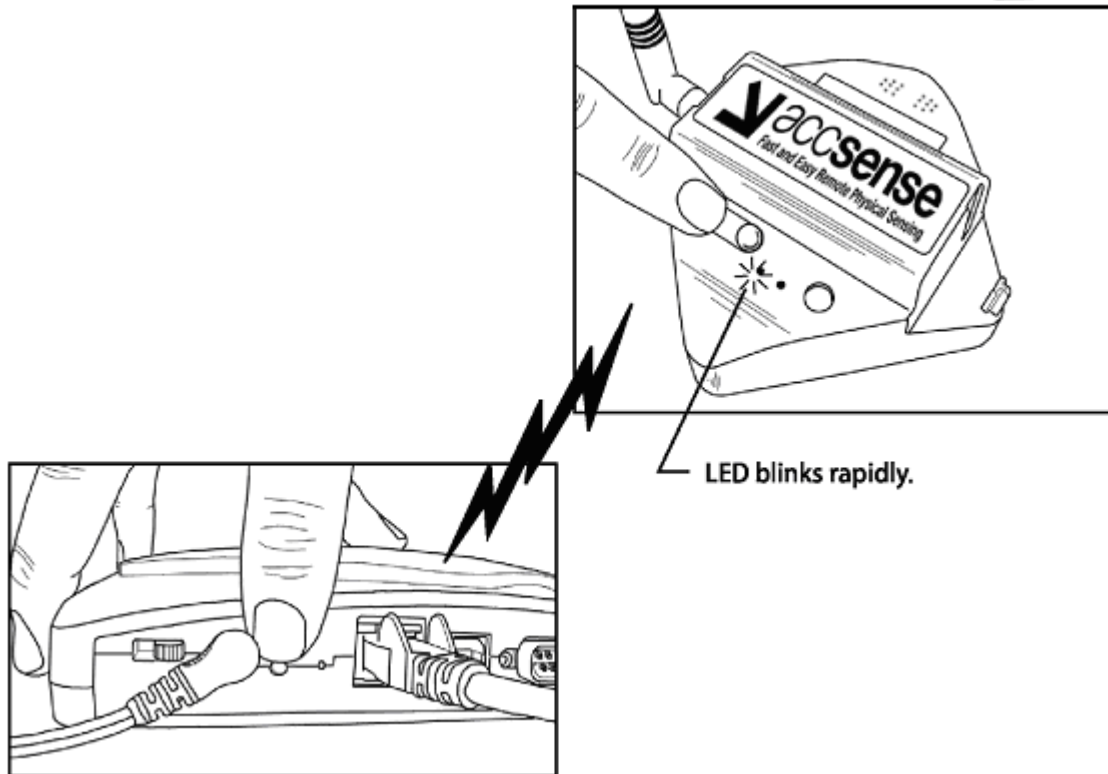


Figure 2-13 Associating a pod with a gateway

That's it. I'm out of suggestions. Don't throw the poor little pod at the wall, call Technical Support.

2.6.4 All unit alarms – static red

Don't panic. The world is not about to end but it looks like either the gateway, power supply or server has crashed. The pods will automatically start saving data so there is time to sort out the rest.

You will know if the power is out. Wait until the backup generator starts, if there is one, or the power is back on. EnviroPoint should restart automatically. If there are issues on start-up, call your Administrator or Technical Support. Don't keep on ringing IT, they'll be frantically busy.

Similarly, if the server has crashed.

Check the gateway as soon as possible if power is available and the server okay. The LED lights indicate the status. See Figure 2-14.

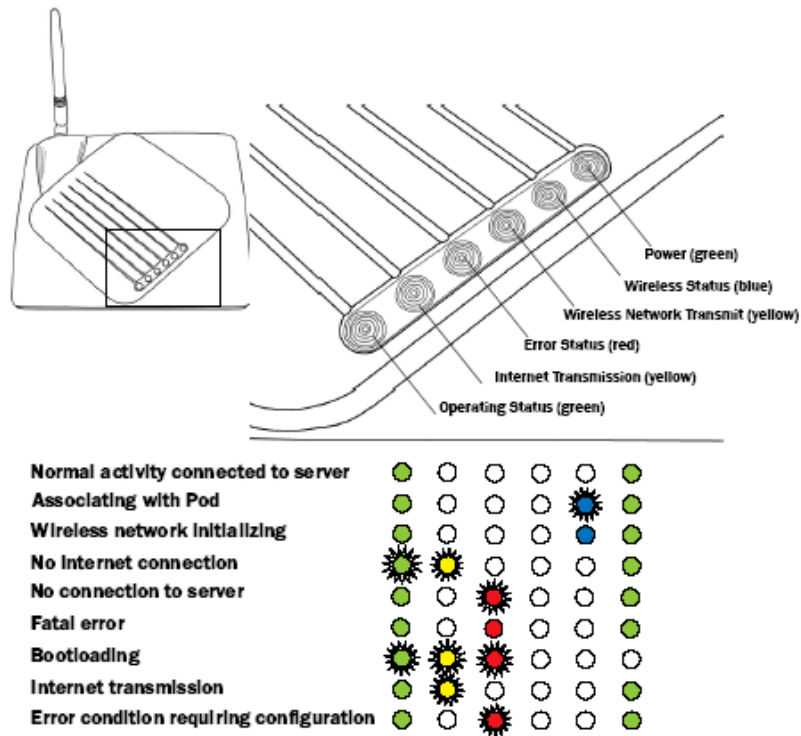


Figure 2-14 LED status indicators for Gateway [1]

2.6.5 Node Trends

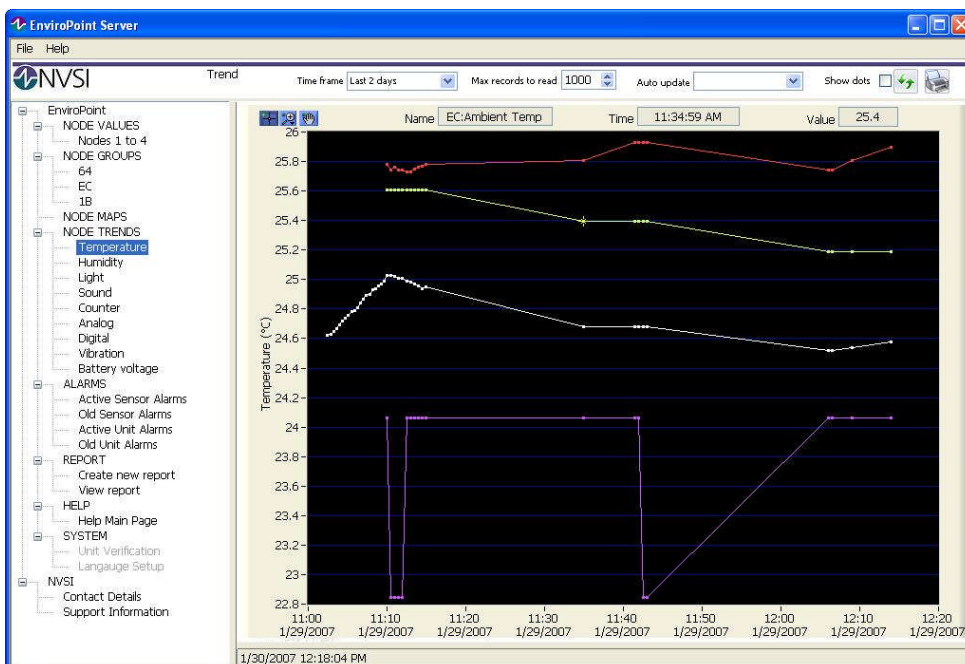


Figure 2-15 Node trends

This page displays trend data for each of the nodes in the system grouped by sensor type. Users can view all of the trends corresponding to a particular sensor type by selecting that sensor type from the tree structure. Trends can be viewed more closely by using the zoom and pan tools at the top left corner of the graph. The X-Axis of the graph will always display time while the Y-Axis units reflect the type of sensor selected.

Controls in the command bar allow users to determine the data plotted for each trend on the graph.

- Time Frame - Trends can be displayed for varying time intervals. Users can select from 1 hour, 12 hours, 1 day, 2 days, 1 week, 1 month, 6 months, 1 year, all values recorded.
- Max Records to read – The maximum number of points graphed for each trend
- Auto Refresh – Users can select the graphs refresh rate. Blank indicates manual refresh mode.
- Show Point – Select this box to show each data point calculated on the graph
- Refresh – Manual Refresh button, redraws the graph.

2.6.6 Alarms

Alarms are divided into two types. Sensor alarms are activated when measured values are outside of the preset limits for that sensor (see administration manual). Unit alarms are activated when a fault occurs in a node causing it to lose communication with the network. There are four alarm application screens.

- Currently active sensor alarms

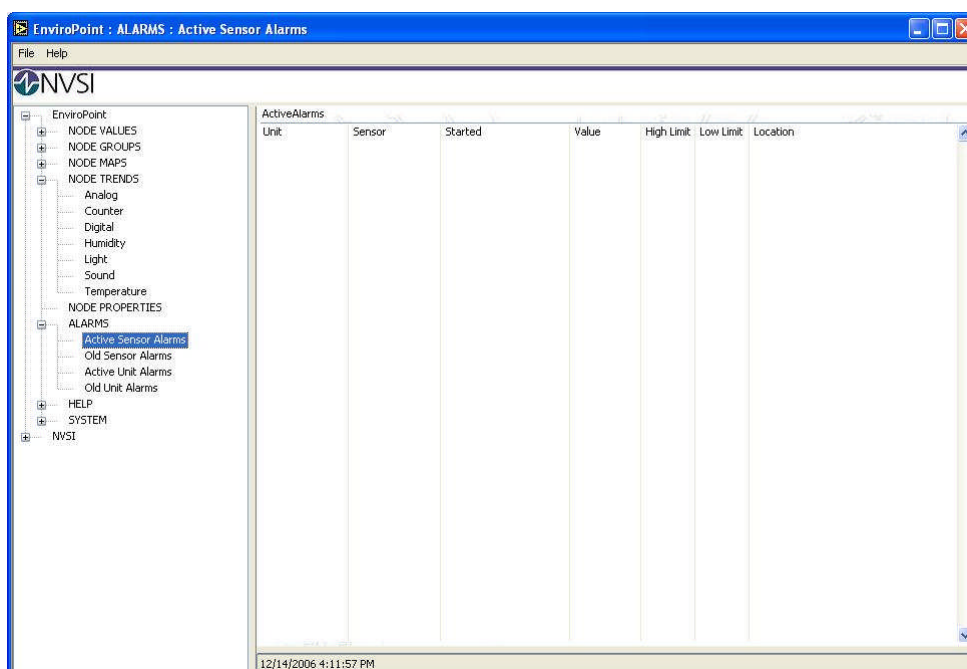
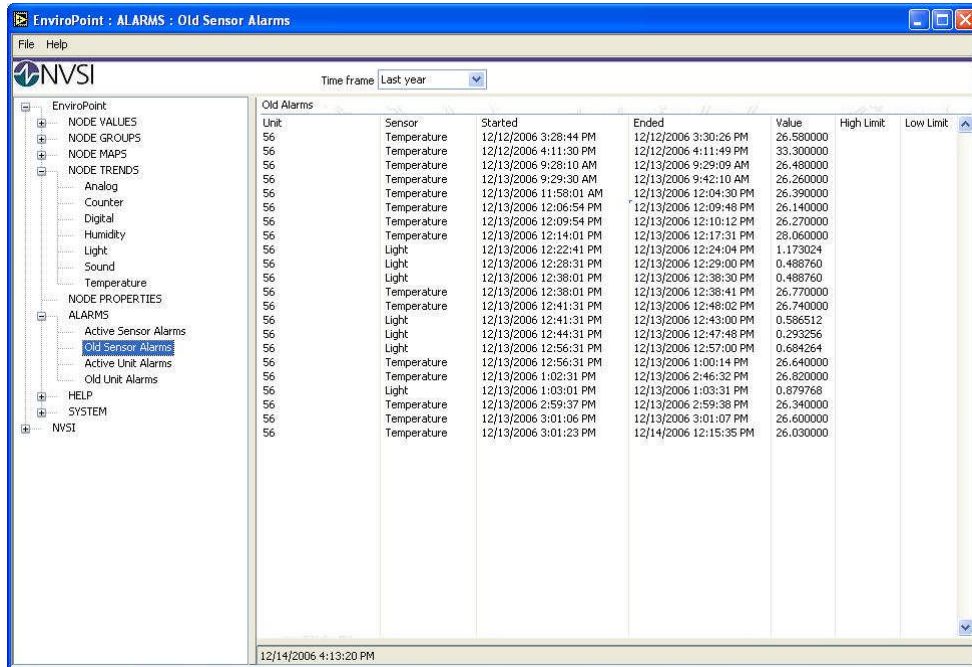


Figure No.9: Current Sensor Alarms

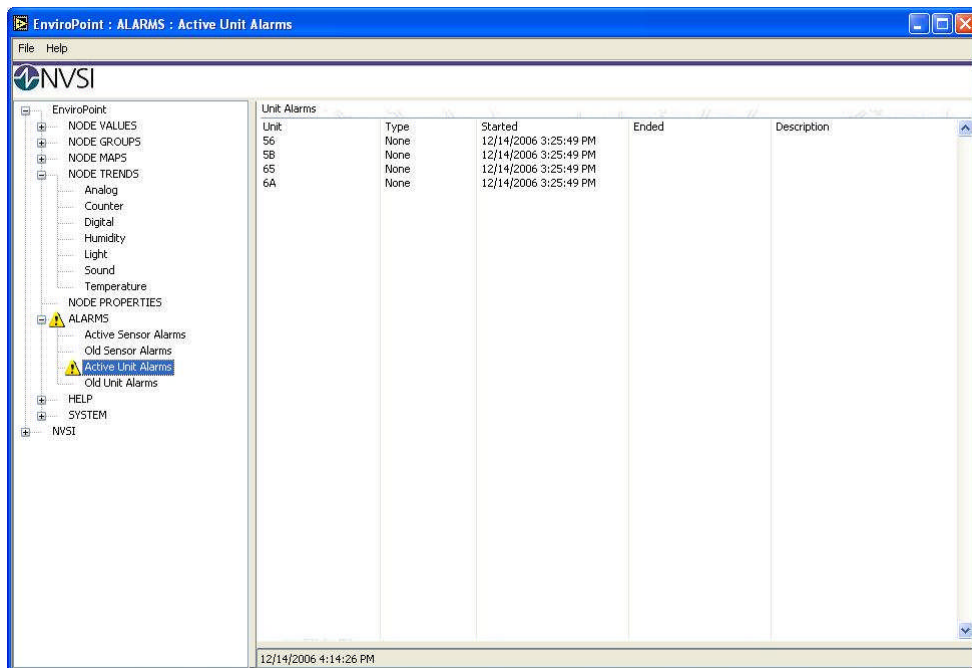
- Old sensor alarms



Unit	Sensor	Started	Ended	Value	High Limit	Low Limit
56	Temperature	12/12/2006 3:28:44 PM	12/12/2006 3:30:26 PM	26.580000		
56	Temperature	12/12/2006 4:11:30 PM	12/12/2006 4:11:49 PM	33.300000		
56	Temperature	12/13/2006 9:28:10 AM	12/13/2006 9:29:09 AM	26.480000		
56	Temperature	12/13/2006 9:29:30 AM	12/13/2006 9:42:10 AM	26.260000		
56	Temperature	12/13/2006 11:58:01 AM	12/13/2006 12:04:30 PM	26.390000		
56	Temperature	12/13/2006 12:06:54 PM	12/13/2006 12:09:48 PM	26.140000		
56	Temperature	12/13/2006 12:09:54 PM	12/13/2006 12:10:12 PM	26.270000		
56	Temperature	12/13/2006 12:14:01 PM	12/13/2006 12:17:31 PM	28.060000		
56	Light	12/13/2006 12:22:41 PM	12/13/2006 12:24:04 PM	1.173024		
56	Light	12/13/2006 12:28:31 PM	12/13/2006 12:29:00 PM	0.488760		
56	Light	12/13/2006 12:38:01 PM	12/13/2006 12:38:30 PM	0.488760		
56	Temperature	12/13/2006 12:38:01 PM	12/13/2006 12:38:41 PM	26.770000		
56	Temperature	12/13/2006 12:41:31 PM	12/13/2006 12:48:02 PM	26.740000		
56	Light	12/13/2006 12:41:31 PM	12/13/2006 12:43:00 PM	0.586512		
56	Light	12/13/2006 12:44:31 PM	12/13/2006 12:47:48 PM	0.293256		
56	Light	12/13/2006 12:56:31 PM	12/13/2006 12:57:00 PM	0.684264		
56	Temperature	12/13/2006 12:56:31 PM	12/13/2006 1:00:14 PM	26.640000		
56	Temperature	12/13/2006 1:02:31 PM	12/13/2006 2:46:32 PM	26.620000		
56	Light	12/13/2006 1:03:01 PM	12/13/2006 1:03:31 PM	0.879768		
56	Temperature	12/13/2006 2:59:37 PM	12/13/2006 2:59:38 PM	26.340000		
56	Temperature	12/13/2006 3:01:06 PM	12/13/2006 3:01:07 PM	26.600000		
56	Temperature	12/13/2006 3:01:23 PM	12/14/2006 12:15:35 PM	26.030000		

Figure No.10: Old Sensor Alarms

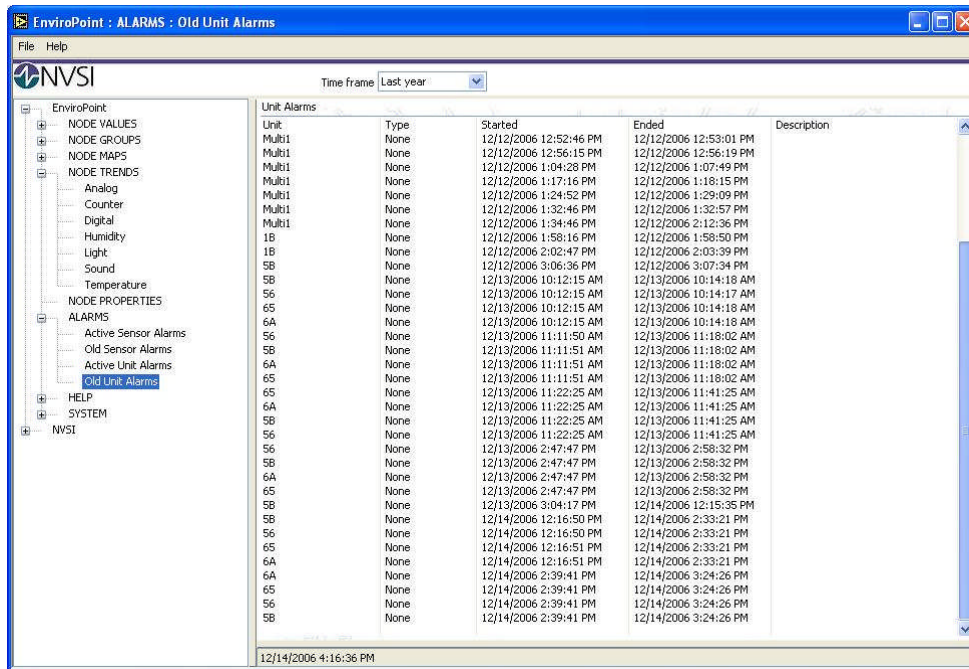
- Currently active unit alarms



Unit	Type	Started	Ended	Description
56	None	12/14/2006 3:25:49 PM		
5B	None	12/14/2006 3:25:49 PM		
65	None	12/14/2006 3:25:49 PM		
6A	None	12/14/2006 3:25:49 PM		

Figure No.11: Active Unit Alarms

- Old unit alarms.



The screenshot shows the 'EnviroPoint : ALARMS - Old Unit Alarms' window. The interface includes a tree view on the left with categories like 'EnviroPoint', 'NODE VALUES', 'NODE GROUPS', 'NODE MAPS', 'NODE TRENDS', 'ALARMES', 'HELP', and 'SYSTEM'. The main area displays a table of unit alarms with columns for Unit, Type, Started, Ended, and Description. The time frame is set to 'Last year'.

Unit	Type	Started	Ended	Description
Multi1	None	12/12/2006 12:52:46 PM	12/12/2006 12:53:01 PM	
Multi1	None	12/12/2006 12:56:15 PM	12/12/2006 12:56:19 PM	
Multi1	None	12/12/2006 1:04:28 PM	12/12/2006 1:07:49 PM	
Multi1	None	12/12/2006 1:17:16 PM	12/12/2006 1:18:15 PM	
Multi1	None	12/12/2006 1:24:52 PM	12/12/2006 1:29:09 PM	
Multi1	None	12/12/2006 1:32:46 PM	12/12/2006 1:32:57 PM	
Multi1	None	12/12/2006 1:34:46 PM	12/12/2006 2:12:36 PM	
1B	None	12/12/2006 1:58:16 PM	12/12/2006 1:58:50 PM	
1B	None	12/12/2006 2:02:47 PM	12/12/2006 2:03:39 PM	
5B	None	12/12/2006 3:06:36 PM	12/12/2006 3:07:34 PM	
5B	None	12/13/2006 10:12:15 AM	12/13/2006 10:14:18 AM	
56	None	12/13/2006 10:12:15 AM	12/13/2006 10:14:17 AM	
65	None	12/13/2006 10:12:15 AM	12/13/2006 10:14:18 AM	
6A	None	12/13/2006 10:12:15 AM	12/13/2006 10:14:18 AM	
56	None	12/13/2006 11:11:50 AM	12/13/2006 11:18:02 AM	
5B	None	12/13/2006 11:11:51 AM	12/13/2006 11:18:02 AM	
6A	None	12/13/2006 11:11:51 AM	12/13/2006 11:18:02 AM	
65	None	12/13/2006 11:11:51 AM	12/13/2006 11:18:02 AM	
65	None	12/13/2006 11:22:25 AM	12/13/2006 11:41:25 AM	
6A	None	12/13/2006 11:22:25 AM	12/13/2006 11:41:25 AM	
5B	None	12/13/2006 11:22:25 AM	12/13/2006 11:41:25 AM	
56	None	12/13/2006 11:22:25 AM	12/13/2006 11:41:25 AM	
56	None	12/13/2006 2:47:47 PM	12/13/2006 2:58:32 PM	
5B	None	12/13/2006 2:47:47 PM	12/13/2006 2:58:32 PM	
6A	None	12/13/2006 2:47:47 PM	12/13/2006 2:58:32 PM	
65	None	12/13/2006 2:47:47 PM	12/13/2006 2:58:32 PM	
5B	None	12/13/2006 3:04:17 PM	12/14/2006 12:15:35 PM	
5B	None	12/14/2006 12:16:50 PM	12/14/2006 2:33:21 PM	
56	None	12/14/2006 12:16:50 PM	12/14/2006 2:33:21 PM	
65	None	12/14/2006 12:16:51 PM	12/14/2006 2:33:21 PM	
6A	None	12/14/2006 12:16:51 PM	12/14/2006 2:33:21 PM	
6A	None	12/14/2006 2:39:41 PM	12/14/2006 3:24:26 PM	
65	None	12/14/2006 2:39:41 PM	12/14/2006 3:24:26 PM	
56	None	12/14/2006 2:39:41 PM	12/14/2006 3:24:26 PM	
5B	None	12/14/2006 2:39:41 PM	12/14/2006 3:24:26 PM	

Figure No.12: Old Unit Alarms