



Instruction Manual
Environmental Monitoring Unit with Optional POE

Watchdog 15 Series
Firmware Version 1



Contents

Contents	2
Specifications	3
Overview	3
Environmental	3
Electrical	3
Networking	3
Data Formats	3
EMC Verification	4
Installation	5
Guidelines	5
Network Overview	6
Default IP Address	6
Initial Setup	6
Web Interface	8
General	8
Overview Page	8
Logging Page	9
Display Page	10
Alarms Page	11
Configuration Page	12
Unit Configuration	13
Network	13
Time and Date	13
E-Mail	14
SNMP	15
User Accounts	15
Admin Information	16
Camera Configuration	16
Alarms	17
Alarm Notifications	17
Alarm Types	17
Alarm Removal	17
Thresholds	17
Sensors	19
Overview	19
Internal Sensors	19
Remote Sensors	19
Accessories	20
IP-Addressable Network Cameras	20
Alternate Data Formats	20
Technical Support	21
Firmware Version	21
Firmware Updates	21
Resetting the Unit	21
Service and Maintenance	21
More Technical Support	21
Table of Figures	22
Revision History	23

Specifications

Overview

The Watchdog 15 Environmental Monitoring Unit provides remote environmental monitoring and alarming capabilities needed to detect climate conditions in data centers. The Watchdog 15 Environmental Monitoring Units are equipped with a built-in web server. Web pages, including graphs, are generated by the unit to monitor environmental conditions within the cabinet. No software other than a web browser is required for operation and several data formats are available. The Watchdog 15 has built-in sensors to monitor Temperature, Relative Humidity and Dew Point. The Watchdog 15 has two expansion port for the connection of up to four external sensors. The Watchdog 15 supports the use of network cameras. The Watchdog 15 can be optionally configured at the factory to support Power-Over-Ethernet (PoE).

Environmental

Temperature

Operating:	-25°C (-4°F) min	80°C (176°F) max
Storage:	-40°C (-40°F) min	80°C (176°F) max

Humidity

Operating:	5% min	95% max	(non-condensing)
Storage:	5% min	95% max	(non-condensing)

Elevation

Operating:	0 m (0 ft) min	2000 m (6561 ft) max
Storage:	0 m (0 ft) min	15240 m (50000 ft) max

Electrical

6-18 Volts DC, 2 Amps
Power Over Ethernet (POE) Enabled (Class 0)

Networking

Protocols

HTTP, HTTPS (SSL/TLS), SMTP/POP3, ICMP, DHCP, TCP/IP, NTP, Telnet, Syslog

Ethernet Link Speed

10/100 Mbps; full duplex

Data Formats

HTML, SNMP, CSV/Plain Text, JSON, XML

EMC Verification

This Class A device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

Installation

Guidelines

- If the Watchdog 15 is installed in a cabinet the ambient temperature of the rack should be no greater than 80°C.
- Install the Watchdog 15 such that the amount of airflow required for safe operation of equipment is not compromised.
- Mount the Watchdog 15 so that a hazardous condition is not achieved due to uneven mechanical loading.

Network Overview

This product comes preconfigured with a default IP address set. Simply connect to the Environmental Monitoring Unit and access the web page with your browser.

Default IP Address

Watchdog 15 units have a default IP address for initial setup and access to the unit if the assigned address is lost or forgotten. Once an IP address is assigned to a unit, the default IP address is no longer active. To restore the default IP address, press the reset button located beside the network connector and hold for approximately 20 seconds. Both the idle and activity lights near the network connector will both light up when the IP address has been reset.

Note: Pressing the reset button will restore the default IP address and will also clear all password settings.

The Configuration page allows you to assign the network properties or use DHCP to connect to your network. Access to the unit requires the IP address to be known, so use of a Static IP or reserved DHCP is recommended. The default address is shown on the front of the unit:

- **IP Address:** 192.168.123.123
- **Subnet Mask:** 255.255.255.0
- **Gateway:** 192.168.123.1

Initial Setup

Connect the Watchdog 15 to your computer using a crossover cable or hub/switch.

Windows OS

Navigate to the Local Area Network Adapter Connections Properties and change the Internet Protocol Version 4 (TCP/IPv4) Properties. Select "Use the following IP address". Use these settings:

- **IP Address:** 192.168.123.1
- **Subnet Mask:** 255.255.255.0
- **Gateway:** Leave blank

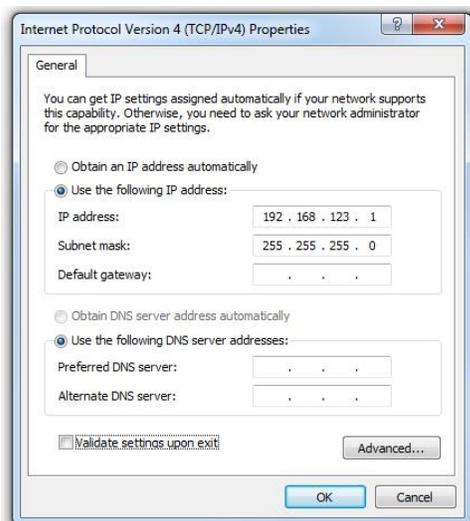


Figure 1: Network settings for initial setup. Images varies depending on Windows versions.

Save changes.

The unit should now be accessible in a web browser via the unit's permanent IP address: <http://192.168.123.123/>. See Unit Configuration (page 13) for details.

Mac OS

Open System Preferences via the Dock or the Apple menu.

Select "Network" under "Internet & Network."

Select "Ethernet" from the list on the left side of the window and enter these settings on the right side of the window:

- **Configure:** Manually
- **IP Address:** 192.168.123.1
- **Subnet Mask:** 255.255.255.0
- **Router:** Leave blank

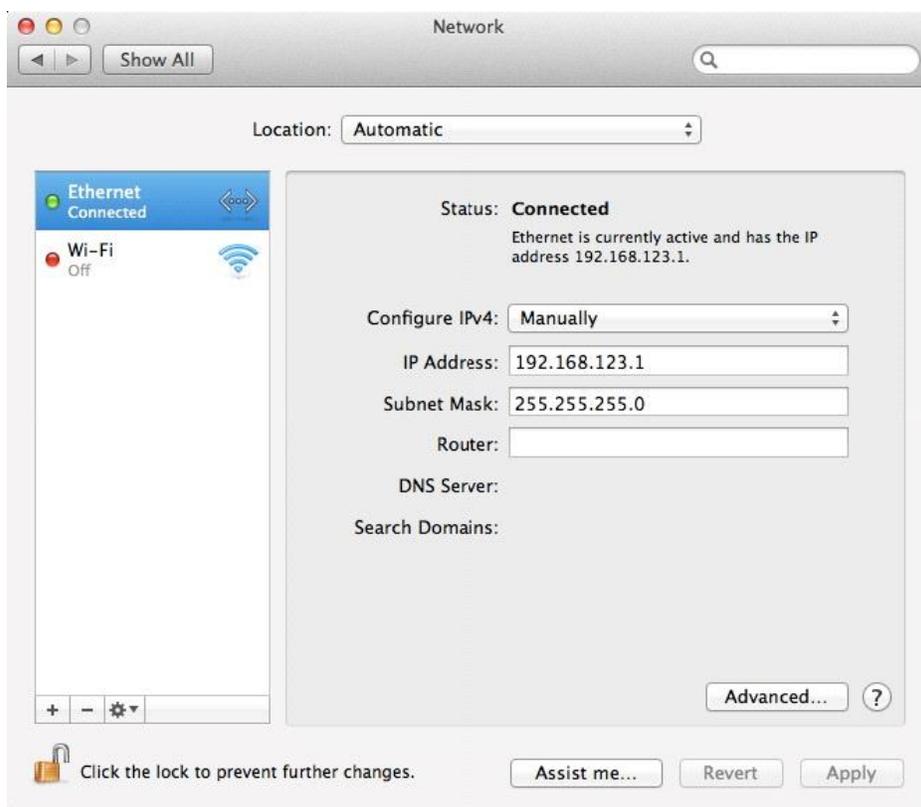


Figure 2: Mac OS network settings for initial setup. Image varies depending on Mac versions.

Apply changes.

The unit should now be accessible in a web browser via the unit's permanent IP address: <http://192.168.123.123/>. See Unit Configuration (page 13) for details.

Web Interface

General

The unit is accessible via a standard, unencrypted HTTP connection as well as an encrypted HTTPS (SSL) connection. The following web pages are available:

Overview Page

The front page, *Overview*, gives a real time view of the unit's data. Readings for the internal temperature, humidity and dew point sensors along with all external sensors will be shown.

Optional cameras may be added and their live snapshots are shown on this page. Plug-and-play external sensors appear below the internal sensors when attached.

The menu bar allows access to the rest of the Environmental Monitoring Unit's functionality.

The screenshot shows the GEIST Watchdog 15 web interface. At the top, the header includes the GEIST logo, the unit name 'Watchdog 15 [TestRack]', IP Address (192.168.140.237), Local Time (2015-02-16 12:20:54), and Firmware Version (v1.6.0). A status bar indicates 'All is well: 3 Alarms Monitored'. A left-hand navigation menu lists Overview, Alarms, Display, Logging, Config, and Help, with 'Alternate Formats' (XML | MIB) below. The main content area is titled 'Overview' and contains three sections: 'Watchdog 15 [TestRack]' showing internal sensors (Temperature: 75.26 °F, Humidity: 31%, Dewpoint: 42.53 °F), 'Temp Sensor' showing an external temperature of 73.85 °F, and 'Cameras' showing a live video feed of the unit's interior. Annotations with red arrows point to various elements: 'Friendly Name' points to the unit name; 'Alarm Status' points to the alarm count; 'Internal Sensors' points to the temperature, humidity, and dewpoint readings; 'Real-Time Sensor Readings' points to the temperature and dewpoint values; 'External Sensors' points to the external temperature reading; and 'Alternate Formats' points to the XML | MIB link.

Figure 3: Overview Page – Sensor and I/O Data

Logging Page

The *Logging* page allows the user to access the historical data by selecting the desired sensors and time range to be graphed. Selected sensor values are logged into the data file at a rate of one point per minute. Please note that although data is logged once per minute, all sensor data used in the real time display and alarm functions is read at least once every 5 seconds for internal sensors and once every 30 seconds for external sensors. Recorded data is available for download in Comma-Separated Values (CSV) or JavaScript Object Notation (JSON) file types.

Click the "Clear Logs" button to clear the historical data stored in the device.

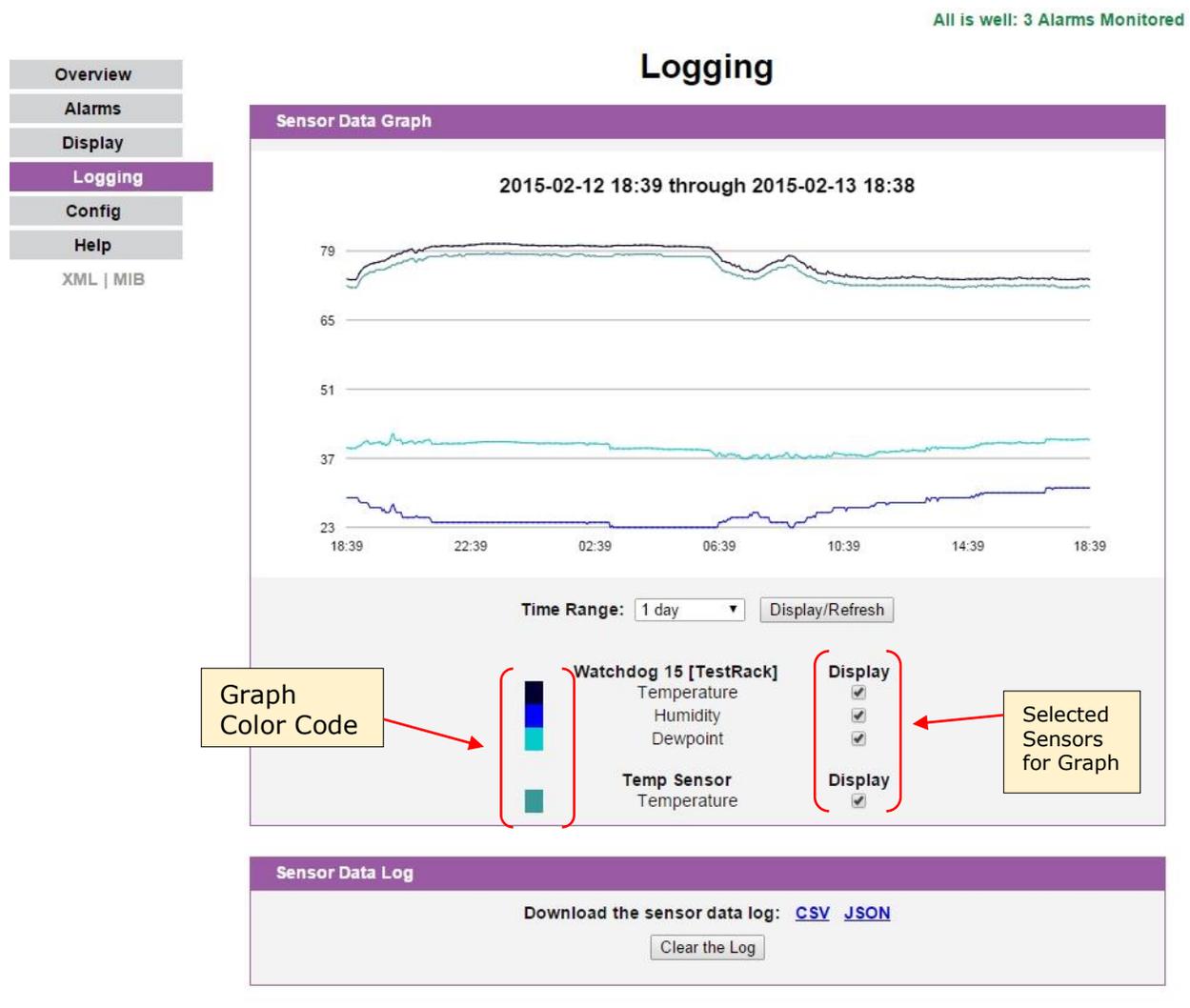


Figure 4: Logging Page

Display Page

The *Display* page allows the user to assign friendly names to internal and attached sensors as well as change the default temperature unit of measure for sensors. The display page also allows the user to select between the default and classic web page layouts. The default interface displays a vertical menu bar to the left of the main window, while the classic interface displays a horizontal menu bar across the top of the screen.

All is well: 3 Alarms Monitored

Display

- Overview
- Alarms
- Display
- Logging
- Config
- Help

XML | MIB

General

Temperature Unit:

Internal Temperature Offset:

Devices

Device ID	Device Type	Friendly Name
5B0004A3797215C3	Watchdog 15	<input type="text" value="Watchdog 15 [TestRack]"/>
B3000000C8EC7528	Temp Sensor	<input type="text" value="Temp Sensor"/>

Remove all unplugged devices

Figure 5: Display Page

Alarms Page

The *Alarms* page allows the user to establish alarm conditions for each sensor reading. Alarm conditions can be established with either high or low trip thresholds. The alarms are displayed in different sections based on the sensor the alarm is associated with. Alarm options include relays, Email and SNMP Traps. See Alarms (page 17) for details.

All is well: 3 Alarms Monitored

Overview

Alarms

Display

Logging

Config

Help

XML | MIB

Alarm settings

Watchdog 15 [TestRack]

Temperature Trips if Below limit -40.00 <input type="button" value="CLEAR"/>	Alarm must remain tripped for 0 (min) before notification Repeat every: 0 (min)	E-mail <input checked="" type="checkbox"/> rrosas@itwatchdogs.com <input type="checkbox"/> (Email 2) <input type="checkbox"/> (Email 3) <input type="checkbox"/> (Email 4) <input type="checkbox"/> (Email 5)
Temperature Trips if Below limit -40.00 <input type="button" value="CLEAR"/>	Alarm must remain tripped for 0 (min) before notification Repeat every: 0 (min)	E-mail <input type="checkbox"/> rrosas@itwatchdogs.com <input type="checkbox"/> (Email 2) <input type="checkbox"/> (Email 3) <input type="checkbox"/> (Email 4) <input type="checkbox"/> (Email 5)

Temp Sensor

Temperature Trips if Above limit 100.00 <input type="button" value="CLEAR"/>	Alarm must remain tripped for 0 (min) before notification Repeat every: 0 (min)	E-mail <input checked="" type="checkbox"/> rrosas@itwatchdogs.com <input type="checkbox"/> (Email 2) <input type="checkbox"/> (Email 3) <input type="checkbox"/> (Email 4) <input type="checkbox"/> (Email 5)
---	---	---

Figure 6: Alarms Page

Configuration Page

The *Configuration* page gives the user the ability to enter and update network settings, time settings, email info and multiple other settings. See Unit Configuration (page 13) for details.

The screenshot displays the Configuration page with a sidebar on the left and three main sections: General, Network, and Time.

Configuration

General

- Restore System Default Values
- Restore Network and Account Default Values

Network

MAC Address: 00:04:A3:79:72:15

Enable DHCP

IP Address:

Subnet Mask:

Gateway:

Primary DNS:

Secondary DNS:

Time

Current time: 2015-02-13 18:46:18

Mode:

UTC Offset:

Year	Month	Day	Hour	Minutes	Seconds
<input type="text" value="15"/> (yy)	<input type="text" value="2"/>	<input type="text" value="13"/>	<input type="text" value="23"/> (0-23)	<input type="text" value="46"/> (0-59)	<input type="text" value="18"/> (0-59)

Server:

Sync Period: seconds

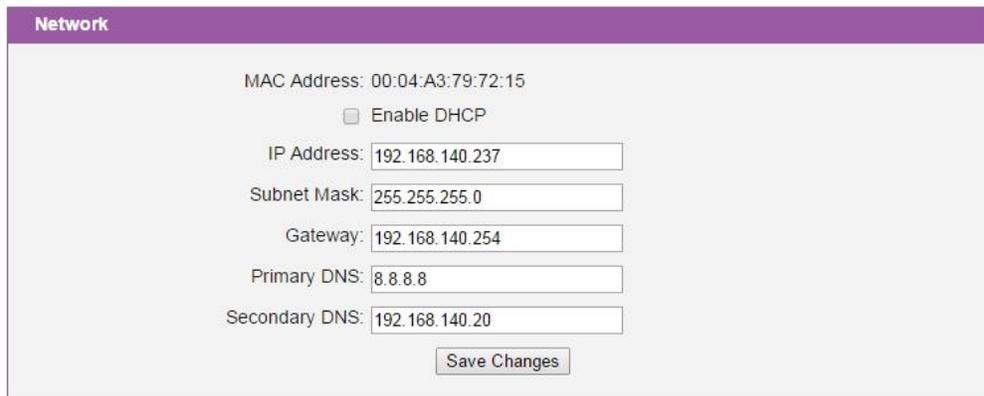
Figure 7: Configuration Page

Unit Configuration

Network

The unit's network configuration is set on the *Network* section of the *Configuration* page. Settings pertaining to the unit's network connection are:

- **DHCP:** Allows the unit to request a dynamic IP address from a server on the network.
- **IP Address/Subnet Mask/Gateway:** When not using a dynamic address, enter static network configuration information here.
- **DNS Servers:** Allows the unit to resolve host names for Email, NTP and SNMP servers as well as cameras.

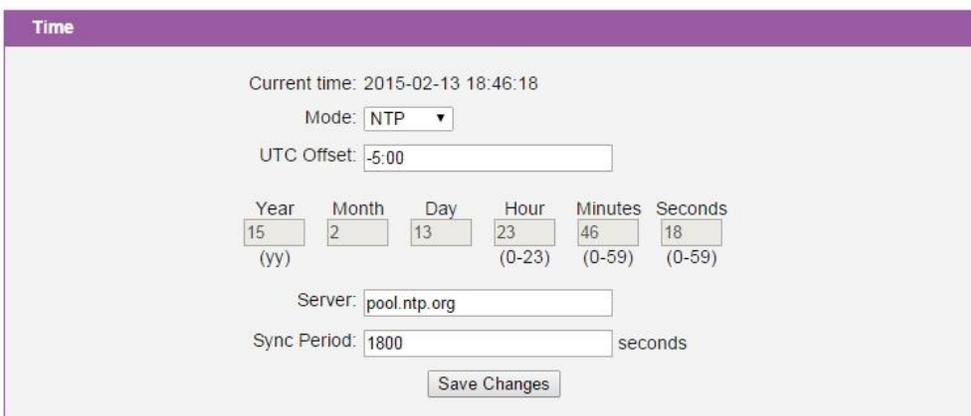


The screenshot shows the 'Network' configuration page. At the top, the MAC Address is 00:04:A3:79:72:15. There is an unchecked checkbox for 'Enable DHCP'. Below that, the IP Address is 192.168.140.237, Subnet Mask is 255.255.255.0, Gateway is 192.168.140.254, Primary DNS is 8.8.8.8, and Secondary DNS is 192.168.140.20. A 'Save Changes' button is at the bottom.

Figure 8: Network Configuration Section

Time and Date

The system clock is set on the *Admin* section of the *Configuration* page. The unit comes preconfigured with the IP addresses of two NIST time servers and is set to the Central Time Zone (-0500 GMT). Should a local time server be preferred, enter its IP address into the "Server" box and click the "Save Changes" button. Clearing the time server addresses and clicking "Save Changes" will set the time servers back to the defaults. The unit attempts to contact the time servers during boot up and periodically while running. Until a time server is contacted or the system clock is manually set, all log time stamps will present time as the number of seconds since the unit was powered up.



The screenshot shows the 'Time' configuration page. The current time is 2015-02-13 18:46:18. The Mode is set to NTP. The UTC Offset is -5:00. The time is displayed as Year: 15 (yy), Month: 2, Day: 13, Hour: 23 (0-23), Minutes: 46 (0-59), and Seconds: 18 (0-59). The Server is pool.ntp.org and the Sync Period is 1800 seconds. A 'Save Changes' button is at the bottom.

Figure 9: Time Configuration Section

The time, date, IP address and friendly name of the unit are displayed in the top of each web page.



Figure 10: Date and Time Display

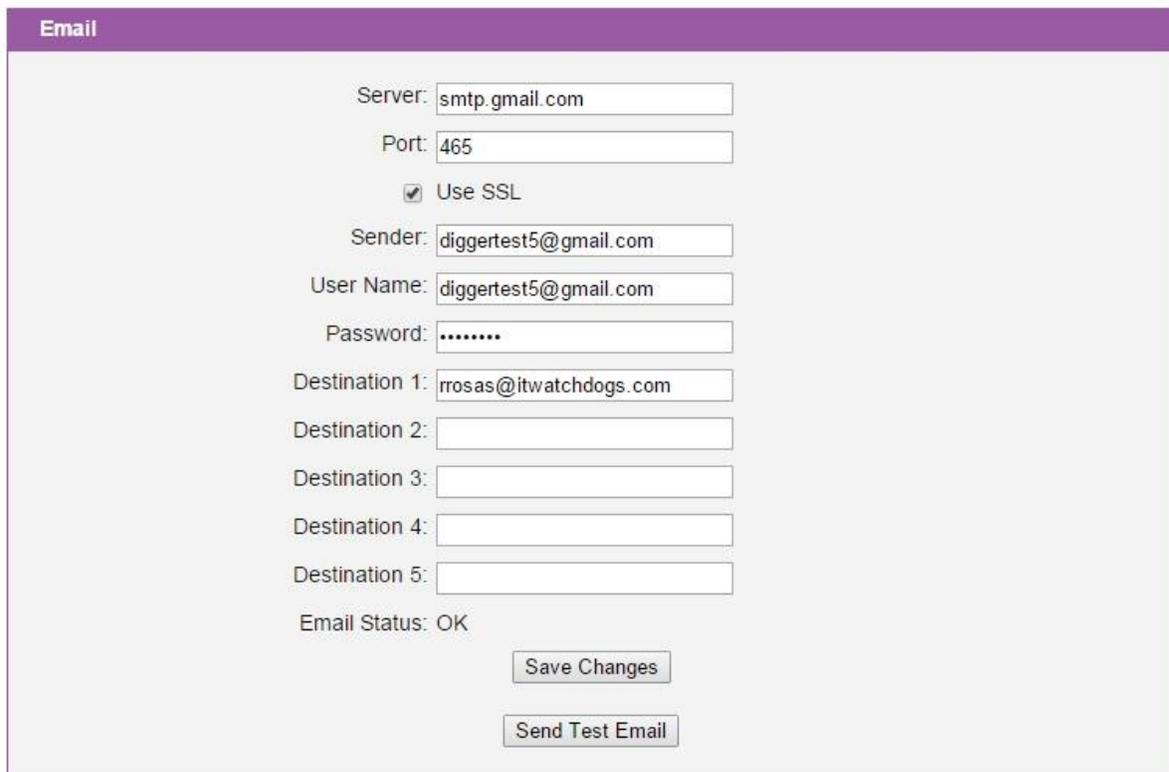
Note: The time and date are not adjusted for daylight savings time. Setting the time zone offset forward and backward an hour will cause a gap or overwriting of logs, respectively.

E-Mail

The unit is capable of sending e-mail to as many as three addresses at once. Most SMTP and ESMTP servers are compatible. Authentication options are None, POP3 (POP-before-SMTP) or ESMTP. The e-mail configuration is set on the *Email* section of the *Configuration* page.

An SMTP server as well as "Sender" and "Destination" addresses are required to send e-mails. Some mail servers may require a username and password. In most cases, the username does not have to match the "Sender" address, but does need to be a valid user on the authenticating server. Microsoft Exchange servers will have to be set to allow SMTP relay from the IP address of the unit. In addition, a test email can be sent from the bottom of this section.

Note: The unit cannot receive e-mails. The POP3 server is used strictly for authentication and is not required when using None or ESMTP.



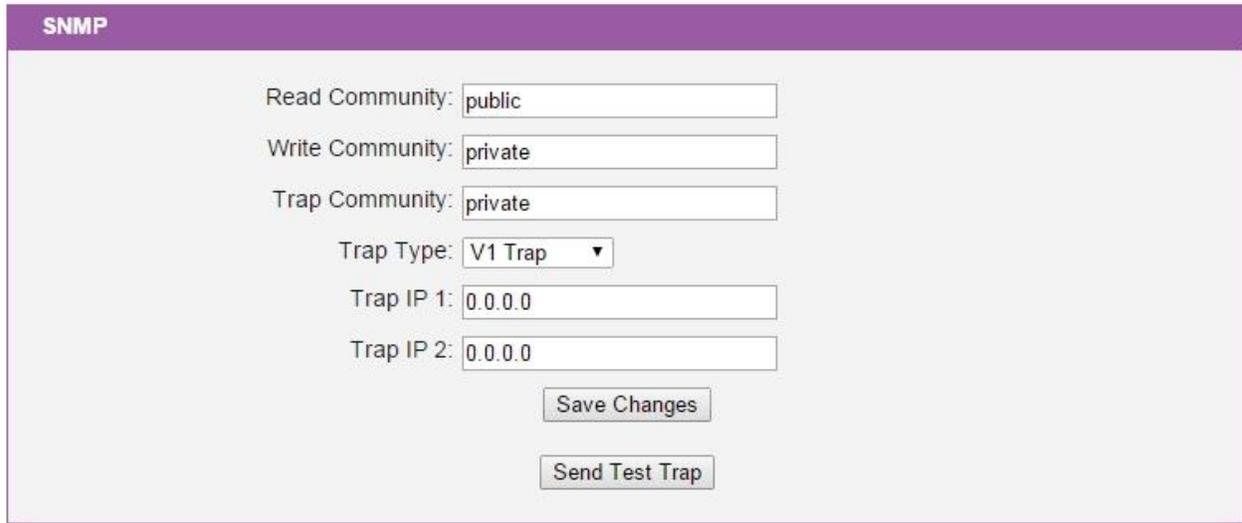
The screenshot shows the 'Email' configuration page. It features a purple header with the word 'Email'. Below the header, there are several input fields and a checkbox. The 'Server' field is set to 'smtp.gmail.com', 'Port' is '465', and the 'Use SSL' checkbox is checked. The 'Sender' field is 'digbertest5@gmail.com', and the 'User Name' field is also 'digbertest5@gmail.com'. The 'Password' field is masked with dots. There are five 'Destination' fields; the first is 'rrosas@itwatchdogs.com' and the others are empty. At the bottom, there is an 'Email Status' field showing 'OK', a 'Save Changes' button, and a 'Send Test Email' button.

Figure 11: Email Configuration Section

SNMP

The unit supports retrieval of all data via Simple Network Management Protocol (SNMP) v1 and v2c. In addition, alarm traps can be sent to up to two IP addresses. The SNMP configuration is entered on the *SNMP* section of the *Configuration* page.

The default read community string is “public” and the MIB is downloadable via a link on the unit’s web page.



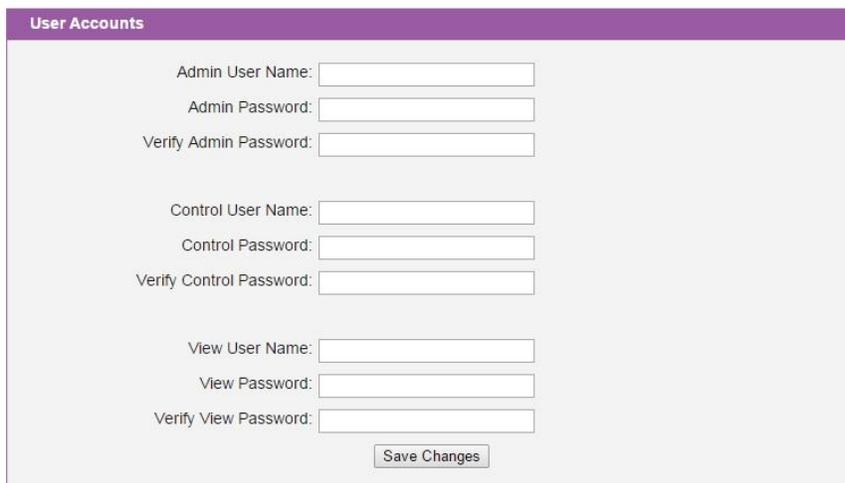
The image shows a web interface for SNMP configuration. It has a purple header with the text "SNMP". Below the header, there are several input fields and buttons. The fields are: "Read Community:" with the value "public", "Write Community:" with the value "private", "Trap Community:" with the value "private", "Trap Type:" with a dropdown menu showing "V1 Trap", "Trap IP 1:" with the value "0.0.0.0", and "Trap IP 2:" with the value "0.0.0.0". At the bottom, there are two buttons: "Save Changes" and "Send Test Trap".

Figure 12: SNMP Configuration Section

User Accounts

Watchdog 15 Units offer account security options that are entered on the *User Accounts* section of the *Configuration* page. There are three levels of account security:

- **Administrator:** Password protects the Display, Alarms and Configuration pages.
- **Control User:** Password protects the Control Actions and Control Settings pages.
- **View User:** Password protects the Sensors, PDA, WAP and XML pages.



The image shows a web interface for User Accounts configuration. It has a purple header with the text "User Accounts". Below the header, there are three groups of input fields. The first group is for the Admin user: "Admin User Name:", "Admin Password:", and "Verify Admin Password:". The second group is for the Control user: "Control User Name:", "Control Password:", and "Verify Control Password:". The third group is for the View user: "View User Name:", "View Password:", and "Verify View Password:". At the bottom, there is a "Save Changes" button.

Figure 13: User Accounts Configuration Section

User account names may include alphanumeric characters, spaces and underscores. Passwords may include alphanumeric characters and underscores.

Note: The Administrator account must be active to enable the Control Access and View-Only accounts.

Note: The Control Access account must be active to enable the View-Only account.

Note: The account names "root" and "admin" are disabled for security reasons and cannot be re-enabled.

Warning: Record your passwords. To reset lost passwords, follow the instructions for resetting the unit's IP address and passwords given in the Default IP Address section (page 6).

Admin Information

Information entered in the *Admin Info* section of the *Admin* tab of the *Configuration* page will show up at the bottom of the unit's web interface.



Figure 14: Admin Information Configuration Section



Figure 15: Admin Information Display

Camera Configuration

Enter the domain names/IP addresses and models of up to four IP-addressable network cameras in the *Cameras* section on the *Configuration* page. The unit will present a linked snapshot from each camera on the *Sensors* page.

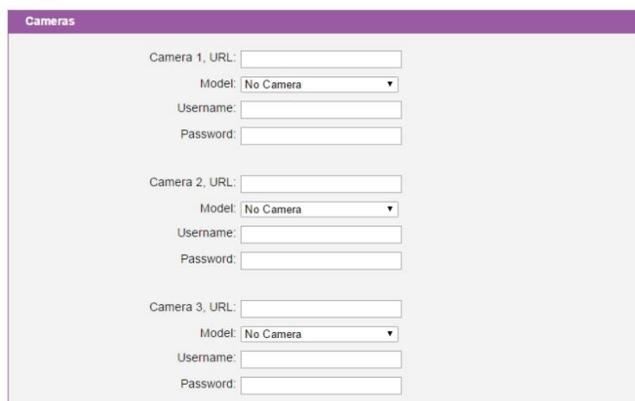


Figure 16: Cameras Configuration Section

Note: Each camera must be set to allow anonymous access to enable this feature.

Alarms

Alarm Notifications

The Watchdog 15 supports three types of alarm notification:

- **E-Mail:** The unit can be configured to send alarm e-mails to up to three recipients.
- **SNMP:** The unit can be configured to send SNMP traps to up to two trap servers.

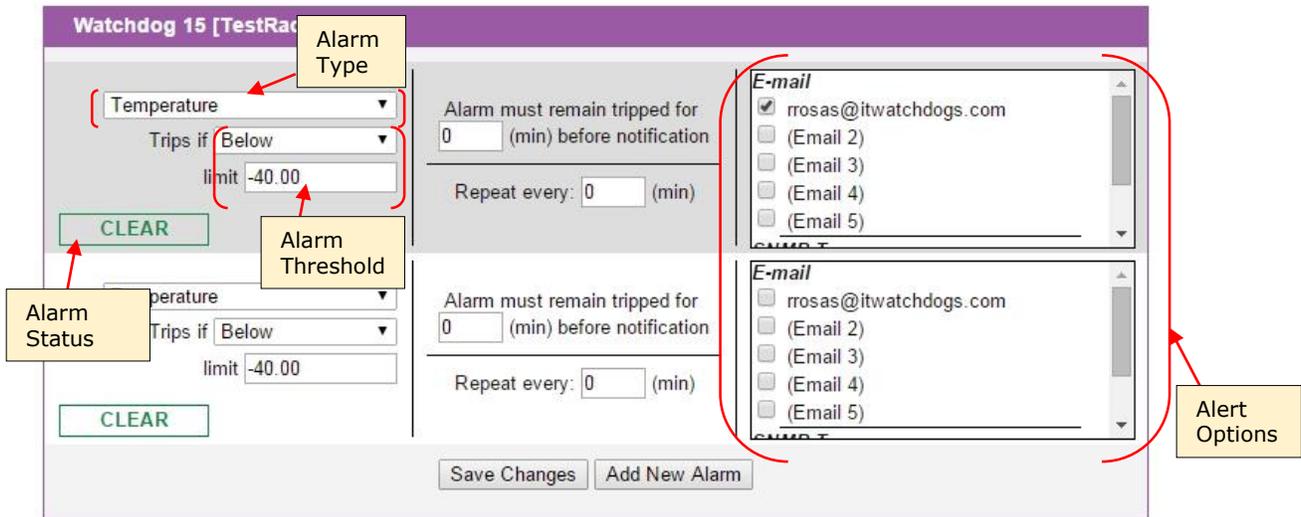


Figure 17: Alarms Options

The unit is capable of any combination of the above alarms at once. Alarm type combinations are selected per alarm via the check boxes which are displayed for each alarm on the *Alarms* page.

Alarm Types

The Watchdog 15 provides three types of alarm messages via E-Mail and SNMP:

- **Trip:** Occurs when a sensor value goes above a high trip threshold or below a low trip threshold.
- **Clear:** Occurs when a sensor already in the Tripped or Unplugged state goes back into its normal range.
- **Unplugged:** Occurs when a sensor with an alarm set loses contact with the main unit due to the sensor being physically unplugged or another communications error.

Alarms can be added for each internal device or external sensor displayed on the Alarms page. An alarm is added by pressing the "Add New Alarm" button and selecting the sensor value to be monitored from a drop down menu.

Alarm Removal

To remove an alarm, select "REMOVE ALARM" from the sensor type drop-down menu then click the "Save Changes" button.

Thresholds

The user must set a trip threshold and type for each alarm that is added to the Alarms page. The threshold type is chosen as "Trips if" either "Above" or "Below" from a drop down menu when the

alarm is created. The threshold value is typed into a data window when the alarm is created. Alarms are triggered based on the selected sensor's data and the trip threshold type and value. Alarm settings can be edited or deleted at any time.

Analysis of each unit is recommended before setting alarm thresholds as some of the values monitored by the unit are relative values whose scale will differ slightly between units. Allow each unit to operate under normal, steady-state conditions for several hours before setting alarm thresholds. By allowing the sensors to operate for several hours, the user can better understand what the normal variations are; thereby allowing the user to choose alarm thresholds that will not trigger numerous false alarms.

Note: Changes in settings take a few moments to become active. Rapidly resetting alarm values may not provide the desired results. Allow up to 2 minutes after changing a setting before modifying it again.

Sensors

Overview

All internal sensors are measured every 5 seconds. External sensors are measured every 10 to 30 seconds, depending on the number of devices connected. Sensor data collected by Watchdog 15 units provides useful trend analysis data. While all values are not absolute in relation to a known unit, trend analysis of the data allows users to view changes and draw useful conclusions about what is happening over time in the monitored environment.

Internal Sensors

Watchdog 15 units contain the following onboard sensors:

- **Temperature:** Measures temperature and can be displayed in °C or °F. The accuracy is ± 0.5 °C from -20°C to 80°C. Note: This sensor may be heated by internal circuitry in the unit; a temperature offset is available to re-calibrate.
- **Humidity:** Measures the percent of water vapor in the air within $\pm 2\%$ from 20% to 80%.
- **Dew Point:** Calculated measurement of temperature at which moisture in the air will turn to water based on the humidity and temperature measurements.

Remote Sensors

Available Sensors

- **RT:** Temperature
- **GTHD:** Temperature / Humidity / Dew Point
- **GT3HD:** Temperature / Humidity / Dew Point with ability to add two RT sensors
- **RTAFHD3:** Temperature / Air Flow / Humidity / Dew Point
- **CCAT:** Converts analog I/O Sensors to Remote Digital Sensors
- **RS2:** Remote power monitoring and switching

RTAFHD3 Compatibility

The (G)RTAFHD3 sensor cannot be utilized in combination with the discontinued (G)RTAF and (G)RTAFH sensors or (G)RTHD sensors built prior to 2010. If you desire to add (G)RTAFHD3 sensors to an existing installation currently utilizing incompatible sensors, please contact Customer Service for installation options.

Connecting Remote Sensors

Plug-and-play remote sensors may be attached to the unit at any time via the RJ-12 connectors on the face of the unit. In some cases splitters may be required to add additional sensors. Each sensor has a unique serial number and is automatically discovered and added to the web page. Up to four sensors may be connected to the Watchdog 15.

The display order of the sensors on the web page is determined by the serial number of each sensor. Friendly names for each sensor can be customized on the *Display* page.

Note: The sensor uses Cat. 3 wire and RJ12 connectors. Wiring must be straight-through: reverse polarity will temporarily disable all sensors until corrected.

Note: The sensors use a serial communication protocol and are subject to network signaling constraints dependent on shielding, environmental noise, and length of wire. Typical installations allow runs of up to 600 feet of sensor wire.

Accessories

IP-Addressable Network Cameras

The unit is able to interface with up to four IP-addressable network cameras. A live snapshot from each camera will be displayed on the unit's *Overview* page. Clicking on a snapshot opens the camera's website in a new browser window.

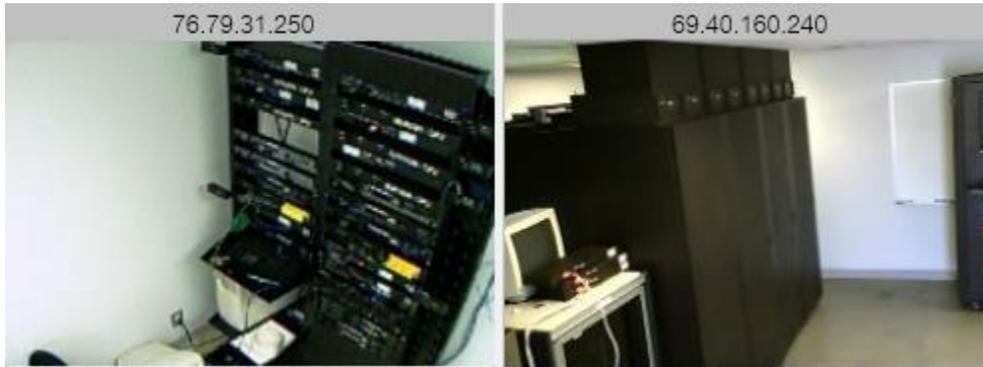


Figure 18: Camera Images

Camera model and IP address are entered on the *Monitoring* tab of the *Configuration* page.

Note: Some cameras require additional software downloads to display live video in a web browser.

Alternate Data Formats

In addition to the full access, control and configuration available via a desktop web browser, Watchdog 15 units present data in multiple formats for easy integration with other monitoring systems. Data formats available via links on the unit's web page are:



Figure 19: Alternate Format Links

- **XML:** Extensible Markup Language. Presents data in a structured tree for use with automated scripts and monitoring systems.
- **MIB:** Management Information Base. Downloads the MIB for use with SNMP monitoring tools.

Technical Support

Firmware Version

The firmware version is located in the upper right section of the web interface header, represented by v1.y.xx. Before contacting support, it is recommended that the Watchdog 15 unit first be updated to the latest firmware version. If this is not possible, please have the unit's existing firmware version number available when contacting technical support.



Figure 20: Web Page Header

Firmware Updates

Keep your unit updated with the latest firmware releases or sign up for notifications at the following website: <http://geistglobal.com/support/monitor/firmware>.

Resetting the Unit

Should the Watchdog 15 unit lose communication; the processor may be manually rebooted by removing power momentarily from the unit. To restore the default IP address, press the reset button located beside the network connector and hold for approximately 20 seconds. Both the idle and activity lights near the network connector will both light up when the IP address has been reset.

Service and Maintenance

No service or maintenance is required. Do not attempt to open the unit or you may void the warranty. No serviceable parts inside.

More Technical Support

<http://www.geistglobal.com>
(800) 432-3219
Email: support@geistglobal.com
Or contact your distributor.

Table of Figures

Figure 1: Network settings for initial setup. Images varies depending on Windows versions.....	6
Figure 2: Mac OS network settings for initial setup. Image varies depending on Mac versions.	7
Figure 3: Overview Page – Internal Sensor and I/O Data	8
Figure 4: Logging Page	9
Figure 5: Display Page	10
Figure 6: Alarms Page	11
Figure 7: Configuration Page	12
Figure 8: Network Configuration Section	13
Figure 9: Time Configuration Section	13
Figure 10: Date and Time Display	14
Figure 11: Email Configuration Section	14
Figure 12: SNMP Configuration Section	15
Figure 13: User Accounts Configuration Section	15
Figure 14: Admin Information Configuration Section	16
Figure 15: Admin Information Display	16
Figure 16: Cameras Configuration Section	16
Figure 17: Alarms Options	17
Figure 18: Camera Images	20
Figure 19: Alternate Format Links	20
Figure 20: Web Page Header	21

Revision History

Revision	Date	Notes	Approved By
1.0	8/9/2012	Initial Version	CG
2.0	2/13/2015	Change Product Name and Update Interface.	QN