GEIST

Instruction Manual
RAC10 Room air controller

RAC Series
Firmware Version 3.15.1

Contents

Specifications

Overview

The RAC system evacuates heat load from the small space and sends it to the outside corridor or ceiling plenum return. The RAC system provides control and monitoring via a built-in web server. Web pages, including graphs, are generated by the unit to monitor RAC settings and environmental conditions within the room. No software other than a web browser is required for operation and several data formats are available. The RAC system includes one internal temperature sensor, two external temperature sensors, and ports for two additional (optional) external temperature sensors. Optional external network cameras can also be displayed on the RAC's web pages.

Environmental

Temperature
Operating:	10°C (50°F) min	45°C (113°F) max
Storage:	-25°C (-13°F) min	65°C (149°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

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.

Electrical

120V, 60 Hz

Networking

Protocols

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

Ethernet Link Speed

10 Mbit; half-duplex

Data Formats

HTML, SNMP, CSV/Plain Text, XML

Installation

- The RAC10 relies on the building installation for protection from overcurrent. A Listed circuit breaker is required in the building installation. The circuit breaker should be rated at 15 or 20 Amps.
- Install the RAC10 so the input plug may be disconnected for service.

Installation:
1. Using appropriate hardware, mount unit into wall or dropped ceiling as detail in Mounting Requirements Section of Instruction Sheet.
2. Plug RAC10 into appropriately rated and protected branch circuit receptacle.

Service and Maintenance:
No service or maintenance is required. Do not attempt to open the RAC10 or you may void the warranty. No serviceable parts inside.

Two Installation Options
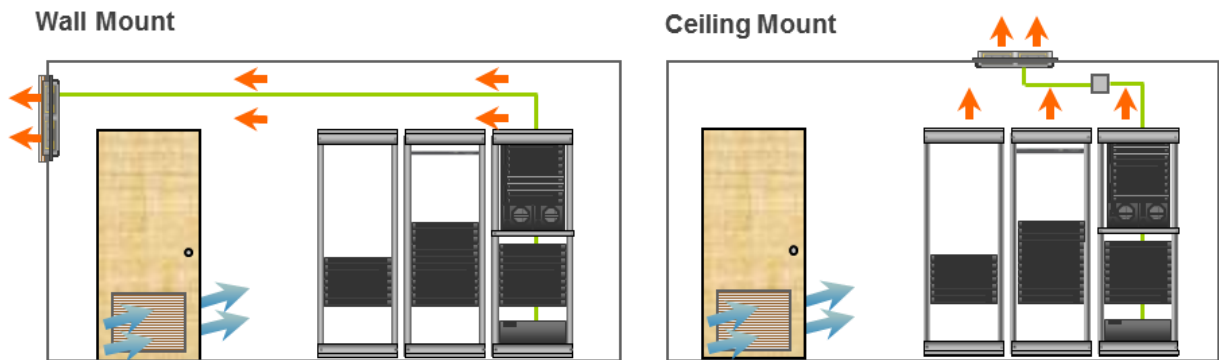
Wall or ceiling mount for automated heat exhaust and critical monitoring / alerts. Optional System for room air supply required for some room and load conditions

Wall Mount
1. Mount to wood studs, spaced 16" apart.
2. Must use 2" length, #10 wood screws into studs as shown in Figure 1.
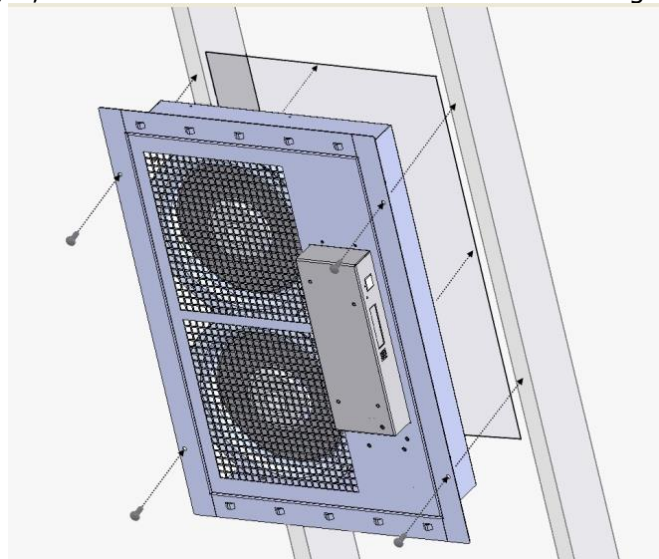

Figure 1: RAC10 Wall Mount

Drop Ceiling Mount
1. Must use 16 or heavier gauge drop-ceiling hanger wire.
2. Attach to unit through 4 eyelets on top of unit as shown in Figure 1.
3. Supplying power receptacle must be below drop ceiling to keep power cord out of plenum space.
4. Optional RAC-D002 duct kit may be used for interfacing to existing duct work.
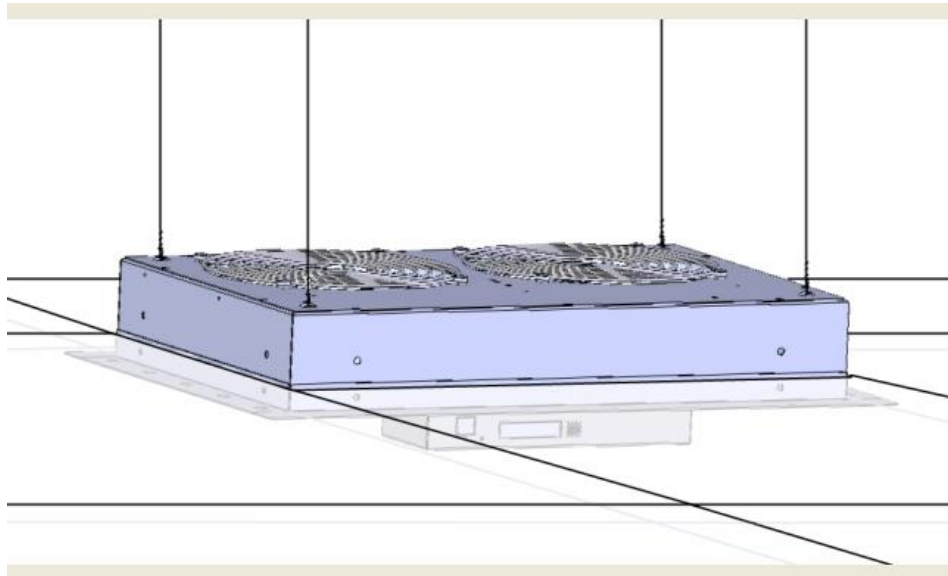

Figure 2: **RAC10 Drop-Ceiling Mount**

Network Overview

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

Default IP Address

RAC 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 and hold the reset button located below the network connector for 20 seconds. The idle and activity lights on the network connector will both light up when IP address has been reset. The reset button is accessed through the white, circular hole located below the Ethernet jack.

Note: Pressing the reset button under the network connector 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 RAC unit 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
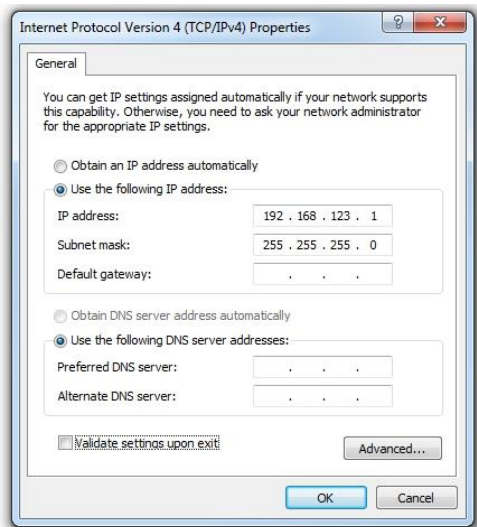- **Gateway:**   Leave blank

Figure 3: 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 15) 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
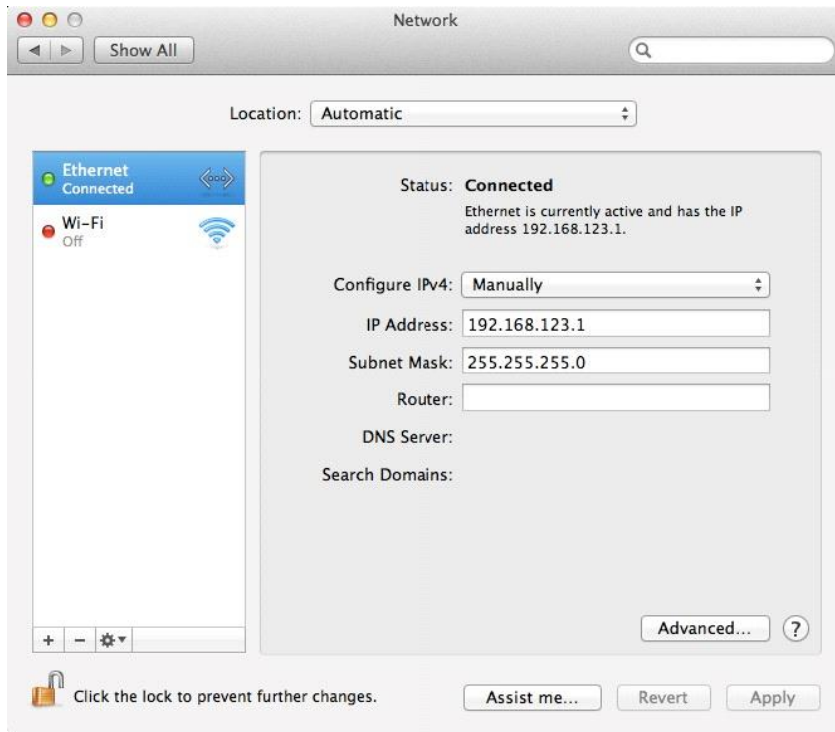
Figure 4: Mac OS network settings for initial setup. Image varies depending on Mac versions.

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 15) for details.

Web Interface

Overview

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

Sensors Page

The front page, *Sensors*, gives both instantaneous and historical views of the unit's data. Real time readings are provided for all data next to historical graphs.

Optional cameras may be added and their live snapshots are shown on this page. Plug-and-play external temperature sensors appear on this page when installed.

The menu bar allows access to the rest of the RAC's functionality.

Figure 5: Sensors Page
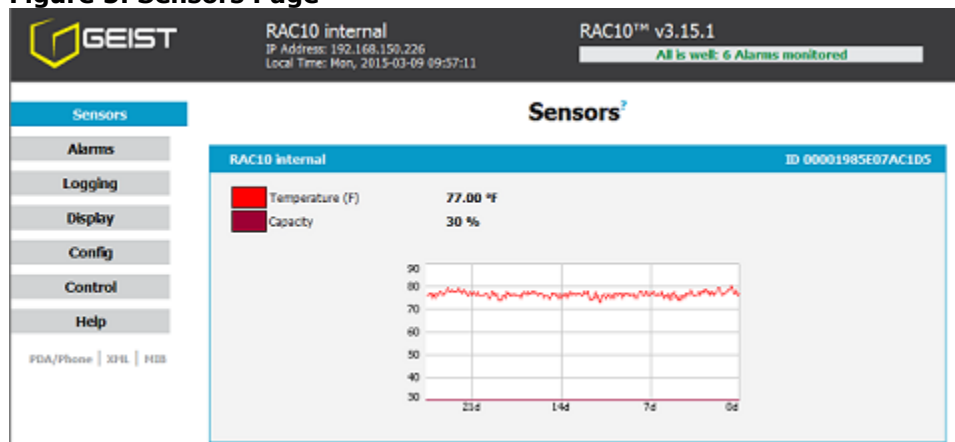
Logging Page

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. Recorded data is available for download in a comma-separated values (CSV) file.
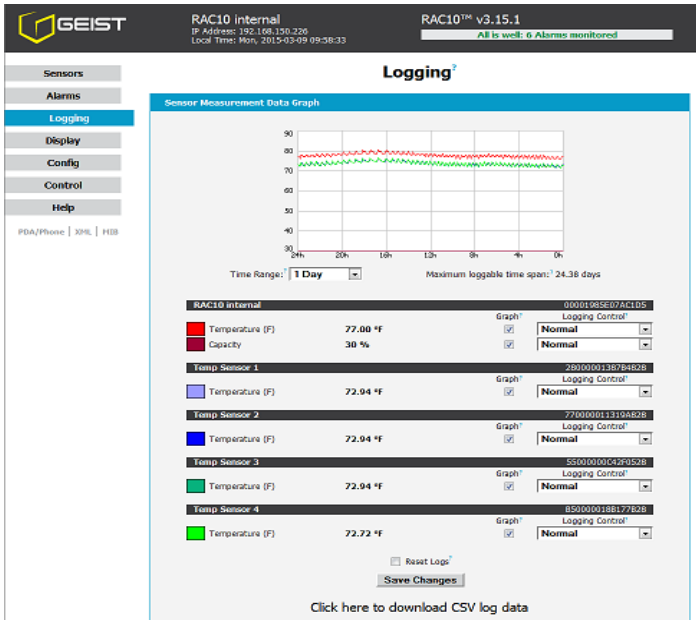
Figure 6: Logging Page

Display Page

The *Display* page allows the user to assign a friendly name to the Fan Controller as well as change the default temperature unit of measure for internal and external 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.
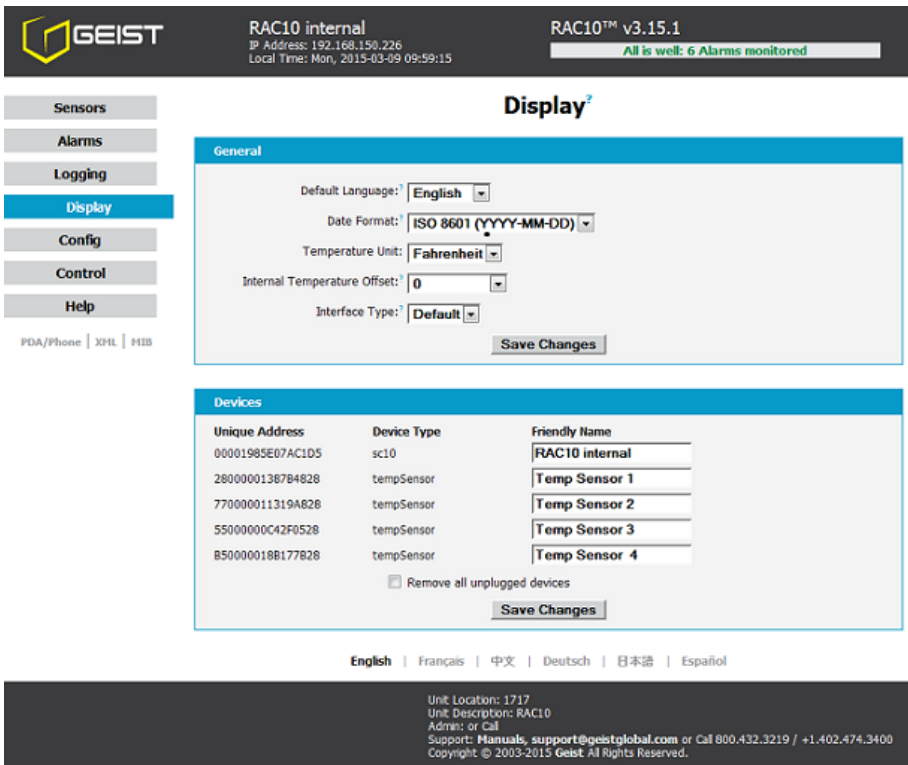
Figure 7: Display Page

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. Alarm options include time tripped before notification, a repeat cycle, Email and SNMP Trap. There is also a provision to notify if a sensor is unplugged. See Alarms (page 28) for details.
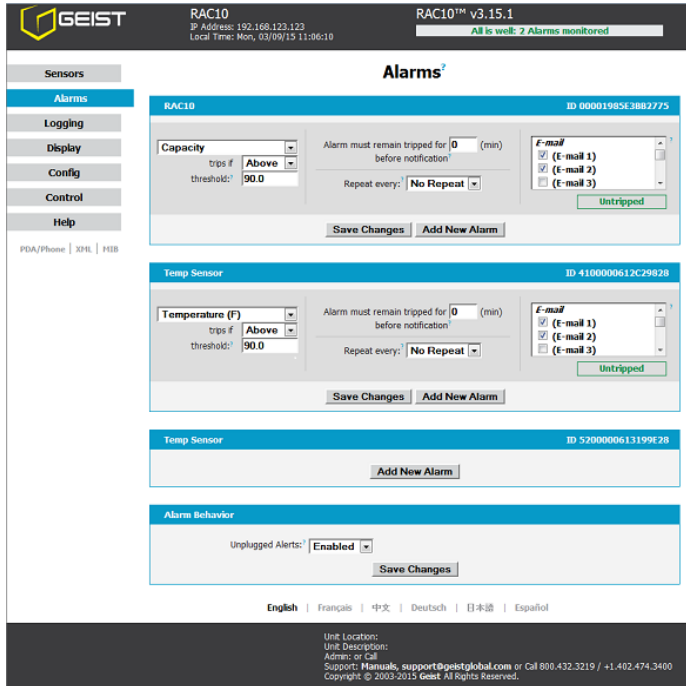
Figure 8: Alarms Page

Control Page

The *Control* page gives the user several options for entering the RAC control set point. A drop down menu allows the user to choose between a temperature set point or a manual fan capacity set point. In addition, the Control page allows the user to assign friendly names to any external temperature sensors attached to the RAC.
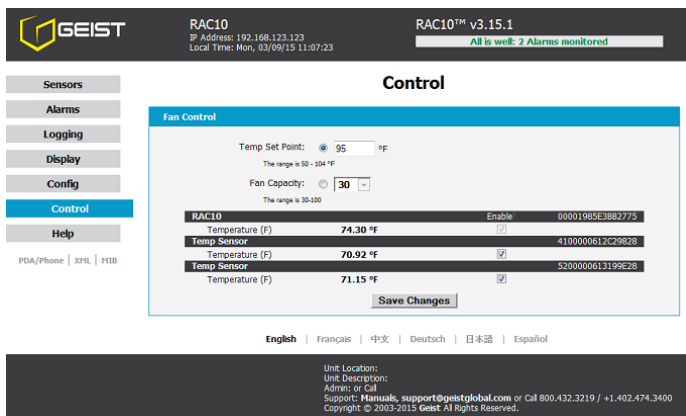
Figure 9: Control Page

Configuration Page

The *Configuration* page has five sub-tabs; *Network*, *Monitoring*, *Diagnostics*, *Event Log*, and *Admin*. See Unit Configuration (page 15) for details.

Configuration Network Tab

The user can enter and update the network settings on the *Network* tab of the *Configuration* page. See Unit Configuration section for details.

Figure 10: Configuration Network Tab

Configuration Monitoring Tab

The user can enter and update the email alert, SNMP, and camera settings on the *Monitoring* tab of the *Configuration* page. See Unit Configuration section for details.

Figure 11: Configuration Monitoring Tab

Configuration Diagnostics Tab

The user can update the Syslog settings on the *Diagnostics* tab of the *Configuration* page.

Figure 12: Partial View of Configuration Diagnostics Tab

Configuration Event Log Tab

The user can view the Event Log and update the Memory Syslog settings on the *Event Log* tab of the *Configuration* page.

Figure 13: Partial View of Configuration Event Log Tab

Configuration Admin Tab

The user can set the system clock and administrative information on this tab. Additionally the user can set administrator and account passwords. See Unit Configuration section for details.

Figure 14: Partial View of Configuration Admin Tab

Unit Configuration

Network Configuration

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

Figure 15: Network Configuration

- **DHCP:** Allows the unit to request a dynamic IP address from a server on the network.
- **Static IP Address/Net Mask/Gateway:** When not using a dynamic address, enter static network configuration information here.
- **Telnet Service:** Enable or disable the built-in Telnet server. See Telnet (page 19) for details.
- **HTTP Services:** Enables/disables access via HTTP and HTTPS. Available options are: HTTP and HTTPS, HTTP only, and HTTPS only. It is not possible to disable the web interface completely.
- **HTTP/HTTPS Server Port:** Changes the TCP port that each server listens on.
- **DNS Servers:** Allows the unit to resolve host names for Email, NTP and SNMP servers as well as cameras.

Time and Date

The system clock is set on the *Admin* tab 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 "NTP primary 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 and graphs will not be shown.

System Clock, set to GMT

Set Clock method:	NTP Server
GMT to local, (+/-)hh:mm	-05:00
NTP primary server	192.43.244.18
	192.43.244.18
NTP secondary server	129.6.15.28
	129.6.15.28
Sync to NTP server period (seconds)	1800
	Save Changes

Daylight Saving Time

DST is DISABLED

Enable DST:	Disabled
	Save Changes

Figure 16: Time Settings

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

Unit Location:
Unit Description:
Admin: or Call
Support: **Manuals, support@geistglobal.com** or Call 800.432.3219 / +1.402.474.3400
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Figure 17: Time and Date 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 five 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 *Monitoring* tab of the *Configuration* page.

Figure 18: E-Mail Configuration

An SMTP server as well as "From" and "To" 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 "From" 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 the *Monitoring* tab of the *Configuration* page.

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

Status Reports

> When enabled, the unit will periodically send a full status report to all "To" e-mail addresses selected for the report. The report includes current unit data from all attached sensors as well as alarm states. Reporting frequency options are: weekly, hourly, every 2, 3, 4, 6, 8, 12, 24, or 48 hours. E-mail addresses are selected when the report is created by checking the corresponding e-mail destination box. Allowing the cursor to hover over an e-mail destination box will display the e-mail address that the box is associated with.

Figure 19: Email Report Settings

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 *Monitoring* tab of the *Configuration* page.

Figure 20: SNMP Configuration

The default community string is "public" and the MIB is downloadable via a link at the top of the unit's web page.

Accounts and Passwords

The Fan Controller offers account security options that are entered on the *Admin* tab of the *Configuration* page. There are three levels of account security:

- **Administrator:** Password protects the *Display*, *Alarms* and *Configuration* pages.
- **Control Access:** Password protects the *Control* page.
- **View-Only:** Password protects the *Sensors* page, including PDA and XML data.

Figure 21: Account Configuration

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. To generate a temporary recovery password to access the unit, contact customer service from a location where the unit can be accessed via the internet.

Telnet

The unit provides a Telnet server for basic monitoring via the command line. The Administrator account must be enabled to use the Telnet interface. Type "help" after logging in to the unit to see a list of available commands. The Telnet service can be disabled under "Web Server" on the *Network* tab of the *Configuration* page.

Note: The All data sent via Telnet is unencrypted. Some settings can be changed and user names and network settings are available via Telnet. In secure environments, it is recommended that Telnet be disabled.

Camera Configuration

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

Figure 22: Configuration and Supported Models

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

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 23: Admin Information Fields

Figure 24: Admin Information Display

RAC Operation

Initial Set Point Configuration

After configuring an IP address and attaching any external sensors, power up the RAC and allow about a minute for the device to boot up. Go to the unit's *Control* page and select a control mode. The available control modes are:

- **Temperature Set Point:** Tells the RAC to use the set point entered when controlling fan speed.
- **Fan Capacity:** Tells the RAC to use the set point entered in the box on the *Control* page for fan capacity.

Figure 25: Set Point Configuration

General Operation

Once the desired mode of operation and set point has been set, the unit will operate without any interaction with the user.

Alarms

Alarm Notifications

The RAC supports 2 types of alarm notification:

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

Figure 26: Alarm State Menu

The RAC 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 RAC 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 set point, fan speed, and internal or external temperature sensors 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.

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 either "High Trip" or "Low Trip" 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

The internal temperature sensor is measured every 5 seconds. External sensors are measured at approximately the same rate, depending on the number (1-4) of devices connected. Sensor data collected by the Fan Controller gives useful trend analysis data that allows users to view changes and draw useful conclusions about what is happening over time in the monitored environment.

Items Displayed on *Sensors* Page

The RAC will display the following items on the *Sensors* page:

- **Set Point Temp:** Displays the desired temperature set by the user.
- **Internal Temp:** Displays measured temperature inside the unit in °C or °F.
- **Temp 1:** Displays temperature measured by external sensor in °C or °F. This value will read 0 °C or 32 °F until and external temperature sensor is connected.
- **Temp 2:** Displays temperature measured by external sensor in °C or °F. This value will read 0 °C or 32 °F until and external temperature sensor is connected.
- **Temp 3:** Displays temperature measured by external sensor in °C or °F. This value will read 0 °C or 32 °F until and external temperature sensor is connected.
- **Temp 4:** Displays temperature measured by external sensor in °C or °F. This value will read 0 °C or 32 °F until and external temperature sensor is connected.
- **Fan Speed:** Percent, from 30-100 of maximum fan speed.

Remote Sensors

Available Sensors

- **RT-12:** Temperature – 12 ft. cord
- **RT-20:** Temperature – 20 ft. cord

Connecting Remote Sensors

Plug-and-play remote temperature sensors may be attached to the RAC at any time via the RJ-12 connectors on the unit. Each sensor has a unique serial number and is automatically discovered and added to the web page. Up to four temperature sensors may be connected.

Note: The display order of the sensors on the web page is determined by the internal serial number of each sensor. Friendly names for each sensor can be customized on the *Display* page. The RAC will only recognize RT (Temperature) sensors. The RAC uses the highest temperature reading available when adjusting fan speed.

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.

Data Logging and Display

All data collected by the unit can be graphed. The *Logging* page allows the user to select graphed content to be logged. Selected sensor values are logged into the data file at a rate of one point per minute. The number of selected sensors determines the maximum data logging time span. This period is calculated and displayed on the *Logging* page. The oldest data will be deleted when the onboard memory fills up in order to make room for new data.

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 *Sensors* page underneath the main unit's graph. Clicking on a snapshot opens the camera's website in a new browser window.

Figure 27: 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.

RSC Integration

For users with multiple RacSense units, Geist RSC software offers:

- Convenient, single-window monitoring of multiple units via simple web-based interface
- Streamlined firmware updating
- Consolidation of alarm settings

See http://www.geistglobal.com/ for more information.

Alternate Data Formats

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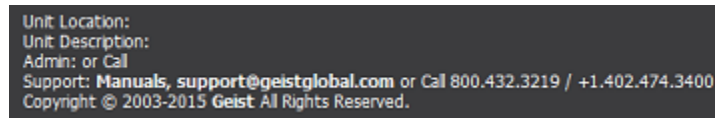

Figure 28: Alternate Format Links

- **PDA/Phone:** Presents data in a format best-suited for PDA or cellular phone web browsers.
- **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 v3.y.xx. Before contacting support, it is recommended that the Fan Controller first be updated to the latest firmware version. If this is not possible, please have the existing firmware version number for the unit available when contacting technical support.

Figure 29: Web Page Header

Firmware Updates

Keep your unit updated with the latest firmware releases or sign up for notifications. http://www.geistglobal.com/GeistUS/Docs/downloads.htm.

Service and Maintenance

No service or maintenance is required. Do not attempt to open the PDU or you may void the warranty. No serviceable parts inside. It is recommended that power be removed from the unit before installing or removing any equipment.

More Technical Support

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

Table of Figures

Revision History

Revision	Date	Notes	Approved By
0.0	4/27/2013	Initial Version	JB
1.0	6/18/2013	Revised	JB
2.0	3/9/2015	Revised	JB