

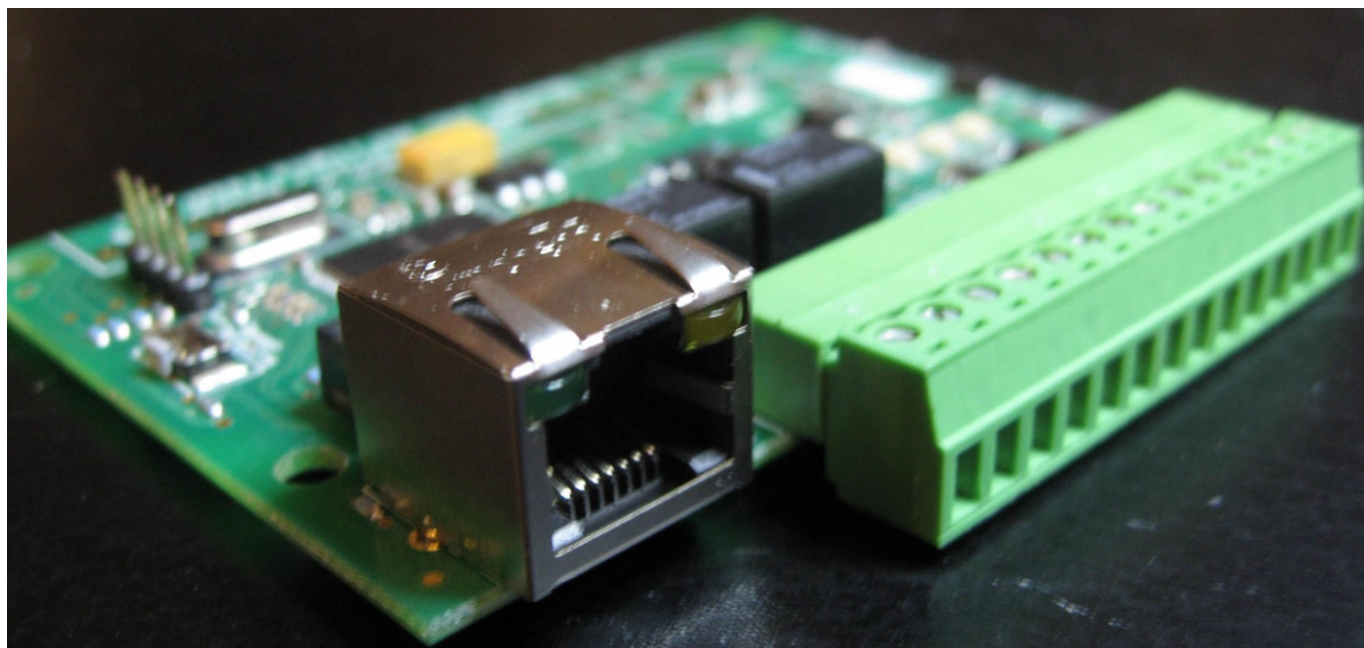


SITE MONITOR AND CONTROL



Temperature Module

User's Manual



IP Temperature Module

Covers: TM-01, TM-02, TM-03

Revision: 1.1 - June 9, 2008

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1. Legal Notice

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2. Getting to know your temperature module

A. Installation and Use Guidelines (Read before installing)

a. Installation:

- i. This unit must be installed by qualified personnel.
- ii. The unit comes in multiple case versions and only the outdoor version may be installed outdoors.

b. Use: This unit must not be used for medical, life saving purposes, or for any purpose where its failure could cause serious injury or the loss of life.

c. Notes about security: By design, this product is very secure. It does not support terminal or file transfer programs such as telnet, ftp, ssh, etc. This means that it is not possible for someone to 'break in' to this module and access other devices on your local network. These products do not support remote firmware updates which means that it is not possible for someone to remotely install malicious software. The simplicity of this product makes it a very secure device. As with any device to be installed on a network, there are some security precautions that should be observed. If this module is installed on the Internet, it is recommended that passwords be enabled for the control page. Make sure secure passwords are used. Passwords should be at least 8 characters in length and should be a combination of upper case letters, lower case letters, and numbers. Don't use passwords that would be easy to guess. For additional security, a firewall may be used to limit access only to selected IP addresses. Another option may be to set up a Virtual Private Network (VPN) between the network where the module resides and the client machine (web browser, PLC, etc.).

d. Final installation note: This Site Monitor and Control product supports connection to 10Mbps and 100Mbps networks. Although 100Mbps networks are faster, the amount of data transferred to and from this device is very minimal and little if any performance increase will be gained by setting it to 100Mbps. There are advantages however, to operate this device at 10Mbps. At 10Mbps, less power is required, the unit runs cooler, and the lifetime of the product will be extended.

B. Introduction

The Temperature Module is an industrial grade, Ethernet data acquisition module for monitoring temperature within the range of -55°C to +125°C. It has with two electro-mechanical relays and the ability to communicate with up to four Digital Temperature Sensors. It can be controlled and/or monitored over any IP network including private networks, IP-based industrial control networks, and the Internet. Users can operate the module using a web browser or a custom application. Computers, PLCs, or automation controllers may control and monitor the state of the module without user intervention. This works by sending text commands over the network and reading XML status pages from the module. The electro-mechanical relays can be controlled through the web server interface as well as be setup to respond to alarm conditions based on the temperature sensors. Up to two other Site Monitor and Control products can be controlled by the Temperature Module as the temperature readings of the Temperature Sensors change.

The Temperature Module is very easy to set up using a web browser. It has a simple "Control Page", which displays the temperature readings of digital temperature sensors that are connected to the module, as well as the current states of the relays.

The Temperature Module provides an XML status page for easy integration with custom monitor and control applications.

a. Features

The Temperature Module is very simple but has many features. Some of the features include

- No programming required. The unit has a built-in web server for configuration and control.
- Easy to use as a stand alone device or as part of a large control system.
- Up to four temperature sensors.
- Two 1 Amp/28V output relays with On/Off/Toggle
- Removable terminal connectors (included) simplify wiring and service.
- Set high/low alarms for digital temperature sensors which can control the relays, send out alert emails, and control other remote Site Monitor and Control devices.
- Custom applications can control the module with simple text commands and read XML formatted status.
- Password protection.
- Selectable TCP ports.
- Can be monitored via web at www.sitemonitorandcontrol.com

b. Available Models

The Temperature Module is currently available in three models. The only difference between the three models is the power supply requirements:

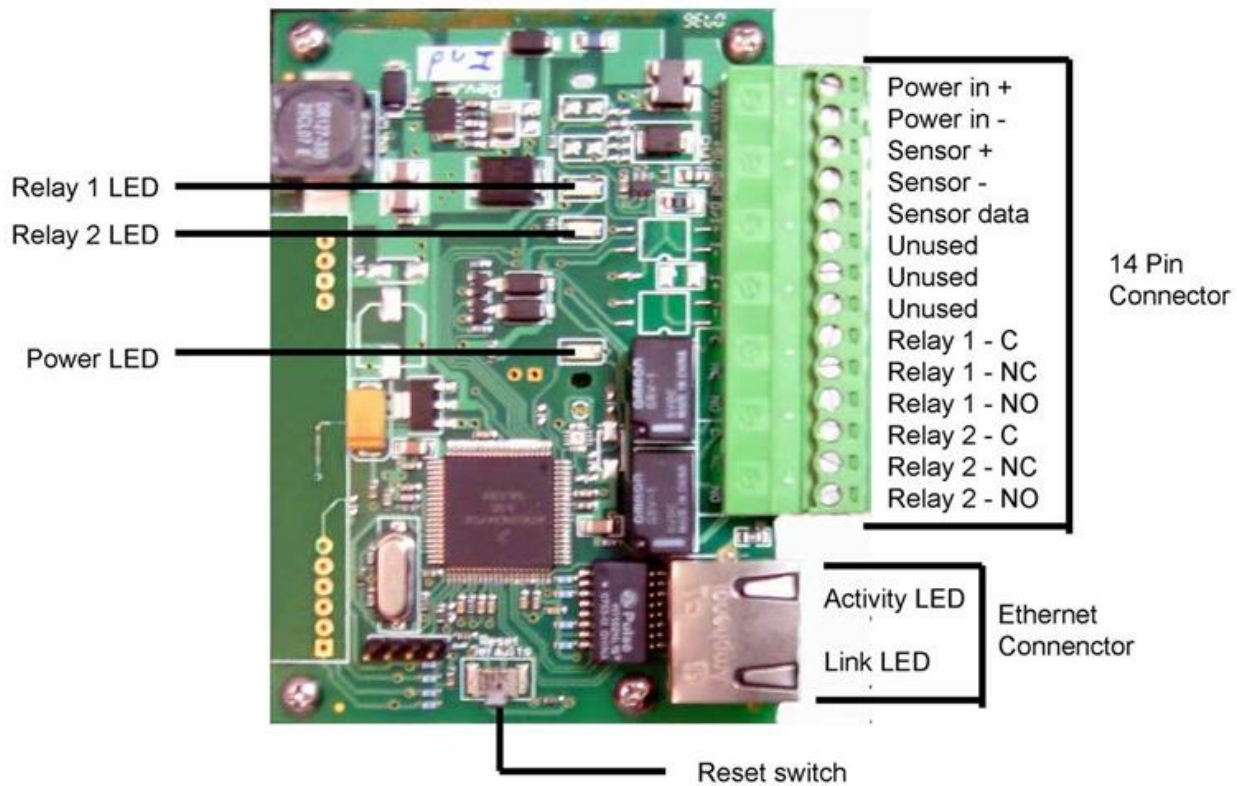
- TM-01 5VDC
- TM-02 9-28VDC
- TM-03 Power Over Ethernet or 5VDC

c. Connectors & Indicators

The temperature module has a removable 14-position terminal connector and an Ethernet connector. The 14-position terminal connector is used to provide power to the module as well as connections for the digital temperature sensors. Up to four temperature sensors may be connected at one time. Terminals are also available for direct connection to relay contacts which can be used to control other devices.

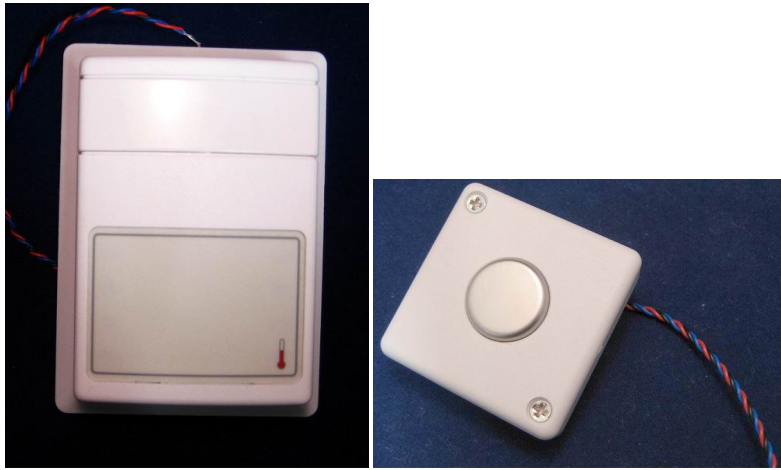
-There are five LED indicators on the temperature module labeled POWER (green), RELAY1 (green), RELAY2 (green), LINK (green), and ACT (amber). Note that the LINK and ACT LEDs are located on the Ethernet connector.

-The RELAY LEDs indicate that an internal relay coil is energized. When a relay coil is energized, the NO (Normally Open) contact is closed and the NC (Normally Closed) contact is open. The load device that is connected to the relay contacts may be on or off when the coil is energized depending on how it is wired. LINK means the temperature module is properly connected to an Ethernet network. The ACT LED flashes when activity is detected on the network.



d. Temperature Sensors

External digital temperature sensors are required for temperature acquisition. Up to four digital temperature sensors can be connected to the Temperature Module at one time. The sensors measure the temperature and convert the analog temperature measurement to a digital format. The digital temperature readings are sent to the Temperature Module periodically (approximately every 800mS). By converting the analog temperature measurement to a digital format, the temperature readings can be transmitted long distances without loss of accuracy and much greater noise immunity. The sensors have three leads for Power, Ground, and Temperature Data. Below are 2 pictures of 2 typical temperature sensors.

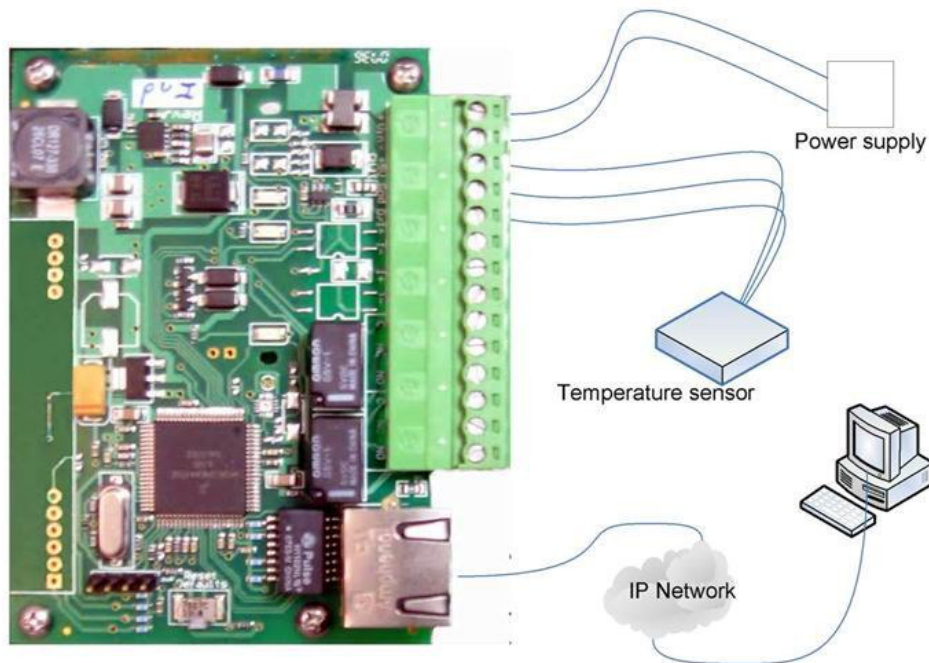


C. Example Configurations and Applications

The Temperature Module is very versatile and can be used in many applications. Several basic installation schemes are illustrated in this section.

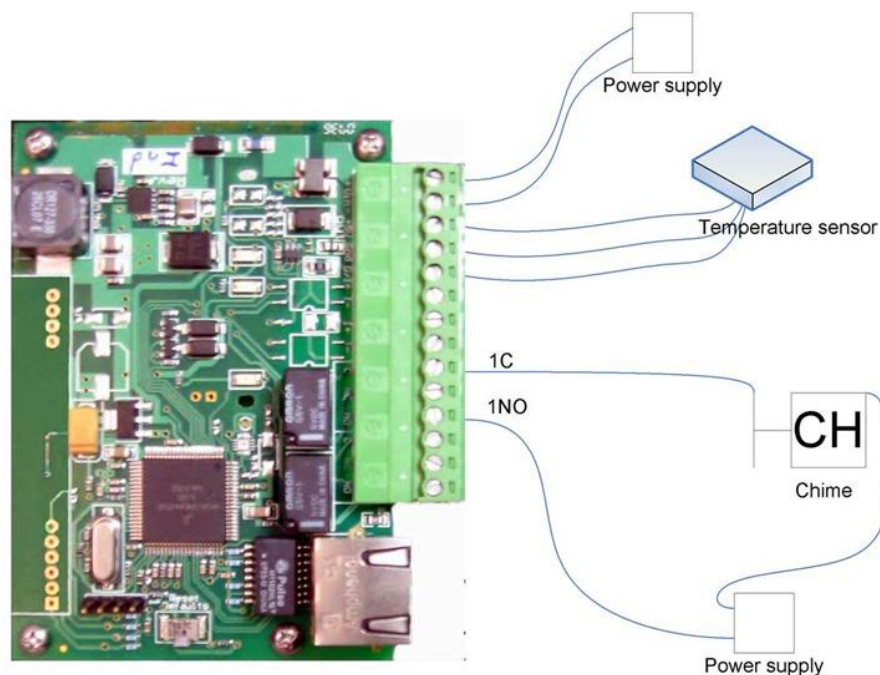
a. Monitoring Temperature

Monitoring a temperature read from a digital temperature sensor requires a sensor to be attached to the temperature module, a device capable of requesting and displaying web pages (Computers, PDA's, etc.), and a network through which the temperature module and monitoring device can communicate. Below is an illustration demonstrating how to connect a temperature sensor and monitor it on a personal computer. Up to four temperature sensors can be connected and monitored through the temperature module at one time.



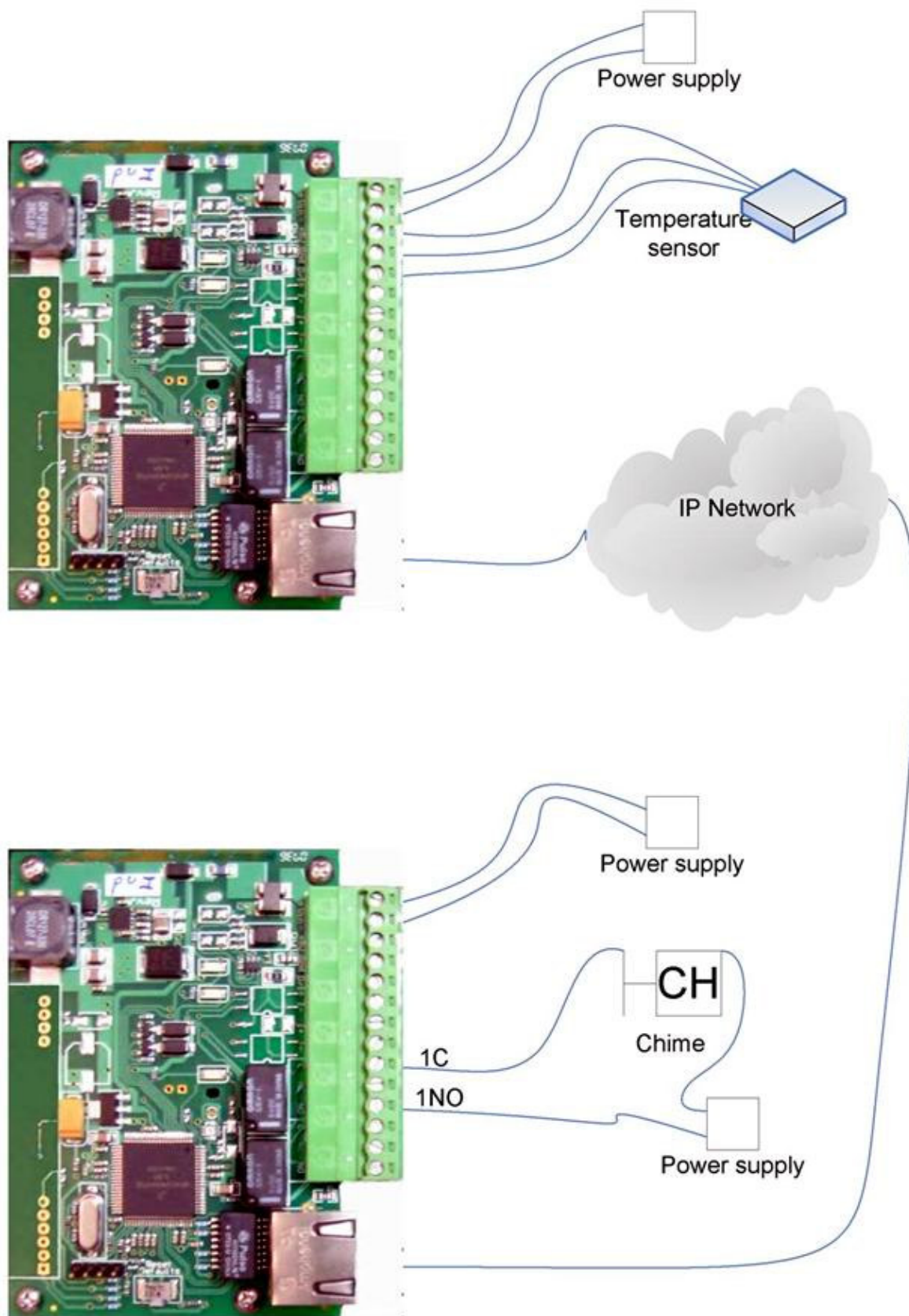
b. Monitoring Application with Local Alarm

The illustration below shows a simple example of using the temperature module to monitor temperature. The method for wiring the sensor to the temperature module is shown. Relay 1 has been wired to an alarm so that temperatures outside the desired range will sound the alarm. When the temperature falls below the lower set point or rises above the upper set point, the alarm will sound.



c. Monitoring Application with Remote Alarm

The following illustration shows an example of using the temperature module to monitor temperature. In this example the temperature module has been configured to send messages to another Temperature Module or another Site Monitor and Control compatible device with a relay. This relay has then been wired to sound an alarm. When the temperature falls below the lower set point or rises above the upper set point, a message will be sent to the remote unit to close it's relay contacts causing the remote alarm to sound.



3. Installation

Installation consists of mounting the temperature module, placing and connecting Digital Temperature Sensors, providing power, and wiring relay contacts to the device that will be controlled.

A. Temperature module mounting

The Temperature Module is designed to be wall mounted in an enclosure. The unit ships in various types of enclosures depending on the configuration. The indoor enclosure should be mounted in a clean dry location where it is protected from the elements. Ventilation is recommended for installations where ambient air temperature is expected to be high. The outdoor should be installed in such a way that the unit be as protected as possible. Try to avoid damp locations, direct exposure to sun or water.

B. Digital Temperature Sensor Placement

a. Temperature Sensor Network Design and Limitations

The connection and placement of the digital temperature sensors in relation to each other and to the temperature module form a network called a '1-wire' network. There are different ways in which the network can be configured. Many factors will determine the maximum length of cable used to connect sensors to the temperature module. Some of these factors include, but are not limited to, the gauge and type of the wire used, and the number of sensors connected to the temperature module. In general, the more sensors you have connected to the temperature module, the less distance there can be between them and the temperature module. For example, when connecting four sensors directly to the temperature module each sensor can be a distance of 60 feet away from the temperature module using 24 gauge wire. When using only one sensor, the distance can be lengthened. Note that the sensors can be connected directly to the Temperature Module or the sensors can be "daisy-chained". These two wiring methods are illustrated below. When daisy chaining sensors, make sure each sensor is attached to the main cable as close as possible. Having long stubs connecting the sensors to the main cable will cause reflections that can make the network less reliable. In addition, if longer distances are required, using a heavier gauge wire will help.

Daisy chaining the devices versus installing them in parallel will allow for longer distance since the total amount of wire used is less. Cat5 cable is recommended due to its higher immunity to noise. In addition, since the CAT5 cable has 8 conductors, 4 can be used for one temperature module and the other 4 to a second one. Here is the recommended color code:

-Temperature module 1:

Sensor Power (typically red) – Green

Sensor Ground (typically black) – White/Green

Sensor Data (typically blue) – Blue

Also connect the White/Blue to Sensor ground at the module only. Leave unconnected everywhere else. It will provide an additional ground wire to drain interference. Leave this wire in one piece if possible throughout the length of the cable.

-Temperature module 2:

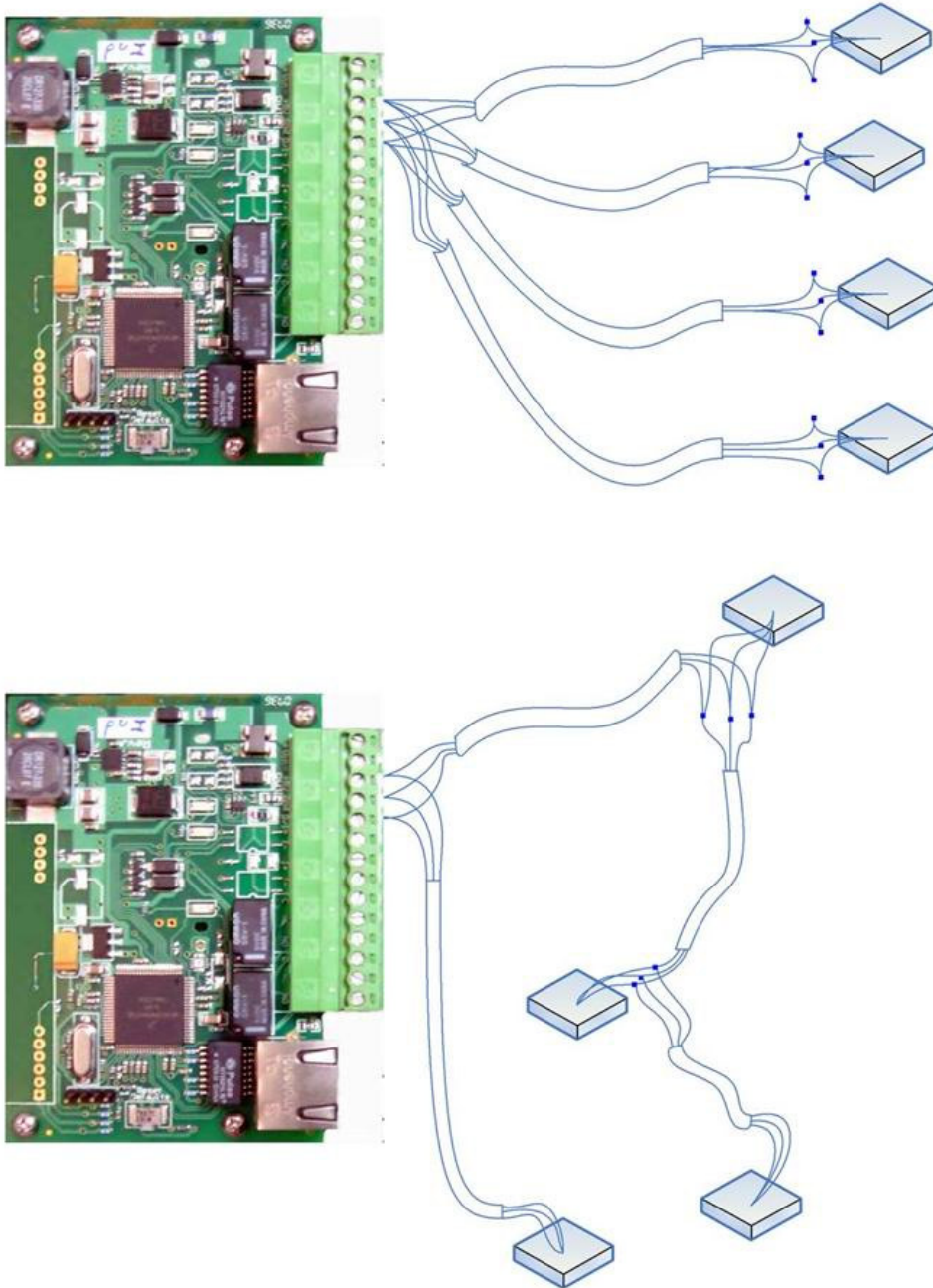
Sensor Power (typically red) – Brown

Sensor Ground (typically black) – White/Brown

Sensor Data (typically blue) – Orange

Also connect the White/Orange to Sensor ground at the module only. Leave unconnected everywhere else. It will provide an additional ground wire to drain interference. Leave this wire in one piece if possible throughout the length of the cable.

Another approach is to place the Temperature Module close to the sensor(s) and use a longer Ethernet cable to connect the module to the router or switch.



b. Digital Temperature Sensor Placement in Monitoring Applications

The placement of the digital temperature sensors depend on the application. The temperature module can act both as a temperature monitor, and a temperature controller. In both cases, cable length limitations must be considered as described in the section above but additional considerations are described in this section and the next section. To accurately measure outdoor air temperature, it is recommended that the sensor be placed 5 feet above ground in an open area where it will not be exposed to direct sunlight. If the sensor is exposed to direct sunlight, or is too close to the ground or other objects that are exposed to direct sunlight, the temperature reading measured by the sensor will be the current temperature of the sensor itself instead of the temperature of the air, as the sun's rays will heat up the sensor. If you need to measure the temperature of a specific object, then the temperature sensor should be mounted as close to the object as possible, possibly even touching the object. Regardless of the location of the sensor, if the sensor is placed outside, make sure it is protected from the elements and that it is secure so wind doesn't blow it around. Also, it is suggested that the wires be run through a PVC conduit if they are to be placed on the ground to protect them from the elements.

c. Digital Temperature Sensor Placement in Control Applications

The temperature module can be configured to control a heater or cooling unit. As with monitoring applications it is important to place the sensor in a location where it will accurately measure the air temperature and not the temperature of the sensor itself or the temperature of some other object. Note that in control applications, the reading of the sensor will determine how often the heater or cooler turns on as well as the duration. If the sensor is located too far from the heater or cooler, the heater or cooler will stay on too

long leading to over heating or over cooling. If the sensor too close to the heater or cooler, then the area surrounding the heater or air conditioner will maintain the desired temperature, but the rest of the area of interest will be too hot or cold. As a general rule, sensor placement midway between the heating or cooling unit and the location farthest away from the heating or cooling unit.

C. Connection

a. Power Supply Connection

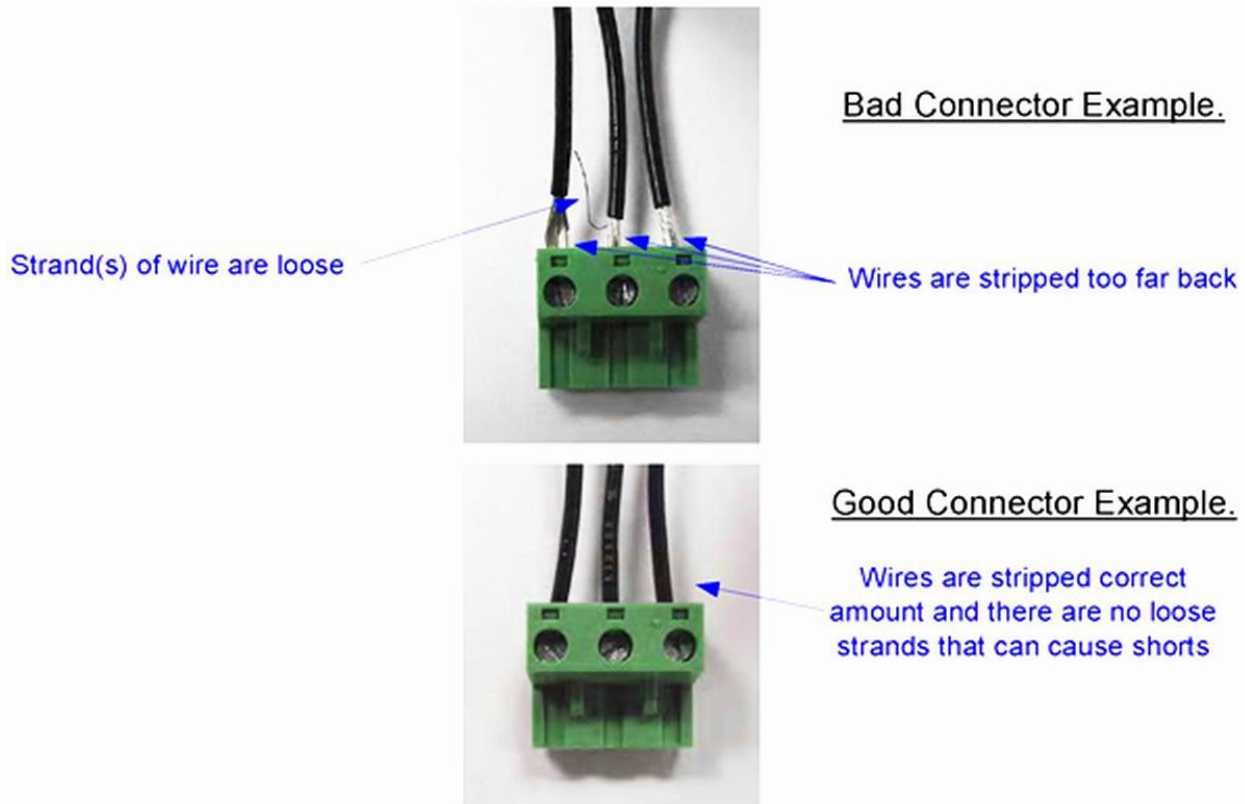
CAUTION: MAKE SURE POWER IS SHUT OFF BEFORE WIRING!

A removable 14-terminal connector is provided for simple wiring to the temperature module. The correct wiring procedure is as follows;

1. Make sure power is turned off.
2. Remove terminal connectors from the temperature module and make wiring connections to the terminals.
3. Reconnect terminal connectors.
4. Apply power.

It is recommended that the loads (devices to be controlled) not be connected to the temperature module until after the module has been configured and tested. By doing this, wiring and configuration mistakes will not cause the load devices to turn on unexpectedly.

IMPORTANT: MAKE SURE WIRES ARE PROPERLY ATTACHED TO THE TERMINALS AND THAT THE TERMINALS ARE TIGHT!



DO NOT EXCEED MAXIMUM POWER SUPPLY VOLTAGE.

-Model TM-01 - 5VDC Power Supply

-Model TM-02 - 9-28VDC Power supply

-Model TM-03 - Power over Ethernet model (PoE). These units do not require a power supply to be connected to this pin when the unit is connected to an 802.3af compliant network. Alternatively, this model can be powered using a 5VDC power supply.

Multiple temperature modules (and other Site Monitor and Control products) may be connected to a single power supply by connecting the power supply input terminals in parallel. The power supply must have a high enough current rating to power all units connected (see specifications for current requirements for a specific model number). Temperature Module units with the Power Over Ethernet option may be connected to an 802.3af compliant Ethernet port instead of connecting to an external power supply. In this case, the temperature module is powered through the network port. In 802.3af compliant networks, a 48 Volt power source is injected into the Ethernet line. This power source is provided by an 802.3af compliant hub, switch, or power injector which may be located in a utility closet which could be a distance away from temperature module. This option is very useful for installations where local power is not available. The power injector may inject the 48 Volt power source through the data lines or the spare lines in the Ethernet cable. DO NOT USE A POWER INJECTOR THAT APPLIES A VOLTAGE TO BOTH THE DATA LINES AND THE SPARE LINES.

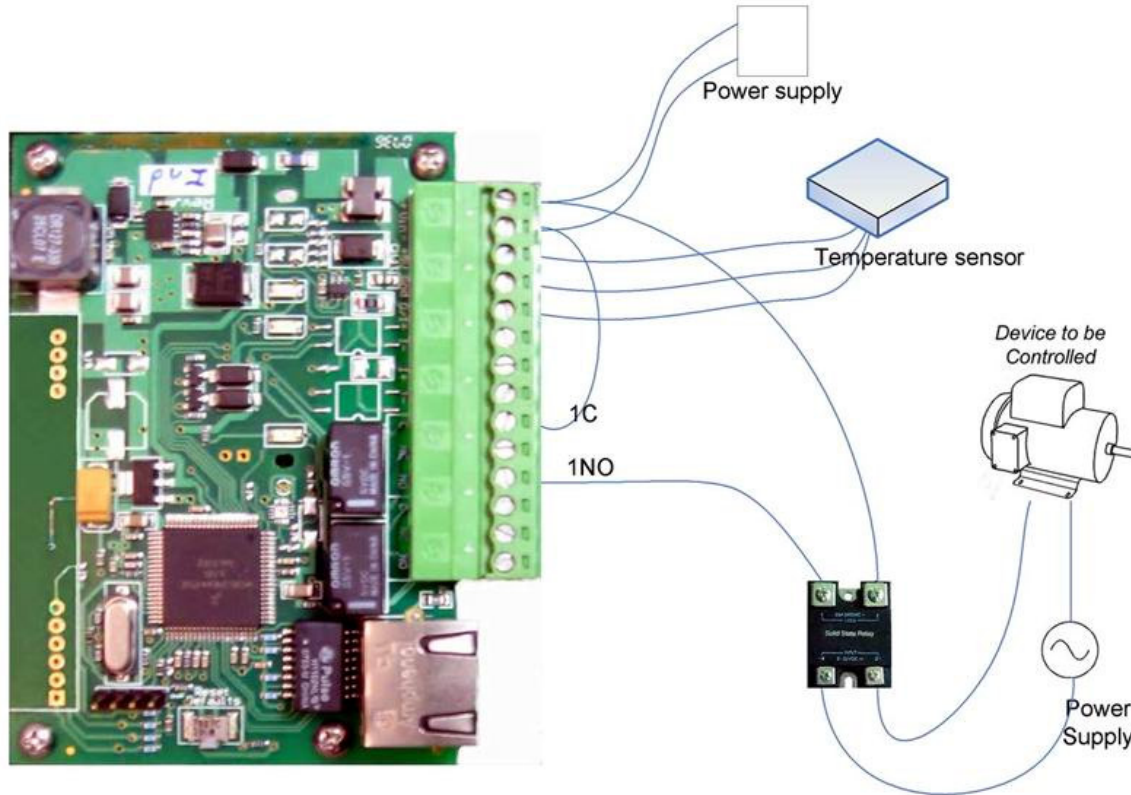
b. Network Connection

Connect the Ethernet port to a 10 Base T or 10/100 Base T Ethernet connection. This typically connects to an Ethernet hub, switch, or router. For configuration, the temperature module may be connected directly to the Ethernet port on a computer using a

“crossover” cable. Otherwise, for connection through a hub, switch, or router, a standard “straight-thru” cable should be used.

c. Relay Connection

The temperature module has two internal relays that may be used to control external devices such as alarms, signals, motors, heaters, etc. The relays can be configured to control devices based upon temperature measurements or they can simply be turned on and off over the network. The relay contacts internally connect directly to the terminal connector. If the power source connected to the relay contacts can deliver more than rated maximum contact current, an external fuse or circuit breaker must be used. Direct access to Common, Normally Open, and Normally Closed contacts are provided. The relay contacts may be wired in series with the power source for a device that will be controlled (the load). For loads greater than the maximum relay contact rating, an external relay may be used. The illustration below shows how a 20-Amp motor can be controlled using an external relay. In the example, the temperature module controls the external relay and the external relay controls the load.



d. Temperature Sensor Connection

Up to four digital temperature sensors can be connected to the temperature module in parallel using the +5, Gnd, and tmp terminals (all sensors are connected to the same three terminals). Sensors have a red wire for connection to the +5 terminal, a black wire to connect to the Gnd terminal, and another wire for connection to the Tmp terminal (may be white, green, or blue). Please refer to the temperature sensors for the exact wiring designation. The Tmp terminal is used to connect to the data line of the temperature sensor.

As digital temperature sensors are connected and removed, the temperature module maintains a record of the unique ID numbers of the sensors. This ID number is then used by the temperature module to communicate with the temperature sensors as well as to specify which temperature sensor is associated with which user options.

4. Set-up

A. Establishing Communication for Set-up

The Temperature Module is set up using a web browser. The first task is to establish communications between a computer and the temperature module so that the browser-based configuration can begin. To do this, the computer and the temperature module must be physically connected to the same network and both must have IP addresses on the same network. By default, temperature module comes from the factory with an IP address of 192.168.1.2 Start by assigning an IP address to the configuration computer that is on the same network as temperature module (for example, the configuration computer could be assigned to 192.168.1.5). Instructions for changing the IP address of the computer that will be used for the temperature module configuration are given here. Note that these instructions are specifically for computers with the Windows XP operating system. For setup using other operating systems, refer to the appropriate user's manual.

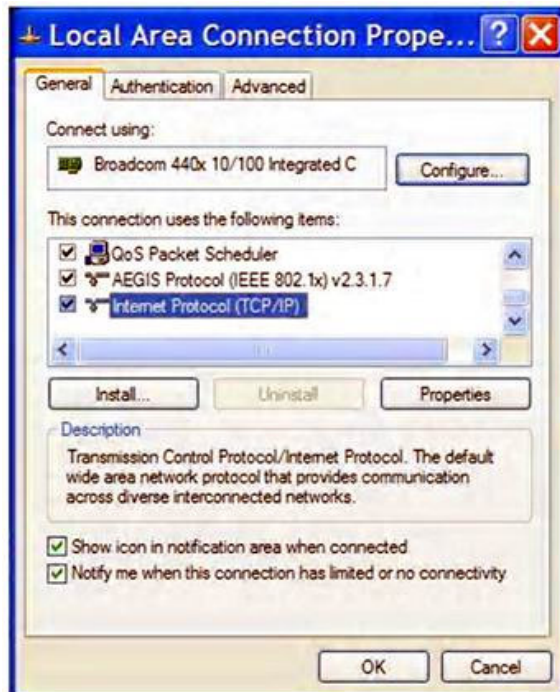
Step 1: Open the control panel by clicking on the start menu and then clicking on Control Panel. (Note that control panel shown is in “Classic View”. If control panel is in “Category View” select the “Classic View” option before proceeding.)



Step 2: Double click on the icon labeled Network Connections. The following menu will pop up.

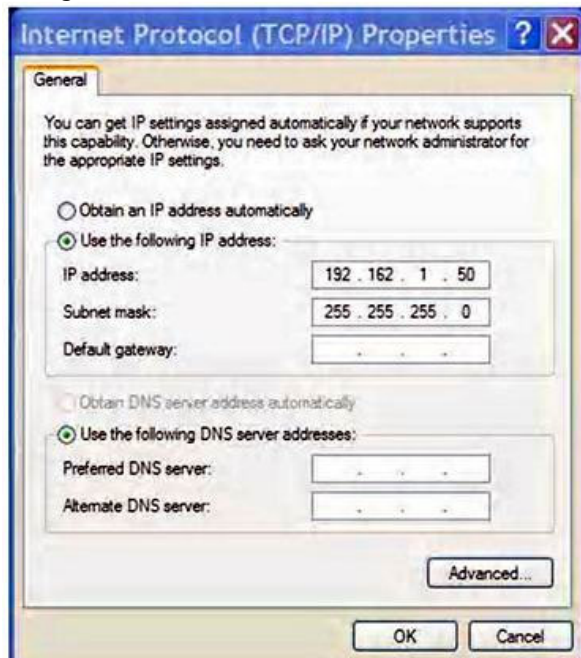


Step 3: Right click on the icon labeled Local Area Connection. Another menu will appear. Select the option at the bottom of the menu labeled Properties. The Local Area Connection Properties window will appear.



Step 4: On the Local Area Connection Properties page scroll down to Internet Protocol (TCP/IP), select it, and then click the button labeled properties.

Step 5: Before making any changes to the network settings, write down the current settings so that they can be restored once the temperature module is configured. Next, select the radio button labeled "Use the following IP address," and type in the IP address 192.168.1.50. Type in a subnet mask of 255.255.255.0. Leave the default gateway field blank. Click OK to apply the new settings.



B. Open Configuration Web Page

Once the network is set up, open the configuration setup page by typing the following URL into the browser:

<http://192.168.1.2/setup.html> A password is required to change any parameters. The default password is 'smac' (do not include quotes, password is case sensitive).

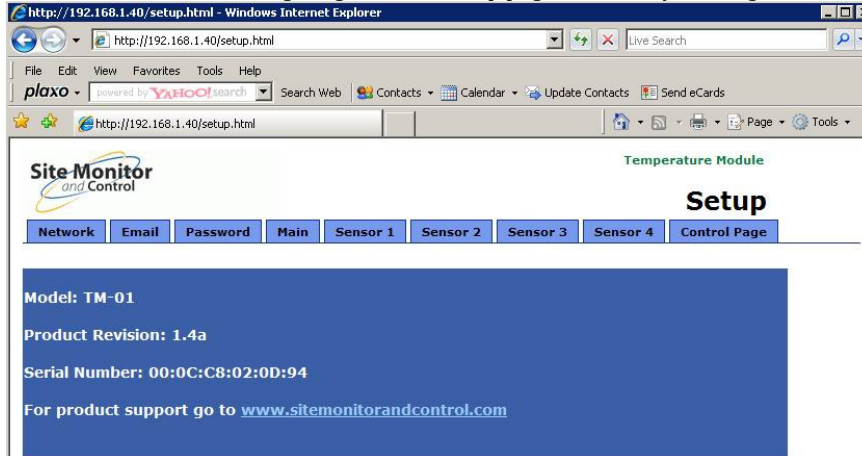
C. Web-Based Setup

The Temperature Module is fully configurable through HTML 4.0 compliant web browsers such as Internet Explorer and Mozilla Firefox. It's easy to use tab based menu system has been designed to allow the unit to be configured easily. Note that in this chapter, the

default IP address of 192.168.1.2 is used in all examples. If the IP address has been changed, substitute the new IP address for the address shown in the examples. Before proceeding, make sure a network connection has been established between the computer and the temperature module. This is done by typing the following URL into the web browser: <http://192.168.1.2/setup.html>. Another way to check communications is to ping the temperature module (from the command prompt (type ping 192.168.1.2)). Each setup page is described below.

a. Setup Page

This is the initial page that appears when the URL <http://192.168.1.2/setup.html> is entered into the web browser. It provides basic information about the unit. Navigating between setup pages is done by clicking on the tabs at the top of the page.



All setup pages require a password. The default password is 'smac' (no quotes, all lower case) and no user name is required.



Each setup page has a "Submit" button and a "Reset" button at the bottom of the page. After entering the desired parameters into each page, the "Submit" button must be pressed before any parameters will be saved. If a mistake is made in entering the parameters, the "Reset" button may be used to restore all parameters on the page to their current settings. The "Reset" button is only effective before the "Submit" button is pressed.

b. Network Setup Page

The network parameters are changed on this page. Note that if multiple temperature modules are used on the same network, install one unit at a time and set the IP address of each unit before connecting the next unit to the network. This avoids having multiple units installed on the network with the same factory default IP address at the same time. It may be necessary to clear the arp cache each time you swap temperature modules on the network (this is because each unit has the same default IP address but a different mac address). This is done by typing `arp -d` in the command prompt of a Windows computer (`arp -d -a` as super user on Apple OSX). **Also note that the unit must be power-cycled (power disconnected, then reconnected) before network settings take effect.** No other setup page requires power-cycling for the settings to take effect.

-IP Address: The temperature module requires a static IP address. This is a unique address that identifies the temperature module on the network. Dynamic IP address assignment is not supported. The lack of dynamic IP addressing support is intentional because dynamically changing the IP address would make it difficult for a client to access the web server built into the temperature module. The IP address is specific to the network where the unit will be installed, and must be obtained from the network administrator.

This guide is not meant to be a tutorial on IP addressing, however a few comments about IP addressing are given here.

If the temperature module will be used over the Internet, the IP address must be a routable address assigned by the upstream Internet Service Provider (ISP). In cases where the ISP only provides a single routable IP address for the entire network (this is typical with ISPs such as cable providers), a proxy server (or gateway router) may be used. A proxy server allows multiple devices to connect to the Internet using a single routable IP address. Many small routers from LinkSys, Dlink, and Netgear perform proxy server functions. If a proxy server is used, the temperature module will not be accessible from the Internet until the proxy server is properly configured (forward proper port to the temperature module). This information is mentioned for convenience but details of setting up a configuration such as this is beyond the scope of this manual. If the temperature module is used on a private network only and is NOT used over the Internet, a routable IP address is not necessary. This may be the case when the temperature module is used to control a device in another room or a nearby building. If the temperature module will be installed on a simple, private network that does not connect to the Internet, the default IP address may be used as long as no other device on the network uses the same address. If multiple units are installed on the same network, each unit must have its own unique IP address. For example, the temperature module comes from the factory with a default IP address of 192.168.1.2. If multiple units are used, change the IP address for each unit (192.168.1.3, 192.168.1.4, 192.168.1.5 etc.).

-Netmask: This specifies the size of the local network. This must be obtained from the network administrator. By default, the netmask is set to 255.255.255.0.

-Broadcast: This specifies the broadcast address. This must be obtained from the network administrator. By default, this is set to 192.168.1.255.

-Gateway: This specifies the IP address of the gateway router. This must be obtained from the network administrator. By default, this is set to 192.168.1.1.

-TCP Port: This specifies the TCP port used for communications with the temperature module. By default, the port is set to 80 which is the standard http port. It is recommended that the port not be changed without an understanding of TCP/IP and ports. Changing the port can be useful for accessing multiple temperature modules which are installed behind a gateway router on a private network that uses non-routable IP addresses (192.168.x.x, 10.x.x.x, and 172.16.x.x through 172.31.x.x are non-routable or private IP addresses). In this case, each temperature module would be assigned a different port (for example 8000, 8001, 8002, etc). The gateway router would be set up to forward all traffic for each of the assigned ports to the IP address of the temperature module which uses that port. The temperature modules could then be accessed from outside the private network by entering the IP address of the gateway and the port for the desired temperature module. Note that whenever any port is assigned other than port 80, all communications with that temperature module must include the port. For example, if the temperature module is assigned port 8000, access to the setup page would require the following URL to be entered; <http://192.168.1.2:8000/setup.html>.

An example screenshot of a gateway router configuration is given below. This setup allows seven Site Monitor and Control products to be accessed on a private network behind a gateway router. Note that this screenshot is simply an example of a typical router setup page. Routers will vary.

LINKSYS

Filters Forwarding Dynamic Routing Static Routing DMZ Host MAC Addr. Close Setup

PORT RANGE FORWARDING

Port forwarding can be used to set up public services on your network. When users from the Internet make certain requests on your router, they will be redirected to the specified IP.

Ext.Port		Protocol TCP	Protocol UDP	IP Address	Enable
8001	To 8001	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	10.10.10.41	<input checked="" type="checkbox"/>
8002	To 8002	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	10.10.10.42	<input checked="" type="checkbox"/>
8003	To 8003	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	10.10.10.43	<input checked="" type="checkbox"/>
8004	To 8004	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	10.10.10.44	<input checked="" type="checkbox"/>
8005	To 8005	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	10.10.10.45	<input checked="" type="checkbox"/>
8006	To 8006	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	10.10.10.46	<input checked="" type="checkbox"/>
8007	To 8007	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	10.10.10.47	<input checked="" type="checkbox"/>
0	To 0	<input type="checkbox"/>	<input type="checkbox"/>	10.10.10.0	<input type="checkbox"/>
0	To 0	<input type="checkbox"/>	<input type="checkbox"/>	10.10.10.0	<input type="checkbox"/>
0	To 0	<input type="checkbox"/>	<input type="checkbox"/>	10.10.10.0	<input type="checkbox"/>

UPnP Forwarding Port Triggering

Apply Cancel

In the example above, the seven Site Monitor and Control products are assigned IP addresses of 10.10.10.41 to 10.10.10.47.

The first device labeled SMAC 1 has an IP address of 10.10.10.41 and is assigned port 8001. Note that in the Temperature Module setup page (under Network settings tab), TCP Port 8001 must be specified for this device. The second device, labeled SMAC 2 has an IP address of 10.10.10.42 and is assigned port 8002. This Temperature Module must have its TCP Port set to 8002 in its network settings page. This pattern continues through 10.10.10.47 which is assigned the port 8007. To access the Site Monitor and Control units from the Internet, enter the IP address of the gateway plus the port number of the desired device.

-Modbus Port: This specifies the port used for Modbus/TCP communications with the temperature module. By default this is set to port 502 which is the standard Modbus port. For users not familiar with Modbus, Modbus is a messaging structure protocol used in industrial manufacturing control and automation. It is an open protocol and offers interoperability with software and devices from other manufacturers. If Modbus is not used, this setting can be ignored. Modbus communications are disabled whenever the control password is enabled.

-Speed: This option sets the data rate of the Ethernet port. Both 10Mbps and 100Mbps can be selected. The 100Mbps option offers faster communications but the amount of data to and from the temperature module is so small that users will not likely notice much of a difference. When the temperature module is set to 10Mbps, it draws less power and runs a little cooler which translate into a longer product life. **IT IS RECOMMENDED THAT THIS SETTING BE LEFT AT 10MBPS UNLESS THE USER HAS A SPECIFIC REASON TO USE 100MBPS.**

-Mode: This option allows the Ethernet port to be set to Half Duplex or Full Duplex. Legacy Ethernet operates in Half Duplex mode which means that devices can either send data or receive data, but not both at the same time. Full duplex means that devices can send and receive data at the same time.

c. Email Setup Page:

The settings on this page are used when the device has been configured to send email messages. The temperature module requires a SMTP server to send email messages and can be configured to use basic authentication.

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http://192.168.1.40/setup.html

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Site Monitor and Control

Temperature Module

Setup

Network Email Password Main Sensor 1 Sensor 2 Sensor 3 Sensor 4 Control Page

Email:

DNS: 0 0 0 0

Mail Server(SMTP):

Mail Server Port: 25

Domain: sitemonitorandcontrol.com

User Name(Optional):

Password(Optional):

Return Email: test@sitemonitorandcontrol.com

Email 1:

Email 2:

Email 3:

Submit Reset

1. **DNS Address:** If Email notification will be used, enter the IP address of a DNS server. This is used to lookup the IP address of the mail server. If the IP address of the SMTP server is known, the DNS server can be bypassed by leaving the Mail Server field blank and entering the IP address of the SMTP server directly into the DNS Address field.
2. **Mail Server (SMTP):** If email notification will be used, enter the SMTP email server in this field. This is the name of the server (for example... mail.example.com). To use this SMTP server, the Temperature module must first determine the IP address of the SMTP server. This is usually done by using a DNS server. If the IP address of the SMTP server is known, the use of a DNS server can be eliminated. This is done by leaving this field blank and entering the IP address of the SMTP server directly into the DNS Address field. This will skip the domain name lookup.
3. **Mail Server Port:** If email notification will be used, enter the port number used by the SMTP server. Port 25 is the standard port for SMTP.
4. **Domain:** If email notification will be used, enter a domain name that will be used when communicating with the SMTP server.
5. **User Name:** Most ISPs require authentication to access their mail servers from outside the network, but do not require authentication from inside the network. If authentication is required, enter the user-name here. If authentication is not used, leave this field blank.
6. **Password:** Most ISPs require authentication to access their mail servers from outside the network, but do not require authentication from inside the network. If authentication is required, enter the password here. If authentication is not used, leave this field blank.
7. **Return Email:** If email notification will be used, enter the return email address (sender email address) here.
8. **Email 1 Address:** If email notification will be used, enter the email address of the first recipient of notification messages.
9. **Email 2 Address:** If email notification will be used and messages will be sent to at least two recipients, enter the email address of the second recipient of email notification messages.
10. **Email 3 Address:** If email notification will be used and messages will be sent to three recipients, enter the email address of the third recipient of email notification messages

d. Password Setup Page:

The password setup page is used to change and enable passwords. A password is required for the setup pages but is optional for the control page. The password is enabled or disabled for the control page by using the **Yes** or **No** radio buttons. Enabling the control page password also enables the requirement for a password when reading/writing XML pages. **Enabling the control page password also disables the ability to communicate with the temperature module using Modbus.** Note that when the password is changed, the password may be displayed in the browser's history in clear text. It is advisable to clear the browsers history after setting the password. Passwords may be up to 10 characters.

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http://192.168.1.40/setup.html

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http://192.168.1.40/setup.html

Site Monitor and Control

Temperature Module

Setup

Network Email Password Main Sensor 1 Sensor 2 Sensor 3 Sensor 4 Control Page

Password:

Setup Password:

Re-enter Setup Password:

Enable Control Password: Yes ☐ No ☐

Control Password:

Re-enter Control Password:

Submit Reset

e. Main Setup Page

The main setup page is used mainly to set parameters that affect the view of the control page, how often it will refresh, etc. It is here that the units of measurement may also be specified.

http://192.168.1.40/setup.html - Windows Internet Explorer

http://192.168.1.40/setup.html

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http://192.168.1.40/setup.html

Site-Monitor and Control Temperature Module

Setup

Network Email Password Main Sensor 1 Sensor 2 Sensor 3 Sensor 4 Control Page

General Setup:

Units: Fahrenheit ☒ Celsius ☐

Control Page Setup:

Main Header Text:

Auto Refresh Page: Yes ☒ No ☐

Duration: sec

Display Sensor 1 Temp: Yes ☒ No ☐

Display Sensor 1 Set Temp: Yes ☐ No ☒

Set Temp Displayed: High Alarm ☒ Low Alarm ☐

Display Sensor 2 Temp: Yes ☒ No ☐

Display Sensor 3 Temp: Yes ☒ No ☐

Display Sensor 4 Temp: Yes ☒ No ☐

Display Relay 1 State: Yes ☐ No ☒

Display Relay 1 ON/OFF Buttons: Yes ☐ No ☒

Display Relay 1 Pulse Button: Yes ☐ No ☒

Display Relay 2 State: Yes ☐ No ☒

Display Relay 2 ON/OFF Buttons: Yes ☐ No ☒

Display Relay 2 Pulse Button: Yes ☐ No ☒

Submit Reset

- 1. Units:** This option specifies the units which will be used for temperature readings. The available options are degrees Fahrenheit and Celsius.
- 2. Main Header Text:** The text entered here appears at the top of the control page. It also appears in the header of the email text when the email notification is used. This field can be up to 25 characters in length.
- 3. Auto Refresh Page:** Web pages traditionally display static information. The temperature module control page, however, displays information that is dynamic. Each time the control page is loaded to the browser, it displays a snapshot of the current status of the unit. Whenever the state of a sensor changes, the control page will be obsolete until the page is refreshed. The temperature module cannot force the web page to be updated when the sensors update. The 'Auto Refresh Page' option will cause the control page to continually update its contents by setting a timer in the web page that causes it to be reloaded at a specified time interval.
- 4. Duration:** When the 'Auto Refresh Page' option is set to **YES**, this field specifies the time interval in seconds that the page will be refreshed. It can be set from 1 to 32 seconds.

- 5. Display Sensor 1 Temp:** When this options is set to **Yes**, the most recent reading of the digital temperature sensor associated with sensor 1 will be displayed in the control page. This setting also enables or disables the sensor 1 status in email alert messages (must be set to **Yes** for the most recent temperature reading associated with sensor 1 to appear in email alert messages.)
 - 6. Display Sensor 1 Set Temp:** When this option is set to **Yes**, an editable text field, along with a button labeled 'Apply', will appear on the control page. The set temperature for sensor 1 can be changed by editing the temperature in the text field and pressing the 'Apply' button. The set temp applies either to the high alarm or low alarm for sensor 1. Whether or not it applies to the high or low alarm is determined by the next option.
 - 7. Set Temp Displayed:** This option determines whether or not the set temperature is applied to the **High Alarm** or **Low Alarm** when it is changed through the control page.
 - 8. Display Sensor 2 Temp:** When this options is set to **Yes**, the most recent reading of the digital temperature sensor associated with sensor 2 will be displayed in the control page. This setting also enables or disables the sensor 2 status in email alert messages (must be set to **Yes** for the most recent temperature reading associated with sensor 2 to appear in email alert messages.)
 - 9. Display Sensor 3 Temp:** When this options is set to **Yes**, the most recent reading of the digital temperature sensor associated with sensor 3 will be displayed in the control page. This setting also enables or disables the sensor 3 status in email alert messages (must be set to **Yes** for the most recent temperature reading associated with sensor 3 to appear in email alert messages.)
 - 10. Display Sensor 4 Temp:** When this option is set to **Yes**, the most recent reading of the digital temperature sensor associated with sensor 4 will be displayed in the control page. This setting also enables or disables the sensor 4 status in email alert messages (must be set to **Yes** for the most recent temperature reading associated with sensor 4 to appear in email alert messages.)
 - 11. Display Relay 1 State:** When this options is set to **Yes**, the relay status for relay 1 will be displayed on the control page. If it is set to **No**, the relay status for relay 1 will not be displayed.
 - 12. Display Relay 1 ON/OFF Buttons:** When this option is set to **Yes**, the ON/OFF buttons for relay 1 will be displayed in the control page. If it is set to **No**, the ON/OFF buttons for relay 1 will not be displayed.
 - 13. Display Relay 1 Pulse Button:** When this option is set to **Yes**, the Pulse button for relay 1 will be displayed in the control page. If it is set to **No**, the Pulse button for relay 1 will not be displayed.
 - 14. Display Relay 2 State:** When this options is set to **Yes**, the relay status for relay 2 will be displayed on the control page. If it is set to **No**, the relay status for relay 2 will not be displayed.
 - 15. Display Relay 2 ON/OFF Buttons:** When this option is set to **Yes**, the ON/OFF buttons for relay 2 will be displayed in the control page. If it is set to **No**, the ON/OFF buttons for relay 2 will not be displayed.
 - 16. Display Relay 2 Pulse Button:** When this option is set to **Yes**, the Pulse button for relay 2 will be displayed in the control page. If it is set to **No**, the Pulse button for relay 2 will not be displayed.
- f. Sensor Setup Pages** These pages (Sensor 1 through Sensor 4) define which digital temperature sensor is associated with which sensor number, and define how alarms and email alert messages are handled. All four pages are identical with the exception of the Sensor 1 page which also includes additional settings for controlling both the local relays as well as remote Site Monitor and Control devices based on alarm conditions.

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Site-Monitor and Control

Temperature Module

Setup

Network Email Password Main **Sensor 1** Sensor 2 Sensor 3 Sensor 4 Control Page

Sensor 1 Setup:

Sensor Description: S1 - Outside

Sensor Address: 285D7DFE000009F Refresh

High Alarm/Set: 212.0 °F

Low Alarm/Set: 0.0 °F

Deadband: 0.5 °F

Email Option: No Email Messages

Use Email Address: ☐ 1 ☐ 2 ☐ 3

Relay 1 Options

Relay Description: Relay 1

Option: No Relay Control

Pulse: 1.5 sec

Relay 2 Options

Relay Description: Relay 2

Option: No Relay Control

Pulse: 1.5 sec

Remote Relay 1 Options:

Option: No Relay Control

IP Address: 192 . 168 . 1 . 15

TCP Port: 80

Password:

Relay #: 0

Periodic State Interval: 0 sec

Remote Relay 2 Options:

Option: No Relay Control

IP Address: 192 . 168 . 1 . 15

TCP Port: 80

Password:

Relay #: 0

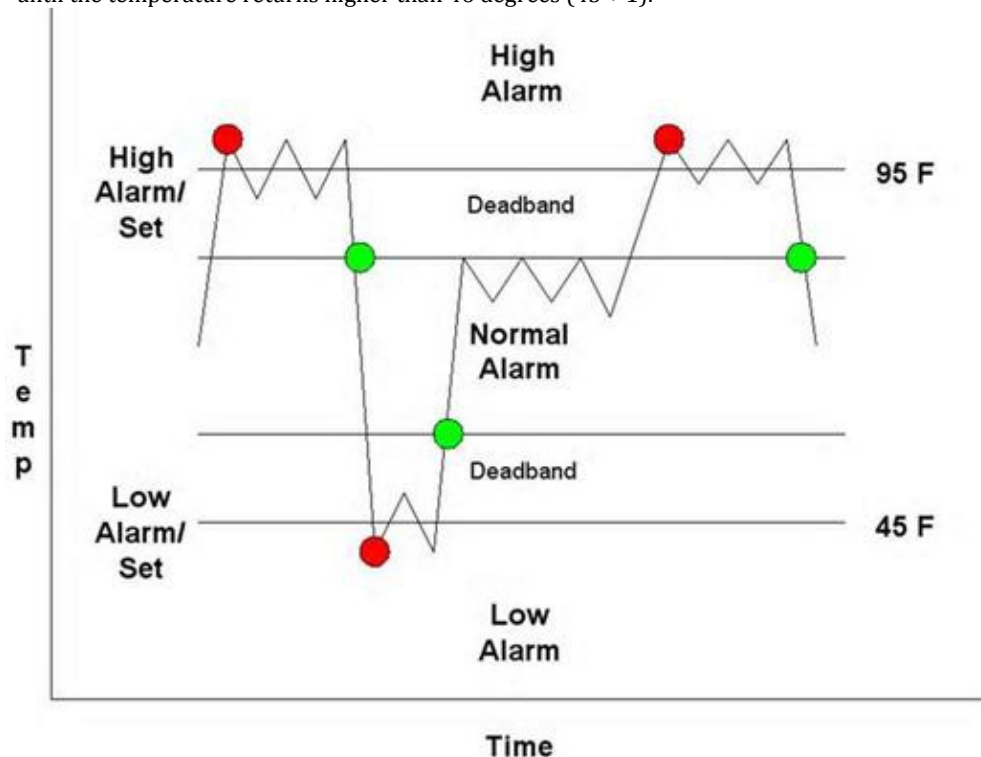
Periodic State Interval: 0 sec

Submit Reset

The first 6 parameters appear on all the Sensor pages. The remaining parameters appear on the Sensor 1 page only.

- 1. Sensor Description:** The text in this field appears to the left of the temperature reading associated with the sensor. This text also appears in the email status messages when that feature is enabled. This field can be up to 20 characters in length.

- 2. Sensor Address:** Every digital temperature sensor has a unique id number associated with it. In order to associate a digital temperature sensor with a sensor number, this field should be set to correspond with the id number of the desired digital temperature sensor. The drop down box will list the id numbers of all the digital temperature sensor currently connected to the temperature module (these are automatically detected.) When first connecting the digital temperature sensor, it is useful to connect one at a time and then press the refresh button in the browser to update the list of id numbers in the drop down box. This way it can be determined which id number belongs to which digital temperature sensor. If for some reason the id number associated with one of the digital temperature sensors doesn't appear in the drop down box, you may select the option **Other...** at which point the drop down box will change into a text box where the id number can be directly entered. If the id number entered isn't valid, temperature readings will cannot be read.
- 3. High Alarm/Set:** This option determines the trigger point for high alarms. This value should be greater than the low alarm set point. When the temperature read from the digital temperature sensor is greater than this value, a high alarm condition exists. The actions taken as a result are determined by the other parameters on this setup page. Sensors 2 through 4 can only send alert emails as a result of a high alarm. Sensor 1 can send out alert emails as well as change the state of the local relays and up to two remote relays on other Site Monitor and Control devices.
- 4. Low Alarm/Set:** This option determines where the trigger point is for low alarms. This value should be less than the high alarm set point. When the temperature read from the digital temperature sensor is lower than this value, a low alarm condition exists. The actions taken as a result are determined by the other parameters on this setup page. Sensors 2 through 4 can only send alert emails as a result of a low alarm. Sensor 1 can send out alert emails as well as change the state of the local relays and up to two remote relays found on other Site Monitor and Control devices.
- 5. Deadband:** This option specifies the deadband used when evaluating alarm conditions. Deadband prevents alarms or relays from toggling excessively when measured temperature is at the set point. This is due to normal fluxuating. For example, if the deadband is set to 1 degree, and a high alarm is to occur at 95 degrees, the dead band ensures that once the high alarm is triggered, it won't go off until the temperature return below 94 degrees ($95 - 1$). This reduces problems with small fluctuations in temperature readings triggering multiple alarms. The deadband is also used during low alarm conditions. If for example a low alarm is to occur at 45 degrees and the dead band is set to 1 degree, then once the low alarm is triggered, it won't go off until the temperature returns higher than 46 degrees ($45 + 1$).



- 6. Email Options:** Simple email messages can be sent in response to alarm conditions. This parameter is used to specify what alarm conditions, if any, will cause email messages to be sent. Note that email notification will work only if the 'DNS Address', Mail Server (SMTP), and 'Email 1 Address' are correctly set up in the Network setup page.
- No Email Messages- No email messages will be sent due to alarm conditions.
 - Send High Alarm, and Low Alarm Messages- Email messages will be sent out due to high and low alarm conditions.
 - Send High Alarm, Normal, and Low Alarm Messages- Email messages will be sent out due to high, normal, and low alarm conditions.
- 7. Use Email Address:** If email messages are to be sent out based on alarm conditions, these check boxes specify to which email addresses the message will be sent. Each check box corresponds to one email address specified on the email setup page.
- 8. Relay 1 Description:** This text is used to describe the function of relay 1 on the control page. This text will not appear unless

the relay 1 status is visible, or the ON/OFF buttons or Pulse button for relay 1 are enabled. This field can be up to 20 characters in length.

9. Relay 1 Options: This parameter is used to specify if and how relay number 1 will react to high alarm conditions. Note that relay 1 only reacts to high alarm conditions, meaning it can be setup to change states when a high alarm condition exists, and then return to its previous state when a normal alarm occurs. The options in the drop down list are described below. Also note that once the relay reacts to an alarm condition, users may change the state of the relay from the web browser even if the alarm condition remains.

- **No Relay Control** – Take no action when a high alarm occurs.
- **Relay On when High Alarm** – Turn the relay on when a high alarm occurs.
- **Relay Off when High Alarm** – Turn the relay off when a high alarm occurs.
- **Relay Pulse when High Alarm** – Pulse the relay when a high alarm occurs.

10. Relay 1 Pulse: This parameter determines the pulse duration used when relay 1 is set to pulse when a high alarm occurs or when the pulse button is pressed on the control page. This time can be set from 0.1 seconds to 86,400 seconds (1 day).

11. Relay 2 Description: This text is used to describe the function of relay 2 on the control page. This text will not appear unless the relay 2 status is visible, or the ON/OFF buttons or Pulse button for relay 2 are enabled. This field can be up to 20 characters in length.

12. Relay 2 Option: This parameter is used to specify if and how relay number 2 will react to low alarm conditions. Note that relay 2 only reacts to low alarm conditions, meaning it can be setup to change states when a low alarm condition exists, and then return to its previous state when a normal alarm occurs. The options in the drop down list are described below. Also note that once the relay reacts to an alarm condition, users may change the state of the relay from the web browser even if the alarm condition remains.

- **No Relay Control** – Take no action when a low alarm occurs.
- **Relay On when Low Alarm** – Turn the relay on when a low alarm occurs.
- **Relay Off when Low Alarm** – Turn the relay off when a low alarm occurs.
- **Relay Pulse when Low Alarm** – Pulse the relay when a low alarm occurs.

13. Relay 2 Pulse: This parameter determines the pulse duration used when relay 2 is set to pulse when a low alarm occurs or when the pulse button is pressed on the control page. This time can be set from 0.1 seconds to 86,400 seconds (1 day).

14. Remote Relay 1 Option: This parameter is used to specify if and how the remote relay number 1 will react to high alarm conditions. Note that remote relay 1 only reacts to high alarm conditions, meaning it can be setup to change states when a high alarm condition exists, and then returns to its previous state when a normal alarm occurs. The options in the drop down list are described below. Also note that once the remote relay reacts to an alarm condition, user may change the state of the relay from the web browser even if the alarm condition remains.

- **No Relay Control** – Take no action when a high alarm occurs.
- **Relay On when High Alarm** – Turn the remote relay on when a high alarm occurs.
- **Relay Off when High Alarm** – Turn the remote relay off when a high alarm occurs.
- **Relay Pulse when High Alarm** – Pulse the remote relay when a high alarm occurs. Note that the amount of time the remote relay will pulse is determined by the user settings in that unit and not by any of the local settings.

15. Remote Relay 1 IP Address: When any option in the 'Remote Relay 1 Option' setting is selected other than **No Relay Control**, commands are sent over the IP network to this address as alarm conditions change.

16. Remote Relay 1 TCP Port: When any option in the 'Remote Relay 1 Option' setting is selected other than **No Relay Control**, commands are sent over the IP network to this TCP port on the remote Site Monitor and Control device as alarm conditions change.

17. Remote Relay1 Password: If remote messages are to be sent to a remote device that requires a password, the password entered in this field will be used.

18. Remote Relay 1 Relay #: When any option in the 'Remote Relay 1 Options' setting is selected other than **No Relay Control**, commands are sent to the remote device with this relay offset. This option should ALWAYS be set to 0, unless the remote device is something other than Site Monitor and Control. This is used, for example, when the remote device has multiple relays. For example, a Site Monitor and Control device that has 4 relays. To send commands to the third relay on such a device, this option would be set to 3. To send commands to the first relay, this option would be set to 1. This field may be set from 0 to 255.

19. Remote Relay 1 Periodic State Interval: When any option in the 'Remote Relay 1 Option' setting is selected other than **No Relay Control**, this parameter controls whether or not periodic messages should be sent out as well as messages that get sent out as alarm conditions change. This setting has the range of 10 to 4223173 seconds (roughly 48 days).

20. Remote Relay 2 Options: This parameter is used to specify if and how the remote relay number 2 will react to low alarm conditions. Note that remote relay 2 only reacts to low alarm conditions, meaning it can be setup to change states when a low alarm condition exists, and then returns to its previous state when a normal alarm occurs. The options in the drop down list are described below. Also note that once the remote relay reacts to an alarm condition, users may change the state of the relay from the web browser even if the alarm condition remains.

- **No Relay Control** – Take no action when a low alarm occurs.
- **Relay On when Low Alarm** – Turn the remote relay on when a low alarm occurs.
- **Relay Off when Low Alarm** – Turn the remote relay off when a low alarm occurs.
- **Relay Pulse when Low Alarm** – Pulse the remote relay when a low alarm occurs. Note that the amount of time the remote relay will pulse is determined by the user settings in that unit and not by any of the local settings.

21. Remote Relay 2 IP Address: When any option in the 'Remote Relay 2 Option' setting is selected other than **No Relay**

Control, commands are sent over the IP network to this address as alarm conditions change.

22. Remote Relay 2 TCP Port: When any option in the 'Remote Relay 2 Option' setting is selected other than **No Relay Control**, commands are sent over the IP network to this TCP port on the remote Site monitor and Control device as alarm conditions change.

23. Remote Relay 2 Password: If remote messages are to be sent to a remote device that requires a password, the password entered in this field will be used.

24. Remote Relay 2 Relay #: When any option in the 'Remote Relay 2 Option' setting is selected other than **No Relay Control**, commands are sent to the remote device with this relay offset. This option should ALWAYS be set to 0, unless the remote device is something other than Site Monitor and Control. This is used, for example, when the remote device has multiple relays. To send commands to the third relay, this option would be set to 3. To send commands to the first relay on, this option would be set to 1. This field may be set from 0 to 255.

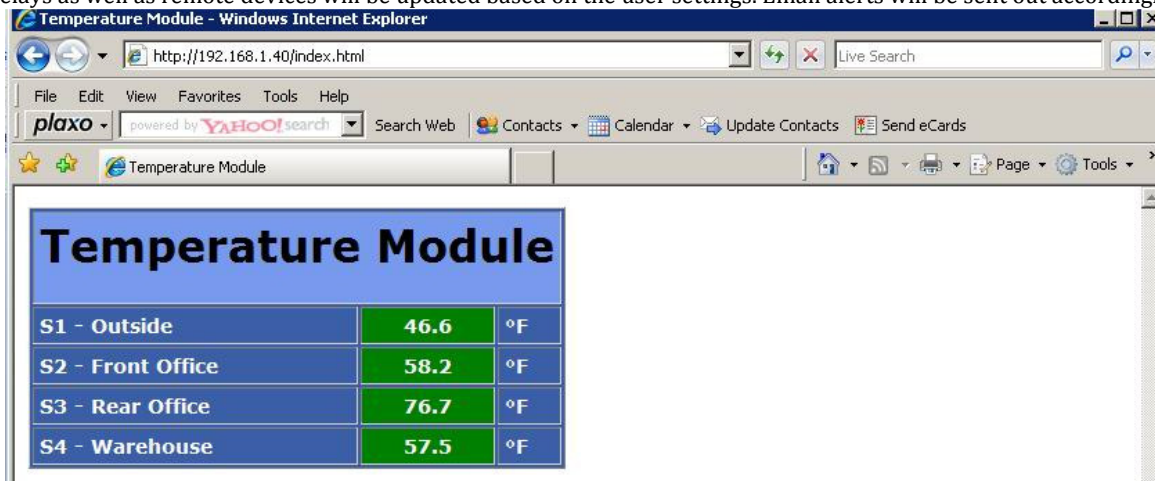
25. Remote Relay 2 Periodic State Interval: When any option in the 'Remote Relay 2 Option' setting is selected other than **No Relay Control**, this parameter controls whether or not periodic messages should be sent out as well as messages that get sent out as alarm conditions occur. This setting has the range of 10 to 4223173 seconds (roughly 48 days).

5. Operation

The temperature module can be operated using a web browser, by sending text commands to an XML status/control page, or by sending Modbus/TCP requests. The temperature module can also be configured to control the local relays as well as remote Site Monitor and Control devices based on alarm conditions.

A. Browser Operation

Once the unit is set up, the control page may be accessed by typing the following URL into the web browser: <http://192.168.1.2> (Note that if the IP address was changed, replace the default IP address shown with the new address that was assigned. Note also that if any port is used other than port 80, the port must also be included in the request: (<http://192.168.1.2:8000>)). The new control page will appear. A control page with default settings is shown below. Note that any sensors that have not been assigned to a specific digital temperature sensor will display xx.x in the control page, XML page, and alert emails. The control page allows the user to turn the individual relays on and off as well as monitor the current temperature of the digital temperature sensors. It is here that the set temperature for sensor 1 alarms can be changed. To change the set temperature for sensor 1 through the control page enter the new set temperature in the text field to the right of the heading 'Sensor 1 Set Temp.' and then push the 'Apply' button. The set temperature will apply to either the high alarm set temperature or low alarm set temperature depending on the setting of the parameter 'Set Temp Applies To' on the main setup page. When the set temperature is changed, all active alarms will be reevaluated immediately and the local relays as well as remote devices will be updated based on the user settings. Email alerts will be sent out accordingly as well.



B. XML Operation

Custom computer applications may be created to monitor and control the temperature module without using a web browser. Monitoring the temperatures and the relays is done by sending a request to port 80 (or port specified in setup) for the XML page. Control of the relay is done by sending GET requests to the same page on port 80 (or port specified in setup). This can be demonstrated by entering commands into the URL line of a web browser. Request the current state: <http://192.168.1.2/state.xml>. This will return the following XML page:

```
<?xml version="1.0" encoding="utf-8" ?>
-<datavalues>
  <units>F</units>
  <sensor1temp>xx.x</sensor1temp>
  <sensor2temp>xx.x</sensor2temp>
  <sensor3temp>xx.x</sensor3temp>
  <sensor4temp>xx.x</sensor4temp>
  <relay1state>0</relay1state>
```



```
<relay2state>0</relay2state>
</datavalues>
```

The tags <units>, <sensortemp> and <relaystate> indicate the current state of the temperature module. Values for each tag are described below.

<units>	F (Degrees Fahrenheit) C (Degrees Celsius)
<sensortemp>	xx.xx (indicates that no digital temperature sensor is associated with the sensor number) 80.10 (temperature reading from digital temperature sensor associated with the sensor number)
<relaystate>	0=off (coil off) 1=on (coil energized)

Commands can be sent to the temperature module that control the relays and change their states. Commands are sent using a variable called relayState. Two examples of using relayState are given here.

Turn relay 1 'off': <http://192.168.1.2/state.xml?relay1State=0>

Turn relay 2 'on': <http://192.168.1.2/state.xml?relay2State=1>

All relayState options are contained in the following list.

relayState	0=Turn relay off
	1=Turn relay on
	2=Pulse relay
	5=Toggle the state of the relay

When the pulse command is sent to one of the relays, the relay will pulse for the time specified in the setup page. It is possible however to specify a pulse time that is different than the pulse time configured in the setup page. This is done by sending an additional variable called pulseTime and the desired pulse time.

[state.xml?relay1State=2](http://192.168.1.2/state.xml?relay1State=2) This will pulse relay 1 for the time specified in the setup page.

[state.xml?relay1State=2&pulseTime1=5.5](http://192.168.1.2/state.xml?relay1State=2&pulseTime1=5.5) This will pulse relay 1 for 5.5 seconds.

(Note that <http://192.168.1.2/> would be included on both commands above, and that to achieve the same thing with relay 2 we would replace relay1State with relay2State and pulseTime1 with pulseTime2)

The pulseTime variable does not change the pulse time specified in the setup page and it is not stored or recorded. The pulseTime variable only changes the pulse duration for the single pulse initiated by that command. In other words, you must issue the pulseTime for each pulse command that differs from the preset pulse time. For example, suppose the pulse time for relay 2 is set to 1.5 seconds in the configuration pages. To issue one 1.5 second pulse, three five second pulses, and a 1.5 second pulse once again, you would issue the following commands...

[state.xml?relay2State=2](http://192.168.1.2/state.xml?relay2State=2) This will pulse relay 2 for the preset time (1.5 seconds)

[state.xml?relay2State=2&pulseTime2=5](http://192.168.1.2/state.xml?relay2State=2&pulseTime2=5) This will pulse relay 2 for 5 seconds.

[state.xml?relay2State=2&pulseTime2=5](http://192.168.1.2/state.xml?relay2State=2&pulseTime2=5) This will pulse relay 2 for 5 seconds

[state.xml?relay2State=2&pulseTime2=5](http://192.168.1.2/state.xml?relay2State=2&pulseTime2=5) This will pulse relay 2 for 5 seconds

[state.xml?relay2State=2](http://192.168.1.2/state.xml?relay2State=2) This will pulse relay 2 for the preset time (1.5 seconds)

(Note that <http://192.168.1.2/> would be included on all commands above)

Note that when commands are sent to the temperature module, its current state is returned in the form of an XML page. The commands can also be sent without having the temperature module return the XML page. This is accomplished by adding the noReply field as follows.

Turn relay 1 'on' without returning state: <http://192.168.1.2/state.xml?relay1State=1&noReply=1>

Turn relay 1 'off' without returning state: <http://192.168.1.2/state.xml?relay1State=0&noReply=1>

Set Temperature for Sensor 1:

The set temperature can be changed through the control page as well as issuing commands directly from another application. For example, to change the set temperature of sensor 1 through another application issue the following command.

<http://192.168.1.2/index.srv?setTemp=90.2&7=Apply>

In response to this command the temperature module will return the control page with the updated set temperature.

Password :

If the control password is enabled in the temperature module and the XML page is requested through a browser, the browser will prompt the user for the password. If the XML request is sent from another application and not a browser, the html request will need to contain the password encoded using the base 64 encoding scheme. The html request header without the password looks like this:

GET /state.xml?noReply=1 HTTP/1.1 (Ends with two \r\n)

The html request header with the password looks like this:

```
GET /state.xml?relayState=1&noReply=1 HTTP/1.1 (Ends with two \r\n)
```

```
Authorization: Basic bm9uZTp3ZWJyZWxheQ== (Ends with two \r\n)
```

where bm9uZTp3ZWJyZWxheQ== is the base 64 encoded version of the username and password
none:smac

C. Site Monitor and Control Operation

The Temperature Module can be accessed from www.sitemonitorandcontrol.com. The web site's engine will poll the unit every few minutes, read the data and record it in a database. The values can then be either downloaded or viewed in graphical form for certain periods of time. The relays can be triggered based on the different triggers. Please see the dealers link on the website for access.

6. Special Functions

A. Email Alerts

Each of the four sensors on the temperature module can be configured to send an email message to up to three email addresses when alarm conditions occur. Email messages can be sent to one, two, or three different email addresses. The header, descriptions and temperature units are taken from the entries in the setup pages. The message is shown below with default text settings. The text shown in bold indicates that it can be changed by the user.

Temperature Module - Email Notification

Email alert triggered by high alarm from **Sensor 1: 87.0° F**

Sensor 1 Current Temp: 87.4° F

Sensor 2 Current Temp: xx.x

Sensor 3 Current Temp: xx.x

Sensor 4 Current Temp: xx.x

Quite a bit of the text above is shown in bold. These items can be changed by the user using the fields described below from the setup pages.

Temperature Module – This text is set in the 'Main Header Text' field under the Main tab.

F – The units are set through the radio button field 'Units' under the Main tab.

Sensor 1 – This text is set in the 'Sensor Description' field under the Sensor 1 tab.

Sensor 2 – This text is set in the 'Sensor Description' field under the Sensor 2 tab.

Sensor 3 – This text is set in the 'Sensor Description' field under the Sensor 3 tab.

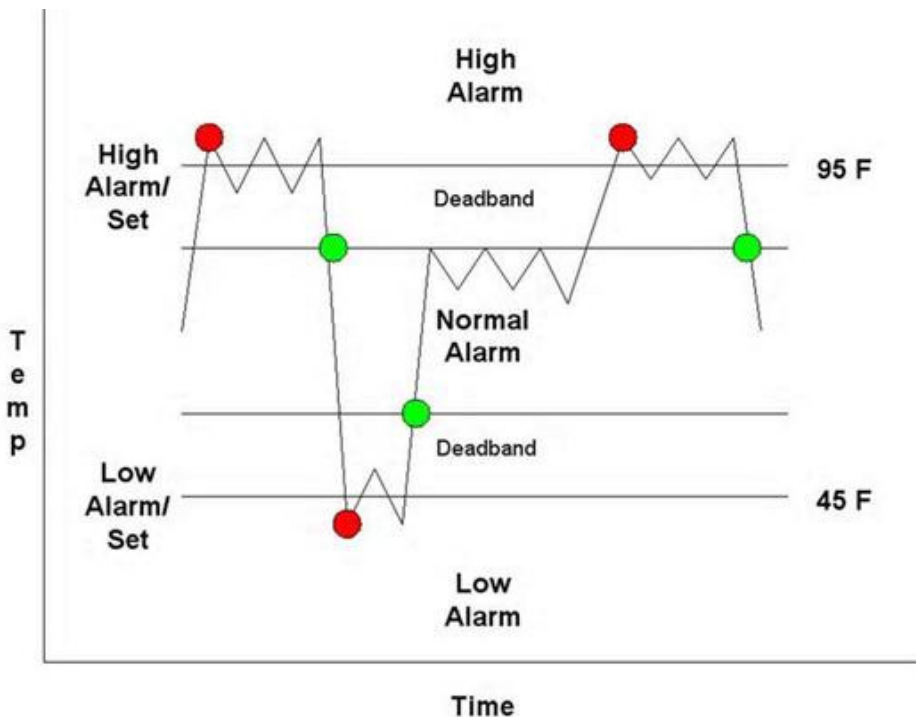
Sensor 4 – This text is set in the 'Sensor Description' field under the Sensor 4 tab.

*Note: The email message will only contain the temperature for sensors that have the 'Display Sensor Temp' field set to **Yes** on the Main setup page.

Email notification requires that the email settings are correct, the email recipients (1,2,3) on the Sensor pages be selected and the Email option be set to the desired type of notification

B. Alarm Conditions

The diagram below shows a visualization of the high alarm set point and low alarm set point options when one of the temperature sensors is configured to send out emails or remote messages based on the set points. When the temperature goes above the high alarm set point a high alarm occurs. This high alarm condition remains until the temperature drops below the deadband. The same is true when the temperature falls below the low alarm set point. In this situation the low alarm condition remains until the temperature rises past the deadband. Red dots indicate high and low alarms while the green dots indicate a return to the normal operating condition. Note that relays are only changed when the alarm condition changes. Users can still manually change relays using the web page.



7. Restoring Factory Default Settings

In the event that the IP address or passwords are forgotten, the temperature module may be restored to its original factory default settings. Please refer to section 2.A.c for the location of the reset switch. First remove the power from the unit. Next, using insert a thin object (such as a toothpick or other non metallic object) carefully press the small button that is located inside the unit. When the button is pushed, a tactile feel can be detected as the button is depressed. While holding the button down, apply power and wait for about 10 seconds. After about 10 seconds, release the button. Now all settings will be back to the original factory defaults. CAUTION: DO NOT USE METAL OBJECTS FOR THIS FUNCTION.

8. Specifications

Power Requirements:

Model TM-01

Voltage: 5VDC \pm 5%

Current:

	10 Mbps Network	100 Mbps Network
No Relays / 1 Sensor	128mA	272mA
2 Relays / 4 Sensors	282mA	421mA

Model TM-02

Voltage: 9~28VDC

Current:

	10 Mbps Network	100 Mbps Network
9VDC - No Relays / 1 Sensor	85mA	176mA
9VDC - 2 Relays / 4 Sensors	152mA	240mA
12VDC - No Relays / 1 Sensor	66mA	133mA
12VDC - 2 Relays / 4 Sensors	114mA	180mA
24VDC - No Relays / 1 Sensor	35mA	69mA
24VDC - 2 Relays / 4 Sensors	60mA	93mA
28VDC - No Relays / 1 Sensor	30mA	60mA
28VDC - 2 Relays / 4 Sensors	52mA	81mA

Model TM-03

POE Class 1 (0.44Watt to 3.84Watt range). Optionally can be powered with external 5VDC power supply.

Relay Contacts:

Contact Form: SPDT

Contact Material: Ag (Au clad)
Max Voltage: 28VAC
Max Current: 1A
Relay Control Options: ON/OFF or Pulsed
Pulse Timer Duration: 100ms to 86400 Seconds (1 day)
Accuracy of pulse timer: 99.99%

Network: 10/100 Base-T Ethernet

Network Setup: static IP address assignment, TCP port selectable

Connectors:

Power/Relay Contacts/Digital Temperature Sensors: 14-position, removable terminal strip, 3.81 mm terminal spacing
(Replacement part number, Phoenix Contact 1803691)
Network: 8-pin RJ-45 socket

Digital Temperature Sensors:

Temperature Range: -55°C to +125°C (-67°F to +257°F)
Accuracy: ±0.5°C from -10°C to +85°C

LED Indicators: 5

- Power on
- Relay coils (1-2) engaged
- Network linked
- Network activity

Physical:

Operating Temperature: -20° to 70°C (-4°-158°F)
Size: 1.41in (35.7mm) wide X 3.88in (98.5mm) tall X 3.1 in(78.0mm) deep

Password Settings:

Password protection on setup page: Yes
Password protection on control page: Optional
Password Encoding: Base 64
Max password length: 10 characters

9. Warranty

This Site Monitor and Control product has a warranty against defects in material and workmanship for a period of one year from the date of shipment. During the warranty period, Site Monitor and Control will, at its option, either repair or replace products that prove to be defective. This warranty is extended to the original purchaser of the equipment only. For warranty service or repair, the product must be properly packaged, and returned to Site Monitor and Control. An RMA number must be secured prior to returning the unit. The purchaser shall prepay all charges for shipping to and from Site Monitor and Control. IN addition, if the product is shipped outside of the United States, the purchaser shall pay all, duties, and taxes.

Limitation: The foregoing warranty shall not apply to defects or damage resulting from improper use or misuse, unauthorized repair, tampering, modification, improper connection, or operation outside the electrical/environmental specifications for the product or any kind of moisture damage. Further, the warranty does not cover Acts of God, such as fire, flood, hurricanes, and tornadoes.

This warranty does not cover damage to property, equipment, direct, indirect, consequential, or incidental damage (including damage for loss of business profit, business interruption, loss of data, and the like) arising out of the use or misuse of this product. UNDER NO CIRCUMSTANCES WILL THE LIABILITY OF Site Monitor and Control TO THE PURCHASER OR ANY OTHER PARTY EXCEED THE ORIGINAL PURCHASE PRICE OF THE PRODUCT, REGARDLESS OF THE FORM OF THE CLAIM. No other warranty is expressed or implied. Site Monitor and Control specifically disclaims the implied warranties or merchantability and fitness for a particular purpose. Some jurisdictions may not allow the exclusion of limitation of liability for consequential or incidental damage.

10. FCC Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

Warning: This equipment has been tested and found to comply with the limits for a Class B (Class A for POE models) digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-Consult the dealer or an experienced radio/TV technician for help.

Notice: Changes or modification not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

11. Open TCP Legal Notice

Portions of the software used in the temperature module are open source.

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OpenTCP is the unified open source TCP/IP stack available on a series of 8/16-bit micro controllers, please see <<http://www.opentcp.org>>. For more information on how to network-enable your devices, or how to obtain commercial technical support for OpenTCP, please see <<http://www.violasystems.com/>>