District Energy Audit

Scotten Elementary School
Gilmore Middle School
Bell Hill Academy

A.4.2 Mechanical

Mechanical Measure BHA-M-1: Replace Existing Manual and Programmable Thermostats with Network Wireless Based Thermostats

Measure Description

The HVAC systems at Bell Hill Academy are presently controlled by manual and programmable thermostats. This measure looks at replacing all existing thermostats with internet/network thermostats. There are 19 network thermostats recommended in this measure.

Measure Implementation

Refer to Section 7.2.1 for information on technology and implementation of this measure.

Measure Analysis

Savings were estimated based on 10 percent of estimated HVAC end-use energy. Refer to **Table A.4.6** for the savings estimate.

Table A.4.6 Savings Estimate for Network Thermostats

	Heating	Cooling	Fans
Savings from Improved Scheduling	4%	4%	4%
Savings from Improved Temperature Control	3%	3%	3%
Savings from Optimized Start/Stop	3%	3%	3%
Total Savings	**10%**	**10%**	**10%**

Analysis Summary

Refer to **Table A.4.7** for analysis summary. Pacific Gas & Electric has a Customized Basic Non-Lighting rate of $0.08 per kWh savings.

Table A.4.7 Analysis Summary of Proposed Mechanical Measure BHA-M-1

Site	kW Saved	kWh Saved	Rate ($/kWh)	Natural Gas Saved (Therms)	Rate ($/Therm)	Measure Cost ($)	Cost Savings ($)	Simple Payback Period without Incentive (Years)	Approx. Incentive ($)	Measure Costs w/ Incentive ($)	Simple Payback Period with Incentive (Years)
Bell Hill Academy	-	7,161	$ 0.140	490	$ 0.689	$ 13,561	$ 1,340	10.1	$ 573	$ 12,988	9.7

Lighting Measure BHA-L-1 Alt.:

(A) Replace Existing Interior Fluorescent Fixtures with New LED Fixtures

(B) Install Occupancy Sensors for New Interior LED Fixtures

Measure Description

This measure is presented to illustrate the potential costs and savings associated with a complete lighting modernization effort entailing the following:

1. Replace existing interior linear fluorescent fixtures with new energy efficient LED fixtures, school wide.
2. Implement occupancy sensors (for code compliance).

This measure would serve as an alternative to proposed retrofits in Lighting Measure BHA-L-1 and occupancy sensors in Lighting Measure BHA-L-3 (A), as energy savings differs by the type of technology replacing interior linear fluorescent fixtures.

Measure Implementation

Refer to Section 7.1.8 and 7.1.2 for information on technology and implementation of this measure.

Analysis Summary

Refer to **Tables A.4.5A** and **A.4.5B** for analysis summary. Incentives are estimated under PG&E K-12 Rebate Program on a per kilolumen basis, at $8.00 for 30 watt 2'x4' fixtures (Rebate Code LT043) and $6.00 for 33 watt 1'x4' fixtures (Rebate code LT050).

Table A.4.5A Analysis Summary of Lighting Measure BHA-L-1 Alt. (A)

Site	# of Fixtures	kW Saved	kWh Saved	Rate ($/kWh)	Measure Cost ($)	Cost Savings ($)	Simple Payback Period without Incentive (Years)	Approx. Incentive ($)	Measure Costs w/ Incentive ($)	Simple Payback Period with Incentive (Years)
Bell Hill Academy	121	4.1	6,847	$ 0.219	$ 42,403	$ 1,500	28.3	$ 2,976	$ 39,427	26.3

Controls mandated by code are not eligible for incentives or rebates.

Table A.4.5B Analysis Summary of Lighting Measure BHA-L-1 Alt. (B)

Site	# of Sensors	kW Saved	kWh Saved	Rate ($/kWh)	Measure Cost ($)	Cost Savings ($)	Simple Payback Period without Incentive (Years)	Approx. Incentive ($)	Measure Costs w/ Incentive ($)	Simple Payback Period with Incentive (Years)
Bell Hill Academy	12	-	627	$ 0.140	$ 3,123	$ 88	35.5	$ -	$ 3,123	35.5

Mechanical Measure BHA-M-2: Implement Occupancy Based Zone Temperature Reset

Measure Description

This measure proposes use of occupancy sensors to control the HVAC systems. The new network thermostats are capable of accepting an input from an occupancy sensor. These thermostats can be programmed to use the occupancy sensor input to reset the zone temperature when no occupancy is detected. This measure proposes installing 19 occupancy sensors for Bell Hill Academy.

Measure Implementation

Refer to Section 7.2.2 for information on technology and implementation of this measure.

Measure Analysis

Savings were estimated based on 5 percent of estimated HVAC end-use energy.

Analysis Summary

Refer to **Table A.4.8** for analysis summary. The savings are estimated post implementation of Mechanical Measure BHA-M-1. Pacific Gas & Electric has a Customized Basic Non-Lighting rate of $0.08 per kWh savings.

Table A.4.8 Analysis Summary of Proposed Mechanical Measure BHA-M-2

Site	kW Saved	kWh Saved	Rate ($/kWh)	Natural Gas Saved (Therms)	Rate ($/Therm)	Measure Cost ($)	Cost Savings ($)	Simple Payback Period without Incentive (Years)	Approx. Incentive ($)	Measure Costs w/ Incentive ($)	Simple Payback Period with Incentive (Years)
Bell Hill Academy	-	1,697	$ 0.140	220	$ 0.689	$ 7,460	$ 389	19.2	$ 136	$ 7,324	18.8

B.4.2 Mechanical

Mechanical Measure MSES-M-1: Replace Existing Manual and Programmable Thermostats with Network Wireless Based Thermostats

Measure Description

The HVAC systems at Margaret Scotten ES are presently controlled by manual and programmable thermostats. This measure looks at replacing all existing thermostats with internet/network thermostats. There are 37 network thermostats recommended in this measure.

Measure Implementation

Refer to Section 7.2.1 for information on technology and implementation of this measure.

Measure Analysis

Savings were estimated based on 10 percent of estimated HVAC end-use energy. Refer to **Table B.4.6** for the savings estimate.

Table B.4.6 Savings Estimate for Network Thermostats

	Heating	Cooling	Fans
Savings from Improved Scheduling	4%	4%	4%
Savings from Improved Temperature Control	3%	3%	3%
Savings from Optimized Start/Stop	3%	3%	3%
Total Savings	**10%**	**10%**	**10%**

Analysis Summary

Refer to **Table B.4.7** for analysis summary. Pacific Gas & Electric has a Customized Basic Non-Lighting rate of $0.08 per kWh savings.

Table B.4.7 Analysis Summary of Proposed Mechanical Measure MSES-M-1

Site	kW Saved	kWh Saved	Rate ($/kWh)	Natural Gas Saved (Therms)	Rate ($/Therm)	Measure Cost ($)	Cost Savings ($)	Simple Payback Period without Incentive (Years)	Approx. Incentive ($)	Measure Costs w/ Incentive ($)	Simple Payback Period with Incentive (Years)
Margaret Scotten ES	-	10,958	$ 0.147	473	$ 0.676	$ 25,870	$ 1,930	13.4	$ 877	$ 24,993	12.9

Mechanical Measure MSES-M-2: Implement Occupancy Based Zone Temperature Reset

Measure Description

This measure proposes use of occupancy sensors to control the HVAC systems. The new network thermostats are capable of accepting an input from an occupancy sensor. These thermostats can be programmed to use the occupancy sensor input to reset the zone temperature when no occupancy is detected. This measure proposes installing 37 occupancy sensors for Margaret Scotten ES.

Measure Implementation

Refer to Section 7.2.2 for information on technology and implementation of this measure.

Measure Analysis

Savings were estimated based on 5 percent of estimated HVAC end-use energy.

Analysis Summary

Refer to **Table B.4.8** for analysis summary. The savings are estimated post implementation of Mechanical Measure MSES-M-1. Pacific Gas & Electric has a Customized Basic Non-Lighting rate of $0.08 per kWh savings.

Table B.4.8 Analysis Summary of Proposed Mechanical Measure MSES-M-2

Site	kW Saved	kWh Saved	Rate ($/kWh)	Natural Gas Saved (Therms)	Rate ($/Therm)	Measure Cost ($)	Cost Savings ($)	Simple Payback Period without Incentive (Years)	Approx. Incentive ($)	Measure Costs w/ Incentive ($)	Simple Payback Period with Incentive (Years)
Margaret Scotten ES	-	1,987	$ 0.147	-	$ 0.676	$ 5,345	$ 292	18.3	$ 159	$ 5,186	17.8

C.4.2 Mechanical

Mechanical Measure LGMS-M-1: Replace Existing Manual Thermostats with Network Wireless Based Thermostats

Measure Description

The HVAC systems at Lyman Gilmore MS are presently controlled by manual thermostats. This measure looks at replacing all existing thermostats with internet/network thermostats. There are 61 network thermostats recommended in this measure.

Measure Implementation

Refer to Section 7.2.1 for information on technology and implementation of this measure.

Measure Analysis

Savings were estimated based on 10 percent of estimated HVAC end-use energy. Refer to **Table C.4.6** for the savings estimate.

Table C.4.6 Savings Estimate for Network Thermostats

	Heating	Cooling	Fans
Savings from Improved Scheduling	4%	4%	4%
Savings from Improved Temperature Control	3%	3%	3%
Savings from Optimized Start/Stop	3%	3%	3%
Total Savings	**10%**	**10%**	**10%**

Analysis Summary

Refer to **Table C.4.7** for analysis summary. Pacific Gas & Electric has a Customized Basic Non-Lighting rate of $0.08 per kWh savings.

Table C.4.7 Analysis Summary of Proposed Mechanical Measure LGMS-M-1

Site	kW Saved	kWh Saved	Rate ($/kWh)	Natural Gas Saved (Therms)	Rate ($/Therm)	Measure Cost ($)	Cost Savings ($)	Simple Payback Period without Incentive (Years)	Approx. Incentive ($)	Measure Costs w/ Incentive ($)	Simple Payback Period with Incentive (Years)
Lyman Gilmore MS	-	10,234	$ 0.161	1,858	$ 0.959	$ 23,172	$ 3,430	6.8	$ 819	$ 22,353	6.5

Mechanical Measure LGMS-M-2: Implement Occupancy Based Zone Temperature Reset

Measure Description

This measure proposes use of occupancy sensors to control the HVAC systems. The new network thermostats are capable of accepting an input from an occupancy sensor. These thermostats can be programmed to use the occupancy sensor input to reset the zone temperature when no occupancy is detected. This measure proposes installing 61 occupancy sensors for Lyman Gilmore MS.

Measure Implementation

Refer to Section 7.2.2 for information on technology and implementation of this measure.

Measure Analysis

Savings were estimated based on 5 percent of estimated HVAC end-use energy.

Analysis Summary

Refer to **Table C.4.8** for analysis summary. The savings are estimated post implementation of Mechanical Measure LGMS-M-1. Pacific Gas & Electric has a Customized Basic Non-Lighting rate of $0.08 per kWh savings.

Table C.4.8 Analysis Summary of Proposed Mechanical Measure LGMS-M-2

Site	kW Saved	kWh Saved	Rate ($/kWh)	Natural Gas Saved (Therms)	Rate ($/Therm)	Measure Cost ($)	Cost Savings ($)	Simple Payback Period without Incentive (Years)	Approx. Incentive ($)	Measure Costs w/ Incentive ($)	Simple Payback Period with Incentive (Years)
Lyman Gilmore MS	-	1,365	$ 0.161	838	$ 0.959	$ 12,534	$ 1,022	12.3	$ 109	$ 12,425	12.2

7.2 Mechanical Technology

7.2.1 Networked Thermostats

Network thermostats are an alternative lower cost option to Energy Management Systems (EMS)/Direct Digital Control (DDC) systems. These types of controls have gained ground in the controls industry given their ability to do many of the same EMS/DDC functions but at a lower cost. As a result, network thermostats are often referred to as technology that helps bridge the gap between conventional thermostats and expensive building control systems.

Network thermostats can be connected via a secure wired Ethernet or wireless (Wi-Fi) connectivity to a facility's data network. Through an IP address, each thermostat is able to serve up its own web pages to allow the user to configure and monitor the thermostat using a standard web-browser. Remote HVAC zone monitoring and control are also available over secure and authorized broadband internet connections. This feature allows for maintenance staff or other service providers to monitor, diagnose, and control HVAC systems from a remote location. The thermostats can also be linked to the installed occupancy sensors to reset the zone temperature when no occupancy is detected.

Network thermostats typically feature:

- Automatic Heat/Cool Changeover
- Dual Occupied and Unoccupied Setpoints for Heat and Cool
- Remote Sensor Capability (indoor, duct, and outdoor)
- Outdoor Temperature Display (if applicable)
- Keyboard Lockout (prevents users from tampering with setpoints)
- Push Button Override with temperature adjustment

Optional features may include:

- Integrated humidity sensor and relay for humidification and dehumidification control
- CO_2 sensor integration for the demand control ventilation strategy

Software is available to provide a clean and simple graphical interface. With such software, maintenance staff will be able to administer common changes to multiple thermostats, save predefined common or specific device settings, and restrict user access privileges. Software also has the ability to do visual alarm notification and e-mail or text message fault reporting. **Appendix E** provides sample information for various network thermostat manufacturers.

Implementation Scope of Work

1. Assess the capabilities of the existing communication (Ethernet) network. Verify that the proposed network thermostats are suitable for the application. Contact network thermostat dealer.

2. Provide new network thermostats in each controlled zone. This may also be a good time to identify thermostats presently in unsuitable locations, such as near windows and doors, where they may be exposed to sunlight and draft winds.
3. To minimize installation cost, use existing conduits for drawing communication wiring. Use new conduits where required.
4. Programming will require specification of logic and sequence of operation for all equipment. This component of the measure will require a careful design process. The logic must address key areas germane to the operation of the units under the conditions encountered at the facility.
5. Provide training for the operators. Training shall include all operational, programming, control, and maintenance aspects of the system.

Note: Effective use of the control system critically hinges upon proper training and programming. Therefore, the District must plan for procuring adequate training during system installation. Success of the system is also critically dependent on the School's ability to assign a dedicated staff resource to remain knowledgeable and maintain such controls.

6. An important factor to consider in selection of a control system is the local support available in the area. Limited support in the area may result in long down times in cases of system failures.

7.2.2 Occupancy Based HVAC Control

Implementation Scope of Work

1. Confer with utility representative regarding incentives availability and requirements, prepare and submit applications as desired.
2. Develop a detailed list of all the areas with network thermostats.
3. Install Occupancy Sensors as explained in Lighting Measures.
4. Hire a controls contractor with wiring subcontractor to wire the occupancy sensors to the inputs on the network thermostats, and to program the controls to control HVAC based on the occupancy sensors.
5. Install new low voltage wiring to connect the occupancy sensors to the thermostats.
6. Programming the energy management system controllers will require specification of logic and sequence of operation for all equipment. This component of the measure will require a careful design process. The logic must address key areas germane to the operation of the units under the conditions encountered at the facility.
7. Provide training for the operators. Training shall include all operational, programming, control, and maintenance aspects of the system.

Note: Effective use of the control system critically hinges upon proper training and programming. Therefore, each facility must plan for training during system installation. Success of the system is critically dependent on the facility's ability to assign a dedicated staff resource to remain knowledgeable and maintain such controls.

Grass Valley Charter School
Energy Audit

4.2 Mechanical

Mechanical Measure M-1: (A) Replace Existing Programmable Thermostats with Network Based Thermostats (B) Install Occupancy Based Temperature Setpoint Reset

Measure Description

Presently, the HVAC systems at Grass Valley CS are controlled by aged failing centralized Energy Management System (EMS). The occupants of the zones have no control over the temperature settings of the thermostats, and the temperature and scheduling is controlled via the school office.

The zone controllers use a mercury based sensors to control temperature setting, and have failed. It is recommended to replace the existing EMS with the Network Thermostats.

Section 7 provides information on scope of implementation of this measure and the advantages of energy management systems. Additionally, it is recommended to install an occupancy sensor in conjunction to the network thermostats controls, to reset HVAC temperature setpoints during periods of no occupancy. Note that the successful implementation of the measure M-1 (B) is predicated on the implementation of the measure M-1 (A).

Measure Implementation

Refer to Section 7 for information on technology and implementation of the measure.

Analysis Summary

Refer to **Tables 4.8A** and **4.8B** for analysis summary. Customized incentives are estimated at $0.08/kWh for basic non-lighting control measures.

Table 4.8A Analysis Summary of Proposed Mechanical Measure M-1 (A)

Facility	kW Saved	kWh Saved	Electricity Rate ($/kWh)	Natural Gas Saved (Therms)	Gas Rate ($/Therm)	Measure Cost ($)	Energy Cost Savings ($)	Payback Period without Incentive (Years)	Estimated Incentives ($)	Non-repayable Funds ($)	Measure Costs w/ Incentive & Non-repayable Funds ($)	Payback Period with Incentive & Non-repayable Funds (Years)	Savings to Investment Ratio (SIR)
Grass Valley CS	-	15,990	$ 0.219	1,664	$ 0.593	$ 32,876	$ 4,489	7.3	$ 1,279	$ -	$ 31,597	7.0	1.80

Table 4.8B Analysis Summary of Proposed Mechanical Measure M-1 (B)

Facility	kW Saved	kWh Saved	Electricity Rate ($/kWh)	Natural Gas Saved (Therms)	Gas Rate ($/Therm)	Measure Cost ($)	Energy Cost Savings ($)	Payback Period without Incentive (Years)	Estimated Incentives ($)	Non-repayable Funds ($)	Measure Costs w/ Incentive & Non-repayable Funds ($)	Payback Period with Incentive & Non-repayable Funds (Years)	Savings to Investment Ratio (SIR)
Grass Valley CS	-	7,195	$ 0.219	749	$ 0.593	$ 14,957	$ 2,020	7.4	$ 576	$ -	$ 14,381	7.1	1.32

7.2 Mechanical Technology

7.2.1 Network Thermostats

Network thermostats are an alternative lower cost option to Energy Management Systems (EMS)/Direct Digital Control (DDC) systems. These types of controls have gained ground in the controls industry given their ability to do many of the same EMS/DDC functions but at a lower cost. As a result, network thermostats are often referred to as technology that helps bridge the gap between conventional thermostats and expensive building control systems.

Network thermostats can be connected via a secure wired Ethernet or wireless (Wi-Fi) connectivity to a facility's data network. Through an IP address, each thermostat is able to serve up its own web pages to allow the user to configure and monitor the thermostat using a standard web-browser. Remote HVAC zone monitoring and control are also available over secure and authorized broadband internet connections. This feature allows for maintenance staff or other service providers to monitor, diagnose, and control HVAC systems from a remote location. The thermostats can also be linked to the installed occupancy sensors to reset the zone temperature when no occupancy is detected.

Network thermostats typically feature:

- Automatic Heat/Cool Changeover
- Dual Occupied and Unoccupied Setpoints for Heat and Cool
- Remote Sensor Capability (indoor, duct, and outdoor)
- Outdoor Temperature Display (if applicable)
- Keyboard Lockout (prevents users from tampering with setpoints)
- Push Button Override with temperature adjustment

Optional features may include:

- Integrated humidity sensor and relay for humidification and dehumidification control
- CO_2 sensor integration for the demand control ventilation strategy

Software is available to provide a clean and simple graphical interface. With such software, maintenance staff will be able to administer common changes to multiple thermostats, save predefined common or specific device settings, and restrict user access privileges. Software also has the ability to do visual alarm notification and e-mail or text message fault reporting.

Appendix E provides sample information for various network thermostat manufacturers.

Implementation Scope of Work

1. Assess the capabilities of the existing communication (Ethernet) network. Verify that the proposed network thermostats are suitable for the application. Contact network thermostat dealer.

2. Provide new network thermostats in each controlled zone. This may also be a good time to identify thermostats presently in unsuitable locations, such as near windows and doors, where they may be exposed to sunlight and draft winds.
3. To minimize installation cost, use existing conduits for drawing communication wiring. Use new conduits where required.
4. Programming will require specification of logic and sequence of operation for all equipment. This component of the measure will require a careful design process. The logic must address key areas germane to the operation of the units under the conditions encountered at the facility.
5. Provide training for the operators. Training shall include all operational, programming, control, and maintenance aspects of the system.

Note: Effective use of the control system critically hinges upon proper training and programming. Therefore, the District must plan for procuring adequate training during system installation. Success of the system is also critically dependent on the School's ability to assign a dedicated staff resource to remain knowledgeable and maintain such controls.

6. An important factor to consider in selection of a control system is the local support available in the area. Limited support in the area may result in long down times in cases of system failures.

7.2.2 Occupancy Based HVAC Control

Implementation Scope of Work

1. Confer with utility representative regarding incentives availability and requirements, prepare and submit applications as desired.
2. Develop a detailed list of all the areas with network thermostats.
3. Install Occupancy Sensors as explained in Lighting Measures.
4. Hire a controls contractor with wiring subcontractor to wire the occupancy sensors to the inputs on the network thermostats, and to program the controls to control HVAC based on the occupancy sensors.
5. Install new low voltage wiring to connect the occupancy sensors to the thermostats.
6. Programming the energy management system controllers will require specification of logic and sequence of operation for all equipment. This component of the measure will require a careful design process. The logic must address key areas germane to the operation of the units under the conditions encountered at the facility.
7. Provide training for the operators. Training shall include all operational, programming, control, and maintenance aspects of the system.

Note: Effective use of the control system critically hinges upon proper training and programming. Therefore, the facility must plan for training during system installation. Success of the system is critically dependent on the facility's ability to assign a dedicated staff resource to remain knowledgeable and maintain such controls.

Network Thermostats

PelicanWirelessSystems

Internet Programmable Thermostat (TS200)

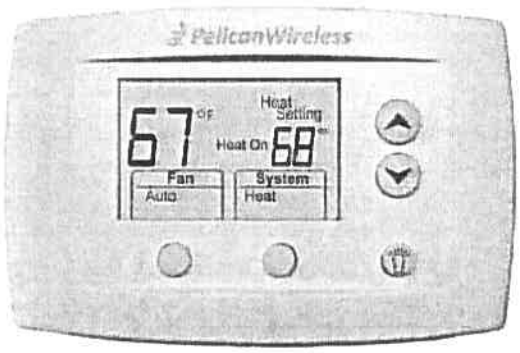
wireless management and control

www.pelicanwireless.com

Internet Programmable Thermostat

PelicanWirelessSystems

Overview



TS200

Pelican's wireless Internet Programmable Thermostat is an affordable alternative to the wired HVAC building controls of the past. Utilizing standard thermostat to HVAC unit wiring, Pelican is able to offer a retrofit friendly thermostat that is affordable to both purchase and install in any commercial building. The Pelican thermostat is able to control up to 3 stages heat, 2 stages cool for Heat Pump systems and 2 stages heat, 2 stages cool for Conventional. It also comes with an innovative 3-wire module that allows for installations in limited wiring situations.

The easy to understand, large display, shows current temperature and active settings. Intuitive buttons allow you to set the desired temperature for heating, cooling, and fan modes. It also has a 15 second light button to illuminate the display panel for night viewing. And yes, our thermostat has Auto change-over.

Initial thermostat configuration and ongoing scheduling management is done through your own Pelican web-app. Our web-app provides you with an intuitive control screen for managing multiple thermostats. In addition, historical temperature and HVAC usage data can be reviewed at any time. Pelican's wireless Internet Programmable Thermostat continuously monitors the health of your HVAC systems. This advanced feature will send an immediate maintenance alert to authorized personnel via email or test message at the first sign of a problem.

Key Customer Benefits

- Internet Programmable
- Wireless Communication
- Simple Installation
- Retrofit Friendly
- Advanced maintenance Alarm Notification via email or text message
- User Friendly Interface
- Real-time monitoring and Analytical reporting
- Increase in Comfort
- Energy Savings
- Decrease Maintenance and Operation costs
- Meets 2014 Title 24 Specifications
- 24/7 Email Technical Support
- Monday thru Friday, 8am-5pm PST Live Support
- 5 Year Warranty

Features

- Internet Programmable
  - 7 day scheduling with up to 12 set points per day
  - Intuitive web based app
  - Set-up via the web based app
- Wireless Communication
  - Wireless to Pelican's Gateway (GW200)
  - Automatically connects
  - Repeats and Routes wireless signal
- Web Based Control
  - Works with all smartphone browsers
  - Works with all tablet browsers
  - Works with PC browsers: Firefox, Safari, Chrome, Internet Explorer 8+
- Easy Installation
  - Standard industry color coded wiring
  - Uses existing wires from replaced thermostat
  - Special limited wiring capability allows installation with as few as 3 wires to control multi-stage HVAC systems
  - Self connecting wireless communication
  - Guided web-based set-up instructions
  - Special limited wiring capability allows installation with as few as 3 wires to control multi-stage HVAC systems
  - Compatible with new installations, replacement installations, and upgradeable pre-wired systems

Features Cont.

- Energy Efficiency
  - Adjustable scheduling for occupied and unoccupied hours
  - Calculated energy costs reporting
  - Historical trend data for accurate scheduling and temperature control settings
  - Remote management and diagnostics
  - Very accurate temperature detection for proper conditioned management
- Thermostat Settings
  - 7 day programming for up to 12 set points per day
  - Heat Pump 3 Heat and 2 Cool
  - Conventional 2 Heat and 2 Cool
  - Scheduled Fan setting auto/on
  - Circulating Fan mode
  - Settable temperature limits
- Thermostat Keypad
  - Increase and Decrease temperature settings
  - Shows both set-point and room temperature
  - Auto-change over
  - Light button
  - Can limited temperature setting range
  - Lock and unlock keypad via web-based app (if the Internet goes down keypad unlocks automatically)

Specifications

Compatibility

- Compatible with most 24VAC gas, electric, or oil heating and cooling systems
- Conventional and Heat Pump compatible

Electrical

- Power - hardwire 24VAC; 50mA
- Voltage - 23-30VAC
- Heat current – 1.0 A running
- Cool current – 1.0 A running
- Fan current – 1.0 A running

Wiring

- Conventional Terminals
  R, RC, W, W2, Y, Y2, G, C
- Heat Pump Terminals
  R, RC, O/B, AUX/E, Y, Y2, G, C

System Regulation and Protection

- 4 minute compressor short cycle protection
- Temporary program override
- Auxiliary or Emergency Heat
- Keypad lockout

Thermostat Range

- Setting Temperature Range – heat: 40°F to 90°F (4.5°C to 32°C), cool: 50°F to 99°F (10°C to 37°C)
- Differential Temperature – ± 0.5 F (± 0.25 C)
- Operating Humidity Range (%RH) – 5 to 90% RH, non-condensing

Size

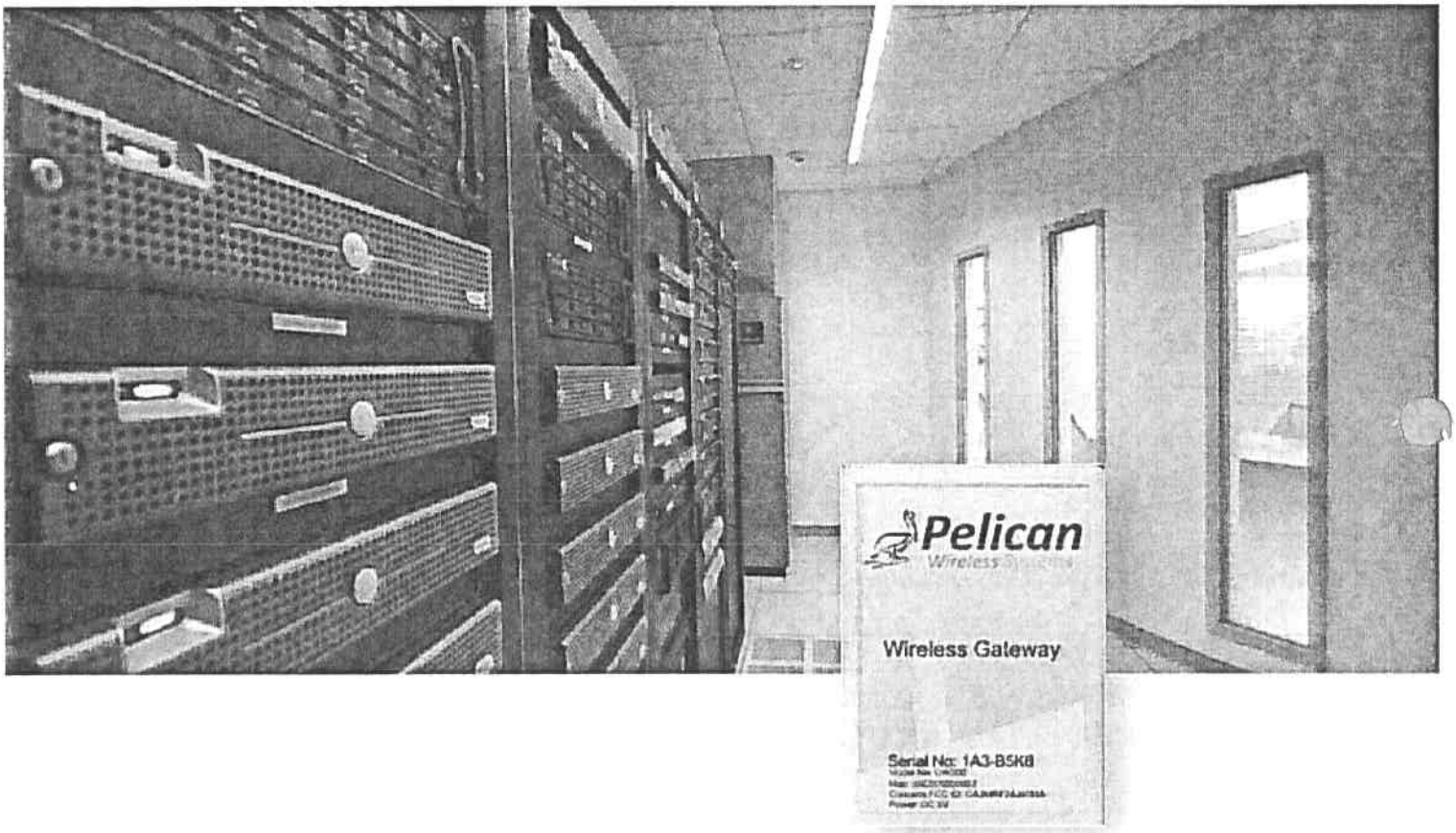
- Dimensions (in.) H 3.5" X W 5.875" X D 1.5"
- Dimensions (mm) H 89 X W 150 X D 38
- Mounting – Horizontal
- Display Size – 4 square inchs

PelicanWirelessSystems
2655 Collier Canyon Road
Livermore, CA 94551

Sales: (888)512-0490
sales@pelicanwireless.com

PelicanWirelessSystems

Wireless Gateway (GW200)
access point for Pelican Wireless products



www.pelicanwireless.com

Wireless Gateway

PelicanWirelessSystems

Overview

GW200

Pelican's wireless gateway is the link between your Pelican products and the cloud based web-app you will be managing them on. A single plug-and-play gateway is able to manage and communicate with up to 2000 Pelican products. The gateway utilizes intelligent wireless technology to provide a secure and reliable connection. The gateway will automatically connect with any Pelican products within range, which will then repeat the gateway's wireless signal to create a mesh network between all the Pelican products installed at your property. Utilizing our gateway's technology means there is no setup, no computers to buy, no software to maintain, and no repeaters to install or buy. Simplicity at its finest.

Key Customer Benefits

- Can management and control 2,000 Pelican products
- No Networking Knoweldege Required
- Secure Encrypted Connection
- Simple Installation
- Small Footprint
- No Software to Buy
- Affordable Wireless
- 24/7 Email Technical Support
- Monday thru Friday, 8am-5pm PST Live Support
- 5 Year Warranty

Features

- Wired Ethernet port and cable provided to easily connect into your Internet router or LAN.
- Automatic Internet connectivity.
- Wireless communication to your Pelican products.
- Can Manage up to 2,000 Pelican products.
- Encrypted high-speed connection for protection and reliability.
- Removable command strips for product mounting.
- Network connection status indicator light.
- No interference with WiFi networks.

assembled in USA designed in the

Specifications

Wireless

- 2.4 GHz IEEE Std. 802.15.4
- Complies with Class B Part 15 of the FCC rules

Ethernet

- 7 foot Ethernet cable included
- LAN protocols: TCP/IP, DHCP, DNS
- Interface: 10BaseT Twisted Pair

Electrical

- Power – 5 VDC, 50 mA
- AC adapter included

Software

- Automatic upgrades available via the Internet at no charge

Size

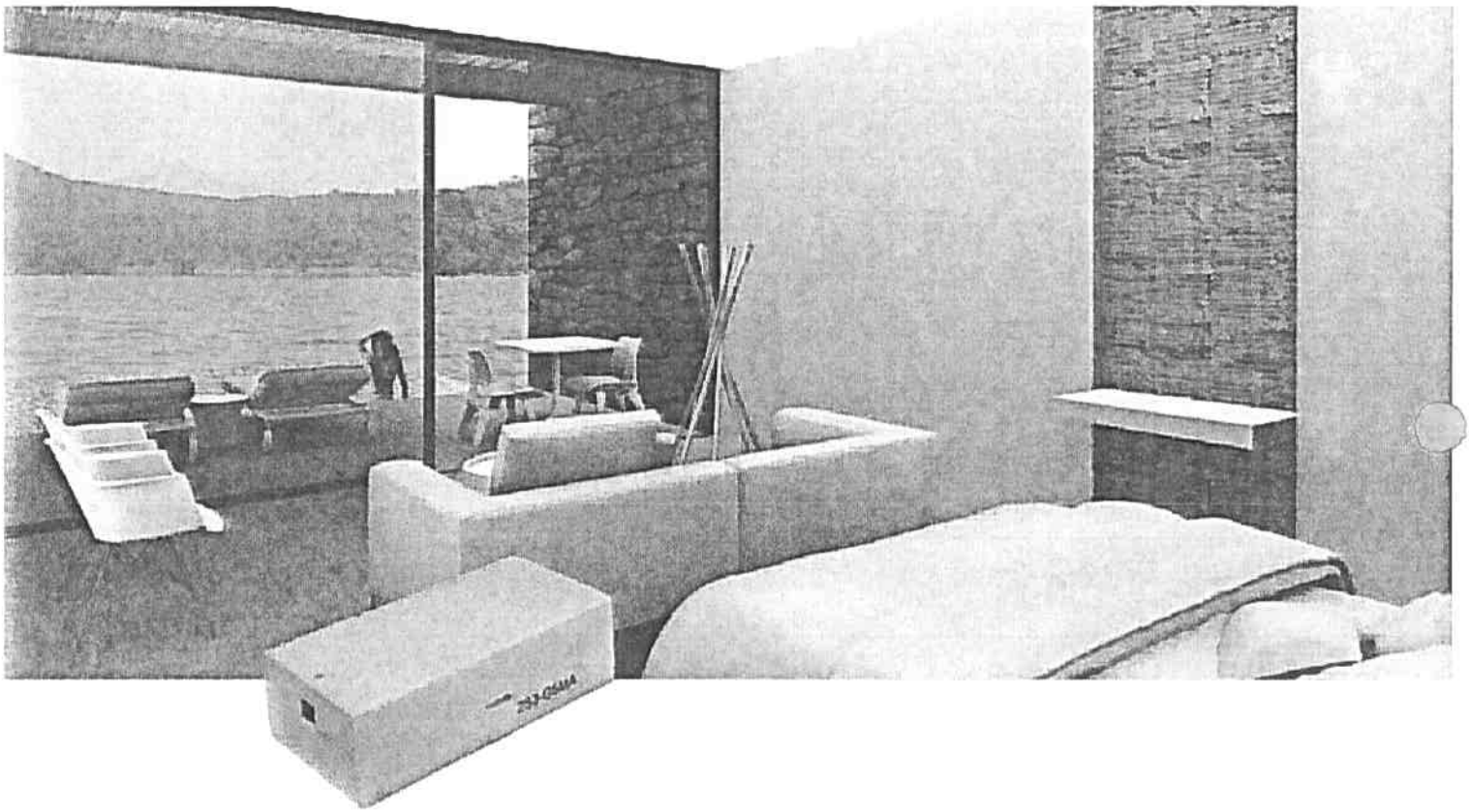
- Dimensions (in.) W 2.5" X H 3.5" X D 1.125"
- Dimensions (mm) W 66 X H 92 X D 28
- Mounting - Vertical

PelicanWirelessSystems
2655 Collier Canyon Road
Livermore, CA 94551

Sales: (888)512-0490
sales@pelicanwireless.com

PelicanWirelessSystems

Wireless Proximity Sensor (PRX1)
door or window sensor



www.pelicanwireless.com

Wireless Proximity Sensor

PelicanWirelessSystems

Overview

PRX1

The Pelican Door Sensor is a battery operated remote wireless device designed to detect the opening and closing of doors or windows. By simply pairing the wireless door switch to a Pelican thermostat, it will turn "OFF" that thermostat's HVAC unit when it has detected that the door or window has been opened. A 2-wire terminal is built in, allowing for a customer supplied reed switch and magnet to be attached. An optional internal magnetic sensor is integrated in its housing. This can be used to detect a magnet attached to the movable section of the window or door. For proper operation the magnet must stop within 1/4" of the internal sensor. The door switch is powered by 2 AA batteries and lasts for at least 12 months. Your Pelican Site Manager will notify you when the battery has less than 20% of it's capacity. You will also be able to see when a door or window is open on your Pelican Site Manager. The door switch can be disabled via the Site Manager.

Key Customer Benefits

- Wireless Accessory
- Simple Installation
- Know if Window or Door is Opened or Closed
- Low Battery Alarm Warnings
- Easy Access Battery Compartment
- Small Footprint
- Affordable Accessory
- 24/7 Email Technical Support
- Monday thru Friday, 8am-5pm PST Live Support
- 5 Year Warranty

Features

- Wireless connection to your Pelican thermostat
- Automatically connects to your Pelican wireless network
- Batteries last for one year, notification for low battery
- Simple installation, with removable cover for changing batteries
- Able to see open/closed door or window from web app
- Built in 2-wire terminal input for adding an external magnetic sensor

Specifications

Wireless

- 2.4 GHz IEEE Std. 802.15.4
- Complies with Class B Part 15 of the FCC rules

Magnetic Switch

- Integrated internal magnetic sensor
- (Optional) Built in 2-wire terminal input for adding an external magnetic sensor

Electrical

- Power – 2 AA Batteries (included)

Software

- Automatic upgrades available via the Internet at no charge

Size

- Dimensions (in.) H 1.5" X W 3.25" X D 1"
- Dimensions (mm) H 38 X W 82.5 X D 25
- Mounting - Horizontal

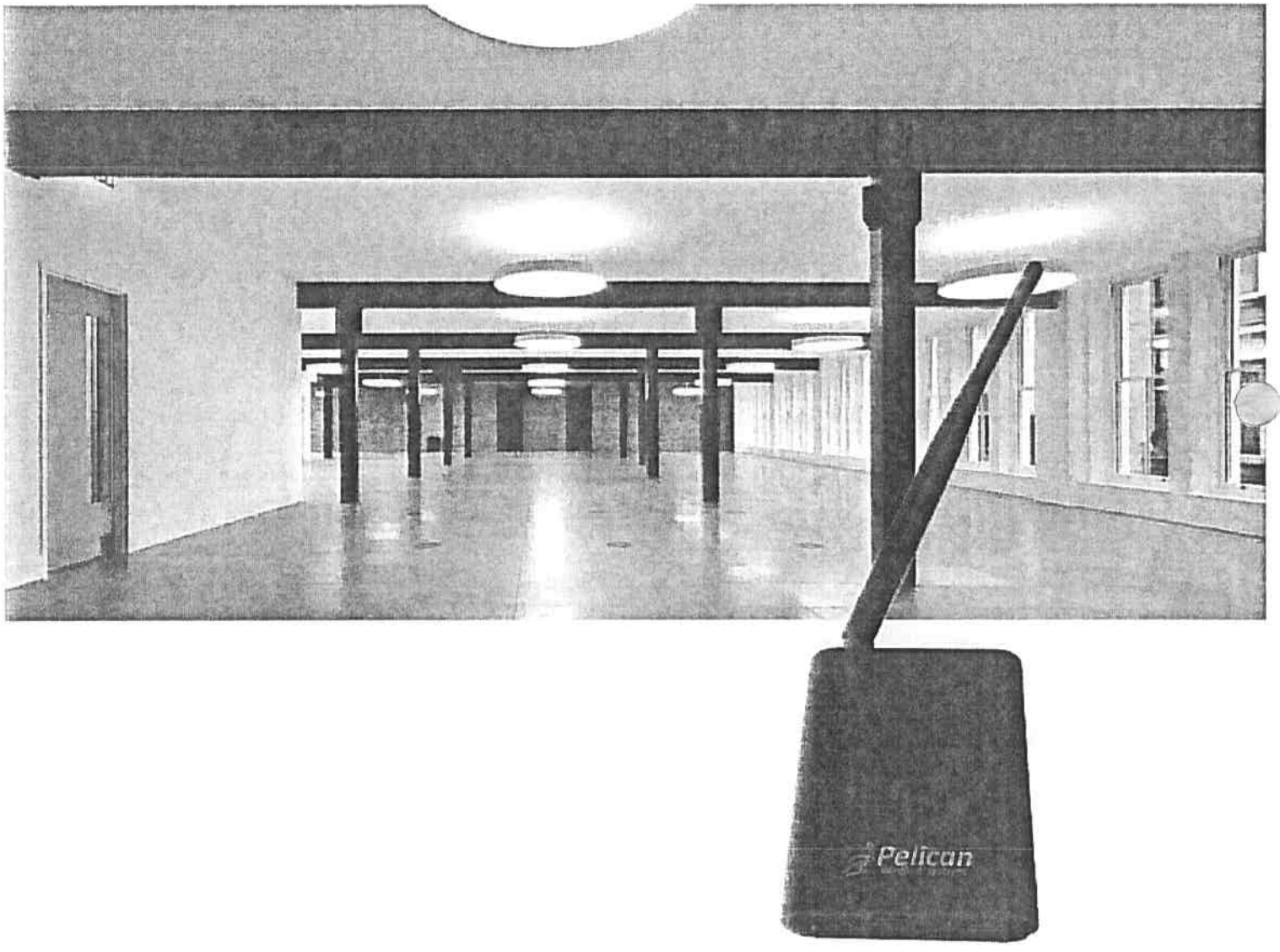
PelicanWirelessSystems
2655 Collier Canyon Road
Livermore, CA 94551

Sales: (888)512-0490
sales@pelicanwireless.com

PelicanWirelessSystems

Extended Range Wireless Repeater (WR400)

repeater for Pelican's wireless network



www.pelicanwireless.com

Extended Range Wireless Repeater

PelicanWirelessSystems

Overview

The Pelican Extended Range Wireless Repeater has a wireless signal that reaches twice as far as the WR100. It bridges long distances or dead spots in a property's wireless network. Pelican's free network monitoring software included in Pelican's Site Manager Subscription Service will identify any connectivity issues. The Repeater can then be installed in locations where poor signal quality is detected. While most sites will not require repeaters, they are available to assure reliable communications when needed.

WR400

Key Customer Benefits

- Wireless Repeater
- No Networking Knoweldege Required
- Secure Encrypted Conntection
- Simple Installation
- Small Footprint
- No Software to Buy
- Affordable Wireless
- 24/7 Email Technical Support
- Monday thru Friday, 8am-5pm PST Live Support
- 5 Year Warranty

Features

- Simple AC power plug-in
- Automatic wireless connectivity.
- Wireless communication to your Pelican products.
- Acts as a wireless repetition for Pelican Gateway
- Encrypted high-speed connection for protection and reliability.
- Removable command strips for product mounting.
- Network connection status indicator light.
- No interference with WiFi networks.

Specifications

Wireless

- 2.4 GHz IEEE Std. 802.15.4
- Complies with Class B Part 15 of the FCC rules

Size

- Dimensions (in.) W 3.5" X H 4.5" X D 1.25"
- Antenna Dimensions (in.) H 7.25"
- Dimensions (mm) W 89 X H 114 X D 32
- Antenna Dimensions (mm) H 184
- Mounting - Vertical

Electrical

- Power – 5 VDC, 50 mA
- AC adapter included

Software

- Automatic upgrades available via the Internet at no charge

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2655 Collier Canyon Road
Livermore, CA 94551

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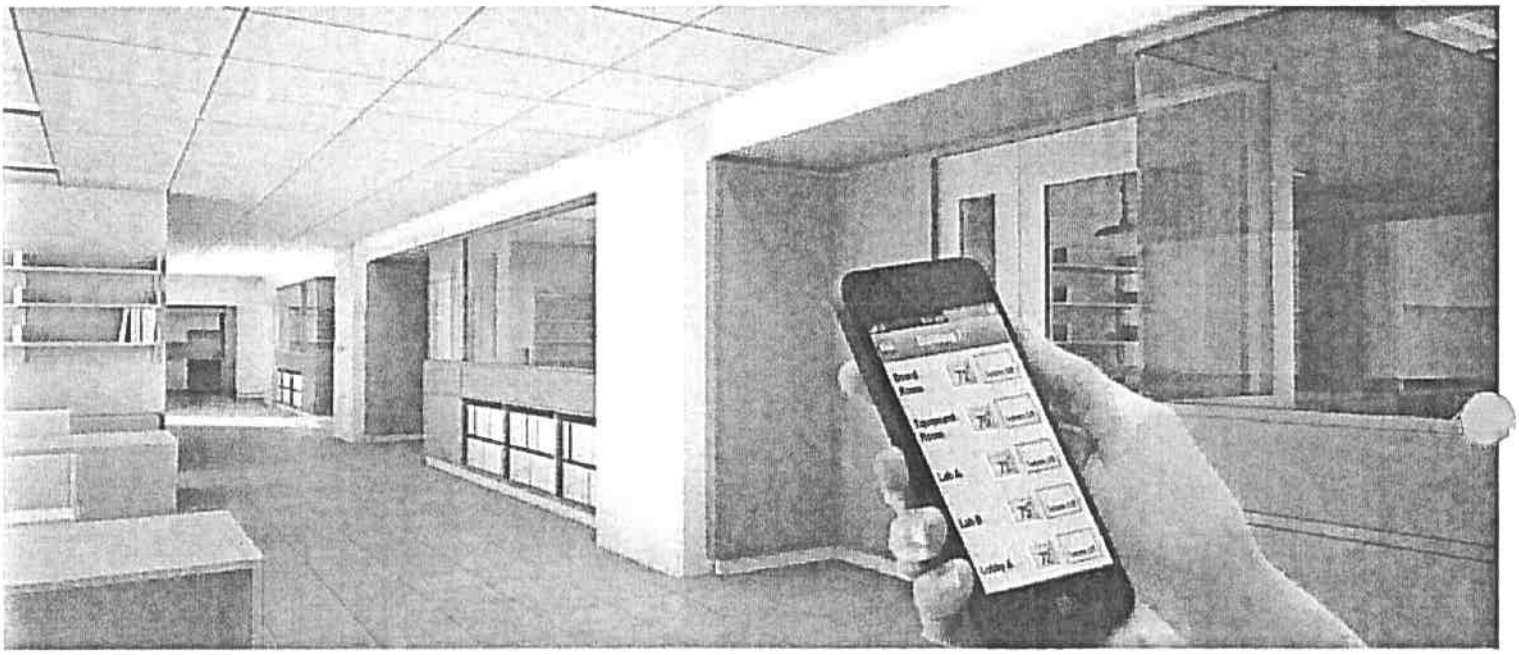
PelicanWirelessSystems

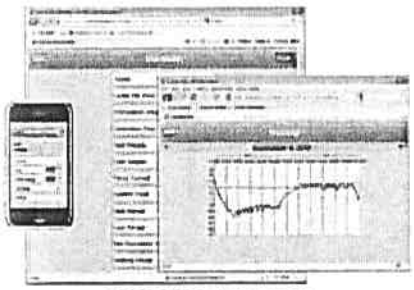
Pelican Site Manager Subscription (SME002/003)
cloud based service



www.pelicanwireless.com

Pelican Site Manager Subscription

PelicanWirelessSystems



SME002/SME003

Overview

The Pelican Site Manager Subscription Service is the key to fully utilizing your Pelican solution and accessing data and control via the Internet. Pelican's managed servers run continuously delivering the innovative Web App to your smartphone, iPad, computer or browser. Pelican's Site Subscription Service is easy to set-up, and the servers securely store your historical data and deliver Alert Notifications via email and/or text message. When new features or software updates become available, Pelican's servers automatically install upgrades into your products

The Standard Site Manager Subscription (SME002) is provided for free for the first year. The Basic Subscription then becomes the default services unless you decide to continue with the Standard subscription. For Hospitality there is an alternative subscription (SME003) which provides additional functionality and savings.

Key Customer Benefits

- Cloud Based Management and Control
- 24/7 Real-Time Remote Access
- Personalize Web-Server
- Automated Alert Notifcations
- Automatic Updates
- No Software to Buy or Update
- No Hardware to Buy or Maintain
- Encyrpted Security Connection
- Inexpensive Cost
- 24/7 Email Technical Support
- Monday thru Friday, 8am-5pm PST Live Support

Features:	Basic	Standard	Enhanced
View Current Temperature and Settings	X	X	X
Change Thermostat Settings	X	X	X
Program Up to 12 Schedules Per Day	X	X	X
Configure Operating Parameters	X	X	X
View Alarm Notifications	X	X	X
Single Administrator Access	X	X	X
1 Week of Historical Temperature and Settings	X	X	X
Receive Alarm Notifications via Email or Text		X	X
View HVAC Energy Consumption		X	X
View HVAC Energy Costs		X	X
2 Years of Historical Temperature and Settings		X	X
Support for Unlimited Admins and Users		X	X
Open API Interface for Customer Applications		X	X
After Hour Usage Reports		X	X
Hotel PMS Interface Application			X
Automatic Hotel Vacancy and Occupancy Settings			X
Weekly Performance Comparison Reports			X

Standard Part No. SME002
Enhanced Part No. SME003

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2655 Collier Canyon Road
Livermore, CA 94551

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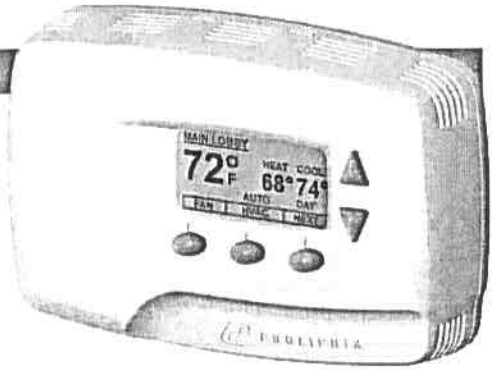
PROLIPHIX

Internet HVAC Control

PRO

PROFESSIONAL SERIES THERMOSTATS



NT120, NT130, NT150, NT160

Programmable & Communicating Network Thermostats

- Supports 2 Remote Indoor or Outdoor Thermal Sensors
- Web Server Technology

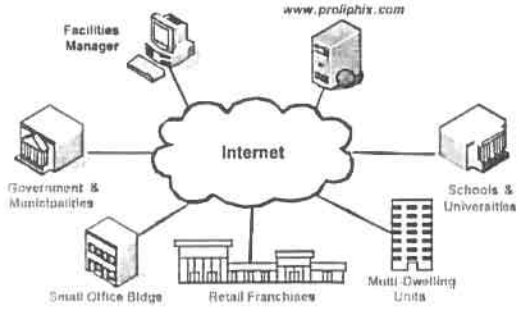
Product Highlights

- Web Browser Configuration
- E-mail or Text Message Fault Reporting
- Multi-year Scheduling
- Standards-Based TCP/IP Communications
- Secure Internet Monitoring and Control
- UL & ENERGY STAR Rated

Professional Series Network Thermostats Proliphix Network Thermostats take full advantage of ubiquitous Ethernet networks and the Internet to utilize the converged business network for HVAC control. The Proliphix Network Thermostat product line is compatible with typical HVAC systems and offers all the features expected by commercial installers and system integrators. Internet connectivity and the thermostat's browser interface offer unprecedented ease of configuration, monitoring and management capabilities at a fraction of the cost of current programmable communicating thermostats.

Secure, Remote Monitoring and Management Proliphix Network Thermostats feature standard Internet browser-based configuration and control over a secure Ethernet connection. Remote monitoring and control are available over secure and authorized broadband connections to the Internet. Proliphix Network Thermostats can deliver e-mail status and alerts[1] to any personal computer or mobile text messaging device. A service provider can monitor, diagnose and control HVAC systems from a remote central location. This allows the provider to offer unprecedented energy management and service to its customers, and creates new service revenue opportunities.

Remote Management Applications



Features & Advantages

- **Independent Fan Scheduling**
- **Keypad Lockout**
- **Temporary Manual Override**
- **Fossil Fuel or Heat-Pump Systems**
- **Multi-Stage Support**
- **Remote Alarm Notification**
- **Advanced Scheduling Capability**
- **Sophisticated Networking Configuration**
- **Advanced Energy-Saving HVAC Settings**
- **Multiple Power Options**
- **Failsafe Operation**
- **ENERGY STAR Compliant**
- **UL & CSA Certified**

Benefits

Superior Energy Management
- Automatic DST Support
- 366-Day Programming
- Advanced HVAC Settings
- Temporary Manual Override

Optimized Time Management
- Remote Schedule Changes
- Remote HVAC System Changes
- Remote System Monitoring
- Remote Alarm Notifications

Power Options	h	e
HVAC System (24Vac, common)	X	
Power over Ethernet – 802.3af		X
Proliphix Network Power – EPA		X

Ordering Examples: NT120e, NT160h

Specifications

Operating Temperature: -10°C to +40°C
Dimensions: 5.5" x 3.5" x 1.5"
Shipping Dimensions: 7.5" x 5.5" x 2.25"
Weight: .75 lb
Agency Approvals: FCC, UL, ENERGY STAR
Warranty: 1 Year Limited Warranty

Note 1: With *FREE* subscription to Proliphix Remote Management Service or alternatively via Syslog.

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PROLIPHIX

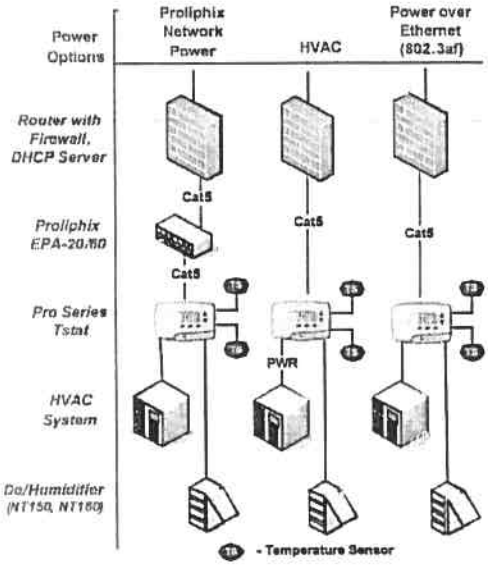
PRO

PROFESSIONAL SERIES THERMOSTATS

NT120, NT130, NT150, NT160

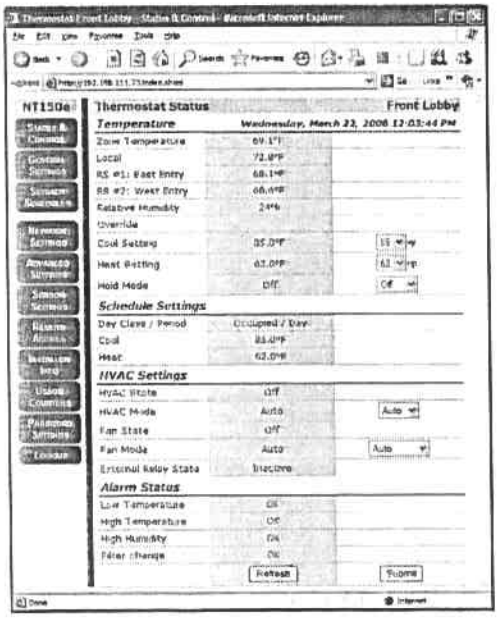
Typical Network Installation

The Pro Series Network Thermostat is easily installed in a wired LAN environment by terminating conventional Cat5, Cat5e or Cat6 cable to the thermostat terminal block.



Thermostat Management Interface (TMI)

The default status page is organized to clearly display the most important current status and settings of the Pro Series thermostats.



Key Features	NT120	NT130	NT150	NT160
HVAC Systems				
• Fossil Fuel – Gas/Oil, 2H/2C	X	X	X	X
• Heat Pump/AC – Electric, 3H (Aux heat)/2C	X	X	X	X
Auto Changeover	X	X	X	X
Auto Daylight Savings	X	X	X	X
Hold Mode Timeout Options	X	X	X	X
Broad Temperature Range (40F to 99F)	X	X	X	X
Fahrenheit/Celsius	X	X	X	X
Clear, Backlit Graphic LCD	X	X	X	X
Unique Thermostat Naming	X	X	X	X
ENERGYSTAR Compliant	X	X	X	X
FCC Class B Compliant	X	X	X	X
UL, CSA Certified	X	X	X	X
Advanced Features	**NT120**	**NT130**	**NT150**	**NT160**
Usage Counters	X	X	X	X
Failsafe Temperature Switch	X	X	X	X
Fan (Period) Scheduling	X	X	X	X
Adjustable 2nd Stage Offsets	X	X	X	X
Keypad Lockout w/Override Limits	X	X	X	X
One Button Override (OBO)		X		X
Adjustable Compressor Delay	X	X	X	X
2nd Stage Turn-on Delay	X	X	X	X
Fan Control on Heat	X	X	X	X
Adjustable Setpoint Deadband	X	X	X	X
Max Heat/Cool Cycles per Hour	X	X	X	X
Maintenance Contact Info	X	X	X	X
Scheduling				
• 4 Periods per Day	X	X	X	X
• 366 Day Programming	X	X	X	X
• Scheduling to 3 years	X	X	X	X
• 30 Special Day Groups	X	X	X	X
Alarm Types				
• Filter Change Reminder	X	X	X	X
• Below Low/Above High Temperature	X	X	X	X
• Above High Humidity			X	X
• Contact Closure (w/settable presence interval)				
Internal Temperature Sensor				
• Adjustable Temp Offset	X	X	X	X
• Algebraic Temp Averaging	X	X	X	X
External Sensor Inputs (2)				
• Adjustable Temp Offsets	X	X	X	X
• Algebraic Temp Averaging	X	X	X	X
• Type – Wired Thermistor, Analog	X	X	X	X
• Type – Dry Contact Closure				
Humidity Control				
• AC cycling			X	X
• External De/Humidifier			X	X
Aux Relay Control				
• Adjustable Polarity			X	X
• Actuation Conditions				
Above/Below Humidity Threshold			X	X
Below Low/Above High Temp Threshold			X	X
On Fan Activation			X	X
Clock (Period) Scheduled				X
Network Features	**NT120**	**NT130**	**NT150**	**NT160**
Web Browser Graphical Interface	X	X	X	X
Static/DHCP Addressing	X	X	X	X
Settable Gateway Address/Address Mask	X	X	X	X
Selectable Firewall and HTTP Ports	X	X	X	X
Supports Class A, B, C IP Addressing	X	X	X	X
Selectable Address Access Filter	X	X	X	X
Syslog Support	X	X	X	X
HTTP Password Authentication	X	X	X	X
Alarm Reporting				
• 4 E-Mail/4 Text Message Accounts[1]	X	X	X	X

Note 1: With *FREE* subscription to Proliphix Remote Management Service or alternatively via Syslog.

Product features and availability are subject to change without notice. Please contact Proliphix or visit our website for more information. Rev 1.0

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PROLIPHIX

Unified HVAC Monitoring and Control

UniVista™

DEVICE MANAGEMENT SOFTWARE

UniVista™

Proliphix Device Management Software

Integrated device monitoring and control for hundreds of thermostats within numerous facilities

Product Highlights

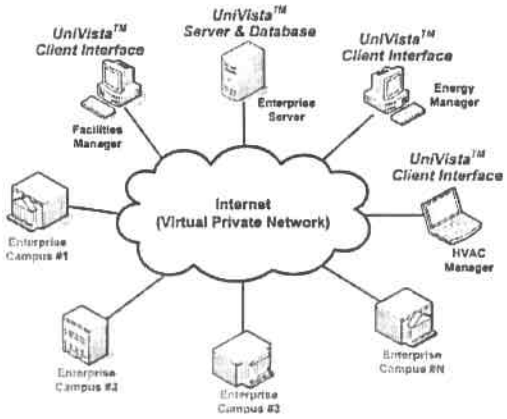
- Single or Group Device Control
- Immediate Visual Alarm Notification
- Stored Configurations
- E-mail or Text Message Fault Reporting
- Hierarchical User Account Management
- Standards Based TCP/IP Communications

Proliphix Uniphy™ There is no more sophisticated yet cost effective means by which to remotely monitor and control HVAC in small to mid-sized light commercial facilities than to employ the Proliphix Uniphy solution. Uniphy is the integration of both the award-winning Proliphix Network Thermostats and the simple and intuitive UniVista™ device management software application.

The combination of this hardware and software yields the most economical HVAC management solution available at a fraction of the cost of conventional energy management systems. The Uniphy solution can now provide the facility manager with affordable energy monitoring and control for hundreds of thermostats, through one unified graphical interface, for all their facilities no matter where they are physically located.

Proliphix UniVista™ UniVista is the Proliphix software application which provides a clean and simple graphical interface with which to manage few or hundreds of Proliphix Network Thermostats which may be located across multiple geographically separated facilities. Paired with Proliphix Network Thermostats, **UniVista offers a complete HVAC monitoring and control solution with unprecedented ease-of-use and the lowest cost of ownership for HVAC management in any small to medium-sized facility.**

Inexpensive HVAC Management Proliphix Network Thermostats and UniVista comprise an ideal low cost alternative to conventional and expensive energy management systems (EMS). Responsible facility managers no longer have to forego remote monitoring and control of their HVAC systems in small distanced facilities. **UniVista and Proliphix Network Thermostats together address those unmanaged facilities without the obstacle of the high EMS price tag.**



UniVista is easy to install on an always-on PC or Windows® Server. **The server software along with the integral database together provide a highly scalable application which will accommodate monitoring and control of hundreds of thermostats.**

Features

- Hierarchical Device Organization
- Single or Group Device Control
- Functional or Geographical Thermostat Grouping
- Immediate Visual Alarm Notification
- Continual Device Status Monitoring
- Stored Schedule Configurations
- Stored HVAC Settings Configurations
- Hierarchical User Account Management
- Familiar Functional Thermostat Control
- E-mail or Text Message Fault Reporting
- Standards Based TCP/IP Communications

Benefits

- Leverages both the enterprise data network and the Internet
- Administer common changes to multiple thermostats
- Save groups of selected thermostats
- Save predefined common or specific device settings
- Restrict user access privileges

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PROLIPHIX

UniVista™

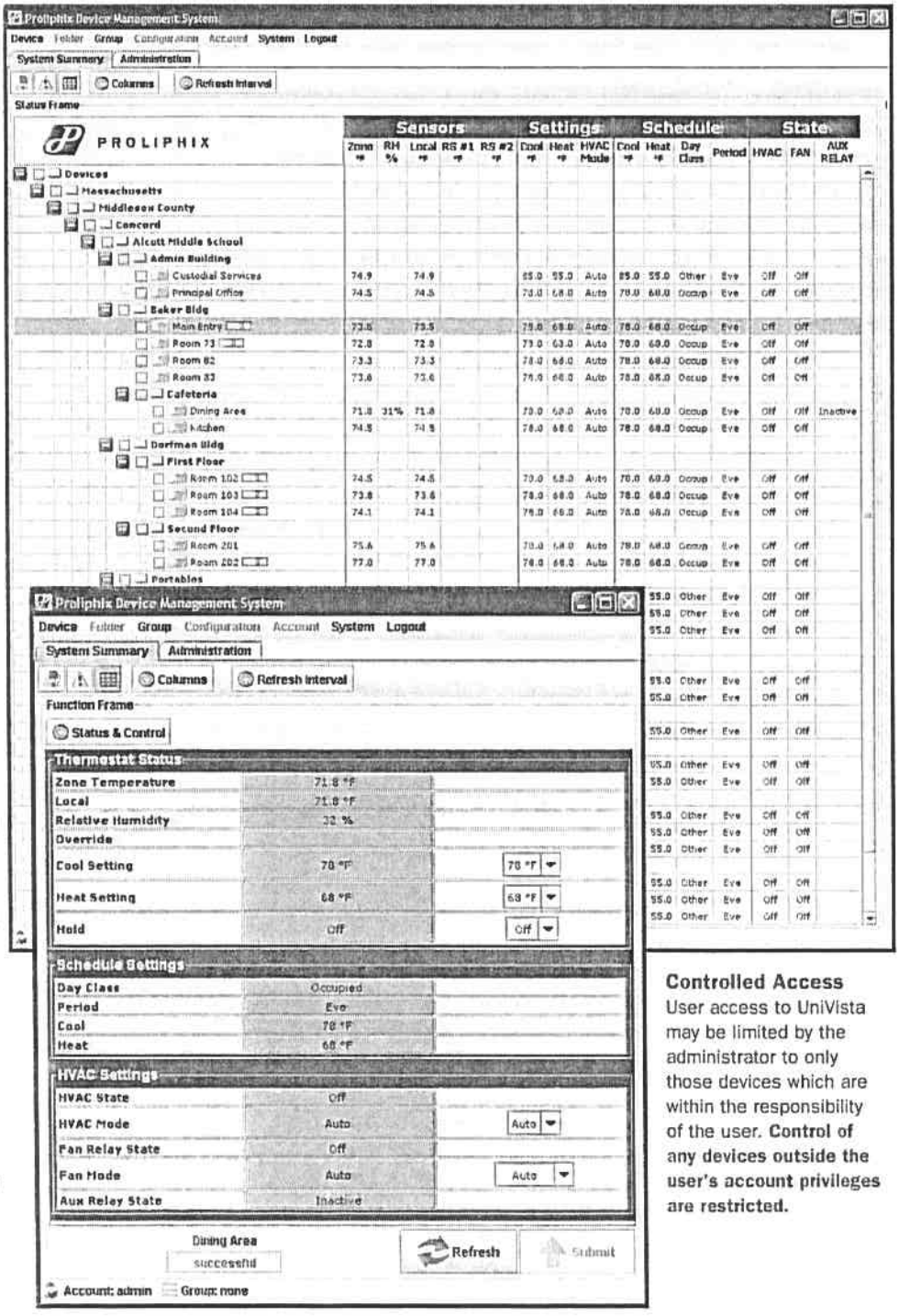
DEVICE MANAGEMENT SOFTWARE

UniVista™

Proliphix Device Management Software: Integrated device monitoring and control for hundreds of thermostats within numerous facilities

UniVista in Depth

The graphical client interface is communicated to the user's desktop or laptop computer after an authenticated user login. **The UniVista client interface organizes all enterprise Network Thermostats neatly in a familiar Windows-style folder hierarchy and clearly displays the most pertinent thermostat status along with any alarm or alert notifications.** The thermostat status is periodically updated automatically and total enterprise thermostat monitoring couldn't be easier.



Function Frames

Control of a single or grouped Network Thermostats is accomplished through function frames which are purposely similar to the respective Network Thermostat web pages. **Function frame parameters are easily modified through convenient drop-down menus which provide for unprecedented ease of schedule programming and HVAC settings changes.**

Configuration Templates

Settings which wish to be saved for application to other groups of Network Thermostats can be stored in Configuration templates. **The user can save an unlimited number of Schedule Configurations or HVAC Configurations.**

Controlled Access

User access to UniVista may be limited by the administrator to only those devices which are within the responsibility of the user. **Control of any devices outside the user's account privileges are restricted.**

Product features and availability are subject to change without notice. Please contact Proliphix or visit our website for more information. Rev 1.0

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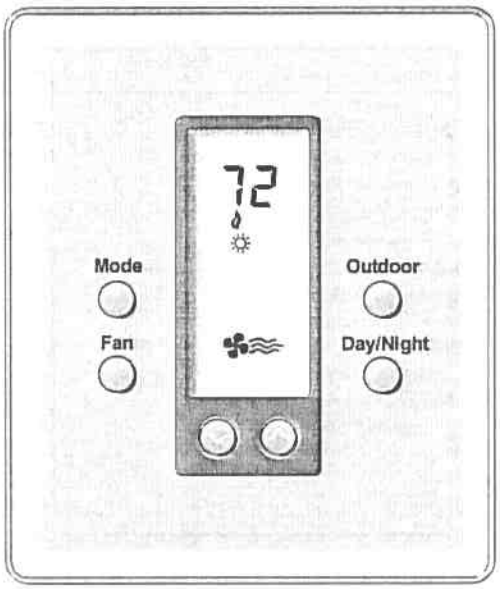
GAS/ELECTRIC THERMOSTATS

for 1 & 2 Compressor Applications

GE11-NX 1 Heat / 1 Cool
GE22-NX 2 Heat / 2 Cool
(using XBUS Protocol)

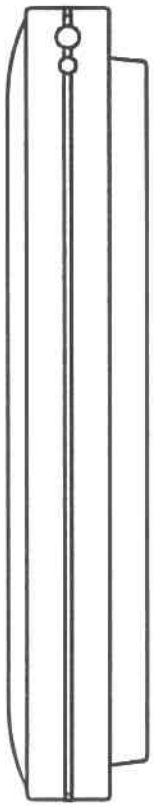
GENERAL DESCRIPTION

The GE11-NX and GE22-NX communicating thermostats are designed for new or replacement commercial or residential conventional applications. The Net/X thermostats represent the latest in solid-state surface mount electronics and manufacturing techniques incorporated into an extremely low-profile, ultra-slim white ABS plastic case. Both units offer "user-friendly" control of the heating/cooling equipment along with an easy-to-read vertical LCD that displays complete operating status. An included 2-wire communications port allows complete scheduling, remote control and status with a separate serial interface. A direct-wire, easy-to-install sub-base mounts directly on a standard vertical outlet box or any drywall surface using hardware provided.



Standard Features

- Selectable Celsius or Fahrenheit temperature display
- Fan selector for continuous fan operation
- Built-in anticipation and droop
- Built-in short cycle protection
- Electronic circuitry replaces conventional mechanical anticipator
- Internal switch to lockout the keypad to prevent unauthorized tampering
- Day/Night (Occupied/Unoccupied) button allows setpoint setback for energy savings
- No battery required (maintains last setpoint/mode of operation following power outages)
- Lockable access cover
- Commercial lockout with 1 or 3 hour temporary override; +/- 3°F adjustment during override
- Plenum fan switch
- GE22-NX has 2 LED lights available for status indication with switchable LCD icons
- Automatic changeover from heat-to-cool and cool-to-heat
- 2°F (1°C) minimum Heat/Cool separation
- Complete control and status via any of NetworkThermostat's interfaces
- Selectable minimum on/off time (2 or 4 minutes)
- HVAC equipment control using dry contact relays
- Optional remote indoor, outdoor, supply air and return air sensing modules



Note : Specifications subject to change without notice.

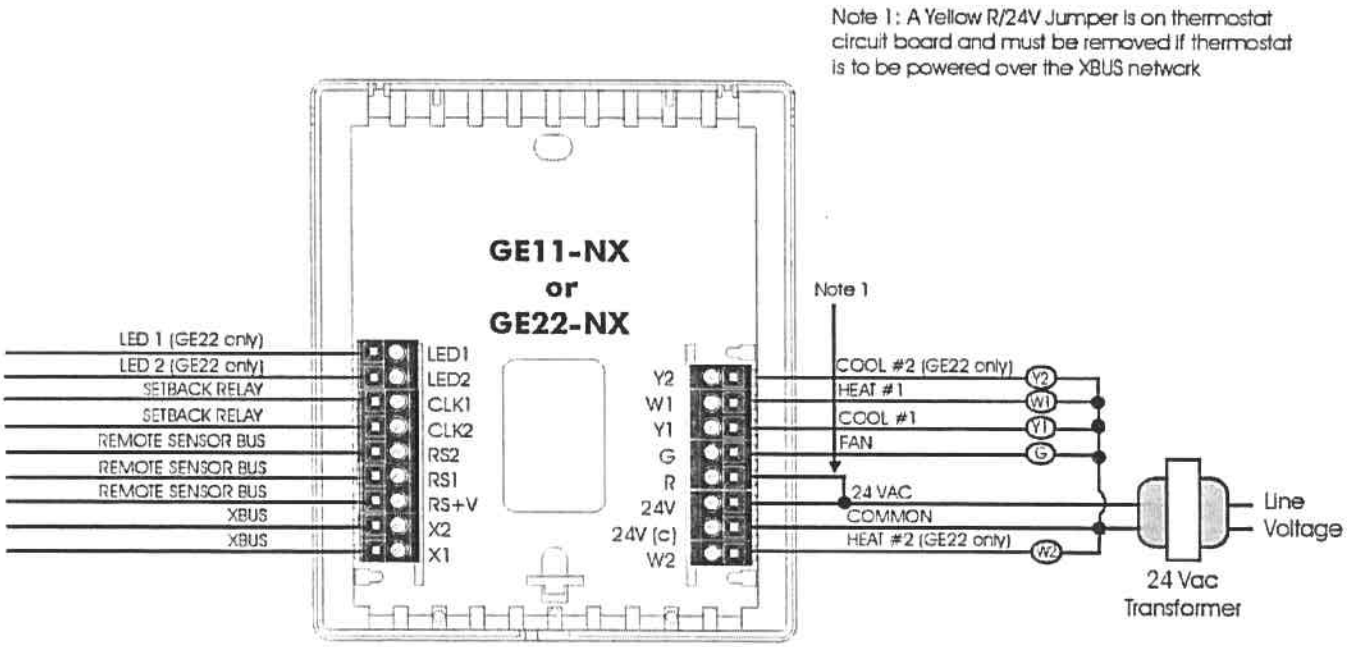
Telephone (866) 563-0711

P/N 240002-001

SPECIFICATIONS

Rated Voltage :	20 to 30Vac, DC 24 nominal
Rated A.C. Current :	0.05 to 0.75 Amp continuous per output, with surges to 3 Amps maximum
Rated D.C. Current :	0.0 to 0.75 Amp continuous per output, with surges to 3 Amps maximum
Control Range :	Heating : 38 to 88°F in 1° steps (6 to 30°C in 1° steps) Cooling : 60 to 108°F in 1° steps (16 to 40°C in 1° steps)
Thermostat Measurement Range :	28 to 124°F or 0 to 48°C
Control Accuracy :	+/- 1°F @ 68°F (0.5°C @ 20°C)
Minimum Deadband :	(between heating and cooling) 2°F or 1°C
Dimensions :	4.5" H x 4" W x 7/8" D (114mm x 102mm x 22mm)
Equipment Terminations :	R-switching voltage, W1-heat stage 1, Y1-cool stage 1, G-fan MST-1 only - Y2-cool stage 2, W2-heat stage 2
Power Terminations :	24V - power, 24V(c) - power common
Communication Terminations :	X1 - comm(+), X2 - comm(-)
Sensor Terminations :	RS+V - sensor power, RS1 - comm(+), RS2 - comm(-)
Setback Terminations :	CLK1, CLK2 dry contact closure

NOTE: This thermostat contains electronic circuitry that replaces the conventional mechanical anticipator



OUTPUT TERMINAL FUNCTIONS

LED1	Free light for status or function indication
LED2	Free light for status or function indication
CLK1	Dry contact closure input for setback
CLK2	Dry contact closure input for setback
RS2	Remote indoor, outdoor and/or wet
RS1	location sensor
RS+V	Power for remote sensors
X2	Communications bus input/output
X1	Communications bus input/output
Y2	Energizes on a call for second stage cool, GE22 only
W1	Energizes on a call for first stage heat
Y1	Energizes on a call for first stage cool
G	Energizes the fan circuit
R	Independent Switching Voltage
24V	24Vac
24V(c)	24Vac Common
W2	Energizes on a call for second stage heat, GE22 only

Net/X™

NETWORK thermostat

NT-SSA32/CLK Net/X Network Controller

Non-Expandable

- CONTROL UP TO 32 SERIAL-STATS
- REAL-TIME CLOCK/CALENDAR

(2) RS-232C Ports

GENERAL DESCRIPTION

The NT-SSA32/CLK network controller supports up to 32 Net/X thermostats. The NT-SSA32/CLK includes a real-time clock/calendar that allows simple, yet robust environment control. The network controller enables simple integration with any control system, automation system or personal computer. Two RS-232C ports are included for dual connections to local and remote needs. Removable screw terminals are included for power and the Net/X-Stat bus for communications, and a serial cable is included for RS-232C connection. The NT-SSA32/CLK accepts simple ASCII commands using a published open protocol and replies with readable text answers. The entire family of controllers has built-in intelligence to correct illegal thermostat settings that might damage equipment.

Standard Features

Hardware

- Two RS-232 Serial Ports; Two Net/X-Stat Communications Ports
- Allows full control of up to 32 thermostats on each adapter
- No additional hardware needed at the thermostat
- Any Net/X-Stat can be up to 1000' away; Combined total of 4000' for all thermostats
- Any mix of home-run, daisy-chain or multi-drop wiring can be used
- Only two wires needed for communications with the thermostat using CAT5 cabling
- Advanced protection circuitry for data inputs/outputs; All input/output/power on removable connectors
- Non-volatile clock/calendar setpoint memory
- Integrated Real-Time Clock/Calendar allows hundreds of scheduled programs

RS-232 Features

- One port connects directly to any PC or control system
- One port connects directly to the NT-MODEM External Modem or NT-LAN232 Ethernet Adapter

Software/Manuals

- Open ASCII Protocol allows custom software development
- ASCII Protocol Summary and complete Protocol Manual available
- Installation Manual included; Pre-wire Manual available
- NetworkThermostat Command Center, Windows-based software included
- All Manuals/Software/Application Notes available on the web site

Note : Specifications subject to change without notice.

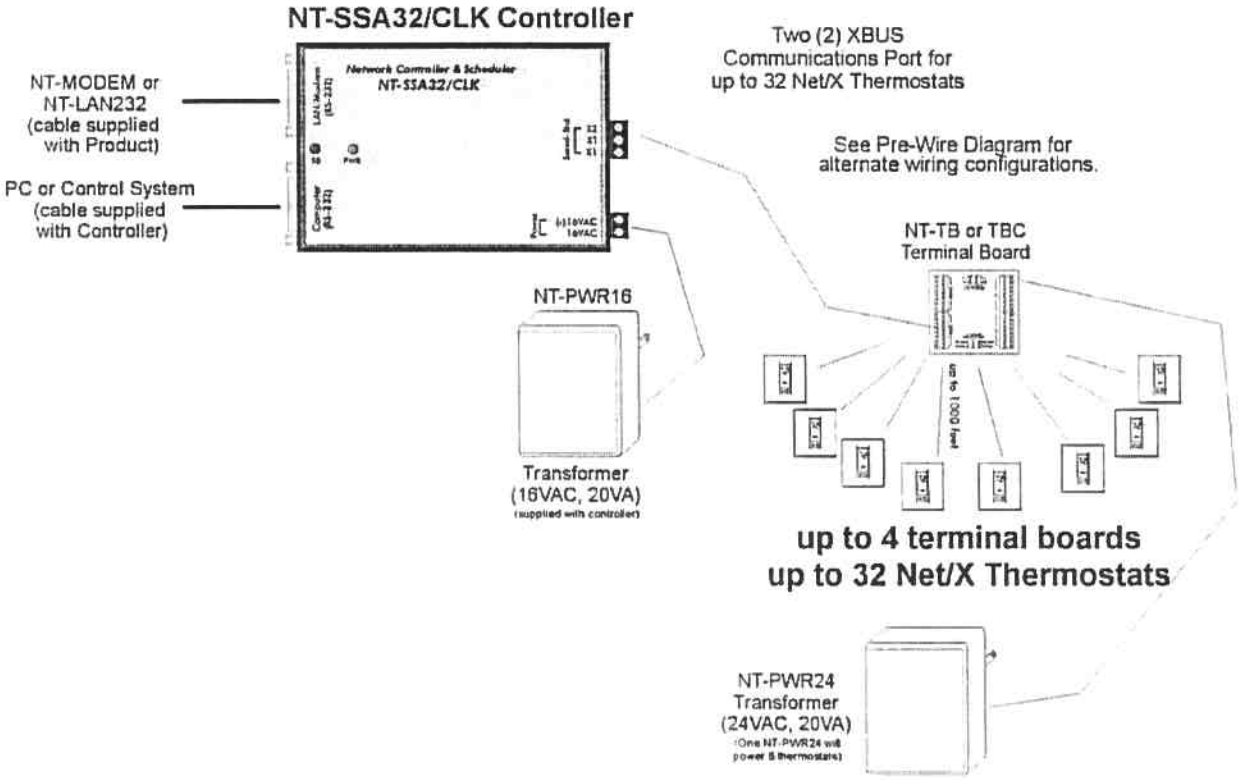
Telephone (866) 563-0711

P/N 240067-001

SPECIFICATIONS

Rated Voltage :	16VAC nominal, +/- 20 %	
Rated A.C. Current :	200 mA maximum	
Indicator LEDs :	PWR (power)	blinking - normal operation; steady - system interruption occurred
	SS (Net/X-Stat)	flashing - transmission in progress
Dimensions :	3.6" H x 6.25" W x 7/8" D (91mm x 159mm x 22mm)	
Power Terminations :	16VAC - power, 16VAC(c) - power common	
Communication Terminations :	X1 – Data(+) ; X2 - comm(-)	
RS-232 Terminations :	1) LAN/Modem - 9-Pin Female D-Sub, pins 2, 3, 5; 7 & 8 opt. (RTS/CTS) 2) Computer - 9-Pin Male D-Sub, pins 2, 3, 5; 7 & 8 opt. (RTS/CTS)	

Typical Wiring Diagram



Net/X™

NETWORK thermostat

NT-LAN232 Ethernet Add-On Adapter

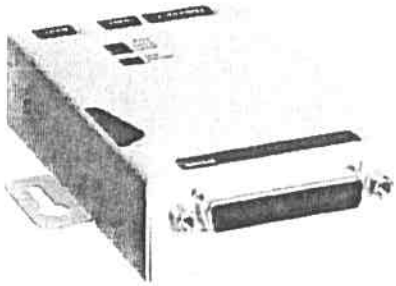
TCP/IP (Internet Protocol) Addressable Interface

Enables NetworkThermostat Systems on Any TCP/IP LAN

(1) RS-232C and (1) 10BaseT Port

GENERAL DESCRIPTION

The NT-LAN232 is a complete Local Area Network adapter designed to work the NT-SSA family of serial communications controllers. The NT-LAN232 includes all of the necessary intelligence to enable Plug-N-Play capability between any 10BaseT LAN and any Net/X Thermostat network. The NT-LAN232 allows simple integration with any Net/X Network and a personal computer. One RS-232C and one 10BaseT port is included with the adapter for complete versatility of environments. The unit ships complete with a power supply and a 10BaseT LAN connection cable. Installation and set-up takes only minutes to complete. With the TCP/IP addressing, any Net/X network can now be accessed over the Internet!



Standard Features

Hardware

- One RS-232 Serial Port; 25 pin female Sub-D jack
- One 10BaseT Port; standard RJ-45 receptacle
- 10BaseT Network Patch Cord Included
- 9-25 Pin Serial Cable included for connection to any NT-SSAx Network Controller
- Separate 12VDC power transformer included
- Firmware updates can be done with the TFTP protocol over the LAN or Internet
- Rugged aluminum case with mounting wings
- Advanced protection circuitry for data inputs/outputs
- Full TCP/IP addressing allowed for connection to any networks of any size

RS-232 Features

- Connects directly to the Network Controller Modem/LAN port

10BaseT Features

- Standard 4-wire RJ-45 cable allows direct connection to any 10BaseT hub
- Supported transparent network connections include TCP/IP (binary stream) or Telnet protocols.
- Firmware updates can be done with the TFTP protocol.

Manuals

- Installation Manual and System Administrator Manual included
- All Manuals/Software/Application Notes available on the web site

Note : Specifications subject to change without notice.

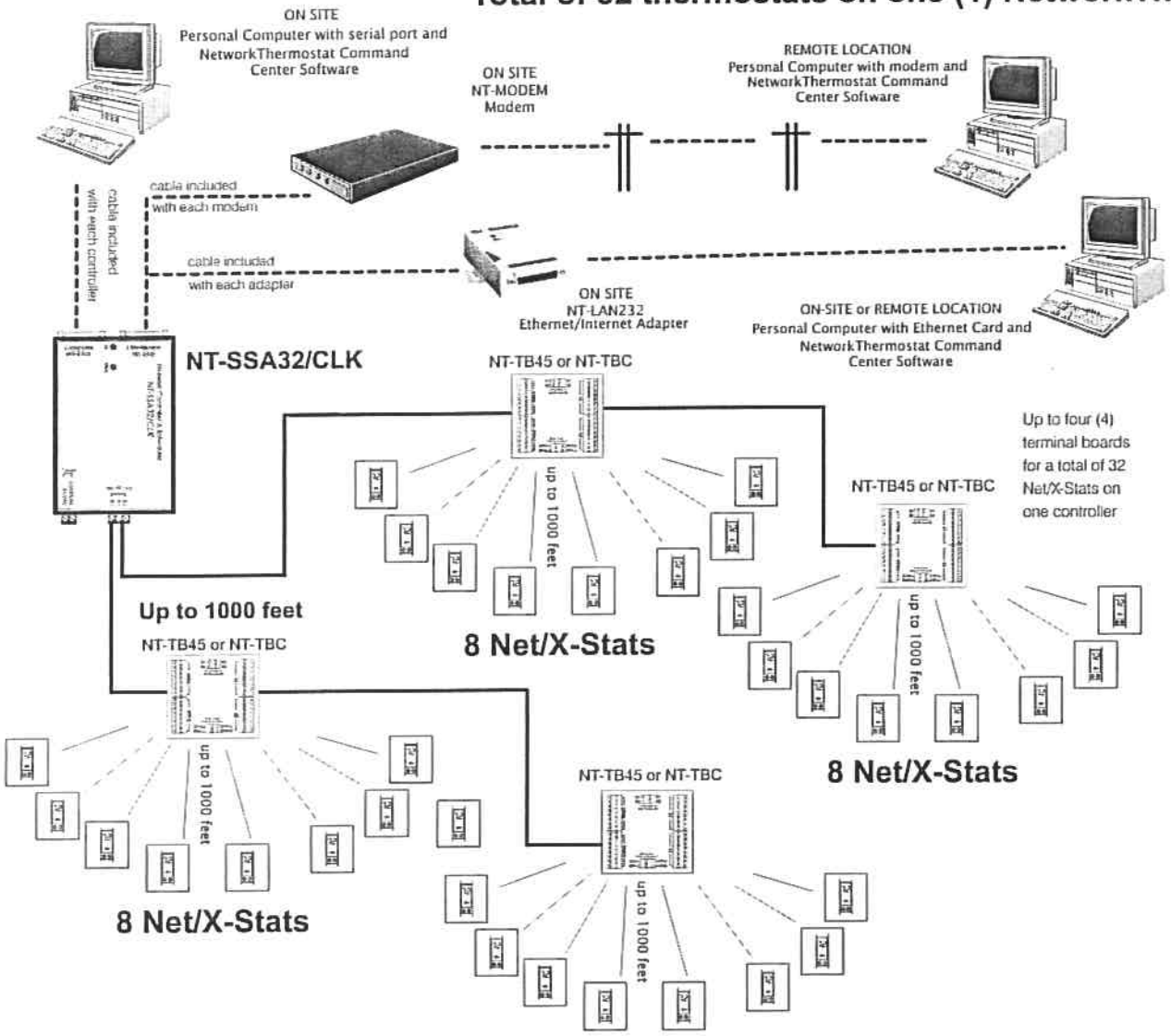
Telephone (866) 563-0711

P/N 240053-001

NETWORK Thermostat

Typical HVAC Communications Network for NT-SSA32/CLK Network Controller

Total of 32 thermostats on one (1) NetworkThermostat Net/X-Stat Controller



Cable and Wiring Notes
All NetworkThermostat products follow industry standard data communications wiring practices. Refer to your local building codes for specific requirements.

Wiring Guidelines
A) Any Serial-Stat can be up to 1,000 feet away from the Network Controller
B) Total of 4,000 feet of cable on any one controller (2,000 feet on each Net/X-Stat comm circuit (X1-X2)
C) ANY combination of home-run, daisy-chain, or multi-drop wiring configuration may be used
D) NT-TBC or NT-TB45 terminal boards may be placed anywhere within the 4,000 feet

Cable Specifications
Net/X-Stat cable options:
A) Category 5, 24AWG, 4-pair, or equivalent
B) Category 5, 24AWG, 4-pair, plenum rated or equivalent

Pair 1 - Serial-Stat Communications Bus
X2 - Blue with White Stripe
X1 - White with Blue Stripe
Pair 2 - (Option) Contact Closure Setback
CLK2 - Orange with White Stripe
CLK1 - White with Orange Stripe
Pair 3 - (Option) Remote Power
24VAC (common) - Green with White Stripe
24VAC - White with Green Stripe
Pair 4 - (Option) Spare Pair
Spare - Brown with White Stripe
Spare - White with Brown Stripe

Telephone (866) 563-0711

P/N 240069-001

FOUNTEN
ENERGY PERFORMANCE

Wireless Door Switch

Part No. FS-DOORSWITCH

Overview

The Founten Door Switch is a battery operated remote wireless device designed to detect the opening and closing of doors or windows. By simply pairing the wireless door switch to a Founten thermostat, it will turn "OFF" that thermostat's HVAC unit when it has detected that the door or window has been opened. A 2-wire terminal is built in, allowing for a customer supplied reed switch and magnet to be attached. An optional internal magnetic sensor is integrated in its housing. This can be used to detect a magnet attached to the movable section of the window or door. For proper operation the magnet must stop within ½" of the internal sensor. The door switch is powered by 2 AA batteries and lasts for at least 12 months. Your Founten Site Manager will notify you when the battery has less than 20% of it's capacity. You will also be able to see when a door or window is open on your Founten Site Manager. The door switch can be disabled via the Site Manager.

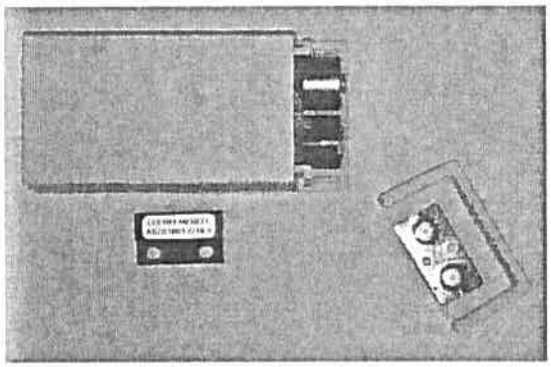
Key Customer Benefits:

- **Wireless Connection**
- **Save Energy**
- **Customizable Magnetic Sensor Terminal**
- **Simple Installation**
- **Small Footprint**
- **Affordable Solution**
- **No Wires to Run**
- **Increase Overall HVAC unit's Life Span**
- **Know When Window or Door Is Open**
- **24/7 Email Customer Support**
- **Monday thru Friday, 9 - 5 PST Live Support**
- **3 Year Warranty**

Designed and Assembled in the USA

Features:

- Wireless connection to your Founten thermostat
- Automatically connects to your wireless network and back to your Founten Site Manager
- Notification when batteries are low
- Straightforward, snap on cover for product mounting
- Easy access for changing batteries
- No interference with existing Wifi network
- Can see when window or door is open on Founten Site Manager
- 2-wire terminal built in, allowing for customer supplied reed switch and magnet to be attached



Founten Wireless Door Switch
Part No. FS-DOORSWITCH

Specifications:

- **Wireless**
  - 2.4 GHz IEEE Std. 802.15.4
  - Complies with Class B Part 15 of the FCC rules
- **Electrical**
  - Power – 2 AA batteries
- **Magnetic Switch**
  - 2-wire Terminal for Extended Customer Provided Reed Switch
  - (Optional) Integrated Magnetic Sensor in Housing
- **Size**
  - Dimensions (in.) 1 ½ in. high x 3 1/4 in. wide x 1 in. deep
  - Dimensions (mm) – 38 mm high x 82.5 mm wide x 25 mm deep
  - Mounting – Horizontal
- **Software**
  - Automatic updates and upgrades available via the Internet at no charge
  - Integrates in with your Founten Site Manager and Founten Wireless Network

Sales Support: 1.866.239.4440 - **Email Support:** support@founten.com - **Website:** www.founten.com

FOUNTEN