Cypress Envirosystems

From Pneumatic to DDC in 20 minutes

www.CypressEnvirosystems.com

CYPRESS
ENVIROSYSTEMS

V4.0 081114

Wireless Pneumatic Thermostat (WPT)

EXISTING LEGACY STAT

- Manual Setpoint Control
- No Remote Readings
- No Diagnostics
- Manual Calibration Required
- Cannot support Demand Response strategies

DDC in 20 Minutes!

CYPRESS ENVIROSYSTEMS
WIRELESS PNEUMATIC THERMOSTAT

- Remote Wireless Setpoint Control
- Remote Monitoring of Temperature & Pressure
- Pager/Cell Notification of Excursions
- Automatic Self-calibration
- Programmable Temperature Setbacks
- Occupancy Override
- Enables Demand Response strategies
- BACnet Interface to BMS
- Compatible With Existing Johnson, Honeywell, Siemens, Robertshaw
- Up to 2yr battery life

Get the benefits of Direct Digital Control (DDC) in less than 20 minutes

CYPRESS ENVIROSYSTEMS

Who is Cypress Envirosystems?

- Mission:
  - Save energy, improve productivity for older plants and buildings.
  - Use technologies which minimize disruption, downtime, retraining of staff.
  - Target payback of less than 18 months.
- Subsidiary of Cypress Semiconductor
- Sister company of SunPower
- Founded by ex-Honeywell executives

The Opportunity

Silicon Valley Technology Today

- Wireless
- Image capture + sensors
- Intelligent Processing
- Large memory
- Programmable
- ALMOST FREE!

Typical Legacy Plant or Building

- Pneumatic
- Analog 4-20mA wires
- Manual gauges
- COSTS HUNDREDS $$

Apply leading edge wireless, non-invasive instrumentation technologies to legacy sites!!

What Problem Are We Solving?

Pneumatic Thermostats

Dial Gauges

Steam Traps

Need to save energy & improve uptime, but hindered by outdated facility?

Standalone Transducers, LED/LCD Displays

-80C Freezers

Uninterruptible Power Supplies

Manual Instrumentation, Not Programmable, No Diagnostics…
Equals: Wasted Energy, Higher Downtime, More Labor Required

CYPRESS ENVIROSYSTEMS

What is our Solution?

WIRELESS PNEUMATIC THERMOSTAT

"Go from Pneumatic to DDC in minutes"

WIRELESS GAUGE READER

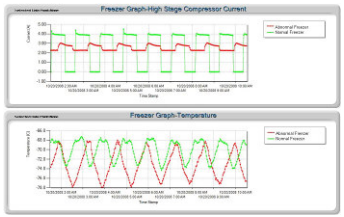
"Remotely Read Gauges in minutes"

WIRELESS STEAM TRAP MONITOR

"Avoid Expensive Steam Leaks"

WIRELESS TRANSDUCER READER

"Remotely Read Transducers – No Wires"



WIRELESS FREEZER MONITOR

"Predicts and Avoids Costly Freezer Failure"

WIRELESS BATTERY MONITOR

"Automates UPS Health Check"

Non-invasive, easy retrofit, energy and labor savings, payback under one year

CYPRESS ENVIROSYSTEMS

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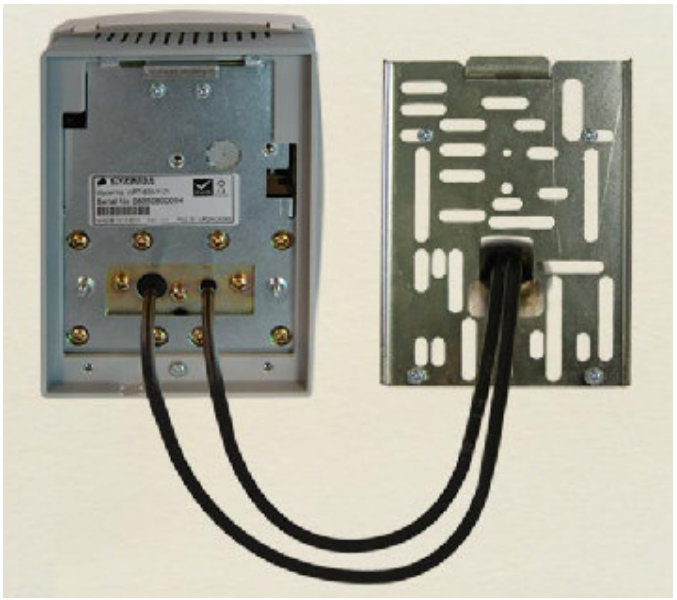
CYPRESS ENVIROSYSTEMS

Directly Replaces Existing Thermostats

- Directly replaces most existing pneumatic thermostats from Honeywell, Johnson Controls, Siemens, Robertshaw etc.

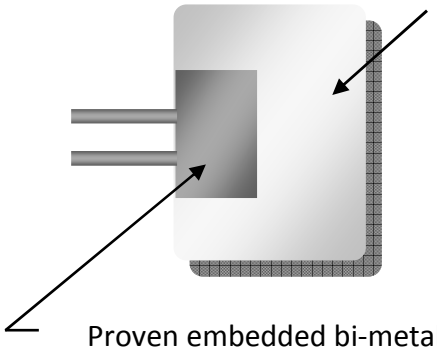
- Comes with a universal wall mounting bracket, and connects to existing main and branch pipes in minutes.



Proven Wireless + Pneumatic Technology

- Uses proven pneumatic bi-metallic strip technology for room temperature control
- We added advanced electronics to remotely control setpoint, and monitor temperature, branch pressure, and battery status
- If battery fails and electronics stop working, unit will function just like a traditional pneumatic stat

US & Int'l Patents Pending



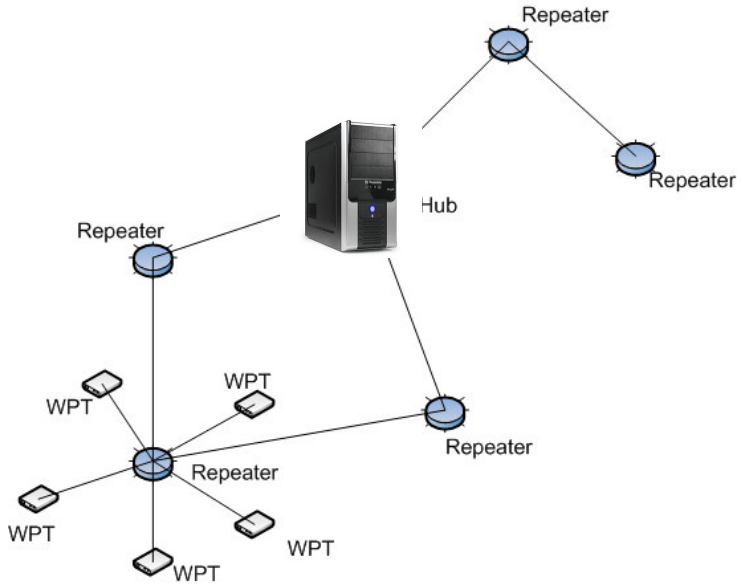
Advanced digital electronics for wireless control, monitoring and diagnostics.

Proven embedded bi-metallic strip technology for room temperature control

Three Year Battery Life

Cypress Wireless Communications

- Uses Cypress Semiconductor wireless technology – first deployed over six years ago, with over 25 million nodes in use today
- Hybrid mesh wireless architecture provides coverage for most buildings and industrial sites – already in use by many Fortune 500 customers
- Up to 250 WPT's supported per Hub
- Note: Do not use where cell phones or WiFi are prohibited (i.e. hospital operating rooms), or in environments requiring temperature validation

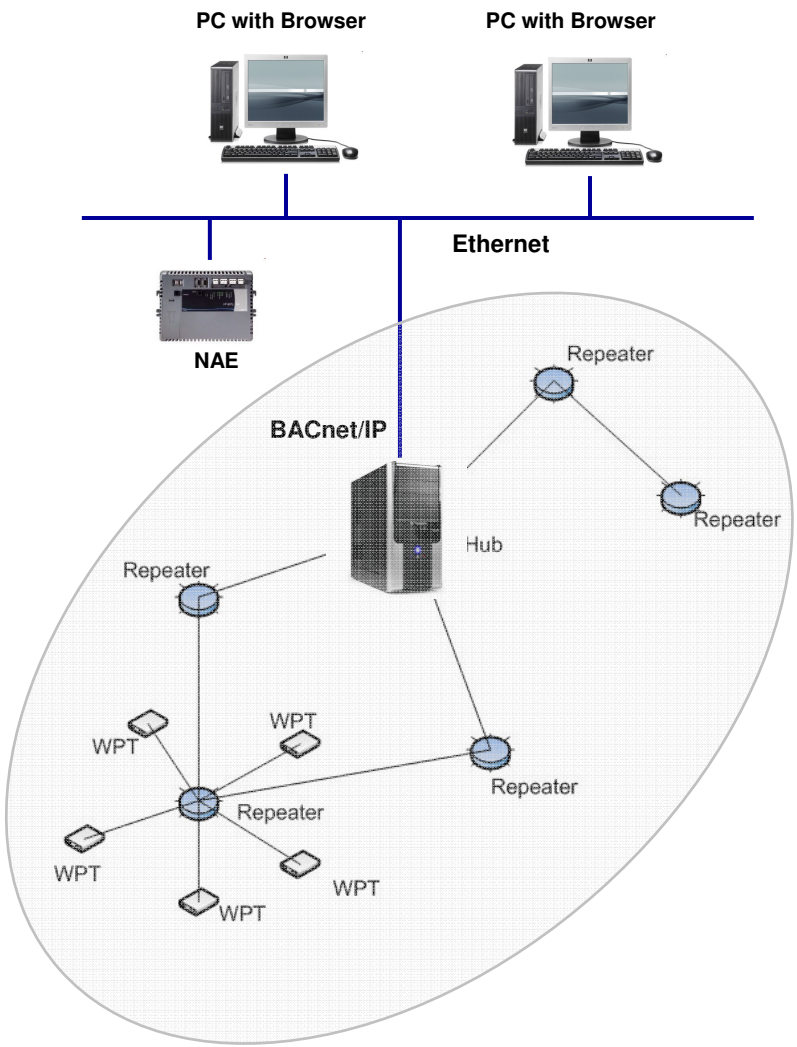


2.4 GHz DSSS radios, +20dBm (100mW) peak output power

Cypress Envirosystems Wireless Customers

User Interface and Connectivity via BACnet

- The WPT Hub has a built-in web based user interface for configuration and basic operations
- The WPT Hub may also be connected to existing automation systems via BACnet/IP using a simple CAT 5 Ethernet cable
- BACnet compatible devices (e.g. JCI NAE) can gather data points and control setpoints, and provide a user interface
- Users do not need a separate operator station or learn a new interface.



BACnet Compatibility Testing

VENDOR	BAS	TEST PARTNER	LOCATION
ALERTON	BACtalk	Syserco	Fremont, CA
AUTOMATEDLOGIC CORPORATION	ALC	ACCO Engineered Systems	San Leandro, CA
Honeywell	Excel, Tridium	Pending	
Johnson Controls	Metasys	RSD-Total Control JCI Sensor Products	San Jose, CA Milwaukee, WI
SIEMENS	Apogee	Siemens Building Technologies	Hayward, CA
t.a.c by Schneider Electric	Andover Continuum	EMCOR Integrated Solutions	Pleasanton, CA

WPT – Reducing Energy Use & Improving Productivity

Savings Type	*Typical Reduction per 1200 sq-ft Zone*	*Annual Savings per 1,200 sq-ft zone*	*Comments*
Reduced Energy Cost			
Improved Calibration	1% to 5%	$17 to $83	Typical pneumatic thermostat is out of calibration in under 6 months
Programmable Zone Control, Night Setback	5% to 15%	$83 to $248	2% per every degree F of setback general rule
Lower Tariffs - Demand Response	0% to 3%	$0 to $50	Utility Demand Response program for electricity
Reduced Maintenance Labor			
Fewer tenant complaints/calls	0.0 man-hrs to 1.0 man-hrs	$0 to $85	Average 0 to 2 calls per year per thermostat
Reduce Calibration work	0.1 man-hrs to 0.5 man-hrs	$9 to $43	Average 20 minutes for calibration per year per thermostat
Reduce Troubleshooting	0.1 man-hrs to 0.2 man-hrs	$9 to $17	Average 10 minutes for troubleshooting per year per thermostat
Lower Tenant Related Costs			
Better occupancy overide cost recovery		$5 to $50	Enable tenant zone override with automatic tracking
Improvement in lease retention rate	5% to 10%	$60 to $120	Happier tenants (tenant turnover cost $10 per sq-ft)
TOTAL		**$175 to $700**	

Source: US Energy Information Administration (2003 - 2007), ASHRAE, Cypress Envirosystems customer surveys

Annual savings of up to $700 per year per Thermostat – typical payback in less than one year

How Does This Compare with Alternatives?

BENEFITS

- Retrofit in minutes
- No disruption of tenants
- Can implement zone-by-zone (vs. all at once)
- No running wires
- No Controllers, I/O cards
- No drawings and approvals
- No replacing actuators
- Works with existing Building Automation Systems
- Minimal retraining of staff

COMPARISON WITH DDC

	Wireless Pneumatic Thermostat	Direct Digital Control Retrofit
Thermostat	$350	$75
Controllers, Actuators, I/O	$20	$750
Install/Wiring Labor	$100	$1,000
Drawings, Reviews	$0	$200
Tenant Disruption	$0	$300
End-Customer Installed Price	$470	$2,325

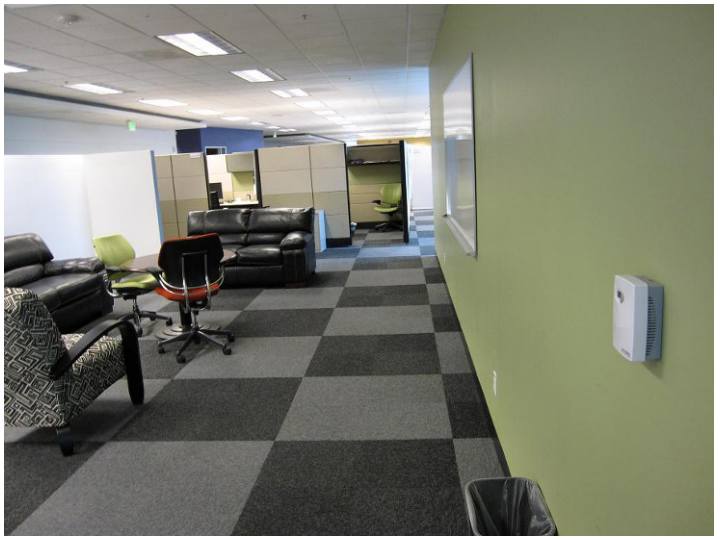
Note: Estimates for typical 100 zone system

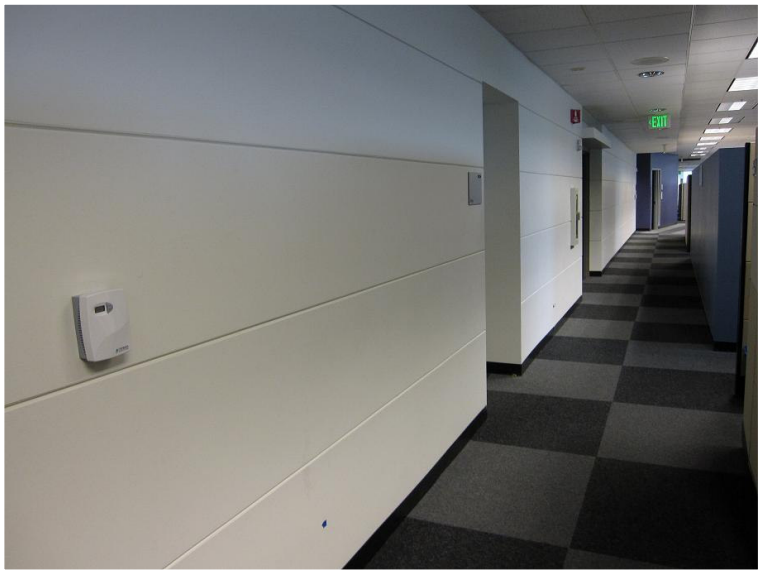
About 80% Lower Cost than DDC, and 80 Times Faster to Install

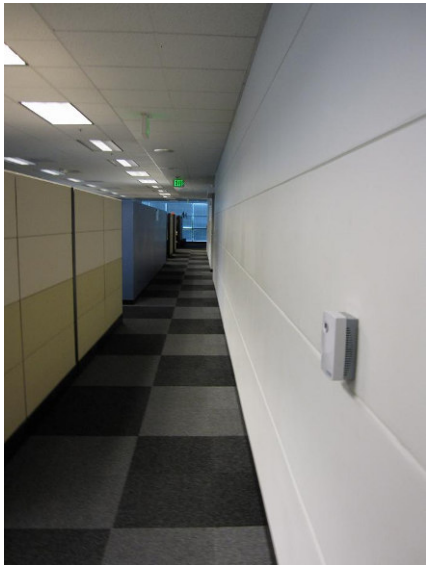
WPT Case Study – Silicon Valley

- 125,000 sq-ft, 3 story office building, in Santa Clara, CA built in 1993.
- Headquarters for a $4B high tech corporation
- 30 pneumatic zones per floor, with existing Honeywell 2-pipe direct acting room thermostats
- No existing BAS installed
- RSD-Total Control, replaced thermostats in one entire floor with the WPT
- Installation was completed in August, 2008
- RSD connected the WPT system to a remote JCI NAE via BACnet/IP for monitoring, alarming, and integration with other BACnet points

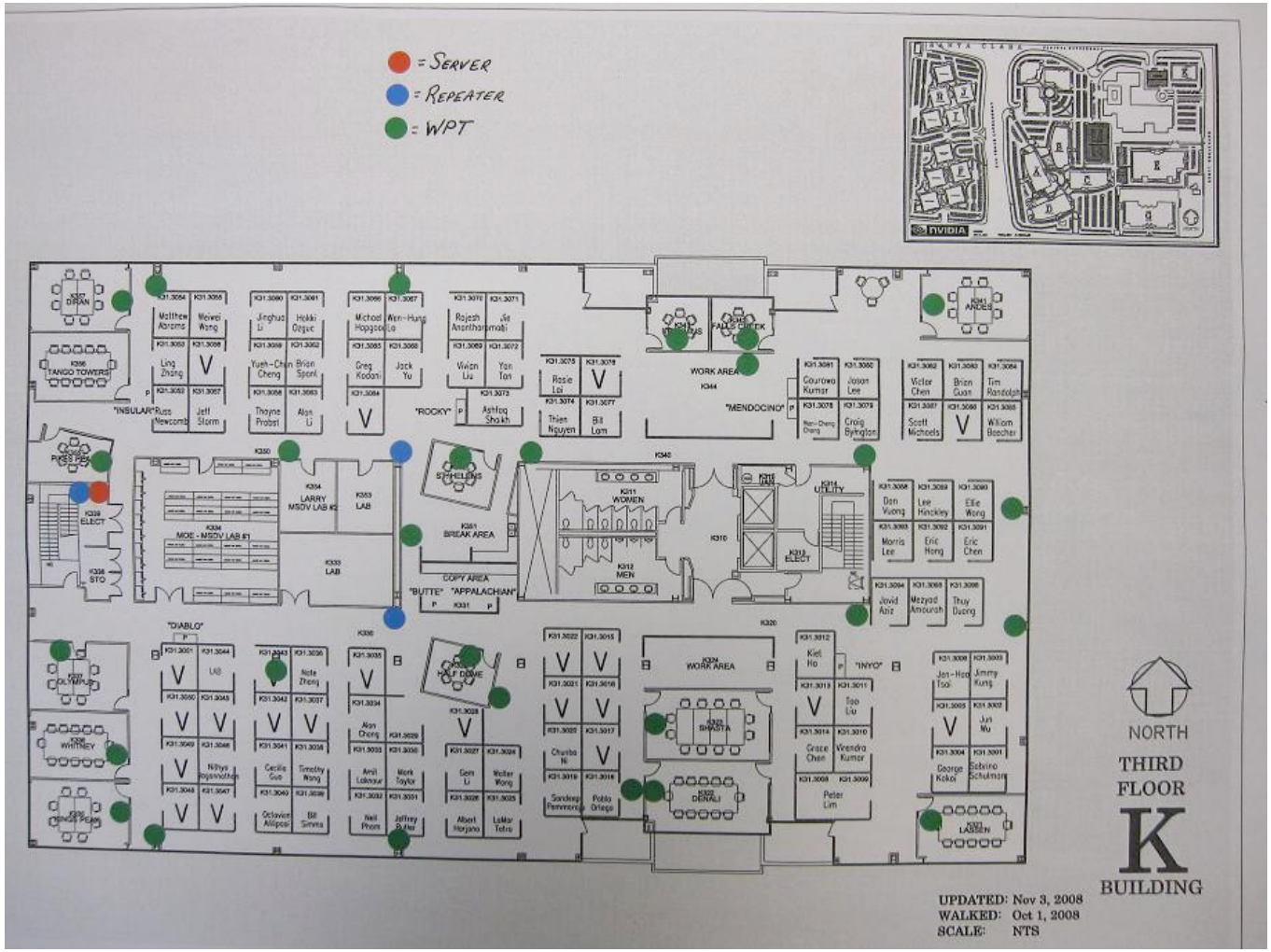
Installation Locations







Floor Plan and Installation Locations

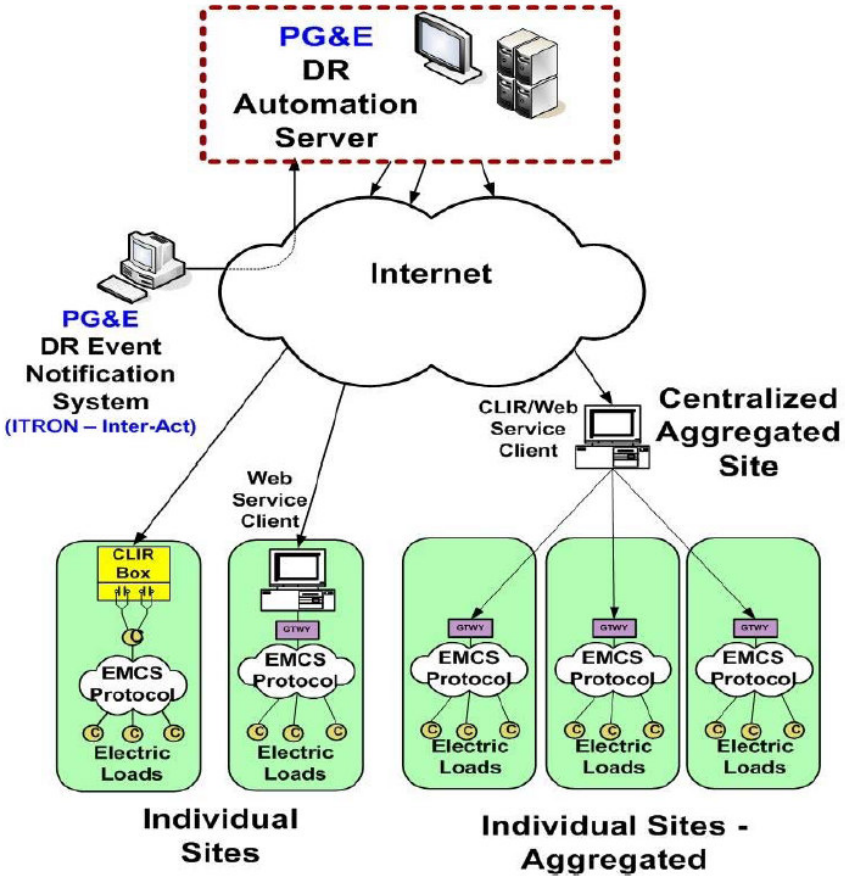


Approx. 150 ft

Approx. 275 ft

Utility Demand Response Integration with PG&E

- Communications link technology developed by Lawrence Berkeley National Labs.
- PG&E Technical Incentive:
  - $200/kW for equipment and installation
  - $40/kW for participant incentive
  - $60/kW for Technical Coordinator
- Funding approved by PUC
- Average power switched by one WPT => 2kW to 5kW. Up to 100% of cost eligible for rebate!



Compatibility Testing Completed with Lawrence Berkeley National Labs

Experience Since August 2008

- Already installed in wide variety of buildings:
  - Office Buildings
  - Community Colleges/Universities
  - Health Care

- Dan Ginn, General Manager RSD-Total Controls: "The interest and response to this technology has been phenomenal. It can be our savior in a very difficult business environment."

Good Fit for Today's Economic Environment!

Challenges and Opportunities

Slowing Demand

- Building operators cutting back on spending
- Projects delayed or cancelled
- Older buildings foregoing modernization – make do with existing equipment

Federal Stimulus May Help

- Anticipated federal stimulus for energy efficiency improvements to old gov't buildings!
- Eligible projects must be "shovel ready", i.e. ready to implement immediately, and have reasonable payback
- President Obama, Jan 24, 2009: "We'll save taxpayers $2 billion a year by making 75% of federal buildings more energy efficient…we'll renovate and modernize 10,000 schools"

Challenge: Improving Old Building HVAC Efficiency

- Low hanging fruit largely done (e.g. lighting, insulation). Need to upgrade controls.
- But most older buildings have pneumatic controls
  - No zone or night setback strategies or occupancy overrides
  - No auto-DR capability
  - Labor intensive calibration and maintenance
- No easy way to upgrade Pneumatics to DDC
  - Cost $3000+ per zone for DDC retrofit, 4-7 year payback typical
  - Disruptive, can't do until tenants vacate
- How can we drastically reduce the cost and improve the payback?
- How can we implement the retrofits quickly, without disrupting existing tenants?

Huge Existing Pneumatically Controlled Buildings Still in Use.
No Easy Way to Quickly Upgrade with Reasonable Cost…Till Now!

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What's New For Processing Special Report

Inventory management design for large refineries, small tank farms

Small, powerful new satellite phone unveiled

New wireless gauge readers

Remote visual inspection system: no cords, boxes

Better visibility into gas monitoring effectiveness

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Economists Say Housing Should Rebound in 2009

The economists at the National Association of Home Builders (NAHB) Construction Forecast Conference generally believed that the battered housing market will start to make a comeback in 2009. But in their assessment of the economy, they raised the specter of the dreaded "R" word — recession. However, the speakers did point out the positives in the current turmoil.

by Greg Mazurkiewicz Comments (0)

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Product of the Week RSS

Cypress Envirosystems: Wireless Pneumatic Thermostat

A wireless pneumatic thermostat with direct digital control-like functionality enables automatic zone-by-zone scheduling of temperature set point changes, automatic calibration, and remote monitoring of temperature and pressure. According to the company, it can be installed in older buildings with legacy pneumatic thermostats.

Home comfort from the brand you're already comfortable with.

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CYPRESS ENVIROSYSTEMS

Compelling Products – Substantiated by Industry Reviews

Some Other Cypress Envirosystems Products

Wireless Steam Trap Monitor (WSTM)

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WIRELESS STEAM TRAP MONITOR

- Necessary part of the steam distribution system, usually hundreds of units per site
- 15-20% average failure rate; leaks steam
- Failed traps lose $5,000 per year (1/8” orifice)
- Manual inspection typically done annually – labor intensive, do not catch problems in timely manner
- Solution: Wireless steam trap monitor detects faults and alarms on error, avoiding expensive leak loss
- Non-invasive installation: no breaking seals, wireless, integrates with BMS
- Battery life of 3+ years at typical sample rates
- IP65/NEMA 4 rated for outdoor use
- One year payback on investment

Leaking Traps Waste Energy

Typical Steam Trap

Save Energy and Time Locating Faulty Steam Traps

CYPRESS ENVIROSYSTEMS

Wireless Gauge Reader (WGR)

- Non-invasive, clamp-on to existing gauges in minutes
- Enables remote wireless monitoring of gauge
- No downtime
- No leak check
- No audit/requalification (e.g. FDA, OSHA)
- No running wires
- No drawings and approvals
- Minimal retraining of staff
- No new enterprise software
- Battery life of 3+ years at typical sample rates
- IP65/NEMA 4 rated for outdoor use
- Optional OPC or BACnet interface to existing building or plant automation system

Non-Intrusive Reader Mounts On Top of Existing Gauge in Minutes…
Enables Alarming, Trending, Historization for Process/Asset Monitoring and Troubleshooting

Energy Audits: Reduce Time and Cost to Perform

Customer Challenge:

Many customers have energy savings targets, but lack baseline data.

To obtain a baseline, they must approve drawings changes, install transmitters and potentially disrupt their process... before even 1 Watt of savings!

WGR Solution:

The WGR is quick & non-invasive to install to log temp, flow rates, pressures for steam, hot water, chilled water, air flow.

Takes minutes to install, and may be removed or reused after audit.

WGR installation takes minutes and cost 70% less than transmitters... and may be removed and reused at other locations

Reduce Energy Consumption

Customer Challenge:

Compressors, pumps and fans often run at settings beyond what is needed e.g. 125psi for Compressed Dry Air instead of 85psi, wasting >20% energy.

Operators lack monitoring so they don't reduce pressure – avoid risk of process upset.

Installing transducers is very time-consuming & disruptive for multiple air branches and can introduce leaks.

WGR Solution:

Typically manual gauges are already installed throughout CDA systems or coolant loop systems.

WGR's can monitor and alarm pressure/flow to ensure process integrity and reduce energy use.

App note available:
"Compressed Dry Air System Energy Savings"

Savings on 500hp Compressed Air System can be up to $100K per year, with a 8 month payback.

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Monitoring of Legacy Air Handlers

Typical Air Handler Units

Wireless Magnehelic Reader
Monitors Filters and Airflow

- Most older Air Handler Units (AHU's) are not monitored/automated
- Labor intensive to detect problems, check filters
- Proper air flow is the critical parameter - but can only be seen via manual dial gauges (e.g. Magnehelics)
- Solution: Wireless Magnehelic Reader clamps on in minutes and transmits reading wirelessly to BMS/BAS
- No downtime, no wiring, no leak checks
- Alarm notification for filter changeout, low air flow
- Condition-based maintenance, not schedule-based

Wireless Readers
Mounts Over Existing Gauges

Enables Monitoring of Legacy Air Handlers for 70% Less Than Traditional Transducers

Wireless Transducer Reader (WTR)

- Enables wireless remote monitoring of virtually any analog transducer or instrument with the following outputs: 4-20mA, 0-5V, or 0-10V, RS-232, RS-485, thermocouple, thermistor
- Non-disruptive – no need to change out transducers, break pressure seals, or run wires
- Compatible with most existing flow meters, current meters, particle counters, thermocouples, weigh scales etc.
- Enables data logging to enable trend analysis, notification, or statistical process control
- Optional Class 1 Div 2 and IP65/NEMA 4 enclosures available
- Battery life of 3+ yrs under typical sampling rates
- Optional OPC or BACnet interface to existing building or plant automation system

Non-Intrusive Reader Connects to Existing Transducers in Minutes…
Enables Alarming, Trending, Historization for Process/Asset Monitoring and Troubleshooting

WGR/WTR – Reducing Energy Use & Improving Productivity

Energy Savings

- Compressed Air – ramp down compressor
- Exhaust/Venting – ramp down fans, variable speed fans
- Low cost audits for current, steam/water pressure, temp, flow

Reduce labor and consumable costs

- Gas Cylinder monitoring (regulator gauges, e.g. cal gases)
- Domestic water supply

Improved Equipment Uptime via Monitoring

- Filter changeouts (measure delta P)
- Pumps, compressors, fans (measure delta P)
- Air handlers, chillers, scrubbers

Reduced troubleshooting cost

- Fast non-invasive data gathering/logging/alarming

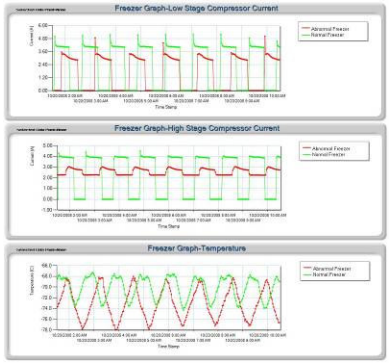
Safety/Compliance

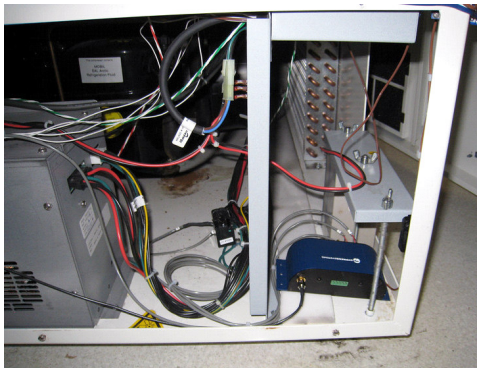
- Avoid manual reading at difficult to reach or hazardous locations
- Monitor exhaust/venting (e.g. Magnehelic gauge)

Better yield/quality

- Upgrade older process units with no data outputs
- Data for statistical process control, or feed to advanced control models

Wireless Freezer Monitor (WFM)

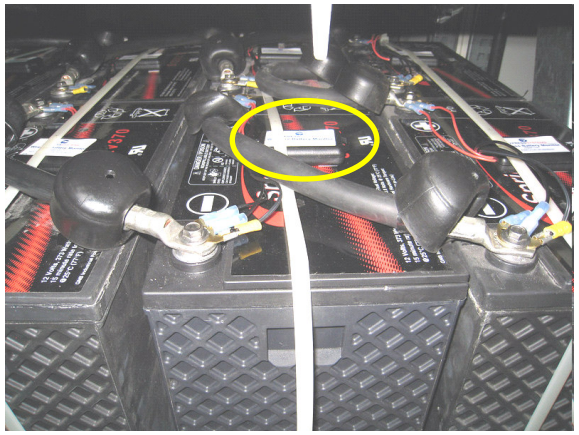




- Monitors health of -80C freezers holding critical material or samples
- Provides early warning of freezer failure
- Measures critical parameters including high-stage and low-state compressor current, door open/close status, and internal temperature
- Retrofit installation on existing freezers
- No running wires – battery life of 3+ years
- Includes user interface for history trending, alarming, cell phone notification
- No new software to install – simple web browser interface enables multi-user visibility
- Optional connectivity to existing building or plant automation systems via OPC or BACnet

Wireless Health Monitoring of Existing Freezers for Predictive Maintenance.
Early Detection Enables Proactive Measures to Avoid Content/Sample Degradation

Wireless Battery Monitor (WBM)



- Monitors health of Uninterruptible Power Supply batteries to ensure availability
- Replaces time-consuming manual validation using error prone handheld tools
- Provides early warning of potential battery failure
- Measures critical parameters including Internal Resistance, Voltage, and Temperature
- Simple and fast installation – small package mounts to top of each battery and wirelessly sends data
- Includes user interface for history trending, alarming, cell phone notification
- No new software to install – simple web browser interface enables multi-user visibility
- Optional connectivity to existing building or plant automation systems via OPC or BACnet

Non-Intrusive Reading Mounts On Top of Existing Batteries in Minutes…
Enables Alarming, Trending, Historization for Predictive Maintenance and Improved Uptime

Customer Feedback

"In the first two weeks of using the WGR, we were able to detect and develop corrective measures for a potentially costly issue that we never suspected" *Mike Long, Control System Supervisor, Tri-State Generation and Transmission*

"This is a no-brainer way to save money" *Dan Hutcheson – CEO, VLSI Research*

"Micrel saves time, money and effort. We are very happy with our purchase."
Guy Gandenberger – VP Global Operations, Micrel

"We've already discovered a major problem we would have never seen without your equipment" *- Rick Pasquini, Operations Manager, Linear Technology*

"~70% less cost than adding hard wired devices" - *Zach Rhyne, Utilities Specialist, Genentech Inc.*

"Almost certainly the most compelling argument in favour of the Cypress solution compared with possible alternatives is cost" *– Andrew Bond, Industrial Automation Insider*

"The impact of dynamically reading many of these hidden gauges, previously thought too difficult, has uncovered significant cost, resource savings & yield improvement opportunities." *– Dick Deininger, Taylor Deininger Partners Inc.*

"Workforce reductions are motivating organizations to increasingly adopt online Plant Asset Management (PAM) solutions. Using the Cypress Wireless Gauge Reader allows real-time distribution of critical asset information to PAM systems enabling the workforce to take proactive action." *– Wil Chen, ARC Advisory Group*

"This is the coolest thing I have seen in the past couple of years"
Walt Boyes – Editor-in-Chief, Control Magazine

"This is a big step toward wireless sensor network implementations in manufacturing"
Gary Mintchell – Editor in Chief, AutomationWorld

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