Wireless Leak Detection Prevents Water Damage While Improving Safety and Energy Efficiency

Introduction

Water leaks in commercial buildings and hotels can cause thousands of pounds in damage. Traditional leak detection methods rely on manual inspections, resulting in slow response times that can lead to water waste and property damage. A wireless leak detection system that incorporates EnOcean technology with wireless valve controllers (WVCs) and EnOcean to BACnet gateways offers a comprehensive, easy-to-implement solution that prevents water damage, improves safety and energy efficiency, and ensures regulatory compliance with lowered insurance costs as an additional benefit.

Understanding the Protocols

EnOcean is a wireless radio standard (ISO/ IEC 14543-3-1X) developed for self-powered, wireless devices with ultra-low power consumption. EnOcean devices and networks utilize energy harvesting technology which draws energy from ambient resources—such as, motion, light, or temperature variations—eliminating the need for batteries or external power supplies. With an indoor radio range of up to 30 m, EnOcean devices only require minimal maintenance, and most can be installed without wiring, making them ideal for newly constructed buildings and retrofit projects.

BACnet (Building Automation and Control Networks) is an ASHRAE, ANSI, and ISO standard communication protocol developed for building automation and control systems. This open standard provides a framework to ensure interoperability between different manufacturers to enable seamless integration and centralization control of:

- Building systems—HVAC, lighting, security, and energy efficiency
- Communication networks—Ethernet, IP, MS/TP, and wireless

Key Components

The wireless leak detection solution combines WES Products' advanced wireless controllers with Contemporary Controls' EnOcean to BACnet gateway.

WES Products' Wireless Valve Controller (WVC) is a compact, smart device that regulates water flow through wireless communication. The valve controller mounts directly onto solenoid valves via a DIN socket. The EnOcean model (WVC-ENO-230EB or ET) can be paired via built-in buttons on the front of the WVC with indicator lights that show when the pairing is successful. The controller supports a 230 V power connection.

WES Products Wireless Valve Controller EnOcean 230 V (WVC-ENO-230EB or ET)

WES Products Wireless Water Sensor – EnOcean – Battery Powered (WWS-ENO)

WES Products' EnOcean Wireless Water Sensor (WWS-ENO) is a battery-powered device designed for low-power, wireless water detection. It features two exposed conductive screw heads that serve as electrodes. When water completes the circuit between the two electrodes, the sensor is triggered and transmits a leak-detection signal. A leak detection cable attached to the screw heads allow the sensor to be wall-mounted while the cable is positioned along the floor-wall junction.

PIR Sensor is compatible with the EnOcean worldwide Smart Home & Smart Building protocol, this EnOcean motion sensor will automatically detect any motion. In this system, the sensor detects occupancy and controls water flow accordingly.

Danfoss Solenoid Valves work with the WVC to control water flow. Standard solenoid valves with DIN 43650 spade connections can be fitted with the WVC.

Contemporary Controls' EnOcean to BACnet Gateway (BASGE-EN868) provides bidirectional communication between EnOcean wireless devices and BACnet/IP networks. This gateway is the critical link that allows building automation supervisors to seamlessly discover and integrate EnOcean devices into existing BACnet systems.
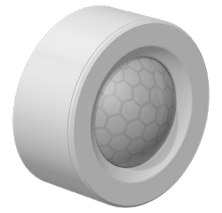
Figure 3 NodOn EnOcean Motion Sensor (PIR-2-1-01)

How the System Works

1. **Occupancy Detection**: PIR sensors detect room occupancy and signal the WVC to open the water supply valve.

2. **Automatic Shutoff**: When a room becomes vacant for a set period, the solenoid valve automatically shuts off the water supply, preventing leaks in unoccupied spaces.

3. **Leak Detection**: If water sensors detect moisture, they immediately send a wireless signal to the WVC, which closes the affected valve and can trigger alerts.

4. **System Integration**: The EnOcean to BACnet gateway translates EnOcean wireless signals into standard BACnet objects, allowing the system to be monitored and controlled through existing building management systems.

Certified Level 2

Advantages of the Solution

Seamless Integration: By incorporating virtual routing technology, the EnOcean to BACnet gateway allows building automation supervisors to seamlessly discover EnOcean devices via BACnet because each device will appear as a separate BACnet-compliant device. The gateway creates a set of BACnet objects, specific for each EnOcean Equipment Profile (EEP), and decodes the received EnOcean data into standard BACnet objects, eliminating complex programming.

Wireless Flexibility: The wireless setup eliminates complex wiring, reducing installation costs and time. The system can be easily reconfigured or expanded as building needs change.

Enhanced Safety: By automatically shutting off water when spaces are unoccupied and immediately responding to detected leaks, the system dramatically reduces the risk of water damage. The battery-operated wireless water sensors eliminate electrocution risks associated with traditional wired sensors.

Energy and Cost Efficiency: By reducing unnecessary water circulation and enhancing energy efficiency, the system helps buildings achieve better BREEAM ratings while preventing costly water damage.

Real-time Alerts: When leaks are detected, the system can trigger audible alarms and automatically send messages or emails via the wireless gateway to notify maintenance personnel, enabling rapid response before significant damage occurs.

Application Scenarios

Hotels and Hospitality

Hotels face unique water management challenges with high guest turnover and numerous water fixtures. The wireless leak detection system provides comprehensive protection by automatically shutting off water supply in unoccupied rooms, preventing costly damage and waste from faucets or shower heads that may have been left on by guests. The system's integration with hotel management software allows maintenance staff to receive immediate alerts about potential leaks, minimizing response time and damage. Additionally, the water usage data collected helps hotels optimize their water conservation efforts and achieve sustainability certifications.

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Commercial Office Buildings

In office environments, water damage often occurs in rarely monitored areas, such as server rooms, kitchenettes, and restrooms. The wireless leak detection system provides 24/7 monitoring of these critical spaces, automatically shutting off water supplies during non-business hours or in unoccupied zones. BACnet integration allows facility managers to incorporate water management into their existing building automation systems, providing centralized control and monitoring. This integration is particularly valuable for multi-tenant buildings where water damage can affect multiple businesses simultaneously.

Educational Institutions

Schools, colleges, and universities contain a variety of water-consuming facilities, including laboratories, dormitories, cafeterias, and athletic facilities. The wireless leak detection system helps prevent damage during holiday periods when buildings are unoccupied for extended periods. In laboratory settings, the system provides crucial protection for sensitive equipment and research materials. The wireless nature of the sensors allows for easy installation in existing buildings without disruptive construction, making it ideal for historic campus buildings where wiring modifications would be challenging.

Healthcare Facilities

Hospitals and healthcare facilities operate continuously with critical equipment and vulnerable patients. The wireless leak detection system provides targeted protection for sensitive areas, such as operating rooms, imaging centers, and server rooms that house patient data. The system's ability to integrate with existing building management systems ensures that maintenance staff can quickly respond to alerts while maintaining focus on patient care. The battery-operated wireless water sensor eliminates electrocution risks, a critical safety feature in healthcare environments.

Data Centers

Data centers require exceptional protection against water damage due to the high value of equipment and the critical nature of their operations. The wireless leak detection system provides early warning of potential leaks from cooling systems, sprinklers, or external water sources. The system's ability to automatically shut off water supplies and trigger alerts ensures rapid response before water can reach sensitive equipment. The BACnet integration allows data center operators to monitor water detection systems alongside other critical infrastructure components through a single interface.

Residential Apartment Complexes

Multi-unit residential buildings face significant risks from water damage that can affect multiple units simultaneously. The wireless leak detection system allows property managers to monitor common areas and individual units from a centralized system.

Automatic water shutoff in vacant units prevents damage during tenant transitions. The system's wireless nature makes it ideal for retrofit installations in existing buildings without requiring extensive construction or disruption to tenants.

Industrial Facilities

Manufacturing and industrial environments often have water-cooled equipment and processes that pose leak risks. The wireless leak detection system provides targeted protection for critical machinery and control systems. The robust design of the sensors and controllers makes them suitable for industrial environments, while BACnet integration allows seamless incorporation into existing industrial automation systems. The system's ability to automatically shut off water supplies helps prevent production downtime and equipment damage.

The wireless leak detection system integrates EnOcean technology with an EnOcean to BACnet gateway, combining wireless sensors, smart valve controllers, and standardized building automation protocols, to provide comprehensive protection against water damage.

Museums and Cultural Institutions

Museums, galleries, and archives house irreplaceable cultural artifacts that are particularly vulnerable to water damage. The wireless leak detection system provides discreet protection without compromising the aesthetic integrity of exhibition spaces. The system's ability to detect leaks early and respond automatically is crucial for protecting valuable collections. The wireless nature of the sensors allows for installation in sensitive historic buildings where wiring modifications would be problematic or prohibited.

Conclusion

Wireless leak detection based on EnOcean technology and Contemporary Controls' EnOcean to BACnet gateway provides an easy-to-implement solution to a common and often costly problem. By combining wireless sensors, smart valve controllers, and standardized building automation protocols, this system provides comprehensive protection against water damage while improving safety and energy efficiency and ensuring regulatory compliance.

Recommended Solution Provider: WES Products

WES Products is a leading innovator in wireless environmental sensing technology, specializing in advanced leak detection systems that seamlessly integrate with building management infrastructure to provide comprehensive water damage prevention solutions.

EnOcean to BACnet Gateway Ordering Information Visit e-store	
Model	**Description**
BASGE-EN868	EnOcean to BACnet Gateway 868 MHz (European Version) Note: An antenna is required but not included. Be sure to purchase either the BASGE-ANT868 or the BASGE-ANT-2M (listed below).
Antennas: **Model**	**Description**
BASGE-ANT868	EN868 stick antenna
BASGE-ANT-2M	EnOcean antenna with 2 m cable

For more information about the EnOcean to BACnet Gateway, visit EnOcean to BACnet Gateway