



Wireless Valve  
Monitoring System





## The Westlock solution to wireless valve monitoring

**The Westlock wireless valve monitoring system was specifically designed to work with both manual and automated on/off valves and to integrate directly with a wider plant control system. All field devices use a proven standard wireless protocol design to IEEE 802.15.4-2006 at 2.4 GHz with built-in AES 128bit encryption security.**

The specially designed wireless valve position monitoring system from Westlock provides real-time information about a valve's status directly into the control system, reducing failure and risk while increasing safety and yield.

### Benefits

- Reduced costs (wires, conduits, cable trays, cabinets, I/Os)
- Easier engineering and installation
- Faster commissioning and startup
- Solution for space constraints, smaller footprint
- Monitoring for manual, automated, rotary or linear valves
- Reduced unwarranted field trips and labor costs
- Improved operation efficiency and safety

### Features

- Multiple enclosure options (resin, aluminum, 316 SST)
- High visibility beacon and wireless valve monitoring (0 to 100%)
- 10-year battery life
- Intrinsically safe and explosion proof options
- Diagnostics and valve signature
- Direct mount to valves and actuators
- Easy integration with control systems





Conventional



Wireless

## The challenge of monitoring valves for operational and safety reasons

**The need to monitor plant for both operational and safety reasons has never been greater, however the potential cost involved in putting a monitoring system in place means that larger numbers of valves remain 'un-monitored'.**

### Conventional wiring

A major restriction when installing automation systems is the need to use wires to connect sensors and actuators. Wiring an automation system in a modern plant is very time consuming and costly, takes a considerable footprint and adds significantly to weight. Research suggests that only 10% of all possible monitoring instrumentation is currently installed. Wireless automation could increase this rate to 30% or more.

Most plant operators have to deal with at least one event per year where a manual valve is incorrectly left open, closed, or partially open. Since most manual valves are not monitored, those events can go undetected for a significant time causing considerable operational losses in addition to environmental and safety risks.

Typically half of the I/O points on a plant control system are used for on/off valves; however due to wiring cost constraints only one third of the automated valves have limit switches (just the solenoid is wired), leaving two thirds of these automated valves without any position feedback or monitoring. More significantly, for every automated on/off valve there will be another 3 to 4 manually operated valves on the plant leaving 70 to 85% of the valves without any monitoring.

**The main issue with using conventional wiring to monitor valves is the huge cost of cables, cable trays, cabinets, and the associated I/O points in the control system.**

### The wireless solution

The specially designed wireless valve position monitoring system from Westlock works with both manual and automated on/off valves and smoothly integrates with wider plant control systems. It provides real-time information about a valve's status directly into the control system, reducing failure and risk while increasing safety and yield.

Without monitoring it is impossible to assess the efficiency of an automated valve. A Westlock wireless device will not only provide accurate up-to-date information on the valve's status at any point in time, but can also provide the valve's operational signature enabling cost effective predictive maintenance.

Monitoring manual valves can be both labor intensive and problematic with valves in inaccessible locations; the Westlock wireless device provides accurate information helping operators to improve safety and quality while reducing inefficiencies and costs.

Designed with interoperability in mind using breakthrough wireless technology the Westlock wireless valve monitoring system is currently based on the standard Zigbee Pro, with built-in AES 128bit encryption security but will also be available for WirelessHART® and ISA SP100 in the near future.

One wireless module fits multiple enclosures



The wireless module fits in multiple Westlock enclosures



## A wireless position monitor to put you in control throughout the plant

**The Westlock wireless valve monitoring system was specifically designed to work with both manual and automated on/off valves and to integrate directly with a wider plant control system. Based around the very flexible valve monitoring wireless device (WD) the system also includes the wireless router (WR), gateway (WG), handheld (WH) and the Wireless Management System (WMS) software.**

### **Valve Monitoring Wireless Device (WD)**

The valve monitoring wireless device is a battery powered wireless position transmitter (0 to 100%) with integrated limit switches and auxiliary inputs. The ultra compact design can be integrated with any valve, manual or actuated using a mechanical attachment to the valve or actuator shaft.

The unit is suitable for mounting to any ISO/DIS 5211.2 F03 manual valve using our custom designed hardware and to actuators using the NAMUR interface; on other valves or actuators a mechanical bracket is used.

The wireless device is fitted in a choice of standard Westlock enclosures to suit a range of plant conditions. The device is suitable for both rotary and linear monitoring and has the option of internal or external antenna (engineered resin enclosures).

Available to a number of specifications the device can be supplied intrinsically safe and suitable for FM/IEC/ATEX ZONE 0 and CLASS 1 DIVISION 1. The device has a 10 year battery life and can be installed on existing equipment with minimum disruption or specified on new valve / actuator packages. The units are easily commissioned and calibrated using the wireless handheld.

The wireless device reports the valve position every 15 minutes (configurable) or, in a matter of seconds, after every valve movement of at least 1.5°, enabling valve signatures to be created for all automated valves.

**It also monitors temperature, battery status and alarms; all messages are transmitted with a real time stamp.**

# Valve Monitoring Wireless Device (WD)

The valve monitoring wireless device is suitable for both rotary and linear monitoring and has the option of internal or external antenna, and auxiliary inputs. Available to a number of specifications the device can be supplied intrinsically safe and suitable for FM/IEC/ATEX ZONE 0 and CLASS 1 DIVISION 1.

## Ultra Compact Engineered Resin Enclosure

### Intrinsically Safe / Weathertight

This ultra-compact wireless position monitor has an enclosure with Beacon visual indicator, which is installed on the top of a valve or actuator and coupled directly to the valve or actuator shaft.



#### Features

- Internal antenna option
- IP66 engineered resin enclosure ensures both strength and corrosion resistance
- Compact and lightweight design, perfect size for manual valve monitoring
- Namur VDI/VDE standard mounting arrangement

## Lightweight Engineered Resin Enclosure

### Intrinsically Safe / Weathertight

These mid-size housings are constructed with premium engineering resin to provide a robust lightweight alternative to metal enclosures with extreme chemical and impact resistance. It can be supplied with a clear cover and additional entries for auxiliary inputs.



#### Features

- Beacon offers 360 degree instant visual recognition of valve position from up to 150 feet away
- Internal antenna option
- Excellent chemical, UV and impact resistance
- NAMUR shaft option compliant to VDI/VDE 3845 available

## Compact Metallic Enclosure

### Intrinsically Safe / Weathertight

These position monitors provide a compact weathertight metal solution for non-hazardous or intrinsically safe applications where more robust material is required like caustics wash downs, chloride atmospheres or salt water environments.



#### Features

- Beacon offers 360 degree instant visual recognition of valve position from up to 150 feet away
- Aluminum and 316 stainless steel options
- Compact design to mount on smaller actuators or manual valve monitoring
- NAMUR shaft output compliant to VDI/VDE 3845 available

## Severe Service Metallic Enclosure

### Intrinsically Safe / Explosion Proof

This position monitor design meets explosion proof area classification and satisfies a wide range of requirements including; robust mechanical protection, Beacon visual indication, and additional entries for auxiliary inputs.



#### Features

- Aluminum and 316 stainless steel options
- Robust design for superior mechanical protection
- Standard bolt pattern for mounting to NAMUR actuators with common bracket kits
- Global certifications available

## Severe Service Metallic Enclosure

### Intrinsically Safe / Explosion Proof

Explosion proof range of position monitors designed to provide flexibility allowing pre-wired components to be fitted in a compact integrated unit ready to be mounted directly to a valve or actuator housing.



#### Features

- Beacon offers 360 degree instant visual recognition of valve position from up to 150 feet away
- Aluminum and 316 stainless steel options
- Terminal strips are pre-wired and numbered with generous working space for ease of use
- All units are standard with an additional conduit for easy field wiring and mounting accessories



## Wireless Valve Monitoring System - Components

In addition to the Valve Monitoring Wireless Device (WD) the system includes all the components necessary to install operate and integrate with your existing plant operating system.

### Wireless Handheld (WH)

The Wireless Handheld allows local communication with the key components of the system – wireless device, router and gateway. Intended for use at close range the wireless handheld is used to calibrate and set up each wireless device, configure operator ID and passwords, turn units on / off and to prompt transmission confirming the valve's status.



#### Features

- Local field interface
- Configuration, calibration, and troubleshooting
- Internal database with USB port for easy downloading

### Wireless Router (WR)

The Wireless Router is used to extend the range and buffer the data from the wireless devices and allows local monitoring from a single point. It also connects with other routers and transfers information using a self-healing mesh topology providing alternate information relays in the event of a failure.



#### Features

- Buffers data for wireless device
- Redundant communication path with automatic routing and mesh network topology
- Extends wireless coverage

### Wireless Gateway (WG)

The Wireless Gateway manages the data from routers and devices collecting data from up to 32 devices using a standard wireless protocol and then transfers this to a WMS station (standalone or server) via Ethernet TCP/IP. The gateway also operates as part of the self-healing mesh topology ensuring full redundancy and avoiding a single point of failure.

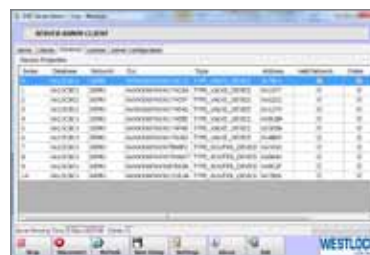


#### Features

- Manages data from routers and devices
- Automatic redundancy to plant network
- Ethernet TCP/IP connection to plant network

### WMS Server

The Wireless Management System Server is the gateway to the main plant control system and can manage data from up to 100 Wireless gateways. The system runs as an application or as a service, manages the license and generates a log of all activity. The main function of the WMS server is to collect data, monitor the network and deliver information to upper tier management systems.



#### Features

- Collect data and network monitoring
- Data logging and information management
- Supports multiple client connections

### WMS Client

The Wireless Management System Client provides the GUI interface to the plant control system and implements connectivity through standard communication protocols like Modbus RTU, Modbus TCP, and OPC DA. The WMS Client also manages a floating license from the Server.



#### Features

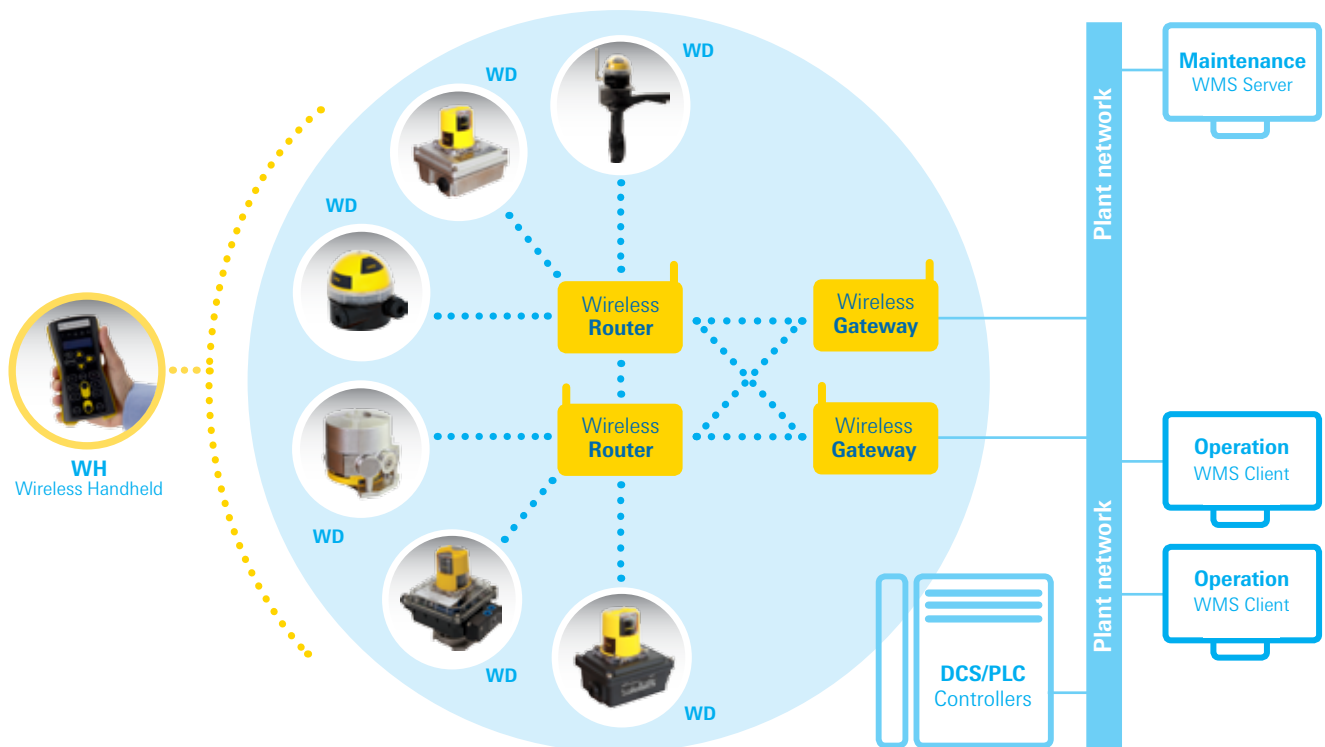
- Provides GUI interface
- View and set maintenance logs for all devices
- Standard communication protocol connectivity



## System Architecture

**The Westlock wireless valve monitoring system has been designed with simplicity and reliability in mind. All field devices use a proven standard protocol for communication.**

Specifically designed for low power consumption and immunity from background interference this ensures reliable readings and long battery life for all the wireless units. The field devices are also configured using a mesh network topology, which ensures full redundancy and avoids any single point of failure. The system is easily integrated with the plant control system (DCS, SCADA, or PLC) through standard communication protocols, like OPC DA and MODBUS RTU/TCP.





## Key Numbers

### Limits

- Wireless Devices (WD) per Wireless Management Server (WMS)
  - 10,000 using WMS Server
  - 120 using WMS Stand Alone
- Wireless Devices (WD) per Wireless Gateway (WG)
  - 100 using Wireless Routers (WR)
  - 32 without Wireless Routers (WR)

### Battery Life

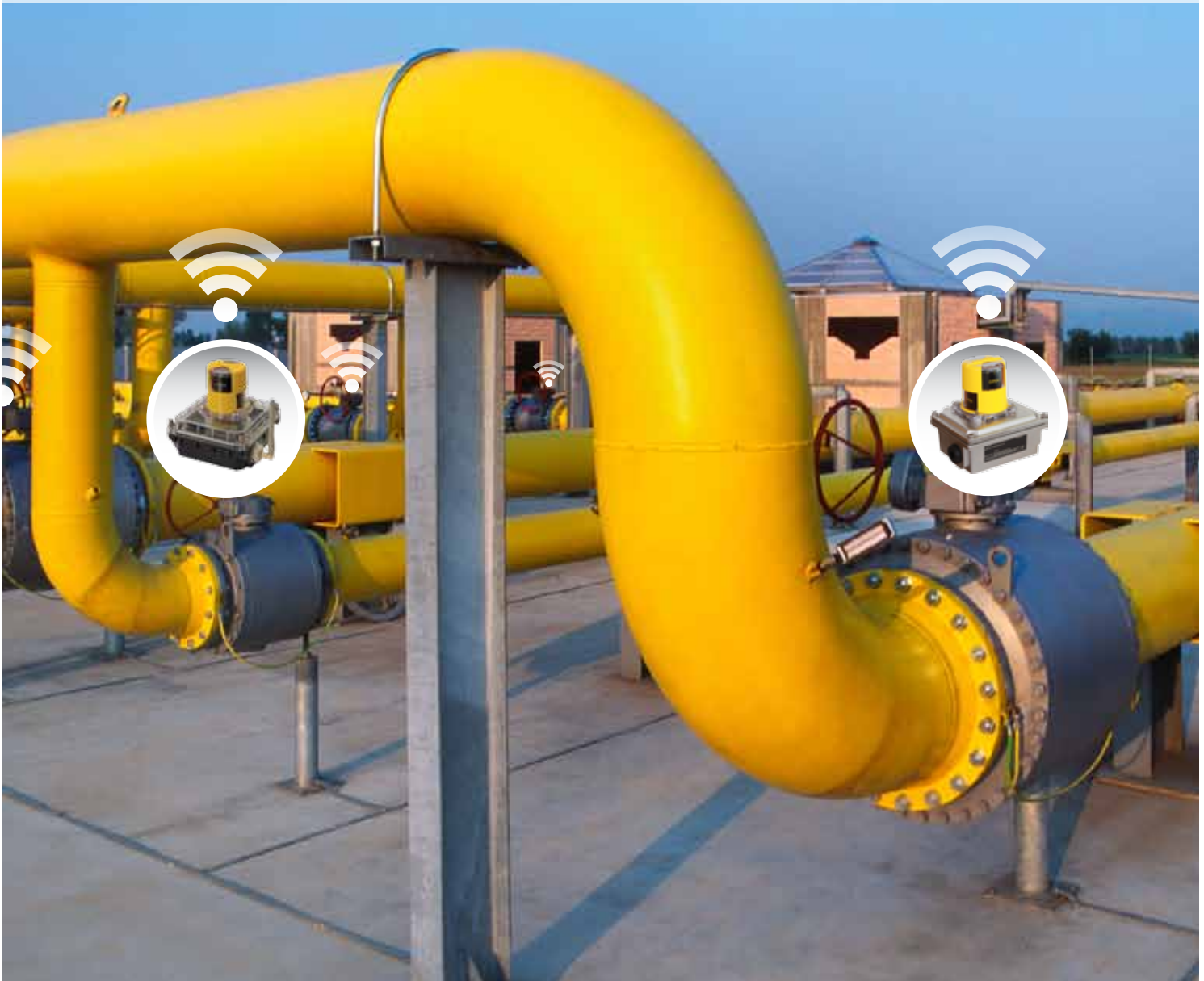
- Wireless Device, nominal configuration: 10 years

### Typical Distances

- Wireless Device (WD) to Router (WR): 25m (70m/open space)
- Router (WR) to Router (WR)/Gateway (WG): 100m (200m/open space)

### Typical Latencies

- Hop to hop: 10ms
- Wireless Device (WD) to WMS: 1 second



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**[www.westlockcontrols.com](http://www.westlockcontrols.com)**

Westlock Controls reserves the right to change product designs and specifications without notice

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