



WIRELESS DEVICE INSTALLATION AND SETUP MANUAL

IOM: Tech-457		Revision:	
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Revision History

Revision

19 June, 2012 Initial release

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1 Introduction

1.1 Product Certification

IS / I / ABCD / T4 T=80° C

I / 0 / AEx ia IIC / T4 Ta=80° C

IS / I / ABCD / T4 T=80° C

I / 0 / Ex ia IIC / T4 Ta=80° C



IECEx

II 1 G Ex ia IIC -40° C ≤ Ta ≤ 80° C

Ex d IIB+H2 T* Tamb -° C TO +° C

Ex tD A21 IP6X T5 Ta 95° C -30° C TO +75° C

Class I, Groups C & D, Class II, Groups E, F & G, Division 1 & 2

Class I, Division 1, Groups A, B, C & D, T5; Ta = -50° C TO 60° C

Class II & III, Division 1, Groups E, F & G, T5; Ta = -50° C TO 60° C; TYPE 4, 4X, 6P

Non-Incendive for Class I, Division 2, Groups A, B, C & D, T5; Ta = -50° C TO 60° C

Ex d IIB+H2 T* Tamb -° C TO +° C

Ex tD A21 IP6X T5 Ta 95° C -30° C TO +75° C

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1.2 Warnings



Misuse of this equipment can cause bodily harm. Operations not performed as per the instructions in this document are done at the user's own risk and liability.



To prevent bodily harm or damage to equipment, only trained, authorized personnel should install, maintain and repair the equipment.



Attention

To prevent damage to equipment, through electrostatic charge on plastic surface of the WD always wipe the surface with a wet cloth.



Attention

Carefully read the safety information contained in this section, and throughout this user guide, before installing, operating, or performing any maintenance task on the equipment.



Attention

Dispose used lithium battery in accordance with applicable State and Federal laws.

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1.3 Description



Note

This technical document provides information about the specific enclosure of a wireless product. All other information regarding the complete wireless system can be found on our website www.westlockcontrols.com or through our technical sales department.

The Westlock Wireless Valve Monitoring System provides real-time information about the status of valves installed in process plants. The data is fed directly into the customer's control system thereby reducing failure while increasing safety and yield. The Wireless System is based on the ZigBee Pro standard protocol and serves as an add-on layer, over traditional process management systems, providing enhanced monitoring capabilities, with considerably reduced complexity. The wireless system includes support for a wide range of standard interfaces, physical and logical, that are common in the industry. This makes the wireless system, from the perspective of connectivity, almost transparent for system designers and integrators, since they can easily integrate into any of the most widely-used system architectures in the process industry.

1.4 Principles of Operation

A Westlock Wireless Device (WD) is bracket-mounted to any type of valve or actuator. Using the standard wireless 802.15.4/ZigBee Pro, 2.4 GHz protocol, the device wirelessly transmits and receives messages relevant to the position status of the valve in real time.

The WD is powered by 4 half AA Lithium batteries. In nominal operation, the battery life of the WD is above 10 years. A battery pack can be replaced in the field.

The WD includes a shaft that is fastened to the valve's stem through a special cylinder. It transfers the angle position of the stem to the WD. An internal WD sensor measures the circular position of the WD shaft thus providing information about the angular position of the stem in degrees relative to the valve.

The WD reports the valve position (angle) immediately when motion of the valve lever is sensed or at configurable, predefined intervals. The WD temperature, WD battery status, and other WD housekeeping information are broadcast with every WD message. Each WD message is transmitted with a real time stamp. In between transmissions the WD is in dormant status to save battery power.

The WD also consists of a Low Frequency (LF) receiver for receiving setting commands from the Operator Device and to commission, decommission, calibrate, and setup the unit and to perform diagnostic procedures.

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2 *Order Guide*

The WD is designed to handle a wide range of control valve applications. For complete ordering guides consult your Westlock representative or visit www.Westlockcontrols.com.

The following features are included in all agency approvals for Wireless products:

- Wireless transmitter module
- Optional proximity switches (reed type)
- Optional antenna (installs in conduit entry)

3 *Definitions*

- Westlock Gateway – An industrial computer running the WMS.
- WMS – Wireless Management System
- EUI – Extended Unique Identifier
- HMI – Human Machine Interface
- WH – Wireless Handheld
- PLC – Programmable Logic Controller
- PLCA – PLC Adaptor
- SCADA – Supervisory Control and Data Acquisition
- WG – Wireless Gateway
- WR – Wireless Router
- WD – Wireless Device
- LF- Low Frequency

4 *Installation*

The Wireless Device can be mounted to an uninstalled valve or an actuator as well as to an operating installed valve or actuator. Each valve type or actuator requires a bracket mounting kit. If a valve or an actuator is outdated and no information can be found, request for measurements or a site survey may be necessary in order to design a bracket kit. Section 4.1 shows a typical actuator mount, and section 4.2 show a typical valve mount.

The WD has an effective valve position (angle) measurement range of about 110°. On the shaft of the WD, an axle spline indicates the position of the shaft (valve). On the bottom of each WD there are two marks indicating a range of 90°. This is the effective motion zone of the WD's shaft to measure the position of the quarter turn valves (see section 4.3)

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4.1 Mounting Wireless Device to a Rotary Actuator

Figure 1 shows a typical mounting of a Wireless Device to a rotary actuator. Follow steps below for proper installation.

1. Install mounting bracket onto the actuator using four mounting screws.
2. Place an actuator coupler onto the actuator shaft in the correct orientation. Coupler has a keyway that reflects WD's shaft. Pay attention to the effective motion zone of the wireless device (see Section 4.3).
3. Place wireless device on the mounting bracket in the correct orientation (see Section 4.3) and secure it with the mounting screws.

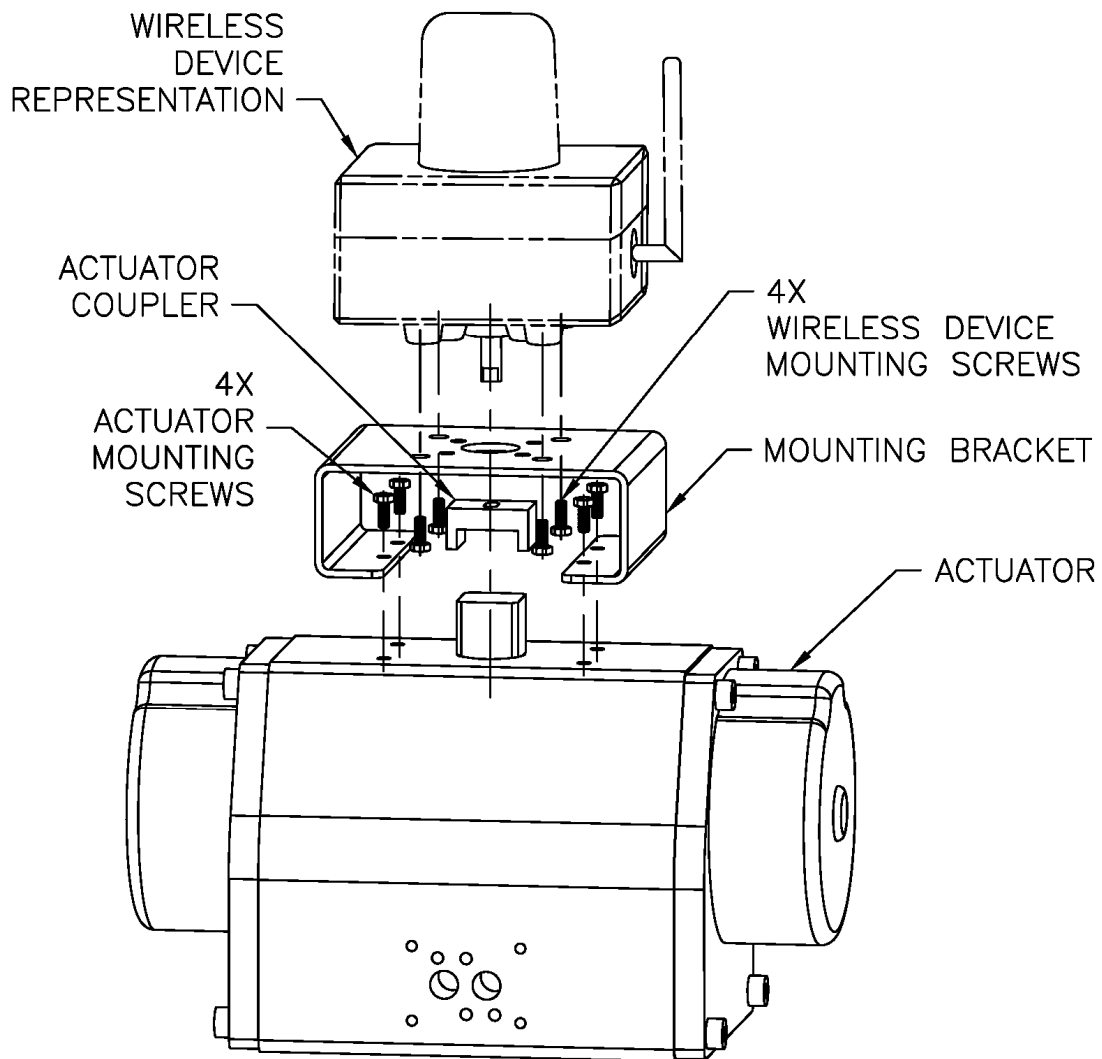


Figure 1

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4.2 Mounting Wireless Device to a Hand Valve

Figure 2 shows a typical mounting of a Wireless Device to a hand valve. Follow steps below for proper installation.

1. Remove a nut above valve handle in order to remove the handle.
2. Place a mounting bracket onto the valve and secure it with screws.
3. Place the handle back on the valve shaft and fasten the nut.
4. Attach a valve coupler to the valve shaft.
5. Place wireless device on the mounting bracket in the correct orientation (see Section 4.3) and secure it with the mounting screws.

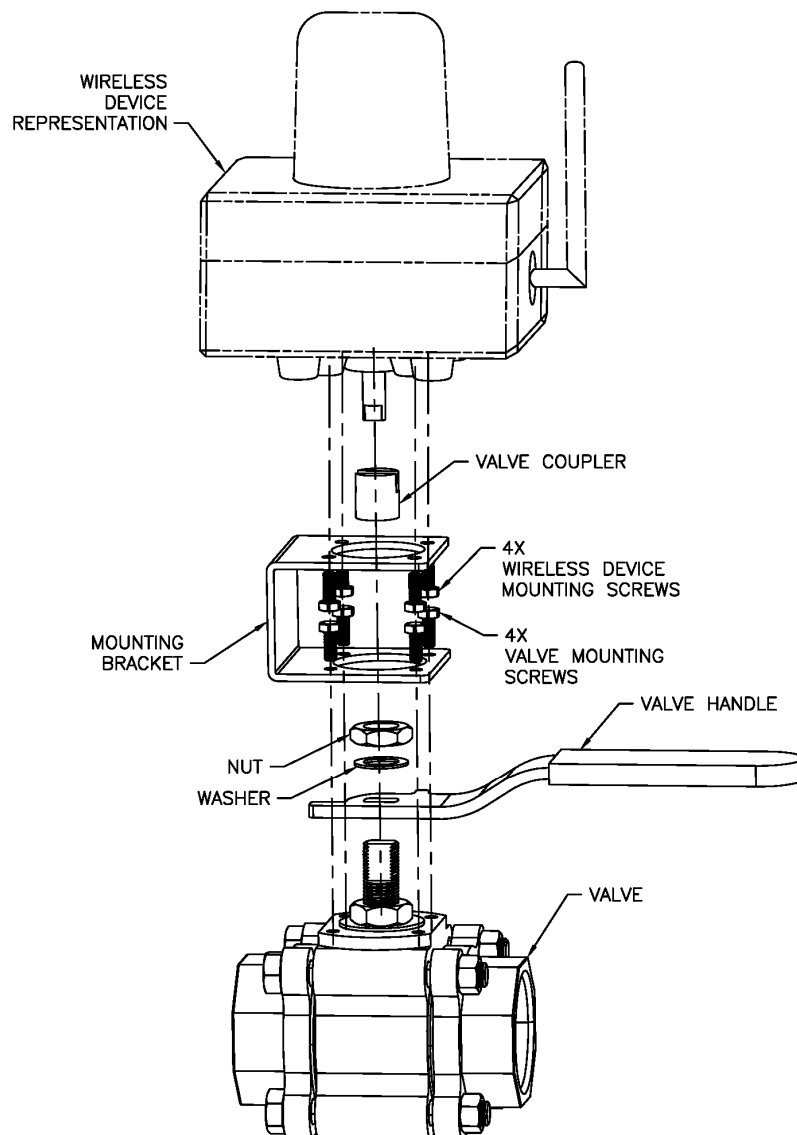


Figure 2

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4.3 Wireless Device Operating Quadrant

When installing the WD on a quarter turn valve or actuator, verify that the unit shaft is always positioned in the range between the two marks indicating the motion zone (see Figure 3 & Figure 4).

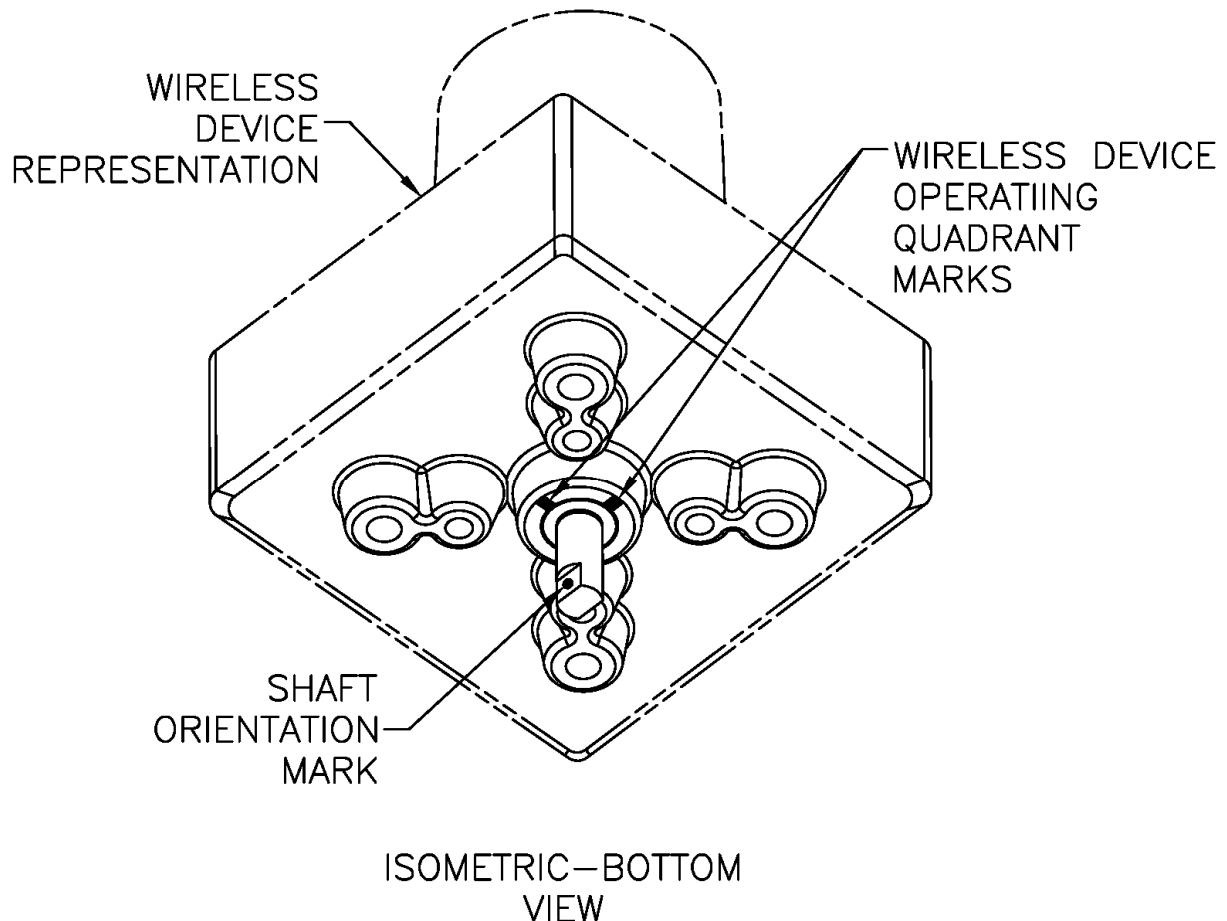


Figure 3

Note:

For 114W only, a special shaft is required if the reverse visual beacon indication is desired. For all other products, outer beacon may be rotated.

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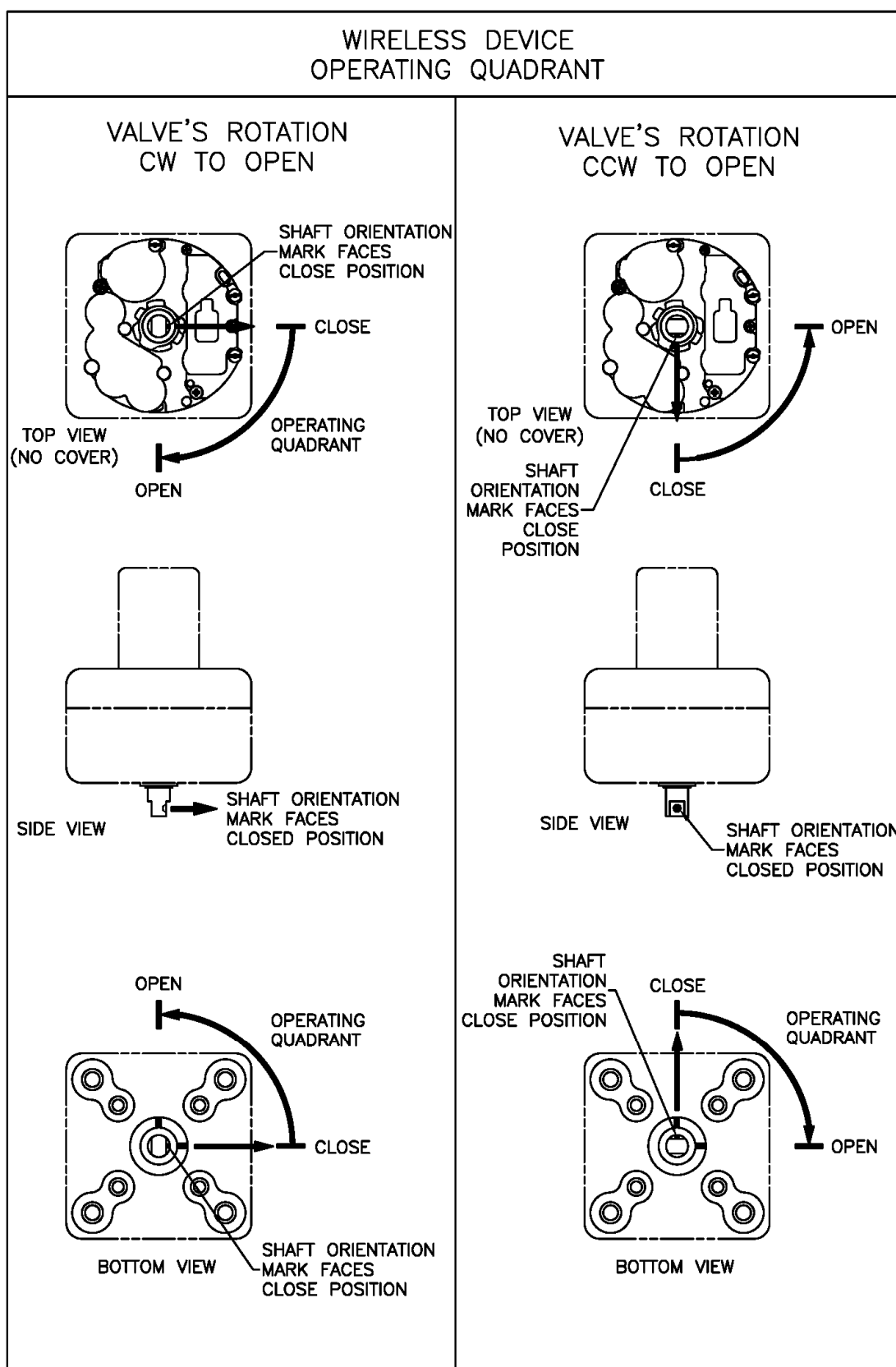


Figure 4

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5 Configuration

5.1 Introduction

As part of the installation process, the Wireless Devices are configured using either the WMS (remotely) or the WH (locally). The following information is installed on the WD:

- Extended ID information
- Thresholds
- Setting operational parameters
- Calibration

5.2 Extended ID information

A Network Name (an alias of eight alphanumeric characters) is set via the WH. The WD and WG remember this name and this prevents a device from accidentally joining another network in the vicinity.

The unique factory set ID is the MAC address. In addition to that, user friendly IDs – more easily remembered and understood by technicians – such as the valve name and serial number can be used.

To manually select a specific device, for a one-on-one session with the WH, perform the following options:

1. On the back side of a WD locate the label with its unique 6-character ZigBee MAC address.
2. On the WH, in the Default mode, key in the MAC address by using the **Up/Down** keys to select the character and the **Tab** key to select the character location.
3. When done press Enter. The selected device will open a one-on-one communication session with the WH Thresholds

The WD continuously measures various status parameters such as the dynamic movement of the valve, ambient temperature and battery voltage. These measurable parameters are normally limited to a threshold or range.

Exceeding a threshold generates an alarm in the WD which is delivered with the normal status message to the WMS (and from there to the HMI/PLC). These thresholds and/or ranges are selectable as part of the system configuration. This is further discussed in the complete wireless system technical document TECH-462 (WMS) under WMS-WMS Operations-Valve Status-The Statistics & Configuration Tab-Configuration. The following documents are available describing the wireless system parameters and configuration: TECH-459 Wireless Gateway-Router, TECH-460 Wireless Hand Held, TECH-461 Wireless Device-Operation Manual, TECH-462 Wireless Management System, TECH-463 Connectivity Server, and TECH-464 Log Analysis.

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5.3 Setting Operational Parameters

Operational parameters define the behavior of the WD. For example:

- How often the WD should send a keep-alive signal.
- How often the WD should poll for pending messages (from the WMS).
- How often the WD should cause the LEDs to blink.
- How fast the WD stem should be sampled.

This is discussed in the TECH-462 (WMS) under WMS-WMS Operations-Valve Status-Setting Tab.



Attention

Changing operational parameters can affect the battery life of the WD and/or the sensing capabilities of the motion sensor.

5.4 Calibration

After mounting the WD on a valve or an actuator, the WD should be calibrated to set the open and closed boundaries of the valve/actuator. This process **must** be performed locally using the WH via LF. This ensures the accuracy of the configuration. Calibration, from the WH point of view is discussed in the TECH-460 (WH) under Wireless Handheld-WH Operations-Working with an Online Wireless Device-Calibrate.

In order to achieve a successful calibration of the WD on the installed valve/actuator, follow these simple steps:

1. Verify that the WD is powered and joined to the same network of the WH.
2. Open an LF session between the WD and the WH
3. Navigate to the **CAL** menu in the WH and key in the following commands. Make sure that each command is acknowledged before moving to the next one.
 - Remove previous calibration using **RESET CAL**.
 - Where applicable make sure the valve is completely open and set the open angle using **SET OPEN**.
 - Where applicable make sure the valve is completely closed and set the closed angle using **SET CLOSE**.
 - If required set the custom angle using **SET CUSTOM**.
 - Apply the new settings using **APPLY**.



Note

The order of calibration **SET OPEN** before **SET CLOSED** or vice versa is not important. Perform the above steps at your convenience.

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The WD can also be run from default values or partial calibration. This is pertinent when an installation is performed on a “hot line”. A complete calibration process can be completed at a later time (after the valve has changed its state).



Note

When completing a partial calibration, do not send **RESET CAL**, otherwise the previous calibrated angle will be erased.

6 Field Wiring

6.1 Wiring External Switches

External switches are optional and can be wired directly into the wireless module using terminal block. Switch operation can be visible on the software interface. See Figure 5 for typical wiring. For correct wiring to a specific product please follow supplied wiring diagram.

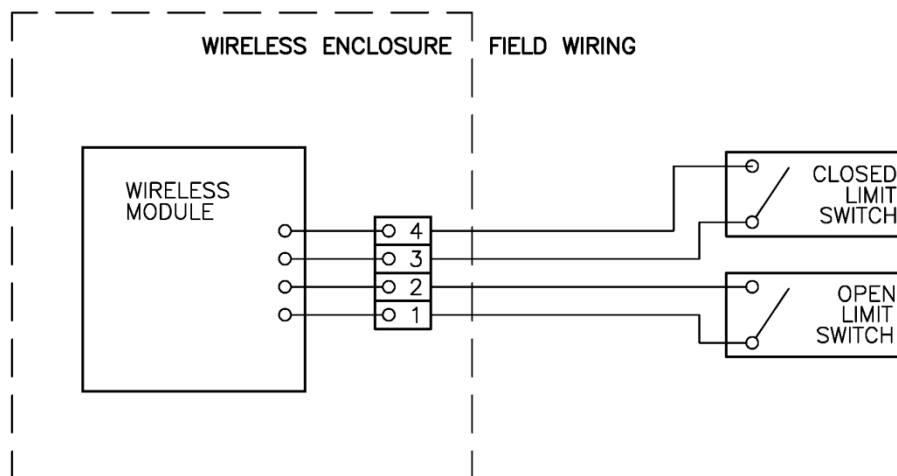


Figure 5

Note:

For 114W only, we do not offer external switches.

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7 Maintenance and Repair

7.1 Procedure to Replace the Battery Pack

1. Remove (4) mounting screws that secure the battery pack as shown in Figure 6.
2. Remove battery pack. The unit will remain operating normally up to 5 minutes without the battery pack.
3. Place new battery pack in designated area and secure it with (4) screws.
4. The device powers back automatically and it attains its previous state without any intervention. If the device is operating in the field, it will rejoin the network and send a status message indicating its presence.



Note

ATEX (in Europe) approves replacement of the battery pack in the field (Zone 1). North America standards do not permit this.

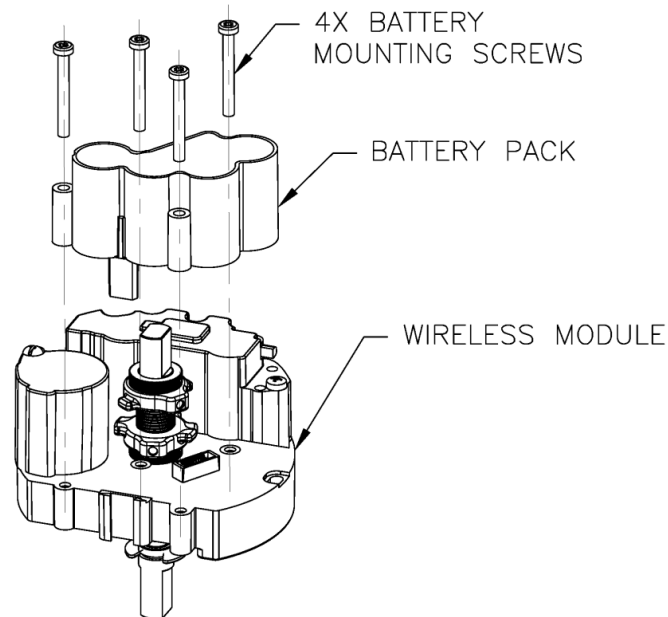


Figure 6



Attention

Dispose used lithium battery in accordance with applicable State and Federal laws.

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8 Appendix

8.1 Appendix A-Procedure to Set Internal Switches

1. To set switches, lift bottom cam and turn until lower switch is activated and then release (Figure 6 & 7). Spring will push cam back onto the splined shaft.
2. Operate the actuator to the opposite extreme, push down on the top cam and turn until the upper switch is activated.
3. Operate actuator from one extreme to the other several times to check switch operation.

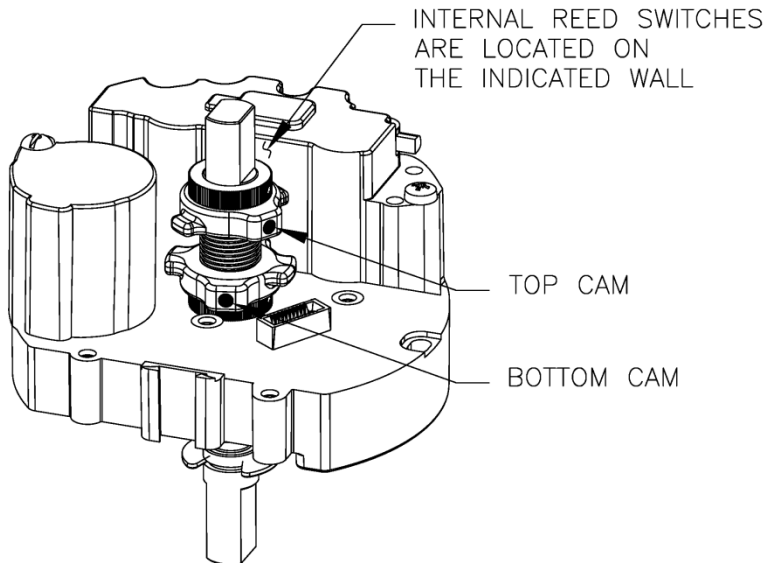


Figure 6

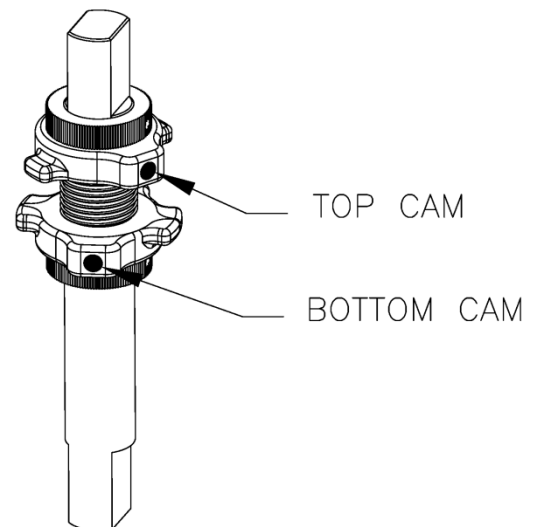


Figure 7

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8.2 Appendix B- Antenna Installation

(If applicable) To prevent any antenna damage in shipment, it has been disassembled from the WD. Follow steps below for proper installation:

For right angle antenna mounting (Figure 8):

1. Feed antenna cable through the right angle fitting.
2. Fasten antenna into right angle fitting.
3. Connect antenna cable with wireless module cable.

For straight antenna mounting (Figure 8):

1. Feed antenna cable through the conduit entry.
2. Fasten antenna into the conduit entry.
3. Connect antenna cable with wireless module cable.

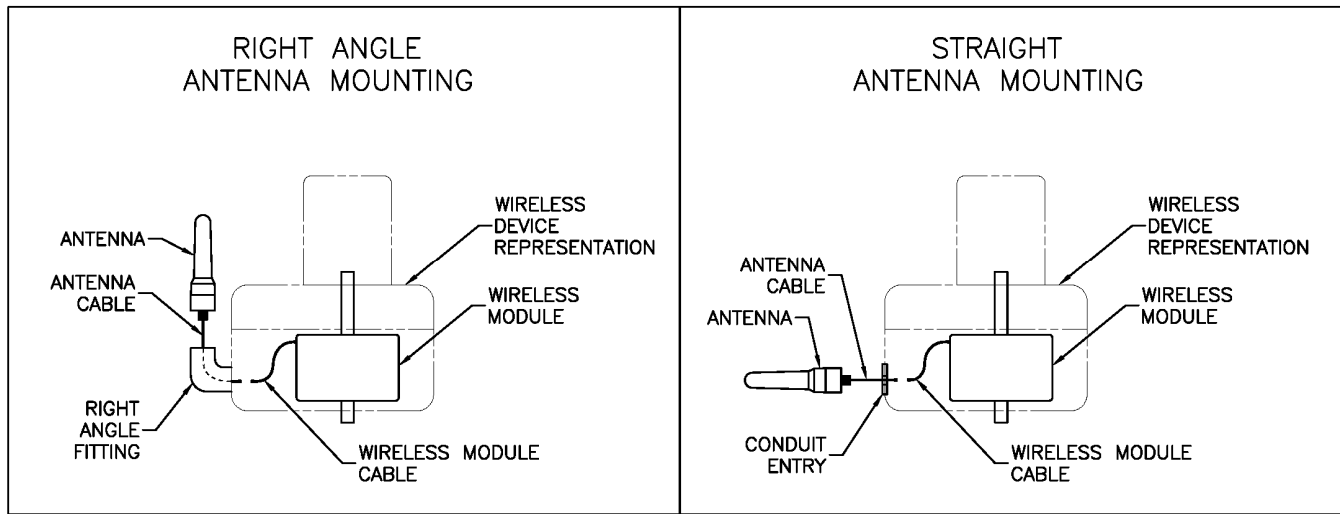


Figure 8

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