Honeywell

OneWireless

XYR 6000 Wireless Valve Position Sensor

Model: WCX Series

User's Manual

50040849
Revision 1
1/15/09

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Notices and Trademarks

Automation and Control Solutions

Sensing and Control

Honeywell

1985 Douglas Drive North

Minneapolis, MN 55422

www.honeywell.com/sensing

About This Document

This document describes preparation, operation and maintenance of the WCX Series Valve Position Sensor and antennas. Mounting and installation are covered in other documents.

Honeywell does not recommend using devices for critical control where there is a single point of failure or where single points of failure result in unsafe conditions. OneWireless is targeted at open loop control, supervisory control, and controls that do not have environmental or safety consequences. As with any process control solution, the end-user must weigh the risks and benefits to determine if the products used are the right match for the application based on security, safety, and performance. Additionally, it is up to the end-user to ensure that the control strategy sheds to a safe operating condition if any crucial segment of the control solution fails.

Revision Information

Document Name	Document ID	Revision Number	Publication Date
XYR 6000 Wireless Valve Position Sensor, Model WCX Series User's Manual	50040849	1	1/15/09

References

The following list identifies all documents that may be sources of reference for material discussed in this publication.

Document Title
XYR 6000 Wireless Valve Position Sensor, Model WCX Series Quick Start Guide
Getting Started with Honeywell OneWireless Solutions
OneWireless Wireless Builder User's Guide
OneWireless Builder Parameter Reference

Support and contact info

WARNING

Risk of death or serious injury from explosion or fire.

If sensor is to be returned to Honeywell for any reason, both batteries MUST be removed prior to shipping. Dispose of used batteries promptly per local regulations or the battery manufacturer's recommendations. Keep away from children. Do not disassemble and do not dispose of in fire.

Sales and Service

Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office or:

E-mail: info.sc@honeywell.com

Internet: www.honeywell.com/sensing

Phone and Fax:

Asia Pacific	+65 6355-2828 +65 6445-3033 Fax
Europe	+44 (0) 1698 481481 +44 (0) 1698 481676 Fax
Latin America	+1-305-805-8188 +1-305-883-8257 Fax
USA/Canada	+1-800-537-6945 +1-815-235-6847 +1-815-235-6545 Fax

Symbol Definitions

The following table lists those symbols used in this document to denote certain conditions.

Symbol	Definition
	**ATTENTION:** Identifies information that requires special consideration.
	**TIP:** Identifies advice or hints for the user, often in terms of performing a task.
CAUTION	Indicates a situation which, if not avoided, may result in equipment or work (data) on the system being damaged or lost, or may result in the inability to properly operate the process.
	**CAUTION**: Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices. **CAUTION** symbol on the equipment refers the user to the product manual for additional information. The symbol appears next to required information in the manual.
	**WARNING**: Indicates a potentially hazardous situation, which, if not avoided, could result in serious injury or death. **WARNING** symbol on the equipment refers the user to the product manual for additional information. The symbol appears next to required information in the manual.
	**WARNING, Risk of electrical shock**: Potential shock hazard where HAZARDOUS LIVE voltages greater than 30 Vrms, 42.4 Vpeak, or 60 VDC may be accessible.
	**ESD HAZARD:** Danger of an electro-static discharge to which equipment may be sensitive. Observe precautions for handling electrostatic sensitive devices.
	**Protective Earth (PE) terminal**: Provided for connection of the protective earth (green or green/yellow) supply system conductor.
	**Functional earth terminal**: Used for non-safety purposes such as noise immunity improvement. NOTE: This connection shall be bonded to Protective Earth at the source of supply in accordance with national local electrical code requirements.
	**Earth Ground**: **Functional earth connection.** NOTE: This connection shall be bonded to Protective Earth at the source of supply in accordance with national and local electrical code requirements.
	**Chassis Ground**: Identifies a connection to the chassis or frame of the equipment shall be bonded to Protective Earth at the source of supply in accordance with national and local electrical code requirements.

continued

Symbol	Description **Note: These are for reference only. See Section 2 for actual approvals**
	The Canadian Standards mark means the equipment has been tested and meets applicable standards for safety and/or performance.
	The Ex mark means the equipment complies with the requirements of the European standards that are harmonised with the 94/9/EC Directive (ATEX Directive, named after the French "ATmosphere EXplosible").
	For radio equipment used in the European Union in accordance with the R&TTE Directive the CE Mark and the notified body (NB) identification number is used when the NB is involved in the conformity assessment procedure. The alert sign must be used when a restriction on use (output power limit by a country at certain frequencies) applies to the equipment and must follow the CE marking.
	The C-Tick mark is a certification trade mark registered to ACMA (Australian Communications and Media Authority) in Australia under the Trade Marks Act 1995 and to RSM in New Zealand under section 47 of the NZ Trade Marks Act. The mark is only to be used in accordance with conditions laid down by ACMA and RSM. This mark is equal to the CE Mark used in the European Union. N314 directly under the logo is Honeywell's unique supplier identification number.

Contents

Tables

Figures

1. Introduction

1.1 Purpose

This manual describes the Honeywell OneWireless WCX Series Valve Position Sensor function, operation and maintenance.

1.2 Scope

The manual includes:

- Details of topics that relate uniquely to the Honeywell WCX Series Valve Position Sensor,
- This manual does not cover installation, mounting, or wiring. See XYR 6000 Wireless Valve Position Sensor, Model WCX Series Quick Start Guide (document 50040850).

1.3 OneWireless Network Overview

OneWireless is an all-digital, serial, two-way communication mesh network that interconnects industrial field sensors to a central system.

OneWireless has defined standards to which field devices and operator stations communicate with one another. The communications protocol is built as an "open system" to allow all field devices and equipment that are built to OneWireless standard to be integrated into a system, regardless of the device manufacturer. This interoperability of devices using OneWireless technology is to become an industry standard for automation systems.

1.4 About the Sensor

The WCX Series Valve Position Sensor is furnished with OneWireless interface to operate in a compatible distributed OneWireless system. The sensor will interoperate with any OneWireless-registered device.

The sensor includes OneWireless electronics for operating in a 2.4GHz network. It features function block architecture.

Input

The WCX Series Valve Position Sensor supports no electrical signal inputs.

The sensor measures a mechanical angular position and transmits a digital output signal proportional to the measured value. Figure 1 shows the functional diagram.

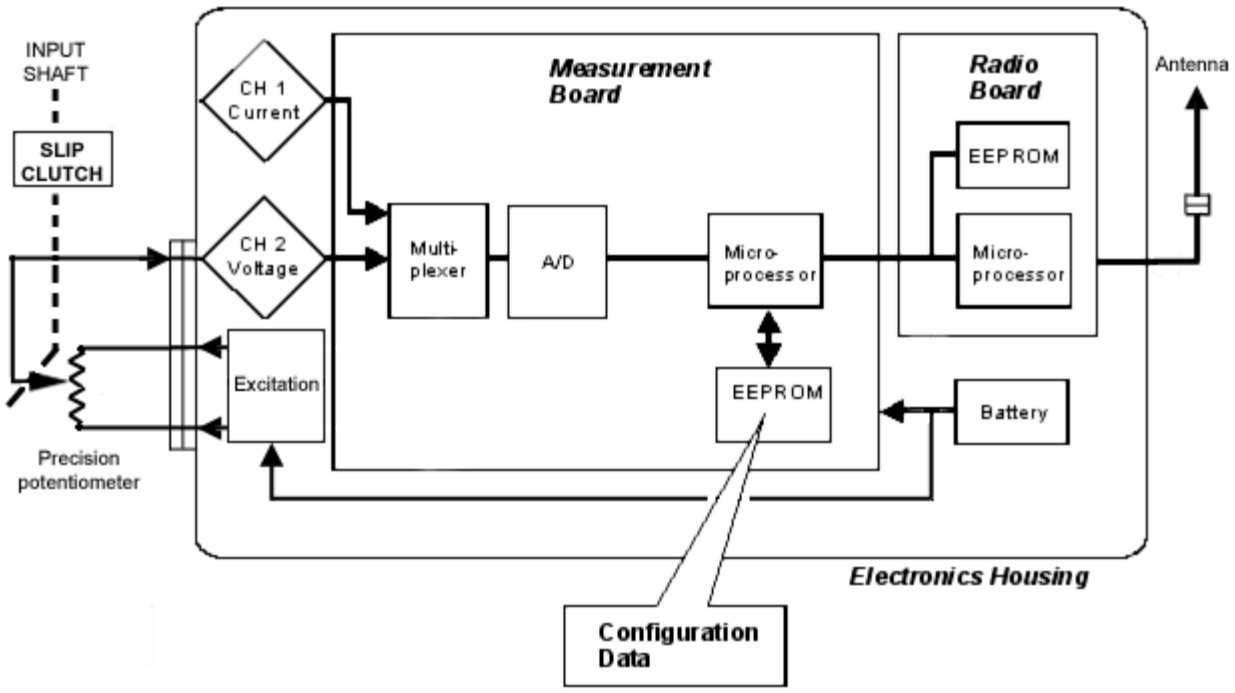


Figure 1 WCX Series Valve Position Sensor Functional Diagram

2. Specifications

2.1 European Union Usage

This product may be used in any of the following European Union nations.

Country	ISO 3166 2 letter code	Country	ISO 3166 2 letter code
Austria	AT	Latvia	LV
Belgium	BE	Liechtenstein	LI
Bulgaria	BG	Lithuania	LT
Cyprus	CY	Malta	MT
Czech Republic	CZ	Netherlands	NL
Denmark	DK	Norway	NO
Estonia	EE	Poland	PL
Finland	FI	Portugal	PT
France	FR	Romania	RO
Germany	DE	Slovakia	SK
Greece	GR	Slovenia	SI
Hungary	HU	Spain	ES
Iceland	IS	Sweden	SE
Ireland	IE	Switzerland	CH
Italy	IT	United Kingdom	BG

2.2 Certifications and Approvals

Sensor

See the product label for applicable approvals and ratings.

Approval / Item	Ratings / Description
cCSAus Explosion Proof with IS outputs	Class I, Division 1, Groups A, B, C & D Class II, Division 1, Groups E, F & G Class III
ATEX Flameproof with IS outputs	II 2 G Ex d [ia] IIB T4 II 2 D Ex tD A21 IP66 T85C
IEC Ex Flameproof with IS outputs	Ex d [ia] IIB T4: DIP A21 IP66 T85C
Enclosure Type	Types 1, 3, 4, 4X, 6, 6P, 13 and IP66/67
Class II and III installations and for Type 4X/IP66 applications require that all cable and unused entries be sealed with a Zone 1 certified seal fitting. Seal fittings are supplied by Honeywell.	

For detailed sensor specifications see the following Specification and Model Selection Guide.

- WCX Series Valve Position Sensor Installation Drawing

Authentication Device

Install the Authentication Device application on any PDA having

- Windows Mobile version 4.2+
- infrared port.

2.3 Agency Compliance Information

This section contains the Federal Communications Commission (FCC), Industry Canada (IC) and Radio Frequency compliance statements for the OneWireless Multinode device.

ATTENTION

WCX Series Valve Position Sensor units must be professionally installed in accordance with the requirements specified in the *OneWireless XYR6000 Agency Compliance Professional Installation Guide.*

FCC compliance statements

- This device complies with Part 15 of FCC Rules and Regulations. Operation is subject to the following two conditions: (1) This device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.
- This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radiofrequency energy and, if not installed and used in accordance with these instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.
- Intentional or unintentional changes or modifications must not be made to the Multinode unless under the express consent of the party responsible for compliance. Any such modifications could void the user's authority to operate the equipment and will void the manufacturer's warranty.

IC compliance statements

- To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropic radiated power (EIRP) is not more than that permitted for successful communication.
- Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.
- This Class A digital apparatus complies with Canadian ICES-003.
- French: Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Radio Frequency (RF) statement

To comply with FCC's and Industry Canada's RF exposure requirements, the following antenna installation and device operating configurations must be satisfied.

- Remote Point-to-Multi-Point antenna(s) for this unit must be fixed and mounted on outdoor permanent structures with a separation distance between the antenna(s) of greater than 20cm and a separation distance of at least 20cm from all persons.
- Remote Fixed Point–to-Point antenna(s) for this unit must be fixed and mounted on outdoor permanent structures with a separation distance between the antenna(s) of greater than 20cm and a separation distance of at least 100cm from all persons.
- Furthermore, when using integral antenna(s) the Multinode unit must not be co-located with any other antenna or transmitter device and have a separation distance of at least 20cm from all persons.

European Union restriction

France restricts outdoor use to 10mW (10dBm) EIRP in the frequency range of 2,454-2,483.5 MHz. Installations in France must limit EIRP to 10dBm, for operating modes utilizing frequencies in the range of 2,454 – 2,483.5MHz.

2.4 Honeywell European (CE) Declaration of Conformity (DoC)

This section contains the European Declaration of Conformity (DoC) statement, for the OneWireless product line.

R&TTE Directive	1999/5/EC	**LVD Directive**	2006/95/EC	**EMC Directive**	2004/108/EC	**ATEX Directive**	94/9/EC
Harmonized Standards							
Emissions Specification and Method: EN 300 328 V1.7.1 Emissions Spec and Method: EN 301 893 V1.4.1 Immunity Specification: EN 301 489-17 V1.2.1 Immunity Method: EN 301 489-1 V1.6.1 Product Standard: IEC61326-1 (1st Edition, 2002-02, Industrial Locations) EN 60079-0, "Electrical Apparatus for Potentially Explosive Atmospheres – General Requirements" EN 60079-15, "Electrical Apparatus for Potentially Explosive Atmospheres – Type of Protection "n"							
Manufacturer's Name and Address	Honeywell Sensing and Control 11 West Spring Street Freeport, IL USA						
Compliance Statement	The product herewith complies with the harmonized standards listed above. Typical product line systems and configurations have been tested, for compliance.						

European Declaration of Conformity statements

Language	Statement
Česky (Czech):	***Honeywell*** tímto prohlašuje, že tento ***Multinode*** je ve shodě se základními požadavky a dalšími příslušnými ustanoveními směrnice 1999/5/ES.
Dansk (Danish):	Undertegnede ***Honeywell*** erklærer herved, at følgende udstyr ***Multinode*** overholder de væsentlige krav og øvrige relevante krav i direktiv 1999/5/EF.
Deutsch (German):	Hiermit erklärt ***Honeywell***, dass sich das Gerät ***Multinode*** in Übereinstimmung mit den grundlegenden Anforderungen und den übrigen einschlägigen Bestimmungen der Richtlinie 1999/5/EG befindet.

Language	Statement
Eesti (Estonian):	Käesolevaga kinnitab ***Honeywell*** seadme ***Multinode*** vastavust direktiivi 1999/5/EÜ põhinõuetele ja nimetatud direktiivist tulenevatele teistele asjakohastele sätetele.
English	Hereby, ***Honeywell***, declares that this ***Multinode*** is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.
Español (Spanish):	Por medio de la presente ***Honeywell*** declara que el ***Multinode*** cumple con los requisitos esenciales y cualesquiera otras disposiciones aplicables o exigibles de la Directiva 1999/5/CE.
Ελληνική (Greek):	ΜΕ ΤΗΝ ΠΑΡΟΥΣΑ ***Honeywell*** ΔΗΛΩΝΕΙ ΟΤΙ ***Multinode*** ΣΥΜΜΟΡΦΩΝΕΤΑΙ ΠΡΟΣ ΤΙΣ ΟΥΣΙΩΔΕΙΣ ΑΠΑΙΤΗΣΕΙΣ ΚΑΙ ΤΙΣ ΛΟΙΠΕΣ ΣΧΕΤΙΚΕΣ ΔΙΑΤΑΞΕΙΣ ΤΗΣ ΟΔΗΓΙΑΣ 1999/5/ΕΚ.
Français (French):	Par la présente ***Honeywell*** déclare que l'appareil ***Multinode*** est conforme aux exigences essentielles et aux autres dispositions pertinentes de la directive 1999/5/CE.
Italiano (Italian):	Con la presente ***Honeywell*** dichiara che questo ***Multinode*** è conforme ai requisiti essenziali ed alle altre disposizioni pertinenti stabilite dalla direttiva 1999/5/CE.
Latviski (Latvian):	Ar šo ***Honeywell*** deklarē, ka ***Multinode*** atbilst Direktīvas 1999/5/EK būtiskajām prasībām un citiem ar to saistītajiem noteikumiem.
Lietuvių (Lithuanian):	Šiuo ***Honeywell*** deklaruoja, kad šis ***Multinode*** atitinka esminius reikalavimus ir kitas 1999/5/EB Direktyvos nuostatas.
Nederlands (Dutch):	Hierbij verklaart ***Honeywell*** dat het toestel ***Multinode*** in overeenstemming is met de essentiële eisen en de andere relevante bepalingen van richtlijn 1999/5/EG.
Malti (Maltese):	Hawnhekk, ***Honeywell***, jiddikjara li dan ***Multinode*** jikkonforma mal-ħtiġijiet essenzjali u ma provvedimenti oħrajn relevanti li hemm fid-Dirrettiva 1999/5/EC.
Magyar (Hungarian):	Alulírott, ***Honeywell*** nyilatkozom, hogy a ***Multinode*** megfelel a vonatkozó alapvetõ követelményeknek és az 1999/5/EC irányelv egyéb elõírásainak.
Polski (Polish):	Niniejszym ***Honeywell*** oświadcza, że ***Multinode*** jest zgodny z zasadniczymi wymogami oraz pozostałymi stosownymi postanowieniami Dyrektywy 1999/5/EC.
Português (Portuguese):	***Honeywell*** declara que este ***Multinode*** está conforme com os requisitos essenciais e outras disposições da Directiva 1999/5/CE.
Slovensko (Slovenian):	***Honeywell*** izjavlja, da je ta ***Multinode*** v skladu z bistvenimi zahtevami in ostalimi relevantnimi določili direktive 1999/5/ES.
Slovensky (Slovak):	***Honeywell*** týmto vyhlasuje, že ***Multinode*** spĺňa základné požiadavky a všetky príslušné ustanovenia Smernice 1999/5/ES.
Suomi (Finnish):	***Honeywell*** vakuuttaa täten että ***Multinode*** tyyppinen laite on direktiivin 1999/5/EY oleellisten vaatimusten ja sitä koskevien direktiivin muiden ehtojen mukainen.
Svenska (Swedish):	Härmed intygar ***Honeywell*** att denna ***Multinode*** står I överensstämmelse med de väsentliga egenskapskrav och övriga relevanta bestämmelser som framgår av direktiv 1999/5/EG.

Language	Statement
Íslenska (Icelandic):	Hér með lýsir ***Honeywell*** yfir því að ***Multinode*** er í samræmi við grunnkröfur og aðrar kröfur, sem gerðar eru í tilskipun 1999/5/EC.
Norsk (Norwegian):	***Honeywell*** erklærer herved at utstyret ***Multinode*** er i samsvar med de grunnleggende krav og øvrige relevante krav i direktiv 1999/5/EF.

For more information about the R&TTE Directive

The following website contains additional information about the Radio and Telecommunications Terminal Equipment (R&TTE) directive:

http://ec.europa.eu/enterprise/rtte/faq.htm

3. Preparation

3.1 Battery Connecting Procedure

WARNING

Risk of death or serious injury from explosion or fire.

Connection and disconnection of the batteries should be done only when the area is non-hazardous.

WARNING

Risk of death or serious injury from explosion or fire.

If sensor is to be returned to Honeywell for any reason, both batteries MUST be removed prior to shipping. Dispose of used batteries promptly per local regulations or the battery manufacturer's recommendations. Keep away from children. Do not disassemble and do not dispose of in fire.

ATTENTION

Both batteries must be the same model from the same manufacturer. Mixing old and new batteries or different manufacturers is not permitted.

Use only the following 3.6V lithium thionyl chloride (Li-SOCl2) batteries (non-rechargeable), size C. No other batteries are approved for use in WCX Series Valve Position Sensors.

- Xeno Energy XL-145F
- Tadiran TL-5920/S

Table 1 Battery Connecting Procedure

(For item numbers, refer to Figures 2 and 3)

Step	Action
1	If applicable, remove two T-15 TORX screws (1) and cover lock clamp (2).
2	If necessary, place a large screwdriver or other flat tool across the two tabs on the cover (3). Unscrew and remove the cover.
3	Using two fingers, press down slightly on both battery tops (4) and remove battery insulator (5). Insure that the batteries are properly seated and making good contact.
4	Replace cover, tightening hand tight. If applicable, replace cover lock clamp (2) and two T-15 TORX screws (1).

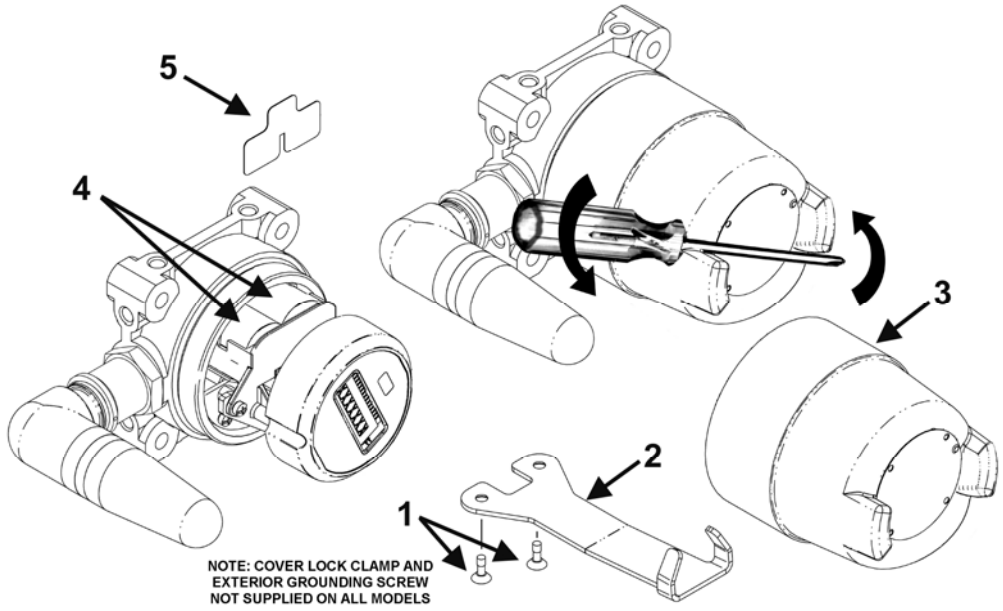


Figure 2 Battery connecting

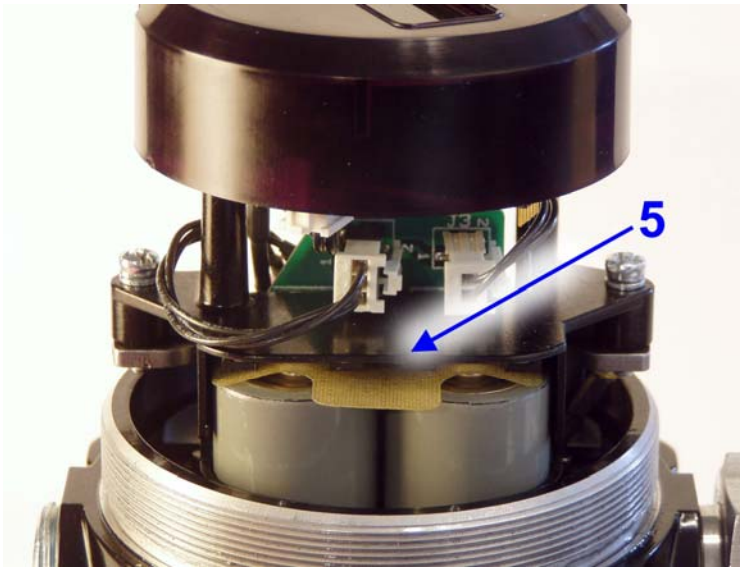


Figure 3 Battery connecting detail

3.2 Installation

Refer to the WCX Series Valve Position Sensor Quick Start Guide (document 50040850) for installation and mounting of your WCX Valve Position Sensor.

3.3 Antenna Adjustment and Mounting

Requirements

- **Radio Installation Requirements**

ATTENTION

Professional Installation is required to insure conformity with Federal Communications Commission (FCC) in the USA, Industry Canada (IC) in Canada and the Radio and Telecommunications Terminal Equipment Directive, 1999/5/EC (R&TTE), in the European Union (EU).

Professional installation is required for the selection and installation of approved antennas and setup of the maximum allowable radiated power from the WCX Series Valve Position Sensor as configured for the particular installation site.

The antennae used for this sensor must be installed to provide a separation distance of at least 20 cm (8 inches) from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

For remote antenna, see antenna installation requirements to satisfy FCC RF exposure requirements.

ATTENTION

Federal Communications Commission (FCC):

The WCX Series Valve Position Sensors comply with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Industry Canada (IC):

The installer of this radio equipment must ensure that the antenna is located or pointed such that it does not emit RF fields in excess of Health Canada limits for the general population; consult Safety Code 6, obtainable from Health Canada's web site www.hc-sc.gc.ca/rpb.

Integral Antenna

WARNING

POTENTIAL ELECTROSTATIC CHARGING HAZARD

The integrally mounted antenna shroud is made of Teflon® and has a surface resistance greater than 1Gohm per square. When the WCX Series Valve Position Sensor is installed in potentially hazardous locations care should be taken not to electrostatically charge the surface of the antenna shroud by rubbing the surface with a cloth, or cleaning the surface with a solvent. If electrostatically charged, discharge of the antenna shroud to a person or a tool could possibly ignite a surrounding hazardous atmosphere.

- **Elbow**

Figure 4 Elbow antenna adjustment

If your model has the integral elbow antenna you can adjust it to improve reception. The least signal radiation is in a direction in line with the top (pointed end), so it is best to avoid having the antenna pointed directly toward, or directly away from, the multinode. Typically, pointed straight up gives best performance but your installation may vary. Loosen the 1.5mm (approx. 1/16") set screw located near the antenna base. Rotate antenna for best reception. Do not rotate antenna more than 180 degrees either direction or the internal antenna cable could be damaged. Tighten set screw.

- **Straight**

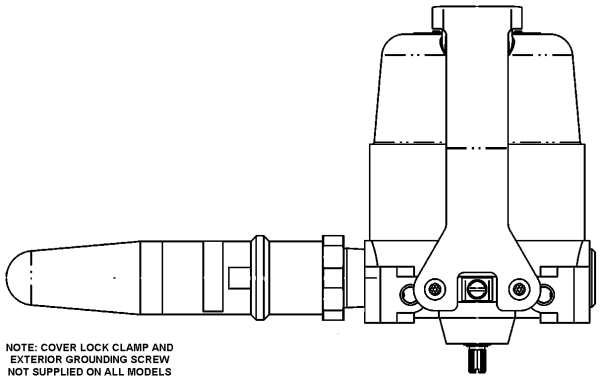


Figure 5 Integral straight antenna

If your model has the integral straight antenna you can adjust its position by rotating the sensor housing. (See section 2). Typically, pointed straight up gives best performance but your installation may vary.

3.4 Configuration

The WCX Valve Position Sensor contains a mechanical interface compatible for connecting to the OneWireless network. An operator uses the Wireless Builder application to configure blocks, to change operating parameters, and to create linkages between blocks that make up the sensor's configuration. These changes are written to the sensor when it is authenticated by a security key. See Section 5.

3.5 Connecting to Network

Use Authentication Device to connect your sensor to the OneWireless network. See Section 5.

3.6 Calibrating the Sensor

ATTENTION

The WCX Valve Position Sensor input shaft is connected to the potentiometer through a slip clutch, limiting the rotation of the potentiometer to 312 deg. However, due to nonlinearity at each end of the potentiometer rotation, the actual usable range of rotation is 270 degrees. If the sensor has been calibrated, and later, the input shaft may have been allowed to rotate past the potentiometer end points (where the slip clutch must slip), then the "setting the device angle" procedures must be repeated.

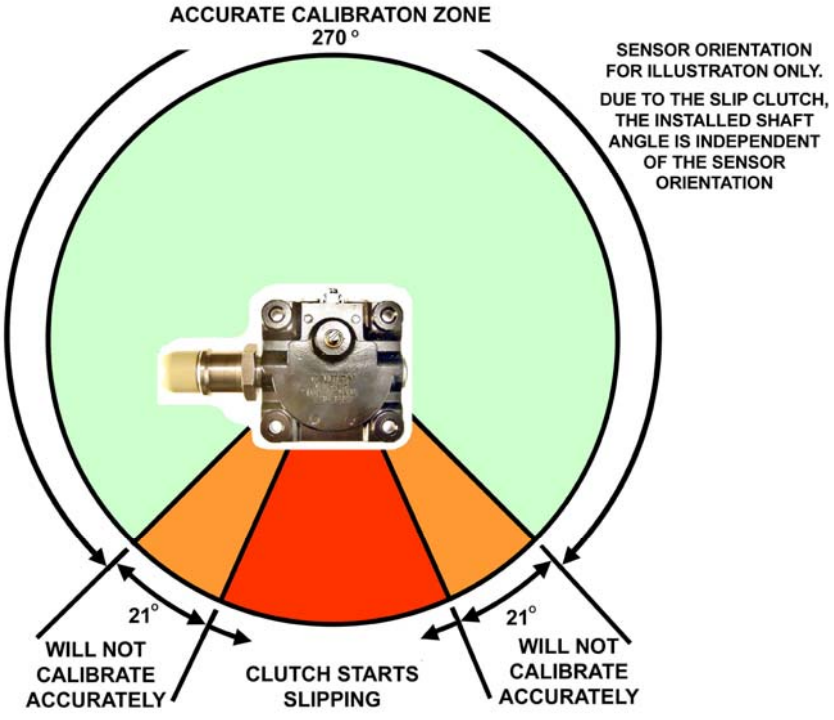


Figure 6 Calibration Angles Permitted

Methods

- Connecting, commissioning and setting device angle (see Table 2)

The following optional calibration methods are available through the sensor menu.

- Hi-Lo User Calibration (Table 3) - Calibrates the channel to the low and high range values for the input.
- Restore Calibration (Table 5) - constants for the channel 1 are restored to factory defaults.
- Clear Calibration (Table 6) - FACTORY or USER Calibration constants for the channel can be cleared.

Wireless Builder

Wireless Builder must be used to unlock and take the channel to be calibrated out of service.

The measurement update rate can be set from Wireless Builder; it cannot be set locally through the IR port.

Cal Unit (CAL_UNIT) can be set from Wireless Builder. This determines what the measurement will be displayed as. The choices for the WCX Series are:

Deg.	Degrees of rotation (Default)	Max Range 270° (may be 0-270° or -135° to +135° for example)
Percent	Percent of Max rotation	Max Range 0% to 100% 0% would be shaft fully CCW (looking at shaft)
Volts DC	Internal potentiometer Voltage	Max Range 0.0 v. to + 1.7 v. nominal This is normally used for factory calibration.

Table 2 - Connecting, Commissioning, and Setting Angle

Step	Action
1	Connecting device to OneWireless network
1.1	If applicable, remove two T-15 TORX screws and cover lock clamp.
1.2	Using a screwdriver or other tool across the two tabs of the cover, unscrew and remove the cover.
1.3	Using authentication device pointed at IR port, clear key and restart WCX transmitter.
1.4	After transmitter restarts, using authentication device, transmit key and connect transmitter.
1.5	Device will go through discovery mode, then secure itself to OneWireless network. After this phase, transmitter will appear in Wireless Builder as an uncommissioned device.
2	Commissioning device in Wireless Builder
2.1	**If this is not the first WCX Unit installed in this system, go to step 2.3**, go to File->New->Type->Wireless Device, then find the path of the WCX DD Files.
2.2	Select the device that appears, then click OK, this creates a new device type in wireless builder.
2.3	In Wireless Builder: Offline Tab, right-click, go to New->Devices->(WCX_DD_FILE_NAME) (this will create an offline configuration for the new device).
2.4	If device appears below “Unassigned” category, click and drag it into the wireless gateway.
2.5	Right-click on the newly created, offline device and go to Device Match.
2.6	In the device matching window, select both the offline device and uncommissioned device and click “Match from Uncommissioned Device to Project Device”. (This allows the factory settings to automatically overwrite the DD files.)
2.7	After device has been matched, click OK.
2.8	Right click on the offline device and click “Load”, Select all check boxes at the bottom of the window, then click OK.
2.9	Now the device should be successfully loaded in Online mode and transmitting data.
	**ATTENTION** If the sensor or input linkage has been removed since the last successful calibration, and the input shaft may have rotated past the potentiometer end points (where the slip clutch must slip), then re-setting the device angle (steps 3-3.9) will be required (See Figure 2).
3	Setting WCX Sensor to valve (after device has been commissioned)
3.1	In the Offline window, double-click on the WCX transducer block (small rectangle with a T inside), the parameters page will open.
3.2	In the Configuration tab, note the current update rate setting. If it is set to the default value of 30 seconds, change the "Period" to 5 seconds. This will greatly speed up the calibration. Click OK. Note that a period of 1 second would update faster but would also introduce noise, which would make calibration more difficult.
3.3	In the Offline window, right-click on the WCX Main block and click Load…
3.4	Ensure that “State to Load” is set to OOS and “Post Load State” is set to Normal, and both boxes at the bottom of the window are checked. This will change the update rate on the sensor and re-load it.

Step	Action
	ATTENTION The sensor can read valve position in degrees from -135º at fully counter-clockwise to 135º at fully clockwise, however, for more accurate performance, a range of -125º to 125º or less is recommended.
3.5	Determine for the application what degree range the sensor will be required to read. NOTE: Hi-Lo User Calibration (optional) may be performed at this time. (See Table 3)
3.6	Turn the sensor shaft counter-clockwise 360º or more (as viewed from the shaft end). This will cause the slip clutch to slip, mechanically positioning the internal potentiometer with respect to the input shaft. While monitoring the sensor's LCD screen, turn the sensor shaft clockwise to obtain the desired angle reading for the valve's most CCW position.
3.7	NOTE: The sensor transmitter board is equipped with a filter to smooth values. This will slow the response of the reading. If the sensor update period was set to 5 seconds (as described in Step 3.2), readings may take 10 or more seconds to settle at the actual value. With the default update period of 30 seconds, readings may take several minutes to settle.
3.8	Set the valve to the position which the sensor will be reading at the most CCW position.
3.9	Mount the sensor onto valve arm. Re-check that the readout is correct. NOTE: If the valve is at position where the sensor will be reading fully CW, the above instructions can be followed simply by replacing all "CCW"s with "CW"s.
4	Reset parameters
4.1	In the Offline window, double-click on the WCX transducer block (small rectangle with a T inside), the parameters page will open.
4.2	In the Configuration tab, change "Period" to 30 seconds. Click OK. Note: If a different update rate is required by the application, it should be selected at this time.
4.3	In the Offline window, right-click on WCX Main block and click Load…
4.4	Ensure that "State to Load" is set to OOS and "Post Load State" is set to Normal, and both boxes at the bottom of the window are checked. This will change the update rate on the sensor and re-load it.
4.5	In the Main tab, change "Actual Mode" to AUTO.
4.6	Unit is now calibrated and active.
5	Replace cover
5.1	Lubricate the threads and "O" ring with a silicone grease such as Dow Corning #55 or equivalent.
5.2	By hand, screw on and tighten the cover.
5.3	If applicable, reinstall the cover lock clamp.

Table 3 - Hi-Lo User Calibration (Optional)

Step	Action
	ATTENTION If a numerical range other than -135º to 135º is desired, the Hi-Lo User Calibration instructions may be performed to provide a numerical range other than the default Example: Valve has 45º of Rotation and desired 0º point (closed) is actually at 35º EU Value @ 0: -135 - 35 = -170 EU Value @ 100: -170 + 794 = 624 This will make the closed position 0º and the open position 45º (or vice versa depending on application), and provide a total numerical range of -170º to 100º
1	Connect and Commission device to OneWireless network
1.1	If applicable, perform Steps 1 through 2.9 of Table 2
2	Set WCX Sensor to valve
2.1	If applicable, perform Steps 3.0 through 3.4 of Table 2
3	Perform Hi-Lo User Calibration
3.1	In the online window, double click on the WCX Transducer Block
3.2	In the Main Tab, set Actual Mode to OOS
3.3	In the Ranges Tab, Set EU Value @ 0 to -135 minus the desired 0º point (example is 35º)
3.4	Set EU Value @ 100 to: 794 plus the EU Value @ 0 (example is -170º)
3.5	In the Main Tab, set Actual Mode to Auto
4	Reset parameters, replace cover
4.1	As applicable, perform Steps 4 through 5.3 of Table 2

Table 4 - Calibration Error Messages

Message	Meaning
CALIBRATION_FAIL	1. Calibration gain is greater than 5%. 2. Calibration offset is greater than 5% of sensor span.
BAD_TRIM_POINT	CAL_POINT_HI is greater than sensor high range value OR CAL_POINT_LO is less than greater than sensor low range value.
BAD_USER_CALIBRATION	CAL_SOURCE is user and user calibration constants contain invalid values.
BAD_FACTORY_CALIBRATION	1. CAL_SOURCE is factory and factory calibration constants do not contain valid values. 2. CAL_RESTORE command was issued but factory calibration constants do not contain valid values.
BAD_SENSOR	1. Check connections to internal precision potentiometer. 2. Rotate shaft and observe proper operation of slip clutch.

Message	Meaning
BAD_UNITS	Units in CAL UNITS parameter are invalid or not supported by the sensor type.
INTERNAL_ERROR	An error occurred during calibration that prevents calibration from being completed successfully.
SUCCESS_WITH_EXCESS	The calibration succeeded but the calculated calibration values are greater than 5 percent beyond the normal calibration values. Typically this indicates that the applied calibration value was significantly different from the expected value or that the sensor is not within expected tolerances for the applied characterization.

Table 5 - Restore Calibration

Step	Action
1	If not already open, remove cover lock clamp (if applicable) and cover per previous Table 1.
2	In Wireless Builder, set sensor's Write Lock to Unlocked.
3	In Wireless Builder, set the sensor's channel to OOS (Out of Service).
4	Use Authentication Device's Device Local Configuration buttons to navigate to the sensor's CAL menu. If the sensor is locked a LOCKED message will be displayed. Go to step 1. If CAL menu is passcode protected, enter the passcode. If the channel is not out of service a WRONG MODE message will be displayed. Go to step 2.
5	• Select CAL RSTR by scrolling through menu. • Press Enter to continue. • Display will say BUSY, then SUCCESS. • If calibration is unsuccessful an error message is displayed. See Table 3. • Press Enter to return to PV display.
6	Exit the menu.
7	When ready, in Wireless Builder return the sensor's channel to service and set Write Lock to Locked.
8	Reinstall cover and cable lock clamp (if applicable) per previous Table 1.

Table 6 - Clear Calibration

Step	Action
1	If not already open, remove cover lock clamp (If applicable) and cover per previous Table 1.
2	In Wireless Builder, set sensor's Write Lock to Unlocked.
3	In Wireless Builder, set the sensor's channel to OOS (Out of Service).
4	Use Authentication Device's Device Local Configuration buttons to navigate to the sensor's CAL menu. If the sensor is locked a LOCKED message will be displayed. Go to step 1. If CAL menu is passcode protected, enter the passcode. If the channel is not out of service a WRONG MODE message will be displayed. Go to step 2.
5	• Select CAL CLR by scrolling through menu. • Press Enter to continue. • Display will say BUSY, then SUCCESS.
6	Exit the menu.
7	Reinstall cover and cable lock clamp (if applicable) per previous Table 1.

4. Function Blocks

4.1 Introduction

This section explains the construction and contents of the WCX Series Valve Position Sensor Function Blocks.

4.2 Block Description

Block types

Blocks are the key elements that make up the sensor's configuration. The blocks contain data (block objects and parameters) which define the application, such as the inputs and outputs, signal processing and connections to other applications. The WCX Series Valve Position Sensor contains the following block types.

Block Type	Function
Device	Contains parameters related to the overall field device rather than a specific input or output channel within it. A field device has exactly one device block.
AITB	Contains parameters related to a specific process input or output channel in a measurement or actuation device. An AITB defines a measurement sensor channel for an analog process variable represented by a floating-point value. There is one AITB per sensor.
Radio	Contains parameters related to radio communication between the sensor and the multimode(s).

Block diagram

Figure 7 shows the blocks of the WCX Series Valve Position Sensor.

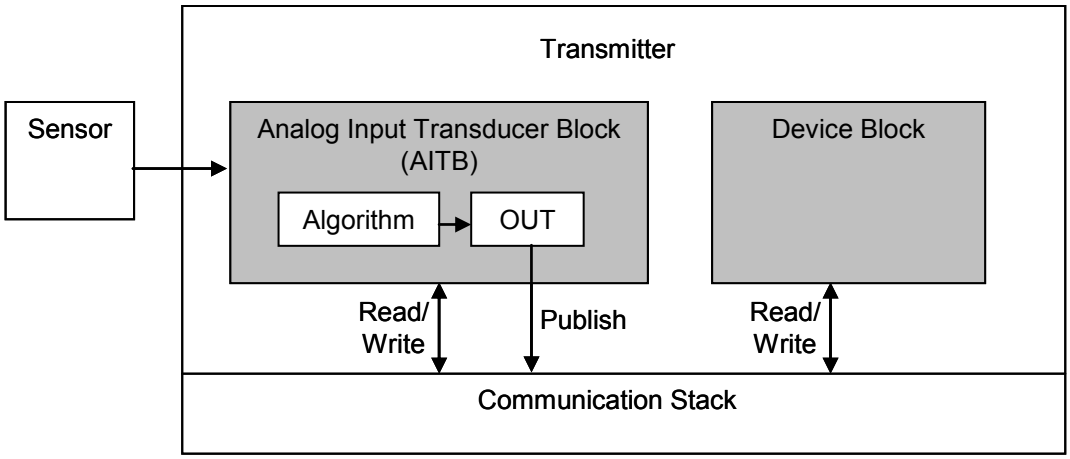


Figure 7 Block Diagram

Each of these blocks contains parameters that are standard OneWireless-sensor defined parameters. The AITB and device blocks contain standard parameters common to the WCX Series sensor models (that is,

degrees of rotation, voltage, percentage). The radio block contains parameters for communication with the wireless network.

4.3 Parameter Details

The sensor itself displays a few basic parameters, such as tag, serial number, device revision, build, device address, WFN ID.

For more information on parameters, refer to the following documents.

- OneWireless Wireless Builder User's Guide
- OneWireless Builder Parameter Reference

5. Operation

5.1 Overview

Display modes

The sensor has the following display modes.

- **Test**. Appears briefly after power-up to self-test the display.
- **Connection status**. Appears when sensor is not fully connected to the OneWireless network. See section 5.2.
- **PV display**. Default mode of the sensor displays the PV and any status messages. See section 5.3 on page 23.
- **Quick view** of sensor identification parameters. Displays read-only parameters then returns to PV display. See section 5.4 on page 26.
- **Menu**. See section 5.5 on page 28.

Authentication Device

To navigate the sensor displays and menus, remove cover and hold the Authentication Device no more than 6" from the sensor and aim the infrared beam at the sensor display while tapping the Device Local Configuration buttons (Table 12). You can also use the PDA's buttons.

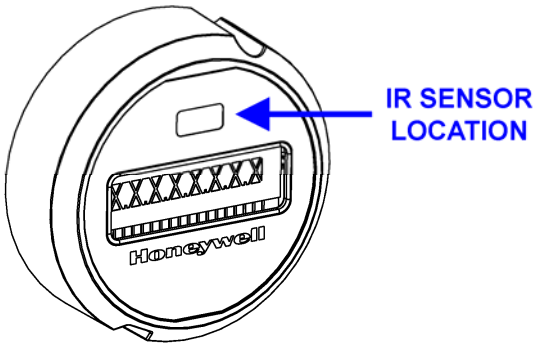


Figure 8 IR Sensor Locations

Authentication Device menus are described in section 5.6 starting on page 29.

5.2 Sensor Connection Status

Table 7 WCX Sensor Connection Status

Displayed status	Definition	What to do
NO KEY	Sensor needs a key from the Authentication Device and is not transmitting.	Transmit a key to the sensor. See page 30.
NOT CONN	Sensor is in between discovery attempts.	If Sensor does not make a connection within five minutes, do the following: • Check that Key is correct for the network you are trying to join. • Check that Multinode(s) in the local area are turned on and are already a secure part of the network. • Check if KeyServer is active. • Check the KeyServer Event Log to see if the Sensor is actively trying to join. Errors in the Event Log show that the Sensor is trying to join but that there are problems. Consult the OneWireless Wireless Builder documentation for troubleshooting errors.
DISCOVER	Sensor has not made a connection to a Multinode and is in discovery (searching for a connection to a Multinode). Sensor will automatically enter a power saving mode if it cannot make a connection and will retry later.	Wait for connection. If Sensor does not make a connection within five minutes, see NOT CONN in this table.
SECURING	Sensor has connected with the network and is validating its key.	Wait for connection. If Sensor does not make a connection within five minutes, see NOT CONN in this table.
CONNECTD	Sensor has validated the key and has made a secure connection with at least two Multinodes. Sensor should appear in Wireless Builder as an uncommissioned device.	No action required.
NO REDUN	No redundancy, that is, Sensor has connected with only one Multinode.	No action required. The Sensor will periodically look for a second Multinode in order to form a redundant connection to the network

5.3 Sensor PV Display

In PV display, the following information is displayed in sequence.

Item displayed	Example	Details
Channel number	1	Channel number.

PV value	50.0	Latest PV value.
PV engineering units	Deg., Volts DC, or Percent	See Table 8.
PV status	BAD	See Table 9. If PV status is not displayed then the PV value is good.
Device status	LOW BATT	See Table 10. If multiple device status messages are in effect, they are displayed one message per channel until all messages have been displayed. If no device status is displayed then the device status is normal.

Table 8 PV Engineering Units

Engineering units	Description
Deg.	degrees of rotation *(default units)*
% (Percent)	Percent
Voltage (D.C. Voltage)	internal voltage measured

Table 9 PV Status

PV status	Cause - Action
(blank)	• PV is normal – no action required
BAD	• Possible calibration error – Clear calibration • AITB can not execute due to internal firmware state – Attempt cold restart of device. • AITB can not execute due to hardware fault – Sensor module must be replaced • Sensor failure – Check the following. – connection between sensor board and potentiometer – reference source connections on battery holder – proper engagement of input shaft to potentiometer shaft
UNC	• Warning: Input inaccurate due to uncertain input data integrity. Warning: Input inaccurate due to input conversion limitations or resolution.

Table 10 Device Status

Sensor display	Wireless Builder display	Definition	What to do

Sensor display	Wireless Builder display	Definition	What to do
OUT SVC	OOS	All channels are out of service.	Restore mode to Auto in Wireless Builder.
CAL ERR	Calibration Error	Calibration Data Invalid or could not be read.	Use Cal Clear, Restore, or User Calibrate.
CFG ERR	Configuration Error	Configuration Check Error.	Database is corrupted. Cold start and reload configuration.
LOW BAT	Low Battery	Battery Voltage Critically Low	Replace batteries as soon as possible. See page 36.
NO RADIO	Radio Interprocessor Comm Error	Radio Board is not accessible.	Restart both the radio and sensor. If condition persists, sensor module must be replaced.
BAD RADIO SPI	Sensor Radio SPI Communication Failure	Radio detected loss of communication with sensor board over the inter-processor communication link.	Restart both the radio and sensor. If condition persists, sensor module must be replaced.
BAD RADIO EEPROM	EEPROM SPI Communication Failure	Radio EEPROM SPI Communication failure	The radio will not be able to perform firmware upgrades but will operate normally using installed code. Sensor module should be replaced.
RADIO WDT RESET	WDT Reset Occurred	Radio Watch Dog Timeout detected	Restart both the radio and sensor. If condition persists, sensor module must be replaced.
BAD RADIO	Radio Circuitry Failure	Radio circuitry has failed	The radio processor detected error on internal radio circuitry. Sensor module must be replaced.
The following status messages have multiple meanings. Refer to Wireless Builder Device Status for exact cause.			
E FAIL	A/D Failure	Diagnostics detected defect with Analog to Digital Converter.	Sensor module must be replaced.
E FAIL	Electronics Failure	Electronic Failure detected on Sensor Board. **Could be caused by one of the status items marked by *.**	Restart both the radio and sensor. If condition persists, sensor module must be replaced.
E FAIL*	NVM Fault*	Startup diagnostics detected defect in Sensor Non-Volatile Memory	Sensor module must be replaced.
E FAIL*	Program Memory Fault*	Startup diagnostics detected defect in Sensor Read Only Memory	Sensor module must be replaced.

Sensor display	Wireless Builder display	Definition	What to do
E FAIL*	RAM Fault*	Startup diagnostics detected defect in Processor Random Access Memory	Sensor module must be replaced..
INP FAIL	Input Failure	Input Error	Check potentiometer connections. Verify that slip clutch is properly engaged with input shaft. Check slip clutch operation. Restart the sensor. If condition persists, sensor module must be replaced.
INP FAIL	A/D Failure	Diagnostics detected defect with Analog to Digital Converter.	Sensor module must be replaced.
The following statuses are displayed only in Wireless Builder Device Status.			
blank*	Device/Firmware Mismatch*	Sensor Board Firmware Error. The software did not pass verification tests.	Sensor module must be replaced.
blank*	Heap Memory Not Available*	Heap Allocation Failure. Software detected heap shortage and some communication packets may have been dropped.	Clear by warm restart of device. If condition persists contact Honeywell service.
blank*	Watchdog Timer Error*	Sensor Watchdog Timeout. The processor was restarted due to unexpected operation.	Clear by warm restart of device. If condition persists contact Honeywell service.

5.4 Sensor Quick View of Parameters

If you press the up or down arrow key during the PV display, the following quick view parameters are shown sequentially, then the PV display resumes.

Parameter	Description
Sensor type	HONEYWELL WCX Valve Position Sensor
Tag	The name given to this sensor
Serial number	Sensor serial number. This is the WBSN on the sensor's nameplate. Do not confuse this with the other nameplate item marked "Serial."
Device revision	This parameter changes whenever objects and parameters are added, deleted, or the data type or range changes. It does not change if the

Parameter	Description
	application firmware changes without affecting the device description.
Build	Sensor firmware number

5.5 Sensor Menu

Menu tree

At the PV display, press Enter to access the menus. To interact with the menus use the Device Local Configuration onscreen buttons (page 32) or the buttons on your PDA.

Table 11 Menu Tree

Menu item	Description
CAL	Calibration menu. May be password-protected. See Table 12 on page 32 for password number entry. See page 13 for calibration details.
CAL RESTR	Constants for the channel 1 are restored to factory defaults.
USER CAL	Calibrates the channel to the low and high range values for selected input type.
CAL CLR	FACTORY or USER Calibration constants for the channel can be cleared.
RADIO	Radio menu
PRI RSSI	Primary receive signal strength. Read only. Signal strength 00 is too weak to connect to the network. Displayed Value / Value dBm / Rx Margin dB 00 / < -86 / < 10 01 / -86 to -81 / 10 to 15 02 / -80 to -75 / 16 to 21 03 / -74 to -69 / 22 to 27 04 / -68 to -63 / 28 to 33 05 / -62 to -57 / 34 to 39 06 / -56 to -51 / 40 to 45 07 / -50 to -45 / 46 to 51 08 / -44 to -11 / 52 to 85 09 / ≥ -10 / Saturation
SEC RSSI	Secondary receive signal strength. Same as PRI RSSI. Read only.
WFN ID	Wireless Field Network ID. Read only.
DEV ADD	Device address. Read only.
TX POWER	Radio transmit power. Read only.

5.6 Authentication Device Menus

Overview

Hold the Authentication Device no more than 6” (15 cm) from the sensor and aim the infrared beam at the sensor display while tapping on the screen command or button.

Main menu

The main menu is shown below. Details start on the next page.

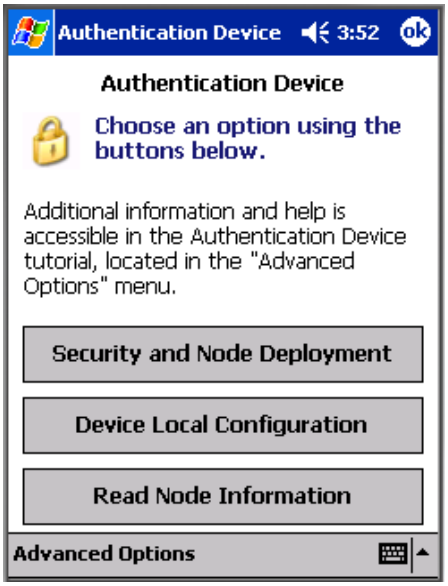


Figure 9 Main Menu

Security and Node Deployment

Use this to:

- receive new security keys,
- transmit security keys for connecting the sensor (or other nodes) to the OneWireless network,
- clear all security keys from the PDA,
- clear the sensor's key and reset its configuration to factory default (such as for decommissioning).

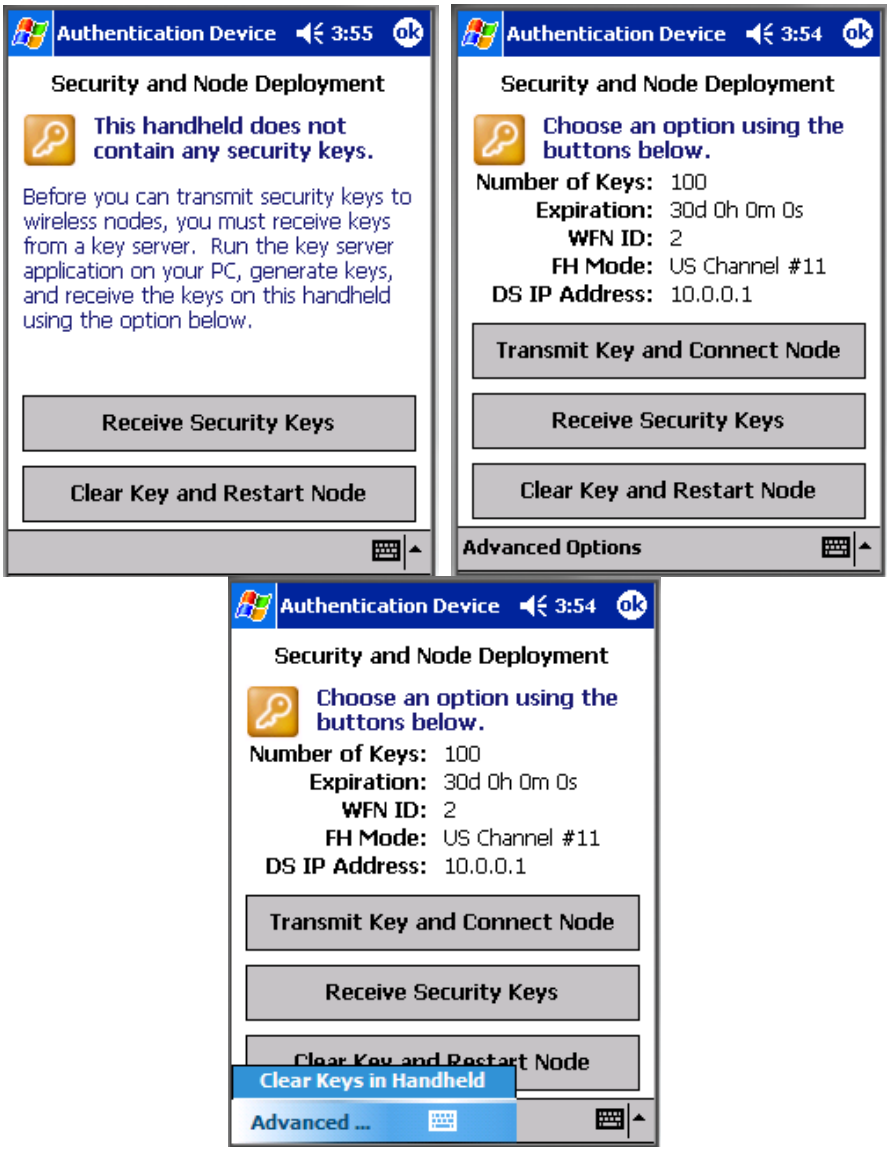


Figure 10 Security and Device Deployment

To connect your sensor to the OneWireless network perform the following steps.

Step	Action
1	If the PDA contains no keys, obtain new security keys from the PC application Key Server Manager. To do this, select **Receive Security Keys**. Keys can be received either through Infrared (by aiming PDA at the infrared dongle) or through an ActiveSync/USB connection. See **Key Server Communication Method** under Advanced options on page 35 for details. **Important**: The Comm Method settings must match in the PC's Key Server Manager and in the Authentication Device (both must be set to Infrared or both to ActiveSync) in order for your PDA to receive security keys. See **Key Server Communication Method** under Advanced options on page page 35 for details.
2	When the Authentication Device has valid unexpired keys, aim it at the sensor and transmit a key to the sensor. The sensor will validate the key and then use it to make a connection to the OneWireless Network. The Sensor may continue to show the diagnostic message "NO KEY" for a brief time while it validates the key before showing the "DISCOVER" message. To verify your sensor has been authenticated, see the Connection prompt on the Read Node Info screen (page 33).

To decommission your sensor from the OneWireless network, select **Clear Key and Restart Node**. This clears the sensor's key, network and security configurations, and resets the sensor to its factory default settings. perform the following steps.

Select **Clear Keys from Handheld** (under Advanced Options) when:

- The PDA has keys from one system, but you have moved your Authentication Device to another system, or
- You want to clear all keys so that you cannot deploy any more keys without going to the key server manager and getting more.

For more details on keys, refer to Getting Started with Honeywell OneWireless Solutions.

Device Local Configuration

Use Device Local Configuration buttons (Table 12) to navigate the sensor menus (Table 11) and to make selections and changes. You can also use the PDA buttons.

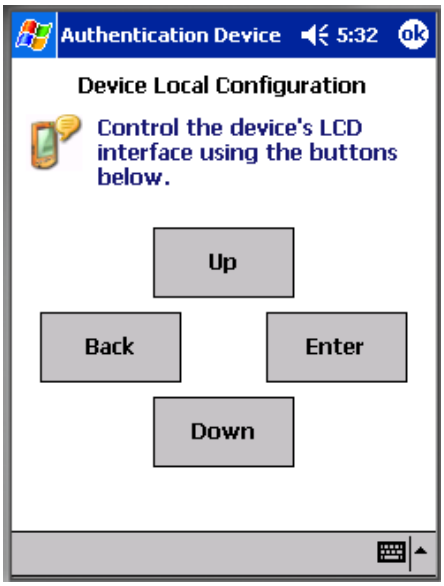


Figure 11 Device Local Configuration Screen

Table 12 Buttons for Device Local Configuration

Button	Function
Enter	• Enter the Menu Tree. • Enter submenu of the menu that is appearing on the screen. • Execute action. • Submit the entered number while doing number entry. • Read value of certain displayed parameters.
Up	• Go to the next menu in the same level. • View quick view parameters in Normal Display Sequence (PV Display). • During number entry, increment the digit or change +/- sign.
Down	• Go to the previous menu in the same level. • View quick view parameters in Normal Display Sequence (PV Display). • During number entry, decrement the digit or change +/- sign.
Back	• Go to the upper menu level. • When changing a number value, move cursor to the left/more significant digit, then wrap around to the least significant digit.

Read Node Information

Use this to read the sensor's information shown in Figure 12. Similar to quick view parameters on the sensor display. (See page 26.)

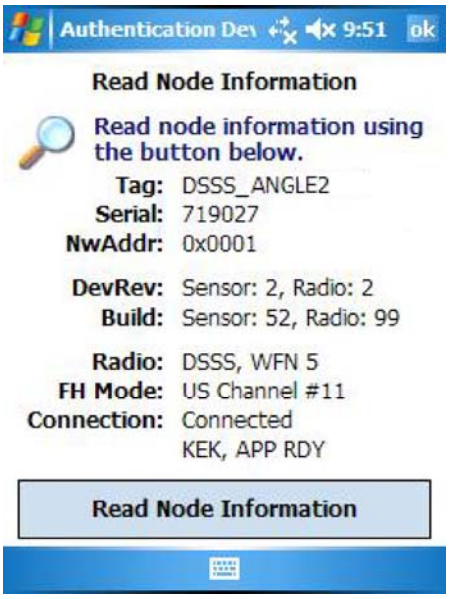


Figure 12 Read Node Information

Item	Description
Tag	The name given to this sensor
Serial	Sensor serial number. This is the WBSN on the sensor's nameplate. Do not confuse this with the other nameplate item marked "Serial."
NwAddr	Network Address of the device in hexadecimal.
DevRev	Device Revision. This parameter changes whenever objects and parameters are added, deleted, or their data type or range changes. It does not change if the application firmware changes without affecting the device description. Range: 0 to 65535.
Build	Sensor firmware and radio firmware build numbers.
Radio	Hardware radio type, FHSS or DSSS WFN ID: Wireless Field Network ID. Range: 0 to 255.

Item	Description
FH Mode	Frequency group or frequency channel selection used by the wireless network of the device. The value must match the value set in the gateway and interface nodes to allow communication between the device and the wireless network. Modes: US Channel #1 US Channel #6 US Channel #11 US Guard Bands EU Channel #1 EU Channel #7 EU Channel #13 EU Guard Bands US/EU Spec Div A US/EU Spec Div B US/EU Channel #3 US/EU Channel #10 Complete Spectrum
Connection	The first line displays one of the following connection states. No Security Key – No security key has been deployed to the device or multinode. The user must give a security key to the device or multinode before it will join the wireless sensor network. No Connection – A security key exists in the device or multinode, but no connection has been formed. The device or multinode is waiting to form a connection and will automatically retry shortly. Users may transmit a new security key in order to force the device or multinode to immediately retry to form a connection. Discovering – The device is attempting to form a connection to the wireless sensor network. The device is discovering multinodes and, if a multinode is found, will transition to the securing state. Securing – The device is attempting to form a connection to the wireless sensor network. The device has discovered one or two multinodes and is attempting to form a secure session. If successful, the device will transition to the connected state. Connected – A secure connection is formed with one or two multinodes. The second line contains detailed state information useful for problem reporting.

Advanced Options

Advanced options are non-typical configuration commands.

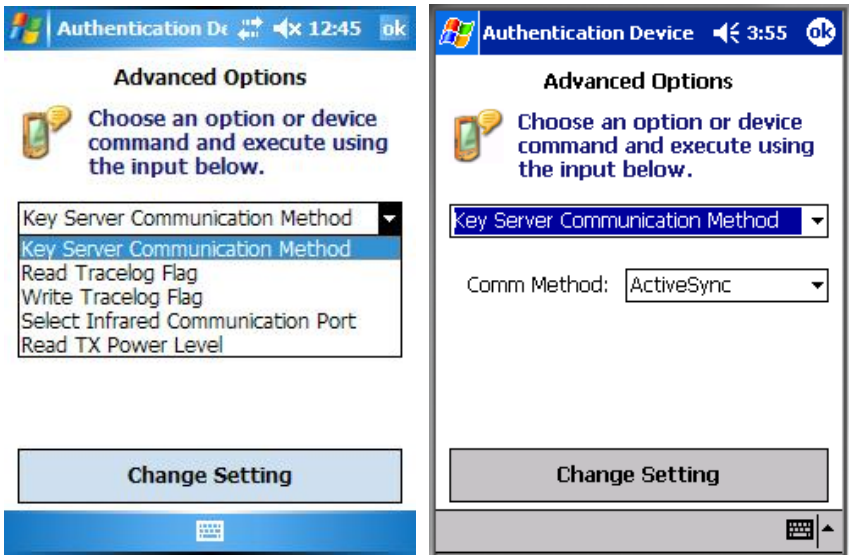


Figure 13 Advanced Options

Table 13 Advanced Options

Item	Description
Key Server Communication Method	Determines how the PDA will receive security keys from the PC's Key Server Manager application. From the Comm Method menu select one of the following methods. **ActiveSync** – Select this to receive keys over a USB connection, such as while the PDA battery is being charged in its base. **Infrared** – Select this to receive keys over the infrared port. **Important**: The Comm Method settings match in the PC's Key Server Manager and in the Authentication Device (both must be set to Infrared or both to ActiveSync) in order for your PDA to receive security keys.
Read Tracelog Flag	Not available for sensors. Used with multinodes. Reads conditional tracelog flag value. Tracelog flags are used to enable and disable logging functionality used for field support.
Write Tracelog Flag	Not available for sensors. Used with multinodes. Writes conditional tracelog flag value. Tracelog flags are used to enable and disable logging functionality used for field support .
Select Infrared Communication Port	Overrides the detected infrared communication port detected on your PDA. If infrared communication is not functioning, you can override the detected settings using this option.
Read TX Power Level	Reads the transmission power level of the sensor radio.

6. Maintenance/Repair

6.1 Replacing Batteries

When to replace

When the sensor displays a LOW BAT message you have 2-4 weeks to replace both batteries before they expire. When batteries are removed or expired, all sensor data is retained in the Radio Board's non-volatile memory. All calibration data is retained in the Measurement Board's non-volatile memory, however, if the sensor was physically removed and re-installed, the calibration must be re-checked.

Figure 14 Low Battery Warning

Tools required

- T-15 Security TORX Screwdriver (Bit supplied with Product) (if applicable)
- #2 Phillips Screwdriver or 1/4" Slotted Screwdriver
- Torque Screwdriver
- Large screwdriver or other flat tool
- Heavy tweezers or needle-nose pliers

Procedure

ATTENTION

Batteries must be replaced only by a trained service technician.

WARNINGS

- Risk of death or serious injury by explosion. Do not open sensor enclosure when an explosive gas atmosphere is present.
- Batteries must not be changed in an explosive gas atmosphere.
- The batteries used in this device may present a risk of fire or chemical burn if mistreated. Do not recharge, disassemble, heat above 100°C (212°F), or incinerate.
- When installing batteries, do not snag the battery terminal on the clip or the battery may be damaged. Do not apply excessive force.
- Do not drop. Dropping the battery may cause damage. If a battery is dropped, do not install the dropped battery into the sensor. Dispose of dropped battery promptly per local regulations or per the battery manufacturer's recommendations.

Table 14 Battery Replacement Procedure

(For item numbers, refer to Figure 9)

Step	Action
	WARNING Risk of death or serious injury from explosion or fire. If sensor is to be returned to Honeywell for any reason, both batteries MUST be romoved prior to shipping. Dispose of used batteries promptly per local regulations or the battery manufacturer's recommendations. Keep away from children. Do not disassemble and do not dispose of in fire.
	ATTENTION You must replace both batteries. Both batteries must be the same model from the same manufacturer. Mixing old and new batteries or different manufacturers is not permitted. Use only the following 3.6V lithium thionyl chloride (Li-SOCl2) batteries (non-rechargeable), size C. No other batteries are approved for use in WCX Series Valve Position Sensor. • Xeno Energy XL-145F • Tadiran TL-5920/S
1	Honeywell recommends that the sensor be removed from service and moved to a clean area before servicing. Use care to avoid rotating the input shaft, causing the internal slip clutch to slip.
2	If applicable, remove two T-15 TORX screws (1) and cover lock clamp (2).
3	If necessary, place a large screwdriver or other flat tool across the two tabs on the cover (3). Unscrew and remove the cover.
4	Unplug cable from potentiometer (4) to Jack J2 on battery board (see Figure 10), by compressing the locking clip and pulling outward.
5	Loosen the two battery holder retaining screws (5) (closest to the batteries). The screws are captive.
6	Pull the sensor/battery module (6) out of the sensor.
	ATTENTION Do not pull on the antenna cable itself, as it will damage the cable.
7	If battery holder is to be completely removed, use tweezers or needle nose pliers to carefully unplug the lower end of the antenna jumper cable from the right angle connector on the antenna cable. See Figure 10. If battery holder is not to be completely removed, place a clean antistatic bag or equivalent, between the battery assembly and the housing.
8	Remove the old batteries (7) from the battery holder. If needed, pry out the batteries by using a slotted screwdriver as a lever in the holder's side slots. See Figure 10.

Step	Action
	ATTENTION Note that both batteries in the WCX Valve Position Sensor are installed with the same orientation, with each positive terminal facing toward the sensor module.
9	Install batteries (7) as follows to avoid damage to the batteries and holder: Do not attempt to bend the battery hold down tabs upward. Insert the battery negative end under the hold-down tab, at an angle, and against the end of the spring. Simultaneously move the negative end of the battery into position, compressing the spring, and angle the positive end into the holder. See Figure 10. Repeat this process for the second battery.
10	Insert the battery holder into the sensor. Reattach the captive screws (5) and tighten to 0,4 – 0,6 N-M (3.5 – 5.3 Lb-in).
11	Plug cable from potentiometer (4) into Jack J2 on battery board. Note that the potentiometer cable goes to the outside of the antenna cable. See Figure 10.
12	If the antenna jumper cable was disconnected, use tweezers or needle nose pliers to grip the right angle antenna connector, hold the lower end of the antenna jumper cable steady, and carefully press the connectors together. A distinct click should be heard as the connector is fully seated.
13	NOTE: Honeywell recommends lubricating the cover O-ring (8) and threads with a Silicone Grease such as Dow Corning #55 or equivalent before replacing the cover. Replace cover, tightening hand tight. If applicable, replace cover lock clamp and two T-15 TORX screws. Re-install and return sensor to service.
14	If the unit removal or re-installation caused the input shaft to be rotated enough to make the internal slip clutch slip, then re-setting the device angle must be performed (see section 3).
15	Dispose of used batteries promptly per local regulations or the battery manufacturer's recommendations. Keep away from children. Do not disassemble and do not dispose of in fire.

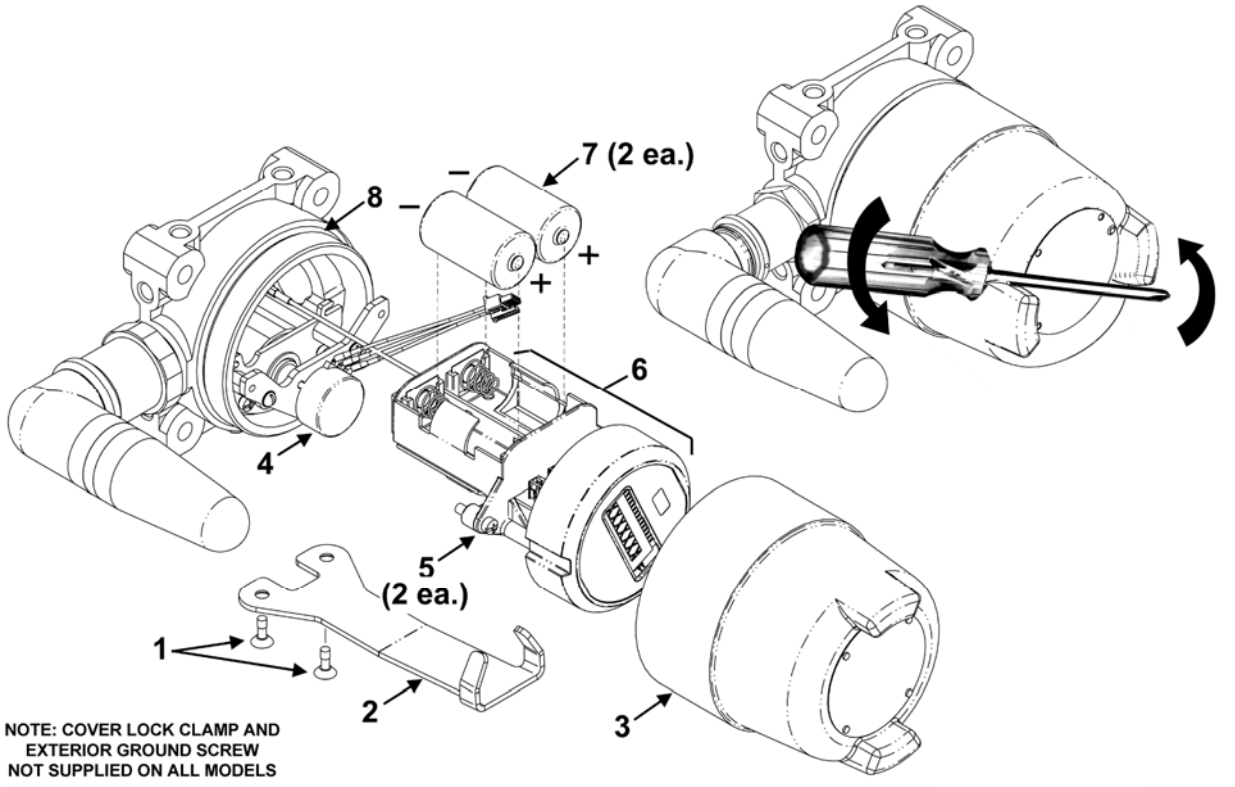
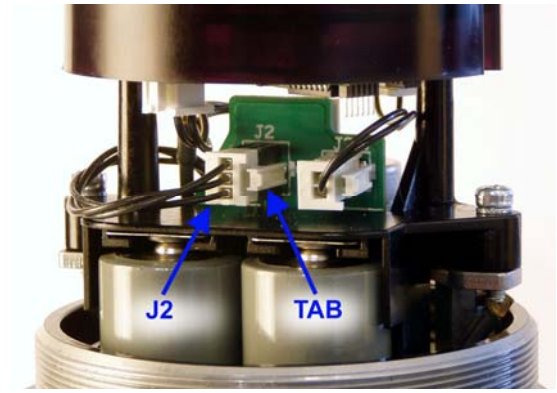


Figure 15 Battery Replacement

	
Remove J2 by pressing tab and pulling J2	OPTIONAL - Disconnect RF cable

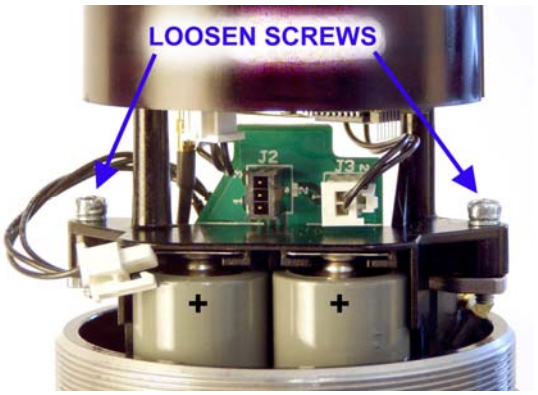
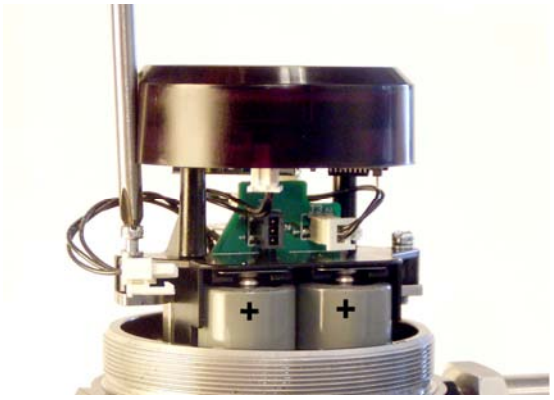
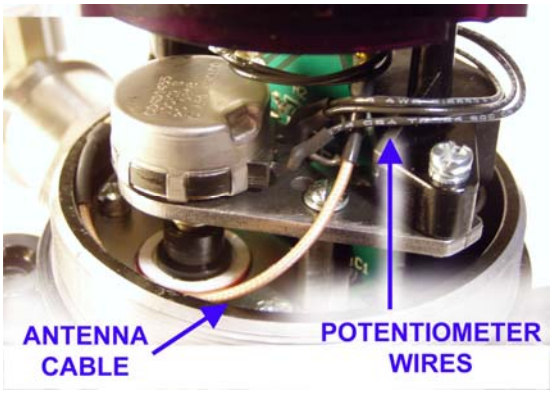
<table>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>Loosen two captive screws, remove assembly</td><td>Press top down, pull battery out on an angle</td></tr>
<tr><td>  </td><td> 
</td></tr>
<tr><td>Replace batteries, install assy., tighten screws</td><td>Replace J2, check wire & cable routing</td></tr>
</table>

Figure 16 Battery Replacement Details

6.2 Replacing Antenna

Tools required

- T-15 Security TORX Screwdriver (Bit supplied with Product) (if applicable)
- #2 Phillips Screwdriver or 1/4” Slotted Screwdriver
- Torque Screwdriver
- Large screwdriver or other flat tool
- Hex wrench, 1.5mm (Supplied with Product)
- Heavy tweezers or needle-nose pliers

Procedure

ATTENTION

You must replace your antenna with the same type, elbow, or straight. Stainless steel must be replaced with stainless steel, aluminum with aluminum. Changing to a different antenna type is not permitted by approval agencies.

CAUTION

Take precautions against electrostatic discharge to prevent damaging the sensor module.

WARNING

POTENTIAL ELECTROSTATIC CHARGING HAZARD

The integrally mounted antenna shroud is made of Teflon® and has a surface resistance greater than 1Gohm per square. When the WCX Valve Position Sensor is installed in potentially hazardous locations care should be taken not to electrostatically charge the surface of the antenna shroud by rubbing the surface with a cloth, or cleaning the surface with a solvent. If electrostatically charged, discharge of the antenna shroud to a person or a tool could possibly ignite a surrounding hazardous atmosphere.

Table 15 Antenna Replacement Procedure

(For item numbers, refer to Figure 10)

Step	Action
1	Honeywell recommends that the sensor be removed from service and moved to a clean area before servicing. Use care to avoid rotating the input shaft, causing the internal slip clutch to slip.
2	If applicable, remove two T-15 TORX screws (1) and cover lock clamp (2).
3	Place a large screwdriver or other flat tool across the two tabs on the cover (3). Unscrew and remove the cover.
4	Unplug cable from potentiometer (4) to Jack J2 on battery board, by compressing the locking clip and pulling outward. See Figure 12.
5	Loosen the two battery holder retaining screws (5) (closest to the batteries). The screws are captive.
	ATTENTION NOTE: Use caution in disconnecting the antenna cable, as applying too much pressure can damage the connectors. NOTE: Antenna location 1 is illustrated. For sensors using antenna locationi 2, the antenna cable routing will be through the opposite slot in lower mounting plate.
6	Remove the sensor/battery module (6) from the sensor body and carefully disconnect the lower connector of the antenna jumper cable (7) from the right angle connector on the antenna cable (8). See Figure 12.
7	Loosen two screws on lower mounting plate (9) and raise the plate sufficiently to allow the release of the antenna's cable. See Figure 12. Lower the lower plate, insuring that the white end bearing on the plate fits back into the shaft assembly. Temporarily tighten screws.
8	Using a 1.5 mm (approx. 1/16") allen wrench, loosen the locking set screw (10) at the antenna base. Note that its position may differ from illustrated. Unscrew the antenna from the sensor. Remove the antenna (11) and its connector from the sensor.
9	Lubricate the new antenna's threads and O-ring (12) with a Silicone Grease such as Dow Corning #55 or equivalent. Feed the new antenna's connector (8) through the antenna hole to the front of the sensor. Do not connect to sensor module cable yet. Screw new antenna into sensor body until finger-tight. For elbow type, back off 180 degrees to permit adjustment later.
10	Loosen two screws on lower mounting plate (9) and raise the plate sufficiently to allow the insertion of the antenna's cable back into the notch in the plate. See Figure 12. Tighten screws and torque to 0,4 – 0,6 N-M (3.5 – 5.3 Lb-in).
11	Use tweezers or needle nose pliers to grip the right angle antenna connector, hold the lower end of the antenna jumper cable steady, and carefully press the connectors together. A distinct click should be heard as the connector is fully seated.
12	Insert sensor/battery module. Tighten the two captive battery module screws. Torque screws to 0,4 – 0,6 N-M (3.5 – 5.3 Lb-in).
13	Plug cable from potentiometer (4) into Jack J2 on battery board. Note that the potentiometer cable goes to the outside of the antenna cable. See Figure 12).

Step	Action
14	NOTE: Honeywell recommends lubricating the cover O-ring (13) and threads with a Silicone Grease such as Dow Corning #55 or equivalent before replacing the cover. Replace cover, tightening hand tight. If applicable, replace cover lock clamp and two T-15 TORX screws. Return sensor to service.
15	If the unit removal or re-installation caused the input shaft to be rotated enough to make the internal slip clutch slip, then re-setting the device angle must be performed (see section 3).
16	For elbow type antenna, adjust antenna for best reception. Don't rotate antenna more than 180 degrees either direction or you could twist and break the antenna wiring inside. Tighten the antenna locking set screw (10).

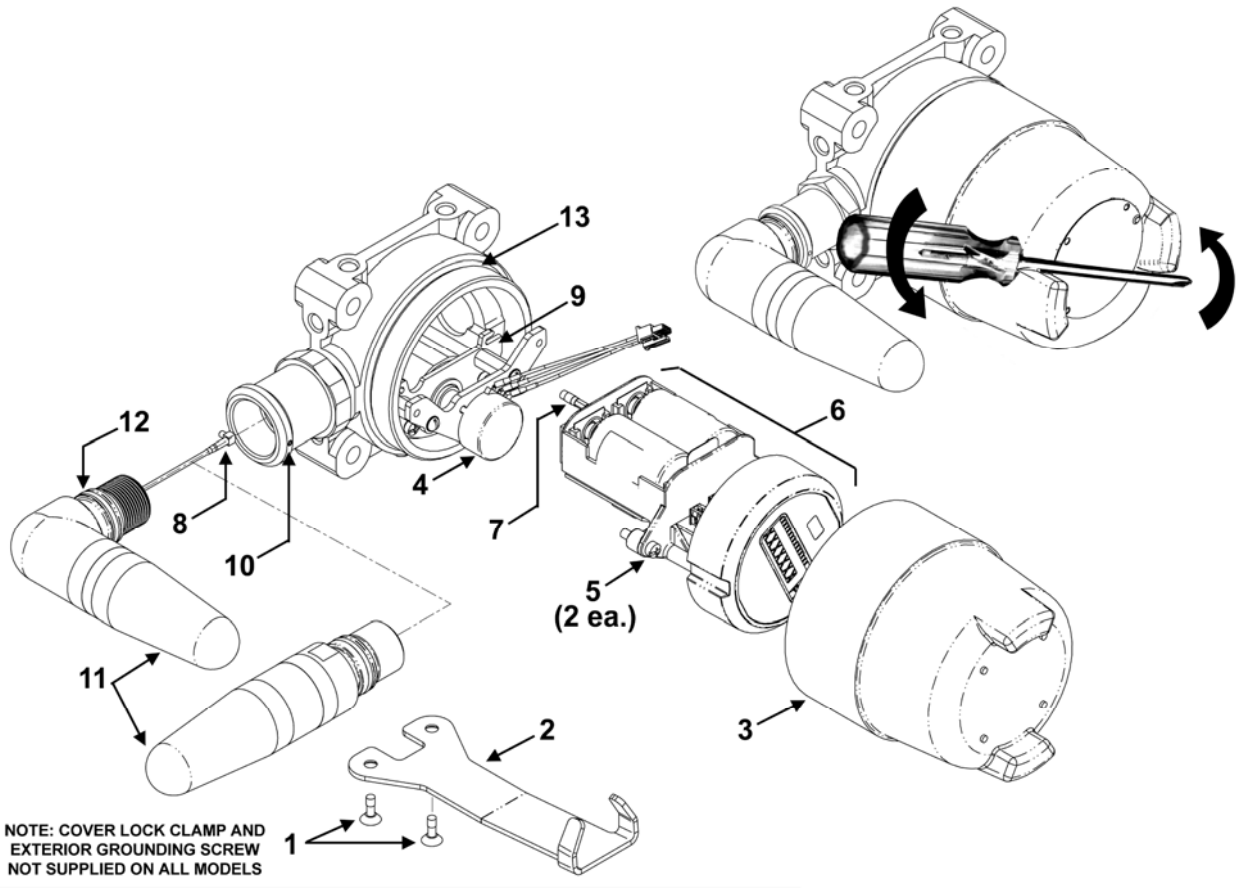
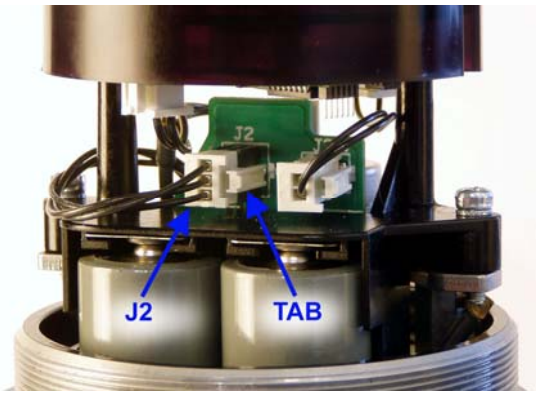
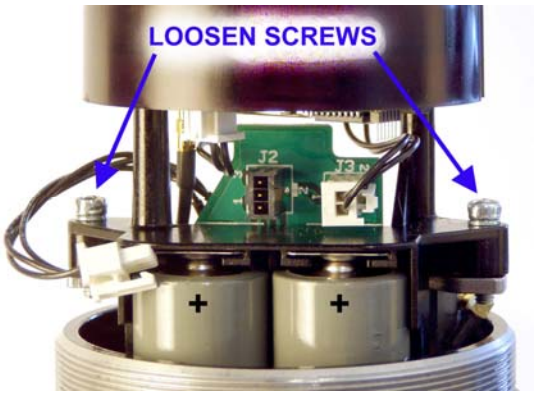


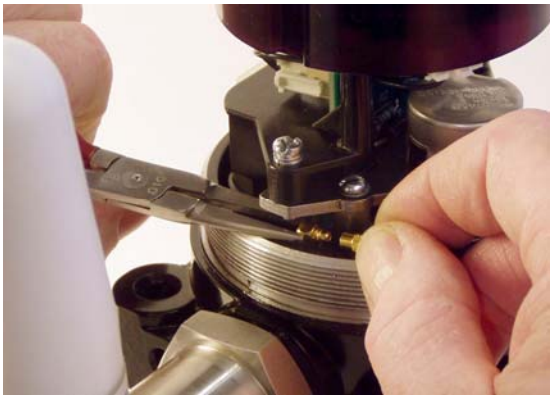
Figure 17 Antenna Replacement



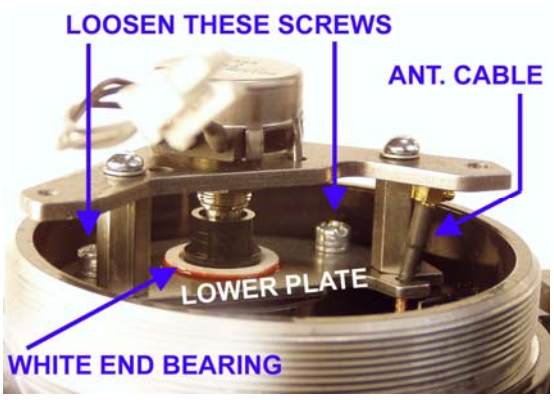
Remove J2 by pressing tab and pulling J2



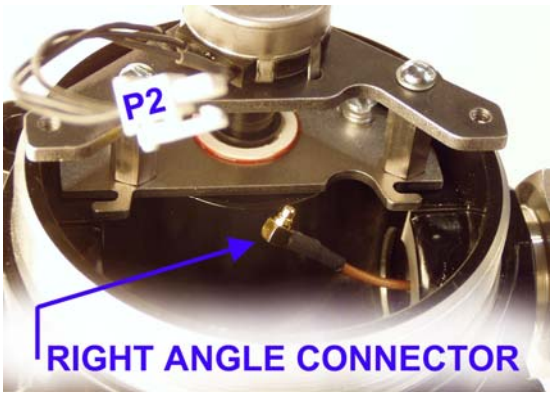
Loosen two captive screws, remove assembly



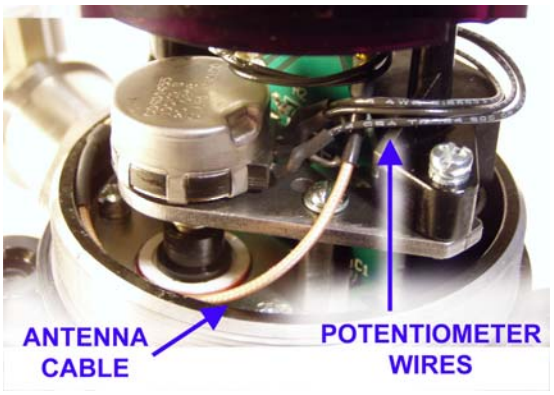
Disconnect RF cable to antenna



Loosen 2 screws on lower mounting plate



Release cable before unscrewing antenna



Install assy., check wire & cable routing

Figure 18 Antenna Replacement Details

Automation and Control Solutions

Sensing and Control

Honeywell

1985 Douglas Drive North

Minneapolis, MN 55422

www.honeywell.com/sensing