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Installation and Technical Manual for the ISA100 Wireless Hazardous Area Limit Switch, WBX Series

Issue 1
32305329

WARNING **PERSONAL INJURY**

DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

Failure to comply with these instructions could result in death or serious injury.

WARNING

Honeywell does not recommend using devices for critical control applications where there is, or may be, a single point of failure or where single points of failure may result in an unsafe condition. It is up to the end-user to weigh the risks and benefits to determine if the products are appropriate for the application based on security, safety and performance. Additionally, it is up to the end-user to ensure that the control strategy results in a safe operating condition if any crucial segment of the control solution fails. Honeywell customers assume full responsibility for learning and meeting the required Declaration of Conformity, Regulations, Guidelines, etc. for each country in their distribution market.

WARNING **POTENTIAL ELECTROSTATIC CHARGING HAZARD**

When the WBX Series 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.

WARNING **POTENTIAL IMPACT HAZARD**

Care should be taken during installation of the WBX switch to not apply an impact force to the device. (i.e. dropping the WBX on a hard surface, impact with a hammer/wrench, etc.).

WARNING

Enclosure contains aluminum. Care must be taken to avoid ignition hazard due to impact.

WARNING **RF EXPOSURE**

To satisfy FCC RF exposure requirements for mobile transmitting devices, a separation distance of 20 cm or more should be maintained between the antenna of this device and persons during device operation. To ensure compliance, operation at closer than this distance is not recommended. The antenna used for this transmission must not be co-located in conjunction with any other antenna or transmitter.

Failure to comply with these instructions could result in death or serious injury.

WARNING

The WBX must be installed in accordance with the requirements specified in this document in order to comply with the specific Country Communication Agency requirements (i.e., FCC, IC, ETSI, ACMA, etc.). See Section 3.3 as this requires choosing the correct Country Use Code and thus allowable antenna and/or cable usage.

WARNING **RISK OF DEATH OR SERIOUS INJURY FROM EXPLOSION OR FIRE**

Connection and disconnection of the antennas should only be performed in a non-hazardous area and with **no battery power** applied to the WBX. This is due to the risk of possibly damaging the internal WBX electronics and/or igniting the surrounding hazardous atmosphere.

Failure to comply with these instructions could result in death or serious injury.

WARNING **RISK OF DEATH OR SERIOUS INJURY FROM EXPLOSION OR FIRE**

Connection and disconnection of the batteries should only be performed in a non-hazardous area. 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.

Failure to comply with these instructions could result in death or serious injury.

WARNING

Device cannot be used without metal "S" shaped clamp and screw securely fastened to switch.

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Intended Audience

This guide is intended for people who are responsible for planning, configuring, administering, and operating the ISA100 Wireless™ Network.

Prerequisite Skills

It is assumed that you are familiar with the operation of ISA100 Wireless™ Networks.

About this Document

This document outlines professional installation requirements for the ISA100 Wireless Hazardous Area Limit Switch, WBX Series. Professional installation is required to comply with certification agency and legal requirements. This document must be adhered to for all installations of the Honeywell ISA100 Wireless Hazardous Area Limit Switch, WBX Series.

These devices are not intended for critical control where there is a single point of failure or where single points of failure result in unsafe conditions. As with any process control solution, it is the end users' responsibility to weigh the risks and benefits to determine if the products used are the right match for the application based on security, safety, regulations, and performance.

Revision Information

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References

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

Document title	Document No.
OneWireless™ Network Planning and Installation Guide	OWDOC-X253
OneWireless™ Wireless Device Manager User's Guide	OWDOC-X254
OneWireless™ Field Device Access Point User's Guide	OWDOC-X256

1 | PRODUCT DESCRIPTION

1.1 | General

The WBX Series product line combines the best of MICRO SWITCH™ Heavy Duty limit switches with the latest commercial off-the-shelf wireless technology. Wireless-enabled limit switches can now be used for position sensing and presence/absence detection for a wide variety of applications. The WBX Series is especially beneficial for remote monitoring applications where wiring or wire maintenance is not physically possible or economically feasible. Combining this greater flexibility with proven harsh duty packaging can result in increased efficiencies and improved safety for machine and equipment OEMs and operators. This document will provide installation instructions to properly install a WBX Series limit switch, or simply the WBX.

1.2 | Principle of Operation

The WBX will transmit the position of its actuator switch through a OneWireless™ Network. The OneWireless™ WDM will then indicate the actuator position of the WBX via a visual indicator, audible indicator, and/or electronic output. The WBX supports no electrical signal inputs and is powered by a replaceable battery.

1.3 | ISA100 Wireless™ Network Overview

ISA100 Wireless™ Network is an all-digital, serial, two-way communication mesh network that interconnects industrial field switches to a central system. The ISA100 Wireless™ Network is an all-digital, serial, two-way communication mesh network that interconnects industrial field switches and sensors to a central system.

ISA100.11a Network has defined standards to which field devices and operator stations communicate with each another. The communications protocol is built as an "open system" to allow all field devices and equipment that are built to ISA100 Wireless™ standards to be integrated into a system, regardless of the device manufacturer. This interoperability of devices using ISA100 Wireless™ technology is to become an industry standard for automation systems.

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1.4 | Product Nomenclature

This document is valid for the ISA100 Wireless Hazardous Area Limit Switch in the following variations.

Figure 1. ISA100 Wireless Hazardous Location Switch, WBX Series Nomenclature

WBX	1	B	00	A	A	A	1A	3
Switch type	Gen Code	RF Code	Antenna type code	Country use code	Zone use code	Operating head code	Actuator code	Modification code
WBX Series Wireless	1 Version 1	B 2.4 GHz; ISA 100.11a For "A" coded versions, refer to WBX P2P datasheet, 32305328.	00 No antenna; RP-SMA connector jack 12 2.0 dBi omni w/switch mount; straight design with radome 14 2.0 dBi omni w/switch mount; 90° metal elbow with radome	A US, Canada, Australia B All approved countries	A Zone 0, Zone 20 B Zone 1, Zone 21 Refer to Zone Use Classification.	A Side rotary, momentary C Top plunger, plain J Wobble stick	1 Fixed, rollerless 1.5 in radius 1A Fixed 0.75 in x 0.25 in nylon roller, front mount 1C Fixed 0.75 in x 0.25 in nylon roller, back mount 2 Adjustable, rollerless 2A Adjust. 0.75 in x 0.25 in nylon roller, back mount 2C Adjust. 0.75 in x 0.25 in nylon roller, front mount 2J Adjust. 1 in x 0.5 in nylon roller, front mount 2K Adjust. 1.5 in x 0.25 in nylon roller, front mount 3E Yoke, 0.75 in x 0.25 in nylon roller, back/front 3M Yoke, 0.75 in x 1.25 in nylon roller, back/front 3S Yoke, 0.75 in x 0.25 in nylon roller, back/back 04 Hub only 4M Hub rod, 5.5 in, aluminum 5 Offset, rollerless 5A Offset, 0.75 in x 0.25 in nylon roller, back mount 5C Offset, 0.75 in x 0.25 in nylon roller, front mount 7A Delrin™ rod, 5.5 inches* 9A Short fixed, 0.75 x 0.25 in nylon roller, front mount 9C Short fixed, 0.75 x 0.25 in nylon roller, back mount	Head assembled with actuator to nameplate side 3 Head assembled with actuator to right side 4 Head assembled with actuator to left side 5 Head assembled with actuator to mounting surface

Zone Use Classifications

Zones refer to classified atmosphere ratings. Single digit indicators (Zone 0 or 1) refer to degree of protection from explosive gases. Double digit indicators (Zone 20 or 21) refer to degree of protection from explosive dusts.

Zone 0: An area in which an explosive gas is present continuously or for long periods.

Zone 20: An area in which an explosive dust is present continuously or for long periods.

Zone 1: An area in which an explosive gas is likely to occur in normal operation.

Zone 21: An area in which an explosive dust is likely to occur in normal operation.

* 7A to be assembled to operating head code J only.

Table 1. Actuator Code Table

Code	Catalog Listing	Material	Roller Dia. (in)	Roller Width (in)	Roller Mounting
Fixed 1.5 inch radius					
1		Rollerless	n/a	n/a	n/a
1A	LSZ51A	Nylon	0.75	0.25	Front
1C	LSZ51C	Nylon	0.75	0.25	Back
Adjustable 1.5 in to 3.5 in radius					
2		Rollerless	n/a	n/a	n/a
2A	LSZ52A	Nylon	0.75	0.25	Back
2C	LSZ52C	Nylon	0.75	0.25	Front
2J	LSZ52J	Nylon	1.0	0.50	Front
2K	LSZ52K	Nylon	1.5	0.25	Front
Yoke – 1.5 in radius					
3E	LSZ53E	Nylon	0.75	0.25	Back/Front
3M	LSZ53M	Nylon	0.75	1.25	Back/Front
3S	LSZ53S	Nylon	0.75	0.25	Front/Front

Code	Catalog Listing	Material	Roller Dia. (in)	Roller Width (in)	Roller Mounting
Rod					
04		Hub only	n/a	n/a	n/a
4M	LSZ54M	Alum, 5.5 in	n/a	n/a	n/a
Offset – 1.5 in radius					
5		Rollerless	n/a	n/a	n/a
5A	LSZ55A	Nylon	0.75	0.25	Back
5C	LSZ55C	Nylon	0.75	0.25	Front
Wobble stick					
7A	LSZ1JGA	Delrin® rod, 5.5	n/a	n/a	n/a
Short fixed - 1.3 in radius					
9A	LSZ59A	Nylon	0.75	0.25	Front
9C	LSZ59C	Nylon	0.75	0.25	Back

1.5 | Abbreviations and Definitions

Table 2. Abbreviations

ACMA	Australian Communications and Media Authority
cpm	Cycles Per Minute
dB	Decibel
dB_i	Decibel Isotropic
dBm	Decibel above or below 1 milliwatt
DSSS	Direct Sequence Spread Spectrum
EIRP	Equivalent isotropic radiated power
EMC	Electromagnetic Compatibility
ETSI	European Telecommunications Standards Institute
EU	European Union
FCC	Federal Communications Committee
FDAP	Field Device Access Point
ft-lb	Foot-pounds
GHz	GigaHertz
IC	Industry Canada
ICES	Industry Canada Electrical Specification
IEEE	Institute of Electrical and Electronics Engineers
I.S.	Intrinsically Safe
kbps	KiloBits Per Second
LED	Light Emitting Diode
MHz	MegaHertz
MNBR	Multi-Node Backbone Router
MPE	Maximum Permissible Exposure
NA	North America – United States of America and Canada
Nm	Newton meter
NEMA	National Electrical Manufacturers Association
PCBa	Printed Circuit Board Assembly
R&TTE	Radio and Telecommunications Terminal Equipment
RP-SMA	Reverse Polarity SMA connector
RF	Radio Frequency
TX	Transmit Power
WBX	Wireless Hazardous Area Limit Switch Series
WDM	Wireless Device Manager
WNSIA	Wireless Network for Secure Industrial Application

1.6 | Symbol Definitions

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

Table 3. Symbol Definitions

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 electrostatic 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.
	The ISA100 Wireless compliant logo indicates the device has received ISA100.11a conformance certification and is registered with the Wireless Compliance Institute, assuring device interoperability.
	C-Tick Mark. 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.
	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”).
	The IEC Ex mark means the equipment complies with the requirements of the International Electrotechnical Commission Explosive. The objective of the IECEx system is to facilitate international trade in equipment and services for use in explosive atmospheres, while maintaining the required level of safety.
	Notified Body. 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 cULus mark means the equipment was tested to Canadian and US standards by Underwriters' Laboratories. The combination mark indicates compliance with both Canadian and U.S. Requirements. “Listed” means that the product can be operated as sold, in accordance with its inscriptions and operating instructions, without retesting by UL. Products are for use in hazardous locations where explosive atmospheres may be present. Certification covers division and zone area classification systems for the United States and/or Canada.

2 | SPECIFICATIONS, CERTIFICATIONS, AND APPROVALS

2.1 | Intended Country Usage

Table 4. North America

Country	ISO 3166 2 letter code
UNITED STATES	US
CANADA	CA

Table 5. Australia

Country	ISO 3166 2 letter code
AUSTRALIA	AU

Table 6. European Union

Country	ISO 3166 2 letter code	Country	ISO 3166 2 letter code
Austria	AT	Latvia	LV
Belgium	BE	Lithuania	LT
Bulgaria	BG	Luxembourg	LU
Cyprus	CY	Malta	MT
Czech Republic	CZ	Netherlands	NL
Denmark	DK	Poland	PL
Estonia	EE	Portugal	PT
Finland	FI	Romania	RO
France	FR	Slovak Republic	SK
Germany	DE	Slovenia	SI
Greece	GR	Spain	ES
Hungary	HU	Sweden	SE
Ireland	IE	United Kingdom	GB
Italy	IT		

Table 7. Other European Countries

Country	ISO 3166 2 letter code	Country	ISO 3166 2 letter code
Bosnia and Herzegovina	BA	Norway	NO
Croatia	HR	Russian Federation	RU
Iceland	IS	Serbia	RS
Liechtenstein	LI	Switzerland	CH
Macedonia	MK	Turkey	TR

2.2 | Certifications and Approvals

See product labels for applicable approvals and ratings.

Table 8. Communication Approvals and Standards

Approval/Item	Ratings/Description	
Communication agency approvals and standards	14 dBm	FCC Part 15.247 and 15.209
		Industry Canada RSS 210 Issue 8
		ACMA, C-Tick mark
	8 dBm	ETSI, CE mark
Enclosure type	Type 1, 3, 4, 13 IP67 (self-declared)	
Hazardous location approvals	cULus, ATEX, IEC Ex	

FCC ID: XJLWBX001
IC ID: 9832A-WBX001IC

⚠ WARNING

The WBX must be installed in accordance with the requirements specified in this document in order to comply with the specific Country Communication Agency requirements (i.e., FCC, IC, ETSI, ACMA)

Specific Conditions of Safe Use:

- Aluminum enclosure – Care should be taken to minimize the risk of ignition due to impact or friction.
- Potential electrostatic discharge – Clean product only with a damp cloth.
- The metal “S-shaped” clamp secures the cover to the enclosure/housing. It must be screwed in place when product is in use.
- Do not open when an explosive atmosphere may be present.
- Do not replace batteries when an explosive atmosphere is present.
- Use only Honeywell battery P/N: WBT7; approved battery manufacturers: Xeno Energy – XL-060F; Tadiran – TL-5903/S; or Bipower ER14505H batteries.

STOP ATTENTION

IEC 60079-0:2007-10 and IEC 60079-11:2006 were applied to the integral component fuse, Part No. 0259.125TX913 manufactured by Littelfuse. There are no significant safety related changes between these editions and the later editions of the standards noted under the “Standards” section of this document.

2.3 | Hazardous Location Standards and Certifications

Table 9. Hazardous Location Standards and Certifications

cULus Listing	ATEX Certification	IEC Ex Certification
Standards: UL913 8th edition; CAN/CSA-C22.2 NO. 157-92 (R2012); UL 60079-0 edition 6.0; UL 60079-11 edition 6.0; CSA C22.2 No. 60079-11: 14 edition 2.0; CSA C22.2 No. 60079-0: 11 edition 2.0	Standards: EN 60079-0: 2012 + A11:2013; EN 60079-11: 2012; EN 60079-26:2007	Standards: IEC 60079-0 edition 6.0; IEC 60079-11 edition 6.0; IEC 60079-26 edition 2.0
Class I, Div 1, Groups A, B, C, D T4 Class II, Div 1, Groups E, F, G Class I, Zone 1 AEx ia IIC T4 Ga Class I, Zone 1 Ex ia IIC T4 Ga Class II, Zone 21 AEx ia IIIC T135°C Da Class I, Zone 0 AEx ia IIC T4 Ga Class I, Zone 0 Ex ia IIC T4 Ga Class II, Zone 20 AEx ia IIIC T135°C Da Tambient -40°C to 70°C	Zone 1 Ex ia IIC T4 Ga Zone 21 Ex ia IIIC T135°C Da Zone 0 Ex ia IIC T4 Ga Zone 20 Ex ia IIIC T135°C Da	Zone 1 Ex ia IIC T4 Ga Zone 21 Ex ia IIIC T135°C Da Zone 0 Ex ia IIC T4 Ga Zone 20 Ex ia IIIC T135°C Da



2.4 | Radio Module Specifications

Table 10. Radio Module Specifications

Item	Specification
Radio module	Honeywell RF-PCBa
Wireless standard	IEEE 802.15.4; 2.4 GHz ISA100.11a compliant
Data rate	250 kbps
Operating frequency	ISM 2.4 GHz, global, license-free band
Module transmit power (max.)	Country code A: 14 dBm max; Country code B: 8 dBm max
Receive sensitivity (typ.)	-98 dBm

2.5 | Battery Specifications

Table 11. Battery Specifications

Item	Specification
Battery	3.6 Vdc Lithium Thionyl Chloride; AA size, Qty: 2 Manufacturer: Honeywell, WBT7; Xeno Energy, P/N XL-060F; Tadiran, P/N TL-5903/S; Bipower, P/N: ER14505H

CAUTION

Do not mount or remove the antenna when batteries are present in WBX product as damage could occur to the WBX electronics and/or ignite the surrounding hazardous atmosphere.

2.6 EMC Specifications

The latest applicable EMC Standards are as follows:

- EN 300 328, V1.8.1
- EN 61326-1 (2012)
- EN 301 489-1, V1.9.2
- EN 301 489-17, V2.2.1

ATTENTION

The antenna cables should not be modified (i.e. cut short and/or re-terminated) as it may affect Communication Agency approval. Approved antennas (refer to Section 3.2) are the only antennas allowed for use with the WBX.

2.7 | Environmental Specifications

Table 12. Environmental Specifications

Item	Specification
Operating temperature	-40 °C to 70 °C [-40 °F to 158 °F]
Storage temperature	-40 °C to 70 °C [-40 °F to 158 °F]
Operating humidity	0 %RH to 100 %RH
Vibration	IEC 60068-2-6: 10 Hz to 58 Hz - 0,35 mm peak-to-peak, 58 Hz to 500 Hz, 10 g
Shock	IEC 60068-2-27; half sine, 50 g, 6 mS
Sealing	Type 1, 3, 4, 13; IP67 (self-declared)

2.8 | Functional Specifications

Table 13. Functional Specifications

Item	Specification
High temperature endurance	70 °C; 10,000 cycles; 15 cpm
Low temperature endurance	-40 °C; 10,000 cycles; 15 cpm
Electrical/mechanical life	25 °C; 1 million operating cycles



ATTENTION

The WBX cannot be used in a portable application. It must be used in a fixed location.

2.9 | Weight

All versions of the WBX Series switch have a maximum weight of 0,754 g [1.7 lb]. These weights do not include remote cables, antennas, radome, or actuators.

2.10 | Antenna Connection

Antennas connect to an RP-SMA male connector on the upper surface of the WBX. For straight antenna variants, a radome is fastened to the metal conduit fitting, protecting the antenna and connectors from the environment. Similarly, for 90° elbow variant, the radome is fastened to the conduit fitting at the far end of the metal elbow. Alternatively, a remote antenna and/or a lightning arrester may be connected to the RP-SMA connector; when ordered without any antenna fitted to the WBX product.

2.11 | Agency Compliance Statements

2.11.1 | 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 B 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 radio frequency 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/her own expense.
- Intentional or unintentional changes or modifications must not be made to the WBX 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.

2.11.2 | Industry Canada (IC) Compliance Statements

- To reduce potential radio interference to other users, the antenna type and its gain should be chosen so 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 B digital apparatus has been tested and found to comply with RSS 210 Gen Issue 8.
- Pour réduire les interférences radio potentielles aux autres utilisateurs, le type d'antenne et son gain doivent être choisis de telle sorte que l'équivalent isotrope puissance rayonnée (PIRE) ne est pas supérieure à celle permise pour une communication réussie.
- Son fonctionnement est soumis aux deux conditions suivantes:
 - (1) ce dispositif ne doit pas causer d'interférences et
 - (2) cet appareil doit accepter toute interférence, y compris les interférences qui peuvent causer un mauvais fonctionnement de l'appareil.
- Cet appareil numérique de classe A est conforme avec Industrie Canada RSS 210 Numéro 8.

2.11.3 | Radio Frequency (RF) Safety Statements (FCC & IC)

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

- Remote antenna for this unit must be fixed and mounted on outdoor permanent structures with a separation distance between any other antenna(s) of greater than 20 cm [7.87 in] and a separation distance of at least 20 cm [7.87 in] from all persons.
- Furthermore, when using an integral antenna with the WBX, it must not be co-located with any other antenna or transmitter device and it must have a separation distance of at least 20 cm [7.87 in] from all persons.

2.11.4 | European Restrictions

- Information regarding national restrictions can be found in document: ERC/REC 70-03 (Relating to the use of short-range devices including appendixes and annexes). Documentation may be found in the document database in the European Communication's office.
- <http://www.erodocdb.dk/doks/dochistory.aspx?docintid=1622>

2.11.5 | European Declaration of Conformity Statements

Figure 2. European Declaration of Conformity (DoC)

Honeywell

Honeywell Control Systems Ltd., Newhouse Industrial Estate, Motherwell, Lanarkshire, ML1 5SB, Scotland, United Kingdom. Tel.: +44 (0)1698 481000 Fax: +44 (0)1698 481011	A subsidiary of Honeywell Control Systems Ltd., Registered Office: Honeywell House, Arlington Business Park, Bracknell, Berkshire, R12 1EB. Registered No 217808 (England)
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EC Declaration of Conformity

Honeywell Control Systems Ltd. hereby declare that the products identified below conform to the essential requirements of the EC Directive(s) listed below and that the products supplied are in conformity with the type described in any EC Type Examination Certificate (EC TEC) identified below.

Manufacturer:	Honeywell International, MICRO SWITCH Division 11309 West Chetlain Lane, Galena, Illinois, IL 61036-0327, USA	
Product:	Limit Switch Wireless Intrinsically Safe Limit Switches	
Directive (Amendments)	Conformity Details	
1999/5/EC and 2004/108/EC	Standards applied:	EN 61326-1: 2012 ETSI EN 300 328 V1.8.1 ETSI EN 301 489-1 V1.9.2 and -17 V2.2.1
94/9/EC	Standards applied:	EN 60079-0: 2012 + A11: 2013 EN 60079-11:2012 EN 60079-26: 2007
	EC TEC No:	DEMKO 14ATEX1224X
	Notified Body:	
	Provisions fulfilled:	1.0, 1.1, 1.2.1, 1.2.5, 1.2.7, 1.2.9, 1.3.1, 1.3.2, 1.3.4, 1.4, 2.2
Signed on behalf of Honeywell Control Systems Ltd. :		
 Colin O'Neil, quality Eng. Manager, Newhouse		
DoC No: A491	DoC Issue: 3	DoC Date: 03/03/2015 Page 1 of 2

2.11.6 | 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/sectors/rtte/faq/>

3 | ANTENNAS

3.1 | Approved Antenna Types and Gains

This section defines the antenna options that can be used in either North America or other approved countries. The integral antenna mounts directly to the WBX RP-SMA jack while the remote antenna mounts to the WBX RP-SMA jack via a cable assembly. Further technical information on the WAN Series antennas, WAMM Series magnetic mounts and WCA Series cable assemblies are available in later sections of this document.

ATTENTION

The WBX cannot be used in a portable application. It must be used in a fixed location.

ATTENTION

The antenna cables should not be modified (i.e. cut short and/or re-terminated) as it may affect communication agency approval.

WARNING

The WBX Series switch must be professionally installed in accordance with the requirements specified in this document. Only the specified power settings, antenna types and gains and cable lengths (attenuation) as outlined in this document are valid for ISA100 Wireless Hazardous Area Limit Switches, WBX Series installations.

WARNING

The WBX must be installed in accordance with the requirements specified in this document in order to comply with the specific Country Communication Agency requirements (i.e., FCC, IC, ETSI, ACMA).

WARNING

POTENTIAL ELECTROSTATIC CHARGING HAZARD

When the WBX Series 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.

WARNING

RISK OF DEATH OR SERIOUS INJURY FROM EXPLOSION OR FIRE

Connection and disconnection of the antennas should only be performed in a non-hazardous area and with **no battery power** applied to the WBX. This is due to the risk of possibly damaging the internal WBX electronics and/or igniting the surrounding hazardous atmosphere.

Failure to comply with these instructions could result in death or serious injury.

Installation and Technical Manual for the ISA100 Wireless Hazardous Area Limit Switch, WBX Series

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3.2 | Antenna Details

The following chart lists the antenna options along with the various characteristics that will be referenced throughout this section. This section is intended to assist an end user in determining which antenna(s) are worth investigating and subjecting to application requirements for proof of suitability.

Table 14. Antenna Options - Country Code A

Ant. type code	Part number	Replacement antenna mount or cable	Antenna design	Ant. gain (max.)	Connector/mounting	Dimensions	Antenna material	Cable material/type	Mount material
00	WAN03RSP	—	flat	3.0 dBi	RP-SMA plug/adhesive mount	115 mm L x 22,1 mm W x 4,57 mm D [4.53 in L x 0.87 in W x 0.18 in D] 3 m [9.8 ft] cable	UV stable ABS	UV stable PVC/ RG-174 coax	—
00	WAN04RSP	WAMM100RSP-005 base with 1,52 m [5 ft] of cable	tilt/ swivel	5.5 dBi	RP-SMA plug/direct mount	Ø 12,7 mm x 208,28 mm L [Ø 0.50 in x 8.20 in L]	UV stable molded polyurethane	UV stable PVC/ RG-174 coax	UV stable black ABS
00	WAN04RSP	WAMM100RSP-010 base with 3,05 m [10 ft] of cable	tilt/ swivel	5.5 dBi	RP-SMA plug/direct mount	Ø 12,7 mm x 208,28 mm L [Ø 0.50 in x 8.20 in L]	UV stable molded polyurethane	UV stable PVC/ RG-174 coax	UV stable black ABS
00	WAN05RSP	WAMM100RSP-005 base with 1,52 m [5 ft] of cable	tilt/ swivel	9.0 dBi	RP-SMA plug/direct mount	Ø 12,7 mm x 384,05 mm L [Ø 0.50 in x 15.12 in L]	UV stable molded polyurethane	UV stable PVC/ RG-174 coax	UV stable black ABS
00	WAN05RSP	WAMM100RSP-010 base with 3,05 m [10 ft] of cable	tilt/ swivel	9.0 dBi	RP-SMA plug/direct mount	Ø 12,7 mm x 384,05 mm L [Ø 0.50 in x 15.12 in L]	UV stable molded polyurethane	UV stable PVC/ RG-174 coax	UV stable black ABS
00	WAN06RNJ	WCA200RNPR-SP-002 coax cable assembly 0,682 m [2 ft]	straight	8.0 dBi	RP-N jack/ bracket	Ø 33,5 mm x 427,9 mm L [Ø 1.32 in x 16.85 in L]	UV stable fiberglass	UV stable PVC/RG-316 coax, UV stable Polyethylene/200 Series coax	300 series SST aluminum alloy
00	WAN06RNJ	WCA200RNPR-SP-010 coax cable assembly 3,05 m [10 ft]	straight	8.0 dBi	RP-N jack/ bracket	Ø 33,5 mm x 427,9 mm L [Ø 1.32 in x 16.85 in L]	UV stable fiberglass	UV stable PVC/RG-316 coax, UV stable Polyethylene/200 Series coax	300 series SST aluminum alloy
00	WAN08RSP	—	90°	0 dBi	RP-SMA plug/direct mount	Ø 8,0 mm x 29 mm L [Ø 0.34 in x 1.14 in L]	UV stable	—	—
00	WAN09RSP	—	low profile mobile	3.0 dBi	RP-SMA plug/magnetic	Ø 76,2 mm x 115 mm L [Ø 3.0 in x 4.54 in L] 4,57 m [15 ft] cable	UV stable ABS plastic	UV stable black PVC	Nickel-plated steel
00	WAN10RSP	—	straight	5.0 dBi	RP-SMA plug/magnetic	Ø 76,2 mm x 230,1 mm L [Ø 3.0 in x 9.06 in L] 4,57 m [15 ft] cable	Nickel-plated steel	UV stable black PVC	Nickel-plated steel
00	WAN11RSP	—	low profile mobile	4.0 dBi	RP-SMA plug/ thru-hole screw	Ø 39 mm x 42,4 mm L [Ø 1.54 in x 1.67 in L]	UV stable black PVC	UV stable black PVC	Nickel-plated steel
12/14	WAN12RSP	—	straight	2.0 dBi	RP-SMA plug/direct mount	Ø 10 mm x 79,5 mm L [Ø 0.39 in. x 3.13 in. L]	UV stable ABS plastic	—	—

Table 15. Antenna Options - Country Code B

Ant. type code	Part number	Replacement antenna mount or cable	Antenna design	Ant. gain (max.)	Connector/mounting	Dimensions	Antenna material	Cable material/type	Mount material
00	WAN03RSP	—	flat	3.0 dBi	RP-SMA plug/adhesive mount	115 mm L x 22,1 mm W x 4,57 mm D [4.53 in L x 0.87 in W x 0.18 in D] 3 m [9.8 ft] cable	UV stable ABS	UV stable PVC/ RG-174 coax	—
00	WAN04RSP	WAMM100RSP-010 base with 3,05 m [10 ft] of cable	tilt/swivel	5.5 dBi	RP-SMA plug/direct mount	Ø 12,7 mm x 208,28 mm L [Ø 0.50 in x 8.20 in L]	UV stable molded polyurethane	UV stable PVC/ RG-174 coax	UV stable black ABS
00	WAN08RSP	—	90°	0 dBi	RP-SMA plug/direct mount	Ø 8,0 mm x 29 mm L [Ø 0.34 in x 1.14 in L]	UV stable	—	—
00	WAN09RSP	—	low profile mobile	3.0 dBi	RP-SMA plug/magnetic	Ø 76,2 mm x 115 mm L [Ø 3.0 in x 4.54 in L] 4,57 m [15 ft] cable	UV stable ABS plastic	UV stable black PVC	Nickel-plated steel
00	WAN10RSP	—	straight	5.0 dBi	RP-SMA plug/magnetic	Ø 76,2 mm x 230,1 mm L [Ø 3.0 in x 9.06 in L] 4,57 m [15 ft] cable	Nickel-plated steel	UV stable black PVC	Nickel-plated steel
00	WAN11RSP	—	low profile mobile	4.0 dBi	RP-SMA plug/thru-hole screw	Ø 39 mm x 42,4 mm L [Ø 1.54 in x 1.67 in L]	UV stable black PVC	UV stable black PVC	Nickel-plated steel
12/14	WAN12RSP	—	straight	2.0 dBi	RP-SMA plug/direct mount	Ø 10 mm x 79,5 mm L [Ø 0.39 in x 3.13 in L]	UV stable ABS plastic	—	—

Table 16. WBX Standard Antenna Options

Option 00	Option 12: Straight with Radome	Option 14: 90° Metal Elbow
No antenna. RP-SMA antenna jack is used	2.0 dBi gain omni-directional antenna	Note: The 90° metal elbow can be swivelled through a 330° range to orient away from any obstructions; the set-screw should be loosened using a M3 Allen key to enable the swivelling and is then tightened when desirable position is identified, using the M3 Allen key to a max. torque of 1,0 Nm [8.85 lb-in]
		

3.3 | Antenna Options

Table 17. Antenna Options for United States, Canada, and Australia

ANTENNAS FOR USE IN UNITED STATES, CANADA, AND AUSTRALIA (Note: all columns are independent of each other)				
Antenna Type Code (antenna provided with product)	Antenna Accessory: Must be ordered separately			
	Remote Mount Antennas (allowed for use)	Magnetic Remote Mount Assemblies/ Antennas WAMM100RSP-005 WAMM100RSP-010 (allowed for use)	Extension Cable Assemblies/Antennas for Remote Mount WCA200RSJRSP-002 WCA200RSJRSP-005 WCA200RSJRSP-010 WCA200RSJRSP-015 WCA200RSJRSP-020 (allowed for use)	Extension Cable Assemblies/Antennas for Remote Mount WCA200RNPRSP-002 WCA200RNPRSP-010 (allowed for use)
00	WAN03RSP	WAN04RSP	WAN03RSP	WAN06RNJ
12	WAN09RSP	WAN05RSP	WAN04RSP	
14	WAN10RSP	WAN08RSP	WAN05RSP WAN08RSP WAN09RSP WAN10RSP WAN11RSP	

- Note:
- (1) Cable with a RP-SMA plug that connects directly to the WBX RP-SMA jack is used for Remote Antenna (exception, WAN06RNJ which uses N-type jack)
 - (2) Industry Canada Compliance Statement: This device has been designed to operate with the antenna types listed in this document, and having a maximum gain of 9 dBi. Antenna types not included in this list or having a gain greater than 9 dBi are strictly prohibited for use with this device. The required antenna impedance is 50 Ohm.

Table 18. Antenna Options for All Other Approved Countries

ANTENNAS FOR USE IN ALL OTHER APPROVED COUNTRIES (Note: all columns are independent of each other)				
Antenna Type Code (antenna provided with product)	Antenna Accessory: Must be ordered separately			
	Remote Mount Antennas (allowed for use)	Magnetic Remote Mount Assemblies/ Antennas WAMM100RSP-005 (allowed for use)	Magnetic Remote Mount Assemblies/ Antennas WAMM100RSP-010 (allowed for use)	Extension Cable Assemblies/Antennas for Remote Mount WCA200RSJRSP-002 WCA200RSJRSP-005 WCA200RSJRSP-010 WCA200RSJRSP-015 WCA200RSJRSP-020 (allowed for use)
00	WAN03RSP	WAN08RSP	WAN04RSP	WAN03RSP
12	WAN09RSP		WAN08RSP	WAN08RSP
14	WAN10RSP			WAN09RSP WAN10RSP WAN11RSP

Remote mount: Remote mount antenna uses a cable with an RP-SMA plug that connects directly to the WBX RP-SMA jack (exception, WAN06RNJ, which uses a cable with an RP-N plug on one end and an RP-SMA plug on the other end.)

4 | CABLES

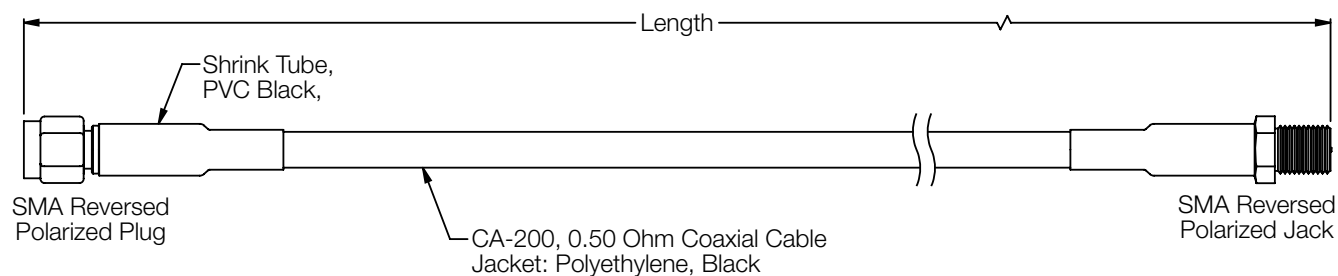
4.1 | WBX Series Antenna Cables

- All cables in these tables have a specified impedance of 50 ohms.
- These cables may also be used between the switch and lightning arrestor, between the lightning arrestor and antenna, or between the switch and antenna.

Table 19. Switch to Antenna Cable Specifications for WBX Series

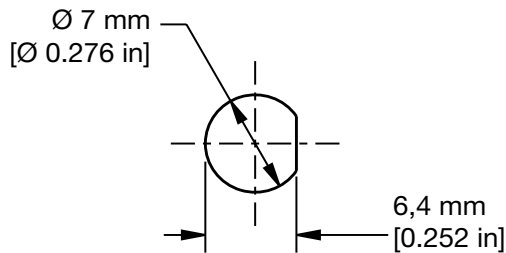
Honeywell Part Number	Cable Type	Connector Type	Frequency (GHz)	Length	Loss (dB)
WAMM100RSP-005	100 Series	RP-SMA Jack to RP-SMA Plug	2.4	1,52 m [5 ft]	1.99
WAMM100RSP-010	100 Series	RP-SMA Jack to RP-SMA Plug	2.4	3,05 m [10 ft]	3.98
RF Cable A					
WCA200RNPRSP-002	200 Series	RP-N Plug to RP-SMA Plug	2.4	0,61 m [2 ft]	0.34
WCA200RNPRSP-010	200 Series	RP-N Plug to RP-SMA Plug	2.4	3,05 m [10 ft]	1.69
RF Cable B					
WCA200RNJRSP-002	200 Series	RP-SMA Jack to RP-SMA Plug	2.4	0,61 m [2 ft]	0.34
WCA200RNJRSP-005	200 Series	RP-SMA Jack to RP-SMA Plug	2.4	1,52 m [5 ft]	0.85
WCA200RNJRSP-010	200 Series	RP-SMA Jack to RP-SMA Plug	2.4	3,05 m [10 ft]	1.69
WCA200RNJRSP-015	200 Series	RP-SMA Jack to RP-SMA Plug	2.4	4,57 m [15 ft]	2.54
WCA200RNJRSP-020	200 Series	RP-SMA Jack to RP-SMA Plug	2.4	6,10 m [20 ft]	3.38

Figure 3. WBX Antenna Extender Cables



Note: This cable may optionally be mounted in a hole (see Figure 4), and fastened with the included nut and lockwasher. This would allow the RP-SMA jack to support the antenna. If this is done, ensure that the surface around the hole is clean and free of paint or oil, so as to allow a low resistance ground connection for optimum R.F. performance.

Figure 4. WBX Antenna Extender Cable Mounting Hole



Recommended Panel Mounting

STOP ATTENTION

The antenna cables should not be modified (i.e. cut short and/or re-terminated) as it may affect communication agency approval.

4.2 | Protection of Antenna Connections

If the antenna and connectors are not protected by the radome, the connector and threads should be protected from the elements through an application of protective tape.

- A recommended protective tape is COAX-SEAL® #104 Hand Moldable Plastic Weatherproofing Tape, available from electrical supply houses.
- Also acceptable is Scotch® Premium Vinyl Electrical Tape 88-Super tape, available from 3M.

Figure 5. Application of Protective Tape

Step 1 - Remove radome.



Step 2 - First apply 1/2 inch wide COAX-SEAL® (flexible and moldable material)



Step 3 - Secondly, apply 3M Scotch® Premium Vinyl Electrical Tape 88-Super



Ultimately, the antenna/cable choice may need to be tested in the actual application conditions to prove suitability for the environment.

5 | WBX BASIC START UP

This section provides basic installation instructions for the WBX used in conjunction with a OneWireless™ User Interface. Please refer to manuals OWDOC-X253, OWDOC-X254, and OWDOC-X255 for additional information and further details on installation.

5.1 | Antenna Connection (if required)

⚠ WARNING

RF EXPOSURE

To satisfy FCC RF exposure requirements for mobile transmitting devices, a separation distance of 20 cm [7.87 in] or more should be maintained between the antenna of this device and persons during device operation. To ensure compliance, operation at closer than this distance is not recommended. The antenna used for this transmission must not be co-located in conjunction with any other antenna or transmitter.

Failure to comply with these instructions could result in death or serious injury.

CAUTION

Power to the WBX should not be applied (ensure battery is removed) during installation of antenna as damage could occur to the WBX electronics and/or ignite the surrounding hazardous atmosphere.

CAUTION

When re-installing a radome on the WBX, do NOT use a wrench. Thread the radome on and tighten hand-tight. Ensure that the lower surface of the radome is flush with the WBX housing. Using a wrench could crack or damage the radome.

The WBX is normally shipped with a direct mount 2.0 dBi antenna and radome. To use one another style of direct mount antenna or remote mount antenna per Section 3.3, the radome may be removed by hand or using 30 mm open-end or adjustable wrench; unscrew the radome by turning it CCW (see Figures 6 and 7). If the WBX you purchased was not provided with an antenna and radome, you can proceed to using another style of antenna recommended and approved for use with this product by Honeywell (see Tables 17 & 18).

Figure 6. Removal of Radome



Figure 7. Unscrew Antenna



Unthread the radome from the conduit fitting. Caution: Using a wrench could crack or damage the radome.

A **remote mount antenna** requires the use of an extension cable to allow the antenna to be mounted in a different location than the WBX location. The extension cable will need to have one end with an RP-SMA plug connector which will mate with the WBX connector jack under the same mounting procedure as the direct mount antenna. The other end of the extension cable will need to mate with antenna connector directly or it may be integral to the particular remote mount antenna chosen. See Figure 8.

Figure 8. ISA100 Wireless WBX RP-SMA Connection, Remote



5.2 Battery Connection Procedure

⚠ WARNING

RISK OF DEATH OR SERIOUS INJURY FROM EXPLOSION OR FIRE

Connection and disconnection of the batteries should only be performed in a non-hazardous area. 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.

Failure to comply with these instructions could result in death or serious injury.

⚠ WARNING

RISK OF DEATH OR SERIOUS INJURY FROM EXPLOSION OR FIRE

If WBX is to be returned to Honeywell for any reason, the battery **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. For shipping purposes, note that each of the two battery cells contains approx. 0.7 grams of lithium metal. Regulations may limit the maximum weight of lithium in a shipment.

Failure to comply with these instructions could result in death or serious injury.

⚠ WARNING

RISK OF DEATH OR SERIOUS INJURY FROM EXPLOSION OR FIRE

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 3.6 V lithium thionyl chloride (Li-SOCl₂) battery (non-rechargeable), size AA. No other batteries are approved for use in the WBX Series. Always replace both batteries at the same time.

- Honeywell Battery, part number: WBT7
- Approved battery manufacturers: Xeno Energy, part number: XL-060F; Tadiran, part number: TL-5903/S; Bipower, part number: ER14505H

STOP ATTENTION

When the WBX switch is being installed or operating in a hazardous environment, the end customer/user should issue a work permit to a trained professional installer prior to any work performed on the ISA100 Wireless WBX switch. This includes the following actions:

- Installation and/or operation of the ISA100 Wireless WBX switch
- Installation and/or adjustment of a remote antenna for the ISA100 Wireless WBX switch
- Maintenance on the ISA100 Wireless WBX switch, including battery replacement, pairing, purging, etc.

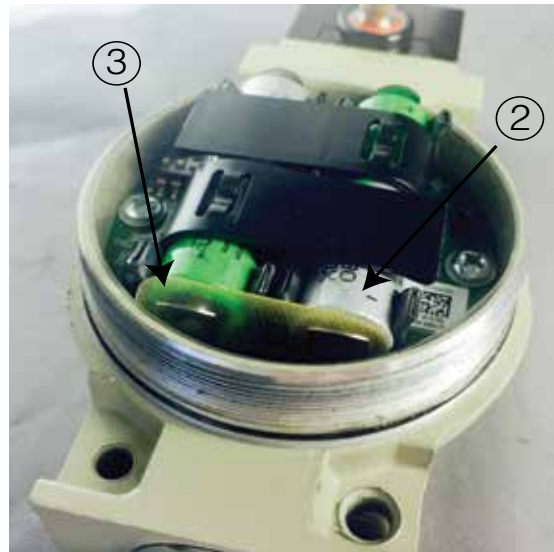
Tools required: #2 Phillips screwdriver

⚠	WARNING DO NOT DISASSEMBLE OR ASSEMBLE WHEN AN EXPLOSIVE ATMOSPHERE IS PRESENT
1	Using a #2 Philips screwdriver, unscrew the screw holding the S-shaped clamp. Remove the screw and S-shaped clamp that is holding down the housing cover.
2	Remove the WBX housing cover by turning in CCW direction as shown in Figure 9.
3	Using a finger, press down slightly on both the batteries and pull out the battery insulator (see Figure 11). Ensure that the batteries are properly seated and making contact. Also, while removing the battery insulator observe the ORANGE LED flash one time; this confirms the device is powered up and operational. IMPORTANT: If the ORANGE LED does not blink upon powering up, it is recommended to remove the batteries and re-insert back again.
4	Replace the cover and thread it on to housing by turning in CW direction until tight.
5	Place the S-shaped clamp and tighten the screw with a 1,5 Nm [13.3 in-lb] torque to firmly hold down the housing cover.
6	Proceed with provisioning the device into the ISA100 network, if applicable.

Figure 9. ISA100 Wireless WBX housing



Figure 10. ISA100 Wireless WBX battery and Insulator



② = Battery • ③ = Insulator

5.3 | DIP Switches

5.3.1 | DIP Switches

The ISA100 Wireless Hazardous Area Limit Switch, WBX Series, is supplied with non-functioning DIP switches. For models with functioning DIP switches, refer to Limitless™ P2P WBX Series, document number 32307000.

Figure 11. DIP Switch Settings



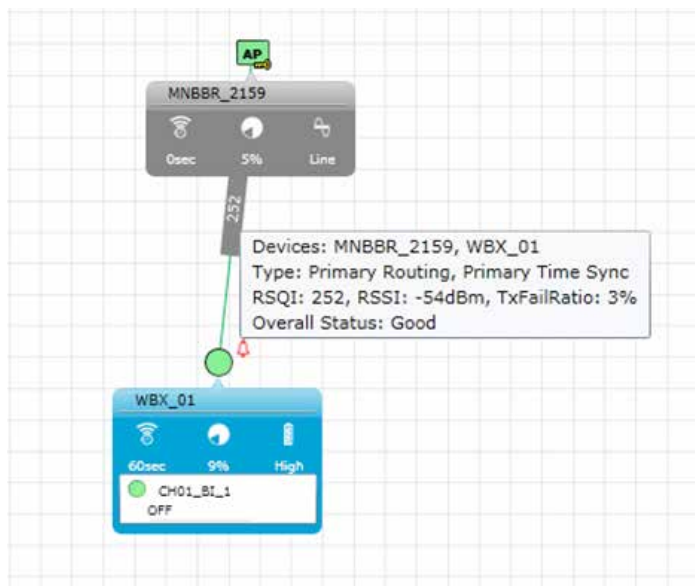
5.4 | Wireless Link Quality Measurements

5.4.1 | Link Measurements

There is one method of observing the R.F. link performance

- **The Map View** on the OneWireless™ User Interface will show a link number in a small block on the line between switch and AP. Hovering over this block will show a larger block of link status info:

Figure 12. R.F. Link Quality Data Block Shown on One-Wireless™ User Interface Map View



RSQI is the Received Signal Quality Indicator value, lowest value/highest value. Higher values are better.

RSSI is the Received Signal Strength Indicator value, lowest value/highest value. The less negative the values, the stronger the signal (-60 dBm is stronger than -70 dBm).

TxFailRatio is related to the percentage of dropped data packets. Low values are better, high values may be an indication of poor link quality or interference

5.4.2 | Connection Quality Labels

Link quality details can be categorized as poor, fair, good, etc. The default numerical criteria for these labels as per the OneWireless™ Network Planning and Installation Guide (OW-DOC-X253) are

Table 20. WBX Connection Quality Labels

Quality Detail	Numerical Value	Label
RSQI range	196 to 255	Excellent
	128 to 195	Good
	64 to 127	Fair
	0 to 63	Poor
RSSI range	-75 to -25	Good
	-85 to -75	Fair
	-100 to -85	Poor
TxFailRatio	0 to 25	Good
	25 to 50	Fair
	50 to 100	Poor

(For WDM operations and setting alarms and thresholds, refer to OneWireless™ Wireless Device Manager User's Guide, OW-DOC-X254.)

6 | OPERATING ONEWIRELESS™ USER INTERFACE

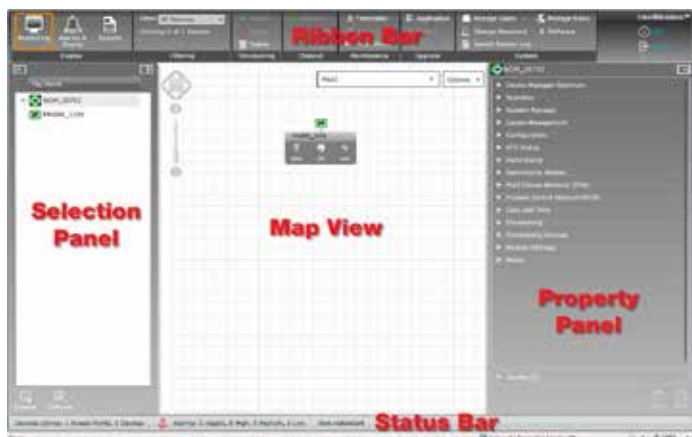
6.1 | Overview of the OneWireless™ User Interface

OneWireless™ user interface comprises of the following main elements (refer to Figure 13):

1. **Ribbon bar** — Consists of the monitoring tab, alarms/events tab and the reports tab. It consists of groupings of user interface controls for controlling display elements and accessing various functions for monitoring and maintaining the ISA100 Wireless™ Network. These user interface controls are contextual and are enabled based on user role and devices/channels selected in the selection panel or the map view.
2. **Map view** — Provides a visual representation of the ISA100 Wireless™ Network.
3. **Selection panel** — Displays a list of all the devices that are configured in the ISA100 Wireless™ Network.
4. **Property panel** — Contains configuration properties of all the devices configured in the ISA100 Wireless™ Network.
5. **Status bar** — Provides an overview of the network status by displaying the number of online devices, active alarms, WDM redundancy status, and the progress of any maintenance operation.

(For WDM operations and procedures, refer to OneWireless™ Wireless Device Manager User's Guide, OWDOC-X254).

Figure 13. OneWireless™ User Interface Screen



6.2 | Provisioning the OneWireless™ User Interface

6.2.1 | Connecting to ISA100 Network

1. Enable the FDAP (or MNBR) for provisioning.
 - a. Select the FDAP (or MNBR) in the OneWireless™ User Interface Home Screen on the selection panel (see Figure 14).
 - b. Expand '**Device Parameters**' in the property panel and scroll down to 'Over The Air Provisioning' (see Figure 15).
 - c. Click on '**Enable for 60 Minutes**' button to enable FDAP (or MNBR) for accepting devices over the network (see Figure 15).

Figure 14. Select FDAP (or MNBR) in Selection Panel

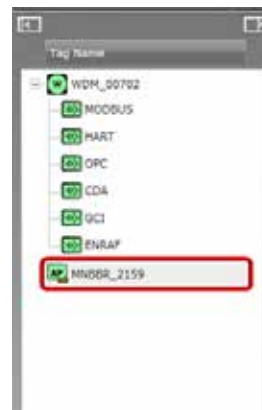
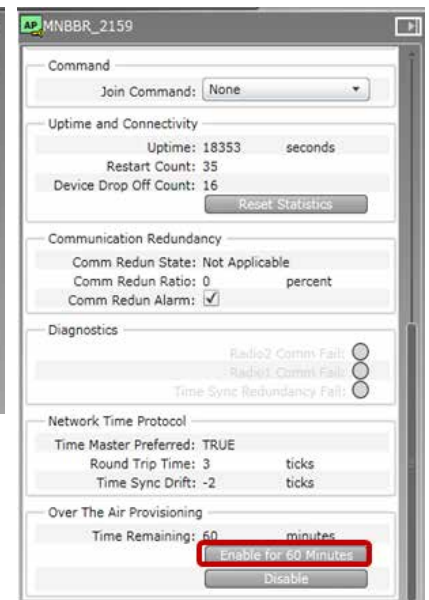


Figure 15. Enable for 60 Minutes Button



2. Provision the WBX device into the Network.
 - a. Remove the insulator tab from the battery holder to power-on the WBX device.

Note: If the device was already provisioned once before, it would be required to perform '**Restore to Factory Defaults**' by pressing the reset button for >12 sec before it is ready to be provisioned again (see Figure 29).
 - b. WBX device will appear in the OneWireless™ User Interface home screen, on the selection panel as a new device and will be in **gray** color (see Figure 16).

Note: A fresh, out-of-box WBX device will appear with a Tag name as Txxxxxxxxxxxxxxx, where the 15-digit 'x' are usually the MAC ID of the device.

Figure 16. WBX Appearing in Selection Panel



- c. Select the device and click on the **'Accept'** button in the top ribbon bar (see Figure 17).

Figure 17. Accept Button on Ribbon Bar



- d. In the pop-up window that appears, select the device and click on **'Accept'** (see Figure 18).

Figure 18. Accept Button Pop-Up Window



- e. The device icon will turn **blue** and then to **green** color.
Note: This process may take time varying from one minute to five minutes
- f. The device icon in **green** indicates the device is now provisioned into the ISA100 Wireless™ Network.
- g. OPTIONAL: One can rename the device to enable better clarity of either the location it is installed or the purpose. This can be achieved by selecting the WBX device in the OneWireless™ User Interface home screen on the selection panel (see Figure 19), expand **'Field Device Summary'** on the property panel (see Figure 20) and against **'Tag Name:'** field enter the corresponding Tag Name.

Figure 19. Select the WBX Device in the Selection Panel

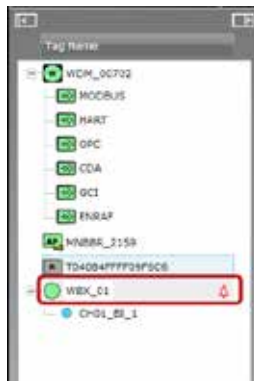
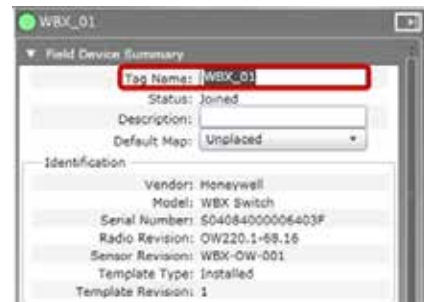


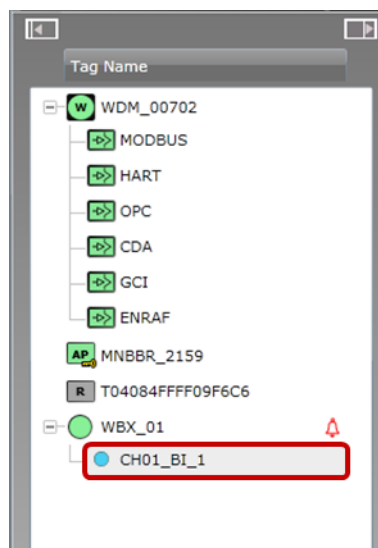
Figure 20. Tag Name Field Entry



6.3 | WBX Device Channel Activation

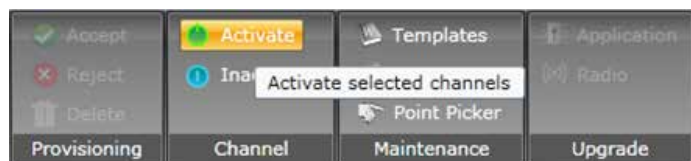
1. Expand on the WBX switch in the Selection Panel and select the channel. Note: One or more channel(s) may appear under a given device depending on the number of AITB blocks supported by the respective device. Also, the channel will appear only after the device is provisioned into the ISA100 Wireless™ Network.

Figure 21. Select WBX Channel in Selection Panel



2. Click on the **'Activate'** button in the ribbon bar

Figure 22. Activate Button on Ribbon Bar



3. In the pop-up window that appears, select the device and click on **'Activate'**.

Figure 23. Pop-Up Window



4. The channel icon will turn from BLUE to GREEN color indicating the activation process is complete. Details of what parameters the channel contains will be available on the property panel.

Figure 24. Activate Channel in Selection Panel

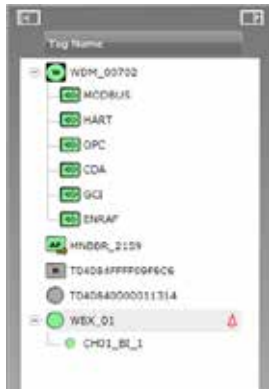
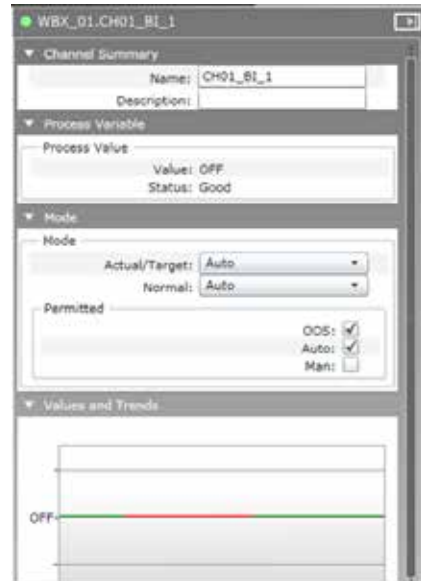


Figure 25. Channel Properties



6.4 | Setting TX Power

6.4.1 | TX Power Setting Policy

⚠ WARNING

The ISA100 WBX Series Limit Switch must be professionally installed in accordance with the requirements specified in this document. Only the specified power settings, antenna types and gains and cable lengths (attenuation) as outlined in this document are valid for ISA100 WBX Series installations.

Failure to comply with these instructions could result in death or serious injury.

The WBX Switch as shipped from the factory will have its TX power value set according to its model number and this value is consistent with those values given in Table 21. The TX power setting may be changed over the air using the OneWireless™ User Interface. Due to radio approval body regulations, changing the TX power setting is only available to the professional installer.

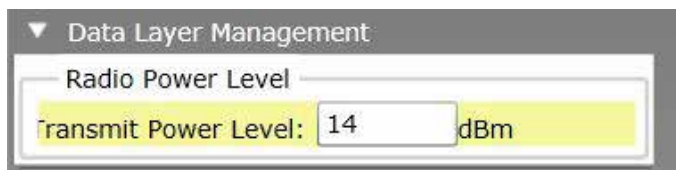
The TX power adjustment feature is provided for Professional Installers to adjust the WBX Switch TX power to match a change in the selection of antenna and cables made at the installation site and still ensure that the EIRP does not exceed the regulatory limits.

6.4.2 | Power Setting Procedure

(For WDM operations and procedures, refer to OneWireless™ Wireless Device Manager User's Guide, OWDOC-X254).

1. From Table 21, determine the new power setting to be set, based on the new antenna configuration.
2. Log into the OneWireless™ User Interface with a user account and password having suitable access privileges.
3. Ensure that the WBX device to be set has been successfully provisioned.
4. On the selection panel, click on the Sensing Device to be set.
5. On the property panel, click on **"Data Layer Management"**.
6. Enter the new power level number in dBm and press Enter.
7. On the OneWireless™ User Interface Map View, verify that the link quality data block shows an acceptable link quality (see Figure 26).
8. Log off the OneWireless™ User Interface account.

Figure 26. R.F. Power Setting Procedure Using OneWireless™ User Interface



6.5 | Reading Battery Voltage

6.5.1 | Reading Switch Battery Voltage

The OneWireless™ User Interface allows the reading of the current battery voltage of the switch by the following:

1. Log into the OneWireless™ User Interface using any account.
2. On the selection panel, click the **switch name** (not the channel name).
3. On the property panel, click on “**Device Vendor Parameters**”. Read the battery voltage.
4. Log off the OneWireless™ User Interface account.

Figure 27. Select WBX Channel in Selection Panel



Figure 28. Device Vendor Parameters on Property Panel

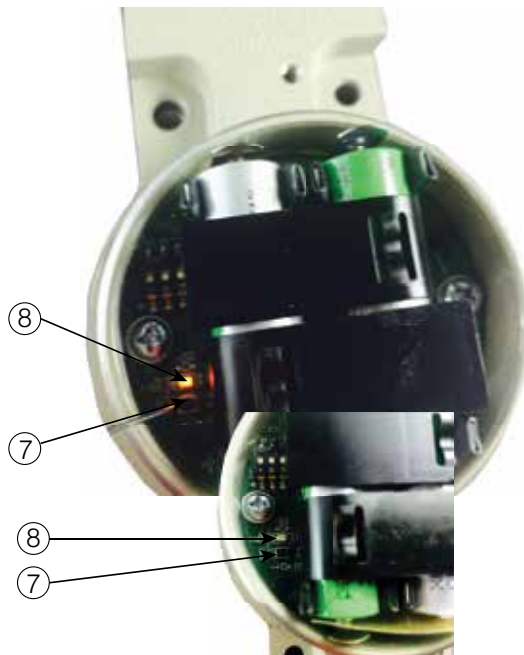


Note that a number of alerts may be enabled and configured in this dialog box. (For WDM operations and procedures, refer to OneWireless™ Wireless Device Manager's User's Guide, OWDOC-X254.)

6.6 | Restore to Factory Defaults

The WBX device can be restored to factory default settings by pressing and holding the reset button for >12 seconds. The reset button must be held pressed until the reset (orange) LED turns off, indicating successful restoration to factory defaults. Figure 29 shows the location of the reset button and LED.

Figure 29. Location of Reset Button



Note: Use a blunt object, such as paper clip to actuate the RESET button⑦.

6.7 | Battery Life

6.7.1 | Battery Life

The battery life depends on three factors:

- Periodic update interval - Setting a higher update interval increases battery consumption
- RF link data re-transmissions - When the ISA100 WBX Switch needs to send a packet of data to the nearest AP (publish), it transmits the packet and waits for an acknowledgement. Normally, it receives the acknowledgement immediately, stops, and waits for the next scheduled transmission time. A long RF path, interfering materials (metal structures, etc.), or RF interference from other nearby transmitters, may cause the transmitted packet to be “dropped”. If this occurs, the switch will re-try to send the packet. It will re-try two more times, waiting for an acknowledgement. These extra re-transmissions will greatly increase the battery usage and reduce battery life.

- Operating in “Router” mode - When the ISA100 WBX Switch is configured to act as a ‘routing device’ in an ISA100 Wireless™ Network, as defined by the ISA100 architecture, this device stays awake almost all the time which can increase battery consumption.

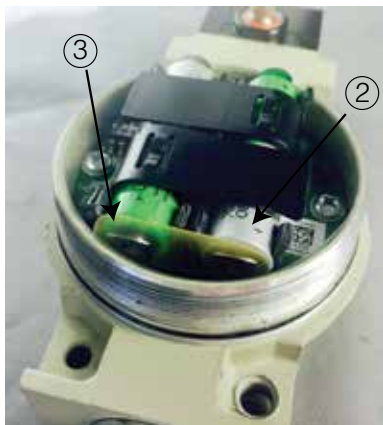
Typical battery life is estimated to be as much as 1 year for 5 second periodic update intervals.

6.7.2 | Battery Life Considerations

As shipped from the factory, the switch will have two battery cells installed. There will be a battery insulator tab ③ installed, to inactivate the switch electronics (see figure below). The following are suggested policies:

- Do not remove the tab until the unit is ready for use, as battery life will be considerably shortened. The unit will transmit frequently, trying to establish communication with a node. This node establishment will not succeed, if the network has not yet been provisioned for that switch.
- Do not remove the tab and provision the unit until the unit is in its intended location, as it will try to establish links with whatever APs are nearby. This will cause unnecessary transmissions through the network to occur, wasting battery power and using bandwidth.
- When a switch is removed from service, and is to be stored, it is recommended that the insulating tab be installed, or the batteries removed, so as to preserve battery life and avoid unnecessary data transmissions.

Refer to Section 10.5 for battery replacement procedures.



6.7.3 | Battery Life Remaining

The WDM will calculate and display the estimated remaining battery life in years.

The battery life remaining is calculated by precisely measuring the battery voltage, under current conditions of periodic update interval, display timing and network activity, and recording the battery voltage decrease over an 8 hour period. By extrapolating this data, and knowing the battery type, the WDM can calculate in how many years the battery voltage will reach 5.4 Vdc.

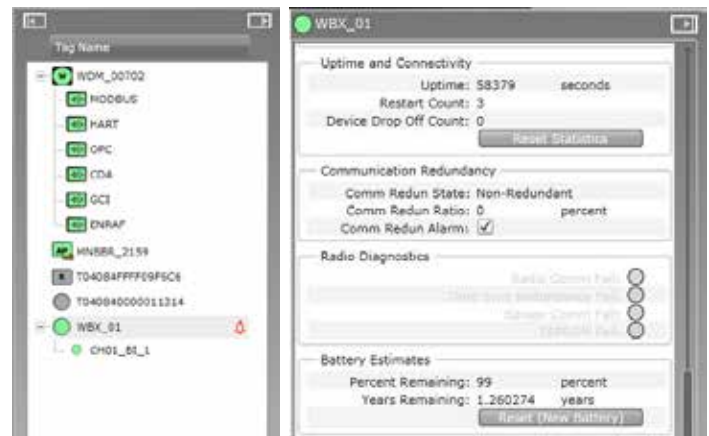
Note: The battery life remaining, as displayed on the OneWireless™ User Interface, will not be valid until eight hours after the latest change to the periodic update interval.

To display the life remaining, and to reset the calculation following a battery replacement, perform the following:

- Log into the OneWireless™ User Interface with a user account and password having suitable access privileges.
- Ensure that the WBX device to be set has been successfully provisioned.
- On the selection panel, click the switch name (not the channel name).
- On the property panel, click on “**Device Management**”, and scroll down to “**Battery Estimates**”.
- Observe the “**Percent Remaining**” and “**Years Remaining**”.
- If the batteries have just been replaced, click on the “**Reset (New Battery)**” box.
- Log off the OneWireless™ User Interface account.

Figure 30. Select WBX Channel in Selection Panel

Figure 31. Battery Estimates on Property Panel



6.8 Software Updates

As required, new software may be uploaded over the air, into the switch. This procedure may be performed while the switch is in service. No disassembly of the switch is required. It is recommended to avoid user intervention (such as device reset, etc.) on the device during an over-the-air upgrade event.

Software updating, if required, may be performed in the field, utilizing the OneWireless™ User Interface. These procedures are described in the OneWireless™ Wireless Device Manager User's Guide (OWDOC-X254). Software updating will require image files for the specific part number of the switch, and are downloadable from the relevant Honeywell support pages.

6.9 | Fault Codes

The only error codes applicable for the WBX are listed below. They are not visible on the switch; they must be viewed on the OneWireless™ User Interface:

1. OOS - Channel is out of Service: Ensure the switch has been properly provisioned with the OneWireless™ User Interface. Use restore mode to OneWireless™ User Interface.
2. Low Battery: Battery voltage is critically low, below 5.4 Vdc; replace batteries as soon as possible.

6.10 | Setting Periodic Update Interval

The “periodic update interval” is the frequency at which the switch makes a measurement and transmits it over the wireless network to the FDAP, which then sends it to the WDM. The rates allowed for the ISA100 Wireless Hazardous area Limit Switch, WBX Series are 1, 5, 10, 30, or 60 seconds. There are three criteria for this setting:

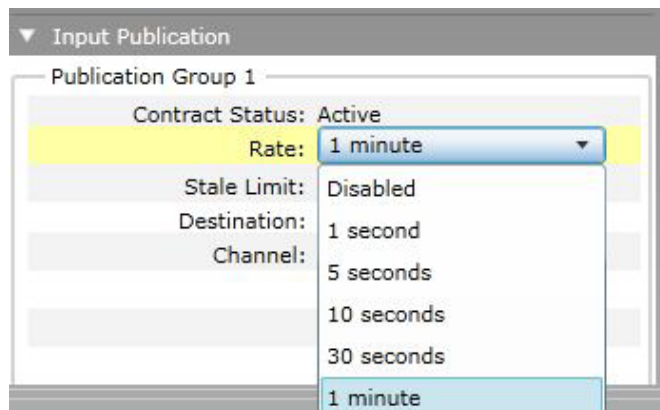
1. How rapidly the switch is being actuated
2. The criticalness of the measurement
3. The battery life desired

The periodic update interval has a large impact on the battery life. The switch will actually go into a very low-power, “sleep” mode, and awaken in time to make and transmit a measurement, and wait to receive an acknowledgement of that transmission. Battery drain is proportional to the rate of measuring, and particularly to the rate of transmitting and receiving data.

To set the “**periodic update interval**”, follow this procedure on the OneWireless™ User Interface (Figure 32): Select the switch name on the selection panel, and select “**Input Publication**” on the property panel. Click on the “**Rate**” drop-down arrow to select a rate.

Note: The update interval can only be set via the OneWireless User Interface. **The DIP switches on the product are not used and should all be set to OFF condition.**

Figure 32. Input Publication Dialog Box



Stale Limit: Each time the switch transmits a measurement, it waits for an acknowledgement from the WDM. If it does not receive this acknowledgement, the switch will re-send the measurement and wait for the acknowledgement. If it does not receive it the second time, it will attempt a third time. If this is not successful, the switch will record the results, and await the next scheduled time to transmit a measurement, based on the current publication rate. If, due to interference, or a weak signal path, the number of missed transmissions equals the “stale limit”, an error message is recorded by the WDM. This information can be useful in diagnosing an interference problem or a poor link path.

To avoid nuisance alarms, it is recommended that the stale limit be set to 15 for a periodic update interval of 1 per second, and set to 5 for other periodic update intervals.

7 | EQUIVALENT ISOTROPICALLY RADIATED POWER (EIRP)

In radio communication systems, Equivalent Isotropically Radiated Power (EIRP) or, alternatively, Effective Isotropic Radiated Power, is the amount of power that would have to be emitted by an isotropic antenna (that evenly distributes power in all directions and is a theoretical construct) to produce the peak power density observed in the direction of maximum antenna gain. EIRP can take into account the losses in transmission line and connectors and includes the gain of the antenna. The EIRP is often stated in terms of decibels over a reference power level that would be the power emitted by an isotropic radiator with an equivalent signal strength. The EIRP allows making comparisons between different emitters regardless of type, size or form. From the EIRP, and with knowledge of a real antenna's gain, it is possible to calculate real power and field strength values.

$EIRP(dBm) = \text{Radio TX Power (dBm)} - \text{Cable Loss, including Lightning Arrestor loss (dB)} + \text{Antenna Gain(dBi)}$

Antenna gain is expressed relative to a (theoretical) isotropic reference antenna (dBi).

7.1 | EIRP Limits and TX Power Setting

Table 21. Maximum EIRP Limits and Radio Module TX Power Setting

Antenna Part Number	Antenna Type	Radio Usage/ Application	Frequency (GHz)	Max. Antenna Gain (dBi)	Min. Cable Length (ft)	Min. Cable Loss (dB)	Agency/ Country	Max. TX Power Setting (dBm)	Max. EIRP (dBm)
WAN03RSP	Omni-directional	Remote	2.4 GHz	3.0	9.8	7.35	FCC, IC	15	10.7
				3.0	9.8	7.35	ETSI	6	1.7
WAN04RSP		Integral	2.4 GHz	5.5	0	0.00	FCC, IC	11	16.5
				5.5	0	0.00	ETSI	2	7.5
WAN05RSP		Integral	2.4 GHz	9.0	0	0.00	FCC, IC	11	20.0
				9.0	0	0.00	ETSI	-0.5	8.5
WAN06RNJ		Remote	2.4 GHz	8.0	3	0.76	FCC, IC	15	22.2
				8.0	11	2.11	FCC, IC	15	20.9
				8.0	3	0.76	ETSI	-0.5	6.7
				8.0	11	2.11	ETSI	-0.5	5.4
WAN08RSP		Integral	2.4 GHz	0.0	0	0.00	FCC, IC	15	15.0
				0.0	0	0.00	ETSI	6	6.0
WAN09RSP		Remote	2.4 GHz	3.0	15	2.81	FCC, IC	15	15.2
				3.0	15	2.81	ETSI	6	6.2
WAN10RSP		Remote	2.4 GHz	5.0	15	2.81	FCC, IC	11	13.2
				5.0	15	2.81	ETSI	2	4.2
WAN11RSP		Remote	2.4 GHz	4.0	9.8	1.66	FCC, IC	15	17.3
				4.0	9.8	1.66	ETSI	4	6.3
WAN12RSP		Integral	2.4 GHz	2.0	0	0.00	FCC, IC	15	17.0
				2.0	0	0.00	ETSI	6	8.0

- ¹ The Maximum TX Power Setting values given in Table 18 represent the power produced by the radio circuit within the RF Module. These maximum TX power setting values do not include antenna gain nor do they include the losses caused by cables and connectors. When these external gains and losses are included, then using these maximum TX power setting values ensures that the WBX Series EIRP will not exceed the maximum EIRP limits that are given in Table 21.
- ² The values in the above tables have been determined through agency certification testing.
- ³ The following shall apply for antenna type, frequency range, application/usage and agency/country compliance:
- Antenna gains above the maximum values shown shall not be used.
 - Cable length/loss below the minimum values shown shall not be used.
 - Maximum overall radio output power shown shall not be exceeded.
 - Maximum EIRP values shown above shall not be exceeded.
- ⁴ France restricts outdoor use to 10 mW (10 dBm) EIRP in the frequency range of 2,454 MHz to 2,483.5 MHz. Installations in France must limit EIRP to 10 dBm for operating modes utilizing frequencies in the range of 2,454 to 2,483.5 MHz.
- ⁵ Industry Canada Compliance Statement: This device has been designed to operate with the antenna types listed in this document, and having a maximum gain of 14 dBi. Antenna types not included in this list or having a gain greater than 14 dBi are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

8 | ANTENNA CONSIDERATIONS AND INSTALLATION

8.1 | Overview of Antenna Options

Tables 14 and 15 lists the antenna options along with the various characteristics that will be referenced throughout this section. This section is intended to assist an end user in determining which antenna(s) are worth investigating and subjecting to application requirements for proof of suitability.

STOP ATTENTION

The antenna cables should not be modified (i.e. cut short and/or re-terminated) as it may affect Communication Agency approval.

WARNING

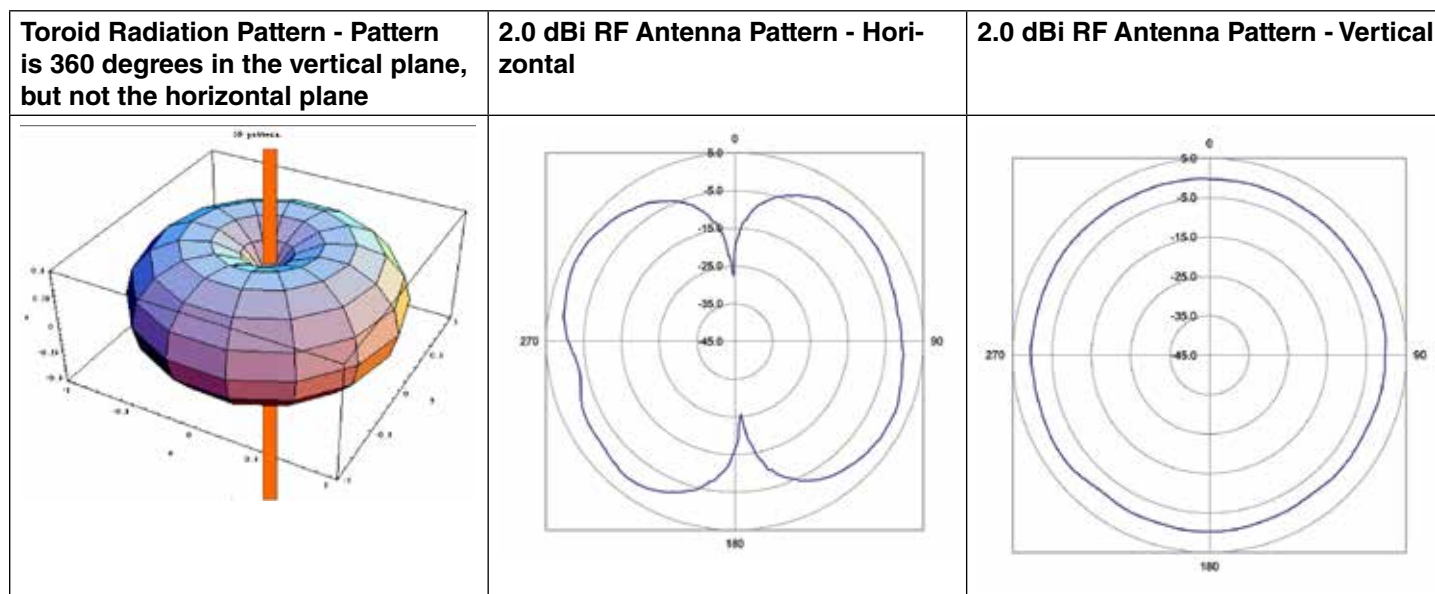
The WBX must be installed in accordance with the requirements specified in this document in order to comply with the specific Country Communication Agency requirements (i.e., FCC, IC, ETSI).

8.1.1 | Omni-directional Antenna Design

The omni-directional antennas offered in the ISA100 Wireless Series were chosen for their ability to be used in applications where transmit-and-receiver antennas may be moving with respect to each other or could also be stationary. They are dipole antennas that radiate power (power from the internal radio of the WBX) in a 360° outward pattern in a plane perpendicular to the length of the antenna element. “Omni” may suggest the antenna radiates power in all directions, but that is not the case. The actual antenna radiation pattern looks more like a toroid (doughnut-shape) as shown in Figure 33.

The antenna radiates virtually zero power in the Z axis and most of the power in the X and Y axis. Increasing the antenna’s gain will increase the power only in the X and Y axis. As a result, the radiation pattern becomes narrower. For instance, this is analogous to the reflector in an automobile’s headlight. The reflector does not add light or increase the luminous intensity of the light bulb, rather it simply directs all the light energy in the forward direction where the light is needed most.

Figure 33. Radiation Pattern of an Omni-directional Antenna



8.2 | Antenna Mounting Considerations

8.2.1 | Antenna Mounting Location with Respect to RF Signal

ATTENTION

When the WBX switch is being installed or operating in a hazardous environment, the end customer/user should issue a work permit to a trained professional installer prior to any work performed on the WBX Series limit switch. This includes the following actions:

- Installation and/or operation of the WBX Series limit switch
- Installation and/or adjustment of a remote antenna for the WBX Series Limit switch
- Maintenance on the WBX Series Limit Switch, including battery replacement, pairing, purging, etc.

WARNING

RF EXPOSURE

To satisfy FCC RF exposure requirements for mobile transmitting devices, a separation distance of 20 cm [7.87 in] or more should be maintained between the antenna of this device and persons during device operation. To ensure compliance, operation at closer than this distance is not recommended. The antenna used for this transmission must not be co-located in conjunction with any other antenna or switch.

Failure to comply with these instructions could result in death or serious injury.

WARNING

LIVES MAY BE AT RISK!

Carefully observe these instructions and any special instructions included with the equipment being installed.

WARNING

CONTACTING POWER LINES COULD BE FATAL

Look over the site before beginning any installation and anticipate possible hazards, especially these:

- Make sure no power lines are near where possible contact can be made. Antennas, masts, towers, guy wires, or cables may lean or fall and contact these lines. People may be injured or killed if they are touching or holding any part of equipment when it contacts electric lines. Make sure there is NO possibility that equipment or personnel can come in contact directly or indirectly with power lines.
- Assume all overhead lines are power lines.
- The horizontal distance from a tower, mast, or antenna to the nearest power line should be at least twice the total length of the mast/antenna combination. This will ensure that the mast will not contact power if it falls during either installation or later.

WARNING

TO AVOID FALLING, USE SAFE PROCEDURES WHEN WORKING AT HEIGHTS ABOVE GROUND

- Select equipment locations that will allow safe, simple equipment installation
- Don't work alone. A friend or co-worker can save a life if an accident happens.
- Use approved, non-conducting ladders and other safety equipment. Make sure all equipment is in good repair.
- If a tower or mast begins falling, don't attempt to catch it. Stand back and let it fall.
- If anything such as a wire or mast does come in contact with a power line, **DON'T TOUCH IT OR ATTEMPT TO MOVE IT.** Instead, save a life by calling the power company.
- Don't attempt to erect antennas or towers on windy days.

WARNING

MAKE SURE ALL TOWERS AND MASTS ARE SECURELY GROUNDED, AND ELECTRICAL CABLES CONNECTED TO ANTENNAS HAVE LIGHTNING ARRESTORS.

This will help prevent fire damage or human injury in case of lightning, static build up, or short circuit within equipment connected to antenna.

- The base of the antenna mast or tower must be connected directly to the building protective ground or to one-or-more approved grounding rods, using 1 AWG ground wire and corrosion-resistant connectors.
- Refer to the National Electrical Code for grounding details.
- Lightning arrestors for antenna feed coaxial cables are determined as 'Simple Apparatus' are allowed and approved for use.

WARNING

If a person comes in contact with electrical power, and cannot move

DO NOT TOUCH THAT PERSON OR RISK ELECTROCUTION.

- Use a non-conductive dry board, stick, or rope to push, pull, or drag them so they no longer are in contact with electrical power.
- Once they are no longer contacting electrical power, administer CPR if certified, and make sure emergency medical aid has been requested.

8.2.2 | Antenna Mounting Location with Respect to Antenna Location

There are several environmental factors to consider with respect to antenna location during installation. These factors can affect the radio frequency (RF) signal strength being both transmitted and received by the WBX and corresponding Field Device Access Point (FDAP). It is desirable for the antenna to be mounted to limit exposure of adjacent materials/objects between the Honeywell WBX and FDAP, as they will have an effect on RF signal strength. If the mounting location for an omni-directional antenna is on the side of a building or tower, the antenna pattern will be degraded on the building or tower side.

Obstacles that affect antenna patterns and RF signal strength:

- Indoor: Concrete, wood, drywall, and metal walls, etc.
- Outdoor: Vehicles, buildings, trees, structures, topology, weather conditions, chain link fence, major power cables, etc.

Rain and moisture: Wireless switches compliant with IEEE 802.15.4 operate in a 2.4 GHz band. As the peak absorption frequency of water molecules is approximately 22 GHz, the total signal attenuation due to rain, fog or moisture is negligible (less than 0.1 dB/mile for a heavy downpour).

8.2.3 | Line of Sight Considerations

Best performance is achieved when antennas for both the WBX Limit Switch and FDAP are mounted at the same height and in a direct line of sight (LoS) with no obstructions, and with both antennas vertical. Generally, the higher the antenna is above ground, the better it performs.

Figure 34. WBX to FDAP Antennas with RF Signal Line of Sight (LOS) Free From Obstacles

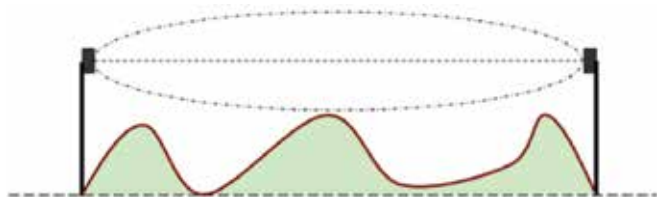
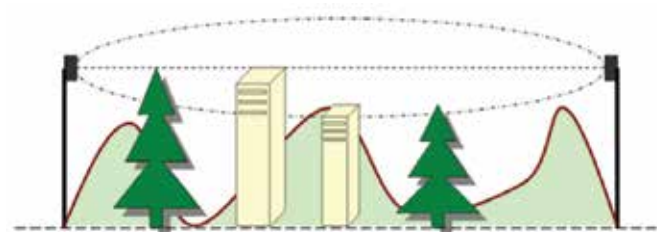


Figure 35. WBX to FDAP Antennas with RF Signal Line of Sight (LOS) Affected by Obstacles



8.3 | R.F. Interference Considerations

8.3.1 | General

The 802.15.4 specification provides a high resistance to interference. Within the 2.4 GHz band, there are 16 channels, each using approximately 2 MHz of bandwidth. The channel used may be rapidly changed depending on the presence of other signals sensed in that channel. Thus narrow band interfering signals may have no effect, while broadband noise sources may cause loss. The effect of light to moderate interference is not to make the system fail, but to increase the rate of “lost packets” of data. These “lost packets” are simply retransmitted as needed, so the user may not notice any problem. More serious interference can cause loss of more data updates, and error messages reported by the WDM, as well as shorter battery life.

8.3.2 | WiFi Networks

Most WiFi (WLAN) networks operate in the same 2.4 GHz range and use wider bands within that range. Also, the faster protocols (802.11N or AC), may utilize multiple channels. Factors affecting RF interference would be channel separation, distance separation, and duty cycle.

- Channel separation: Studies have shown that a channel separation of 7 MHz will make interference less likely. WiFi routers can be set to use different channels as needed, and auto channel modes can be disabled. If possible, switching to a 5 GHz-only protocol (using 802.11N or AC), would eliminate any possibility of 2.4 GHz interference. The WDM may be set to not use certain 802.15.4 channels.
- Distance separation: A physical separation of 10 meters or more will reduce possibility of interference.
- Duty Cycle: Generally the duty cycle of WiFi routers is very low for simple uses as e-mailing, messaging, most web browsing, and voice protocols. However, a video camera or multiple users streaming video would cause a significant increase in bandwidth usage and increase the possibility of interference, making channel or distance separation more desirable.

Regarding the WiFi client (laptop, smartphone, tablet), they are much less of a problem as they generally operate with a much reduced duty cycle (most data is received by the device), and may operate with much lower transmit power.

8.3.3 | Smart Phone “Apps”

Smart phone “apps” are available to display consumer WiFi signal strengths or download/upload speeds. These apps will not display the 802.15.4 signals as the packet format is different. However, if a suspected interference source causes a large reduction in consumer WiFi download speed, it is likely it could also cause interference to the 802.15.4 data used by the WBX.

8.3.4 | Bluetooth® Devices

Bluetooth® interference is less of an issue, due to the very narrow bandwidth of Bluetooth® signals, the low transmit power, and the rapid “frequency hopping” of the signals. If the 802.15.4 device misses a packet of data due to a Bluetooth® burst of data, the re-transmission of the 802.15.4 data will likely succeed, as the Bluetooth® will have hopped to a different channel by then.

8.3.5 | Wireless Video Camera and Video Links

Wireless video links operating in the 2.4 GHz band can cause serious interference as they are operating continuously, use a wide (6 MHz) bandwidth, and may be more powerful. Interference from wireless video could cause the “NO RF” indication in severe cases. As mentioned, frequency and/or distance separation may be required.

- Frequency Separation: Many video links have four or more channels selectable. Changing channels may help. Additionally, wireless video links are available in the 900 MHz band, and the 1.2 GHz band. Switching to one of those would eliminate interference issues with 802.15.4 (and 802.11x).
- Distance Separation: Separating the video link switch from the wireless switch would be very desirable. Alternatively, utilizing directional antennas on the wireless switch, and /or on the wireless video link would help greatly.

8.3.6 | Microwave Ovens

Microwave ovens operate in the 2.4 GHz range, they are powerful, and a high duty cycle. However, they may not be a problem to a modern 802.15.4 network. The magnetron in a microwave oven is driven by half-wave rectified AC, so the R.F. output is actually off for one half of the 60 Hz or 50 Hz power line cycle (8.33 or 10.0 msec). During that part of the cycle, the packets of 802.15.4 data may succeed. However, close to half of the packets may require retransmission, so data throughput could be greatly reduced.

8.3.7 | Cordless Phones/Baby Monitors/ Intercoms

A 2.4 GHz cordless phone in very close proximity to a wireless switch could cause lost packets, while the phone is in use, but is not a very likely cause. If monitoring the link quality as in “link measurements” above, shows interference, a simple remedy is to switch to a DECT 6.0 cordless phone operating on 1.9 GHz.

8.4 | Requirements

8.4.1 | Radio Installation Requirements

ATTENTION

- Professional Installation is required to ensure 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 ISA100 WBX Series as configured for the particular installation site.
- The antenna used for this switch 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 switch.
- For remote antenna, see antenna installation requirements to satisfy FCC RF exposure requirements.

ATTENTION

Federal Communications Commission (FCC):

- The ISA100 WBX Series Limit Switch 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 <http://www.hc-sc.gc.ca/index-eng.php>

8.5 | Direct Mount Antenna

⚠ WARNING

POTENTIAL ELECTROSTATIC CHARGING HAZARD

The direct mount antenna radome is made of plastic and has a surface resistivity greater than 1 Gohm per square. When the ISA100 WBX Series Limit Switch is installed, 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.

8.5.1 | Direct Mount, General Guidelines

A direct-mount antenna can be easily mounted by threading the mating RP-SMA plug of the antenna to the RP-SMA jack on the WBX. Tighten the antenna connection until finger tight by holding the antenna above the vertical 'knurl' portion of the antenna. Mildly push the antenna radome on to the conduit fitting and hand-tight the radome by rotating it CW till the radome hits a hard stop, when it comes in contact with the metal housing surface.

8.5.2 | Direct Mount, Straight

Figure 36. Direct Mount Antenna

Option "12" – Straight with Radome. 2.0dBi gain omni-directional antenna



Option "14" – 90° metal elbow with Radome. 2.0dBi gain omni-directional antenna



Note: The 90° metal elbow can be swivelled through a 330° range to orient away from any obstructions; the set-screw should be loosened using a M3 Allen key to enable the swivelling and is then tightened when desirable position is identified, using the M3 Allen key to a max. torque of 1,0 Nm [8.85 lb-in].

Direct mount antenna available in 2 dBi configurations.

8.6 | Remote Antennas

8.6.1 | Outdoor Installation Warnings

⚠ WARNING

LIVES MAY BE AT RISK!

Carefully observe these instructions and any special instructions included with the equipment being installed.

⚠ WARNING

CONTACTING POWER LINES COULD BE FATAL

Look over the site before beginning any installation and anticipate possible hazards, especially these:

- Make sure no power lines are near where possible contact can be made. Antennas, masts, towers, guy wires, or cables may lean or fall and contact these lines. People may be injured or killed if they are touching or holding any part of equipment when it contacts electric lines. Make sure there is NO possibility that equipment or personnel can come in contact directly or indirectly with power lines.
- Assume all overhead lines are power lines.
- The horizontal distance from a tower, mast, or antenna to the nearest power line should be at least twice the total length of the mast/antenna combination. This will ensure that the mast will not contact power if it falls during either installation or later.

⚠ WARNING

TO AVOID FALLING, USE SAFE PROCEDURES WHEN WORKING AT HEIGHTS ABOVE GROUND

- Select equipment locations that will allow safe, simple equipment installation
- Don't work alone. A friend or co-worker can save a life if an accident happens.
- Use approved, non-conducting ladders and other safety equipment. Make sure all equipment is in good repair.
- If a tower or mast begins falling, don't attempt to catch it. Stand back and let it fall.
- If anything such as a wire or mast does come in contact with a power line, DON'T TOUCH IT OR ATTEMPT TO MOVE IT. Instead, save a life by calling the power company.
- Don't attempt to erect antennas or towers on windy days.

WARNING

MAKE SURE ALL TOWERS AND MASTS ARE SECURELY GROUNDED, AND ELECTRICAL CABLES CONNECTED TO ANTENNAS HAVE LIGHTNING ARRESTORS.

This will help prevent fire damage or human injury in case of lightning, static build up, or short circuit within equipment connected to antenna.

- The base of the antenna mast or tower must be connected directly to the building protective ground or to one-or-more approved grounding rods, using 1 AWG ground wire and corrosion-resistant connectors.
- Refer to the National Electrical Code for grounding details.
- Lightning arrestors for antenna feed coaxial cables determined as 'Simple Apparatus' are allowed and approved for use.

WARNING

If a person comes in contact with electrical power, and cannot move

DO NOT TOUCH THAT PERSON OR RISK ELECTROCUTION.

- Use a non-conductive dry board, stick, or rope to push, pull, or drag them so they no longer are in contact with electrical power.
- Once they are no longer contacting electrical power, administer CPR if certified, and make sure emergency medical aid has been requested.

ATTENTION

When the WBX switch is being installed or operating in a hazardous environment, the end customer/user should issue a work permit to a trained professional installer prior to any work performed on the WBX Series Limit switch. This includes the following actions:

- Installation and/or operation of the WBX Series Limit Switch
- Installation and/or adjustment of a remote antenna for the WBX Series Limit switch
- Maintenance on the WBX Series Limit Switch, including battery replacement, pairing, purging, etc.

8.6.2 | Cable Requirement

Some remote mount SMA connector antennas have an antenna cable permanently attached, with an RP-SMA plug, which is simply connected to the jack on the switch. Other remote mount antennas do not include cable, and require the use of an extension cable. This extension cable will normally need to have one end with an RP-SMA plug (inside threads), which will connect to the switch, and one end with an RP-SMA jack (outside threads). The jack of the extension cable will mate with the antenna or the

lightning arrestor. If a lightning arrestor is connected this way, the antenna may be directly connected to the arrestor.

Note that at 2.4 GHz, typical antenna cables types have 0.5 dB of loss per meter (almost 5 dB for a ten meter cable, plus connector losses). Excessively long cable runs should be avoided if possible.

Refer to Section 3.3 and 4.1 for approved antenna options and approved cable options.

8.6.3 | Lightning Arrestor

The lightning arrestor may be mounted directly on the switch, or at the far end of the antenna cable, mounted to a sheet of metal in a through-hole. Generally, the choice should be made based on having the shortest, most direct path to a good, solid ground.

If the lightning arrestor is mounted directly on the switch, use caution when attaching a grounding wire to the arrestor to avoid putting undue stress on the switch's antenna connector. If the coax cable is to enter a building, then the lightning arrestor should be mounted as close as possible to where the lead-in wire enters the building.

Lightning arrestors determined as 'Simple Apparatus' are allowed and approved for use with WBX Series Limit Switch.

8.6.4 | Choosing a Mounting Location

The location of the antenna is important. Objects such as metal columns, walls, etc. will reduce efficiency. Best performance is achieved when antennas for both Multinodes and WBX Series Switches are mounted at the same height and in a direct line of sight with no obstructions. If this is not possible and reception is poor, you try different mounting positions to optimize reception.

Antennas should be mounted clear of any obstructions to the sides of the radiating element. If the mounting location for an omni-directional antenna is on the side of a building or tower, then the antenna pattern will be degraded on the building or tower side.

8.6.5 | Site Selection Before attempting to install your antenna, consider the best place to install the antenna for safety and performance.

Follow these steps to determine a safe distance from wires, power lines, and trees.

Step	Action
1	Measure the height of the antenna.
2	Add this length to the length of the tower or mast and then double this total for the minimum recommended safe distance.

Generally speaking, the higher the antenna is above the ground, the better it performs. Good practice is to install your antenna about 1,5 m to 3 m [5 ft to 10 ft] above the roof line and away from all power lines and obstructions. If possible, find a mounting place directly above the wireless device so the lead-in cable can be as direct as possible.

8.6.6 | Antenna Styles

Choosing an antenna mounting style depends on application conditions, along with antenna benefits and/or features and user preference. The antenna's gain to some extent determines physical size; also a consideration is the amount of room available in the application.

Figure 37. Straight Antennas (Radome included with 2.0 dBi straight antenna)



8.6.7 | Antenna Mount Types

Antennas are provided with a variety of mounting options, including magnetic mount, tape mounting, or mast mounting. The standard 2.0 dBi antennas, normally mounted on the switch, may also be mounted to an extender cable, if the remote cable end is mounted in a through hole with the nut and lockwasher. These antennas may also be mounted on a lightning arrestor, if the lightning arrestor is properly mounted in a through hole with a nut and lockwasher.

Omni-directional antennas are vertically polarized and produce a “doughnut” shaped pattern. It is very important to mount the antenna in a vertical (not leaning) position for optimal performance, especially with higher gain antennas.

8.6.8 | Magnetic Mounting

If a horizontal steel structural member or sheet metal area is available, and there are no severe environmental conditions (wind, vibration, etc.), a magnetic mount antenna may be an easy solution. This also allows the option of easily making small adjustments to optimize RF path performance.

Using tie-wraps (cable ties), secure the coax cable to the nearby structural members, using a tie-wrap every 25 cm to 30 cm [10 in to 12 in].

Figure 38. Magnetic Mount Antenna

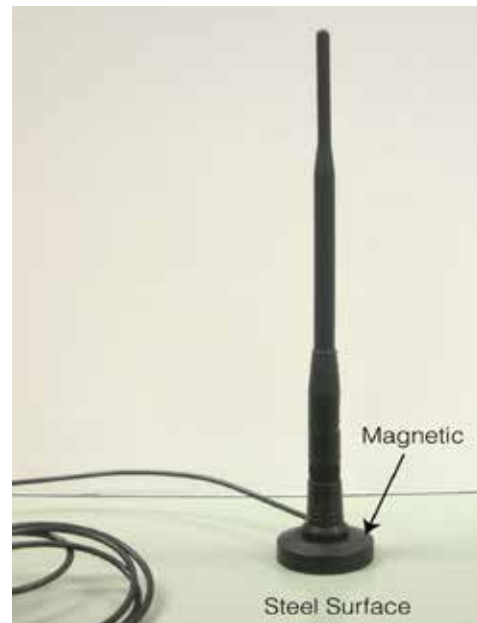


Figure 39. Adhesive Mounting Steps

Step 1. Pre-clean the surface



Step 2. Peel Protection from Adhesive Strip



Step 3. Mount the Antenna



8.6.9 | Adhesive Mounting

The benefit of the remote adhesive mount antenna is mounting flexibility to a number of surfaces and in various orientations. Note that the surface that the antenna is being mounted to will affect the radiation pattern so it is suggested that masking tape be used to temporarily attach the antenna. Evaluate RF link performance, as described in the Wireless Link Quality Measurement (see Section 5.3) paragraphs before permanently mounting.

Permanent mounting: Pre-clean the surface where the antenna is to be mounted with an alcohol wipe. Peel paper protection from adhesive strip and mount to the cleaned surface. See Figure 39.

8.6.10 | Mast Mounting

Mast mounting kits consist of a mounting bracket and one or two U-bolt clamps. These kits allow the bracket to be mounted to masts with outside diameters (O.D.) from 3,2 cm [1.25 in] to 5,1 cm [2 in]. Honeywell recommends that a 3,8 cm [1.5 in] or larger tubing mast be used. The antenna is then mounted in a hole on the bracket upper surface. Most standard brackets will have a hole too large for an SMA mount antenna, so a new hole will be needed. For hole dimensions, refer to Figure 4, WBX Antenna Extender Cable Mounting Hole.

Follow these steps to mount the antenna on a mast.

**Figure 40. Mast Mount Antenna –
Tighten nut on mounting bracket**



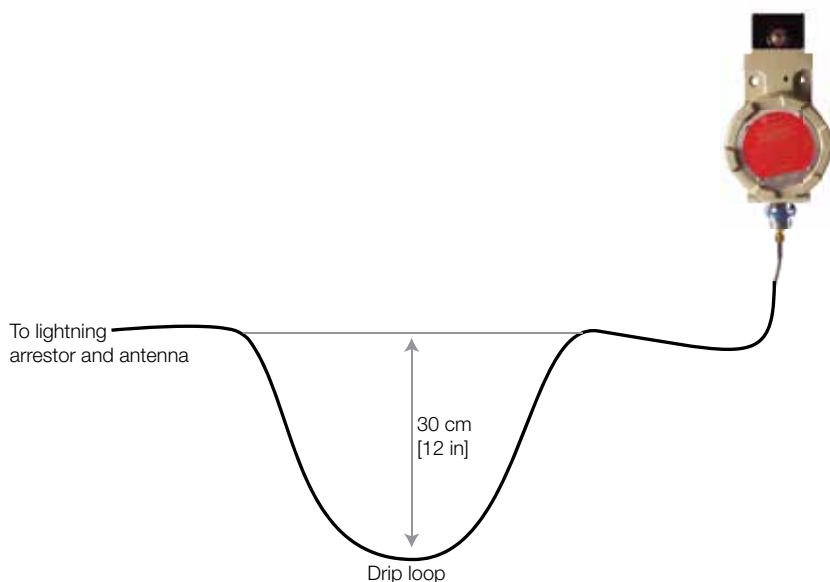
**Figure 41. Mast Mount Antenna –
Side View with Attachment to Pipe**



8.7 | Antenna Assembly and Installation

Table 22. Antenna Installation Steps

Step	Action
1	Assemble the new antenna on the ground at the installation site. For SMA mount antennas, mount the RP-SMA jack of the antenna cable to a hole in the bracket, using the nut and lockwasher supplied. For lightning arrestor mounting, mount the lightning arrestor in the mounting bracket hole, and attach the extension cable to the arrestor.
2	Screw the SMA antenna onto the cable or lightning arrestor. Tighten all cables by hand only; do not use tools or you could overtighten. Make sure that the connections are sealed (if outdoors) to prevent moisture and other weathering elements from affecting performance. Honeywell recommends using a weathering tape (such as COAX-SEAL® #104 from electrical supply houses, or Super 88 tape from 3M) for outdoor connections. Silicon sealant or ordinary electrical tape is not recommended for sealing outdoor connections.
3	Attach the antenna bracket to the mast, using the U-Bolts as required.
4	Using tie-wraps (cable ties), secure the coax cable to the mast, using a tie-wrap every 25 cm to 30 cm [10 in to 12 in].
5	Follow standard strain relief practice when installing the antenna cable. Avoid excessive strain, bending, kinks, or crushing (stepping on or placing any weight on cable) before, during, or after the coax cable is secured in its final position.
6	Make sure the mast does not fall the “wrong way” should you lose control as you raise or take down the mast. Use a durable non-conductive rope. Have an assistant tend to the rope; ready to pull the mast clear of any hazards (such as power lines) should it begin to fall.
7	If the installation will use guy wires: • Install guy anchor bolts. • Estimate the length of guy wire and cut it before raising the mast. • Attach guy wires to a mast using guy rings.
8	Carefully connect the antenna and mast assembly to its mounting bracket and tighten the clamp bolts. In the case of a guyed installation, you must have at least one assistant to hold the mast upright while the guy wires are attached and tightened to the anchor bolts.
9	Attach a "DANGER" label at eye level on the mast.
10	Install ground rods to remove any static electricity buildup and connect a ground wire to the mast and ground rod. Use ground rods designed for that purpose; do not use a spare piece of pipe.
11	When attaching the coax cable to the WBX Switch, it is recommended that a drip loop with a radius of at least 30 cm [12 in] be formed close to the WBX Switch. This will minimize ice and water buildup on the switch itself. Tighten cables by hand only; do not use tools or you could overtighten.



8.8 | Grounding the Antenna

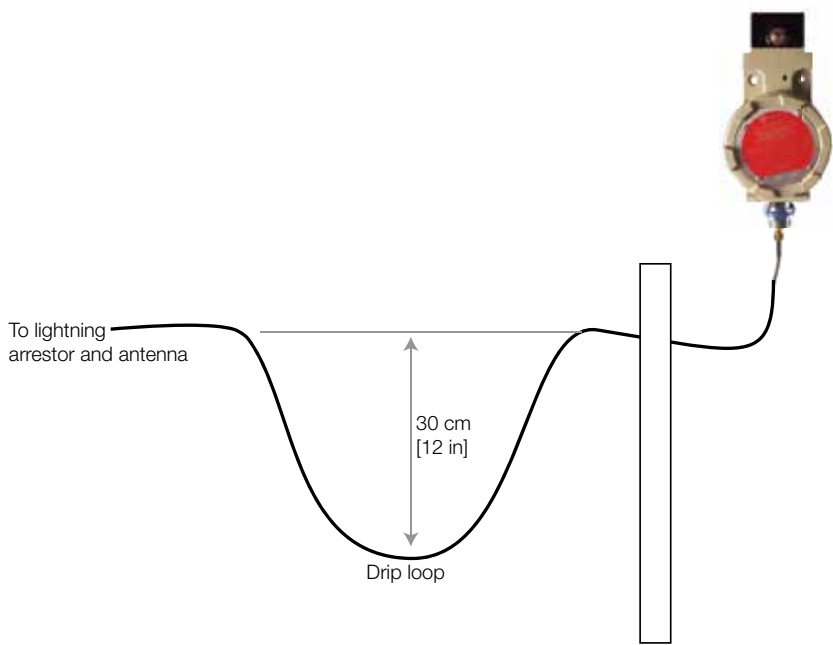
Follow these guidelines to ground the antenna in accordance with national electrical code instructions.

Table 23. Antenna Grounding Steps

Step	Action
1	Use No. 10 AWG copper or No. 8 or larger copper-clad steel or bronze wire as ground wires for both mast and lead-in. Securely clamp the wire to the bottom of the mast.
2	Secure the lead-in wire to a lightning arrestor and mast ground wire to the building with stand-off insulators spaced from 1,2 m [4 ft] to 1,8 m [8 ft] apart.
3	The lightning arrestor must be bonded to earth ground in order to function properly. Due to the small diameter coaxial cables used with the RP-SMA connectors, the lightning arrestor must be grounded independent of the antennas, using number 10 solid wire. This wire must be connected directly to a solid ground. It may be the same ground as is used for the antenna tower.
4	Drill a hole in the building's wall as close as possible to the equipment to which you will connect the lead-in cable. Use a rubber grommet or feed-thru tube to protect the cable from abrasion.

⚠ CAUTION

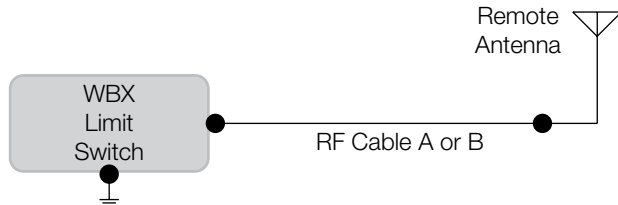
There may be wires in the wall. Before drilling check that the area is clear of any obstructions or other hazards.

5	Pull the cable through the hole and form a drip loop on the outside close to where the cable enters the building. The drip loop should have a radius of at least 30 cm [12 in]. 
6	Thoroughly waterproof the lead-in area.
7	Connect the lead-in cable to the WBX Switch. Tighten cables by hand only; do not use tools or you could overtighten.

8.9 | Antenna Configurations/Parameters

8.9.1 | Connection Diagrams for Remote Antenna Configuration

Figure 42. WBX Connected to Remote Antenna² Directly



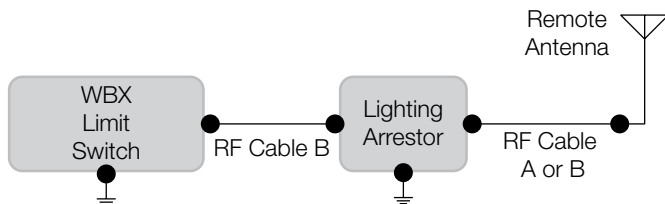
Zones 0, 20/1, 21, IIC, IIIC, Ga, Da

$U_0 = 5.0\text{ V}$
 $I_0 = 757\text{ mA}$
 $P_0 = 0.946\text{ W}$
 $C_0 = 23.48\text{ }\mu\text{F}$
 $L_0 = 4.487\text{ }\mu\text{H}$

**Class I, II, Div. 1,
Groups A, B, C, D, E, F, G**

$V_{oc} = 5.0\text{ V}$
 $I_{sc} = 757\text{ mA}$
 $P_0 = 0.946\text{ W}$
 $C_a = 23.48\text{ }\mu\text{F}$
 $L_a = 4.487\text{ }\mu\text{H}$

Figure 43. WBX Connected to Remote Antenna² Via Lightning Arrestor



Zones 0, 20/1, 21, IIC, IIIC, Ga, Da

$U_0 = 5.0\text{ V}$
 $I_0 = 757\text{ mA}$
 $P_0 = 0.946\text{ W}$
 $C_0 = 23.48\text{ }\mu\text{F}$
 $L_0 = 4.487\text{ }\mu\text{H}$

**Class I, II, Div. 1,
Groups A, B, C, D, E, F, G**

$V_{oc} = 5.0\text{ V}$
 $I_{sc} = 757\text{ mA}$
 $P_0 = 0.946\text{ W}$
 $C_a = 23.48\text{ }\mu\text{F}$
 $L_a = 4.487\text{ }\mu\text{H}$

NOTES:

- (1) These values are specific to the WBX.
- (2) Only lightning surge arrestors determined to be simple apparatus may be installed.
- (3) Refer to Tables 17 and 18 that capture the approved antenna to be used with the WBX product as remote connection.

8.9.2 | Intrinsically Safe Device Entity Parameters for Remote Antenna Cables

Table 24. Intrinsically Safe Device Entity Parameters for Remote Antenna Cables

	Length	Loss (dB)	Total Capacitance	Total Inductance
RF Cable A				
WCA200RNPRSP-002	0,61 m [2 ft]	0.34	49 pF	0.12 μH
WCA200RNPRSP-010	3,05 m [10 ft]	1.69	245 pF	0.61 μH
RF Cable B				
WCA200RNJRSP-002	0,61 m [2 ft]	0.34	49 pF	0.12 μH
WCA200RNJRSP-005	1,52 m [5 ft]	0.85	122 pF	0.3 μH
WCA200RNJRSP-010	3,05 m [10 ft]	1.69	245 pF	0.61 μH
WCA200RNJRSP-015	4,57 m [15 ft]	2.54	367 pF	0.92 μH
WCA200RNJRSP-020	6,1 m [20 ft]	3.38	490 pF	1.2 μH

8.10 | Environment Usage/Concerns

8.10.1 | Choosing an Antenna/Cable to Meet Application Exposure Conditions

There is no antenna or cable design impervious to every environmental condition that it could be exposed to. So it is suggested that the application environment be reviewed as follows:

Table 25. Preparing Antennas for Environmental Use

Step	Action
1	Determine where the antenna will be installed and the application conditions: indoor, outdoor, or limited outdoor exposure. Even if the antenna is going to be used indoors, an outdoor antenna may be more suitable (i.e., resistant to fluids, rigid construction, etc.)
2	Determine what the antenna may be subjected to (i.e., fluids, chemicals, oils, wind, shock, vibration, etc.).
3	A. Review antenna and/or cable materials (listed in Section 3.2) against resistance to chemicals and fluids. If choosing an adhesive mount, adhesive resistance testing may be necessary. B. If shock, vibration, wind, rain, sleet/snow, etc. are in the application, choose an antenna rated for outdoors and has a rigid design.
4	The WBX's enclosure is designed to meet NEMA 4 and IP67 requirements; however, this step may be required to provide an extra level of protection, especially if the application may be subjecting antennas and cables to liquids. The RP-SMA connections, tilt/swivel joints, and cable entrances are potential leak paths that could lead to corrosion. The following procedure is one way to provide extra protection to these connections and joints. Ensure that the area you are applying tape to is clean from contaminants by first cleaning with mild detergent/water and completely dry. Follow with an isopropyl alcohol wipe of the area. Layer 1: Wrap a layer of polyvinyl chloride insulating tape Layer 2: Wrap a layer of Rubber splicing tape i.e. Scotch® 23 Layer 3: Wrap a layer of UV stable polyvinyl chloride insulating tape Layer 1 allows the user to remove Layer 2 for connector inspection, antenna replacement, repositioning of the tilt/swivel antenna, etc. See Figure 5 as an example of the tapes applied to a RP-SMA jack antenna connection. The lime/black antenna guard is not required to be installed.

If the antenna and connectors are not protected by the radome, the connector and threads should be protected from the elements through an application of protective tape. See Figure 5, Application of Protective Tape.

- A recommended protective tape is COAX-SEAL® #104 Hand Moldable Plastic Weatherproofing Tape, available from electrical supply houses.
- Also acceptable is Scotch® Premium Vinyl Electrical Tape 88-Super tape, available from 3M.

9 | MOUNTING AND DIMENSIONS

9.1 | WBX Mounting

The housing has two slotted mounting holes that will accept a M5 or #10 size screw and allow adjustment of the switch actuator to the customer actuator during installation. The switch also has two 5/16-18 UNC-2B tapped holes for mounting from the back. Note: The adjustment process should not allow preload of the switch actuator and the full travel of the switch actuator should not exceed the switch over travel maximum specification.

9.2 | Conduit / Cable Entries

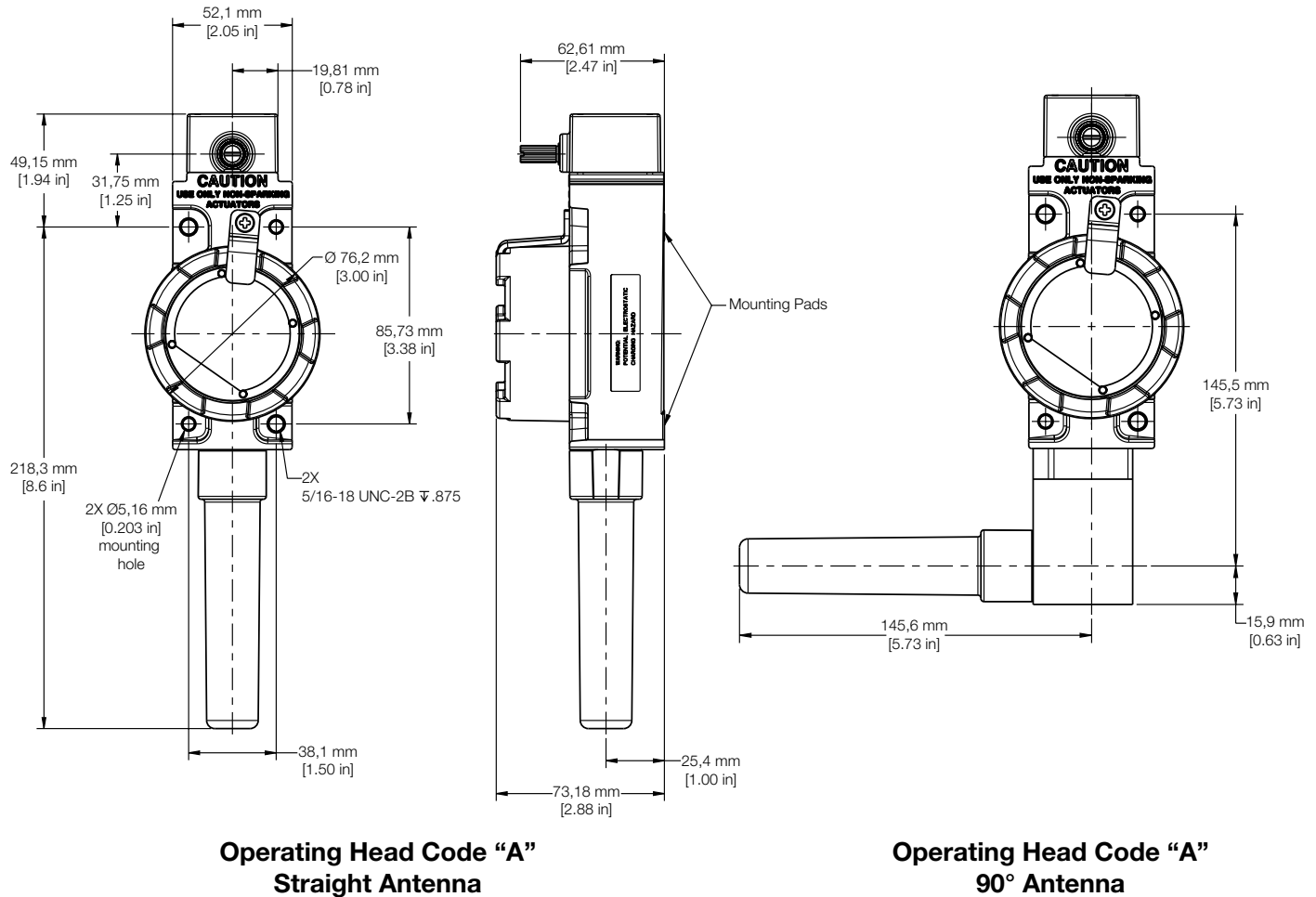
There are no conduit/cable entries for the ISA100 Wireless Hazardous Area Limit Switch, WBX Series.

9.3 | Bracket Mounting

There is no bracket mounting for the ISA100 Wireless Hazardous Area Limit Switch, WBX Series. It is mounted by means of the switch body mounting holes.

9.4 | WBX Mounting Dimensions

Figure 44. ISA100 Wireless WBX Dimensions (Side Rotary)



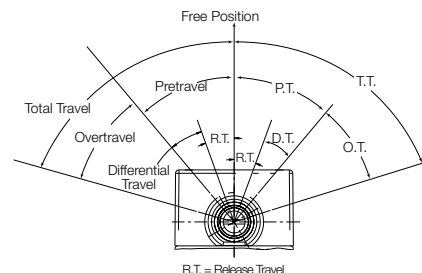
MECHANICAL OPERATING SPECIFICATIONS

for Side Rotary Actuators

Operating Specifications (Mechanical)*

Characteristic	Operating Head Code “A” Momentary
Pretravel	17.5° max.
Overtravel	60° min.
Differential travel	7° max.
Total travel	85° ref
Operating torque	0,45 Nm [4 in-lb] max.
Full travel torque	0,68 Nm [6 in-lb] max.

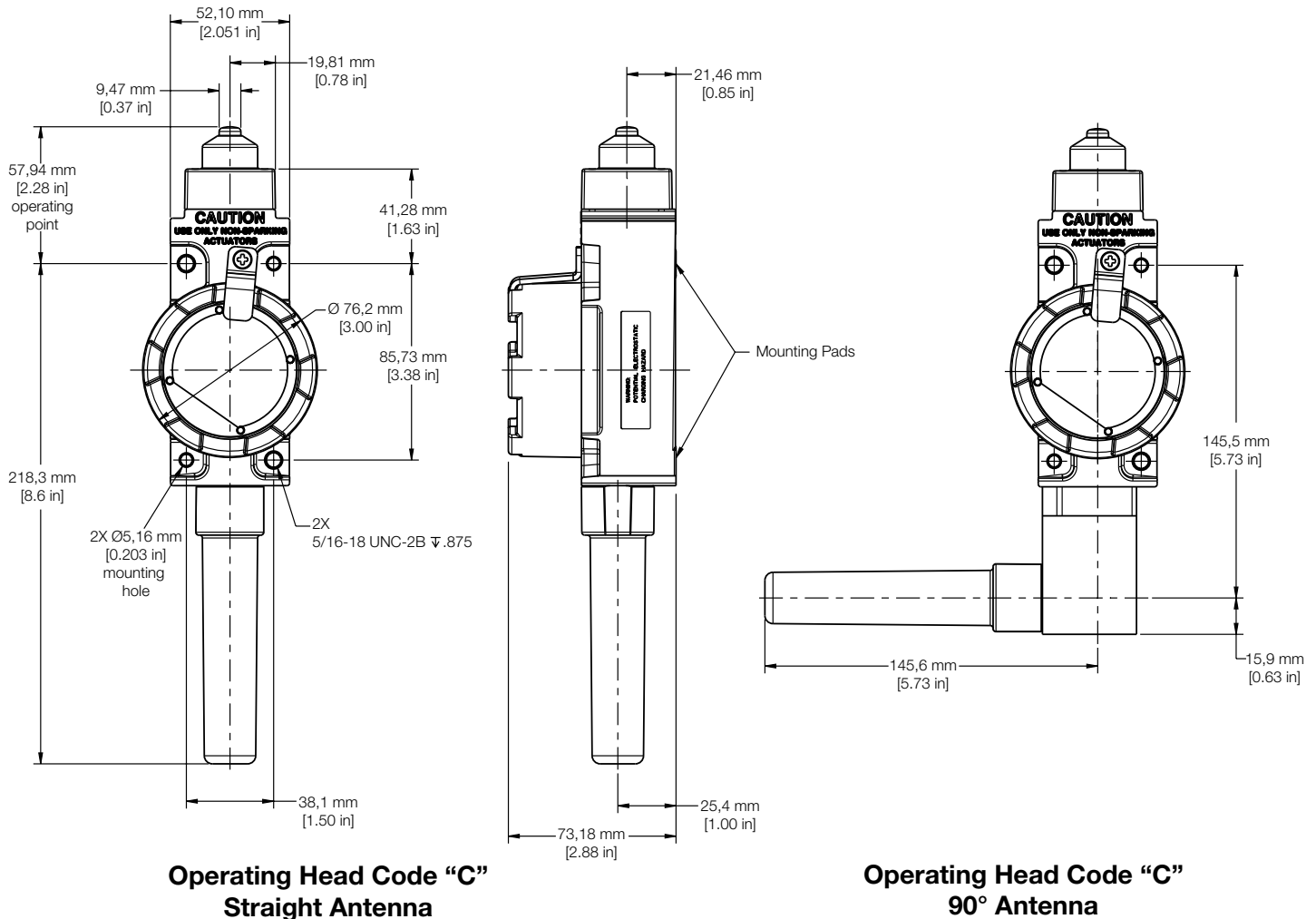
* Operating point given in relation to actuator center



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Figure 45. ISA100 Wireless WBX Dimensions, Pin Plunger



MECHANICAL OPERATING SPECIFICATIONS

for Pin Plunger Actuators

Operating Specifications (Mechanical)*

Characteristic	Operating Head Code "C" Top Plunger Plain
Pretravel	1,78 mm [0.07 in] max.
Overtravel	4,83 mm [0.19 in] min.
Differential travel	0,51 mm [0.02 in] max.
Operating force	20,02 N [4.5 lb] max.
Operating point	57,94 mm $\pm$ 0,50 mm [2.281 in $\pm$ 0.02 in]
Full overtravel force	40 N [9 lb] max.

* Operating point given in relation to top mounting hole

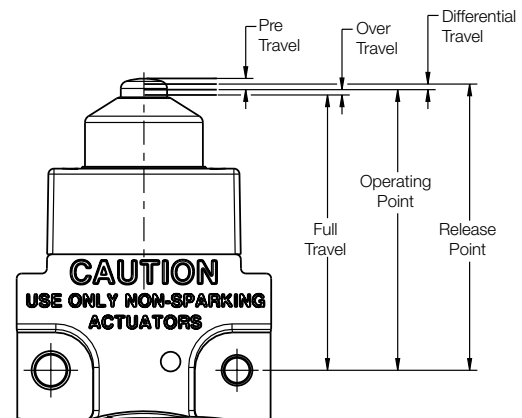
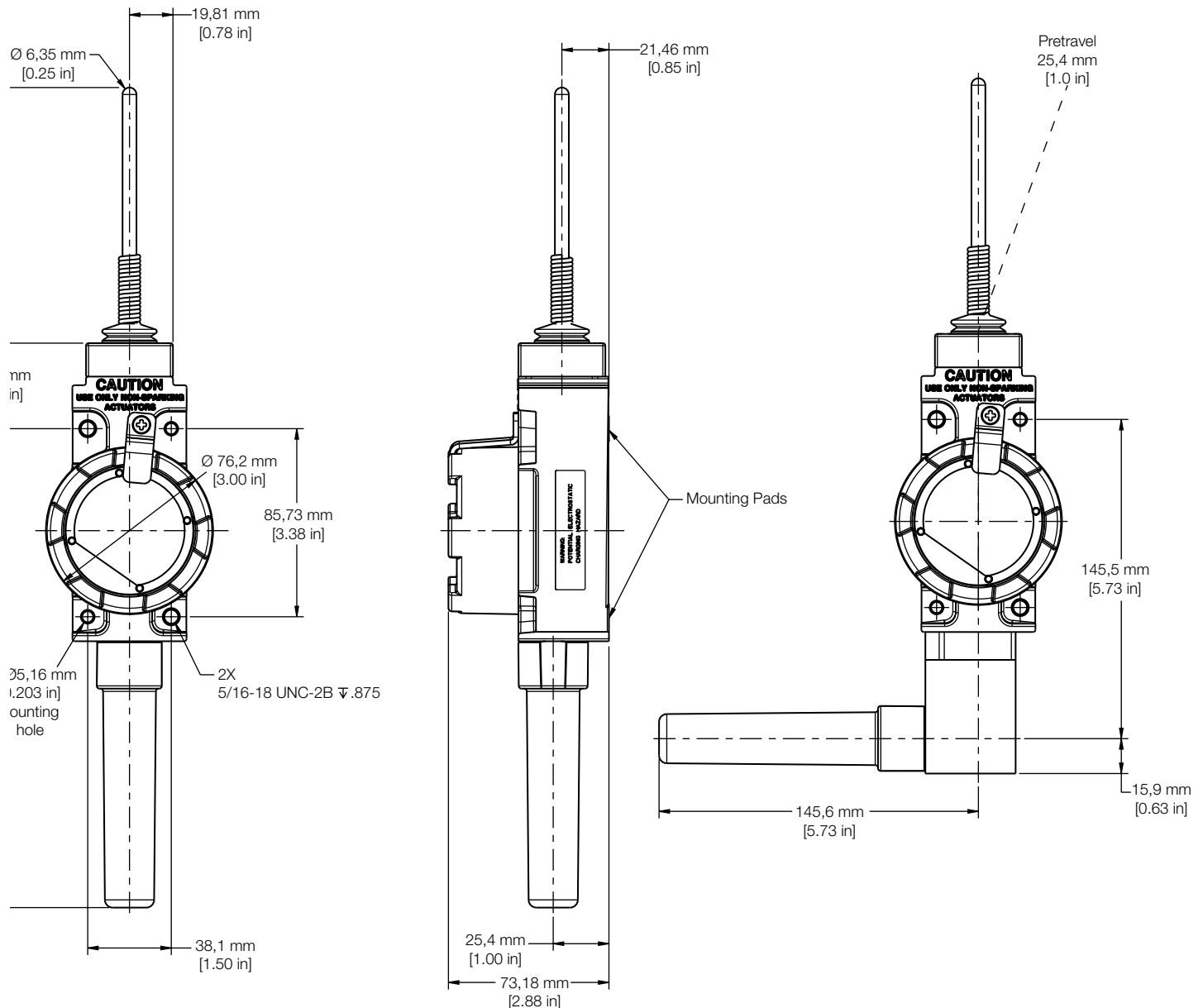


Figure 46. ISA100 Wireless WBX Dimensions, Wobble



Operating Head Code "J" Straight Antenna

Operating Head Code "J" 90° Antenna

MECHANICAL OPERATING SPECIFICATIONS

for Wobble Stick Actuators

Operating Specifications (Mechanical)*

Characteristic	Operating Head Code "J" Wobble Stick
Pretravel	25,4 mm [1.0 in] approx. radius
Operating force	2,8 N [10.0 oz] max.

* Operating point given in relation to wobble stick center

10 | INSPECTION, MAINTENANCE AND REPAIR

10.1 | WBX Inspection and Replacement

Periodic inspection

- Check the WBX housing and the actuator, cable grip, and/or connectors, etc. for signs of damage. Replace if necessary

ATTENTION

When the WBX switch is being installed or operating in a hazardous environment, the end customer/user should issue a work permit to a trained professional installer prior to any work performed on the ISA100 Wireless WBX switch. This includes the following actions:

- Installation and/or operation of the ISA100 Wireless WBX switch
- Installation and/or adjustment of a remote antenna for the ISA100 Wireless WBX switch
- Maintenance on the ISA100 Wireless WBX switch, including battery replacement, pairing, purging, etc.

10.2 | Antenna Inspection and Replacement

Periodic inspection

- Check radome or cable connection to WBX connector to ensure it is tight and there are no signs of damage or corrosion. Replace if necessary per Section 10.6.

ATTENTION

When the WBX switch is being installed or operating in a hazardous environment, the end customer/user should issue a work permit to a trained professional installer prior to any work performed on the ISA100 Wireless WBX switch. This includes the following actions:

- Installation and/or operation of the ISA100 Wireless WBX switch
- Installation and/or adjustment of a remote antenna for the ISA100 Wireless WBX switch
- Maintenance on the ISA100 Wireless WBX switch, including battery replacement, pairing, purging, etc.

10.3 | Replacement Parts

The following replacement parts may be ordered from Honeywell Sensing and Control.

Table 26. WBX Replacement Parts

Part number	Qty.	Description
WAN12RSP	1	2.4 GHz, 2.0 dBi RP-SMA WLAN antenna
WAN20RAD	1	Replacement WBX Radome
WBT7	1	3.6 Vdc Lithium Thionyl Chloride, AA size, Quantity: 2. Battery extractors (2), included

The above batteries are also available from the Xeno Energy, part number XL-060F, Tadiran, part number TL-5930/S, and Bipower, part number ER14505H. Refer to battery specifications, Table 11.

10.4 | Antenna and Radome Connection (if required)

WARNING

RF EXPOSURE

To satisfy FCC RF exposure requirements for mobile transmitting devices, a separation distance of 20 cm or more should be maintained between the antenna of this device and persons during device operation. To ensure compliance, operation at closer than this distance is not recommended. The antenna used for this transmission must not be co-located in conjunction with any other antenna or transmitter.

Failure to comply with these instructions could result in death or serious injury.

ATTENTION

Don't mount or remove the antenna when batteries are present in WBX product as damage could occur to the WBX electronics and/or ignite the surrounding hazardous atmosphere.

The WBX is normally shipped with a direct mount 2.0 dBi antenna and radome. To either replace the radome and antenna or use remote mount antenna per Section 3.3, follow the procedure described in the table below. If the WBX you purchased was not provided with an antenna and radome, you can proceed to using another style of antenna recommended and approved for use with this product by Honeywell (see Tables 17 & 18).

Table 27. WBX Antenna and Radome Steps

Step	Action
⚠	WARNING DO NOT DISASSEMBLE OR ASSEMBLE WHEN AN EXPLOSIVE ATMOSPHERE IS PRESENT
1	Remove the radome by turning it CCW by hand or by using a 30 mm open-end /adjustable wrench.
2	Unscrew the antenna by turning it CCW by hand (if required to replace the antenna)
3	Mount the antenna and tighten by turning CW till hand-tight. CAUTION: Do not use any tool for tightening to avoid damage to the RF cable.
4	Mount the radome and thread it on to the conduit fitting by turning CW and tighten till hand-tight. Ensure the lower surface of the radome is flush with the housing surface. CAUTION: Do not use any tool for tightening to avoid damage to the radome.
5	To connect remote antenna, the RP-SMA end of the cable (either from antenna or an extension cable) should be threaded on to the RP-SMA connector and tightened by turning CW till hand-tight. Protect the junction of remote cable as explained in Section 4.2. CAUTION: Do not use any tool for tightening to avoid damage to the RF cable.

Note: A remote mount antenna requires the use of an extension cable to allow the antenna to be mounted in a different location than the WBX location. The extension cable will need to have one end with a RP-SMA plug connector which will mate with the WBX connector jack (refer to Section 5.1 for details). The other end of the extension cable will need to mate with either antenna connector directly or lightning arrestor or it may be integral to the particular remote mount antenna chosen.

10.5 | Replacing Batteries

⚠ WARNING

RISK OF DEATH OR SERIOUS INJURY FROM EXPLOSION OR FIRE

Connection and disconnection of the batteries should only be performed in a non-hazardous area. 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.

Failure to comply with these instructions could result in death or serious injury.

⚠ WARNING

RISK OF DEATH OR SERIOUS INJURY FROM EXPLOSION OR FIRE

If the WBX is to be returned to Honeywell for any reason, the 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.

Failure to comply with these instructions could result in death or serious injury.

⚠ WARNING

When installing the battery, 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 WBX. Dispose of dropped battery promptly per local regulations or per the battery manufacturer's recommendations.

Failure to comply with these instructions could result in death or serious injury.

⚠ WARNING

RISK OF DEATH OR SERIOUS INJURY FROM EXPLOSION OR FIRE

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 3.6 V lithium thionyl chloride (Li-SOCl₂) battery (non-rechargeable), size AA. No other batteries are approved for use in the WBX Series. Always replace both batteries at the same time.

Honeywell battery part number: WBT7.

Approved battery manufacturers: Xeno Energy, part number: XL-060F, Tadiran, part number: TL-5903/S, Bipower, part number: ER14505H

STOP ATTENTION

When the WBX switch is being installed or operating in a hazardous environment, the end customer/user should issue a work permit to a trained professional installer prior to any work performed on the ISA100 Wireless WBX switch. This includes the following actions:

- Installation and/or operation of the ISA100 Wireless WBX switch
- Installation and/or adjustment of a remote antenna for the ISA100 Wireless WBX switch
- Maintenance on the ISA100 Wireless WBX switch, including battery replacement, pairing, purging, etc.

10.5.1 | When to Replace

When the OneWireless™ User Interface displays a low battery warning message, there are two- to four-weeks of operation remaining before the batteries expire, unless the periodic update interval is operating at one update per second, then there is only one week of operation remaining.

When batteries are removed or expired, all switch configuration data, calibration data, and program data is retained in the switch's flash memory.

10.5.2 | Battery Storage

Batteries should be kept in pairs, not mixed together with others from different vendors or of different shipments.

10.4.3 | Transporting Batteries

When transporting or shipping Lithium Thionyl Chloride batteries, be aware that many regulations and restrictions apply. These batteries are not permitted for transport aboard passenger aircraft. For shipping purposes, two "AA" sized Lithium Thionyl Chloride cells weigh approximately 35 grams and contain approximately 1.4 grams of lithium.

10.5.4 | Tools Required

- #2 Phillips screwdriver

STOP ATTENTION

Both batteries to be replaced together.

⚠ WARNINGS

- Risk of death or serious injury by explosion. Do not open switch enclosure when an explosive gas atmosphere is present.
- Batteries must not be changed in an explosive gas atmosphere.
- The switch enclosure must not be opened when an explosive gas atmosphere is present.
- When not in use the batteries must be stored in a non-hazardous area.
- 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. Do not expose batteries to water.
- 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 switch. Dispose of dropped battery promptly per local regulations or per the battery manufacturer's recommendations.

Figure 47. Switch Battery Replacement



Table 28. Battery Replacement Procedure

Step	Action
⚠	WARNING DO NOT DISASSEMBLE OR ASSEMBLE WHEN AN EXPLOSIVE ATMOSPHERE IS PRESENT
1	Using a #2 Philips screwdriver, unscrew the screw holding the S-shaped clamp. Remove the screw and S-shaped clamp that is holding down the housing cover.
2	Remove the WBX housing cover by turning in CCW direction as shown in Figure 47.
3	Remove the old batteries from the battery holder by pulling on the battery extractors as shown.
4	Install each battery as follows to avoid damage to the battery and holder: - See label on battery PCBa defining the “+” and “-” terminals to ensure battery is placed in holder with correct polarity. - Do not attempt to bend the battery's hold-down tabs forward. - Insert the battery negative end first, at an angle, and against the end of the tab. Push down the battery into position gently. Ensure the batteries are properly seated and making contact. IMPORTANT: If the ORANGE LED does not blink, it is recommended to remove one of the batteries and re-insert back again.
5	Repeat steps 3 and 4 for the other battery
6	Replace the cover and thread it on to housing by turning in CW direction until tight.
7	Place the S-shaped clamp and tighten the screw with a 1,5 Nm [13.3 in-lb] torque to firmly hold down the housing cover.
8	Dispose of used battery promptly per local regulations or the battery manufacturer's recommendations. Keep away from children. Do not disassemble. Do not dispose of in fire.

Note: Each battery contains 0,7 gm of lithium metal. There may be shipping restrictions depending upon the total amount of lithium metal.

10.6 | Replacing Antenna and Radome

10.6.1 | Tools Required

- #1 Phillips screwdriver

STOP ATTENTION

You must replace your antenna with the same type and gain, that is, straight or remote. Changing to a different antenna type is not permitted by approval agencies.

CAUTION

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

WARNING

POTENTIAL ELECTROSTATIC CHARGING HAZARD

The antenna radome is made of plastic and has a surface resistivity of >1 Gohm per square. When this device is being installed care should be taken not to electrostatically charge the radome surface by rubbing the surface with a cloth, or cleaning the surface with a solvent.

Figure 48. Antenna Replacement



Table 29. Antenna Replacement Procedure

Step	Action
1	Remove the radome by turning it CCW by hand or by using a 30 mm open-end /adjustable wrench.
2	Unscrew the antenna by turning it CCW by hand (if required to replace the antenna).
3	Inspect both antenna and RP-SMA connectors for damage or debris, clean as needed.
4	Mount the antenna and tighten by turning CW till hand-tight. CAUTION: Do not use any tool for tightening to avoid damage to the RF cable.
5	Mount the radome and thread it on to the conduit fitting by turning CW and tighten till hand-tight. Ensure the lower surface of the radome is flush with the housing surface. Do not use any tool for tightening to avoid damage to the radome.

11 | AGENCY LABEL INFORMATION

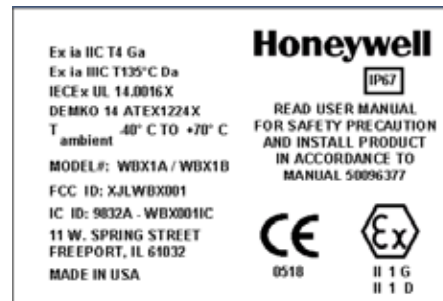
The following information shall be clearly and permanently labeled on the ISA100 Wireless Hazardous Area Limit Switch, WBX Series.

11.1 | External Labels

Figure 49. External Cover Metal Label



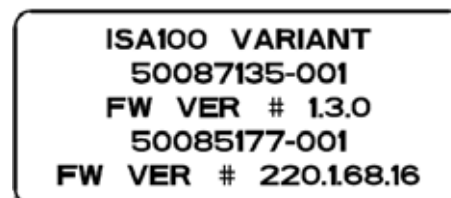
Figure 50. Side Label



11.2 | Internal Label

This label is applied on the battery board of the product.

Figure 51. Battery Board Label



12 | ACCESSORIES

Figure 52. ISA100 Wireless WBX Available Levers

Note in hazardous locations, only non-sparking actuators are allowed for use.



Table 30. Cable and Coax Accessories

Photo	Part Number	Description
	WCA200RNPRSP-002	Wireless cable assembly with 200 Series cable, 2 ft length, reverse polarity N plug to reverse polarity SMA plug, use only with WAN06RNJ antenna
	WCA200RNPRSP-010	Wireless cable assembly with 200 Series cable, 10 ft length, reverse polarity N plug to reverse polarity SMA plug, use only with WAN06RNJ antenna
	WCA200RNJRSP-002	Wireless cable assembly with 200 Series cable, 2 ft length, reverse polarity SMA jack to reverse polarity SMA plug
	WCA200RNJRSP-005	Wireless cable assembly with 200 Series cable, 5 ft length, reverse polarity SMA jack to reverse polarity SMA plug
	WCA200RNJRSP-010	Wireless cable assembly with 200 Series cable, 10 ft length, reverse polarity SMA jack to reverse polarity SMA plug
	WCA200RNJRSP-015	Wireless cable assembly with 200 Series cable, 15 ft length, reverse polarity SMA jack to reverse polarity SMA plug
	WCA200RNJRSP-020	Wireless cable assembly with 200 Series cable, 20 ft length, reverse polarity SMA jack to reverse polarity SMA plug

Table 31. Base Accessories

Photo	Part Number	Description
	WAMM100RSP-005	Magnetic antenna base with 1,52 m [5 ft] of cable
	WAMM100RSP-010	Magnetic antenna base with 3,05 m [10 ft] of cable

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