Installation and Technical Manual for the
Limitless™ Multi-Protocol Receiver, WMPR Series

⚠ 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.

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

⚠ 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 WMPR 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 as this requires choosing the correct Country Use Code and thus allowable antenna and/or cable usage.

🛑 CAUTION

Power to the WMPR should not be applied during installation of an antenna as damage could occur to the WMPR electronics.

⚠ WARNING

- The cable length of the customer-supplied dc power source to the WMPR supply terminals cannot exceed three (3) meters.
- The WMPR must be used indoors.
- The WMPR must be used inside a cabinet and can only be accessed during set-up or maintenance.

TABLE OF CONTENTS

List of Figures

List of Tables

Intended Audience

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

Prerequisite Skills

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

About this Document

This document outlines professional installation requirements for the Limitless™ Receiver, WMPR Series. Professional installation is required to comply with certification agency and legal requirements. This document must be adhered to for all installations of the Limitless™ Receiver, WMPR 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

Document name	Document ID	Publication Date
Installation and Technical Manual for the Limitless™ Receiver, WMPR Series	32309669	July 2015
New	32309669 Issue 1	July 2015

References

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

Document title	Document No.
WMPR3000700100100.eds	Contact Honeywell
Limitless™ WMPR Series Wireless Multi-Protocol Receiver EtherNet/IP™ Object Model	32308916

1 | PRODUCT DESCRIPTION

1.1 | General

The Limitless™ Series uses the latest commercial off-the-shelf wireless technology that can be used in a wide variety of applications. This is especially beneficial for remote monitoring applications where previous wiring installation or wire maintenance was not physically possible or economically feasible. This document will provide installation instructions to properly install a Limitless™ Wireless Multi-Protocol Receiver WMPR, as well as a detailed understanding of its functions.

1.2 | Principle of Operation

A Limitless™ input sends an RF signal to the WMPR when the Limitless™ digital or analog input changes state. There may be up to 14 Limitless™ digital or analog inputs that communicate and indicate their state to a single WMPR. The WMPR receiver is menu driven through the use of function buttons and a easy to read LCD display. The menu allows you to see status of the nodes, configure nodes, and update receiver functionality. A change of state of a Limitless ™ input will cause a corresponding change in output of the particular node to be output via an EtherNet/IP™ output. The WMPR indicates low battery conditions, lost RF links, as well as other diagnostic and functional operations described in further detail throughout this manual.

1.3 | Product Nomenclature

This document is valid for the Limitless™ Receiver, WMPR Series in the following variations.

Figure 1. Limitless™ Receiver, WMPR Series Nomenclature

WMPR	1	A	00	A	1	A	1	
Receiver type	GEN code	RF code	Antenna type code	Country use code	Output code	Seal code	Mounting code	Specials
WMPR Series Multi-Protocol Receiver	**1** Version 1	**A** 2.4 GHz; IEEE 802.15.4	**00** No antenna; RP-SMA connector jack	**A** US, Canada	**1** EtherNet/IP™	**A** IP20	**1** Mounting plate, epoxy coated CRS	
			02 2.2 dBi omni w/receiver mount; tilt/swivel	**B** All other approved countries			**2** DIN bracket, aluminum	

1.4 | Abbreviations and Definitions

Table 1. Abbreviations

ACMA	Australian Communications and Media Authority
CRS	Cold-rolled steel
dB	Decibel
dBi	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
ft-lb	Foot-pounds
GHz	GigaHertz
IC	Industry Canada
ICES	Industry Canada Electrical Specification
IEEE	Institute of Electrical and Electronics Engineers
IP	Internet Protocol
ISO	International Organization of Standardization
kbps	KiloBits Per Second
LED	Light Emitting Diode
MAC ID	Media Access Control address
MHz	MegaHertz
MPE	Maximum Permissible Exposure
NA	North America – United States of America and Canada
NEMA	National Electrical Manufacturers Association
R&TTE	Radio and Telecommunications Terminal Equipment
RP-SMA	Reverse Polarity SMA connector
RF	Radio Frequency
RSS	Radio Standards Specifications
TX	Transmit Power
WBX	Wireless Hazardous Area Limit Switch
WDRR	Wireless Din-Rail Receiver
WGLA	Wireless Global Limit Switch Series
WLS	Wireless Limit Switch
WMPR	Wireless Multi-Protocol Receiver
WOI	Wireless Operator Interface
WPS	Wireless Pressure Sensor

1.5 | Symbol Definitions

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

Table 2. Symbol Definitions

Symbol	Definition
(STOP)	**ATTENTION:** Identifies information that requires special consideration.
(arrow)	**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 symbol)	**ESD HAZARD:** Danger of an electrostatic discharge to which equipment may be sensitive. Observe precautions for handling electrostatic sensitive devices.
(PE symbol)	**Protective Earth (PE) terminal:** Provided for connection of the protective earth (green or green/yellow) supply system conductor.
(functional earth symbol)	**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 symbol)	**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 symbol)	**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.
(C-Tick mark)	**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.
CE	**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 alert sign must be used when a restriction on use (output power limit by a country at certain frequencies) applies to the equipment and must follow the CE marking.

2 | SPECIFICATIONS, CERTIFICATIONS, AND APPROVALS

2.1 | Intended Country Usage

Table 3. North America; Country Code Use "A"

Country	ISO 3166 2 letter code
UNITED STATES	US
CANADA	CA

Table 4. Asia Pacific; Country Code Use "B"

Country	ISO 3166 2 letter code
AUSTRALIA	AU

Table 5. European Union; Country Code Use "B"

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	BG
Italy	IT		

Table 6. Other European Countries; Country Code Use "B"

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

🛑 **ATTENTION**

Contact Honeywell before use of the WMPR is countries not listed in Tables 3 through 6.

2.2 | Certifications and Approvals

See product labels for applicable approvals and ratings.

Table 7. Communication Approvals and Standards

Approval/Item	Ratings/Description
Enclosure type	IP20
Federal Communications Commission (FCC)	FCC Part 15.247: 2014
Industry Canada (IC)	Canadian RSS-210: 2010
European Telecommunications Standards Institute (ETSI)	CE mark
Australian Communications and Media Authority (ACMA)	C-Tick mark

⚠ **WARNING**

The WMPR 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 as it requires choosing the correct Country Use Code and thus allowable antenna and/or cable usage.

⚠ **WARNING**
- The cable length of the customer-supplied dc power source to the WMPR supply terminals cannot exceed three (3) meters.
- The WMPR must be used indoors.
- The WMPR must be used inside a cabinet and can only be accessed during set-up or maintenance.

2.3 | Radio Module Specifications

Table 8. Radio Module Specifications

Item	Specification
Radio module	Honeywell RF-PCBa
Wireless standard	WPAN IEEE 802.15.4 Direct Sequence Spread Spectrum (DSSS), 2.4 GHz
Data rate	250 kbps
Operating frequency	ISM 2.4 GHz
Module transmit power	Country use code "A" Power level, 11 dBm
	Country use code "B" Power level, 6 dBm
Receive sensitivity (typ.)	-100 dBm
# of pairing (max.)	Up to 14 Limitless™ inputs can be paired to a single WMPR

2.4 | Electrical Specifications

Table 9. Electrical Specifications

Item	Specification
Supply voltage	10 Vdc to 30 Vdc
Supply current	500 mA max.
Output type	EtherNet/IP™
Termination	Cage-clamp connector block

⚠ **WARNING**

The cable length of the customer-supplied dc power source to the WMPR's supply terminals cannot exceed three (3) meters.

2.5 | Operational Characteristics

2.5.1 | Update Rate vs. Node Quantity

To ensure suitable performance the tables below define the maximum number of nodes that are allowed with all nodes being at the defined Update Rate:

Table 10. WPS Series Sensors Update Rate

Update Rate (seconds)	# of Nodes
0.1	4
0.25, 0.5	6
> 1	14

Table 11. WBX Series Switches Update Rate

Update Rate (seconds)	# of Nodes
> 1	14

Limitless™ WLS, WGLA, WOI Series switches cannot have the update rate changed and are factory set at 30 seconds; number of nodes: 14.

2.5.2 | Update Rate vs. RF Lost Indication

Table 12 displays the approximate amount of time it takes for the WMPR to indicate a Node Lost RF with respect to the Update Rate that the Node is set to.

Table 12. Update Rate vs. RF Lost Indication

Update Rate (sec)	RF Lost Indication (approx. sec)
0.1	0.5
0.25	1
0.5	2
1	5
5	18
10	45
30	120
90	360

2.6 | EMC Specifications

The latest applicable EMC Standards are as follows:

- EN 300 328, V1.8.1
- EN 61326-1 (2013)
- EN 301 489-1, V1.9.2
- EN 301 489-17, V2.2.1

2.7 | Environmental Specifications

Table 13. Environmental Specifications

Item	Specification
Operating temperature	-20 °C to 70 °C [-4 °F to 158 °F]
Storage temperature	-20 °C to 70 °C [-4 °F to 158 °F]
Operating humidity	0 %RH to 100 %RH
Shock	IEC 60068-2-27; half sine, 10 g, 6 ms, 3 axis
Vibration	IEC 60068-2-6; 10-500 Hz w/ 0.35 mm – peak-to-peak, 58-500 Hz – 5 g

2.8 | Weight

All versions of the WMPR Series Receiver have an approximate weight of 215 g [7.5 oz]. This weight does not include mounting brackets/plates, remote cables, or antennas.

2.9 | Antenna Connection

Antennas connect to an RP-SMA male connector on the upper surface of the WMPR. Alternatively, a remote antenna and/or a lightning arrestor may be connected to the RP-SMA connector; when ordered without any antenna fitted to the WMPR product.

2.10 | Agency Compliance Statements

2.10.1 | 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 WMPR 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.

2.10.2 | 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 A digital apparatus has been tested and found to comply with Canadian RSS-210:2010.

- This radio transmitter (identify device by certification number) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissiable gain indicated. Antenna types not included in this list, have a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device

  - Antenna type approved for use: Omni
  - Antenna gain (max.): 9 dBi

- 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: 2010.

- Cet émetteur radio (appareil identifié par numéro de certification) a été approuvé par Industry Canada pour fonctionner avec les types d'antenne répertoriés ci-dessous et présentant le gain maximal admissible indiqué. Utiliser des types d'antennes non mentionnés dans cette liste ou présentant un gain supérieur au maximum indiqué pour ce type est strictement interdit.

  - Type d'antenne approuvé : Toutes directions
  - Gain d'antenne (max.) : 9 dBi

2.10.3 | 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 direct-mount 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.

2.10.4 | European Restrictions

- Information regarding national restrictions can be found in document: Annex 1: Non-specific Short Range Devices, page 6; Oct 07. Documentation may be found in the document database in the European Communication's office.

- http://www.erodocdb.dk/doks/dochistory. aspx?docintid=1622

2.10.5 | European Declaration of Conformity Statements

This section contains the European Declaration of Conformity (DoC) statement for the radio used in the Limitless™ WMPR receiver.

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)

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: WMPR Series Multi-Protocol Receiver

Directive (Amendments)	Conformity Details	
1999/5/EC and 2004/108/EC	Standards applied:	EN 61326-1:2013 ETSI EN 300 328 V1.8.1 ETSI EN 301 489-1 V1.9.2 and -17 V2.2.1

Signed on behalf of Honeywell Control Systems Ltd. :

Colin O'Neil, quality Eng. Manager, Newhouse

DoC No: A502   DoC Issue: 1   DoC Date: 06/08/2015   Page 1 of 2

2.10.6 | 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 | WMPR FEATURES

Figure 2. Limitless™ WMPR Multi-Protocol Receiver with location call-out

3.1 | LED Indicator

The WMPR LED operates as follows (see Figure 2 ⑦):

Table 14. LED Indications

LED Function	Indication
Solid green	Power supplied, system functioning normally
Flashing blue	1 or more nodes with low battery
Solid blue	1 or more nodes with lost RF
Flashing red	EtherNet/IP™ lost connection
Solid red	System fault
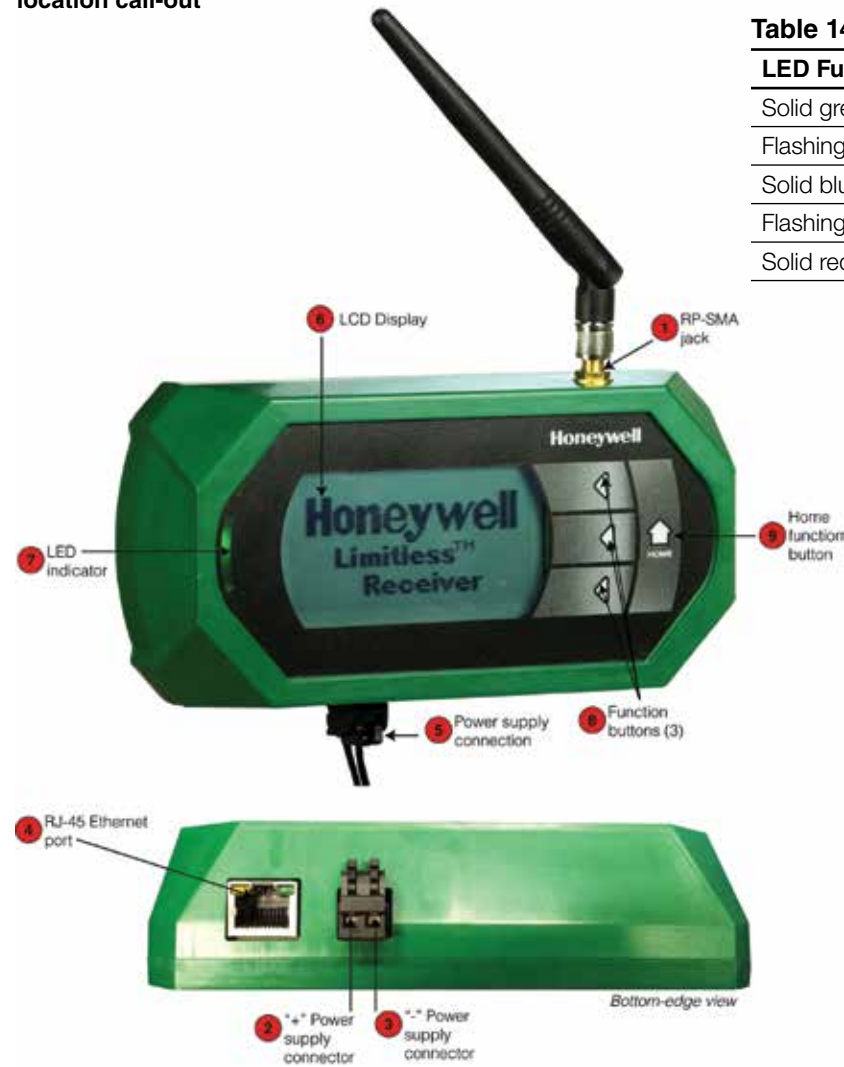
3.2 | Limitless™ Switch and Sensor Function Buttons

Figure 3a. Limitless™ WBX: Function Button and LED

Figure 3c. Limitless™ WPS: Reset Button and LED
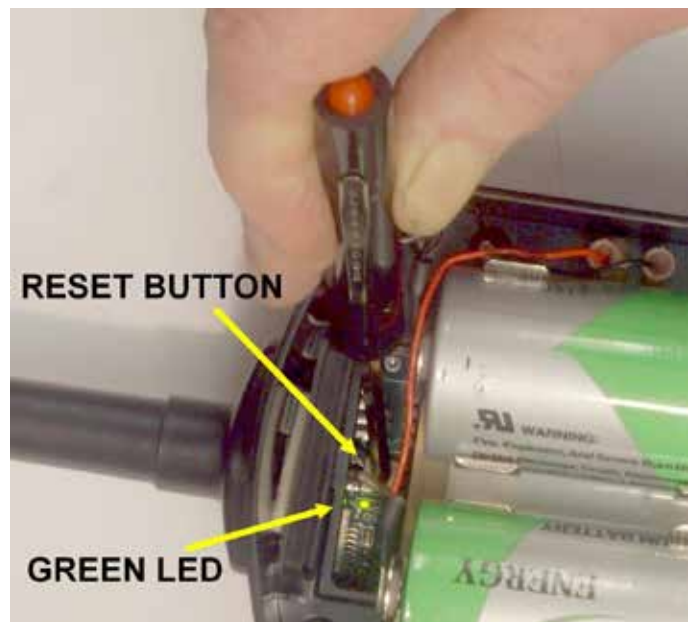
Figure 3b. Limitless™ WLS: Function Button and LED
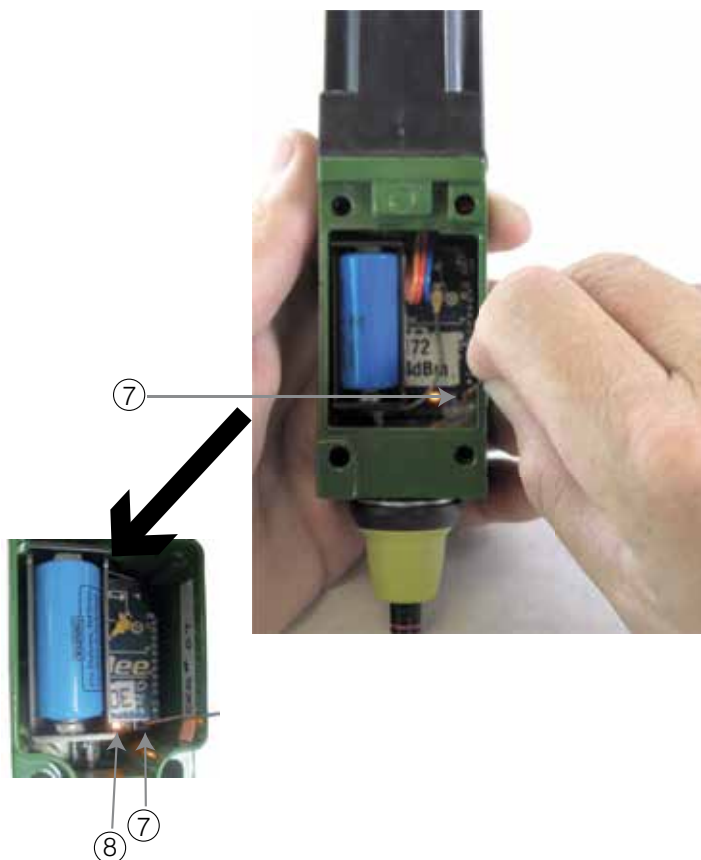
4 | R.F. INTERFERENCE CONSIDERATIONS

4.1 | R.F. Interference Considerations

4.1.1 | 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 WMPR, as well as shorter battery life.

4.1.2 | 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 R.F. 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.

- 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

4.1.3 | 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 WMPR.

4.1.4 | 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.

4.1.5 | 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 sensor from the WMPR would be very desirable. Alternatively, utilizing directional antennas on the WMPR, and /or on the wireless video link would help greatly.

4.1.6 | 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 msec 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.

4.1.7 | Cordless Phones/Baby Monitors/ Intercoms

A 2.4 GHz cordless phone in very close proximity to a wireless sensor could cause lost packets, while the phone is in use, but is not a very likely cause. If suspected interference, a simple remedy is to switch to a DECT 6.0 cordless phone operating on 1.9 GHz.

5 | SETUP AND ELECTRICAL CONNECTIONS

> ⚠ **WARNING**
> **RISK OF ELECTRICAL SHOCK**
> Potential shock hazard where HAZARDOUS LIVE voltages greater than 30 Vrms, 42.4 V peak, or 60 Vdc may be accessible.
>
> **Failure to comply with these instructions could result in death or serious injury.**

> ⚠ **WARNING**
> Pay attention to ESD discharge at dc-in port.

> 🛑 **ATTENTION**
> Do not run the electrical wires in parallel and close proximity to the antenna or antenna cable.

5.1 | System Set Up

5.1.1 | WMPR EDS File

The WMPR Series needs to connect to an EtherNet/IP™ compliant Master device and thus the Electronic Data Sheet will need to be uploaded to the Master device (Contact Honeywell for this file).

This file allows the unique MAC ID of the WMPR to be associated to the parameters in this file. To view and obtain the MAC ID of your device refer Section 6.1.1, Figure 5.

5.1.2 | WMPR Object Model

The WMPR Object Model describes the different object models supported as well as bytes and attributes in detail. (Contact Honeywell for this file).

The key attributes that most customers are interested in are Digital Input State, Analog Input Value with Unit Type, Battery Level and Radio Signal Strength. The descriptions relative to Limitless™ Series of product are as follows for each:

Digital Input State: The wireless switch actuation state is either ON or OFF for a WLS, WGLA, WOI and WBX Series switch.

Analog Input Value with Unit Type: Pressure reading from a WPS Series sensor in psi, bar, mbar, Pa or kPa.

Battery Level: The battery condition is either OK or LOW. A LOW condition normally indicates the battery life is coming to an end and the battery should be replaced as soon as possible.

Radio Signal Strength: This attribute identifies the level of signal strength between the WMPR and the Limitless™ switch or sensor.

5.2 | EtherNet/IP™ Output Connection

5.2.1 | Description

The Limitless™ WMPR Series has a RJ45 ethernet jack on the housing's bottom left which needs to be connected to Cat5e or Cat 6 cable (dependant n application conditions) that then connects to the EtherNet/IP™ compliant Master device. Refer to the EtherNet/IP Media Planning and Installation Manual (Pub 148) for more information at www.odva.org.

> 🛑 **NOTICE**
> Power needs to be applied after the EtherNet/IP™ connection has been made and is active.

5.3 | Power Supply Connections

5.3.1 | Description

> ⚠ **WARNING**
> The cable length of the customer-supplied dc power source to the WMPR supply terminals cannot exceed three (3) meters.

Refer to Figure 2. The Limitless™ WMPR Series has two (2) cage clamp connectors on the housing's bottom left. A regulated voltage supply of 10 Vdc to 30 Vdc needs to be connected to the power supply terminals identified as "+" ② and "-" ③. Power needs to be applied after the EtherNet/IP™ connection has been made and is active.

> 🛑 **ATTENTION**
> Power needs to be applied after the EtherNet/IP™ connection has been made and is active.

6 | LCD/MENU/MODE OPERATION

6.1 | Start-up or Re-start Sequence Mode (EtherNet/IP™ Active Connection and Power Supplied to WMPR)

6.1.1 | Zero Switches or Sensors Paired to WMPR

Zero switches/sensors paired to the WMPR: EtherNet/IP™ active connection is made and then applying power to the WMPR will result in the LCD Menu sequencing through the following displays before entering the Main Menu.

Figure 4. Honeywell Splash Screen (momentarily shown)
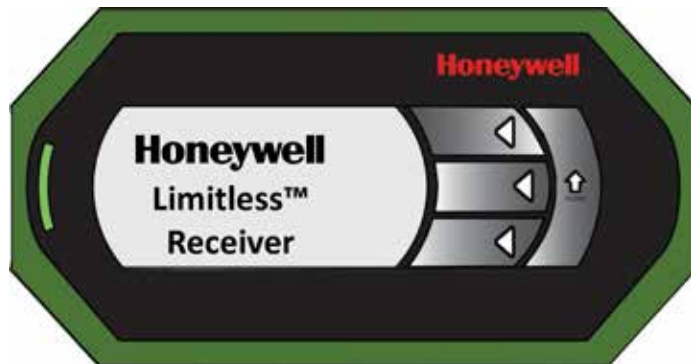
EtherNet/MAC ID screen appears (see Figure 5). (Record the MAC ID, IP Address, and then touch the "Next" function button to move to the Main Menu).

Figure 5. Ethernet/IP™ MAC ID & IP Address
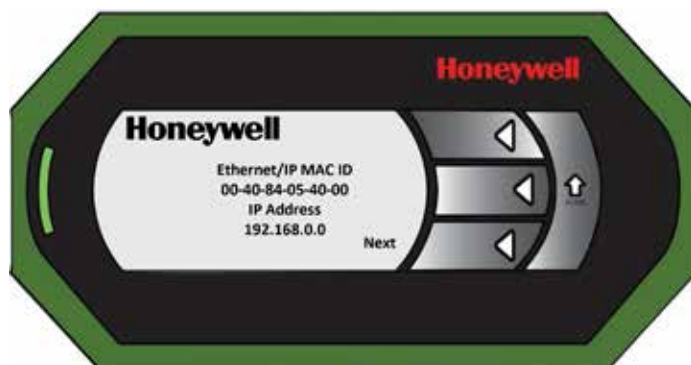
Figure 6. Main Menu
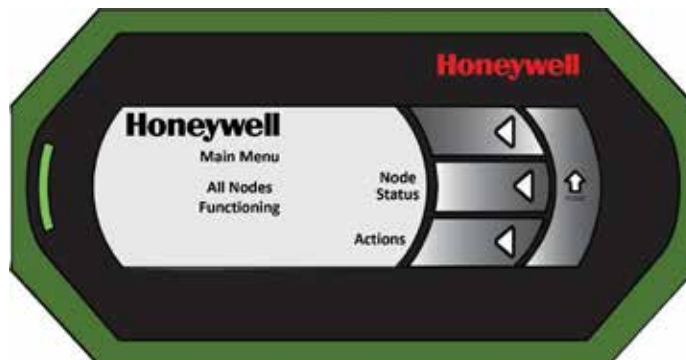
6.1.2 | One or More Switches or Sensors Paired to WMPR

One or more switches/sensors paired to the WMPR: EtherNet/IP™ active connection is made and then applying power to the WMPR will result in the LCD Menu scrolling thru the following displays before entering the Main Menu:

Figure 7. Honeywell Splash Screen (momentarily shown)
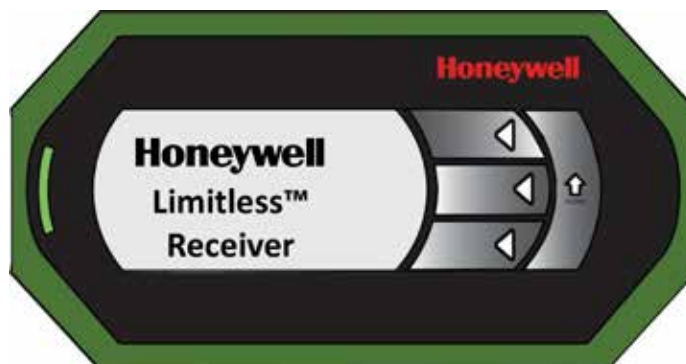
System start-up screen (see Figure 8) will take up to two (2) minutes before displaying EtherNet/IP MAC ID & IP address (see Figure 9) screen.

Figure 8. System Start Up
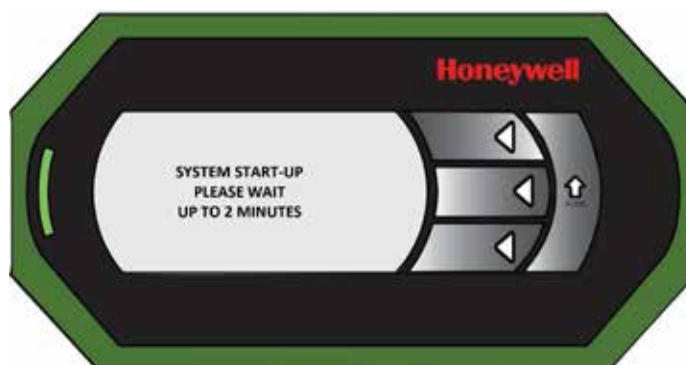
EtherNet/MAC ID screen appears (see Figure 9). (Record the MAC ID, IP Address, and then touch the "Next" function button to move to the Main Menu) (see Figure 10).

Figure 9. EtherNet/IP™ MAC ID & IP Address
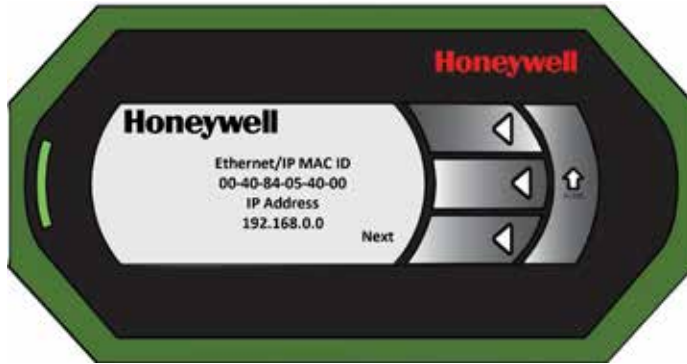
Figure 10. Main Menu
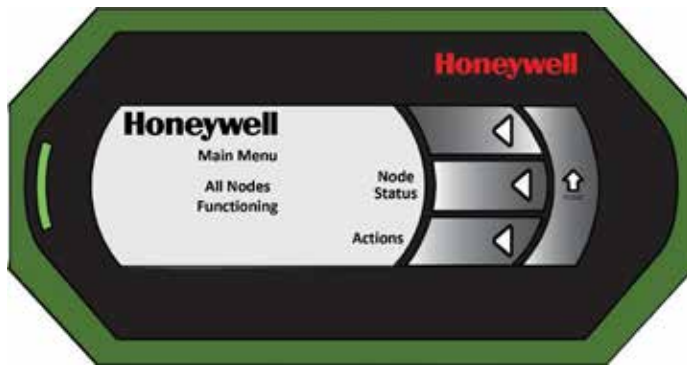
🛑 **ATTENTION**

If there are multiple WMPRs being used in the application, apply power to previously paired WMPRs first (if any) and then to one WMPR at a time. **Allow time for each WMPR to complete its start-up sequence before applying power to the next WMPR. There is a maximum of five WMPRs that can be used in the same localized area. Contact Honeywell Application Engineering at 800-537-6945 if more than five WMPRs are desired to be used in the same localized area.**

6.2 | Main Menu

6.2.1 | Menu Status

The Main Menu (see Figure 11) allows you to see the status "at-a-glance" of the EtherNet/IP™ connection and information of **ALL** the Nodes currently paired to the WMPR. It also allows you to choose the "Node Status" menu for quick access to further information about each node or "Actions" that routes you to several other different modes.

Figure 11. Main Menu
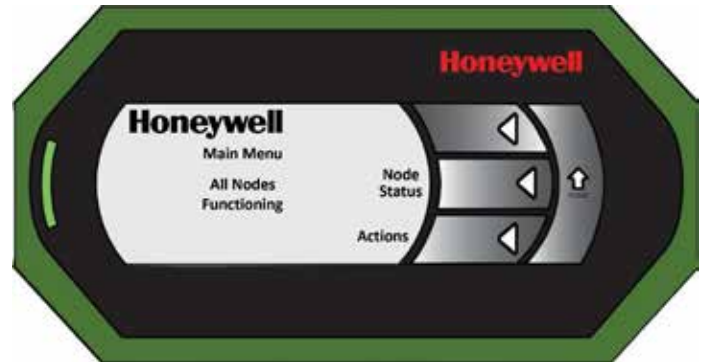
6.2.2 | EtherNet/IP™ Connection

EtherNet/IP™ connection: The Main Menu display will indicate "Ethernet Lost" (see Figure 12) if the connection is not allowing a good signal to reach the WMPR; no indication means the connection is good.

Figure 12. Main Menu - Ethernet Lost
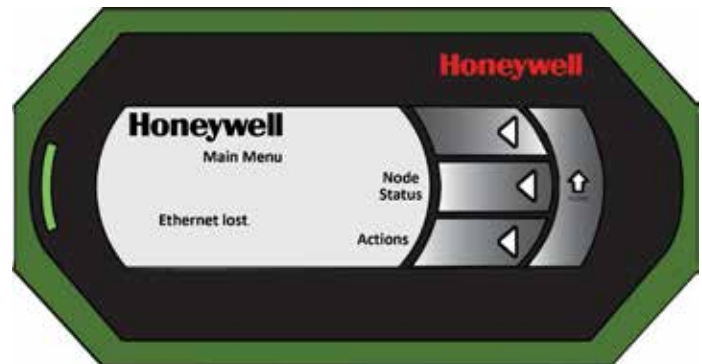
6.2.3 | Node Information

Node Information: The Main Menu will display RF Lost and Low Battery (see Figure13) for a single node or multiple nodes based the conditions occurring.

Figure 13. Main Menu - RF Lost Screen Display
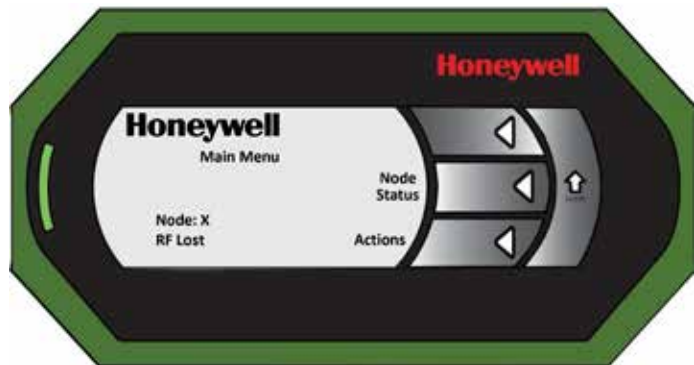
6.3 | Node Status

6.3.1 | Node Status Menu

Figure 14. Node Status
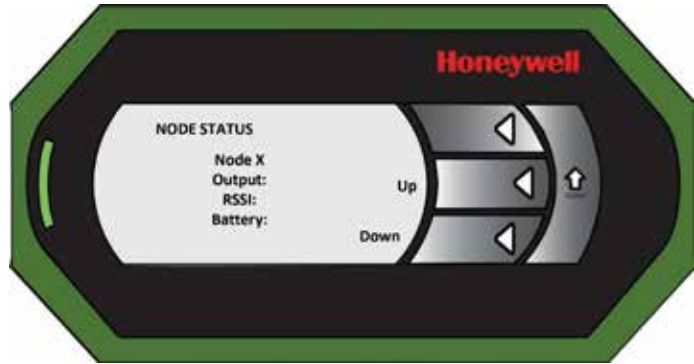
The NODE STATUS menu (see Figure 14) can be accessed by touching the "Node Status" function button as displayed in the Main Menu (see Figure 11). Once you are in the NODE STATUS menu you can scroll thru all 14 node/device address locations by scrolling "Up" or "Down". A description of the information is as follows:

Table 15. Node Display and Indication

Display	Indication
Not Paired	Limitless™ switch or sensor is not paired to this Device Address location
Output:	**ON** or **OFF** status for a Digital input-Limitless™ switch **Pressure value** and **Unit type** for Analog sensor-Limitless™ pressure sensor
RSSI:	**R**eceived **S**ignal **S**trength **I**ndication-Signal strength between the WMPR and the Limitless™ switch or sensor displayed as **EXCELLENT, VERY GOOD, GOOD, LOW,** or **POOR**
Battery	Indicates battery condition as **OK** or **LOW**; A LOW condition normally indicates the battery life is coming to an end and the battery should be replaced as soon as possible.
RF Lost	RF Signal between WMPR & Limitless™ switch or sensor does not exist

Note: If the particular Node # that you are trying to obtain status on is not paired, the screen will display "Not Paired".

6.4 | Action Menu

6.4.1 | Action Menu

Figure 15. Action Menu
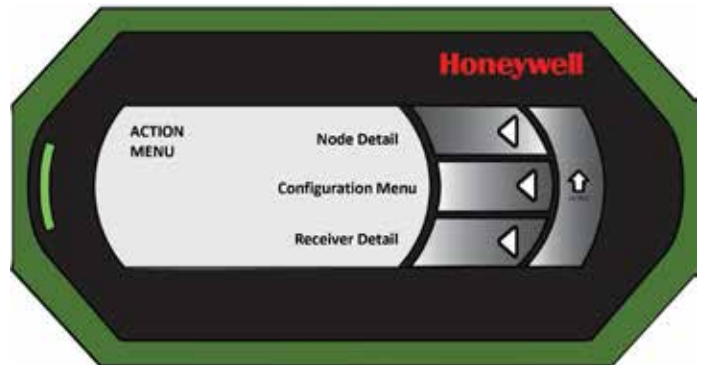
The ACTIONS MENU (see Figure 15) can be accessed by touching the "Actions" function button as displayed in the Main Menu (see Figure 11). Once you are in the ACTION MENU you can choose between several different actions: A description of the actions are as follows:

Node Detail: Node specific information including (as applicable) Output status or value, RF Signal strength, Battery condition, Update Rate, Sensor Range, Serial Number and Diagnostic condition. Functionality described in Tables 16 to 18.

Configuration Menu: Allows you to take action to Pair or Purge Nodes, Change Update Rate or Node LCD Display Time, or Reset to WMPR to Factory Defaults. Functionality described in Section 8.6

Receiver Detail: Receiver information specific the WMPR device which includes WMPR FirmWare revision, Part Number, Radio FirmWare revision, Radio MAC ID, and Radio Transmit Power. Functionality described in Section 8.7

6.5 | Node Detail

Figure 16. Node Detail Menu
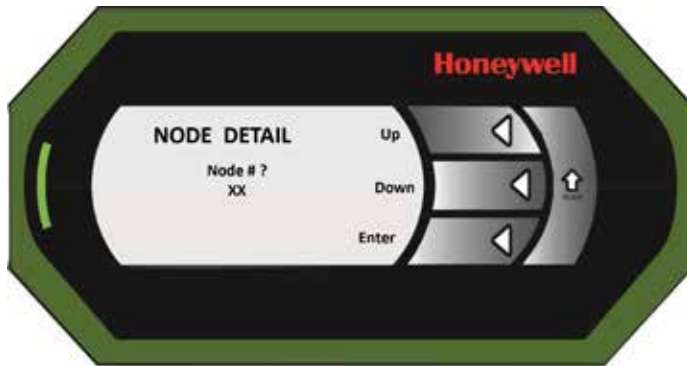
The NODE DETAIL menu (see Figure 16) can be accessed by touching the "Node Detail" function button as displayed in the Action Menu (see Figure 15). Once you are in the Node Detail menu you can choose any of the 14 node numbers by scrolling "Up" or "Down" to the desired Node number and then touching "Enter". You will be able to view three screens of Node Detail information by touching "Next" or "Prev".

6.5.1 | Node Detail Menu, Screen 1

Figure 17. Node Detail, Screen 1
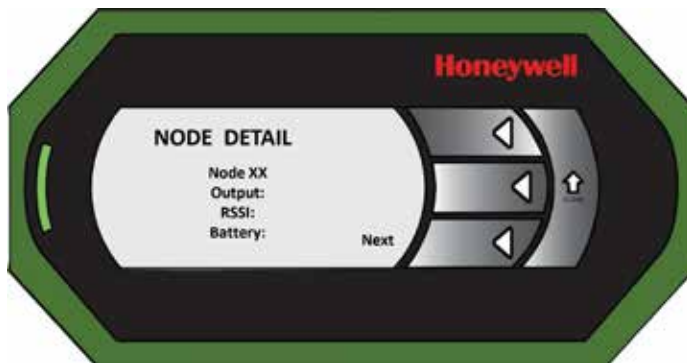
A description of the Node Detail "screen 1" information (see Figure 17) is as follows:

Table 16. Node Display and Indication (Screen1)

Display	Indication
Not Paired	Limitless™ switch or sensor is not paired to this Device Address location
Output:	**ON** or **OFF** status for a Digital input-Limitless™ switch **Pressure value** and **Unit type** for Analog sensor-Limitless™ pressure sensor
RSSI:	**R**eceived **S**ignal **S**trength **I**ndication-Signal strength between the WMPR and the Limitless™ switch or sensor displayed as **EXCELLENT, VERY GOOD, GOOD, LOW,** or **POOR**
Battery	Indicates battery condition as **OK** or **LOW**; A LOW condition normally indicates the battery life is coming to an end and the battery should be replaced as soon as possible.
RF Lost	RF Signal between WMPR & Limitless™ switch or sensor does not exist

6.5.2 | Node Detail Menu, Screen 2

Figure 18. Node Detail, Screen 2
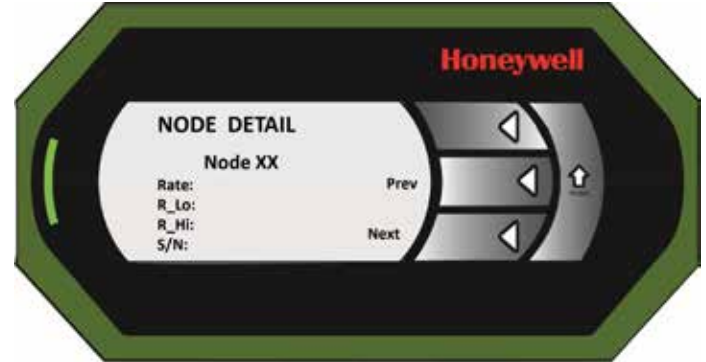
A description of the Node Detail "screen 2" information (see Figure 18) is as follows:

Table 17. Node Display and Indication (Screen 2)

Display	Indication
Rate	Update rate of Limitless™ switch or sensor
R_Lo	Low output value of a Limitless™ sensor
R_Hi	High output value of a Limitless™ sensor
S/N	Serial number of Limitless™ switch or sensor
N/A	Information not available
Not Read Yet	Information available*

*Information needs to be read from Node: Operator will need to scroll to "Prev" or "Next" screen and then back to this screen to allow updating of information. This action may need to be repeated to allow time for information to be displayed.

6.5.3 | Node Detail Menu, Screen 3

Figure 19. Node Detail, Screen 3
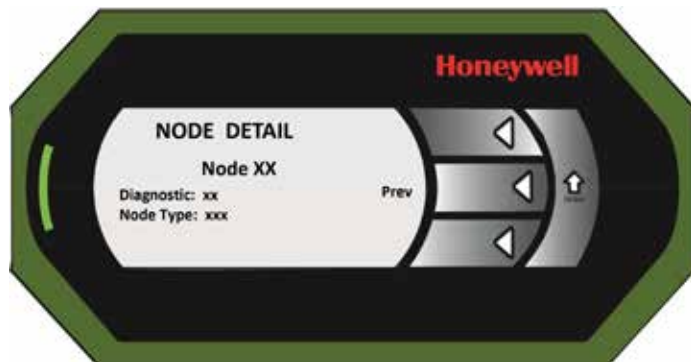
A description of the Node Detail "screen 3" information (see Figure 19) is as follows:

Table 18. Node Display and Indication (Screen 3)

Display	Indication
Diagnostic	**"OK"** or if an **Error Code**- Refer to WPS Series Installation and Technical Manual (32305925) for **Sensor Error Code** definitions
Node Type	Limitless™ switch or sensor series (i.e., Switch, WBX, WPS)

6.6 | Configuration Menu

Figure 20. Configuration Menu
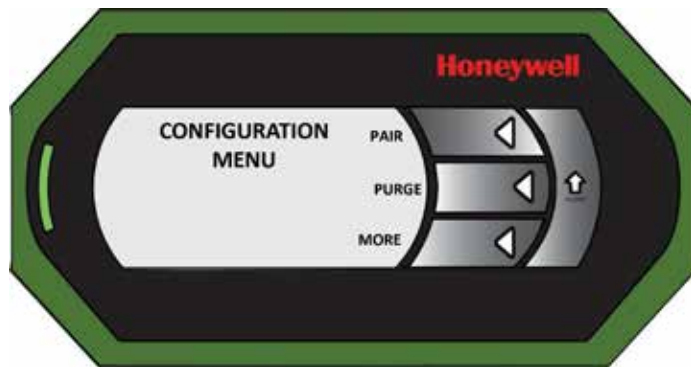
The CONFIGURATION MENU (see Figure 20) can be accessed by touching the "Configration Menu " function button as displayed in the Action Menu (see Figure 15). Once you are in the CONFIGURA-TION MENU you can choose between several different modes. A description of the modes are as follows:

PAIR: Pairing mode is required to initiate and establish an RF communication li

PURGE: Purge mode is used to remove a Limitless™ switch or sensor from the WMPR that is no longer needed in service. Functionality described in Section 6.9.

MORE: Moves to next screen where there are more modes to choose (see Figure 21).

Figure 21. Configuration Menu, continued
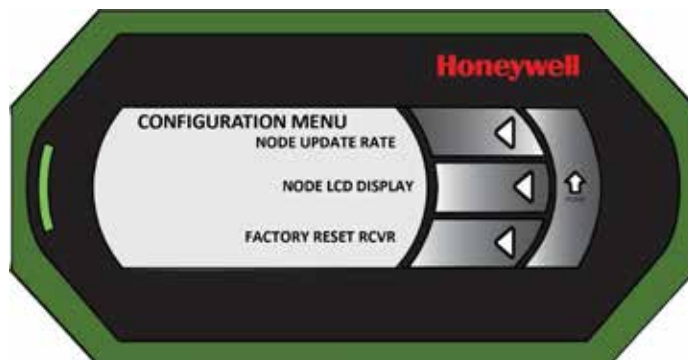
A description of the Configuration Menu (cont.) modes are as follows:

NODE UPDATE RATE: The Node Update Rate is the communication rate of an analog sensor (i.e. pressure sensor) with the WMPR receiver. The Node Update Rate for a Limitless™ switch is more unique as it is the frequency at which the Limitless™ switch will automatically communicate with the WMPR receiver when the switch is not being actuated/de-actuated.

 If the operator is cycling the switch faster than what the update rate is set, the auto communication will not occur. The update rate "clock" will also be reset upon an actuation/de-actuation of the switch so communication will happen at the next switch activation or update rate time; whichever occurs first.

An advantage of increasing the update rate frequency is allowing a **faster** indication of a lost RF signal between the switch/sensor and WMPR which is important in some applications; see Section 2.5.2 for Update Rate vs. RF Lost Indication. A disadvantage of increasing the update rate is that it can decrease the battery life in the Limitless™ switch or sensor as increasing the frequency of communication consumes more battery power. Note: Some Limitless™ Series of switches do not have the capability to allow changing of the Node Update Rate. The rate is adjustable based on the capability of the specific switch or sensor being used.

NODE LCD DISPLAY: The Node LCD Display mode allows you to change the ON/OFF time of the Node LCD display. Note: Applicable to only Limitless™ product that has this capability. Functionality described in Section 6.11.

FACTORY RESET RCVR: The Factory Reset Receiver mode is used to remove/un-pair all Limitless™ inputs that were previously paired to the WMPR and thus it is being returned to the as-manufactured condition. Functionality described in Section 6.12.

6.7 | Receiver Detail

Figure 22. Receiver Detail Menu
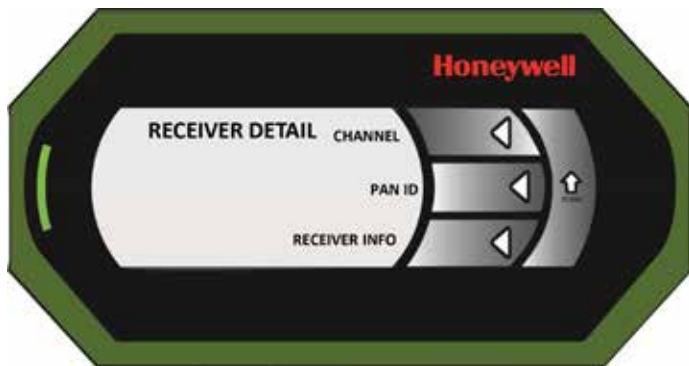
The RECEIVER DETAIL (see Figure 22) can be accessed by touching the "RECEIVER DETAIL" function button as displayed in the Action Menu (see Figure 15). Once you are in the RECEIVER DETAIL you can choose between several different modes.

A description of the modes are as follows:

CHANNEL: The Channel displays which channel in the 2.4 MHz range that the WMPR is operating at.

PAN ID: The PAN ID displays the Personal Area Network identification number assigned to the WMPR.

RECEIVER INFO: The Receiver Information contains the following detail about the WMPR (see Figure 23).

Table 19. Receiver Detail Display & Indication, Screen 1

Display	Indication
P/N	Part Number of WMPR
Radio FW Rev	Firmware version in WMPR radio
Transmit power (Power level setting)	Transmit power of the WMPR: North America = 11 dBm; International = 6 dBm
MAC	MAC ID of WMPR radio

Figure 23. Receiver Information, Screen 1
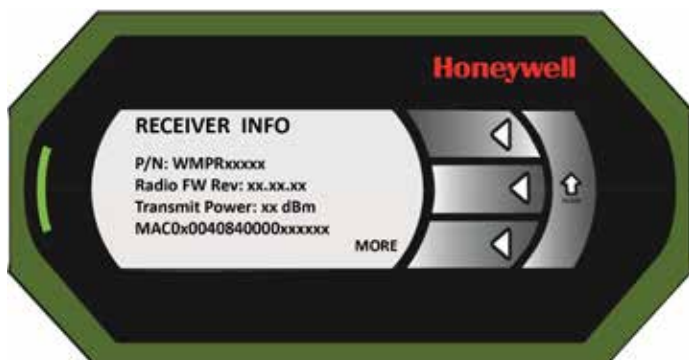
Table 20. Receiver Information, Screen 2

Display	Indication
WMPR REV	Firmware version of WMPR main processor
IP Address	Internet Protocol address
Enternet IP/ MAC ID	EtherNet/IP™ Media Access Control address

Figure 24. Receiver Information, Screen 2
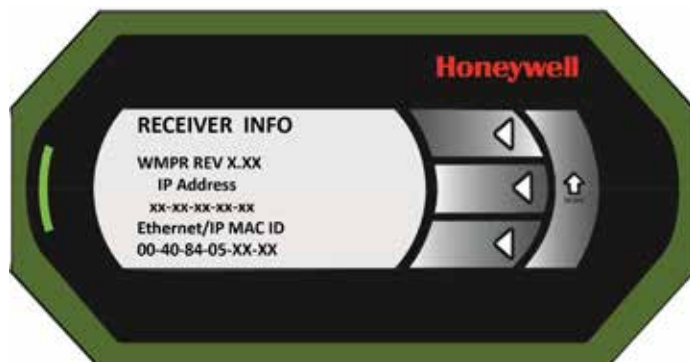
6.8 | Pair Mode

Figure 25. Pair Mode
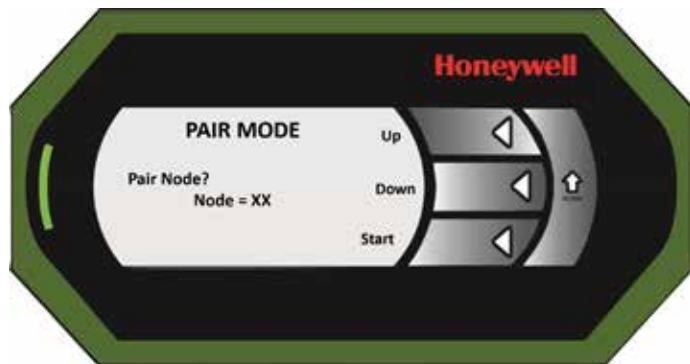
The PAIR MODE (see Figure 25) can be accessed by touching the "PAIR" function button as displayed in the Configuration Menu (see Figure 20). Once you are in the PAIR MODE you can choose any of the 14 node numbers to pair by scrolling "Up" or "Down" to the desired Node number. The screen will display the next sequential Node# available to Pair and if a chosen node has already been paired the screen will display "Node Paired". Follow the Pairing Procedure below to properly Pair a Node to the WMPR:

Table 23. Pair Mode

Step	Action
1	Completely read this procedure before starting in order to understand the timing of events that need to be performed.
2	Limitless™ switch: Remove (if required) the screws on then housing cover and then the cover of the Limitless™ switch and locate the function button ⑧ (see Figure 3a or b) to be used in Step 4. Limitless™ analog sensor: Remove (if required) the screws on the housing cover and then the cover of the Limitless™ sensor and locate the function button ⑧ (see Figure 3c) to be used in Step 4.
3	WMPR (at PAIR MODE screen): Touch the "Start" Function button on the WMPR (see Figure 25) at which time the display will show the following indicating it has entered the pairing mode. **Figure 26. Pairing In Progress**
4	Limitless™ switch or analog sensor: Within a 30 second interval of Step 3, depress the function button ⑧ and hold depressed for more than five seconds but less than 12 seconds at which time the orange or green ⑦ LED turns on (see Figure 3a, b, or c). While in pairing mode, the orange or green led will flash.
5	WMPR: Successful pairing will be indicated by the screen displaying the following: **Figure 27. Join Network Notice (switch)** If it is a Analog sensor; wait up to 45s for the indication that the Node LCD screen has been verified as indicated by the screen displaying the following: **Figure 28. John Network Notice (analog sensor)** You then must touch the "HOME" function button to return to the CONFIGURATION MENU. WMPR: Unsuccessful pairing will be displayed on the screen as "Node Pairing Failed!" or "Not Paired!"
6	You will need to navigate to the "Node Status" or "Node Information" menus to confirm proper pairing between the Limitless™ switch or analog sensor and WPMR.
7	Repeat Steps 2-7 to add additional Limitless™ switches or analog sensors. Up to 14 Limitless™ switches or analog sensors can be paired to a single WMPR.
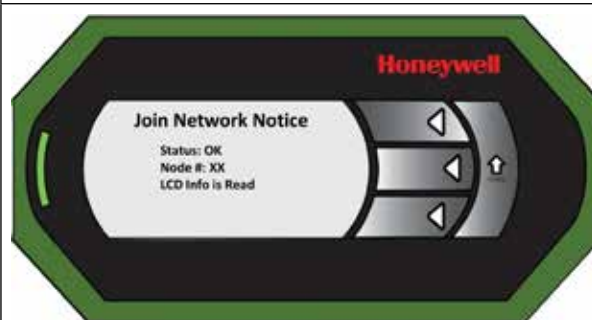
6.9 | Purge Mode

Figure 29. Purge Mode

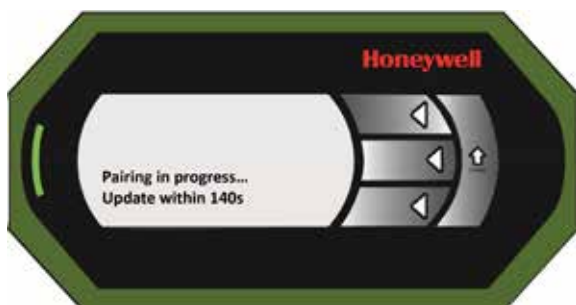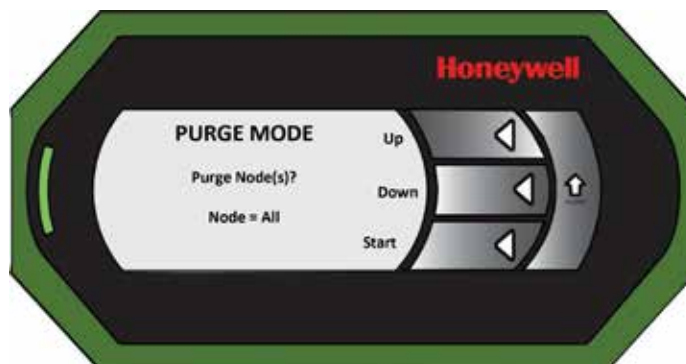The PURGE MODE (see Figure 29) can be accessed by touching the "PURGE" function button as displayed in the Configuration Menu (see Figure 21). Once you are in the PURGE MODE you can choose ALL or any of the 14 node numbers to purge by scrolling "Up" or "Down" to the desired Node number and then touching "Start".

The screen will display the following; Figure 30:

Figure 30. Purge Mode - Purge Update Sent
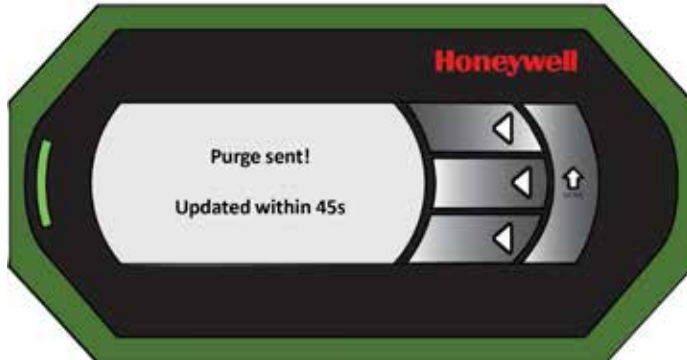
After successful purging the screen will display the following; Figures 31 & 32:

Figure 31. Purge Mode - Single Node Being Purged
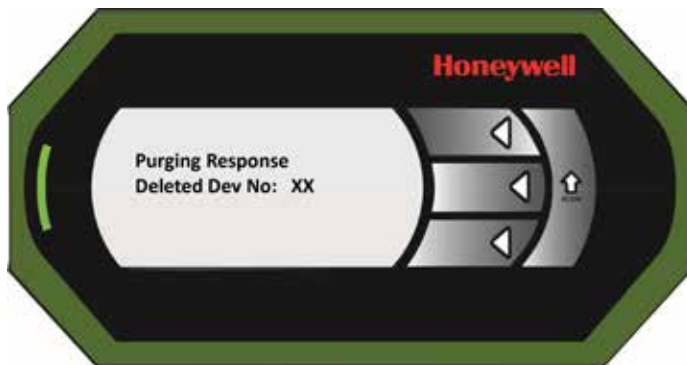
Figure 32. Purge Mode - Multiple Nodes Being Purged. Example #2 and #5 Nodes Being Purged
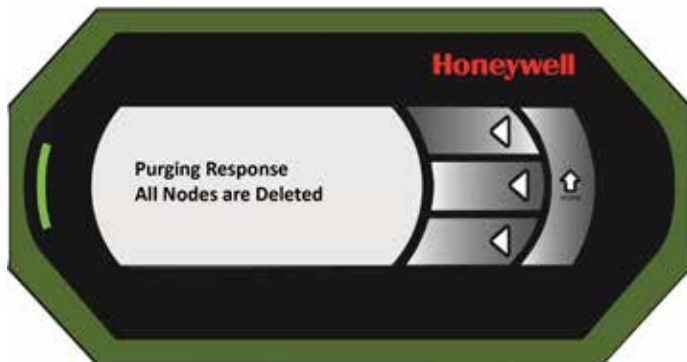
You must touch the "HOME" function button to return to the CONFIGURATION MENU.

6.10 | Node Update Rate Mode

Figure 33. Node Update Rate Mode
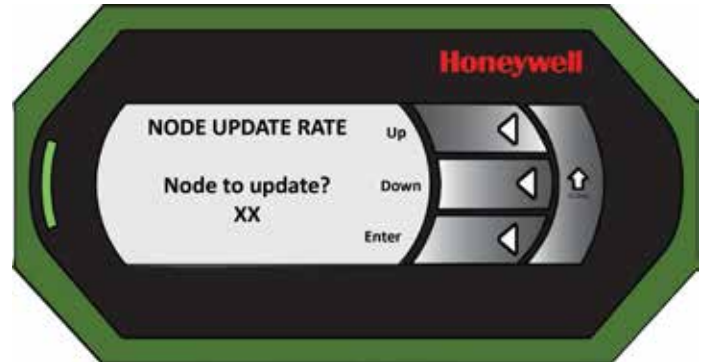
The NODE UPDATE RATE MODE (see Figure 33) can be accessed by touching the "NODE UPDATE RATE" function button as displayed in the Configuration Menu (see Figure 21). Once you are in the NODE UPDATE RATE MODE you can choose any of the 14 node numbers to update by scrolling "Up" or "Down" to the desired Node number and then touching "Enter".

The screen will display the following; Figure 34:

Figure 34. Node Update Rate - Update Rate in Process
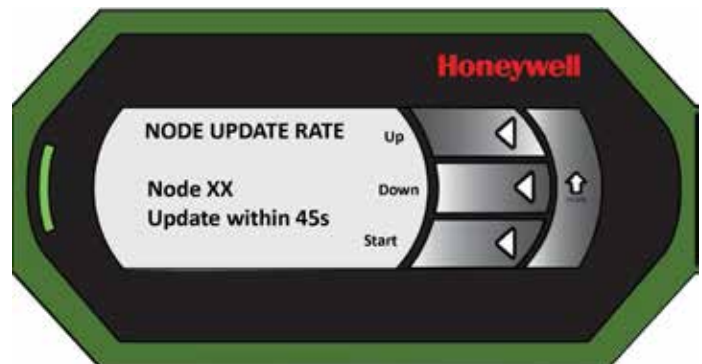
The screen will then change to show the current Update Rate that is being used in the Limitless™ switch or analog sensor (see Figure 35). The update rate options for the different Series are as follows:

WPS Series: 0.1s, 0.25s, 0.5s, 1s, 5s, 10s, 30s, or 90s

WBX Series: 1s, 5s, 10s, 30s, or 90s

You can then scroll "Up" or "Down" to the desired Node Update Rate and touch "Start" to initiate the change in Rate which will lead to the display in Figure 36 momentarily before returning to the previous screen display with the updated Rate; Figure 35:

Figure 35. Node Update Rate - Update Rate Displayed
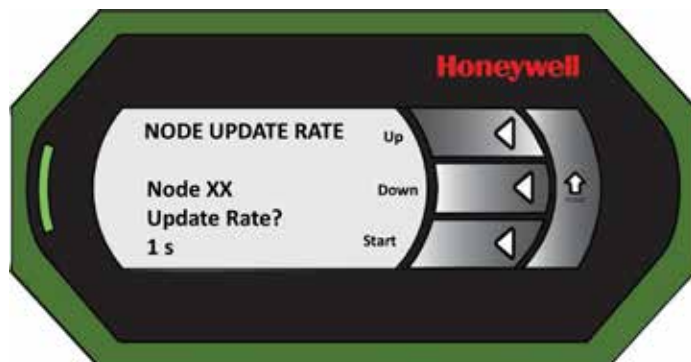
Figure 36. Node Update Rate - Changed Update Rate In-Process
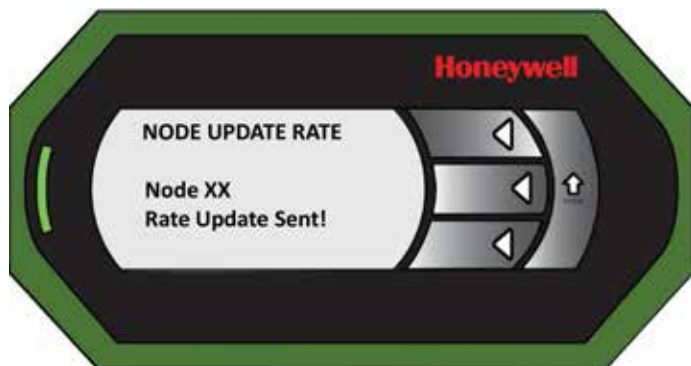
Note: If the particular Node # that you are trying to update does not have update rate capability, the screen will display "Node Rate N/A".

6.11 | Node LCD Display Mode

Figure 37. Node LCD Display Mode
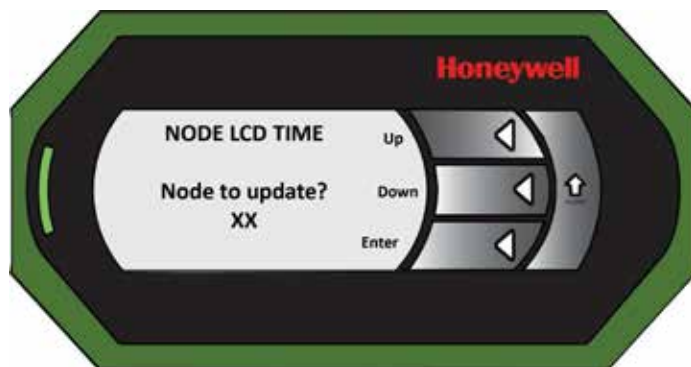
The NODE LCD DISPLAY TIME Mode (see Figure 37) can be accessed by touching the "NODE LCD DISPLAY" function button as displayed in the Configuration Menu (see Figure 21). Once you are in the NODE LCD TIME Mode you can choose any of the 14 node numbers to update by scrolling "Up" or "Down" to the desired Node number and then touching "Enter".

The screen will display the following (see Figure 38):

Figure 38. Node LCD Time - Update of Time In-Process
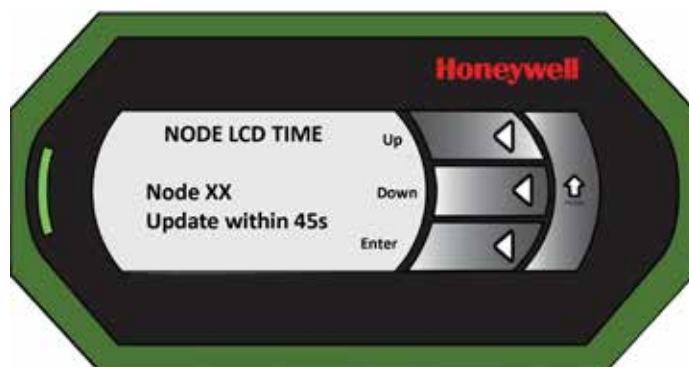
The screen will then change to show the current LCD Time that is being used in the Limitless™ analog sensor (see Figure 39). The LCD Time options are as follows:

WPS Series: 0%; 99%; 60s, Off 60s; 30s, Off 30s; 15s, Off 15s; 10s, Off 10s; 5s, Off 5s

You can then scroll "Up" or "Down" to the desired LCD Time and touch "Start" to initiate the change in LCD Time which will lead to the display in Figure 40 momentarily before returning to the previous screen display with the updated LCD Time; Figure 39:

Figure 39. Node LCD Time - LCD Time Displayed (i.e., 0%)
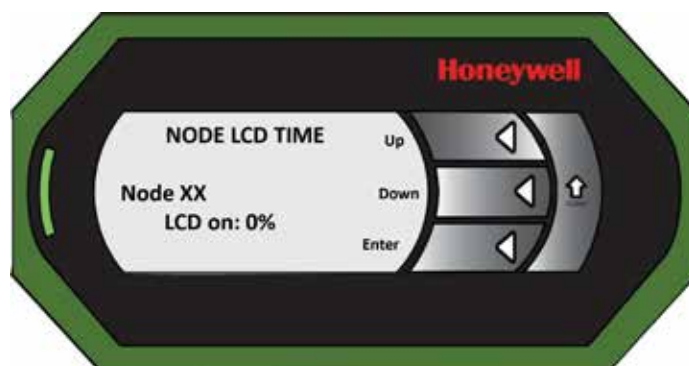
Figure 40. Node LCD Time - Updated LCD Time Displayed (i.e., 5s, Off 5s)
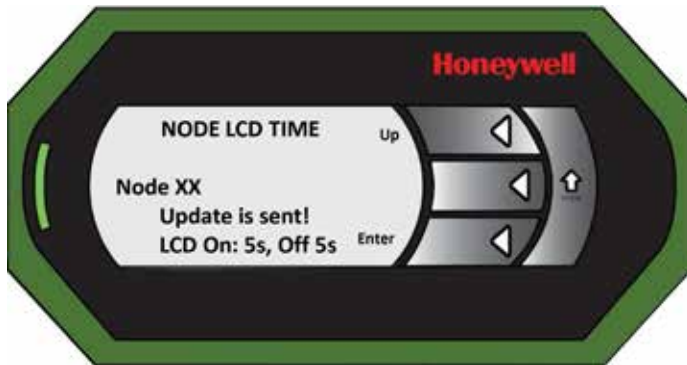
Note: If the particular Node # that you are trying to update does not have an LCD display, the screen will display "Node LCD N/A".

6.12 | Factory Reset Receiver Mode

Figure 41. Factory Reset Receiver Mode
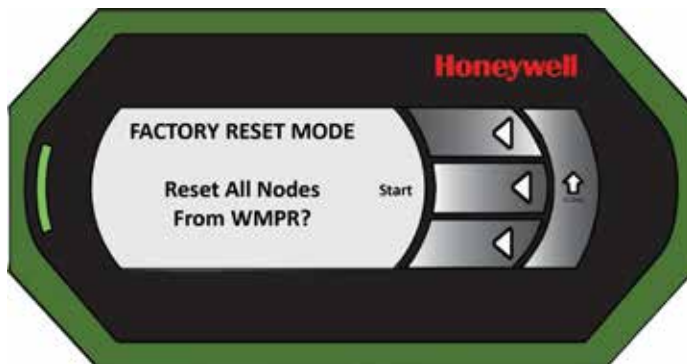
The Factory Reset Mode (see Figure 41) can be accessed by touching the "FACTORY RESET RCVR" function button as displayed in the Configuration Menu (see Figure 21). The Factory Reset Mode will purge all nodes from the WMPR and reset to Factory settings. Touching the "Start" function button will initiate the Factory Reset process and lead to the display in Figure 42 momentarily before displaying the Receiver information; Figure 43:

Figure 42. Reset of Receiver In-Process
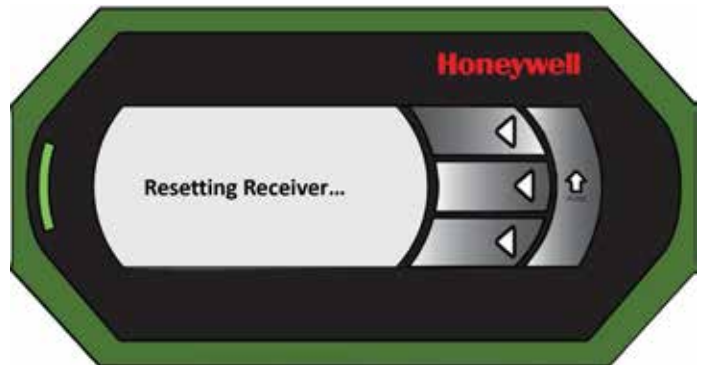
Figure 43. Network Start Notice
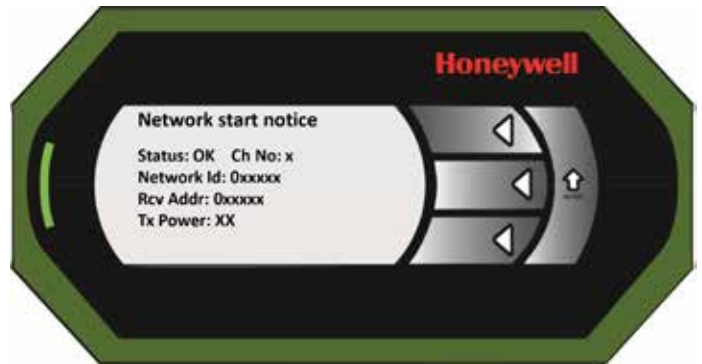
You must touch the "HOME" function button to return to the CONFIGURATION MENU.

7 | ANTENNA, CABLE, & MOUNTING OPTIONS

7.1 | Approved Antenna Options

This section defines the antenna options that can be used in a particular country of interest; reference Section 2.1 for a list of Countries per Country Use Code. It is important to determine the country the WMPR will be used in. Thereby, noting the correct Country Use Code in the WMPR nomenclature will help ensure proper selection of antenna and/or cable options. The direct antenna mounts directly to the WMPR RP-SMA jack while the remote antenna mounts to the WMPR RP-SMA jack via a cable assembly (see Section 8.5.1). Further technical information on the WAN Series antennas, WAMM Series magnetic mounts and WCA Series cable assemblies can be found in Section 8.5.3.

🛑 **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 WMPR 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 as it requires choosing the correct Country Use Code and thus allowable antenna and/or cable usage.

🛑 **CAUTION**

Power to the WMPR should not be applied during installation of an antenna as damage could occur to the WMPR electronics.

Table 22. Country Code Use "A" Antenna/Cable/Mounting Options

ANTENNAS FOR USE IN COUNTRY CODE A (Note: all columns are independent of each other)					
Antenna Type Code (antenna provided with product)	**Direct-Mount Antennas** (allowed for use)	**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 02	WAN01RSP WAN02RSP WAN04RSP WAN05RSP	WAN03RSP WAN06RNJ WAN09RSP WAN10RSP WAN11RSP	WAN01RSP WAN02RSP WAN04RSP WAN05RSP	WAN01RSP WAN02RSP WAN03RSP WAN04RSP WAN05RSP WAN09RSP WAN10RSP WAN11RSP	WAN06RNJ

Note:
Direct mount: Antennas have an RP-SMA plug that connects directly to the WMPR RP-SMA jack
Remote mount: Remote mount antenna uses a cable with a RP-SMA plug that connects directly to the WMPR RP-SMA jack

Table 23. Country Code Use "B" Antenna/Cable/Mounting Options

ANTENNAS FOR USE IN COUNTRY CODE B (Note: all columns are independent of each other)					
Antenna Type Code (antenna provided with product)	**Direct-Mount Antennas** (allowed for use)	**Remote Mount Antennas** (allowed for use)	**Magnetic Remote Mount Assemblies/ Antennas** WAMM100RSP-005 (allowed for use)	**Extension Cable Assemblies/Antennas for Remote Mount** WCA200RSJRSP-010 (allowed for use)	**Extension Cable Assemblies/Antennas for Remote Mount** WCA200RSJRSP-005 WCA200RSJRSP-010 WCA200RSJRSP-015 WCA200RSJRSP-020 (allowed for use)
00 02	WAN01RSP WAN02RSP	WAN03RSP WAN09RSP WAN10RSP	WAN01RSP WAN02RSP	WAN01RSP WAN02RSP WAN04RSP	WAN01RSP WAN02RSP WAN03RSP WAN09RSP WAN10RSP WAN11RSP

Note:
Direct mount: Antennas have an RP-SMA plug that connects directly to the WMPR RP-SMA jack
Remote mount: Remote mount antenna uses a cable with a RP-SMA plug that connects directly to the WMPR RP-SMA jack

---

🛑 **ATTENTION**

If using the WMPR in a portable application (for example, the WMPR is used in a handheld device and the antenna is less than 20 cm from the human body when the device is in operation): The integrator is responsible for passing additional SAR (Specific Absorption Rate) testing based on FCC rules 2.1091 and FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields, OET Bulletin and Supplement C. The testing results will be submitted to the FCC for approval prior to selling the integrated unit. The required SAR testing measures emissions from the module and how they affect the person.

Note for Section 7.1, Tables 22 and 23:

1. 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.

8 | ANTENNA SELECTION, ADJUSTMENT, AND MOUNTING

8.1 | Warnings

8.1.1 General Installation Warnings

🛑 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 Limitless™ WMPR Series as configured for the particular installation site.

- The antenna used for this sensor must be installed to provide a separation distance of at least 20 cm [7.87 in] from all persons and must not be co-located or operating in conjunction with any other antenna or sensor.

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

🛑 ATTENTION

Federal Communications Commission (FCC):

- The Limitless™ WMPR Series complies 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):

- L'installateur de cette radio doit s'assurer que l'antenne est située ou orientée de manière à ne pas émettre de radiofréquences excédant les limites permises par Santé Canada pour la population générale. Veuillez consulter le Code de sécurité 6 de Santé Canada au www.hc-sc.gc.ca/rpb.

8.1.2 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 are available from electrical supply houses.

<table>
</table>

⚠ **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 | Antenna Designs and Considerations

8.2.1 Omni-directional Antenna Design

The Limitless™ Series omni-directional antennas 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 be stationary. These monopole and dipole antennas radiate power (power from the internal radio of the WMPR monitor) in a 360° outward pattern in a plane perpendicular to the length of the antenna element. The term "omni" may suggest that 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 44.

Figure 44. Radiation Pattern of an Omni-directional Antenna

Toroid Radiation Pattern - Pattern is 360 degrees in the vertical plane, but not the horizontal plane	2.0 dBi RF Antenna Pattern - Horizontal	2.0 dBi RF Antenna Pattern - Vertical
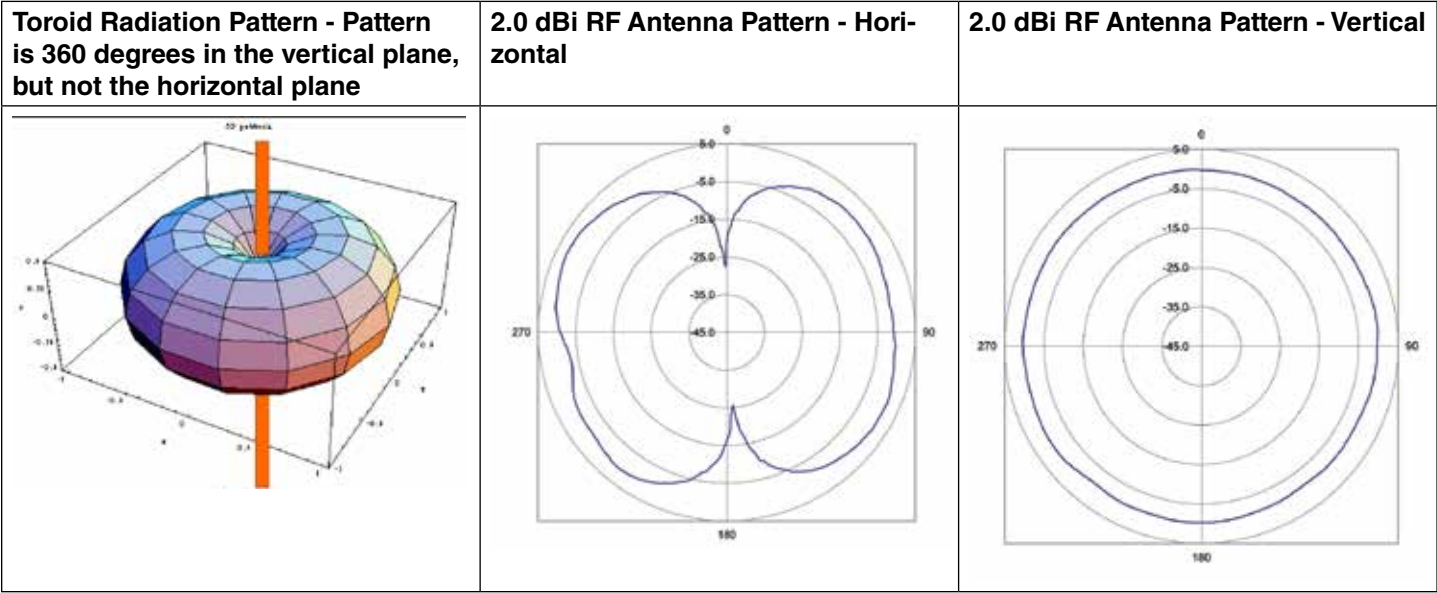
The antenna radiates virtually zero power in the Z axis and most of the power in the X and Y axis. Increasing the antenna's gain will increase the power only in the X and Y axis. As a result, the radiation pattern becomes narrower. For instance, this is analogous to the reflector in an automobile's headlight. 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.

8.3 | Antenna Mounting and Considerations

8.3.1 Antenna Mounting Location with Respect to RF Signal

> ⚠ **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.**

There are several environmental factors to consider when determining antenna location during installation. These factors can affect the radio frequency (RF) signal strength being both transmitted and received by the Limitless™ input and corresponding WMPR. It is desirable for the antenna to be mounted in a place that will limit exposure of adjacent materials/objects between the Limitless™ switch and WMPR, as they 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, metal walls, etc.

- Outdoor: Vehicles, buildings, trees, structures, topology, weather conditions, chain link fence, major power cables, etc.

The best performance is achieved when both the Limitless™ input and WMPR antennas are mounted at the same height and in a direct line of sight (LOS) with no obstructions. Generally, the higher the antenna is above ground, the better it performs. Another concern is RF interference, discussed in Section 8.4.3.

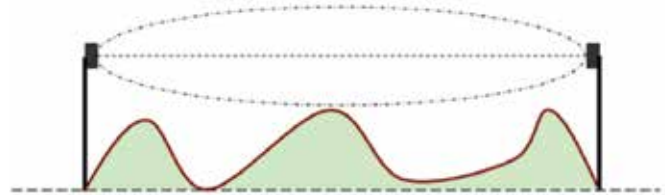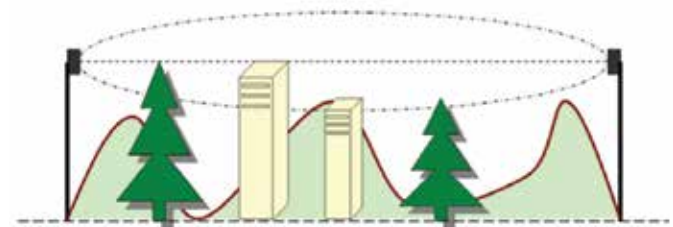**Figure 45. Limitless™ Input to WMPR with RF Signal Line of Sight (LOS) Free From Obstacles**

Figure 46. Limitless™ Input to WMPR with RF Signal Line of Sight (LOS) Affected by Obstacles

8.4 | Antenna Options

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 26. Antenna Options

Ant. type code	Part number	Replacement antenna mount or cable	Ant. gain (max.)	Design/ Style	Mount	Cable Length	Environmental usage**	Dimensions	Antenna mate-rial	Cable material/ type	Mount material
01	WAN01RSP	N/A	2.2 dBi	Omni/ Straight	Direct	N/A	Indoor or outdoor use	–	UV stable LG Key flex BT-1040D	N/A	N/A
02	WAN02RSP	N/A	2.2 dBi	Omni/ tilt & swivel	Direct	N/A	Indoor or outdoor use	–	UV stable LG Key flex BT-1040D	N/A	N/A
03	WAN03RSP	N/A	3.0 dBi	Omni/ flat	Remote with adhesive mount	2,99 m [9.8 ft]	Indoor or outdoor use	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	N/A
04	WAN04RSP	WAMM100R-SP-005 base with 1,52 m [5 ft] of cable	5.5 dBi	Omni/ tilt & swivel	Remote with magnetic mount	1,52 m [5 ft]	Indoor or limited outdoor exposure. Protect against direct rain, salt, snow, ice, etc.	Ø 12,7 mm x 208,28 mm L [Ø 0.50 in x 8.20 in L]	UV stable molded polyure-thane	UV stable PVC/ RG-174 coax	UV stable black ABS
05	WAN04RSP	WAMM100R-SP-010 base with 3,05 m [10 ft] of cable	5.5 dBi	Omni/ tilt & swivel	Remote with magnetic mount	3,04 m [10 ft]	Indoor or limited outdoor exposure. Protect against direct rain, salt, snow, ice, etc.	Ø 12,7 mm x 208,28 mm L [Ø 0.50 in x 8.20 in L]	UV stable molded polyure-thane	UV stable PVC/ RG-174 coax	UV stable black ABS
06	WAN05RSP	WAMM100R-SP-005 base with 1,52 m [5 ft] of cable	9.0 dBi	Omni/ tilt & swivel	Remote with magnetic mount	1,52 m [5 ft]	Indoor or limited outdoor exposure. Protect against direct rain, salt, snow, ice, etc.	Ø 12,7 mm x 384,05 mm L [Ø 0.50 in x 15.12 in L]	UV stable molded polyure-thane	UV stable PVC/ RG-174 coax	UV stable black ABS
09	WAN06RSP	WCA200RN-PRSP-010 coax cable assembly 3,05 m [10 ft]	8.0 dBi	Omni/ straight	Remote with mast mount	3,35 m [11 ft]	Indoor or outdoor use	Ø 33,5 mm x 427,9 mm L [Ø 1.32 in x 16.85 in L]	UV stable fiber-glass	UV stable PVC/ RG-316 coax, UV stable Polyeth-ylene/200 Series coax	300 series SST aluminum alloy
10	WAN02RSP	WAMM100R-SP-010	2.2 dBi	Omni/ straight	Remote with magnetic mount	3,04 m [10 ft]	Indoor or limited outdoor exposure. Protect against direct rain, salt, snow, ice, etc.	Ø 76,2 mm x 230,1 mm L [Ø 3.0 in x 9.06 in L] 4,57 m [15 ft] cable	UV sta-ble LG Keyflex BT-1040D	UV stable PVC/ RG-174 coax	UV stable black ABS
n/a	WAN09RSP	N/A	3.0 dBi	Omni/ low profile straight	Remote with magnetic mount	4,57 m [15 ft]	Indoor or outdoor use	–	UV stable ABS plastic	UV stable black PVC	Nickel-plated steel
n/a	WAN10RSP	N/A	5.0 dBi	Omni/ straight	Remote with magnetic mount	4,57 m [15 ft]	Indoor or outdoor use	–	Nick-el-plated steel	UV stable black PVC	Nickel-plated steel
n/a	WAN11RSP	N/A	4.0 dBi	Omni/ low profile dome	Remote with mobile thru-hole screw mount	4,57 m [15 ft]	Indoor or outdoor use	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

Reference Limitless™ nomenclature (i.e. WMPR Series, WDRR Series, WPMM Series, WGLA Series, etc.)

**Reference Limitless™ Environment Usage section 8.4 for further details*

🛑 **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 WMPR 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 as it requires choosing the correct Country Use Code and thus allowable antenna and/or cable usage.

8.5 | Antenna Connection, Styles, and Mounting Options

⚠ **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 WMPR should not be applied during installation of an antenna as damage could occur to the WMPR electronics.

8.5.1 Antenna Connection

Physical connection of the antenna to the WMPR is accomplished by using mating RP-SMA connectors: plug and jack. Direct-mount antennas have an RP-SMA plug that connects directly to the WMPR RP-SMA jack. The remote mount antenna uses a cable with a RP-SMA plug that connects directly to the WMPR RP-SMA jack allowing the antenna to be remotely mounted away from the WMPR. Mounting options are based on user preference, communication agency approvals, WMPR mounting location, and obstacles as discussed in Section 8.3.1.

A direct- or remote-mount antenna can be easily mounted by threading the mating RP-SMA plug of the antenna to the WMPR's RP-SMA jack. Reference section 8.6 for further details on extra environmental protection of RP-SMA connections. Tighten the RP-SMA connection until finger tight. See Figures 47 and 48.

Figure 47. Limitless™ WMPR RP-SMA Connection, Direct-Mount

Figure 48. Limitless™ WMPR RP-SMA Connection, Remote-Mount

8.5.2 | Cable Requirement

Some remote mount antennas have an antenna cable permanently attached, with an RP-SMA plug, that is simply connected to the jack on the WMPR. 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 sensor, 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 7 for approved antenna and cable options.

8.5.3 | Antenna Styles and Mounting Options

Choosing an antenna mounting style depends on application conditions, antenna benefits and/or features, and user preference. The antenna's gain (discussed further in Section 8.5) to some extent determines physical size. Another consideration is the amount of room available in the application.

Straight or Tilt/Swivel: A benefit of the straight antenna is rigid design and resistance to being repositioned (shock, vibration, wind, etc.) when compared to a tilt-and-swivel design. It is more resistant to weather conditions as there's no swivel-joint connection for contaminants to enter. A benefit of the tilt & swivel design is that it allows easier positioning in relation to other antenna(s) to obtain a suitable RF signal.

Catalog listings: WAN01RSP, WAN02RSP

WAN01RSP	WAN02RSP
Straight wireless antenna with 2.2 dBi gain, reverse polarity SMA plug, connector mount (RP-SMA)	Tilt/swivel wireless antenna with 2.2 dBi gain, reverse polarity SMA plug, connector mount (RP-SMA)

Adhesive mount: The benefit of a remote adhesive mount antenna is mounting flexibility to a number of surfaces and in various orientations. Remember, the surface an antenna is being mounted to will affect the radiation pattern. Use masking tape to temporarily attach the antenna. Perform fade-margin testing, as described in Section 8.7 before permanently mounting.

Catalog listing: WAN03RSP

Permanent mounting: Pre-clean the antenna's mounting surface with an alcohol wipe. Peel paper protection from adhesive strip and mount to the cleaned surface.

Figure 46. Adhesive Mounting Steps

Adhesive Mount Antenna – Step 1. Pre-clean the surface

Adhesive Mount Antenna – Step 2. Peel Protection from Adhesive Strip

Adhesive Mount Antenna – Step 3. Mount the Antenna

Mast mount: The benefit of the mast-mount antenna is its rigid design and resistance to displacement when subjected to shock, vibration, wind, etc. It can be easily mounted high above the ground to obtain greater RF signal performance and it withstands winds up to 100 mph.

Catalog listing: WAN06RNJ

Mast-mount bracket (Included with the 8 dBi antenna): Attach antenna to its mounting bracket. Tighten nut. Assemble two U-clamps around mast and tighten nuts. Ensure provided lock washers are compressed to a flat condition.

**Figure 50. Mast Mount Antenna –
Tighten nut on mounting bracket**

**Figure 51 Mast Mount Antenna –
Side View with Attachment to Pipe**

Magnetic mount: The benefit of the magnetic-mount antenna is its ability to mount on any ferrous-metal surface and in various orientations. A smooth metal surface is preferred to allow the best attraction of the magnet to the surface. First, determine if the magnetic attraction is sufficient to hold the antenna in the desired position (i.e., shock, vibration, etc. in the application). Placing the antenna in a location where it cannot be inadvertently displaced may help.

Catalog listings: WAMM100RSP-005 & WAMM100RSP-010: These magnetic-mount bases are not designed for mobile applications.

Catalog listings: WAN09RSP & WAN10RSP: These magnetic-mount antennas are designed for mobile applications and can withstand winds at >150 mph.

Use Magnetic Mounts with the following antenna catalog listings: WAN01RSP, WAN02RSP,WAN04RSP, and WAN05RSP

Figure 52. Magnetic Mount Base with Antenna – Mounted on Steel Surface

Figure 53. WAN09RSP Magnetic Mount Antenna

Figure 54. WAN10RSP Magnetic Mount Antenna

Thru-hole mount: The benefit of the thru-hole mount antenna is it allows the cable to run "thru" the mounting surface. There is also an adhesive material between the antenna housing and the mounting surface for seal protection. This is a very low profile, rugged design [approximately 30 mm (1.18 in) height] when mounted and can also can be used in mobile applications.

Catalog listing: WAN11RSP

Figure 55. Thru-hole mount antenna

WAN11RSP

8.5.4 | Antenna Adjustment Considerations

The antennas of the Limitless™ input and WMPR receiver should be oriented in parallel as best as possible. This will, in most cases, allow the longest range and highest RF signal. The least RF signal is normally in-line with the top of the antenna, so avoid having the antennas pointed directly toward or directly away from each other.

Figure 56. Highest RF signal when antennas are as parallel to each other as possible (parallel arrangement shown Limitless™ WMPR monitor and WPS sensor)

8.5.5 | Grounding the Remote Antenna

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

Table 25. Grounding the Antenna

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 (i.e., part number AL6-RSPRSJBW-9, manufactured by L-COM Global Connectivity) 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 independant 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 feedthru 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 [11.81 in].

Cabinet lead-in area

To lightning arrestor and antenna

30 cm [12 in]

Drip loop

6	Thoroughly waterproof the cabinet lead-in area.
7	Connect the lead-in cable to the WMPR and tighten cables by hand only; do not use tools or you could overtighten and damage the RF cable on the WMPR.

8.6 | Antenna Environmental Usage/Concerns

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

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

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 8.1) with respect to resistance of chemicals and fluids in the application. 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 as defined in Sections 8.1 and 8.3.3.2.
4	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 the area applying tape to is clean from contaminants by first cleaning it with mild detergent/water and completely dry. Follow with an isopropyl alcohol wipe of the area. (See Figure 54). **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.**

In the end, the antenna/cable choice may need to be tested in the actual application conditions to prove suitability.

8.6.2 | 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 thorugh 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 57. 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.

8.6.3 | Outdoor Antenna Installations - Lightning Concerns

Outdoor antenna installations can lead to the possible damage caused by nearby lightning strikes that induce charges or surges on the antenna and/or antenna extension cables.

A lightning arrestor such as the AL6-RSPRSJBW-9 from L-COM Global Connectivity can be reviewed against application requirements.

> ### 🛑 ATTENTION
>
> National, local, and/or regulatory agencies may require the use of a lightning arrestor and possibly other requirements for an antenna system installation. It is recommended that the customer review and adhere to these requirements.

8.6.4 | Lightning Arrestor

The lightning arrestor may be mounted directly on the sensor, 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 sensor, use caution when attaching a grounding wire to the arrestor to avoid putting undue stress on the sensor'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. The lightning arrestor recommended by Honeywell (AL6-RSPRSJBW-9 from L-COM Global Connectivity) features a bulkhead RP-SMA connector with a rubber "O"-ring seal which can be used for mounting through an enclosure wall. Both connector ports of the lightning arrestor provide equal protection no matter which way it is installed. Either port can face the antenna and either port can face the sensor.

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 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 Limitless™ switch or sensor and the Wireless Multi-Protocol Receiver (WMPR). It is desirable for the antenna to be mounted to limit exposure of adjacent materials/objects between the Limitless™ switch or sensor and the WMPR, 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 sensors 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 negligable (less than 0.1 dB/mile for a heavy downpour).

8.7 | Choosing an Antenna Gain (dBi) with Acceptable Fade-Margin

There are several different Limitless™ Series antenna gain options to choose from. This section helps determine the antenna version(s) that will provide suitable RF signal performance for specific applications.

The Limitless™ Series antenna's actual gain is measured by how much of the input power from the WMPR's internal radio is concentrated in a particular direction. The WMPR antenna transmits RF signals, and also receives RF signals from a Limitless™ input. In a particular application, transmit signal strength may be better than the receive signal strength or vice versa. The intent is to choose an antenna with the optimum gain relative to application conditions for both transmitting and receiving.

Fade-margin is the amount of excess power available above and beyond what is necessary to maintain a reliable RF signal between the transmitter and receiver. Normally, an acceptable threshold of excess power to ensure effective operation in a variety of environmental conditions is 10 dB. A simple way to determine if the signal strength is sufficient is to temporarily install a 10 dB attenuator* between the RP-SMA plug of the antenna or remote cable and WMPR's RP-SMA jack. This should be completed in an operating application environment with good nominal environmental conditions. Starting with the antenna chosen in Section 3 & 8.3, install the attenuator and operate the system until exposure of all normal application conditions is completed while monitoring the Lost RF Signal Output. If the fade-margin is unacceptable, the lost RF signal output changes state) indicating the antenna position on the Limitless™ switch and/or WMPR receiver will need to be changed and/or another antenna type should be chosen. The RF Signal indication within the Node Status menu or Node Information Menu is useful in indicating the RF Link Strength; refer to Sections 6.3 or 6.5 for more information.

Try several mounting locations and/or antennas along with retesting each with the attenuator to determine the optimal set-up that provides an acceptable fade-margin. Remove the attenuator after testing is completed.

*Suggested sources/part numbers

• 10 dB attenuator (i.e. Crystek – Part number: CATTEN-0100)

• RP-SMA female to SMA male connector adaptor (i.e. Connector City – Part number : ADP-SMAM-RPSF)

• RP-SMA male to SMA female connector adaptor (i.e. Connector City – Part number : ADP-RPSM-SMAF)

9 | WMPR MOUNTING

The WMPR is intended to be mounted to a Din-Rail or mounted via the mounting plate.

9.1 | Din-Rail Mounting

The WMPR DIN-Rail bracket is supplied with the WMPR and can be "snapped" on to a 35mm DIN-RAIL.

Figure 58. Limitless™ WMPR DIN-RAIL bracket

9.2 | Tab Mounting

The WMPR has four tabs mounting holes intended to allow mounting with a #8 style screw. As there are many types of screw fasteners, care should be taken to not overtighten the fastener. Also, ensure that the housing is being mounted on a flat surface.

Figure 59. Limitless™ WMPR Mounting Plate

10 | INSPECTION AND MAINTENANCE

10.1 | WMPR Inspection and Replacement

Periodic inspection

* Check the WMPR housing and connectors for signs of damage. Replace if necessary

* Check the condition of the LCD display for signs of cracking or damage. Replace WMPR if necessary

* Check the proper operation of the Function Buttons and if found non-functional, replace WMPR

10.2 | Antenna Inspection and Replacement

* Check antenna or cable connection to WMPR connector to ensure it is tight and bear no signs of damage or corrosion. Replace if necessary per Section 8.

11 | CHOOSING A WMPR SERIES CATALOG LISTING

This section is intended to be used for identifying a catalog listing from the WMPR nomenclature to determine suitability in a particular application.

Figure 60. Limitless™ WMPR Nomenclature
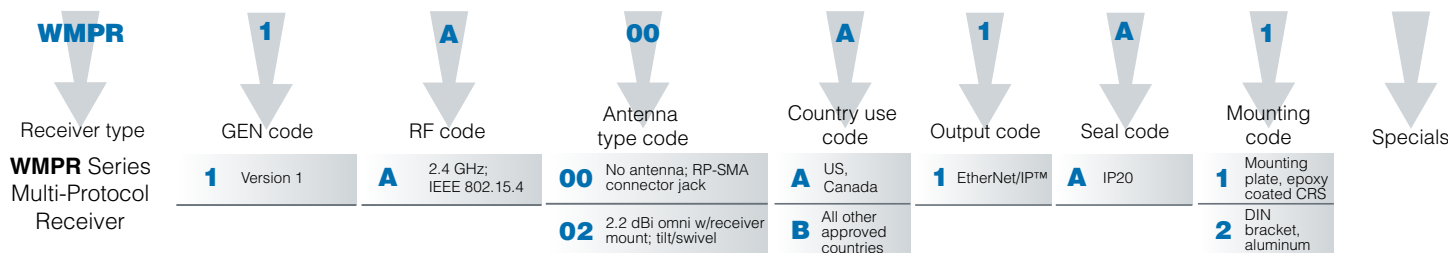
The following procedure refers to appropriate sections in this manual to determine/build a WMPR listing.

1. Determine the country the product will be used in. Review Section 2.1 (Intended Country Usage) to determine the Country Use Code (A or B) in relation to the country the WMPR will be used in.

2. Determine the antennas and/or Antenna Type Codes allowable for use. Review Section 2 (ANTENNA OPTIONS ALLOWED PER COUNTRY USE CODE) to determine the antennas/cables allowed for use in a particular country (based on the Country Use Code determined in Step 1). Some antenna/cable options can be ordered with the WMPR and some are ordered separately. If an antenna is ordered separately, choose Antenna Type Code 00 (see product nomenclature).

3. Review Section 8.4 (Overview of Antenna Options) against the antenna list identified in Step 2. Initially, narrow options by choosing a desired antenna that can be used indoor/outdoor or indoor/limited outdoor exposure.

4. Review Sections 8.2 & 8.3 (Omni-directional Antenna Design & Antenna Mounting and Considerations) for a background of antenna design, considerations, warnings, etc. Choose a possible direct- or remote-mount antenna.

5. Section 8.4 helps to determine the antenna material most suitable for use based on the application environment. Also consider the effects of lightning or RF Interference (if applicable).

12 | QUICK START UP AND INSTALLATION

There are many sections in this manual that describe the consideration, concerns, specifications, etc. with respect to country of use, antenna choices, environmental effects, etc. The following sections are useful for initially "starting up" the WMPR and associated Limitless™ input.

🛑 ATTENTION

Ensure that the country the product is being used in appears in the chart along with the correct Country Use Code on the WMPR label. Review Section 2.1 and 7.1 in this manual. If required, contact Honeywell before use of the WMPR in Countries not listed in Table 3 thru 6 in Section 2.1.

Table 26. Suggested Start-Up Sections to Review

Suggested Start-up Sections to Review	Section
Electrical Configurations/Connections	5.1 to 5.3
Start-up or Restart Sequence Mode	6.1
Main Menu > Action Menu > Pair Mode	6.8
Antenna Connection, Styles, and Mounting Options	8.5.3
Antenna Adjustment Considerations	8.5.4
Antenna Environmental Usage/Concerns	8.6
Choosing an Antenna Gain (dBi) with Acceptable Fade-Margin	8.7
WMPR mounting	9

13 | ACCESSORIES
Table 27. Limitless™ Antennas

	Part Number	Antenna Type Code (if ordered with a wireless switch)		Antenna Design	Antenna Gain (dBi)	Connector/ Mounting	Dimensions
	WAN01RSP	01		straight	2.2	RP-SMA plug/direct mount	Ø 9,91 mm x 112,78 mm L [Ø 0.39 in x 4.44 in L]
	WAN02RSP	02		tilt/swivel	2.2	RP-SMA plug/direct mount	Ø 9,91 mm x 112,78 mm L [Ø 0.39 in x 4.44 in L]
	WAN03RSP	03		flat	3.0	RP-SMA plug/adhe-sive mount	Ø 7,87 mm x 22,1 mm W x 4,57 mm D [Ø 0.31 in x 0.87 in W x 0.18 in D] 3 m [9 ft] cable
	WAN04RSP*	04** with a WAMM100RSP-005 base with 1,52 m [5 ft] of cable	05** with a WAMM100RSP-010 base with 3,05 m [10 ft] of cable	tilt/swivel	5.5	RP-SMA plug/direct mount	Ø 12,7 mm x 208,28 mm L [Ø 0.50 in x 8.20 in L]
	WAN05RSP*	06** with a WAMM100RSP-005 base with 1,52 m [5 ft] of cable	07** with a WAMM100RSP-010 base with 3,05 m [10 ft] of cable	tilt/swivel	9.0	RP-SMA plug/direct mount	Ø 12,7 mm x 384,05 mm L [Ø 0.50 in x 15.12 in L]
	WAN06RNJ*	08** with a WCA200RNPRSP-002 coax cable assembly 0,682 m [2 ft]	09** with a WCA200RNPRSP-010 coax cable assembly 3,05 m [10 ft]	straight	8.0	RP-N jack/ bracket	Ø 33,5 mm x 427,9 mm L [Ø 1.32 in x 16.85 in L]
	WAN09RSP	–		low profile mobile	3.0	RP-SMA plug/mag-netic	Ø 76,2 mm x 115 mm L [Ø 3.0 in x 4.54 in L] 4,57 m [15 ft] cable
	WAN10RSP	–		straight	5.0	RP-SMA plug/mag-netic	Ø 76,2 mm x 230,1 mm L [Ø 3.0 in x 9.06 in L] 1,52 m [5 ft] cable
	WAN11RSP*	–		low profile mobile dome	4.0	RP-SMA plug/th-ru-hole screw	Ø 39 mm x 42,4 mm L [Ø 1.54 in x 1.67 in L]

* Not allowed for use with Country Use Code "B" Limitless™ products

Table 28. Limitless™ Cables

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

Table 29. Limitless™ Base Accessories

	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

14 | INSTALLATION DRAWING
Figure 61. WMPR DImensions
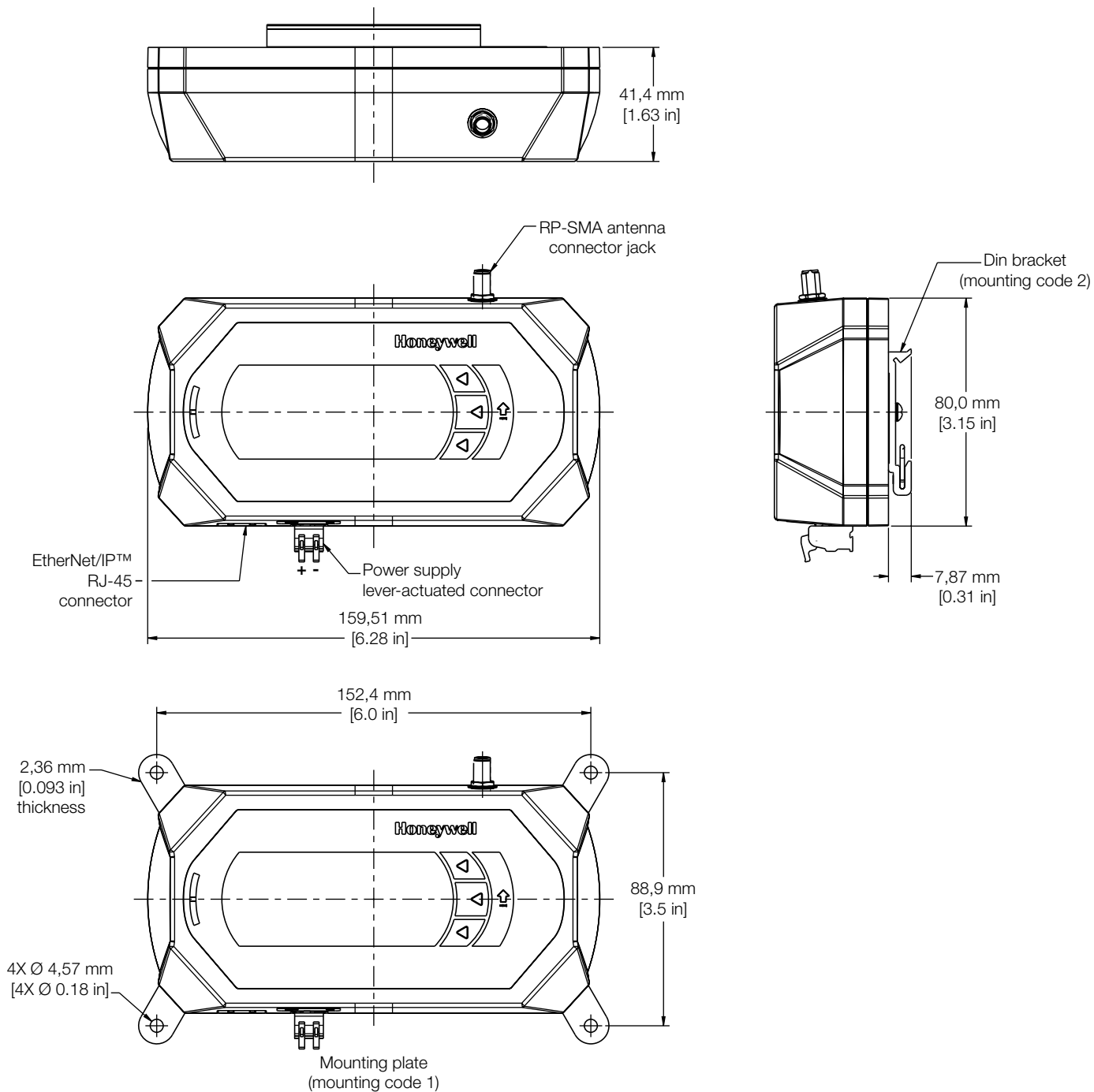
WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgment or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

SALES AND SERVICE

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

E-mail: info.sc@honeywell.com
Internet: sensing.honeywell.com

Phone and Fax:

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

Notices and Trademarks

While this information is presented in good faith and believed to be accurate, Honeywell disclaims the implied warranties of merchantability and fitness for a particular purpose and makes no express warranties except as may be stated in its written agreement with and for its customers.

In no event is Honeywell liable to anyone for any indirect, special or consequential damages. The information and specifications in this document are subject to change without notice.

Honeywell is a registered trademarks of Honeywell International Inc.

Other brand or product names are trademarks of their respective owners.