

Installation and Technical Manual for the **Limitless™ Series WGLA Limit Switch** *used in conjunction with the Limitless™ WPMM Series*

ISSUE 2
50051863

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 WGLA must be installed in accordance with the requirements specified in this document. See Section 3 and Section 4 for EIRP requirements. Only the specified EIRP power settings, antenna types and gains and cable lengths (attenuation) as outlined in this document are valid for WGLA Series installations.

CAUTION

- Power to the WGLA should not be applied (ensure battery is removed) during installation of antenna as damage could occur to the WGLA electronics.

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1 DESCRIPTION

1.1 General

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

1.2 Principle of Operation

The WGLA will transmit the position of its actuator to a Limitless™ Wireless Panel Mount Monitor (WPMM Series). The WPMM will then indicate the actuator position of the WGLA via a visual indicator, audible indicator and/or electronic output. The WGLA supports no electrical signal inputs and is powered by a replaceable battery.

1.3 Model Reference

WGLA	Switch type WGLA Series Wireless	1	Software version 1 Version 1	A	RF Code A 2.4 GHz; IEEE 802.15.4	00	Antenna type code 00 RP-SMA; no connector jack	A	Country use code A U.S. Canada	A	Head code A Side rotary; momentary	1	Lever code Not applicable	A-	Roller code mm [in] Not applicable	3	Modification code 3 Hood assembled with actuator to right side	---	Specials Use only if switch has a special feature.
						01	2.2 dBi omni with switch mount; straight design	B	European countries*	B	Top pin plunger	1	Std. fixed length	A	19 x 6.35 [0.75 x 0.25] nylon	4	Hood assembled with actuator to left side		
						02	2.2 dBi omni with remote adhesive and swivel design	C	Australia	C	Top roller plunger	2	Adjustable roller	B	19 x 6.35 [0.75 x 0.25] steel	5	Hoop assembled with actuator to mounting surface		
						03	3.0 dBi omni with remote adhesive mount/6.8 ft. cable	D	Top roller lever	D	Top roller lever	3	Yoke roller	D	38.1 x 6.35 [1.5 x 0.25] nylon	6	Roller mounting straps		
						04	5.5 dBi omni w/ remote mag. mount; 11.8 swivel/5 ft. cable					4	Adjustable rod	J	20.0 mm aluminum adjustable rod				
						05	9.5 dBi omni w/ remote mag. mount; 11.8 swivel/10ft. cable					5	Offset	K	140 mm adjustable rod				
						06	9.0 dBi omni w/ remote mag. mount; 11.8 swivel/5 ft. cable							N	316 mm stainless steel adjustable rod				
						07	3.0 dBi omni w/ remote mag. mount; 11.8 swivel/10ft. cable							W	40.0 x 12.7 [1.57 x 0.5] tube				
						08	3.0 dBi omni w/ remote bkt. mount; str. design/3 ft. cable							Y	65.9 x 12.7 [2.6 x 0.5] rubber				
						09	3.0 dBi omni w/ remote bkt. mount; str. design/1 ft. cable							T	19 x 8.76 [0.75 x 0.345] stainless steel				
						10	2.2 dBi omni w/ remote bkt. mount; 11.8 swivel/10 ft. cable												

*Antenna type codes 00 - 03, 05, 10; usage also allowed in Country Codes A & C.

1.4 Abbreviations and Definitions













Table 1 –Table of Abbreviations and Definitions

ACMA	Australian Communications and Media Authority
dB	DeciBel
dB_i	DeciBel Isotropic
dB_m	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-lbs	Foot-pounds
GHz	GigaHertz
IC	Industry Canada
ICES	Industry Canada Electrical Specification
IEEE	Institute of Electrical and Electronics Engineers
kbps	KiloBits Per Second
LED	Light Emitting Diode
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
TX	Transmit
WGLA	Wireless Global Limit Switch Series
WPMM	Wireless Panel Mount Monitor Series

1.5 Symbol Definitions

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

Table 2 –Table Symbol Definitions

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

2.1 Intended Country Usage

Table 3 – North America

Country	ISO 3166 2 letter code
UNITED STATES	US
CANADA	CA

Table 4 – Asia Pacific

Country	ISO 3166 2 letter code
AUSTRALIA	AU

Table 5 – European Union

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

Table 6 – Other European Countries

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

2.2 Certification and Approvals

See the product label for applicable approvals and ratings.

Table 7 – Approvals and Ratings

Approval/Item	Ratings/Description
Enclosure Type	IP67; NEMA 1, 4, 12, 13
Federal Communications Commission (FCC)	FCC Part 15.247
Industry Canada (IC)	Canadian ICES-003
European Telecommunications Standards Institute (ETSI)	CE mark
Australian Communications and Media Authority (ACMA)	C-Tick mark

2.3 Radio Module Specifications

Table 8 – Radio Module Specifications

Item	Specification
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	18 dBm or 10 dBm (Maximum transmit power will vary by country usage requirements)
Receive sensitivity (typ.)	-100 dBm



WARNING

The WGLA must be installed in accordance with the requirements specified in this document. See Section 3 and Section 4 for EIRP requirements. Only the specified EIRP power settings, antenna types and gains and cable lengths (attenuation) as outlined in this document are valid for WGLA Series installations.

2.4 Electrical Specifications

Table 9 – Electrical Specifications

Item	Specification
Battery	3.6 Vdc Lithium Thionyl Chloride; 2/3AA size; Manufacturer: Uniwell, P/N DEV-10-0009

2.5 EMC Specifications

The latest applicable EMC Standards are as follows:

- EN 300 328, V1.7.1
- EN 61326-1 (2006)
- EN 301 489-1, V1.8.1
- EN 301 489-17, V2.1.1

2.6 Environmental Specifications

Table 10 – Environmental Specifications

Item	Specification
Operating temperature	-25 °C to 85 °C [-13 °F to 185 °F] ; Side rotary to -40 °C [40 °F]
Storage temperature	-25 °C to 85 °C [-13 °F to 185 °F] ; Side rotary to -40 °C [40 °F]
Operating humidity	0 %RH to 100 %RH

2.7 Agency Compliance Information

2.7.1 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 WGLA 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.

2.7.2 IC Compliance Statements

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

2.7.3 Radio Frequency (RF) Safety Statement (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 20cm and a separation distance of at least 20 cm [7.87 in] from all persons.
- Furthermore, when using an integral antenna with the WGLA, it must not be co-located with any other antenna or transmitter device and have a separation distance of at least 20 cm [7.87 in] from all persons.

2.7.4 European Restrictions

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

2.8 European (CE) Declaration of Conformity (DoC)

2.8.1 European Declaration of Conformity Statements

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

Figure 1. European Declaration of Conformity (DoC)

Honeywell

Honeywell Control Systems Ltd.,
Newhouse Industrial Estate,
Motherwell, Lanarkshire, ML1 5SB,
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Tel.: +44 (0)1698 481000
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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: Limit Switch
WGLA and WPMM Wireless Limit Switch and Monitor

<u>Directive (Amendments)</u>	<u>Conformity Details</u>	
LVD 2006/95EC	Standards applied:	EN 61010-1: 2001 + A2:2005
1999/5/EC and 2004/108/EC	Standards applied:	EN 61326-1:2006 ETSI EN 300 328 V1.7.1 ETSI EN 301 489-1 V1.8.1 and -17 V2.1.1

Signed on behalf of Honeywell Control Systems Ltd. :

Frank Turnbull, S&C Chief Engineer

DoC No: A434

DoC Issue: 1

DoC Date: 08/04/2010

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2.8.2 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 EQUIVALENT ISOTROPICALLY RADIATED POWER (EIRP)

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

Values found in Tables 11 and 12.

EIRP (dBm) = Max. Radio Output Power (dBm) – Min. Cable/Connector Loss (dB) + Max. Antenna Gain (dBi)

EIRP Example for WGLA Series:

5.5 dBi Omni remote antenna used in ETSI/European Countries including France restriction

$EIRP = 8 \text{ dBm} - 4.53 \text{ dB} + 5.5 \text{ dBi}$

$EIRP = 8.97 \text{ dBm}$ (value is less than the max. EIRP allowed of 10.00 dBm)

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

4 COUNTRY COMMUNICATION AGENCY EIRP LIMITS PER ANTENNA

Table 11 – EIRP Limits Per Antenna

Antenna type code	Antenna max. gain/type	Radio usage	Application mounting	Agency/country	Max. radio output power (dBm)	Max. EIRP (dBm)
01, 02, 10	2.2 dBi Omni	Point to point	Integral* or Remote**	FCC, IC/USA, Canada	18	36.00
01, 02, 10	2.2 dBi Omni	Point to point	Integral* or Remote**	ACMA/Australia	8	19.24
01, 02, 10	2.2 dBi Omni	Point to point	Integral* or Remote**	ETSI/European Countries	8	10.00***
03	3.0 dBi Omni	Point to point	Remote*	FCC, IC/USA, Canada	18	36.00
03	3.0 dBi Omni	Point to point	Remote*	ACMA/Australia	8	19.24
03	3.0 dBi Omni	Point to point	Remote*	ETSI/European Countries	8	10.00***
04, 05	5.5 dBi Omni	Point to point	Integral** or Remote**	FCC, IC/USA, Canada	18	36.00
04, 05	5.5 dBi Omni	Point to point	Integral** or Remote**	ACMA/Australia	8	19.24
05	5.5 dBi Omni	Point to point	Remote**	ETSI/European Countries	8	10.00***
08, 09	8.0 dBi Omni	Point to point	Remote*	FCC, IC/USA, Canada	18	36.00
08, 09	8.0 dBi Omni	Point to point	Remote*	ACMA/Australia	8	19.24
06, 07	9.0 dBi Omni	Point to point	Integral** or Remote**	FCC, IC/USA, Canada	18	36.00
06, 07	9.0 dBi Omni	Point to point	Integral** or Remote**	ACMA/Australia	8	19.24

* Indoor or outdoor use

** Indoor or limited outdoor exposure. Protect against direct rain, salt, snow, ice, etc.

*** Based on France outdoor restriction

Table 12 – Cable/Connector Loss Per Antenna Type for the WGLA Series

Antenna Type Code	Min. Cable/Connector Loss (dB)
01	0.4
02	0.4
03	4.73
04	2.54
05	4.53
06	2.54
07	4.53
08	1.33
09	2.68
10	4.53

EIRP Example for WGLA Series: 5.5 dBi Omni remote antenna used in ETSI/European Countries including France restriction

EIRP (dBm) = Max. Radio Output Power (dBm) – Min. Cable/Connector Loss (dB) + Max. Antenna Gain (dBi)
 Values found in Tables 11 and 12.

EIRP = 8 dBm – 4.53 dB + 5.5 dBi

EIRP = 8.97 dBm (value is less than the max. EIRP allowed of 10.00 dBm)



ATTENTION

If using the WGLA in a portable application (for example, the WGLA 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.



ATTENTION

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

Notes for Table 11:

1. Antennas listed in this chart are approved for use with the Digi International XBee –PRO® RF Module which the WPMM utilizes.
2. The following shall apply for antenna type, frequency range, application/usage and agency/country compliance:
 - Antenna gains above the maximum values shown shall not be used.
 - Cable length/loss below the minimum values shown shall not be used.
 - Maximum overall radio output power shown shall not be exceeded.
 - Maximum EIRP values shown above shall not be exceeded.
3. 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.

5 QUICK START UP

5.1 Antenna Connection



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 WGLA should not be applied (ensure battery is removed) during installation of antenna as damage could occur to the WGLA electronics.

The antenna and antenna guard are packaged separately and thus will need to be assembled to the WGLA.

A **direct mount antenna** (either straight or tilt & swivel) can be easily mounted by threading the mating RP-SMA plug of the antenna to the RP-SMA jack on the WGLA. Tighten the connection until finger tight. Then, attach the antenna guard by simply threading the guard finger tight onto the threaded base with the RP-SMA connector.

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

Refer to Section 6.3 for further information regarding installation.

5.2 Battery Connection Procedure

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

- Connection and disconnection of the batteries should only be performed in a non-hazardous area. The batteries used in this device may present a risk of fire or chemical burn if mistreated. Do not recharge, disassemble, heat above 100 °C [212 °F], or incinerate.

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

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

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

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

i ATTENTION

Use only the following 3.6V lithium thionyl chloride (Li-SOCl₂) battery (non-rechargeable), size 2/3AA. No other batteries are approved for use in the WGLA Series limit switch.

- Uniwell, DEV-10-0009
- Honeywell, WBT1

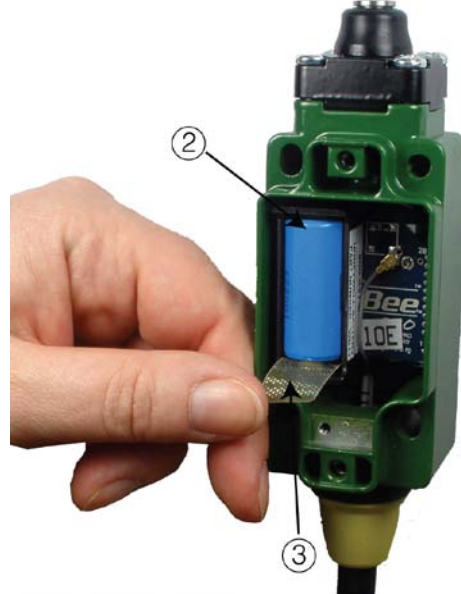
WGLA battery activation:
 Tools required: Slotted or Phillips screwdriver

Step	Action
1	If applicable, remove the two screws ① on the housing cover.
2	Using a finger, press down slightly on the battery top ② and remove the battery insulator ③. Insure that the battery is properly seated and making good contact.
3	Replace cover and retighten screws or immediately proceed to Section 5.3 Pairing Mode.

Figure 2. Limitless™ Switch Housing



Figure 3. Limitless™ Battery and Insulator



5.3 Pairing Mode

Pairing is required to initiate and establish an RF communication link between each single WGLA and a single WPMM. The WGLA will be shipped from the factory with two identification labels (1) that are recommended to be completed and applied to the WGLA housing during the pairing mode. As there are up to 16 WGLAs that can be paired to a single WPMM, these labels will be used to identify the WGLA switch in the sequence of #1 to #16. The initial WGLA switch paired to the WPMM will be Sequence #1; the second WGLA paired will be Sequence #2 and so on. If replacing a WGLA switch that has been purged (see section 6.5 of the WPMM Installation and Technical Manual), identify the correct replacement Sequence # on the identification labels.



ATTENTION

The operation and LED functions for the WPMM are visually depicted and described in Section 5.4. This file is also located as a separate file on this CD or at www.honeywell.com/sensing.



ATTENTION

The operation and LED functions for the WPMM are visually depicted and described in Section 5.4. This file is also located as a separate file on this CD or at www.honeywell.com/sensing.

The battery will need to be activated in the WGLA and proper power applied to the WPMM (green ② LED illuminated) before proceeding with this pairing procedure. Once the pairing is completed, the WGLA selected will only communicate with the WPMM it was paired to and no other device.

Step	Action
1	Completely read this procedure before starting in order to understand the timing of events that need to be performed.
2	WGLA: Remove (if required) the two screws ⑥ on the housing cover (See Figure 4) of the WGLA and locate the function button ⑦ to be used in Step 4.
3	WPMM: Press the Function button ④ on WPMM (See Figure 5) for more than four seconds and less than eight seconds at which time the green ② and amber ③ LEDs will be flashing which indicates to release the function button immediately as it has entered the pairing mode.
4	WGLA: Within a 30 second interval of Step 3, depress the WGLA switch function button ⑦ (See Figure 6) and hold depressed for more than one second and less than 12 seconds at which time the orange ⑧ LED turns on. While in pairing mode, the orange led will flash on for 100 ms every second. The orange ⑧ LED flashes three times 100 ms on, 100 ms off when pairing succeeds. If pairing does not succeed, the orange ⑧ LED will turn off and user will need to repeat steps starting with Step 3.
5	WPMM: Successful pairing will be indicated by the green ② and amber ③ LEDs (See Figure 5) ceasing to flash and remaining on for a few seconds before turning off. A short buzzer beep will also occur.
6	To confirm proper pairing between the WGLA and WPMM, actuate the WGLA, and the red LED ⑤ should illuminate along with a buzzer sound.
7	Record the WGLA Sequence # on identification labels ① and apply to the WGLA housing in desired locations (See Figure 7).
8	Repeat Steps 2-7 to add additional WGLA switches. Up to 16 WGLAs can be paired to a single WPMM.



ATTENTION

The purging of a WGLA per Section 5.4 is required when a previously paired WGLA is desired to be paired again.

Figure 4. Limitless™ Switch Housing



Figure 5. Limitless™ Switch Housing



NOTE: Use a blunt object, such as a paper clip or tooth pick to actuate the function switch ④.

Figure 6. Limitless™ Switch with Function Button Depressed



NOTE: Use a blunt object, such as a paper clip or tooth pick to actuate the function switch ⑦.

Figure 7. Limitless™ Switch Label Placement



5.4 WGLA Purge Mode

The purging of a WGLA is required when a previously paired WGLA is desired to be paired again per Section 5.3. Follow the procedure below which will then allow a new pairing to be conducted after successful purging:

Step	Action
1	Remove (if required) the two screws ⑥ on the housing cover of the WGLA (See Figure 4) and locate the switch function button ⑦ & orange LED ⑧ (See Figure 6).
2	Press and hold the switch function button for greater than 12 seconds. Initially the orange LED ⑧ turns on and after the 12 seconds will turn off indicating the WGLA has been purged.
3	Repeat above steps if necessary to purge more Limitless™ switch(s).

5.5 WPMM Operation and LED functions

5.5.1 Principle of Operation of the WPMM and Limitless™ Switch :

A Limitless™ switch will send an RF signal to the WPMM when the actuator of the switch changes position. There are up to 16 Limitless™ switches that will communicate and indicate their actuation position with a single WPMM. The actuation (Free Position to Full Overtravel) of any one of the Limitless™ switches will cause a single red output LED to illuminate, a buzzer to sound, and a change in the NPN output. However, there will be no differentiation of outputs (visual, audible or NPN state change) between the Limitless™ switches (up to 16) being actuated. Further, if a Limitless™ switch is actuated and thus causes the single red output LED to illuminate, a buzzer to sound, and a change in the NPN output, actuation of another Limitless™ switch(s) will not cause another output change (visual, audible or NPN state change).

The operation and LED functions for the WPMM are visually depicted and described in the attached file. This file is also located as a separate file on this CD or @ www.honeywell.com/sensing.

Figure 8. WPMM Operation and LED Functions Chart – part 1

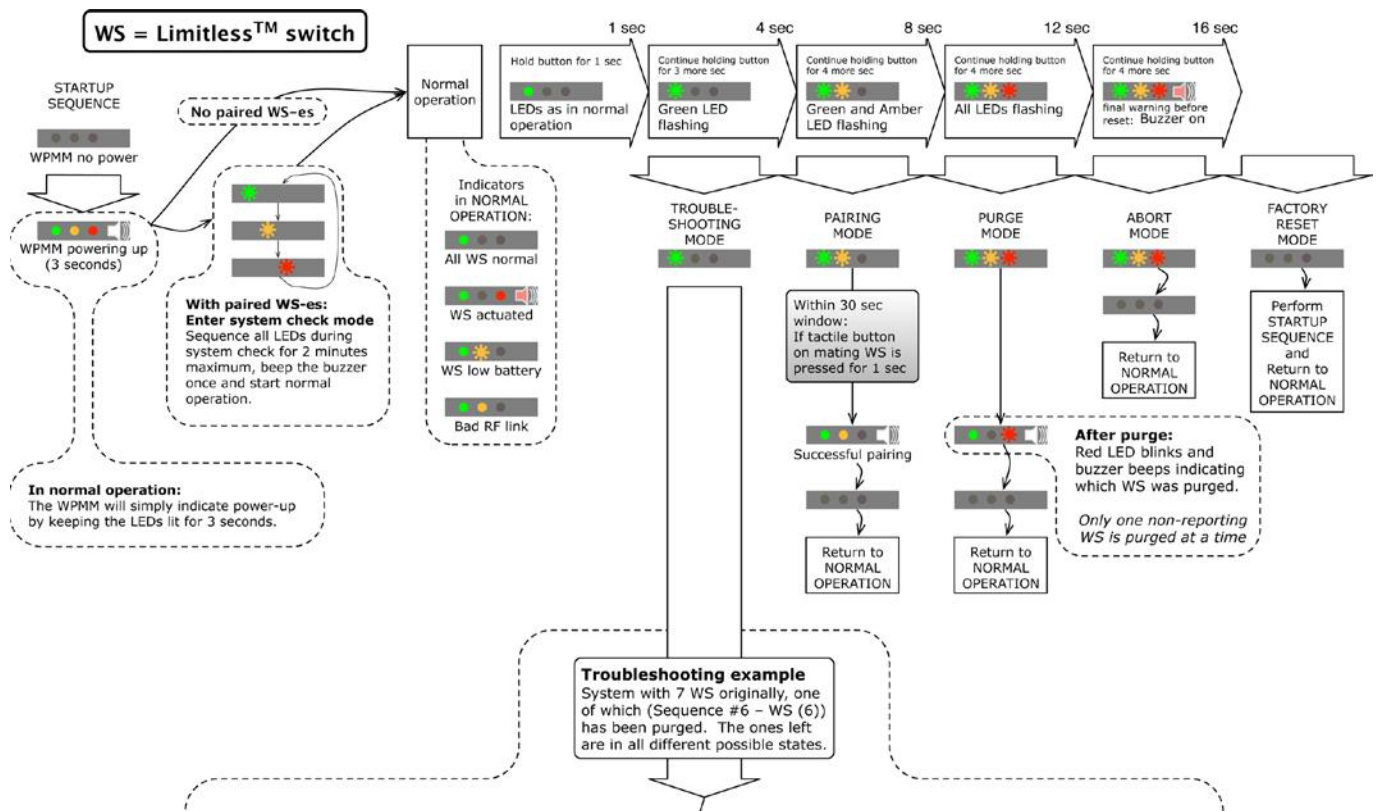
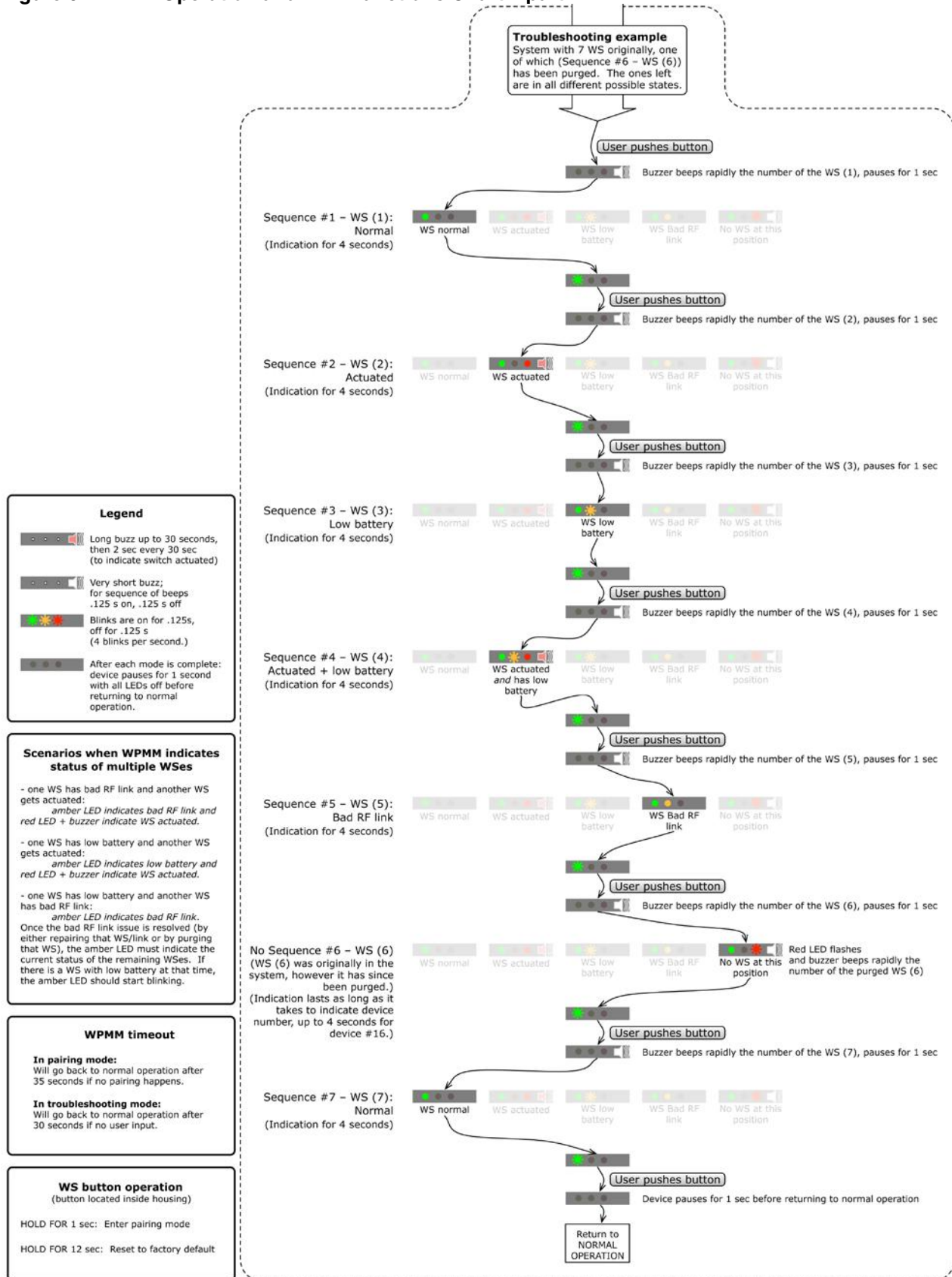


Figure 9. WPMM Operation and LED Functions Chart – part 2



6 ANTENNA CONSIDERATIONS/OPTIONS AND SWITCH/ANTENNA INSTALLATION

6.1 Overview of 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.

Ant. type code*	Repl. ant.	Replacement antenna mount or cable	Ant. gain (max.)	Design/style	Mount	Cable length	Environment usage **	Antenna material	Cable material/type	Mount material
01	WAN01RSP	N/A	2.2 dBi	Omni/ Straight	Integral	N/A	Indoor or outdoor use	UV stable LG Keyflex BT-1040D	N/A	N/A
02	WAN02RSP	N/A	2.2 dBi	Omni / Tilt and Swivel	Integral	N/A	Indoor or outdoor use	UV stable LG Keyflex 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	UV stable ABS	UV stable PVC/ RG-174 coax	N/A
04	WAN04RSP	WAMM100R SP-005	5.5 dBi	Omni/ Tilt and Swivel	Remote with magnetic mount	1,52 m [5 ft]	Indoor or limited outdoor exposure. Protect against direct rain, salt, snow, ice, etc.	UV stable Molded Polyurethane	UV stable PVC/ RG-174 coax	UV stable black ABS
05	WAN04RSP	WAMM100R SP-010	5.5 dBi	Omni/ Tilt and Swivel	Remote with magnetic mount	3,04 m [10 ft]	Indoor or limited outdoor exposure. Protect against direct rain, salt, snow, ice, etc.	UV stable Molded Polyurethane	UV stable PVC/ RG-174 coax	UV stable black ABS
06	WAN05RSP	WAMM100R SP-005	9.0 dBi	Omni/ Tilt and Swivel	Remote with magnetic mount	1,52 m [5 ft]	Indoor or limited outdoor exposure. Protect against direct rain, salt, snow, ice, etc.	UV stable Molded Polyurethane	UV stable PVC/ RG-174 coax	UV stable black ABS
07	WAN05RSP	WAMM100R SP-010	9.0 dBi	Omni/ Tilt and Swivel	Remote with magnetic mount	3,04 m [10 ft]	Indoor or limited outdoor exposure. Protect against direct rain, salt, snow, ice, etc.	UV stable Molded Polyurethane	UV stable PVC/ RG-174 coax	UV stable black ABS
08	WAN06RSP	WCA200RNP RSP-002	8.0 dBi	Omni/ Straight	Remote with mast mount	0,91 m [3 ft]	Indoor or outdoor use	UV stable fiberglass	UV stable PVC/RG-316 coax, UV stable Polyethylene/200 Series coax	300 series SST aluminum alloy
09	WAN06RSP	WCA200RNP RSP-010	8.0 dBi	Omni/ Straight	Remote with mast mount	3,35 m [11 ft]	Indoor or outdoor use	UV stable fiberglass	UV stable PVC/RG-316 coax, UV stable Polyethylene/200 Series coax	300 series SST aluminum alloy
10	WAN01RSP	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.	UV stable LG Keyflex BT-1040D	UV stable PVC/ RG-174 coax	UV stable black ABS

*Reference Limitless™ Nomenclature (i.e. WPMM Series, WGLA Series, etc.)

**Reference Limitless™ Environment Usage section 6.5 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 WGLA must be installed in accordance with the requirements specified in this document. See Section 3 and Section 4 for EIRP requirements. Only the specified EIRP power settings, antenna types and gains, and cable lengths (attenuation) as outlined in this document are valid for Limitless™ WGLA Series installations.

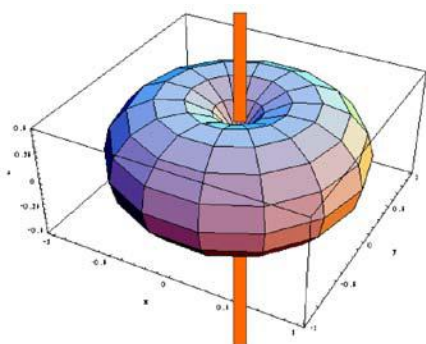
6.1.1 Omni-directional Antenna Design

The omni-directional antennas offered in the Limitless™ Series were chosen for their ability to be used in applications where transmit-and-receiver antennas may be moving with respect to each other or could also be stationary. They are dipole antennas that radiate power (power from the internal radio of the WGLA switch) in a 360° outward pattern in a plane perpendicular to the length of the antenna element. “Omni” may suggest the antenna radiates power in all directions, but that is not the case. The actual antenna radiation pattern looks more like a toroid (doughnut-shape) as shown in Figure 10.

Figure 10. Radiation Pattern of an Omni-directional Antenna

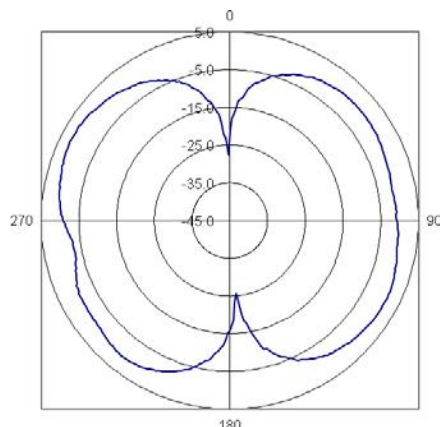
Toroid Radiation Pattern -

Pattern is 360 degrees in the vertical plane, but not the horizontal plane



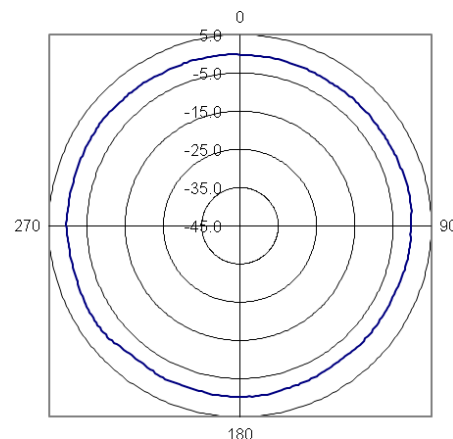
2.2 dBi RF Antenna Pattern -

Horizontal



2.2 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 more narrow. 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.

6.2 Antenna Mounting and Considerations

6.2.1 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 with respect to antenna location during installation. These factors can affect the radio frequency (RF) signal strength being both transmitted and received by the WGLA switch and corresponding WPMM monitor. It is desirable for the antenna to be mounted to limit exposure of adjacent materials/objects between the Limitless™ WGLA and WPMM, 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.

Best performance is achieved when antennas for both the WGLA switch and WPMM monitor 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 1.5.3.

Figure 11. WGLA to WPMM Antennas with RF Signal Line of Sight (LOS) Free From Obstacles

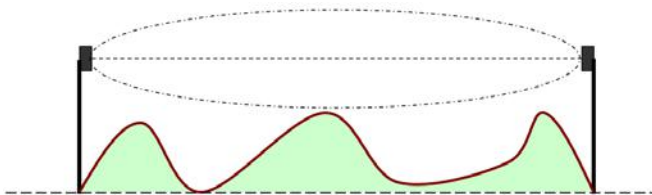
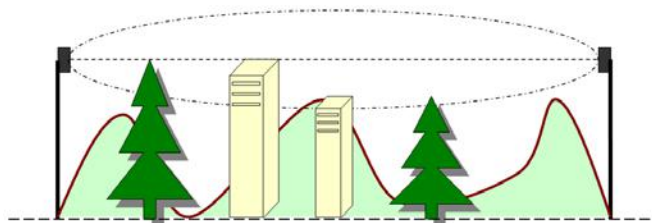


Figure 12. WGLA to WPMM Antennas with RF Signal Line of Sight (LOS) Affected by Obstacles



6.2.2 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 CAN BE LETHAL

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 HyperLink Technologies, Inc.

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.

6.2.3 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 WGLA switch should not be applied during installation of an antenna as damage could occur to the WGLA switch electronics.

6.2.3.1 Antenna Connection, Styles, and Mounting Options

Physical connection of the antenna to the WGLA switch is accomplished by using mating RP-SMA connectors: plug and jack. Integral-mount antennas have an RP-SMA plug that connects directly to the WGLA RP-SMA jack. The remote mount antenna uses a cable with a RP-SMA plug that connects directly to the WGLA RP-SMA jack allowing the antenna to be remotely mounted away from the WGLA switch. Mounting options are based on user preference, communication agency approvals, WGLA switch mounting location, and obstacles as discussed in Section 6.2.1.

An **integral or remote mount antenna** can be easily mounted by threading the mating RP-SMA plug of the antenna to the RP-SMA jack on the WGLA switch. Reference section 6.5 for further details on extra environmental protection of RP-SMA connections. Tighten the RP-SMA connection until finger tight, and then attach the lime/black guard finger tight. See Figures 13 and 14.

Figure 13. Limitless™ WGLA RP-SMA Connection, Integral



Figure 14. Limitless™ WGLA RP-SMA Connection, Remote



6.2.3.2 Antenna Styles and Mounting Options

Choosing an antenna mounting style depends on application conditions, along with antenna benefits and/or features and user preference. The antenna's gain (discussed further in Section 6.4) to some extent determines physical size; also a consideration is the amount of room available in the application.

Straight or Tilt/Swivel: A benefit of the straight antenna is its rigid design and resistance to being repositioned (shock, vibration, wind, etc.) when compared to a tilt and swivel design. It is also 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.

Figure 15. Straight and Tilt/Swivel antennas



Adhesive mount: The benefit of the remote adhesive mount antenna is mounting flexibility to a number of surfaces and in various orientations. Remember, the surface that the antenna is being mounted to will affect the radiation pattern so it is suggested that masking tape be used to temporarily attach the antenna. Perform fade-margin testing, as described in Section 6.4 before permanently mounting.

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

Figure 16. Adhesive Mount Antenna – Step 1. Pre-clean the surface



Figure 17. Adhesive Mount Antenna – Step 2. Peel Protection from Adhesive Strip



Figure 18. 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.

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

Figure 19. Mast Mount Antenna – Tighten nut on mounting bracket



Figure 20. 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, the user will need to 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. Magnetic-mount antennas are not designed for mobile applications.

6.2.4 Antenna Adjustment Considerations

The antenna of the WGLA switch and WPMM monitor should be oriented in parallel. This will, in most cases, allow the longest range and highest RF signal. The least RF signal is normally in a direction in-line with the top of the antenna, so avoid having antennas pointed directly toward or directly away from each other.

Figure 21. Magnetic Mount Bracket with Antenna – Mounted on Steel Surface

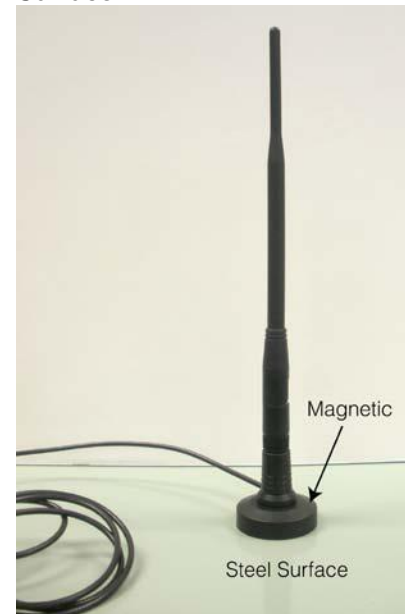
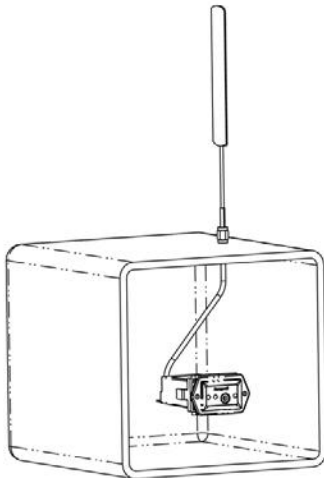


Figure 22. Highest RF signal when antennas are as parallel to each other as possible



6.3 Signal Range of an Antenna

The signal range is defined as the physical distance between the WGLA switch and WPMM monitor. It's a function of the antenna's gain, radio output of the WGLA switch and WPMM monitor (8 dBm or 18 dBm), and cable loss (if used) in conjunction with the environment (i.e. outdoor urban, indoors, etc.) that the Limitless™ product is operating in. The Honeywell antenna range calculator can be used to estimate the expected signal range that can be achieved between the WGLA switch and WPMM monitor with chosen antennas, cable extensions, radio output, etc. The calculator can be found at www.honeywell.com/limitless.

Signal range specification:

250 m [820 ft] (nominal) – 8 dBm radio output

305 m [1000 ft] (nominal) – 18 dBm radio output

Line of sight with a 2.2 dBi antenna installed on the WGLA switch and WPMM monitor

6.4 Choosing an Antenna Gain (dBi) With Acceptable Fade-Margin

There are several different antenna gain options in the Limitless™ Series 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 internal radio of the WGLA switch is concentrated in a particular direction. The WGLA switch's antenna transmits RF signals, and also receives RF signals from a Limitless™ WPMM monitor. 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 RP-SMA jack of the WGLA switch. This should be completed in an operating application environment with good nominal environmental conditions. Starting with the antenna chosen in Section 8.2, install the attenuator and operate the system until exposure of all normal application conditions is completed while monitoring the amber LED (RF link/signal indicator of the WPMM monitor). If the fade-margin is unacceptable, the LED turns on solid indicating that the antenna position on the WGLA switch and/or WPMM monitor will need to be changed or another antenna type should be chosen.

Try several mounting locations and/or antennas while retesting each with the attenuator to determine the optimal set-up that provides an acceptable fade-margin. Remember to 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)

6.5 Environment Usage/Concerns

6.5.1 Choosing an Antenna/Cable to Meet Application Exposure Conditions

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

Step 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.)
Step 2	Determine what the antenna may be subjected to (i.e., fluids, chemicals, oils, wind, shock, vibration, etc.)
Step 3	<p>A. Review antenna and/or cable materials (listed in Section 6.1) against resistance to chemicals and fluids. If choosing an adhesive mount, adhesive resistance testing may be necessary.</p> <p>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 6.1 and 6.2.3.2.</p>
Step 4	<p>The WGLA’s enclosure is designed to meet IP and NEMA seal requirements; however, this step may be required to provide an extra level of protection, especially if the application may be subjecting antennas and cables to liquids. The RP-SMA connections, tilt/swivel joints, and cable entrances are potential leak paths that could lead to corrosion. The following procedure is one way to provide extra protection to these connections and joints.</p> <p>Ensure that the area applying tape to is clean from contaminants by first cleaning with mild detergent/water and completely dry. Follow with an isopropyl alcohol wipe of the area.</p> <p>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</p> <p>Layer 1 allows the user to remove Layer 2 for connector inspection, antenna replacement, repositioning of the tilt/swivel antenna, etc.</p>

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

6.5.2 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 AL-NFNFB-9 from Hyperlink Technologies 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.

6.5.3 RF Interference

The WGLA switch and WPMM radio operate in the 2.4 GHz range. Upon initial pairing with the WGLA switch, the WPMM's radio will automatically scan each of the 16 channels in the 2.4 GHz range and choose a channel with the least amount of usage. This provides a level of protection from RF interference as the chosen channel where RF communication is low will have a lower chance of signal collision.

However, if multiple RF sources exist in the chosen channel or the external source has an extremely high power intensity or it is in close proximity to the Limitless™ Series antenna, RF interference can cause an RF signal to not reach the WGLA switch or WPMM monitor. RF interference can be caused by many sources (i.e., other radios in the same operating range, solar activity, high frequency digital products, conventional microwave ovens, etc.). If the Limitless™ Series is in an environment with a high usage of products in the 2.4 GHz range, or the RF environment is unknown, an on-site RF survey may prove to be valuable in identifying possible RF interference sources along with other existing wireless devices.

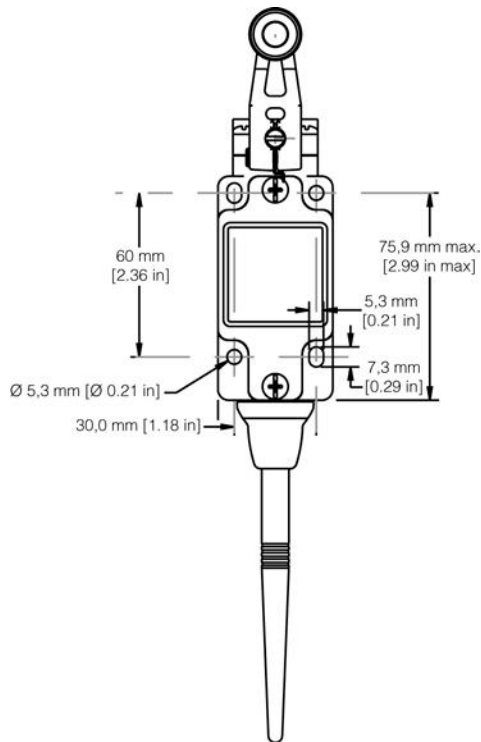
Once the RF sources are identified and located, it may allow the Limitless™ Series antennas to be moved away from the identified RF sources to achieve acceptable performance. The other option is removing the external source, if feasible.

6.6 WGLA Mounting/Mechanical Actuators

The WGLA housing has four mounting holes that will accept a M5 or #10 size screw. Two of the mounting holes are slotted to allow adjustment of the switch actuator to the customer actuator during installation. It is suggested that the two slotted holes have screws installed and adjustment be made before installing screws in the non-slotted holes.

Note: The adjustment process should not allow preload of the switch actuator and the full travel of the switch actuator should not exceed the switch over travel maximum specification. (See installation drawing at www.honeywell.com/sensing)

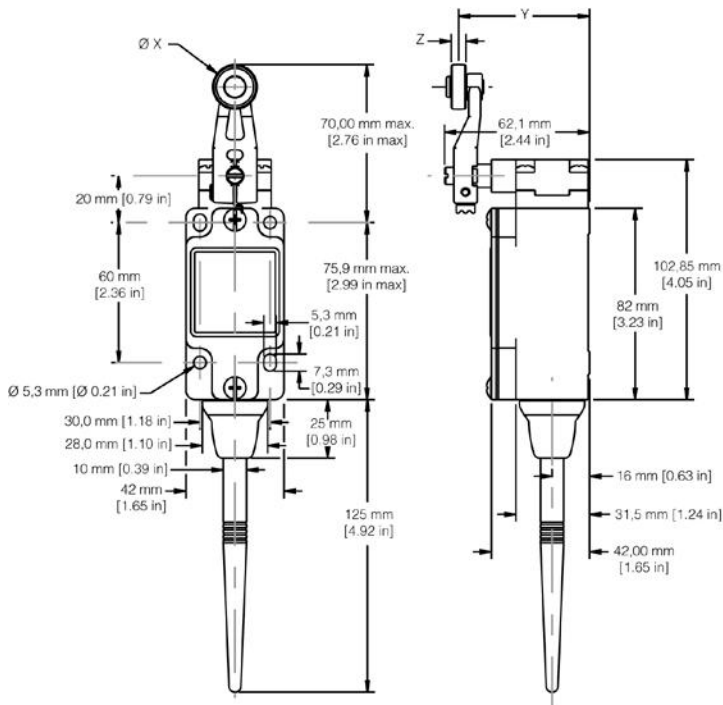
Figure 23. Limitless™ WGLA mounting hole diagram



The WGLA Series switch has many actuator types and associated specifications (see below). Additional information regarding the instructions for reading of the bar charts can be found at: www.honeywell.com/sensing

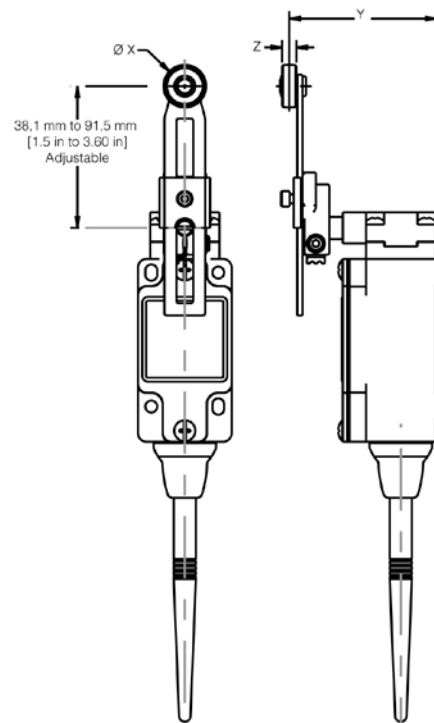
Figure 24. Limitless™ Switch Actuator characteristics

Side Rotary Head with GLZ51 Series Lever



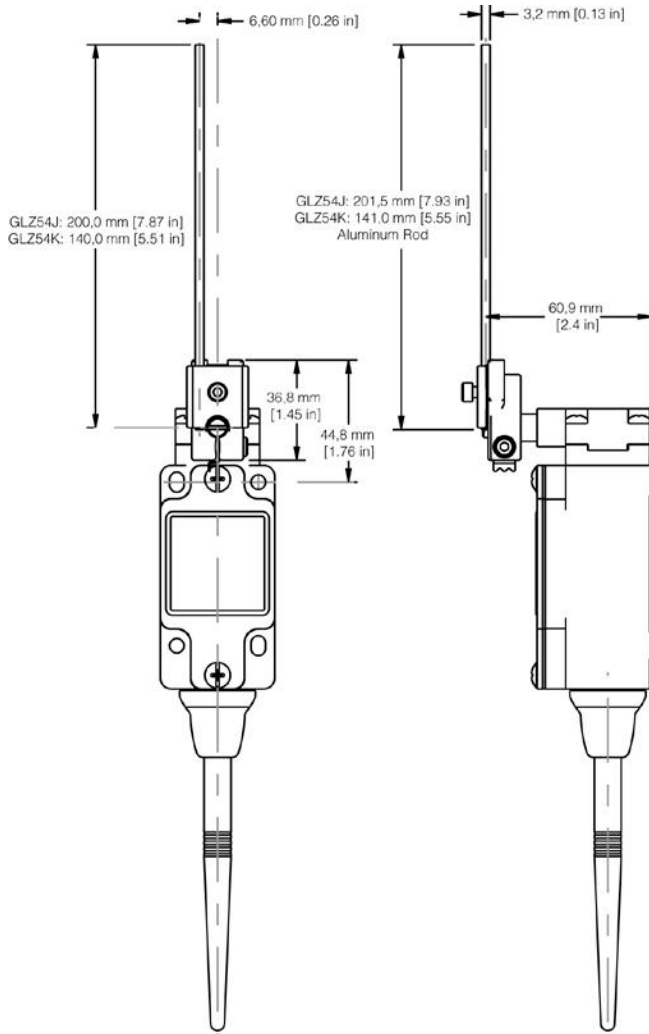
Lever	Roller Material	X Dim	Y Dim	Z Dim
GLZ51A	Nylon	19,1 mm [0.75 in]	55,9 mm [2.2 in]	6,4 mm [0.25 in]
GLZ51B	Steel	19,1 mm [0.75 in]	55,9 mm [2.2 in]	6,4 mm [0.25 in]
GLZ51T	Stainless Steel	19,1 mm [0.75 in]	56,8 mm [2.24 in]	8,8 mm [0.35 in]
GLZ51Y	Rubber	50,0 mm [1.97 in]	66,1 mm [2.60 in]	10,0 mm [0.39 in]

Side Rotary Head with GLZ52 Series Lever

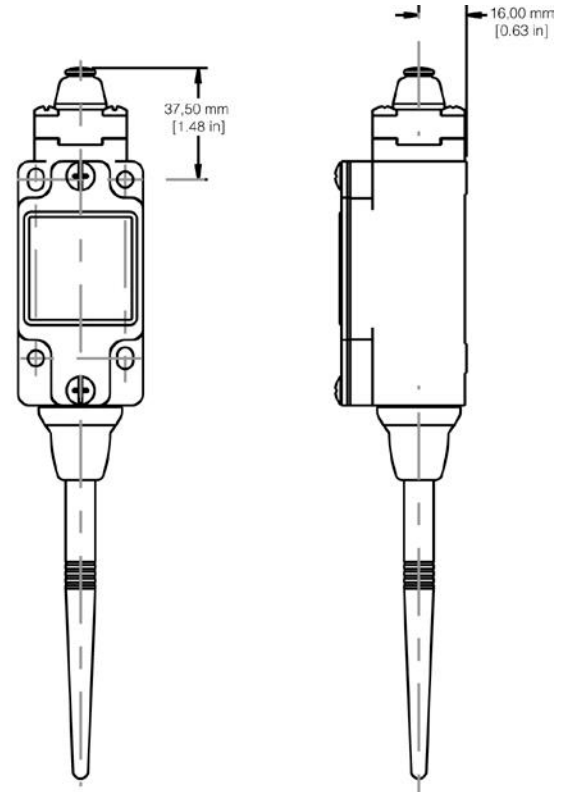


Lever	Roller Material	X Dim	Y Dim	Z Dim
GLZ52A	Nylon	19,1 mm [0.75 in]	65,9 mm [2.59 in]	6,4 mm [0.25 in]
GLZ52B	Steel	19,1 mm [0.75 in]	65,9 mm [2.59 in]	6,4 mm [0.25 in]
GLZ52D	Nylon	38,1 mm [1.5 in]	65,9 mm [2.59 in]	6,4 mm [0.25 in]
GLZ52E	Nylon	19,1 mm [0.75 in]	79,4 mm [3.13 in]	33,1 mm [1.30 in]
GLZ52W	Rubber	40,0 mm [1.57 in]	71,5 mm [2.81 in]	12,7 mm [0.5 in]
GLZ52Y	Rubber	50,0 mm [1.97 in]	68,8 mm [2.71 in]	10,0 mm [0.39 in]

Side Rotary Head with GLZ54 Series Lever



Top Pin Plunger Head



7 INSPECTION AND MAINTENANCE

7.1 WGLA Inspection and Replacement

Periodic inspection

- Check the WGLA housing and the actuator for signs of damage. Replace if necessary

7.2 Antenna Inspection and Replacement

Periodic inspection

- Check antenna or cable connection to WGLA connector to ensure it is tight and no signs of damage or corrosion. Replace if necessary per Section 6.3.

7.3 Battery Replacement

When to replace

- Battery is dead or low. The WPMM will indicate a dead or low battery condition when the amber LED is flashing. Upon this indication, proceed with replacing the battery in the WGLA as per below.

Tools required

- Slotted or Phillips screwdriver

WARNING

RISK OF DEATH OR SERIOUS INJURY FROM EXPLOSION OR FIRE

- Connection and disconnection of the batteries should only be performed in a non-hazardous area. The batteries used in this device may present a risk of fire or chemical burn if mistreated. Do not recharge, disassemble, heat above 100°C [212°F], or incinerate.

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

WARNING

RISK OF DEATH OR SERIOUS INJURY FROM EXPLOSION OR FIRE

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

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

WARNING

- When installing the battery, do not snag the battery terminal on the clip or the battery may be damaged. Do not apply excessive force. Do not drop. Dropping the battery may cause damage. If a battery is dropped, do not install the dropped battery into the WGLA. Dispose of dropped battery promptly per local regulations or per the battery manufacturer's recommendations.

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

ATTENTION

Use only the following 3.6V lithium thionyl chloride (Li-SOCl₂) battery (non-rechargeable), size 2/3AA. No other batteries are approved for use in the WGLA Series limit switch.

- Uniwell, DEV-10-0009
- Honeywell, WBT1

Step	Action
1	Remove the two screws ① on the housing cover.
2	Remove old battery from the battery holder ②. If needed, pry out battery by using a slotted screwdriver as a lever on the holder's side slots.
3	Install battery as follows to avoid damage to the battery and holder: <ul style="list-style-type: none"> • See label in battery holder defining the “+” and “-” terminals ③ to ensure battery is placed in holder with correct polarity. • Do not attempt to bend the battery's hold-down tabs forward. • Insert the battery negative end under the hold-down tab, at an angle, and against the end of the spring tab ④. Simultaneously move the negative end of the battery into position, compressing the spring tab, and angle the positive end into the holder ⑤.
4	Replace cover and retighten screws ①.
5	Dispose of used battery promptly per local regulations or the battery manufacturer's recommendations. Keep away from children. Do not disassemble and do not expose of in fire.

Note: Re-pairing via pairing mode is not required after installing a new battery

Figure 25. Limitless™ WGLA Battery Replacement



8 ACCESSORIES

8.1 Actuators

Lever	Roller Material	X Dim	Y Dim	Z Dim
GLZ51A	Nylon	19,1 mm [0.75 in]	55,9 mm [2.2 in]	6,4 mm [0.25 in]
GLZ51B	Steel	19,1 mm [0.75 in]	55,9 mm [2.2 in]	6,4 mm [0.25 in]
GLZ51T	Stainless Steel	19,1 mm [0.75 in]	56,8 mm [2.24 in]	8,8 mm [0.35 in]
GLZ51Y	Rubber	50,0 mm [1.97 in]	66,1 mm [2.60 in]	10,0 mm [0.39 in]

Lever	Roller Material	X Dim	Y Dim	Z Dim
GLZ52A	Nylon	19,1 mm [0.75 in]	65,9 mm [2.59 in]	6,4 mm [0.25 in]
GLZ52B	Steel	19,1 mm [0.75 in]	65,9 mm [2.59 in]	6,4 mm [0.25 in]
GLZ52D	Nylon	38,1 mm [1.5 in]	65,9 mm [2.59 in]	6,4 mm [0.25 in]
GLZ52E	Nylon	19,1 mm [0.75 in]	79,4 mm [3.13 in]	33,1 mm [1.30 in]
GLZ52W	Rubber	40,0 mm [1.57 in]	71,5 mm [2.81 in]	12,7 mm [0.5 in]
GLZ52Y	Rubber	50,0 mm [1.97 in]	68,8 mm [2.71 in]	10,0 mm [0.39 in]

8.2 Antenna Options

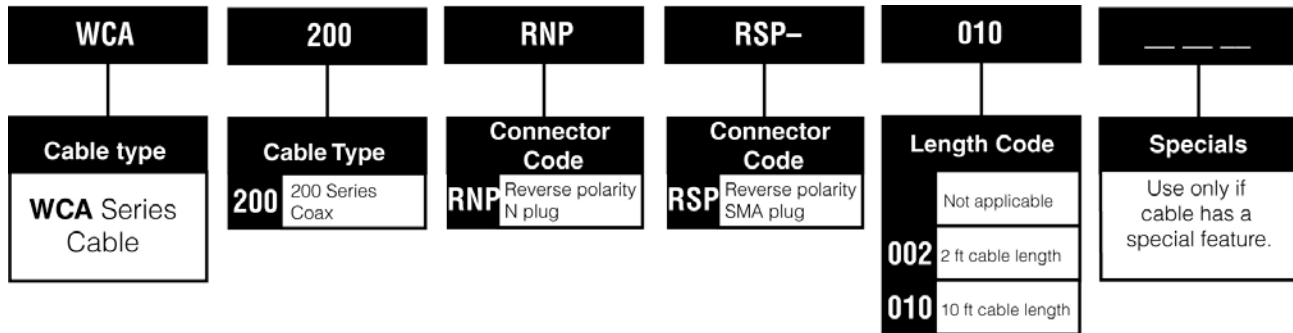
WAN	01	RSP	---																
Antenna type	Antenna type code	Connector Code	Specials																
WAN Series Antenna	<table border="1"> <tr> <td>01</td> <td>2.2 dBi omni; straight design</td> </tr> <tr> <td>02</td> <td>2.2 dBi omni; tilt & swivel des.</td> </tr> <tr> <td>03</td> <td>3.0 dBi omni with adhesive mount & 9.8 ft cable</td> </tr> <tr> <td>04</td> <td>5.5 dBi omni;*** tilt & swivel des.</td> </tr> <tr> <td>05</td> <td>9.0 dBi omni;*** tilt & swivel des.</td> </tr> <tr> <td>06</td> <td>8.0 dBi omni w/ bracket, straight des, 1 ft cable</td> </tr> </table>	01	2.2 dBi omni; straight design	02	2.2 dBi omni; tilt & swivel des.	03	3.0 dBi omni with adhesive mount & 9.8 ft cable	04	5.5 dBi omni;*** tilt & swivel des.	05	9.0 dBi omni;*** tilt & swivel des.	06	8.0 dBi omni w/ bracket, straight des, 1 ft cable	<table border="1"> <tr> <td>RNJ</td> <td>Reverse polarity N jack**</td> </tr> <tr> <td>RSP</td> <td>Reverse polarity SMA plug</td> </tr> </table>	RNJ	Reverse polarity N jack**	RSP	Reverse polarity SMA plug	Use only if antenna has a special feature.
01	2.2 dBi omni; straight design																		
02	2.2 dBi omni; tilt & swivel des.																		
03	3.0 dBi omni with adhesive mount & 9.8 ft cable																		
04	5.5 dBi omni;*** tilt & swivel des.																		
05	9.0 dBi omni;*** tilt & swivel des.																		
06	8.0 dBi omni w/ bracket, straight des, 1 ft cable																		
RNJ	Reverse polarity N jack**																		
RSP	Reverse polarity SMA plug																		

** Only used with 06 antenna type code
 *** Limited outdoor exposure. Protect against direct rain, salt, snow, ice, etc.

Limitless™ Antennas

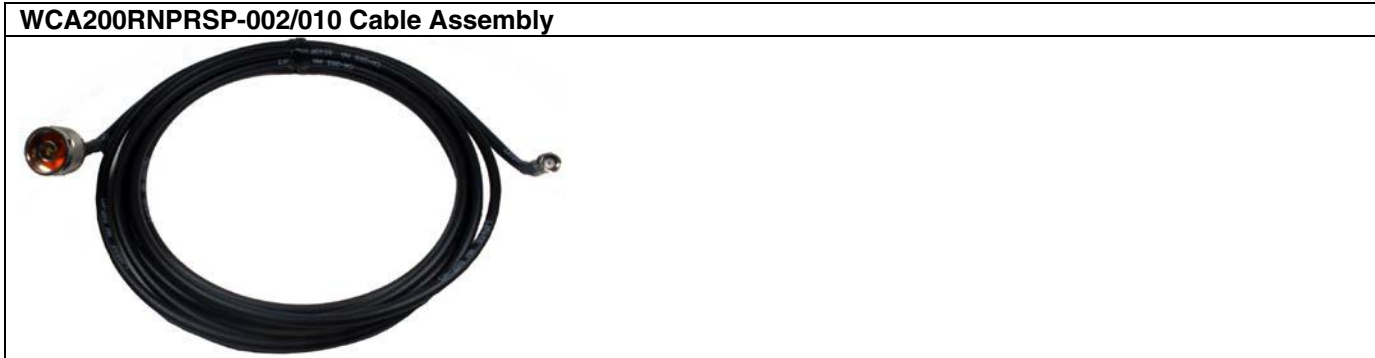
WAN01RSP Straight Design Direct Mount Connector	WAN02RSP Tilt and Swivel Design, Direct Mount Antenna	WAN05RSP with WAMM100RSP-005 Tilt and Swivel Design, Magnetic Mount Antenna	WAN03RSP Flat Design, Adhesive Mount Antenna	WAN06RNJ Straight Design, Bracket Mount Antenna
				

8.3 Antenna Cable Options

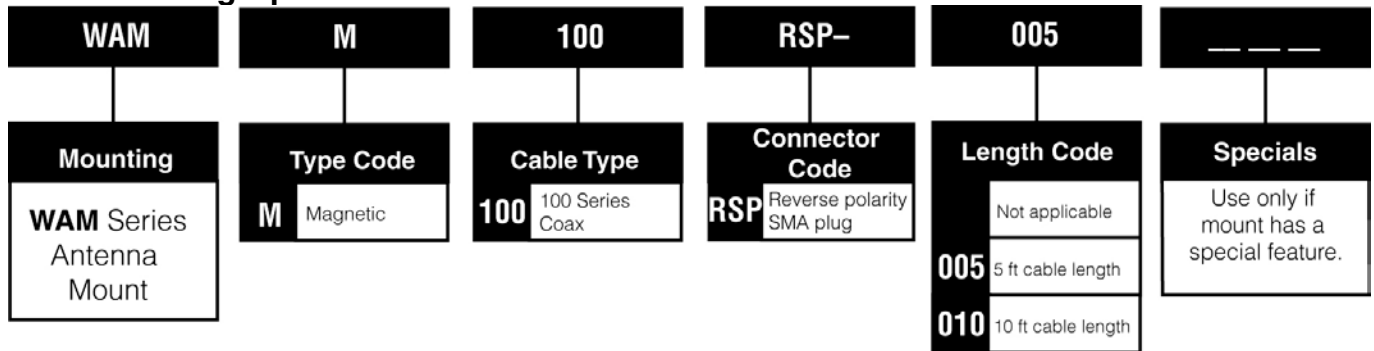


Limitless™ Cable Accessories

WCA200RNPRSP-002/010 Cable Assembly



8.4 Mounting Options



Limitless™ Panel Mount Accessories

WAMM100RSP-005/010 Magnetic Antenna Mount



9 INSTALLATION DRAWINGS

9.1 Drawing Availability

Complete installation drawings for each listing of the Limitless™ WGLA Series switch and accessories are available at www.honeywell.com/sensing

10 TROUBLESHOOTING GUIDES

The troubleshooting guide includes WPMM indications and symptoms as it is being used in conjunction with the WGLA.

SYMPTOM	CAUSE	RESOLUTION
Green LED is not ON	10 Vdc to 30 Vdc is not applied to "+" & "-" terminals	Check for proper connection and 10 Vdc to 30 Vdc to "+" and "-" terminals
	Power leads connected in reverse	Check for proper connection of power: "+" and "-" terminals
Green, amber and/or red LEDs do not blink ON at start-up	WPMM internal electronics damaged	Replace WPMM
	LED(s) burnt out	Replace WPMM
Green, amber, and red LEDs are momentarily OFF then ON with possible NPN output change during normal operation. Resulting in only green LED on and possibly incorrect amber and red LED indication/output for up to 30 seconds.	ESD/EMI exposure beyond published specifications or device performing self check	Determine source for ESD/EMI emissions in application and take action to remove
Amber LED is flashing	Low battery in Limitless™ switch	<ul style="list-style-type: none"> Determine which Limitless™ switch has a low battery using the procedure in Section 7.3. Replace Limitless™ switch battery per Limitless™ switch Installation guide
	Incorrect battery installed in Limitless™ switch	<ul style="list-style-type: none"> Determine which Limitless™ switch has a low battery using the procedure in Section 7.3. Replace Limitless™ switch battery per Limitless™ switch Installation guide
Amber LED is constantly ON	Dead or Low battery in Limitless™ switch	<ul style="list-style-type: none"> Determine which Limitless™ switch has a low battery using the procedure in Section 7.3. Limitless™ switch status will in this case be reported as insufficient RF Replace Limitless™ switch battery per Limitless™ switch installation guide
	Incorrect battery installed in Limitless™ switch	<ul style="list-style-type: none"> Determine which Limitless™ switch has a low battery using the procedure in Section 7.3. Limitless™ switch status will in this case be reported as insufficient RF Replace Limitless™ switch battery per Limitless™ switch installation guide
	RF range/distance between WPMM and Limitless™ switch is beyond capability	Reposition Limitless™ switch closer to the WPMM until amber LED is no longer ON
	Exposure to adjacent materials/objects and/or materials/objects	Reposition Limitless™ switch away from objects until amber LED is no longer ON
	Damage or missing antenna from WPMM and/or Limitless™ switch	Replace antenna per Section 6.3
	Antenna alignment is not acceptable	Reposition antenna per Section 6.3
	Damage to antenna cable	Replace antenna cable per Section 6.3
	Loose antenna or cable connections	Check connections and tighten as necessary per Section 6.3

SYMPTOM	CAUSE	RESOLUTION
Red LED is not ON and buzzer does not sound when Limitless™ switch is actuated (green LED ON, amber LED OFF)	Limitless™ switch is not paired to WPMM	Pair Limitless™ switch to WPMM per Section 5.4
	External actuator of Limitless™ switch damaged	Replace Limitless™ actuator
	Actuating head of Limitless™ switch damaged	Replace Limitless™ actuating head
	Limitless™ switch internal electronics damaged	Replace Limitless™ switch
	Amber LED burnt out or damaged electronics of WPMM	Replace WPMM
	Red LED burnt out	Replace WPMM
Buzzer not sounding when Limitless™ switch is actuated (green LED ON, amber LED OFF)	Limitless™ switch is not paired to WPMM	Pair Limitless™ switch to WPMM per Section 5.3
	External actuator of Limitless™ switch damaged	Replace Limitless™ actuator
	Actuating head of Limitless™ switch damaged	Replace Limitless™ actuating head
	Limitless™ switch internal electronics damaged	Replace Limitless™ switch
	Amber LED burnt out or damaged electronics of WPMM	Replace WPMM
	Buzzer burnt out	Replace WPMM
NPN output is not changing state when Limitless™ switch is actuated (green LED ON, amber LED OFF)	Limitless™ switch is not paired to WPMM	Pair Limitless™ switch to WPMM per Section 5.3
	Incorrect connections	Check for correct connections to output terminal "O" with respect to minus "-" terminal
	External actuator of Limitless™ switch damaged	Replace Limitless™ actuator
	Actuating head of Limitless™ switch damaged	Replace Limitless™ actuating head
	Limitless™ switch internal electronics damaged	Replace Limitless™ switch
	Damaged output	Replace WPMM

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 acknowledgement 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:

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Internet: www.honeywell.com/sensing

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	+1-305-883-8257 Fax
USA/Canada	+1-800-537-6945
	+1-815-235-6847
	+1-815-235-6545 Fax