SENTINEL™ BMN, WGM, and WGM+ Product Family

Product Manual

Innovative Wireless Technologies, Inc.
1100 Main Street
Lynchburg, VA 24504

Phone: 434-316-5230 (United States)
Fax: 434-316-5232 (United States)
www.iwtwireless.com (United States)

Table of Contents

1.0 BATTERY MESH NODE (BMN)

1.1 PRODUCT OVERVIEW DESCRIPTION

The ***SENTINEL™*** **Battery Mesh Node** (BMN) is a self-contained, battery-powered 900 MHz transmitter-receiver. The BMN is part of the fixed infrastructure of Innovative Wireless Technologies' (IWT) ad-hoc wireless digital mesh network intended for use in industrial mining applications.

The BMN includes an LCD and five-button user interface on the front panel of the unit. Three LEDs provide on-site visual indication of unit status. The BMN sends health and status information wirelessly through the *SENTINEL™* communications network to the Dispatch Station.

Features:

- Large, backlit LCD display
- Internal and External antenna options
- Battery powered (internal and external configurations)
- Sealed, rugged enclosure
- MSHA Intrinsically Safe (IS) Configurations (Approval # 23-A170002-0)

1.2 PRODUCT VARIANTS

IWT Part Number	MSHA Approved	Power	Mounting Scheme
FAP4213-090	Yes	External Battery Enclosure: FAP9100-035 (7.5V Lantern Battery) FAP9100-010 (6V Sealed Lead Acid Battery)	Small Back plate w/ Mounting Ears
FAP4213-093	Yes	Internal Batteries: 6V D-Cell	Small Back plate w/ Mounting Ears

Note: Internal batteries cannot be installed in FAP4213-090 version.

Pictures of the battery variants are below:

FAP9100-035 (7.5V Lantern Battery)

FAP9100-010 (6V Sealed Lead Acid Battery)

1.3 DESCRIPTION

The *SENTINEL™* Battery Mesh Node's rugged enclosure features a connection for a removable antenna, user interface (UI) with LCD screen, up to five buttons and three LEDs that indicate the status of the device (*see Figure 1*).

***SENTINEL™* BMN, Internal Battery**
FAP4213-093

***SENTINEL™* BMN, External Battery**
FAP4213-090

1.4 SPECIFICATIONS

Environmental	
Operating Temperature[1]	-20C to +60C
Storage Temperature – without batteries	-40C to +80C
Operating Humidity	0 to 100%
Ingress Protection (Water/Dust)	
FAP4213-093 BMN	IP65

Mechanical	
Dimensions (W x H x D)	
FAP4213-093 BMN	11.1" x 9.6" x 3.5"
Weight of Assembly – with D-cell Batteries	5.5 lbs.

Electrical	
Frequency Range	902 – 928 MHz
RF Transmit Power	+20 dBm
Battery Life	1 Month
Approved Batteries for IS use	Duracell® MN1300 6.0V
	Duracell® PC1300 6.0V
	Energizer® E95 6.0V
	Energizer® EN95 6.0V

Note 1: Ambient temperature

1.5 EXTERNAL ANTENNA INSTALLATION

Two external removable antennas are available for use with the *SENTINEL™* Battery Mesh Node:

1) **IWT FAA9100-017 Yagi antenna**
2) **IWT FAA9100-068 Omni antenna**

Permissible antenna configurations and accessories are outlined in IWT MSHA drawings 6640-17-0003 and 6640-17-0004. Only personnel trained by IWT should select the proper antenna configuration for use in an installation.

1.6 INSTALLATION

Installation should be handled by trained professionals. Conduct a site survey to determine the appropriate locations to install the *SENTINEL™* Battery Mesh Node. Trained personnel in accordance with relevant mandatory safety regulations must install *SENTINEL™* Battery Mesh Nodes.

1.7 PRODUCT USER MANUAL REFERENCE

For more detailed information related to the *SENTINEL™* Battery Mesh Node operation, maintenance and installation, please refer to the Product User Manual, 6650-15-0021 Rev. F.

2.0 WIRELESS GAS MONITOR (WGM)

2.1 PRODUCT OVERVIEW DESCRIPTION

The SENTINEL™ Wireless Gas Monitor is a battery-powered Wireless Monitor with 900 MHz transceiver and a replaceable Sensor Module sub-assembly.

The SENTINEL™ Wireless Gas Monitor wirelessly transmits gas readings, as well as ambient temperature and humidity readings, via the mesh network to the SENTINEL™ Dispatch Station above ground.

The FAP4913-030 (single bay) and FAP4913-032 (dual bay) Wireless Monitor are the main enclosures of the Wireless Gas Monitor. The Wireless Monitor displays real-time gas sensor readings via an LCD on the front of the unit. The LCD and keypad on the front enable users to calibrate the unit on-site. LEDs provide a visual indication of normal and alarm atmospheric conditions at the Gas Monitor.

The WGM contains replaceable Gas Sensor Modules to allow for the quick replacement of sensors. The Single Bay Sensor supports one or two removable **Gas Sensor Module** sub-assemblies.

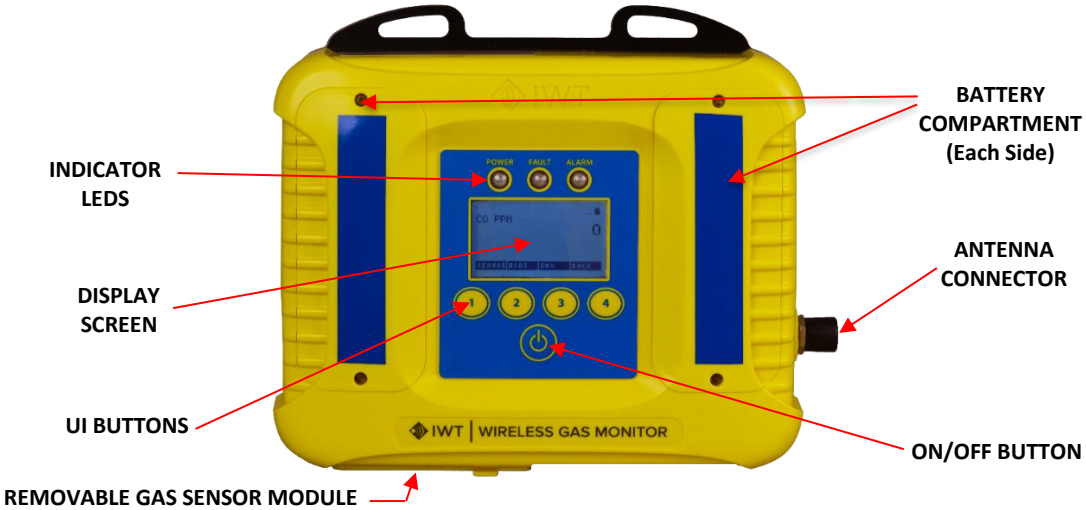
2.2 PRODUCT VARIANTS

IWT Part Number	MSHA Approved	Configuration	Mounting Scheme
FAP4913-030	Yes	Single Bay Internal Batteries:	Small Back plate w/ Mounting Ears
FAP4913-032	Yes	Dual Bay Internal Batteries	Small Back plate w/ Mounting Ears

2.3 DESCRIPTION

2.3.1 SINGLE BAY SENSOR

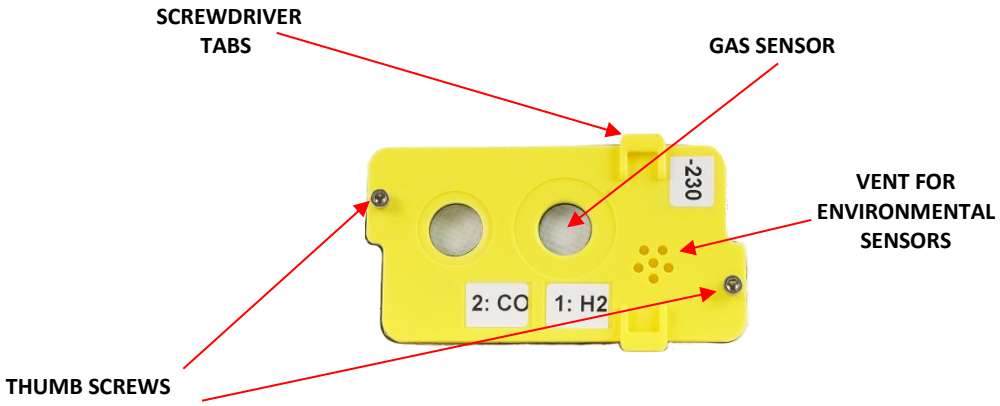
The *SENTINEL*™ Wireless Gas Monitor with Single Bay Sensor features a removable gas sensor module capable of handling up to two gas sensor elements, a connection for a removable antenna, a user interface with a LCD screen and buttons, and three LEDs that indicate the status of the device.



***SENTINEL*™ Wireless Gas Monitor, Single Bay Sensor**

Each *SENTINEL*™ Wireless Gas Monitor with Single Bay Sensor may be used with one or two of four available Gas Sensor Modules. The Gas Sensor Module plugs into a DB-9 connector at the bottom of the Wireless Gas Monitor's main enclosure.

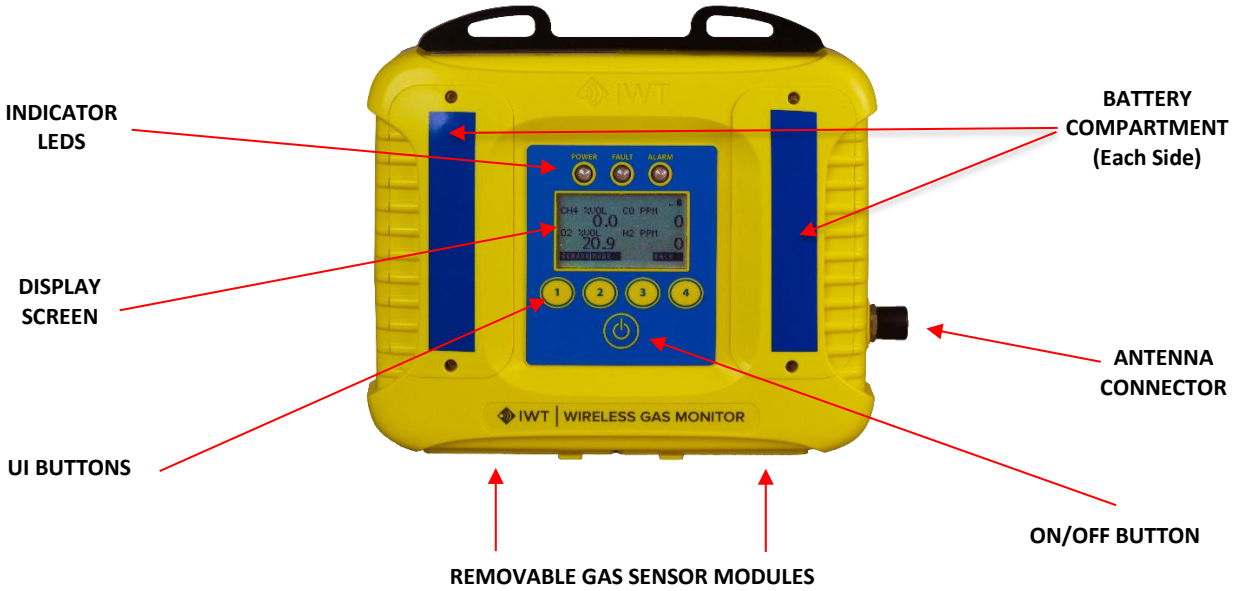
Each Gas Sensor Module is removable/replaceable and contains a gas sensor as well as environmental sensors that monitor ambient temperature, pressure and humidity.



Removable Gas Sensor Module

2.3.2 DUAL BAY SENSOR

The *SENTINEL*™ Wireless Gas Monitor with Dual Bay Sensor features two removable gas sensor modules (each with the ability to hold two gas sensor elements for a total of up to four gases), a connection for a removable antenna, a user interface with LCD screen and buttons, and three LEDs that indicate the status of the device.



***SENTINEL*™ Wireless Gas Monitor, Dual Bay Sensor**

Each *SENTINEL*™ Wireless Gas Monitor with Dual Bay Sensor may be used with two removable Dual Sensor Modules. The Dual Sensor Modules plug into a DB-9 connector at the bottom of the Wireless Gas Monitor's main enclosure.

Each Dual Sensor Module is removable/replaceable and contains two gas sensors as well as environmental sensors that monitor ambient temperature, pressure and humidity. The available Dual Gas Sensor Module options are as follows:

Removable Dual Sensor Module and Dual Bay Sensor Model

2.4 SPECIFICATIONS

FAP4913-030 - Main Enclosure	
Operating Temperature	See temperature range for sensor modules
Storage Temperature	-40C to +80C (without batteries & module)
Operating Humidity	0 to 100%
Dimensions (W x D x H)	11.1" x 9.3" x 3.5"
Weight of Assembly – with batteries	5.5 lbs.
Enclosure	IP65

Electrical	
Frequency Range	902 – 928 MHz
RF Transmit Power	+20 dBm
Battery Life	Up to 6 months
Approved Batteries for IS Use	Duracell® MN1300
	Duracell® PC1300
	Energizer® E95
	Energizer® EN95

2.5 EXTERNAL ANTENNA INSTALLATION

Two external removable antennas are available for use with the *SENTINEL*™ Wireless Gas Monitor:

- **IWT FAA9100-017 Yagi Antenna**
- **IWT FAA9100-068 Omni Antenna**

2.6 INSTALLATION

Installation should be handled by trained professionals. Conduct a site survey to determine the appropriate locations to install the *SENTINEL™* Wireless Gas Monitor. Trained personnel in accordance with relevant mandatory safety regulations must install *SENTINEL™* Wireless Gas Monitor.

2.7 PRODUCT USER MANUAL REFERENCE

For more detailed information related to the *SENTINEL™* Wireless Gas Monitor operation, calibration, maintenance and installation, please refer to the Product User Manual, 5520-16-0286 Rev. E.

3.0 WGM+

3.1 PRODUCT OVERVIEW DESCRIPTION

The *SENTINEL*™ WGM+ is an all-in-one device that provides wireless communication, tracking and gas monitoring. The WGM+ is designed to withstand the harshest conditions and comes with a high-resolution backlit display and LED lights that indicate communication and battery information as well as power and network status. Integrated as part of the *SENTINEL*™ wireless network, the WGM+ also provides the ability to view gas events, as well as ambient temperature and humidity readings, locally at the device and remotely at the *SENTINEL*™ Dispatch Station above ground.

The WGM+ is battery powered and provides one month of battery life using four D-cell alkaline batteries.

The **FAP4913-040 (single bay)** is the main enclosure of the WGM+. The Wireless Monitor displays real-time gas sensor readings via an LCD on the front of the unit. The LCD and keypad on the front enable users to calibrate the unit on-site. LEDs provide a visual indication of normal and alarm atmospheric conditions at the Gas Monitor.

The WGM+ contains replaceable Gas Sensor Modules to allow for the quick replacement of sensors. The Single Bay Sensor supports one or two removable Gas Sensor Module sub-assemblies.

Product Features:

- All-in-one device combining communication, tracking, and gas monitoring
- Sensor Module containing one or two gas sensor elements
- Large LCD display
- User interface for on-site calibration
- External antenna port
- Battery powered
- Sealed, rugged enclosure
- MSHA approved (18-A160001-0)

3.2 PRODUCT VARIANTS

IWT Part Number	MSHA Approved	Power	Mounting Scheme
FAP4913-090	Yes	External Battery Enclosure: FAP9100-035 (7.5V Lantern Battery) FAP9100-010 (6V Sealed Lead Acid Battery)	Small Back plate w/ Mounting Ears
FAP4913-040	Yes	Internal Batteries: 6V D-Cell	Small Back plate w/ Mounting Ears

Note: Internal batteries cannot be installed in FAP4913-090 version.

Pictures of the battery variants are below:

FAP9100-035 (7.5V Lantern Battery)

FAP9100-010 (6V Sealed Lead Acid Battery)

3.3 DESCRIPTION

The *SENTINEL*™ WGM+ with Single Bay Sensor features a removable gas sensor module capable of handling up to two gas sensor elements, a connection for a removable antenna, a user interface with a LCD screen and buttons, and three LEDs that indicate the status of the device.

***SENTINEL*™ WGM+, Internal Battery**
FAP4913-040

***SENTINEL*™ WGM+, External Battery**
FAP4913-090

3.4 SPECIFICATIONS

Environmental	
Operating Temperature	See temperature range for sensor modules
Storage Temperature	-40C to +80C (without batteries & module)
Operating Humidity	0 to 100%
Dimensions (W x D x H) FAP4913-040	11.1” x 9.3” x 3.5”
Weight of Assembly – with D-cell batteries	5.5 lbs.
Enclosure	IP65

Electrical	
Frequency Range	902 – 928 MHz
RF Transmit Power	+20 dBm
RF Input/Output	50-ohm nominal (N connector)
Receiver Sensitivity	-100 dBm
Battery Life	1 month
Approved Batteries for IS Use	Duracell® MN1300
	Duracell® PC1300
	Energizer® E95
	Energizer® EN95

3.5 EXTERNAL ANTENNA INSTALLATION

Two external removable antennas are available for use with the *SENTINEL*™ WGM+:

- **IWT FAA9100-017 Yagi Antenna**
- **IWT FAA9100-068 Omni Antenna**

3.6 INSTALLATION

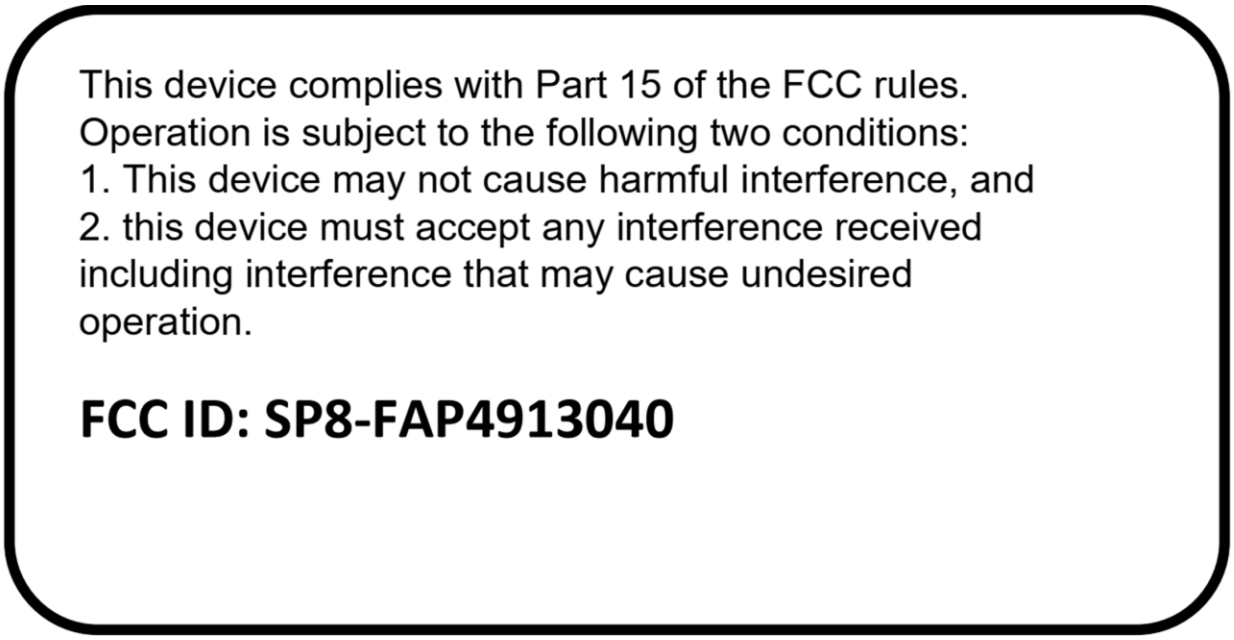
Installation should be handled by trained professionals. Conduct a site survey to determine the appropriate locations to install the *SENTINEL™* WGM+. Trained personnel in accordance with relevant mandatory safety regulations must install *SENTINEL™* WGM+.

3.7 PRODUCT USER MANUAL REFERENCE

For more detailed information related to the *SENTINEL™* WGM+ operation, calibration, maintenance and installation, please refer to the Product User Manual, 5520-24-0334 Rev. A.

4.0 FCC INFORMATION

All Battery Mesh Nodes (BMN), Wireless Gas Monitors (WGM), and WGM+ variations have the same FCC ID: SP8-FAP4913040.



Changes or modifications to this unit not expressly approved by IWT may void the user's authority to operate this equipment.
This device 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.

FCC ID: SP8-FAP4913040

NOTE: 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 the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer (IWT) or an experienced radio/TV technician for help.

To comply with FCC RF Exposure requirements, a minimum separation distance of 20 cm must be maintained between the device and all persons during normal operation.