Personnel Alert

Wireless Alarm Notification System (Base Station)

User Manual

D (English)
iERP: 11

Limited Warranty & Limitation of Liability

BW Technologies LP (BW) warrants this product to be free from defects in material and workmanship under normal use and service for a period of two years, beginning on the date of shipment to the buyer. This warranty extends only to the sale of new and unused products to the original buyer. BW's warranty obligation is limited, at BW's option, to refund of the purchase price, repair, or replacement of a defective product that is returned to a BW authorized service center within the warranty period. In no event shall BW's liability hereunder exceed the purchase price actually paid by the buyer for the Product.
This warranty does not include:

a) fuses, disposable batteries or the routine replacement of parts due to the normal wear and tear of the product arising from use;
b) any product which in BW's opinion, has been misused, altered, neglected or damaged by accident or abnormal conditions of operation, handling or use;
c) any damage or defects attributable to repair of the product by any person other than an authorized dealer, or the installation of unapproved parts on the product; or

The obligations set forth in this warranty are conditional on:

a) proper storage, installation, calibration, use, maintenance and compliance with the product manual instructions and any other applicable recommendations of BW;
b) the buyer promptly notifying BW of any defect and, if required, promptly making the product available for correction. No goods shall be returned to BW until receipt by the buyer of shipping instructions from BW; and
c) the right of BW to require that the buyer provide proof of purchase such as the original invoice, bill of sale or packing slip to establish that the product is within the warranty period.

THE BUYER AGREES THAT THIS WARRANTY IS THE BUYER'S SOLE AND EXCLUSIVE REMEDY AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. BW SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LOSSES, INCLUDING LOSS OF DATA, WHETHER ARISING FROM BREACH OF WARRANTY OR BASED ON CONTRACT, TORT OR RELIANCE OR ANY OTHER THEORY.
Since some countries or states do not allow limitation of the term of an implied warranty, or exclusion or limitation of incidental or consequential damages, the limitations and exclusions of this warranty may not apply to every buyer. If any provision of this warranty is held invalid or unenforceable by a court of competent jurisdiction, such holding will not affect the validity or enforceability of any other provision.

BW Technologies LP
2840 – 2nd Ave. SE
Calgary, AB
Canada T2A 7X9

BW Technologies Inc. (America)
3279 West Pioneer Parkway
Arlington, TX
USA 76013

BW Europe Ltd.
101 Heyford Park,
Upper Heyford, Oxfordshire
United Kingdom OX25 5HA

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Personnel Alert: Base Station

Introduction

⚠ Warning

To ensure your personal safety, read the "Safety Information" before you use the system.

The Personnel Alert Base Station ("the base station") is a wireless alarm notification system that transmits an alarm condition from a fixed gas detection system, such as BW Technologies' GasPoint, to one or more (up to 256) portable alarm modules ("the badge").

The Personnel Alert is an area safety device. It is your responsibility to respond properly to the alarm.

CAUTION: FOR SAFETY REASONS, THIS EQUIPMENT MUST BE OPERATED AND SERVICED BY QUALIFIED PERSONNEL ONLY. READ AND UNDERSTAND THE USER MANUAL COMPLETELY BEFORE OPERATING OR SERVICING.

Contacting BW Technologies

To contact BW Technologies, call:

USA: 1-888-749-8878
Canada: 1-800-663-4164
Europe: +44 (0) 1869 233004
Other countries: +1-403-248-9226

Address correspondence to:

BW Technologies LP
2840 – 2 Avenue S.E.
Calgary, AB T2A 7X9
CANADA

Email us at info@bwnet.com
Visit BW Technologies' web site: www.gasmonitors.com

ISO 9001

Safety Information - Read First

Use the base station only as specified in this manual, otherwise the protection provided by the instrument may be impaired.

International symbols used on the base and in this manual are explained in Table 1.

Read the ⚠ **Cautions** on the following page before using the base station.

⚠ Cautions

- ⇒ **Do not use the base station if it is damaged. Inspect the case before using the base station. Look for cracks, missing metals, and plastics. If the base station is damaged or parts are missing, contact BW Technologies immediately.**
- ⇒ **Make sure the cover is properly fastened before operating the base station.**
- ⇒ **Do not expose the base station to electrical shock and/or severe continuous mechanical shock.**
- ⇒ **Do not attempt to disassemble, adjust, or service the base station unless instructions for that procedure are provided in the manual and /or that part is listed as a replacement part. Refer to Replacement Parts and Accessories.**
- ⇒ **Do not allow liquids to condense and/or use high power spray on the base station.**
- ⇒ **The Personnel Alert Base Station is only certified with the supplied 2 dBi dipole antenna. Do not substitute this antenna with another. Refer to Replacement Parts and Accessories.**
- ⇒ **When installing cables, ensure they are protected from possible damage. Secure the cable(s) in place and fasten any excess.**
- ⇒ **Do not attach system components that do not meet specified criteria, such as alarms, relays, cabling, etc.**
- ⇒ **The base station warranty will be void if the unit is disassembled, adjusted, or serviced by non-BW Technologies personnel.**

Important

The base station is to be used only for the purposes specified in this manual. Use only BW Technologies' authorized service representatives and parts to perform repairs to the unit to maintain the validity of the warranty. Modification of components, use of non-BW parts, or use of incomplete or used parts will also void the warranty.

Table 1. International Symbols

Symbol	Meaning
	Approved to both U.S. and Canadian Standards by the Canadian Standards Association

Getting Started

Confirm that the items listed below are included with the base station. If the base station is damaged or parts are missing, contact the place of purchase immediately.

- 2 dBi dipole antenna;
- Explosion-proof housing (of the base);
- Personnel Alert Base Station User Manual.

To order replacement parts, refer to Replacement Parts and Accessories.

To become familiar with the features and functions of the base, study the following figures and tables:

- Figure 1 and Table 2: Personnel Alert Base Station (describes the base station external components).
- Figure 2 and Table 3: Control Bay (describes the base station control bay components).
- Figure 3 and Table 4: Base Display Elements (describe the base station display elements).
- Figure 7 and Table 6: Main Board (describe the base station main board).
- Figure 8 and Table 7: Radio Board (describe the base station radio board).

The Personnel Alert Base Station

The Personnel Alert Base Station (“base station”) is a wireless alarm notification system that is designed to operate in conjunction with fixed gas detection equipment and/or plant alarm systems.

The base station continuously broadcasts to portable alarm receivers (“badges”). If an alarm condition is received from a fixed gas detection unit or from a plant alarm system, the base station immediately broadcasts the alarm to all badges within the coverage area. For more information about the badges, refer to Badges.

Each base station maintains an individual number and alarm acknowledgement information for each badge. This information is used to account for personnel during an alarm response situation, such as an evacuation.

Table 2. Personnel Alert Base Station

Item	Function
1	2 dBi dipole antenna
2	Explosion-proof enclosure
3	Cable conduit access

1-256 badges can be monitored on a single base station simultaneously. Up to 999 badge IDs can be recognized by each base station, depending upon the database and configuration of the overall system.

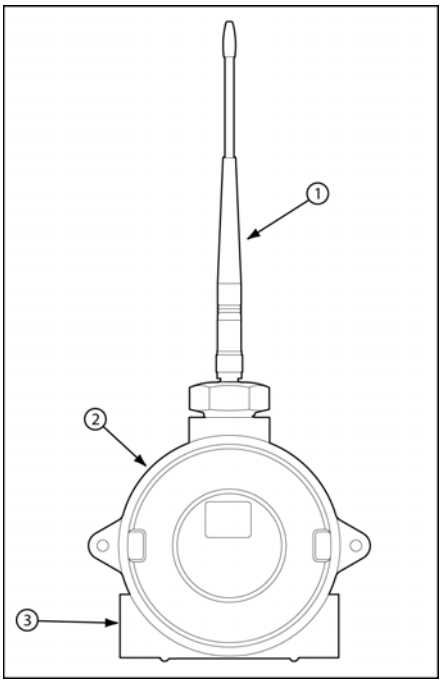

Figure 1. Personnel Alert Base Station

Control Bay

Each base station maintains a control bay that consists of an LCD screen and a low light sensor to provide information to monitoring personnel.

Table 3. Control Bay

Item	Function
1	Liquid crystal display (LCD)
2	Low-light sensor
3	Faceplate security screw

The control bay does not have any manual functions and is used to provide information only. To set parameters and configurations for badges and monitoring coverage areas, refer to Area System Planning and Setting the Badge IDs.

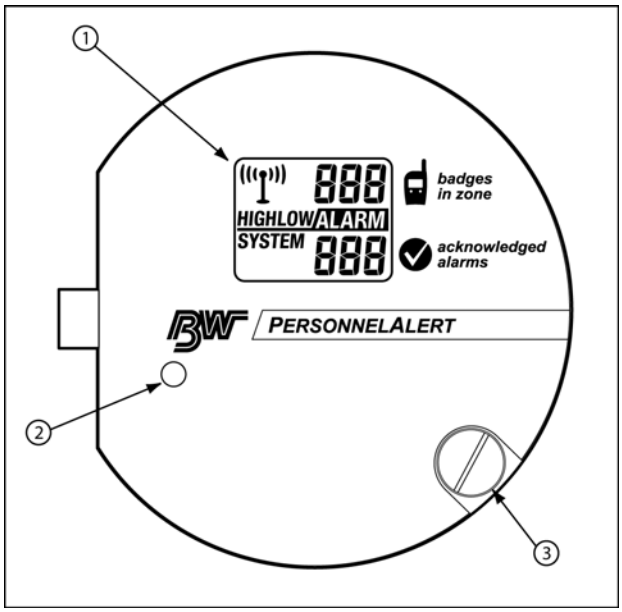

Figure 2. Control Bay

Table 4. Base Display Elements

Item	Function
1	Transmission signal icon
2	Numeric value of badges being monitored in the coverage area
3	Alarm icon
4	Numeric value of how many badges have acknowledged the alarm
5	Alarm severity level: **HIGH**, **LOW**, and **SYTEM**.

Liquid Crystal Display (LCD)

The LCD displays information automatically and continuously. It displays

- the transmission signal icon to indicate that it is broadcasting,
- how many badges are currently in the coverage area,
- if there is an alarm,
- the severity of the alarm, and
- how many badges have acknowledged the alarm.

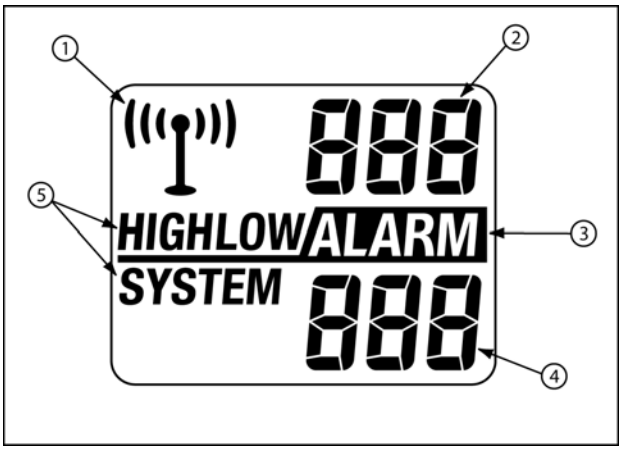

Figure 3. Base Display Elements

The base station continually broadcasts to the badges within the designated coverage area. If a badge is no longer detected after 10 seconds, the base station determines that the worker is no longer in the coverage area.

The base station then decreases the numeric value by one and displays the new value on the LCD. When a new badge is detected, the value automatically increases.

Badges

The alarm receivers are referred to as “badges” that are carried by personnel to provide immediate notification in the event of an alarm condition.

The badges continuously monitor broadcast messages from the base station(s). If an alarm condition occurs, the badges emit audible and visual alarms, and vibrate. The badge LCD also displays the severity of an alarm: **HIGH**, **LOW**, and **SYSTEM**.

If alarm notification is received, personnel then use the badge to acknowledge the alarm. A message is immediately sent back to the base station while personnel are evacuating the area.

Table 5. Badge Display Elements

Item	Function
1	Battery indicator
2	Transmission signal icon
3	Individual badge number
4	Alarm condition (**HIGH**, **LOW**, and **SYSTEM**).

For more information about badges, refer to the *Personnel Alert Badge User Manual.*

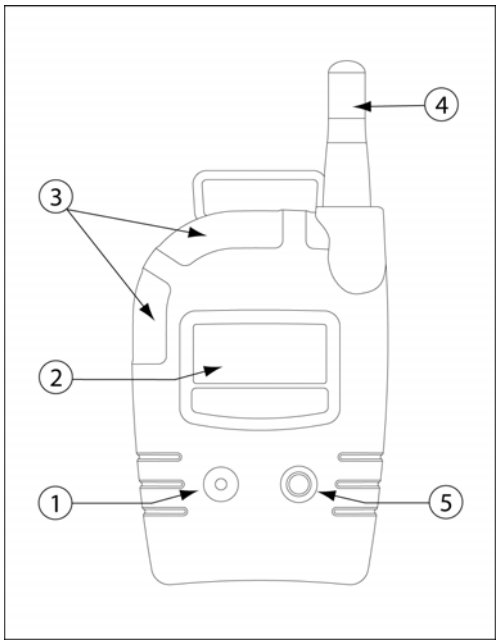

Figure 4. Badge Display Elements

To configure the badge IDs, refer to Setting the Badge IDs.

Installation

⚠ Caution

Only qualified personnel should perform installations of the base stations. Install base stations according to electrical codes, regulations, and safety standards. Ensure that correct cabling and seal fitting practices are implemented.

The Base Station

The design of the base station has been simplified for easy installation. The main board (Figure 11) of the base is mounted to the inner control door, which is equipped with slip hinges.

Main Board

Table 6. Main Board

Item	Function
1	Cable connector to radio board
2	Address dip switches
3	2 or 4-wire RS-485 connectors
4	RS-485 option dip switches
5	2 or 4-wire RS-485 jumpesr

The main board is used to manually set the

- address dip switches,
- 2-wire (half duplex) and 4-wire (full duplex) connectors, and
- wire jumpers.

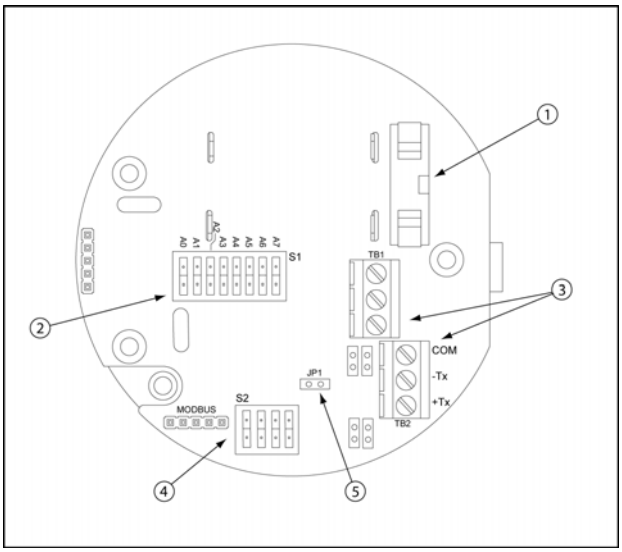

Figure 5. Main Board

Radio Board

The radio board is positioned below the main board in the base station. It provides the

- 2-wire and 6-wire screw down connectors,
- S1 and S2 channel hopping dip switches,
- Reduced Range (RR) radio jumper, and
- transmit and receive rotary switches.

Table 7. Radio Board

Item	Function
1	Relay contact dip switch (**S1**)
2	Cable connector to main board
3	Channel hopping dip switch (**S2**)
4	Reduced Range (**RR**) jumper
5	6-wire alarm relay connectors
6	2-wire 24V DC power supply connector
7	Transmitter rotary switch (**TX Gain**)
8	Receiver rotary switch (**RX Gain**)

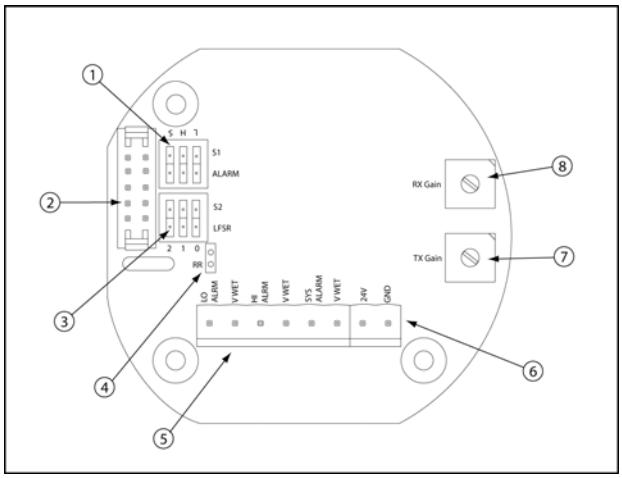

Figure 6. Radio Board

The radio board is used to

Mounting Guidelines

When mounting the base station, adhere to the following guidelines:

- To optimize the radio performance and acquire maximum coverage, install the base station at or near the centre of the selected coverage area.
- Install the base 4-5 meters (8-10 ft.) above ground level. Ensure that the base station is not obstructed by surrounding objects.
- Do not install the base station below 6 ft. of the above ground level as the range of the transmitter will be reduced.
- Do not install the base station directly against a wall, especially a metal wall. To prevent impaired radio performance, ensure the base station is installed with a minimum of 18 inches clearance from the wall.
- If possible, install the base station in a location where the antenna will have a clear line-of-sight with the badges.
- Install the base station as far away as possible from other antenna systems to avoid possible radio frequency interference (RFI).
- Do not locate the base where it can be exposed to electrical shock and/or severe mechanical shock.

Note

Atmospheric conditions may cause signal loss.

⚠Warning

The Personnel Alert Base Station is only certified with the supplied 2 dBi dipole antenna. Do not substitute this antenna with another.

Preparation for Mounting the Base

From the front view, the base station is equipped with pre-drilled mounting flanges and a threaded ¾ inch National Pipe Thread (NPT) conduit fitting outlet on the left side.

Attach the base station to a bracket and mount on a pole using bolts through the two mounting holes.

Table 8. Bolt and Flange Sizes

Mounting flanges	0.25 in. on 5.5 in. centers

Install the base with the antenna pointing vertically only.

⚠Warning

The Personnel Alert Base Station is only certified with the supplied 2 dBi dipole antenna. Do not substitute this antenna with another.

Note

BW recommends that the base be attached to a bracket on a pole by using bolts through the two mounting holes. Attach pole to wall? Post? Ground? What if the floor is concrete?

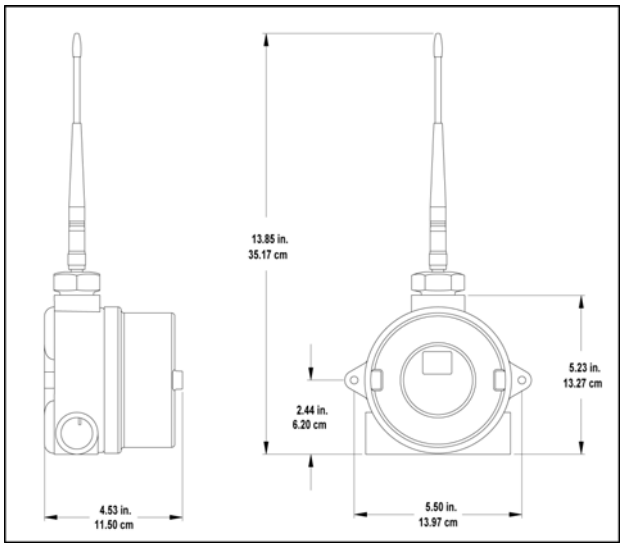

Figure 7. Outline Drawing of Base Station

Conduit Installation

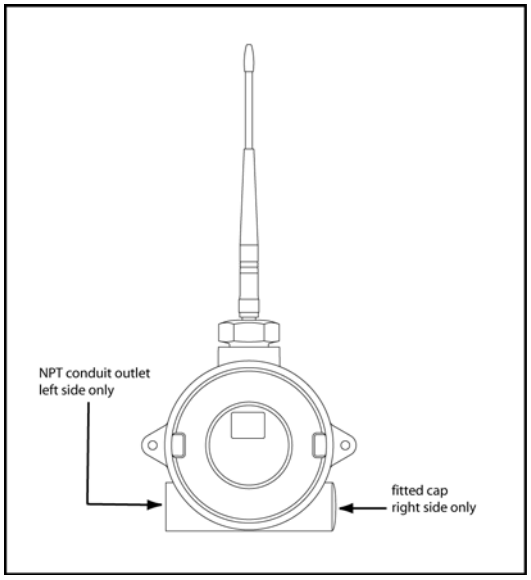

Figure 8. Base Station Installation Front View

Note

Only qualified personnel should perform the conduit and cable installations.

Install the base station and conduit according to electrical codes, regulations, and safety standards. Ensure that correct cabling and seal fitting practices are implemented.

⚠ Warning

Do not remove the base cap. Do not attempt to install conduit fittings where the base cap is inserted. It is not compatible with NPT thread.

Note

Conduit attached to the base station must be grounded to reliable earth ground.

Cable Installation

Note

In classified areas, use only approved hazardous location cable. Use shielded cable only

Separate cables are required for each base station that is mounted. Use shielded cable that employs a “drain wire” that is electrically connected to the cable shield.

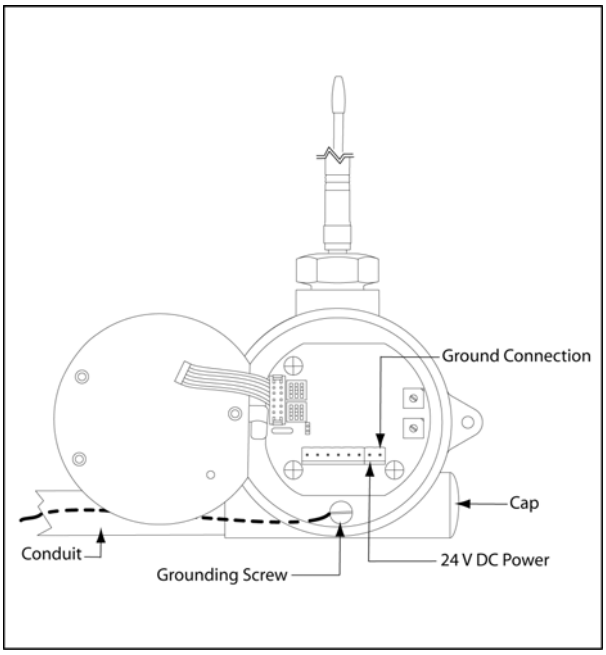

Figure 9. Cable and Wire Installation

Cables

⚠Caution

All connections must be from shielded cable.

Adhere to the following procedures to install cables.

1. Disconnect/de-energize power to all circuits prior to commencing any work on the base station.
2. Remove the front cover. Open the hinged control bay door to access the wiring terminations.

   If required, the control bay door and attached main board can be temporarily removed. Disconnect the ribbon cable that is attached to the radio board. Slide the door upwards and off of the slip hinge.
3. Attach conduit and pull all cables into the base enclosure. Cable signal designations are marked on the main and radio circuit boards. Refer to figure 10.

Power and Ground Wiring

Adhere to the following procedures to install wiring.

To avoid radio frequency interference, the shielded cable (including mylar) and all spare wires must be grounded.

There are three connections that are required. They are the

- power +24 V DC (**+24 V**),
- ground reference wire (**GND**), and
- shield ground drain wire (attaches to ground screw).

⚠ Warning

Tying a bare drain wire to a ground wire will not ground a shield.

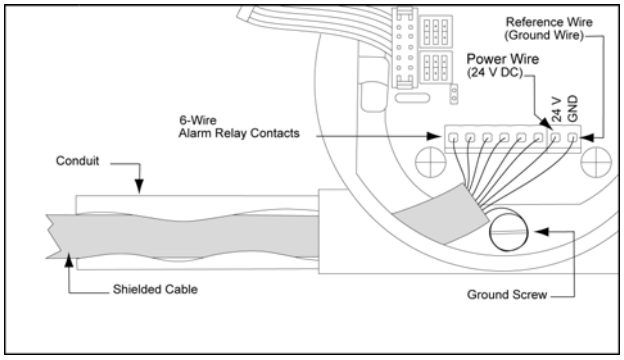

Figure 10. Power, Ground, and Relay Wiring

Shield Ground Drain Wire

BW recommends that a third drain wire be attached to the grounding screw inside the base station, and to a reliable earth ground on the power supply that is connected to the base station. Refer to Figure 10.

Note

After all wiring is complete, check continuity.

Power Wiring

Connect the +12-24 V DC power wiring to the removable 2-wire screw down terminal connector on the radio board. Refer to Figure 11.

⚠ Caution

Polarity must be observed. If the ground and the +24V wires are reversed, the base station will not work.

Power Supply

Ensure that the power supply meets the minimum requirements of your system. BW recommends that the power supply be regulated.

For information regarding alarm relays, refer to Alarm Relay Contact Wiring and Configuration.

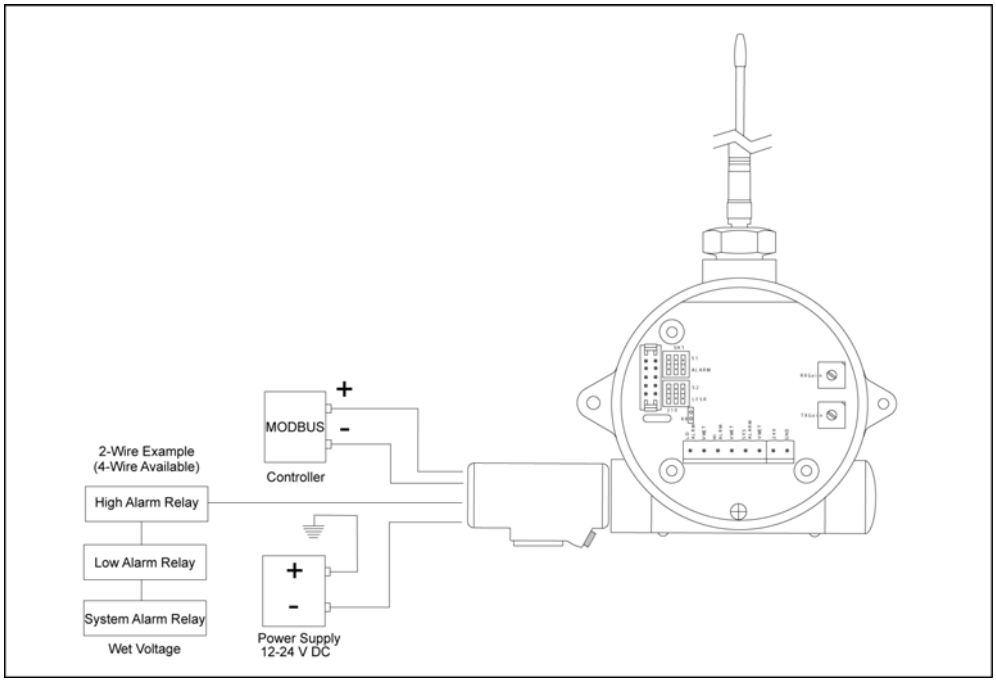

Figure 11. Wiring Installation

MODBUS Wiring and Configuration

The MODBUS protocol is designed for master-slave communication. The base station operates as a MODBUS slave device and must be connected to a MODBUS master, such as a MODBUS compatible PLC Control System or an industrial PC.

MODBUS Wiring

The base station can be configured for either a 2-wire (half duplex) or 4-wire (full duplex) MODBUS interface.

MODBUS signalling can be used to

- set and clear alarm status,
- read tables containing badge IDs,
- read alarm acknowledgements of all badges that are within range of the base station.

All MODBUS wiring is connected to the 2-screw down terminal blocks, **TB1** (upper) and **TB2** (lower) that are located on the main board.

Note

*For 2-wire operation on the main board, the jumper pin **JP1** must be shorted (closed) by using the supplied jumper.*

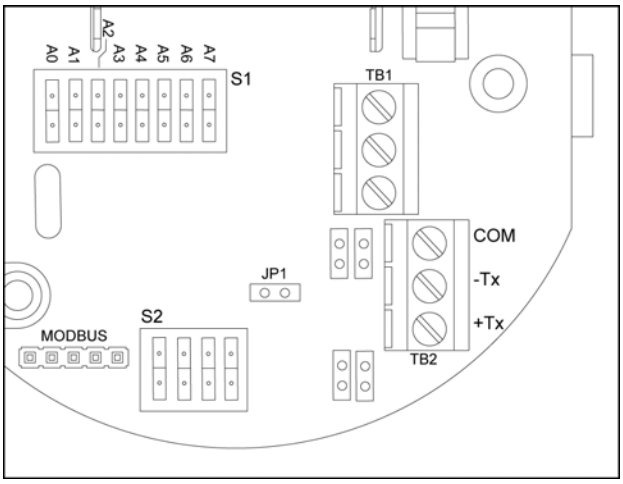

Figure 12. MODBUS Wiring on Main Board

2-Wire MODBUS (half-duplex)

1. Connect the RS-485 positive lead to the **+T/Rx** on **TB2**.
2. Connect the RS-485 negative lead to the **–T/Rx** on **TB2**.

4-Wire MODBUS (full-duplex)

1. Connect the positive RS-485 lead for data transmission to the terminal marked **+T/Rx** on **TB2**.

   Ensure that the connection is routed to the base station.

2. Connect the negative RS-485 lead for data transmission to the terminal marked **-T/Rx** on **TB2**.

   Ensure that the connection is routed to the base station.

3. Connect the positive RS-485 lead for data transmission to the terminal marked **+/Tx** on **TB1**.

   Ensure that the connection is routed from the base station.

4. Connect the negative RS-485 lead for data transmission to the terminal marked **-/Tx** on **TB1**.

   Ensure that the connection is routed from the base station.

Note

For 4-wire operation on the main board, jumper pin "JP1" must be removed. Place it over one of the other pins so that the jumper is an open circuit.

Baud Rate and Parity Configuration

The option dip switches configure the Baud rate and the parity. Refer to the following tables.

Note

The default Baud rate is set to 19200. The default parity is set to no parity, one stop bit.

Table 9. Baud Rate

Baud Rate	Dip Switch Position	
	D1	D0
19200	Open	Open
9600	Close	Open
4800	Open	Close
2400	Close	Close

Table 10. Parity Configuration

Parity Checking	Dip Switch Position	
	D3	D2
No parity, one stop bit	Open	Open
No parity, two stop bit	Close	Open
Odd parity	Open	Close
Even parity	Close	Close

Setting the Dip Switch Addresses

⚠ Warning

The Personnel Alert Base Station must be powered down before removing the outer cover. If it is in a classified area, either remove the base or declassify area.

MODBUS Switch Configuration

There are two sets of dip switches (**S1** and **S2**) on the main board to set the MODBUS configuration. These dip switch settings are loaded only upon start-up. If changes are required, the base station must be powered down.

Note

Ensure that each unit has its own unique address.

Address **0** is forbidden. A minimum of one switch must be in the **1** position. Valid addresses range from 1-255.

Set the Address Dip Switches

Switches for **A7**, **A6**, **A5**, **A4**, **A3**, **A2**, **A1**, and **A0** set the local address of the Personnel Alert. An address is selected by setting the binary equivalent of the address of the dip switches, where **A0** is the least significant bit.

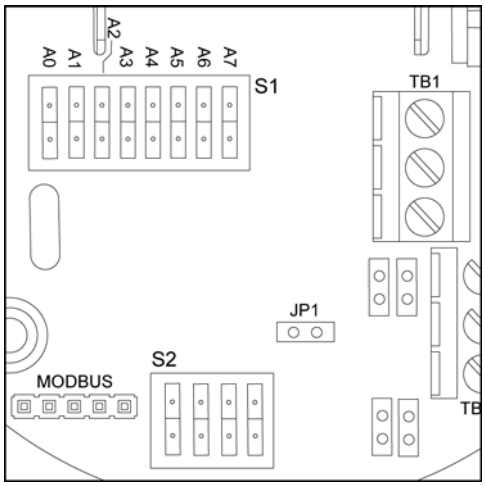

Figure 13. S1 and S2 Dip Switches for MODBUS Configuration

Note

*The Personnel Alert is set to address **01** as the default.*

Table 12. Address Switches

Slave Address	Binary Equivalent	Dip Switch Position - Open position indicates binary 0 - Close position indicates binary 1							
		A7	**A6**	**A5**	**A4**	**A3**	**A2**	**A1**	**A0**
01	00000001	Open	Open	Open	Open	Open	Open	Open	Close
02	00000010	Open	Open	Open	Open	Open	Open	Close	Open
03	00000011	Open	Open	Open	Open	Open	Open	Close	Close
04	00000100	Open	Open	Open	Open	Open	Close	Open	Open
05	00000101	Open	Open	Open	Open	Open	Close	Open	Close
06	00000110	Open	Open	Open	Open	Open	Close	Close	Open
07	00000111	Open	Open	Open	Open	Open	Close	Close	Close
08	00001000	Open	Open	Open	Open	Close	Open	Open	Open
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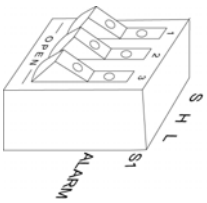
Alarm Relay Contact Wiring and Configuration

The base station can be connected directly to an alarm signalling device (fixed gas detector), such as the BW GasPoint detector.

The base station has inputs for high, low, and system alarms. The wetting voltage for these circuits are included with the base. Depending upon the normally open (NO) normally closed (NC) operation of the alarm contacts, each alarm circuit can be configured to be NO or NC by setting dip switch **S1** on the radio board.

NO alarm contacts

NC alarm contacts



If no alarm contacts are installed, the **S1** dip switch can be used to trigger alarms to test the system setup.

⚠Warning

If the area is classified, the base station must be deenergized before testing alarm contacts.

Connect each alarm circuit to the positions marked on the removable 6-wire screw down connector on the radio board.

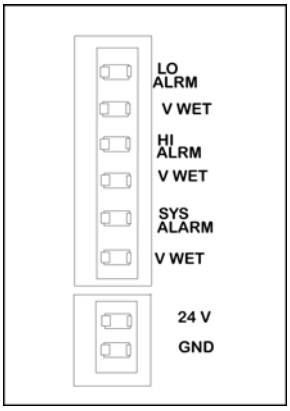


Figure 14. Alarm Relay Contact Wiring

Alarm conditions that are broadcasted by the base station to the badges can be sent through relay contact circuits. The circuits are connected to the base station and they transfer data using MODBUS.

If this option is used, each circuit must be set for either NO or NC. If no alarm contacts are installed, the **S1** dip switch can be used to trigger alarms to test the system setup. Open or close a single switch to test.

⚠Warning

If the area is classified, the base station must be de-energized before testing alarm contacts.

The **S1** dip switch that is used to set the circuits is labelled on the radio board.

Table 13. Alarm Circuits and Switch Positions for the S1 Dip Switch

Alarm Circuits	Switch Positions	Open (NO) or Closed (NC)
Low	**L**	
High	**H**	
System	**S**	

The wetting voltage for the alarm circuits is provided by the base station.

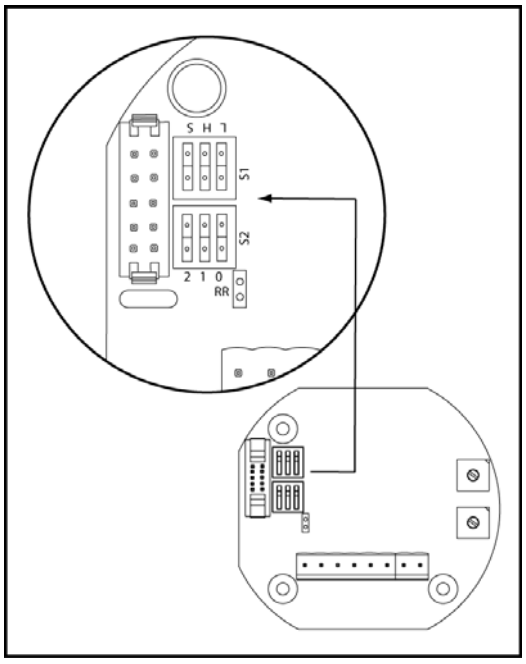


Figure 15. Alarm Relay Contact on Radio Board

Wiring DC Power

⚠ Caution

Polarity must be observed. If the ground and the +24V wires are reversed, the base station will not work.

Testing Manual Alarms

⚠Warning

If the area is classified, the base station must be de-energized before testing alarm contacts.

Radio Frequency (RF) Optimization

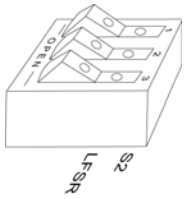
The radio configuration requires that the base station channel hopping pattern be set, and the transmit/receive attenuation levels be adjusted.

Channel Hopping Pattern

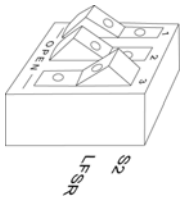
The base station “hops” randomly to fifty frequencies, continually repeating the “transmit-listen-hop” pattern.

The hopping pattern for each base station is selected from one of seven channel-hopping algorithms. On the radio board, the hopping pattern can be selected from **S2**, by configuring the binary representation of channels 0 through 7. . Set the binary representation as follows:

bit 0 = switch is closed



bit 1 = switch is open



Single Base Station System: For systems that require only one base station, any dip switch setting can be used on **S2**.

Multi Base Station Systems: For systems consisting of more than seven base stations, the risk of interference is minimal when using the recommended Honeycomb pattern setup mode. The optimum layout for multi base station systems is the Honeycomb pattern. Refer to Area System Planning and Figure 5.Honeycomb Pattern.

The numbers in each hexagon represent the decimal equivalent for the dip switch setting that should be used for switch S2. Maintain a record of the pattern that is selected for each base station to ensure that settings are not duplicated for adjacent base stations. Refer to Table 6 for an example.

Table 14. Base Station S2 Dip Switch Setting Example

Base Station #	S2 Dip Switch Setting
Cell # ?? Zoltan	

⚠ Caution

For multi-base station installations, ensure that adjacent base stations do not have the same hopping pattern, as interference will result.

The following Table 7. Frequency Hopping Pattern represents the decimal to binary conversion for the dip switch S2 settings. 0-6 and 7=1 (Zoltan)

Table 15. Frequency Hopping Pattern

Decimal	1	2	3	4	5	6	7
Binary	001	010	011	100	101	110	111

Adjusting the Transmit/Receive Attenuation Levels

Area coverage of the base station can be controlled by adjusting the transmit/receive attenuation levels in the base station to match the actual radio coverage area that was determined during the area system planning.

The attenuation adjustments are also used to tune the amount of coverage overlap between base stations.

Proper operation of the Personnel Alert system requires that robust data transfer in both directions: from the base station to the badges, and from the badges to the base station.

The 1 Watt maximum transmit power of the base station can never be exceeded. However, by using the attenuation adjustments, it can be reduced by up to 40dB. Attenuation can also be used to adjust the receive path in the base station to maintain a similar loss in both the receive and transmit links.

The transmit power levels and the receive sensitivity are fixed for the badges and cannot be adjusted.

To adjust the base station attenuation levels, it is necessary to physically walk with a badge within the coverage area(s) to determine the range of each base station.

After establishing the boundaries between the coverage areas, review the site plans to determine if base station power levels need to be reduced.

If a “coverage hole” is revealed, verify if

- an additional base station is required,
- attenuation reduction of the neighbouring base stations is required,
- the mounting height of the base station needs to be increased, or
- the location of the base station needs to be changed.

Note

Adjusting attenuation levels requires trial and error to test various settings for optimum transmission.

For the base station, initially set both the transmit and receive paths to minimum attenuation levels for maximum power. If overlapping results between base stations, then adjust the attenuation to reduce the span of the coverage area.

c) Transmit Rotary Switch: The transmitter rotary switch is used to increase/decrease the base station output power.

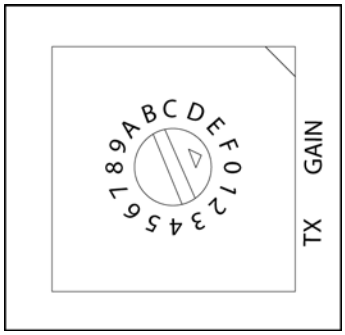


Figure 16. Transmit Rotary Switch Maximum Power Setting

Set the switch to **F** for maximum output power. Set the switch to **E** to decrease the output power by 2dB and **0** decreases by 30db. Refer to Table 8.

Table 16. Rotary Switch Output Settings

Tx Gain Rotary Switch Setting	Tx Chain Attenuation dB	Output Power	
		Normal Mode dBm	Reduced Range Mode dBm
F max output	0	30	20
E	2	28	18
D	4	26	16
C	6	24	14
B	8	22	12
A	10	20	10
9	12	18	8
8	14	16	6
7	16	14	4
6	18	12	2
5	20	10	0
4	22	8	-2
3	24	6	-4
2	26	4	-6
1	28	2	-8
0 min output	30	0	-10

d) Receiver Rotary Switch: The receiver rotary switch is used to decrease the sensitivity of the receiver.

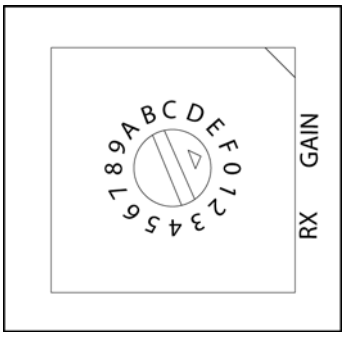


Figure 17. Receiver Rotary Switch Maximum Sensitivity

Set the switch to **F** for maximum receiver sensitivity. Set the switch to **E** to decrease the sensitivity by 2dB and set to **0** for minimum. Refer to Table 14. Receiver Sensitivity Switch.

The switch setting for the receiver sensitivity (**Rx Gain**) should be set the same as the transmit switch (**Tx Gain**) to balance the transmit/receive path losses.

Note

If the RR jumper is shorted, it further reduces the receiver sensitivity by 11-12 dB.

Table 17. Receiver Sensitivity Switch

Rx Gain Rotary Switch Setting	Rx Chain Attenuation dB
F (max sensitivity)	0
E	2
D	4
C	6
B	8
A	10
9	12
8	14
7	16
6	18
5	20
4	22
3	24
2	26
1	28
0 (min sensitivity)	30

e) Reduced Radio Range Jumper

The reduced radio range jumper is used when precise coverage of a defined small area is required. For normal operation (high Tx power/high Rx sensitivity), open the reduced radio range jumper.

Note

This jumper should only be used when the transmit/receive rotary switches are incapable of providing sufficient signal attenuation for defined small coverage areas.

open = only one pin is covered

graphic

When the reduced range jumper is closed, an additional 10 dB is acquired for the transmit attenuation. The receive sensitivity for the base station is reduced by 11-12 dB.

Setting the Badge ID

The base station maintains the ID number and alarm acknowledgement information for each badge while in the coverage area. This information is used to account for personnel during an alarm response situation, such as an evacuation.

1-256 badges can be monitored on a single base station simultaneously. Up to 999 badge IDs can be recognized by each base station, depending upon the database and configuration of the overall system.

Setting-up Badge ID Numbers

The badge ID number is used to identify the employee who is carrying the corresponding badge during an alarm condition. When setting up ID numbers, maintain a log to verify employees and badge ID numbers. Refer to the following table.

Table 18. Active Badge Table

Employee Name	Badge ID#
John Smith	001
Jane Doe	002

Setting-up the Badge IDs

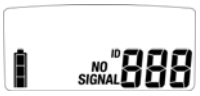
Read the following procedures prior to accessing the badge ID set-up screen. To set-up the badge ID numbers, complete the following:

Note

The badge IDs should be set-up prior to the employee entering the coverage area to ensure proper safety.

The NO SIGNAL icon displays during the setup. Receiving broadcasts are not required during the set-up process. The base station will automatically identify any badge that has been set-up.

1. The badge set-up can only be accessed during the start-up process. If required, deactivate the badge.
2. Press ◯ and continue to hold until the badge ID setup screen displays and the side LED flashes once (approximately 10 seconds).



The badge emits the audible alarm, flashes, and vibrates the same as during normal start-up. The audible alarm, flashes, and vibrating will stop for 3 seconds. Continue to hold the C button.

When the side LED lights, release and immediately press C again.

Area System Planning

Base stations can be configured to operate as single or multiple notification systems, depending upon the

- area of the zones,
- complexity of the area (buildings / obstructions),
- indoor and/or outdoor installations,
- alarm/emergency response procedures,
- number of badges, and
- the functional requirements of the badges.

The base station system can be configured for individual and unique requirements.

Note

Area system planning and configurations must be performed by qualified personnel only.

Prior to configuring the base station, an area system plan must be developed. To determine the particular requirements of your system, complete the following sections:

Single or Multiple Stations

To determine if single or multiple base stations are required, the overall area must be known. Each base station is designed to accurately broadcast to a radius of 45 metres (150 ft.). The base station can broadcast to a radius of 150 metres (500 ft.) across open terrain and flat areas.

Each base station can accurately broadcast to and track up to 256 badges. Use the following guidelines to determine the system requirements.

Area and Radio Frequency (RF) Coverage

It is necessary to initially determine how large of an area each base station will be broadcasting to. The base station operates on the

- 902-928 MHz unlicensed radio band, and
- is subject to federal regulations that restrict RF to transmit power to a maximum of 1 Watt (30dBm) or less.

Note

Radio link and capacity can be affected and reduced by radio interference from other wireless sources outside of the Personnel Alert system, as well as other base stations.

The base station transmitter default setting is set just below the 1 Watt maximum limit. The badges transmit at a fixed RF power level of approximately 50 mW (17 dBm).

Systems without a sufficient number of base stations can experience “coverage holes” where communication between the base station and the badges is not reliable, therefore placing personnel at possible risk.

To resolve the challenge of adequate coverage, use a honeycomb pattern system. Refer to Figure 19.

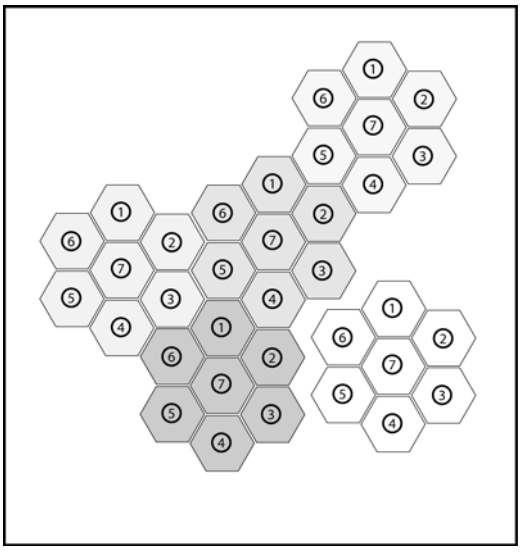


Figure 18. Honeycomb Pattern

Each number represents the recommended frequency hopping pattern for the dip switch settings. For information refer to Channel Hopping Patterns and Setting the Dip Switch Addresses.

To develop a system plan, complete the following:

1. Using a site plan (scale drawing) or an AutoCAD model, design a repeating pattern of seven hexagonal cells in a honeycomb to determine the number and approximate locations of the base stations.

   The seven cell honeycomb pattern is optimum because it allows for the re-use of “frequency hopping pattern algorithms” within the same system.

2. To determine the location of a base station, consider where it will obtain optimum transmission with surrounding badges. The final layout will not result in a perfect honeycomb pattern. However, if the base stations are installed within ten meters of the layout location, required coverage will be achieved.

3. When more than one base station is required to adequately cover an area, use the hexagon cell with a distance of 90 m (300 ft.) between opposite corners. Each hexagon equals a radius of 45 m (150 ft.). Refer to Figure 6. Base Station Broadcast Coverage.

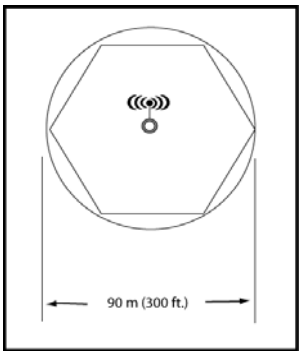


Figure 19. Base Station Broadcast Coverage

Note

Determine system planning by using a 45 m (150 ft.) coverage radius around each base station. Do not exceed the radius as radio transmissions can be compromised.

4. When a honeycomb pattern system has been defined on paper, ensure that the selected physical locations are feasible for installation of the base stations.

Identify System Obstruction RF Challenges

Radio signals transmit well over flat terrain and open water. However, buildings, metal tanks, and other obstructions can interrupt radio transmissions and will therefore require additional base stations to be strategically placed. Placement of base stations within buildings and structures is a factor as walls, pipes, and plant equipment are obstructions.

Additional factors that can reduce area coverage are

- high levels of electrical noise,
- RF interference,
- large metal structures, and
- inadequate number of base stations on a system.

As continuous radio transmissions are essential to ensure effective and constant communication between the base station and the badges, line-of-site placement can effectively resolve obstruction challenges.

System Capacity / Badge Requirements

Next determine how many badges will be receiving broadcasts from each base station (1-256 per base station). The badges can be used to only notify personnel of alarms, or they can also be used for alarm acknowledgement with ID tracking.

Alarms (TBD)

The following table describes the system alarms and shows how the display looks for each alarm. Alarms will reset to normal operation when the alarm condition no longer exists.

Table 17. Alarms

Alarms	Display
Low Gas Alarm •	
High Gas Alarm •	
System Fail Alarm •	

Maintenance

The Personnel Alert Base Station is designed to provide years of service with only regular care and minimal maintenance. At regular intervals inspect the instrument and check that it is operating normally.

Antenna: Replace the bent or damaged antenna.

Cables: Inspect cables to ensure they are properly connected and in good repair.

Troubleshooting (TBD)

If you encounter a problem, follow the solutions listed in the table below. If you are unable to correct the problem, contact BW Technologies.

Table 19. Troubleshooting Tips

Problem	Possible Cause	Solution
There is no transmission to the Badge.	→	→
	→	→
	→	→
There is no signal from the controller.	→	→
	→	→
	→	→
	→	→
	→	→

Replacement Parts and Accessories

⚠ Warning

To avoid personal injury or damage to the detector, use only the specified replacement parts.

To order parts or accessories listed in the table below, contact BW Technologies.

Table 20. Replacement Parts and Accessories

Model No.	Description	Qty
PA-AN-1	2 dBi dipole antenna	1
PA-RPCB1	Radio board	1
D5690	Base station user manual	1
PA-MPCB1	Control and interface board with LCD and internal faceplate	1
PA-IRC	Radio to control board interface cable	1
PA-ICC	Radio board to antenna interface cable	1
PA-CTR-APCB1	Flameproof antenna connector	1

Specifications

Instrument dimensions: 35.17 x 13.97 x 11.50 cm (13.85 x 5.50 x 4.53 in.)

Weight: 2 kg (4.1 lbs. 6 oz.)

Enclosure: Explosion-proof, anodized aluminum enclosure, comes with mounting flanges

Operating temperature: -20°C to +55°C (-4°F to +131ºF)

Storage temperature: -40°C to +85°C (-40°F to +185ºF)

Operating humidity: relative humidity (non-condensing)

RF frequency: 902 - 928 MHz license-free Industrial, Scientific and Medical (ISM) frequency band

RF transmission distance: 100 m (0.62 mi.)

Alarm conditions: Low alarm, high alarm, and system failure alarm

Display: Alphanumeric liquid crystal display (LCD)

Antenna: One port with TNC connector?

Approvals: Approved by CSA to both U.S. and Canadian standards.

Approved: Class I, Division 1, Group B, C, and D

Standards: CSA C22.2 No. 30, UL 1203

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules and ICES-003 Canadian EMI Regulations. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

The term “IC” before the radio certification number only signifies that Industry Canada technical specifications were met.

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.

Changes and/or modifications to the Personnel Alert Base not expressly approved by BW Technologies may void the user’s authority to operate the equipment.