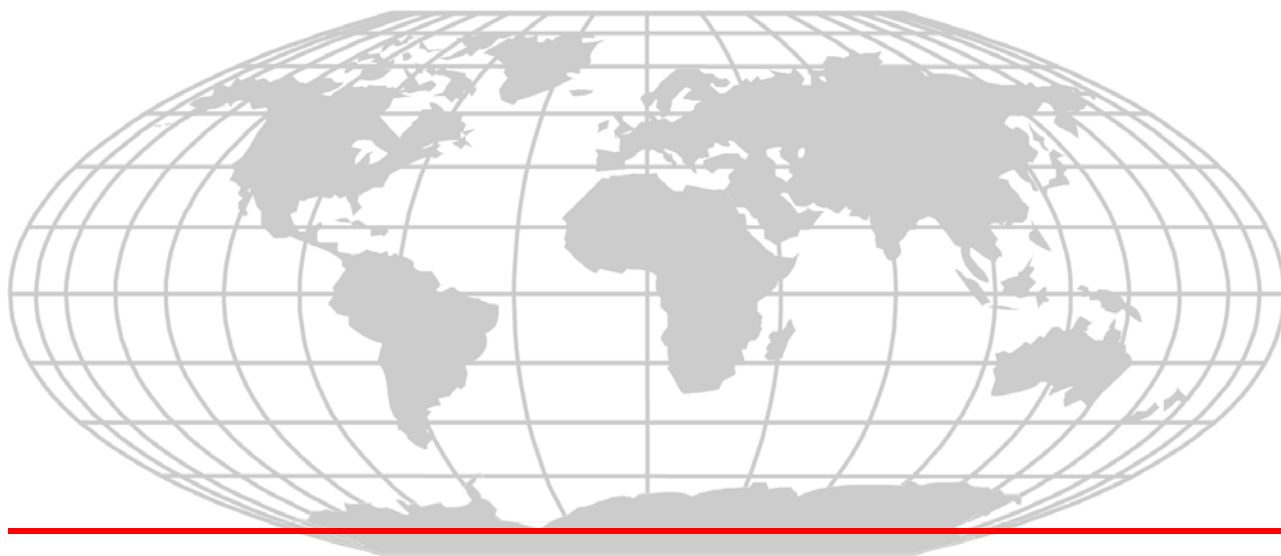




PRELIMINARY



Firelite Wireless Sensor Network
LS10036-000FL-E
User Manual

Fire Alarm & Emergency Communication System Limitations

While a life safety system may lower insurance rates, it is not a substitute for life and property insurance!

An automatic fire alarm system—typically made up of smoke detectors, heat detectors, manual pull stations, audible warning devices, and a fire alarm control panel (FACP) with remote notification capability—can provide early warning of a developing fire. Such a system, however, does not assure protection against property damage or loss of life resulting from a fire.

An emergency communication system—typically made up of an automatic fire alarm system (as described above) and a life safety communication system that may include an autonomous control unit (ACU), local operating console (LOC), voice communication, and other various interoperable communication methods—can broadcast a mass notification message. Such a system, however, does not assure protection against property damage or loss of life resulting from a fire or life safety event.

The Manufacturer recommends that smoke and/or heat detectors be located throughout a protected premises following the recommendations of the current edition of the National Fire Protection Association Standard 72 (NFPA 72), manufacturer's recommendations, State and local codes, and the recommendations contained in the Guide for Proper Use of System Smoke Detectors, which is made available at no charge to all installing dealers. This document can be found at <http://www.systemsensor.com/appguides/>. A study by the Federal Emergency Management Agency (an agency of the United States government) indicated that smoke detectors may not go off in as many as 35% of all fires. While fire alarm systems are designed to provide early warning against fire, they do not guarantee warning or protection against fire. A fire alarm system may not provide timely or adequate warning, or simply may not function, for a variety of reasons:

Smoke detectors may not sense fire where smoke cannot reach the detectors such as in chimneys, in or behind walls, on roofs, or on the other side of closed doors. Smoke detectors also may not sense a fire on another level or floor of a building. A second-floor detector, for example, may not sense a first-floor or basement fire.

Particles of combustion or “smoke” from a developing fire may not reach the sensing chambers of smoke detectors because:

- Barriers such as closed or partially closed doors, walls, chimneys, even wet or humid areas may inhibit particle or smoke flow.
- Smoke particles may become “cold,” stratify, and not reach the ceiling or upper walls where detectors are located.
- Smoke particles may be blown away from detectors by air outlets, such as air conditioning vents.
- Smoke particles may be drawn into air returns before reaching the detector.

The amount of “smoke” present may be insufficient to alarm smoke detectors. Smoke detectors are designed to alarm at various levels of smoke density. If such density levels are not created by a developing fire at the location of detectors, the detectors will not go into alarm.

Smoke detectors, even when working properly, have sensing limitations. Detectors that have photoelectronic sensing chambers tend to detect smoldering fires better than flaming fires, which have little visible smoke. Detectors that have ionizing-type sensing chambers tend to detect fast-flaming fires better than smoldering fires. Because fires develop in different ways and are often unpredictable in their growth, neither type of detector is necessarily best and a given type of detector may not provide adequate warning of a fire.

Smoke detectors cannot be expected to provide adequate warning of fires caused by arson, children playing with matches (especially in bedrooms), smoking in bed, and violent explosions

(caused by escaping gas, improper storage of flammable materials, etc.).

Heat detectors do not sense particles of combustion and alarm only when heat on their sensors increases at a predetermined rate or reaches a predetermined level. Rate-of-rise heat detectors may be subject to reduced sensitivity over time. For this reason, the rate-of-rise feature of each detector should be tested at least once per year by a qualified fire protection specialist. Heat detectors are designed to protect property, not life.

IMPORTANT! Smoke detectors must be installed in the same room as the control panel and in rooms used by the system for the connection of alarm transmission wiring, communications, signaling, and/or power. If detectors are not so located, a developing fire may damage the alarm system, compromising its ability to report a fire.

Audible warning devices such as bells, horns, strobes, speakers and displays may not alert people if these devices are located on the other side of closed or partly open doors or are located on another floor of a building. Any warning device may fail to alert people with a disability or those who have recently consumed drugs, alcohol, or medication. Please note that:

- An emergency communication system may take priority over a fire alarm system in the event of a life safety emergency.
- Voice messaging systems must be designed to meet intelligibility requirements as defined by NFPA, local codes, and Authorities Having Jurisdiction (AHJ).
- Language and instructional requirements must be clearly disseminated on any local displays.
- Strobes can, under certain circumstances, cause seizures in people with conditions such as epilepsy.
- Studies have shown that certain people, even when they hear a fire alarm signal, do not respond to or comprehend the meaning of the signal. Audible devices, such as horns and bells, can have different tonal patterns and frequencies. It is the property owner's responsibility to conduct fire drills and other training exercises to make people aware of fire alarm signals and instruct them on the proper reaction to alarm signals.
- In rare instances, the sounding of a warning device can cause temporary or permanent hearing loss.

A life safety system will not operate without any electrical power. If AC power fails, the system will operate from standby batteries only for a specified time and only if the batteries have been properly maintained and replaced regularly.

Equipment used in the system may not be technically compatible with the control panel. It is essential to use only equipment listed for service with your control panel.

Telephone lines needed to transmit alarm signals from a premises to a central monitoring station may be out of service or temporarily disabled. For added protection against telephone line failure, backup radio transmission systems are recommended.

The most common cause of life safety system malfunction is inadequate maintenance. To keep the entire life safety system in excellent working order, ongoing maintenance is required per the manufacturer's recommendations, and UL and NFPA standards. At a minimum, the requirements of NFPA 72 shall be followed. Environments with large amounts of dust, dirt, or high air velocity require more frequent maintenance. A maintenance agreement should be arranged through the local manufacturer's representative. Maintenance should be scheduled monthly or as required by National and/or local fire codes and should be performed by authorized professional life safety system installers only. Adequate written records of all inspections should be kept.

Installation Precautions

Adherence to the following will aid in problem-free installation with long-term reliability:

WARNING - Several different sources of power can be connected to the fire alarm control panel. Disconnect all sources of power before servicing. Control unit and associated equipment may be damaged by removing and/or inserting cards, modules, or interconnecting cables while the unit is energized. Do not attempt to install, service, or operate this unit until manuals are read and understood.

CAUTION - System Re-acceptance Test after Software Changes: To ensure proper system operation, this product must be tested in accordance with NFPA 72 after any programming operation or change in site-specific software. Re-acceptance testing is required after any change, addition or deletion of system components, or after any modification, repair or adjustment to system hardware or wiring. All components, circuits, system operations, or software functions known to be affected by a change must be 100% tested. In addition, to ensure that other operations are not inadvertently affected, at least 10% of initiating devices that are not directly affected by the change, up to a maximum of 50 devices, must also be tested and proper system operation verified.

This system meets NFPA requirements for operation at 0-49° C/32-120° F and at a relative humidity 93% ± 2% RH (non-condensing) at 32°C ± 2°C (90°F ± 3°F). However, the useful life of the system's standby batteries and the electronic components may be adversely affected by extreme temperature ranges and humidity. Therefore, it is recommended that this system and its peripherals be installed in an environment with a normal room temperature of 15-27° C/60-80° F.

Verify that wire sizes are adequate for all initiating and indicating device loops. Most devices cannot tolerate more than a 10% I.R. drop from the specified device voltage.

Like all solid state electronic devices, this system may operate erratically or can be damaged when subjected to lightning induced transients. Although no system is completely immune from lightning transients and interference, proper grounding will reduce susceptibility. Overhead or outside aerial wiring is not recommended, due to an increased susceptibility to nearby lightning strikes. Consult with the Technical Services Department if any problems are anticipated or encountered.

Disconnect AC power and batteries prior to removing or inserting circuit boards. Failure to do so can damage circuits.

Remove all electronic assemblies prior to any drilling, filing, reaming, or punching of the enclosure. When possible, make all cable entries from the sides or rear. Before making modifications, verify that they will not interfere with battery, transformer, or printed circuit board location.

Do not tighten screw terminals more than 9 in-lbs. Overtightening may damage threads, resulting in reduced terminal contact pressure and difficulty with screw terminal removal.

This system contains static-sensitive components.

Always ground yourself with a proper wrist strap before handling any circuits so that static charges are removed from the body. Use static suppressive packaging to protect electronic assemblies removed from the unit.

Follow the instructions in the installation, operating, and programming manuals. These instructions must be followed to avoid damage to the control panel and associated equipment. FACP operation and reliability depend upon proper installation.

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Section 1: About This Guide

1.1 Purpose

The Firelite Wireless Sensor Network user's manual provides an overview of the following:

- Wireless fire alarm system
- Instructions for installing and configuring the wireless devices
- Information on monitoring the status of the wireless devices
- Removal and replacement procedures of the W-GATE and W-DIS-D
- Testing, maintenance and firmware upgrade information of the W-GATE and W-DIS-D.

1.2 Assumed Knowledge

The document is created with the assumption that all users are familiar with working on a PC and laptop for configuration purposes. Installers should be familiar with the Fire Alarm and Related Service Standards.

The terminology and level of details of this document reflect this assumption.

1.2.1 Additional References

Model	Description	Manual
W-SD355	Wireless LiteSpeed Detector, Photo	W-SD355 and W-SD355T Intelligent Wireless Photoelectric Smoke Sensors. Manual part number for the above devices- I56-4081-000
W-SD355T	Wireless LiteSpeed Detector, Photo/Heat	
W-H355R	Wireless LiteSpeed Heat sensor Heat, Rate Of Rise 135	W-H355R and W-H355 and Intelligent Wireless Temperature Sensors. Manual part number for the above devices- I56-4082-000
W-H355	Wireless LiteSpeed Heat sensor Heat, Fixed Temp135	
W-MMF	Monitor Module	W-MMF Wireless Monitor Module. Manual Part number - I56-4083-000

1.3 Site Survey

A site survey is recommended to assess and qualify the site prior to installing the Wireless Fire Alarm system. The site survey utility allows you to perform the Link quality test and radio frequency (RF) assessment of the site. This information is used for site qualification, maximum device spacing identification, and configuring the network. This helps to optimize the reliability and performance of the wireless network in the wireless fire alarm system. Conduct a site survey, and ensure there are no obstructions for using RF communications. For more information on a site survey, refer to Appendix A: "Site Survey".

1.4 Abbreviations and Meanings

The following table lists the abbreviations and their definitions used in this manual.

Abbreviation	Definition
AHJ	Authority Having Jurisdiction
ANSI	American National Standards Institute
dBm	Milli Decibel
FACP	Fire Alarm control Panel
FCC	Federal Communications Commission
ISM	Industrial, Scientific and Medical Radio Bands.
LCD	Liquid Crystal Display
LED	Light Emitting Diode
mA	Milliampere
MHz	Megahertz
NFPA	National Fire Protection Association
PC	Personal Computer
RF	Radio Frequency
SLC	Signaling Line Circuit
UI	User Interface
UL	Underwriters Laboratories
W-DIS-D	Wireless Display Driver
W-GATE	Wireless Gateway

Section 2: W-GATE

2.1 Description

The W-GATE is a device in a wireless fire system that acts as a bridge between fire alarm control panels and wireless fire devices. All wireless fire devices communicate with the W-GATE over the wireless network formed by the devices and the W-GATE.

The Wireless Sensor Network includes a W-DIS-D (Wireless Display Driver). The W-DIS-D and ANN-80 are required for the display of wireless specific events. W-DIS-D and ANN-80 are explained in detail in Chapter 3.

The W-GATE is powered by either the SLC loop or from any external 24VDC UL listed power supply. The W-GATE uses LiteSpeed protocol on the SLC to communicate with the panel and a proprietary wireless protocol to communicate with wireless fire devices. The following graphic is an illustration of the components of the Firelite Wireless Sensor Network.

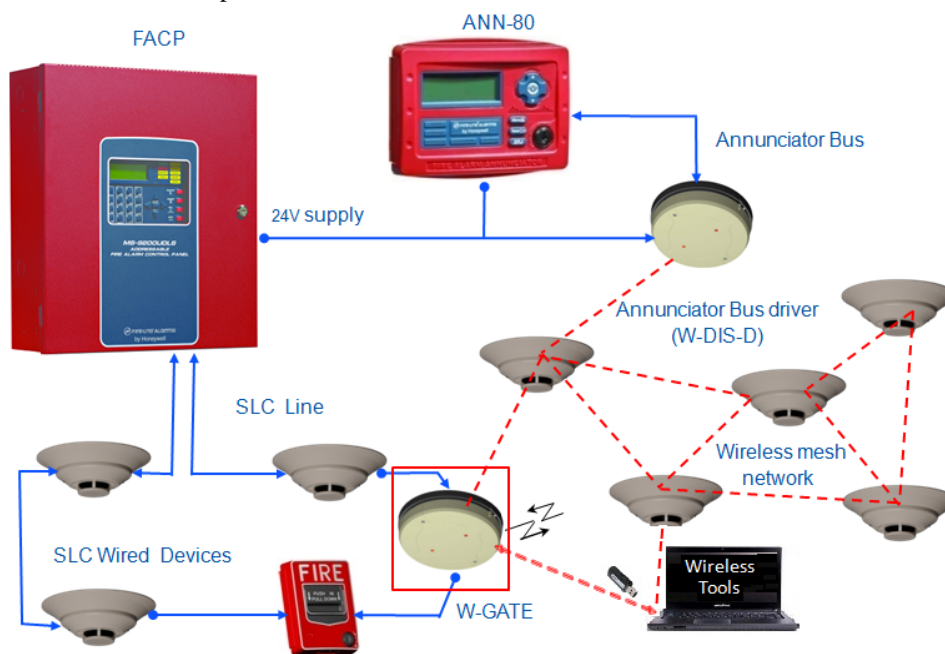


Figure 2.1 Firelite Wireless Sensor Network

2.2 Agency Approvals

2.2.1 FCC

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 PV3WFSGW

WARNING: CHANGES OR MODIFICATIONS NOT EXPRESSLY APPROVED BY THE MANUFACTURER COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.

2.3 Specifications

Following are the specifications of the W-GATE.

Specifications	Data
External Supply Electrical Ratings	18V-30V
SLC Electrical Ratings	15V-30V
Maximum current when using the external supply	40mA
Maximum current when using the SLC power supply	24mA
Maximum SLC Resistance	50 Ohms
Minimum signal strength level needed at the receiver for a primary path with weak link trouble reporting enabled.	-50dBm
Minimum signal strength level needed at the receiver for a secondary path or primary path with weak link trouble reporting disabled.	Must be 15 dBm higher than the noise floor down to a minimum of -87dBm*
Maximum ambient noise level	-90dBm*
Maximum RF Power Output	+17dBm (Tx power level without antenna)
Radio Frequency	Lower ISM Band (915MHz).

NOTE: Devices that do not meet the minimum signal strength or have an ambient noise level that exceeds the limit are not allowed to join the mesh network.

2.3.1 Environmental Specification

System	Operating Temperature	Storage Temperature	Humidity
W-GATE	0°C-49°C / 32°F-120°F	-10°C- 60°C / 14°F-140°F	10 to 93% RH Non-condensing

2.4 Installing W-GATE

2.4.1 Before Installing

Choose a location for the W-GATE that is clean, dry, and vibration-free. The area should be readily accessible with sufficient room to easily install and maintain the W-GATE. Metal obstructions impede the radio frequency communication and should be avoided. Carefully unpack the system and inspect for shipping damage if any. All wiring must comply with the national and local codes for fire alarm systems.

2.5 Mounting & Wiring

2.5.1 Mounting

The W-GATE has two major pieces, the cover and the mounting plate. The mounting plate is mounted to the wall or ceiling, and field wiring is connected to it. The cover contains the PC board and is fastened to the mounting plate once the wiring is connected.

Mount the mounting plate directly to an electrical box on the ceiling or wall. The plate mounts directly to 4" square (with and without plaster ring), 4" octagon, 3 1/2" octagon, single gang or double gang junction boxes. If an electrical box is not available, the mounting plate can be mounted to any flat surface and the wiring can be connected via the knockout points in the mounting plate.

To mount the W-GATE, do the following:

1. Pull the wiring through the opening in the mounting plate.
2. Mount the mounting plate to the junction box or ceiling. See figure 2.2.
3. Connect field wiring to the terminals, as described in section 2.5.2, "Wiring".
4. Connect necessary jumpers where applicable, as described in section 2.5.3, "W-GATE Powered from SLC".
5. To mount the cover, align the locating pins on the cover to the corresponding slots in the mounting plate. See Figure 2.3, "Cover Attaching to Mounting Plate".
6. Secure the cover by tightening the mounting screws.

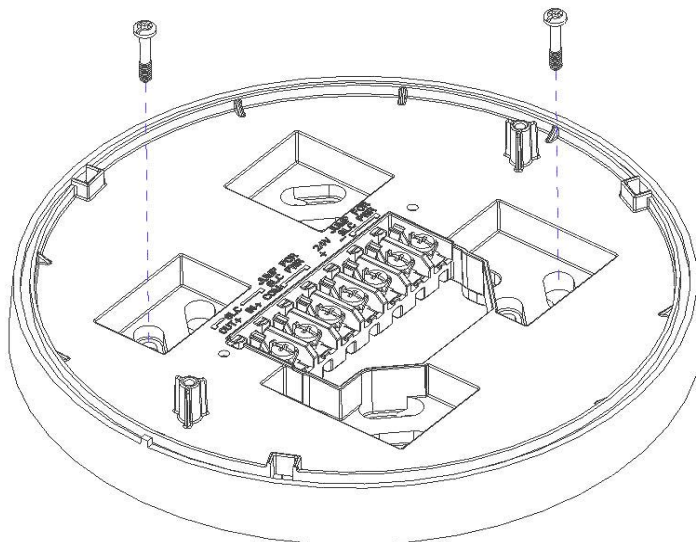


Figure 2.2 Mounting Plate

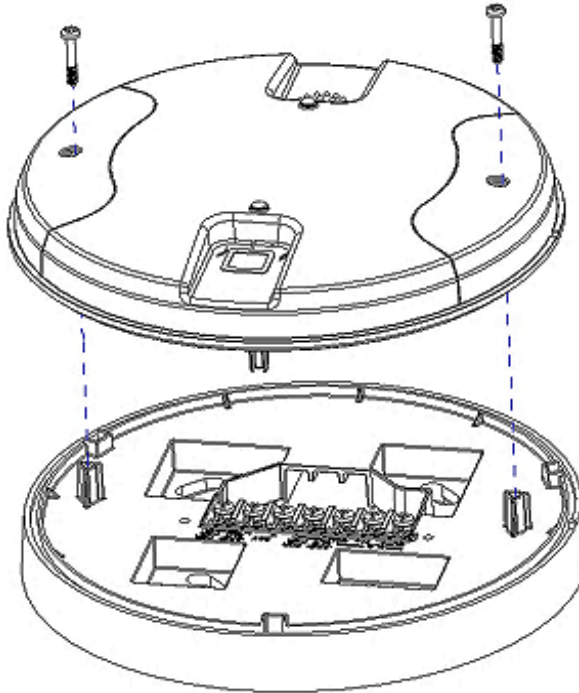


Figure 2.3 Cover Attaching to Mounting Plate

2.5.2 Wiring

- All wiring must be installed in compliance with the National Electrical Code and the local codes having jurisdiction.
- 12-18 AWG is recommended.

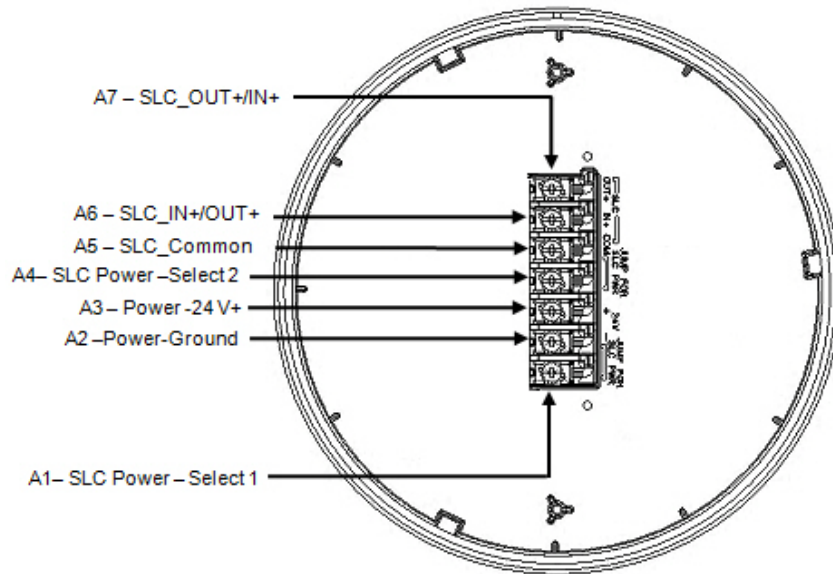


Figure 2.4 (Wiring diagram with terminal descriptions)

For wiring connections, follow this procedure:

- Strip about 3/8" of insulation from the end of the wire.
- Then, to make the wire connection, slide the bare end of the wire under the appropriate clamping plate, and tighten the clamping plate screw.

NOTE: Do not loop the wire under the clamping plate.

2.5.3 W-GATE Powered from SLC

To power the W-GATE using the signal line circuit, connect it as described in table 2.1 below:

Terminal Pins	Description
A5 & A7	SLC Common & SLC Output/Input
A5 & A6	SLC Common & SLC Input/Output
A4 & A5	Jumper selection to enable power from the SLC supply (Insert Jumper when using SLC power)
A3	Unused
A1 & A2	Jumper selection to disable power from the external supply. (Insert Jumper when using SLC power)

Table 2.1

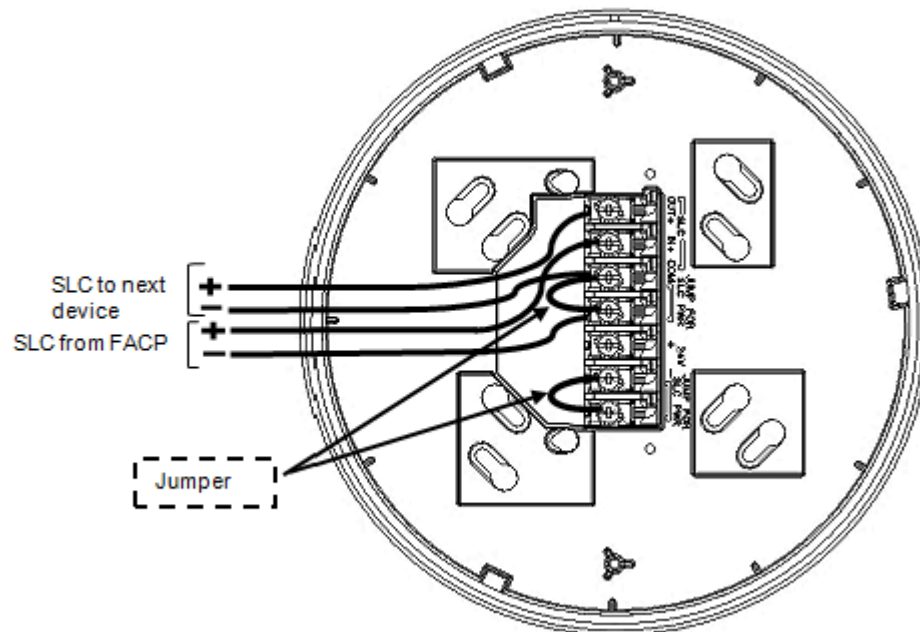


Figure 2.5 Wiring Connections (W-GATE powered from SLC)

NOTE: It is recommended to use the same wire gauge if there are multiple connections to the same terminal.

The W-GATE provides isolation of short circuits on the SLC in class A installations, that use the A6 and A7 connections as an in and out connection. A5 is common for SLC wiring that enters and leaves. Class B wiring that terminates at the W-GATE can use either the A6 or A7 connection for the SLC positive. SLC connections are power limited by the panel. An interruption in the SLC that causes a loss of power at the W-GATE for more than 100ms may result in a trouble condition and loss of fire protection provided by the wireless devices for up to 15 minutes. Using an external 24V power source (not SLC power) is recommended for installations that require fire protection in the presence of short circuits, including class A applications and applications that utilize isolator modules.

2.5.4 W-GATE Powered from an External +24VDC source

To power the W-GATE using a +24VDC source, connect the W-GATE as described in table 2.2 below.

Terminal Pins	Devices Powered
A5 & A7	SLC Input/output
A5 & A6	SLC Input/output
A4	Unused
A2 & A3	+24VDC input. Voltage range from 18VDC to 30VDC. Use only power limited device circuits.
A1	Unused

Table 2.2

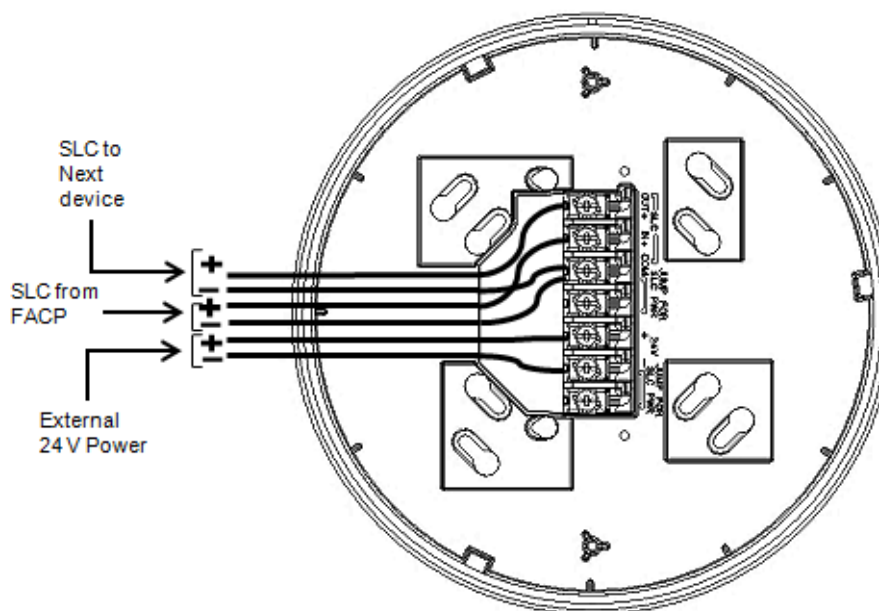


Figure 2.6 Wiring Connections -W-GATE Powered from an External +24VDC source

NOTE: Terminal A5 is referenced more than once in the above connections. It is recommended to use wire of the same gauge for all connections to A5 and use the same wire gauge if there are multiple connections to the same terminal.

The W-GATE provides isolation of short circuits of the SLC in class A installations that use the A6 and A7 as an in and out connection. A5 is common for in and out SLC wiring. Class B SLC wiring that terminates at the W-GATE can use either the A6 or A7 connection for the SLC positive. SLC connections are power limited by the panel. 24VDC must be power limited by the source.

2.6 Configuration and Programming

The goal of configuring and/or programming the W-GATE is to:

1. Create a profile - A profile is a set of parameters that binds together a W-GATE and the devices in a mesh network.
2. Distribute the profile to every device that will be a part of the mesh.
3. Form the mesh - The mesh cannot be formed until the profile is assigned to the W-GATE. The profile contains a mesh ID and, if required, a password, that are used when forming the associations. Creating and distributing the profile will enable all the devices that have that profile to form associative links when the mesh is formed. All devices, including the W-GATE, require a common profile.

This section shows how to configure/program an W-GATE with a profile, how to distribute that profile to other devices, and how to form all these devices into a mesh. These processes may be performed with or without using PC-based configuration tool.

2.6.1 Without a PC-based Configuration Tool

This section shows the configuration of the W-GATE using only a magnet and a screw driver. For configuration instructions using the PC-based configuration tool, refer to 2.6.2, "With a PC-based Configuration Tool".

There are two ways to provide a W-GATE with a profile without using a configuration tool.

- Create a new profile using the W-GATE
- Assign a previously created profile to the W-GATE using a distributor.

Create a New Profile

To create a unique profile in the W-GATE without using the PC-based configuration tool, perform the following steps.

1. Start with the device powered off. The process is performed during the start-up.
2. Power on the W-GATE using SLC power or external +24V. This can be done either by attaching the W-GATE to its mounting plate with the terminals already energized, or by connecting the SLC or external source wiring to a W-GATE that is already installed in its mounting plate.
3. Verify if the W-GATE is in the factory default state; if it is in the factory default state, both the LEDs on the W-GATE flash red (double blink) every second for ten seconds. If the LEDs are yellow, refer to section below on removing a profile.

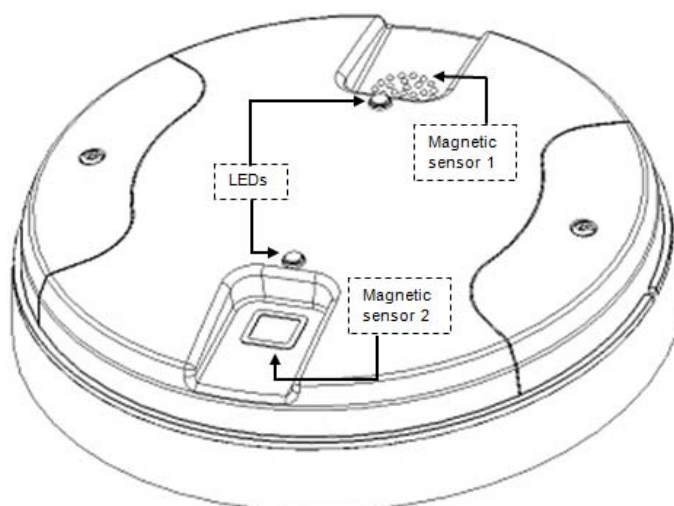


Figure 2.7 W-GATE with LEDs and Magnetic sensors

4. Activate either magnetic sensor with a magnet within ten seconds of starting up the W-GATE while the double red blink is active in the W-GATE. (If you miss this ten-second window, power down the W-GATE and repeat step 1). The LED next to the magnetic sensor emits a red light for one second when it is activated.

When the profile is successfully created, the LEDs on the W-GATE emit green light for five seconds (Refer to 2.7.2, "Magnet Sensor Activations" for further information on activating magnetic sensors). A default profile has been created, containing a mesh ID, and a password. The default password is '12345' and is needed if the W-GATE is locked by the FACP and later accessed by the PC-based configuration tool.

Assign a Previously Created Profile Using a Distributor

To assign an existing profile to the W-GATE (as you would do during a replacement), use the W-GATE that has the profile, or a device in the mesh that contains the profile, to distribute that profile to the W-GATE that requires it. Perform the following steps:

1. Ensure that the W-GATE or other mesh device with the profile is set for distribution (Refer to 2.6.3, "Profile Distribution" or 4.6.2, "Distributor Mode").
2. Start with the device powered off. The process is performed during the start-up.
3. Power on the W-GATE and ensure it is in the factory default state (Refer to steps 1 and 2 in the above topic, "Create a New Profile").
4. Bring the profile distributor within 20 feet of the W-GATE.
5. Wait until the W-GATE blinks only a single red blink (ten seconds after startup).
6. Use a magnet to activate either of the magnetic sensors. The LED blinks a single red every half-second indicating that it is searching for a profile.

When the profile is successfully received from the distributor, the LEDs on the W-GATE emit green light for five seconds. If the profile is rejected, the W-GATE LEDs emit red light for five seconds.

Removing a Profile

To remove the profile from a W-GATE, perform the following steps:

1. Start with the device powered off. The process is performed during the start-up.
2. Power on the W-GATE using SLC power or external +24V. This can be done either by attaching the W-GATE to its mounting plate with the terminals already energized, or by connecting the SLC or external source wiring to a W-GATE that is already installed in its mounting plate.
3. Verify the W-GATE is in the profile modification state; if it is in the profile modification state, both the LEDs on the W-GATE flash yellow (double blink) every second for ten seconds.
4. Activate both the magnetic sensors within ten seconds of starting up the W-GATE (while the double yellow blink is active on the W-GATE) or repeat step 1 (If you miss the ten second window, power down the W-GATE and repeat steps 1 and 2).

The W-GATE LEDs blink green every second for five seconds indicating that the profile is removed.

Create Mesh Network

Mesh formation forms a wireless communication mesh around the W-GATE. The W-GATE communicates with all devices in range that have a common profile and establishes communication links with all the devices. Once a device joins the mesh, it acts as a repeater for devices out of the range of the W-GATE. All devices must be in their final mounting locations prior to initiating the mesh formation. The mesh formation is initiated and terminated by the W-GATE.

To form a mesh network, ensure that the W-GATE is powered on and contains a profile. (Refer to 2.7.3, "LED Indications" for information on how the W-GATE indicates its status). Activate the "Mesh Formation" magnet switch on the W-GATE with a magnet.

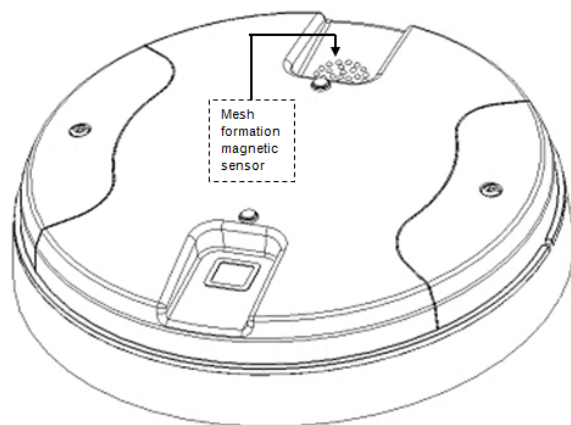


Figure 2.8 Mesh Formation Magnetic Sensor on a W-GATE

The W-GATE transitions to the mesh formation mode and establishes communication with all the devices containing a common profile. The blink pattern in W-GATE indicates that it is in mesh formation mode.

- At this stage, both the LEDs on the W-GATE blink twice every 3.4 seconds.
- The first blink is green and the second blink is red when the W-GATE is acting as a profile distributor and forming the

mesh.

- The first blink is green and the second blink is yellow when the W-GATE is only forming the mesh.

Mesh formation typically takes one minute for each device in the mesh. Mesh formation automatically terminates 10 minutes after the last device joins the mesh. The mesh formation can be terminated manually by the user by activating the mesh formation magnetic sensor again.

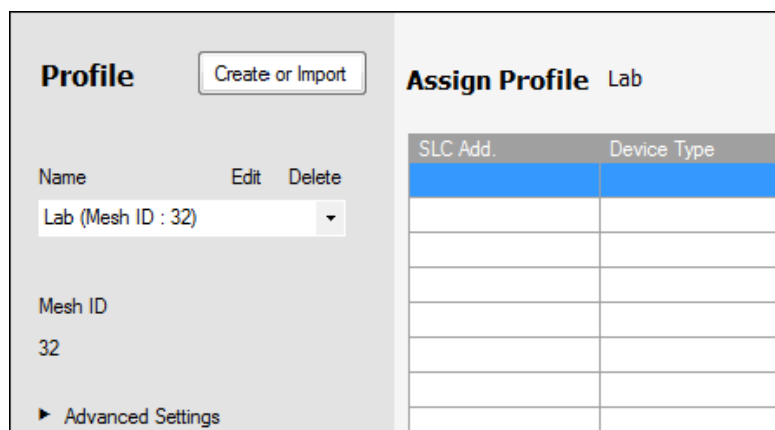
Once the mesh formation is complete, the network transitions to optimize the mesh. For further operating instructions, refer to 2.7, "Operations".

2.6.2 With a PC-based Configuration Tool

Assign Profile with PC Tools

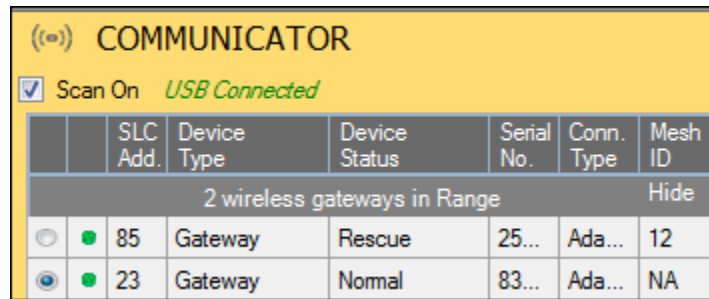
To assign a profile to the W-GATE using the PC Tools application, do the following:

1. Connect the W-USB dongle device to your computer. For more information on USB dongle, refer to Section 5:, "USB Adapter".
2. Launch the PC Tools application. Refer to Appendix B:, "PC tools" to know about launching the PC Tools application.
3. Go to the **Create Mesh Network** step.
4. Create a new profile or import an existing profile as required.
5. Select and open the profile to be assigned to the W-GATE from the **Name** drop-down list in the left panel.



6. Power on the W-GATE in range of the PC Tools.

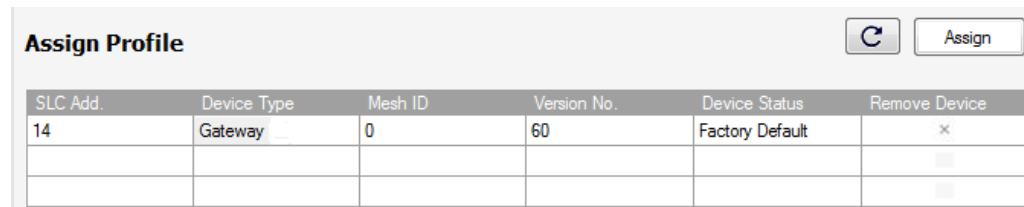
7. Select the W-GATE from the **Communicator** panel.



The screenshot shows the COMMUNICATOR panel with a yellow header. Below the header, there is a checkbox for "Scan On" which is checked, and the text "USB Connected" in green. A table lists two wireless gateways in range. The table has columns for SLC Add., Device Type, Device Status, Serial No., Conn. Type, and Mesh ID. A "Hide" button is located to the right of the table.

SLC Add.	Device Type	Device Status	Serial No.	Conn. Type	Mesh ID
85	Gateway	Rescue	25...	Ada...	12
23	Gateway	Normal	83...	Ada...	NA

8. Click **Assign**.



The screenshot shows the "Assign Profile" dialog box. It has a table with columns: SLC Add., Device Type, Mesh ID, Version No., Device Status, and Remove Device. The first row shows SLC Add. 14, Device Type Gateway, Mesh ID 0, Version No. 60, Device Status Factory Default, and a Remove Device button with an 'x' icon.

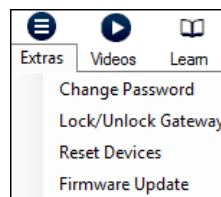
SLC Add.	Device Type	Mesh ID	Version No.	Device Status	Remove Device
14	Gateway	0	60	Factory Default	x

The W-GATE is now included in the list of devices with a profile assigned.

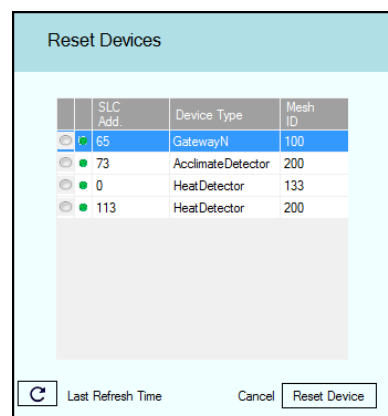
Removing Profile with PC Tools

To remove a profile in a W-GATE using the PC Tools application, do the following:

1. Connect the W-USB dongle device to your computer. For more information on USB dongle, refer to Section 5:, "USB Adapter".
2. Launch the PC Tools application. Refer to Appendix B:, "PC tools" to know about launching the PC Tools application.
3. Go to **Site Survey, Create Mesh Network, or Diagnostics** step.
4. Click **Extras** and select **Reset Devices**. The **Reset Devices** screen appears, displaying the W-GATE and other devices that have a profile assigned.



5. Click to select the W-GATE and click **Reset Device** to remove the profile.



The screenshot shows the "Reset Devices" dialog box. It has a table with columns: SLC Add., Device Type, and Mesh ID. The first row is selected (SLC Add. 65, Device Type GatewayN, Mesh ID 100). Other rows include SLC Add. 73 (AcclimateDetector, Mesh ID 200), SLC Add. 0 (HeatDetector, Mesh ID 133), and SLC Add. 113 (HeatDetector, Mesh ID 200). At the bottom, there are buttons for "Last Refresh Time", "Cancel", and "Reset Device".


SLC Add.	Device Type	Mesh ID
65	GatewayN	100
73	AcclimateDetector	200
0	HeatDetector	133
113	HeatDetector	200

The profile is removed and the W-GATE is reset to factory default state.


Mesh Formation with PC Tools



To create a mesh network using the PC Tools, perform the following steps.

1. Connect the W-USB dongle device to your computer. For more information on USB dongle, refer to Section 5:, "USB Adapter".
2. Launch the PC tools application. Refer to Appendix B:, "PC tools" to know about launching the PC tools application.
3. Go to **Create Mesh Network** step.
4. Navigate to the second step of **Create Mesh Network** by clicking on top of the screen.
5. Click to select the W-GATE displayed in the **Gateways in Range** table, and click 'Start Mesh Formation'.

Steps 1/2
Assign Profile  Next

Gateways in Range

 Start Mesh Formation

Profile Name	Mesh ID	Gateway State	No. of Devices Joined	Total Device Count Expected	Progress Status
	103	Normal		2	
	255	Normal		0	

When the mesh is formed, the tool helps you to track the number of devices that have joined the mesh, and view the progress. The mesh formation terminates 10 minutes after the last device joins the mesh. In addition, it can be terminated by the user by clicking **Stop Mesh Formation**.

Once mesh formation is complete, the network transitions to optimize the mesh. For further operating instructions, refer to 2.7, "Operations".

2.6.3 Profile Distribution

There are two ways to initiate profile distribution from the W-GATE.

- Automatically after creating a profile,
- Activating the profile creating magnetic sensor when it has a profile.

After Creating a Profile

Profile distribution is automatically enabled from the W-GATE after creating a profile. The profile distribution automatically terminates after 10 minutes.

Activating the Profile Magnetic Sensor When it has a Profile

Activating the profile magnetic sensor while it has profile will put the W-GATE in a mode of distributing the profile to any device that requests a profile. The W-GATE's LED pattern will be altered when it is distributing a profile for easy identification. Profile distribution will automatically terminate after 10 minutes. For more information on W-GATE LED patterns, refer to the table in 2.7.3, "LED Indications".

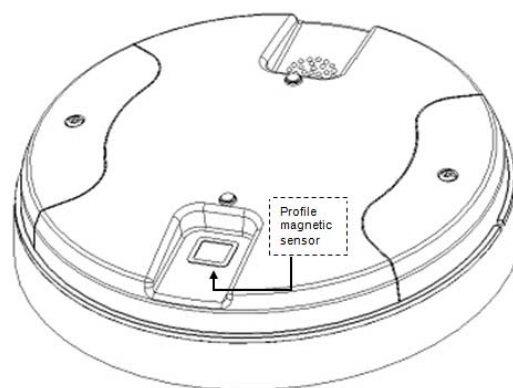


Figure 2.9 Profile Magnetic Sensor on a W-GATE

2.6.4 SLC Configuration

The W-GATE,

- Communicates with the control panel via the SLC circuit.
- Is a LiteSpeed only device.
- CLIP mode is not supported.
- FACPs have limited support for displaying all troubles from the wireless device, and requires the use of an ANN-80 for event details. Refer to the appropriate section below for configuration steps.

Three consecutive SLC addresses are used for a W-GATE. Set the base address using the rotary dials on the W-GATE prior to installation. Ensure the address and the next two addresses on the SLC loop are available.

The base address uses the following configuration parameters:

- Module Type: Monitor
- Type Code Label: Monitor

The W-GATE does not cause any alarms at this address, but the point is used for supervision of the W-GATE.

The base address +1 uses the following configuration parameters:

- Module Type: Monitor
- Type Code Label: Tamper

This address is a latching supervisory condition that goes active whenever a wireless detector in the mesh is removed from its base or a module has its cover plate removed (tamper). This point does not show the address of the tampered device. The ANN-80 displays the device address information.

The base address +2 uses the following configuration parameters:

- Module Type: Monitor
- Type Code Label: Trouble Mon

This address is a tracking trouble condition that goes active whenever a wireless device in the mesh is in a trouble condition. Refer to 3.9.4, "Event Messaging" for the message displayed at the ANN-80 for the trouble event.

The specific address and trouble condition is displayed on the ANN-80.

2.7 Operations

2.7.1 W-GATE Modes of Operation

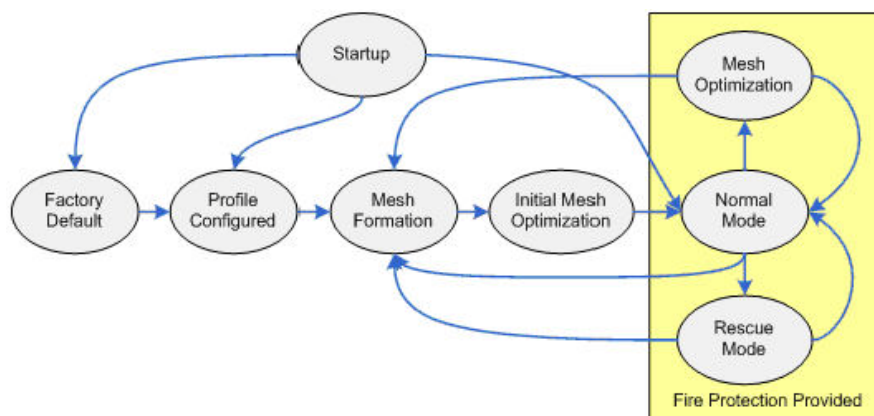


Figure 2.10 W-GATE Modes Of Operation

Start Up

Startup is a temporary mode of operation. It is during the startup mode, that a profile can be created or removed. The startup period lasts for 10 seconds. If a particular unit contains a profile, the LEDs blink yellow twice every second. If the unit does not contain a profile, the LEDs blink red twice every second.

During startup, the W-GATE does not provide fire protection.

After startup, the W-GATE proceeds to the **factory default** state if a profile was removed or missing. In the presence of a profile, the W-GATE will proceed to **mesh formation** if it was previously part of a mesh network or **normal mode** if it was not previously part of a mesh network.

The W-GATE does not respond to the panel during startup. All the three SLC addresses will be an INVALID REPLY.

Factory Default

Factory default is the initial state of the W-GATE. The W-GATE and peripheral devices do not provide any fire protection when they are in factory default mode. The W-GATE does not communicate with wireless devices. The only wireless communication is with the configuration tool. The configuration tool needs to be within 20 feet of the W-GATE for communication. The W-GATE needs to be assigned a profile before continuing the installation.

The W-GATE reports “Factory Default” to the communicator display of the PC Tools application.

The W-GATE’s base address will be normal and the supervisory point (base address + 1) will also be normal. The trouble point (base address + 2) will indicate open circuit.

Profile Configured

The W-GATE enters the profile configured mode after getting assigned a profile from the tool or a distributor or creating a profile. Profile configured is a temporary mode before the W-GATE transitions to mesh formation or normal mode.

The W-GATE does not provide fire protection in the profile configured mode. The W-GATE reports “Profile Assigned” to the communicator display of the PC Tools application.

The W-GATE’s base address will be normal and the supervisory point (base address + 1) will also be normal. The trouble point (base address + 2) will indicate open circuit.

Mesh Formation

The W-GATE must have a profile before entering mesh formation. The W-GATE and the peripheral devices do not provide any fire protection in mesh formation. The W-GATE automatically enters mesh formation in the following ways:

- After creating a profile using the mesh formation sensor.
- After activating the mesh formation sensor with a magnet when the W-GATE contains a profile.
- Automatically after startup when the W-GATE previously was part of a mesh
- By command from the PC Tools application

A W-GATE in mesh formation mode instructs all devices in the mesh to also transition to mesh formation. The W-GATE and all communicating devices search for new or lost devices with the same profile to join the network.

If the W-GATE automatically entered mesh formation after startup, then mesh formation terminates after all existing devices are recovered. If new devices are found or if mesh formation was initiated by the user, then mesh formation terminates after a period of 10 minutes without any new devices joining the mesh. At any point Mesh formation can be terminated by user interaction by activating the magnet sensor again, or by using the PC Tools application.

The W-GATE reports “Mesh Formation” to the communicator display of the PC Tools application.

The W-GATE’s base address will be normal and the supervisory point (base address + 1) will also be normal. The trouble point (base address + 2) will indicate open circuit.

Initial Mesh Optimization

The initial mesh optimization mode automatically runs after each **mesh formation**. The W-GATE and peripheral devices do not provide fire protection during the initial mesh optimization. Mesh optimization analyzes the signal strengths between devices. The W-GATE designates the primary and secondary communication paths between devices that provide a redundant path for all transmissions. Mesh Optimization terminates automatically once all devices have a redundant communication path and signal strengths that meet the requirements of primary and secondary transmission paths. Any device that does not have a redundant path or meet the requirements for signal strength will report a fault.

The W-GATE reports “Optimization” to the communicator display of the PC tools application.

The W-GATE’s base address will be normal and the supervisory point (base address + 1) will also be normal. The trouble point (base address + 2) will indicate open circuit.

Normal Mode

Normal mode can be described as a standard operating state. The mesh network is formed, providing fire protection. The mesh network continuously searches for additional devices with a matching profile to join the mesh. To avoid interference, the mesh network periodically checks for adjacent mesh networks created by Honeywell. The W-GATE reports “Normal” to the communicator display of the PC Tools application.

Rescue Mode

During **normal mode**, when a device loses communication to the network, the W-GATE triggers rescue mode in all communicating devices. All devices in communication continue to provide fire protection during rescue mode, but also searches for a lost or added device. The rescue mode terminates automatically 6 minutes after the last device is rescued and returns to the normal mode. The W-GATE reports “Rescue” to the communicator display of the PC Tools application.

Mesh Optimization

In addition to the **initial mesh optimization**, the routine executes after any restoration of communication to a device or to recover from a link failure (class A fault). Mesh optimization that occurs during the normal mode does not generate a trouble and provides fire protection from all devices that are participating in the mesh communication. The W-GATE reports "Optimization" to the communicator display of the PC Tools application.

Bootloader

The W-GATE enters the bootloader mode when it is being updated using the PC Tools application. The W-GATE does not communicate with the FACP during bootloader mode. The W-GATE reports "Bootloader" to the communicator display of the PC Tools application.

2.7.2 Magnet Sensor Activations

Profile Magnetic Sensor

The profile magnetic sensor (Figure 2.9, "Profile Magnetic Sensor on a W-GATE") is used to create a unique profile on startup. It can also be used to start profile distribution for a W-GATE that contains a profile. The LED next to the profile magnet sensor emits solid red light for ½ a second when the sensor is activated.











Mesh Formation Magnetic Sensor

The mesh formation magnetic sensor (Figure 2.8, "Mesh Formation Magnetic Sensor on a W-GATE") toggles the W-GATE, in and out of mesh formation mode. The initial activation of the sensor puts the W-GATE in mesh formation mode (as long as it contains a profile). A subsequent activation of the magnetic sensor toggles the W-GATE out of mesh formation and into the initial mesh optimization and normal mode. The W-GATE can be placed back into mesh formation by activating the magnet sensor once again. The Mesh formation magnetic sensor can also be used to create a profile on startup for a W-GATE that does not already contain a profile.






The LED next to the mesh formation magnetic sensor emits solid red light for ½ a second when the sensor is activated.

2.7.3 LED Indications





The two LEDs on the W-GATE blink in the same pattern to allow the LED to be viewed from any angle. The LED indications are provided in the table below.

LED Pattern	Condition	Action Required
 <p>Bootloader</p>	Device is ready to update	Use PC based configuration tool to initiate the download
 <p>App loading</p>  <p>App erase</p>	New application code is being downloaded	
 <p>Mesh formation</p>	Gateway is forming the mesh & looking for devices that are not in the mesh	Wait until all devices join the mesh, and then terminate mesh formation
 <p>Mesh formation with profile distribution</p>	Gateway is forming the mesh & looking for devices that are not in the mesh. The gateway is also distributing a profile to any device that requests a profile	Wait until all devices join the mesh, and then terminate mesh formation
 <p>Profile removed</p>	Gateway has returned to the factory default state	
 <p>Profile accepted</p>	Gateway is now profile assigned	
 <p>Normal Mode / Background mesh optimization</p>	Normal operation of the gateway	
 <p>Normal Mode/Background mesh optimization with profile distribution</p>	Normal operation of the gateway. The gateway is also distributing a profile to any device that requests a profile	
 <p>Rescue Mode</p>	Gateway and the mesh network are searching for any device that is not in the mesh network with the same profile	

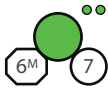
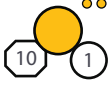
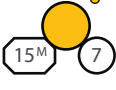
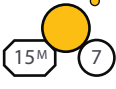



Legend

-  No. of blinks
-  LED color
-  Interval between blink patterns
-  Duration of LED state
-  Approximate duration

Example:

-  Two blinks in this pattern
-  First blink is green. Second is yellow
-  7 sec between blink patterns
-  Will transition to next state after 30 min (approx)

All units are in seconds. Minute is indicated by M.

LED Pattern	Condition	Action Required
 <p>Rescue Mode with profile distribution</p>	Gateway and the mesh network are searching for any device that is not in the mesh network with the same profile. The gateway is also distributing a profile to any device that requests a profile	
 <p>Profile assigned; pending hall sensor activations</p>	starting up with a profile	Activate both hall sensors simultaneously within 10 seconds to remove a profile
 <p>1st mesh optimization</p>	Mesh is formed and initializing	Ensure all devices in the mesh have a valid address.
 <p>1st mesh optimization with profile distribution</p>	Mesh is formed and initializing. The gateway is also distributing a profile to any device that requests a profile	
 <p>Generic Trouble</p>	The gateway has a trouble condition.	Refer to the panel to identify the trouble and possible resolution
 <p>Generic Trouble with profile distribution</p>	The gateway has a trouble condition. The gateway is also distributing a profile to any device that requests a profile.	Refer to the panel to identify the trouble and possible resolution
 <p>Address Trouble</p>	The gateway is in a dual address condition with another wireless module in the mesh or there is a device in the mesh set to address 0.	Ensure all devices in the mesh have a valid address.


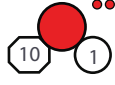



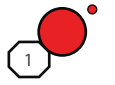
Legend

- No. of blinks
- LED color
- Interval between blink patterns
- Duration of LED state
- Approximate duration

Example:

- Two blinks in this pattern
- First blink is green. Second is yellow
- 7 sec between blink patterns
- Will transition to next state after 30 min (approx)

All units are in seconds. Minute is indicated by M.

LED Pattern	Condition	Action Required
 <p>Address Trouble with profile distribution</p>	<p>The gateway is in a dual address condition with another wireless module in the mesh or there is a device in the mesh set to address 0. The gateway is also distributing a profile to any device that requests a profile.</p>	<p>Ensure all devices in the mesh have a valid address.</p>
 <p>Factory default; pending hall sensor activation</p>	<p>Starting up without a profile</p>	<p>Activate either hall sensors within 10 seconds to create a default profile</p>
 <p>Waiting for profile</p>	<p>Gateway is factory default</p>	<p>Use PC tool to assign profile or activate switch to search for profile</p>
 <p>Searching for profile</p>	<p>Gateway is factory default and requesting a profile from a distributor or another gateway</p>	
 <p>Profile rejected; incompatible device</p>	<p>There is a mismatch between the profile and the gateway.</p>	<p>Recreate the profile or update the gateway</p>
 <p>Create profile</p>	<p>Gateway is creating a default profile</p>	

Legend

- No. of blinks
- LED color
- Interval between blink patterns
- Duration of LED state
- Approximate duration

Example:

- Two blinks in this pattern
- First blink is green. Second is yellow
- 7 sec between blink patterns
- Will transition to next state after 30 min (approx)

All units are in seconds. Minute is indicated by M.

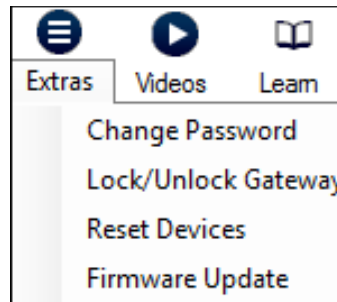
2.7.4 Lock/Unlock W-GATE

The W-GATE can be locked to prevent access to the magnetic sensors and to password-protect all wireless interactions. The lock function can be performed by the PC tool. When the PC tool is used to lock the W-GATE, a password must be provided for all future interactions, including unlocking the W-GATE. If the W-GATE was previously locked with a password from the PC tools, the previous password will be applied. Use this password for all future interactions from the PC Tools application.

Lock/Unlock W-GATE through PC tools

To lock/unlock the W-GATE, perform the following steps.

1. Connect the W-USB dongle device to your computer. For more information on USB dongle, refer to Section 5:, "USB Adapter".
2. Launch the PC tools application. Refer to Appendix B:, "PC tools" to know about launching the PC tools application.
3. Go to **Site Survey**, **Create Mesh Network**, or **Diagnostics** step.
4. Click **Extras**. The following screen is displayed.



5. Select **Lock/Unlock Gateway**.



6. To lock or unlock the gateway, click **Lock** or **Unlock** as required.
 - **Lock** - The **Lock Gateway** screen is displayed. Create a password and click **Lock**. The gateway is locked.
 - **Unlock** - The **Enter password for Gateway** screen is displayed. Enter the password and click **Unlock**. The W-GATE is unlocked.

Password Reset

To reset the password, contact technical support.

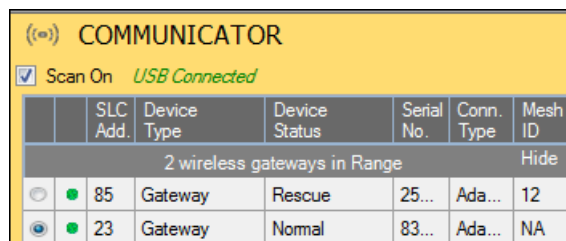
2.7.5 Weak Link Trouble Reporting

The Firelite Wireless Sensor Network uses two paths of communication for each device. To establish the link between devices as a viable communication path, the signal strengths must meet the limits provided in 2.3, "Specifications". The Wireless Sensor Network implements a higher threshold for primary connections to provide an extra layer of robustness and immunity from interference. A weak link trouble condition is initiated for any device that does not have at least one connection at the primary threshold. This is an optional setting that can be disabled to ignore the weak link trouble condition. The trouble can be disabled at the W-GATE.

Disabling Trouble Reporting at the W-GATE Using PC Tools

To disable trouble reporting at the W-GATE through PC tools, perform the following steps:

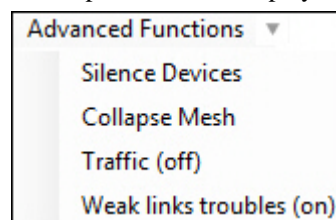
1. Connect the W-USB dongle device to your computer. For more information on USB dongle, refer to Section 5:, "USB Adapter".
2. Launch the PC tools application. Refer to Appendix B:, "PC tools" to know about launching the PC tools application.
3. Go to **Diagnostics** step.
4. Choose the W-GATE from the communicator pane.



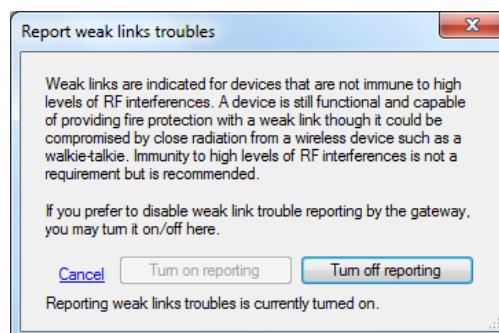
The screenshot shows a window titled "COMMUNICATOR" with a yellow header. Below the header, there is a checkbox labeled "Scan On" which is checked, and a status indicator "USB Connected" in green. Below this is a table with the following columns: SLC Add., Device Type, Device Status, Serial No., Conn. Type, and Mesh ID. The table contains two rows of data, with a header row indicating "2 wireless gateways in Range" and a "Hide" button.

SLC Add.	Device Type	Device Status	Serial No.	Conn. Type	Mesh ID
85	Gateway	Rescue	25...	Ada...	12
23	Gateway	Normal	83...	Ada...	NA

5. Click **View Mesh**.
6. Click **Advanced Functions**. A drop-down list is displayed.



7. Click **Weak links troubles (On)**. The **Report weak links troubles** screen is displayed.



8. Click **Turn off reporting**.

The trouble reporting is disabled.

2.7.6 Collapse Network Command

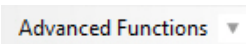
The collapse command is a diagnostic function to break the mesh network. All devices will retain the profile information but will be removed from the mesh. The mesh can be immediately reformed by activating mesh formation.

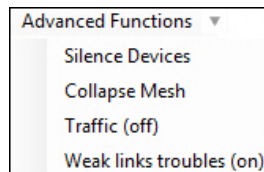
CAUTION: FIRE PROTECTION FROM WIRELESS DEVICES WILL BE LOST WHEN A COLLAPSE COMMAND IS ISSUED.

The mesh network can be collapsed using the PC-based configuration tool.

Collapsing Mesh Network Using PC Tools

To collapse the mesh network using the PC based configuration tool, perform the following steps:

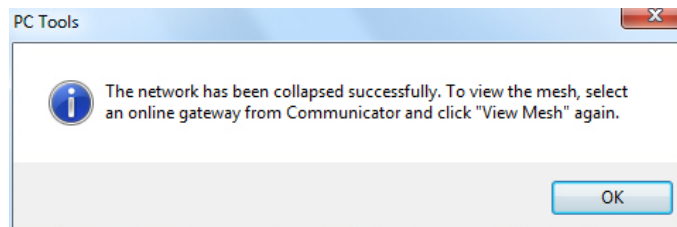
1. Connect the W-USB dongle device to your computer. For more information on USB dongle, refer to Section 5:, "USB Adapter".
2. Launch the PC tools application. Refer to Appendix B:, "PC tools" to know about launching the PC tools application.
3. Go to **Diagnostics** step.
4. Select a Gateway from the communicator pane.
5. Click **View Mesh**. The mesh is displayed.
6. Click **Advanced Functions**  on top of the mesh display. A drop down list is displayed.



7. Click **Collapse Mesh**. The **Collapse mesh network** screen is displayed.



8. Click **Yes**. The network is collapsed and a confirmation is displayed as shown below.



2.7.7 Silence Network Command

The silence network command is a diagnostic function to turn off all radio communication from the wireless devices for the set amount of time. All devices will retain the profile information but will be removed from the mesh. The devices will not send or receive any wireless communication until the set time expires or the device is rebooted. The mesh network can be reformed at the end of the silence period or after the device is restarted.

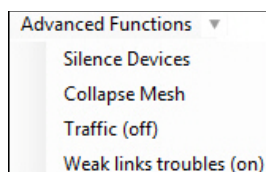
CAUTION: FIRE PROTECTION FROM WIRELESS DEVICES WILL BE LOST WHEN A SILENCE COMMAND IS ISSUED

The mesh network can be silenced using the PC-based configuration tool.

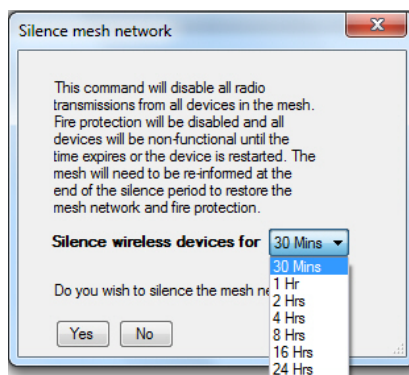
Silencing Mesh Network Using PC Tools

To silence the mesh network using the PC based configuration tool, perform the following steps:

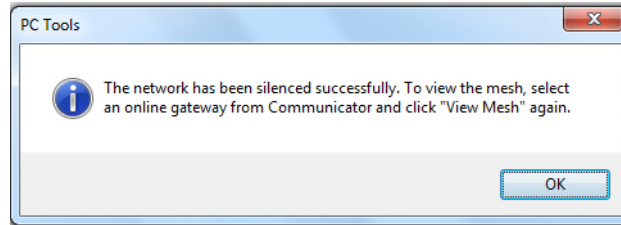
1. Connect the W-USB dongle device to your computer. For more information on USB dongle, refer to Section 5:, "USB Adapter".
2. Launch the PC tools application. Refer to Appendix B:, "PC tools" to know about launching the PC tools application.
3. Go to **Diagnostics** step.
4. Select a Gateway from the communicator pane.
5. Click **View Mesh**. The mesh is displayed.
6. Click Advanced Functions Advanced Functions ▾ on top of the mesh display. A dropdown list is displayed.



7. Click **Silence Devices**. The **Silence mesh network** screen is displayed.
8. Select the time interval to silence the wireless devices from the dropdown list and click Yes.



9. Enter the Verification Password in the Gateway Password screen. The network is silenced and confirmation is displayed as shown below.



2.7.8 Multiple Wireless Sensor Network Installation Restrictions

Firelite's Wireless Sensor Network technology shares the RF spectrum with other Honeywell Wireless Sensor Network systems. Honeywell has established a limit of 4 overlapping networks to avoid congestion in the RF spectrum. If the limit of overlapping systems is exceeded, a system trouble will be generated for the system that detects 4 or more adjacent networks. To resolve this situation, the instances of overlap need to be removed. Refer to Appendix C: "Troubleshooting and Testing" for suggestions on removing overlap between wireless networks. The trouble will be self restoring up to 36 hours after the condition is resolved. To expedite the trouble resolution, toggle the network that is reporting the trouble in and out of mesh formation mode.

2.7.9 Avoiding RF Interference

The Firelite wireless mesh network uses radio frequency hopping spread spectrum technology to communicate in the 900 MHz ISM band (902MHz to 928MHz). Other commercial and industrial products also operate in this band. If two-way radios or other wireless communication devices are used during the installation process it is recommended that they be kept at least 4 feet away from the Firelite wireless devices or that they operate on a different frequency band to ensure rapid mesh formation. A properly installed Firelite wireless mesh network with primary link reporting enabled will be highly immune to RF interference from other wireless products even when they are nearby. The use of the primary link reporting feature is highly recommended. If the system is installed in a controlled environment where other 900 MHz ISM band devices will not be present, the primary link reporting feature may be disabled to permit greater distances between installed devices if required. The Firelite wireless mesh network will be able to automatically detect and avoid certain types of in-band channel interference (often caused by two-way radios) by using an alternate channel set. The system will log detection and avoidance of this kind interference in the W-GATE history as "Walkie Talkie Mode" Entry or Exit and in the NFS2-3030 history as Alternate Channel Set or Normal Channel Set.

Section 3: Wireless Display Driver (W-DIS-D)

This section describes the wireless user interface display driver and how it is connected to the ANN-80. In addition, this section provides information on how to install, configure and monitor the messages on the ANN-80.

3.1 Description

The W-DIS-D and ANN-80 are required for the display of wireless specific events.

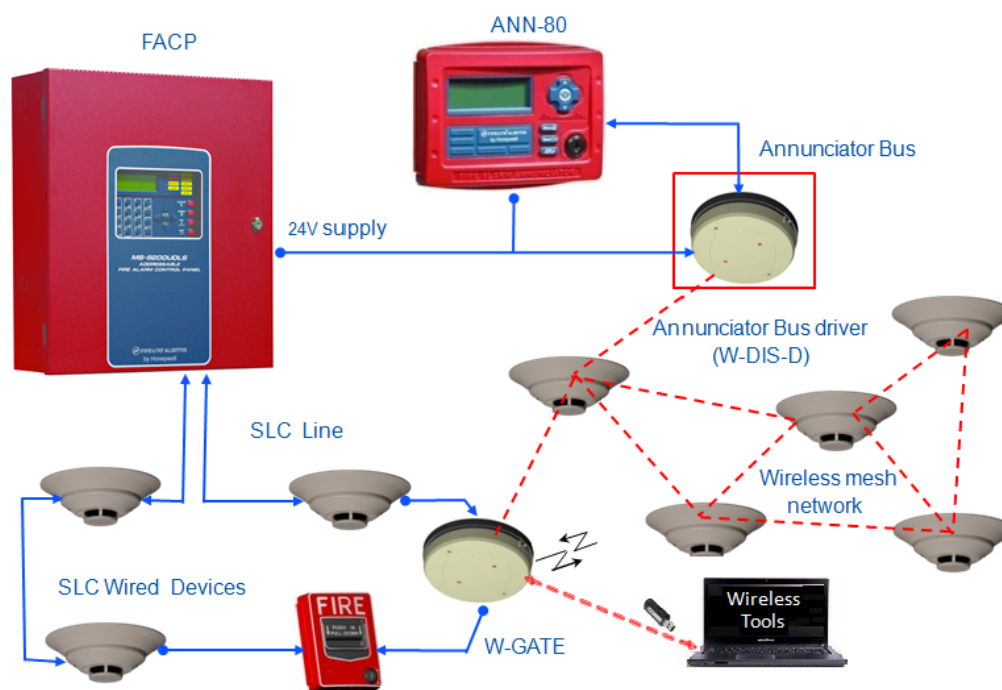


Figure 3.1

The W-DIS-D is a part of the wireless network and has a specific SLC module address. The W-DIS-D and ANN-80 display the wireless specific events that cannot be displayed on the FACP. These wireless events are related to the trouble and supervisory conditions that are specific to the W-GATE and devices. The wireless events are indicated at the FACP as a generic trouble or a supervisory event via the W-GATE utilizing the base address +1 and the base address +2 for supervisory and trouble events respectively. The specific event details are sent to the ANN-80 via an EIA-485 communication line from the W-DIS-D. The following conditions lead to the trouble and supervisory events.

Trouble Events

- Jamming (device communication loss due to RF interference)
- Duplicate address
- Battery low
- Class A missing second link
- Weak link low signal strength
- Mesh Optimization
- Wireless mesh formation in progress
- RF comm loss
- Illegal address

- Maximum Gateway
- Maximum devices

Supervisory Event

- Tamper

3.2 Agency Approvals

3.2.1 FCC

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 PV3WFSLCDUI

WARNING: CHANGES OR MODIFICATIONS NOT EXPRESSLY APPROVED BY THE MANUFACTURER COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.

3.3 Specifications

W-DIS-D

The following are the specifications for the W-DIS-D device.

Specification	Data
Operating Voltage Range	18VDC to 30VDC
Maximum current draw	30 mA
ANN-BUS	Driver: 1.5V - 3.4V and 60 mA max. Receiver: 0.2V - 6V
Radio Frequency	Lower ISM band (915 MHz)
Maximum power output	+17 dBm
Minimum signal strength level needed at the receiver for a primary path with weak link reporting enabled	-63 dBm
Minimum signal strength level needed at the receiver for a secondary path (minimum signal to noise point) or a primary path with weak link trouble reporting disabled	Must be 15 dBm higher than the noise floor down to -87dBm

Table 3.1 W-DIS-D specifications

NOTE: All connections are power limited and supervised.

ANN-80

Specification	Data
Operating Voltage Range (TB1 Terminals 1 & 2)	18VDC to 28VDC
Maximum current drawn	Normal / Standby (no activity): 37.0 mA trouble condition: 39.0 mA
TBI Terminals 3 & 4	ANN-BUS Driver: 1.5V - 5.5V and 60 mA max. Receiver: 0.2V - 6V
Dimensions	6 7/8"W x 5 3/8"H x 1 3/8"D

Table 3.2 ANN-80 Specifications

NOTE: All connections are power limited and supervised.

3.3.1 Environmental Specification

System	Operating Temperature	Storage Temperature	Humidity
W-DIS-D	0°C-50°C	-10°C-50°C	10 to 93% RH Non condensing

3.4 Features**W-DIS-D**

The W-DIS-D has the following features.

Listed to UL standard ANSI/UL 864 edition.

ANN-80

The ANN-80 has the following features.

- Listed to UL standard ANSI/UL 864 edition.
- Control switch ACK for acknowledging the piezo.
- Scrolling keys to scroll up or down when there are multiple events.
- Enclosure supervised for tamper.
- LEDs for trouble and supervisory events.
- Surface mount directly to wall or single, double or 4" square junction box.

3.5 Mounting & Wiring

3.5.1 Mounting W-DIS-D

WARNING: ENSURE THAT THE FORMEX SHEET INSIDE THE W-GATE IS NOT REMOVED OR TAMPERED WHILE INSTALLING OR CLEANING.

The W-DIS-D has two major pieces, the cover and the mounting plate. The mounting plate is mounted to the wall or ceiling and field wiring is connected to it. The cover contains the PC board and is fastened to the mounting plate once the wiring is connected.

Mount the mounting plate directly to an electrical box on the ceiling or wall. The plate mounts directly to 4" square (with and without plaster ring), 4" octagon, 3 1/2" octagon, single gang or double gang junction boxes. If an electrical box is not available, the mounting plate can be mounted to any flat surface and the wiring can be connected via the knockout points in the mounting plate.

To mount the W-DIS-D, do the following:

1. Pull the wiring through the opening in the mounting plate.
2. Mount the mounting plate to the junction box or ceiling. See figure 3.2.
3. Connect field wiring to the terminals, as described in 3.5.2, "Wiring".
4. Connect necessary jumpers where applicable. Refer to section 2.5.3, "W-GATE Powered from SLC".
5. To mount the cover, align the locating pins on the cover to the corresponding slots in the mounting plate. See Figure 3.3, "Cover Attaching to Mounting Plate".

Secure the cover by tightening the mounting screws.

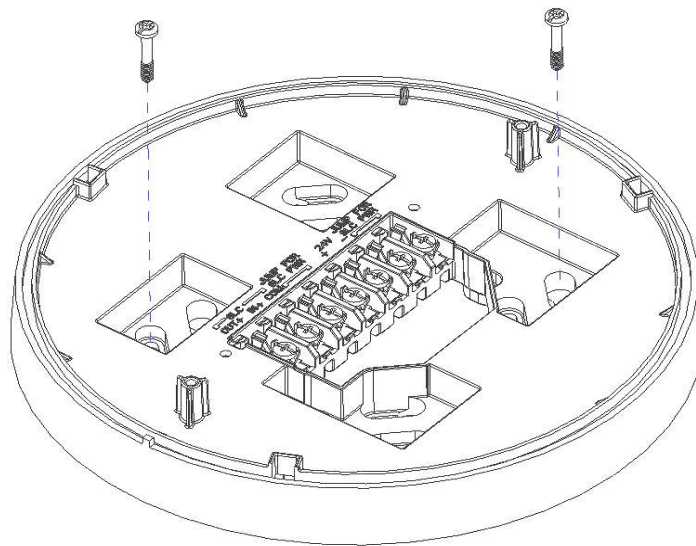


Figure 3.2 Mounting Plate

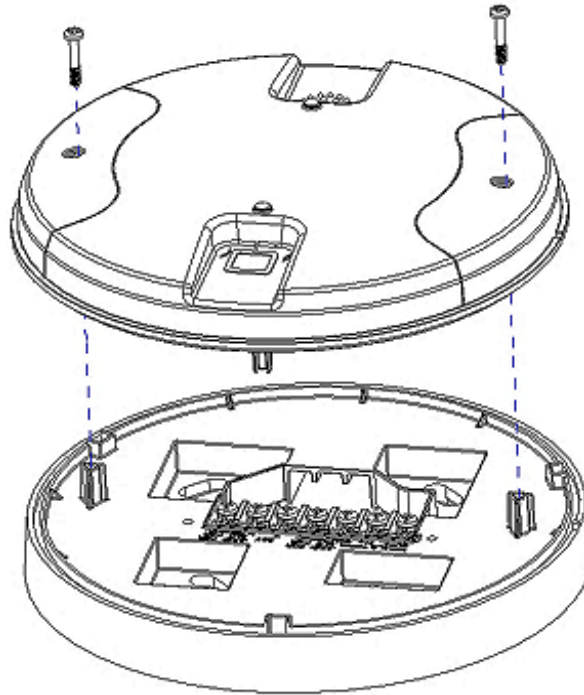


Figure 3.3 Cover Attaching to Mounting Plate

3.5.2 Wiring

- All wiring must be installed in compliance with the National Electrical Code and the local codes having jurisdiction.
- 12-18 AWG is recommended.

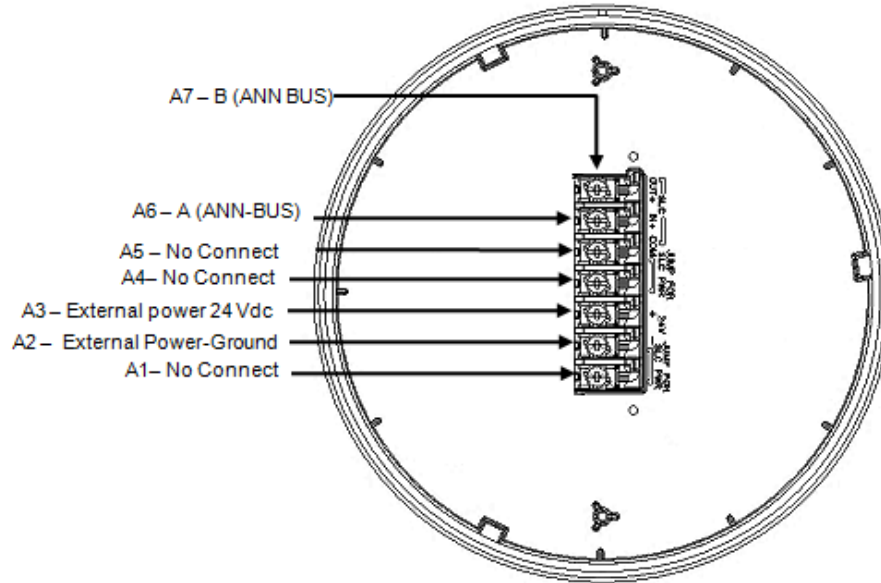


Figure 3.4 Wiring Diagram with Terminal Descriptions

For wiring connections, follow this procedure:

- Strip about 3/8” of insulation from the end of the wire.
- Then, to make the wire connection, slide the bare end of the wire under the appropriate clamping plate, and tighten the clamping plate screw.

3.5.3 ANN-80

Mounting

The ANN-80 has to be mounted next to the Fire Alarm Control Panel. For further instructions on mounting and wiring of ANN-80, refer to ANN-80-series product installation document.

Wiring

ANN-80 Series Terminals (TB1)	ANN-BUS Terminals
Terminal 1 (-)	External power ground
Terminal 2 (+)	External power 24VDC
Terminal 3 (A)	A (ANN-BUS)
Terminal 4 (B)	B (ANN-BUS)

Table 3.3 ANN-80 series to power source

Notes

- 12-18 AWG wire for must be used for the 24VDC circuit.
- The maximum wiring distance is 6000 ft.

The ANN-80 and ANN-BUS requires 24VDC power supply; powered by 24VDC from the host FACP or by remote power supply.

NOTE: Installation and wiring must be done in accordance with the NFPA 72 and local ordinances.

3.6 W-DIS-D Configuration

The configuration of a W-DIS-D starts with assigning a profile. There are two ways to assign a profile.

- Assign profiles using PC Tools.
- Assign profile to a W-DIS-D with W-GATE or Distributor.

NOTE: To assign a profile, the W-DIS-D must be in a factory default state. This is confirmed by a single red light that flashes on the LED. To restore the W-DIS-D to factory default state, refer to section 3.3.3

3.6.1 Assigning Profiles

Assign Profile with PC Tools

To assign a profile to the W-DIS-D using the PC Tools application, do the following:

1. Connect the W-USB dongle device to your computer. For more information on USB dongle, refer to Section 5:, "USB Adapter".
2. Launch the PC Tools application. Refer to Appendix B:, "PC tools" to know about launching the PC Tools application.
3. Go to the **Create Mesh Network** step.
4. Create a new profile or import an existing profile as required.
5. Select and open the profile to be assigned to the W-DIS-D from the **Name** drop-down list in the left panel.

The screenshot shows the PC Tools application interface. On the left, under the 'Profile' section, there is a 'Create or Import' button. Below it, a 'Name' field contains a dropdown menu with 'Lab (Mesh ID : 32)' selected. To the right of the dropdown are 'Edit' and 'Delete' buttons. Below the name field, the 'Mesh ID' is displayed as '32'. At the bottom of this section is a '► Advanced Settings' link. On the right, under the 'Assign Profile' section, there is a 'Lab' label and a table with two columns: 'SLC Add.' and 'Device Type'. The table has a header row and several empty rows below it.

6. Switch on the W-DIS-D in range of the USB adapter, which is connected to the laptop or PC where PC tool is installed.

7. Select the W-DIS-D from the **Communicator** panel. The W-DIS-D is listed by its generic name, "LCD UI".

SLC Add.	Device Type	Device Status	Mesh ID	More Info
No Mesh Networks in range of USB adapter				
13 Devices in range of USB adapter				
007	Detector	Factory Default	.	i
008	Detector	Factory Default	.	i
011	Gateway	Profile Assigned	5	i
022	LCD UI	Profile Assigned	5	i

8. Click **Assign**.

SLC Add.	Device Type	Mesh ID	Version No.	Device Status	Remove Device
141	LCD UI	0	40	Factory Default	x

The W-DIS-D is now included in the list of devices with a profile assigned. When the profile is assigned, the LED emits a solid green light for 10 seconds.

Assigning a Profile to a W-DIS-D with W-GATE or Distributor

A W-GATE that has a profile can be used to distribute the profile to a W-DIS-D. The W-GATE must be in a state where it can distribute a profile. For further information on profile distribution from a W-GATE, refer to 2.6.3, "Profile Distribution". A device that has a profile can be used to distribute the profile by using distributor mode. For more information on distributor mode of a device refer to 4.6.2, "Distributor Mode".

To transfer profile from W-GATE/distributor to W-DIS-D, do the following:

1. Bring the W-DIS-D within the range of the W-GATE or the distributor device.
2. Power on the W-DIS-D. Ensure the W-DIS-D is in the factory default state. A single or double red light flashes on the LED confirming that the W-DIS-D is in the default state.
3. Activate either magnet sensors to make the W-DIS-D request the profile.

Once a magnet sensor is activated, the LED flashes red light every half second indicating that it is requesting a profile. If the profile is successfully received, the LED emits a solid green light for 10 seconds. If the profile is not received within a minute, the LED flashes a red light every ten seconds indicating that it has stopped requesting for a profile.

3.6.2 Mesh Formation

To add a W-DIS-D to a mesh, refer to , "Mesh Formation with PC Tools" or “, "Mesh Formation".

3.6.3 Removing Profiles

Restoring a W-DIS-D to Factory Default Without Using the PC-based Configuration Tool

To remove a profile from a W-DIS-D without using the PC-based configuration tool, perform the following steps:

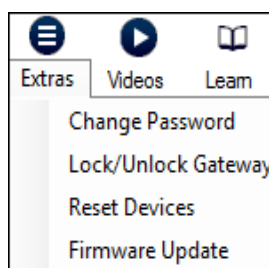
1. Start with the device powered off. The process is performed during the start-up
2. Power on the W-DIS-D using external +24V. This can be done either by attaching the W-DIS-D to its mounting plate with the terminals already energized, or by connecting the external source wiring to a W-DIS-D that is already installed in its mounting plate.
3. Verify the W-DIS-D is in the profile modification state; if it is in the profile modification state, both the LEDs on the W-DIS-D flash yellow (double blink) every second for ten seconds.
4. Activate both the magnetic sensors within ten seconds of starting up the W-DIS-D (while the double yellow blink is active in the W-DIS-D) or repeat step 1.
5. The W-DIS-D LEDs blink green every second for five seconds indicating that the profile is removed.

NOTE: After following the above steps, the profile is erased and the device returns to factory default state. This is indicated by five green blinks every 0.5 seconds.

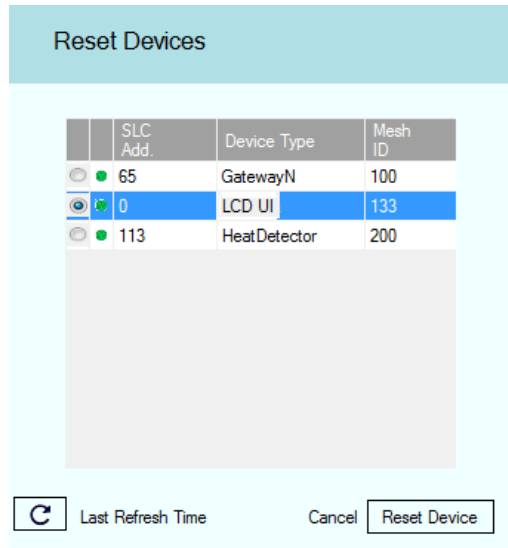
Restoring a W-DIS-D to Factory Default with the PC-based Configuration Tool

To restore a W-DIS-D to factory default state with the PC-based configuration tool, perform the following steps:

1. To remove a profile in a device using the PC Tools application, do the following:
2. Connect the W-USB dongle device to your computer. For more information on USB dongle, refer to Section 5:, "USB Adapter".
3. Launch the PC Tools application. Refer to Appendix B:, "PC tools" to know about launching the PC Tools application.
4. Go to **Site Survey, Create Mesh Network** or **Diagnostics step**.
5. Click **Extras** and select **Reset Devices**. The **Reset Devices** screen appears, displaying the W-DIS-D and other devices that have the profile assigned.



6. Click to select the required device and click **Reset Device** to remove the profile.



The profile is removed and the device is reset to factory default state.

3.7 ANN-80 Configuration

To configure the ANN-80, set the serial address of ANN-80 to 1 when it is connected to W-DIS-D. To set the serial address of the ANN-80, refer to the ANN-80 series product installation document.

3.8 W-DIS-D Operations

Table 3.4 outlines the wireless related events and the location of display.

Events	FACP	Annunciator
Alarm (Detector or Module activations)	YES (Address specific to the initiating device)	NO (No Display)
Tamper	YES (Generic Supervisory at GW +1 address)	YES (Detailed display with SLC address)
RF related trouble conditions - Jamming, Battery Low, Duplicate address, Class-A missing second link, Weak link low signal strength.	YES (Generic Trouble GW +2 address)	YES (Detailed display with SLC address)
Wireless Device Missing from network	YES (No Answer/Invalid response for the specific SLC Address)	NO
W-GATE initializing, wireless mesh formation in progress.	YES (Generic Trouble GW +2 address)	YES (no address specified)
Illegal address	YES (Generic Trouble GW +2 address)	YES (address zero)
Mesh capacity exceeded	YES (Generic Trouble GW +2 address)	YES (W-GATE base address)
RF comm loss	YES (No Answer/Invalid response for the W-DIS-D SLC Address)	YES
Normal	None	Mesh ID number

Table 3.4 Event Display Location Table

NOTE: One W-DIS-D is required for one W-GATE. Multiple W-GATE installations require a W-DIS-D for each W-GATE.

3.8.1 W-DIS-D Operations

Modes of Operation Not in a Mesh Network

■ Bootloader

In this mode, the W-DIS-D cannot participate in a mesh and cannot provide fire protection. The W-DIS-D will be available in the communicator window of the PC Tool with a status “Bootloader”. To get a device out of bootloader, refer to the troubleshooting section.

■ Factory Default

In this mode, the W-DIS-D is not associated with the W-GATE. For further information on assigning a profile, refer to section 3.6.1. In this mode, the W-DIS-D will be viewable in the communicator window of the PC tool with a state of “Factory Default”. The ANN-80 will display RF COMM LOSS when the W-DIS-D is at Factory Default state.

■ Profile Configured

In this mode, the W-DIS-D is associated with the W-GATE but is not an active participant in the mesh network. For further information on mesh formation, refer to, “4.6.3, "Mesh Formation". To remove a profile from a W-DIS-D, refer to section, “3.6.3, "Removing Profiles".

In this mode, the W-DIS-D will be viewable in the communicator window of the PC tool with a state of profile configured. The ANN-80 will display RF COMM LOSS when the W-DIS-D is at factory default state.

Modes of Operation as a Mesh Participant

■ Mesh Formation Mode

In this mode, the W-DIS-D is an active participant in a mesh that is forming. The LED flashes in the following pattern: First blink green, second blink yellow for every 6.8 seconds. For further information on mesh formation mode, refer to, “4.6.3, "Mesh Formation". The W-DIS-D will not communicate directly with the tool for display in the communicator. The status of the W-DIS-D must be obtained via the W-GATE. The ANN-80 will display ‘Mesh Formation in Progress’ during mesh formation mode.

■ Initial Mesh Optimization Mode

In this mode, the mesh network is formed and is in the process of establishing stronger communication paths. The LED pattern flashes in the following pattern: A single yellow blink every 6.8 seconds. For further information on initial mesh optimization mode, refer to the topic, "Initial Mesh Optimization". The W-DIS-D will not communicate directly with the tool for display in the communicator. The status of the W-DIS-D must be obtained via the W-GATE. The ANN-80 will display Gateway Initializing during the initial mesh optimization mode.

■ Normal Mode

In this mode, the mesh network formation is complete. The LED flashes in the following pattern: A single green blink every 13.6 seconds. The LED flash can be disabled by panel configuration. If a device is in trouble, it will be displayed at the ANN-80 or the FACP. For information, refer to 3.9.4, "Event Messaging". The W-DIS-D will not communicate directly with the tool for display in the communicator. The status of the W-DIS-D must be obtained via the W-GATE. The ANN-80 will display the mesh ID when the system is normal, or will display a wireless event as specified in 3.9.4, "Event Messaging".

■ Rescue Mode

In this mode, devices that are active participants in the mesh search and retrieve the devices that have lost the communication link. The rescue mode is indicated by the following LED pattern: One green blink every 6.8 seconds. For more information on rescue mode refer to “2.7.1, "W-GATE Modes of Operation" The W-DIS-D will not communicate directly with the tool for display in the communicator. The status of the W-DIS-D must be obtained via the W-GATE.







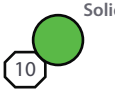
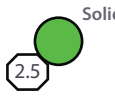

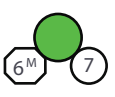


The ANN-80 will display the mesh ID when the system is normal, or will display a wireless event as specified in 3.9.4, "Event Messaging".

SLC Operation






Program the point as a monitor point. When the communication to the ANN-80 is missing or disrupted, the point will indicate open circuit. The monitor point will not initiate an alarm condition.

3.8.2 W-DIS-D LED Indications





The two LEDs on the devices blink in the same pattern to allow the LED to be viewed from any angle. The LED indications are provided in the table below.

LED Pattern	Condition	Action Required
 <p>Bootloader</p>	Device is ready to update	Use PC based configuration tool to initiate the download
 <p>Slot request rejected</p>	Device not permitted into the mesh	Confirm device count and software version
 <p>Mesh Forming</p>	Device is in the mesh & looking for devices that are not in the mesh	
 <p>App erase</p>  <p>App loading</p>	New application code is being downloaded	
 <p>Profile removed</p>	Device has returned to factory default state	
 <p>Profile received</p>	Device is now profile assigned.	
 <p>Battery Check - All batteries are fresh</p>	Minimum of 2.5 years battery life remaining	
 <p>Distributor mode</p>	Device is distributing its profile to other devices which requested profile	
 <p>Rescue mode</p>	Device is functioning as normal and searching for lost devices	
 <p>Background mesh optimization</p>	Device is functioning as normal and optimizing parent-child connectivity	
 <p>Normal mode</p>	Device is functioning as normal	



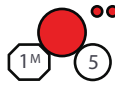




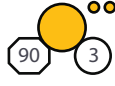


Legend

-  No. of blinks
-  LED color
-  Interval between blink patterns
-  Duration of LED state
-  Approximate duration

Example:

-  Two blinks in this pattern
-  First blink is green. Second is yellow
-  7 sec between blink patterns
-  Will transition to next state after 30 min (approx)

All units are in seconds. Minute is indicated by M.

LED Pattern	Condition	Action Required
	Waiting for profile Device is factory default	Use PC tool to assign profile or activate switch to search for profile
	Searching for profile Device is factory default and requesting a profile from a distributor or gateway	
	Pending site survey Device is factory default and is ready to enter site survey	Clear the tamper condition within 1 minute to enter site survey
	Self test fail Device has failed internal self diagnostics	Restart the device. If problem persists. Contact customer support
	Factory Command Device is in a configuration state.	Restart the device. If problem persists. Contact customer support
	Profile modification Device has a profile and can be set as distributor or have profile removed	Set code wheel pattern to enter the desired mode
	Battery Check - All batteries are present Minimum of 6 months battery life remaining	
	Searching for mesh (in rescue mode) Profile is assigned and device is searching for the mesh	Ensure the mesh is in rescue mode or wait for timeout to search mesh in formation mode
	Searching for mesh (in formation mode) Profile is assigned and device is searching for the mesh	Ensure the mesh is in formation mode
	1st Mesh optimization Mesh is formed and initializing	







Legend

- No. of blinks
- LED color
- Interval between blink patterns
- Duration of LED state
- Approximate duration






Example:

- Two blinks in this pattern
- First blink is green. Second is yellow
- 7 sec between blink patterns
- Will transition to next state after 30 min (approx)





All units are in seconds. Minute is indicated by M.

LED Pattern	Condition	Action Required
 <p>Device generic trouble (Eg: Low battery, Partial link condition)</p>	Device is in the mesh and in trouble condition.	Refer to the panel to identify the trouble and possible resolution
 <p>Device address trouble (Eg: Dual address, Zero address)</p>	Device is in the mesh but has a incorrect SLC address	Verify the address is non duplicate and non zero
 <p>Sustained tamper</p>	Device is tampered	Ensure detector is in the base and module has the face-plate on
 <p>Tamper entry</p>	Device has just been tampered	Ensure detector is in the base and module has the face-plate on
 <p>Battery Check - Weak</p>	Less than 6 months or not all 4 batteries present	Ensure all 4 batteries are present or replace the batteries.
 <p>Alarm state</p>	Device is functioning as normal and has been activated	

Legend

-  No. of blinks
-  LED color
-  Interval between blink patterns
-  Duration of LED state
-  Approximate duration

Example:

-  Two blinks in this pattern
-  First blink is green. Second is yellow
-  7 sec between blink patterns
-  Will transition to next state after 30 min (approx)

All units are in seconds. Minute is indicated by M.

3.8.3 Switches

The W-DIS-D has two magnetic sensor switches. The switches are used to remove a profile as described in 3.6.3, "Removing Profiles" or to request a profile as described in 3.6.1, "Assigning Profiles".

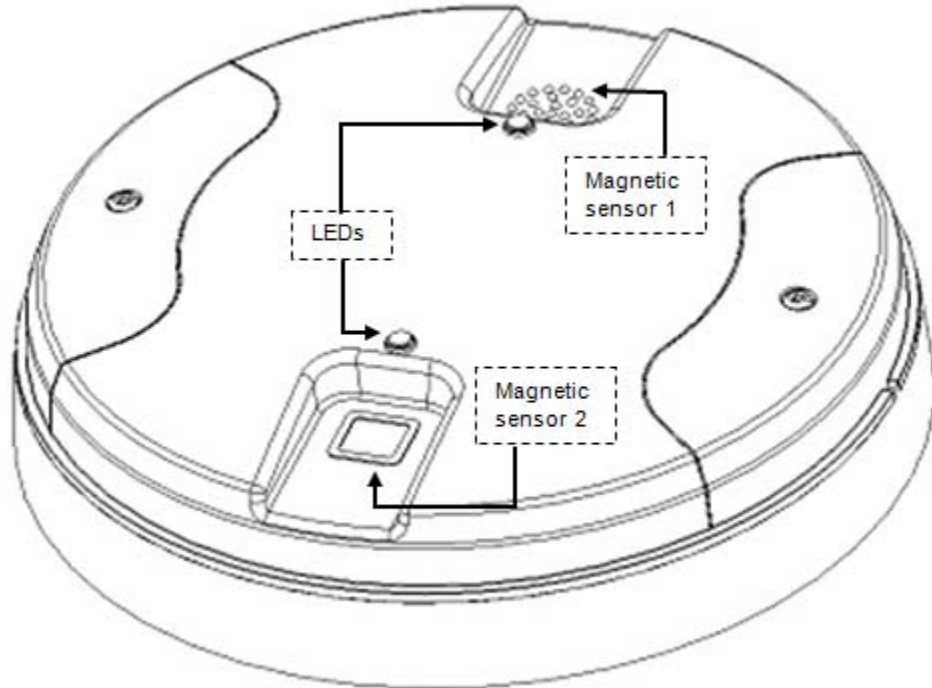


Figure 3.5 W-DIS-D

3.9 ANN-80 Operations

The ANN-80 displays wireless specific events for the associated mesh network. Alarm conditions and trouble events that are displayed by the FACP are not displayed at the ANN-80. The ANN-80 incorporates an automatic resound of the piezo and trouble indicator every 4 hours for active events.

3.9.1 Buttons and Switches

The buttons and switches in the ANN-80 are displayed below in the image and are explained in the Table 3.5 .

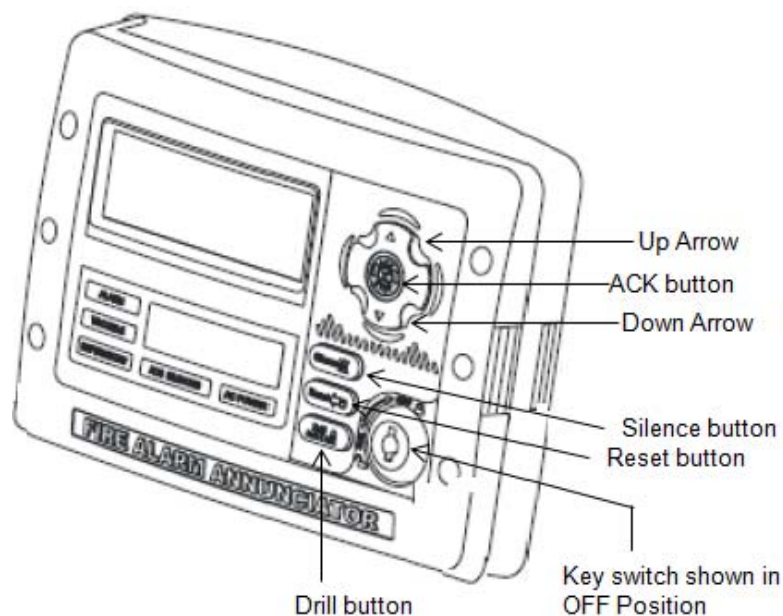


Figure 3.6 Buttons in ANN-80

Button	Action
Drill button	Not Used
Up Arrow	Press the UP Arrow to scroll up through the messages
Ack button	Press the ACK button to acknowledge the messages
Down Arrow	Press the Down Arrow to scroll down through the messages
Silence button	Not Used
Reset button	Press the Reset button to clear latching wireless events
Key switch	Use the Key switch to switch on and switch off, to enable the Reset button

Table 3.5

3.9.2 Visual Indicators

The visual indicators in the ANN-80 are displayed in the below image and are explained in the Table 3.6.

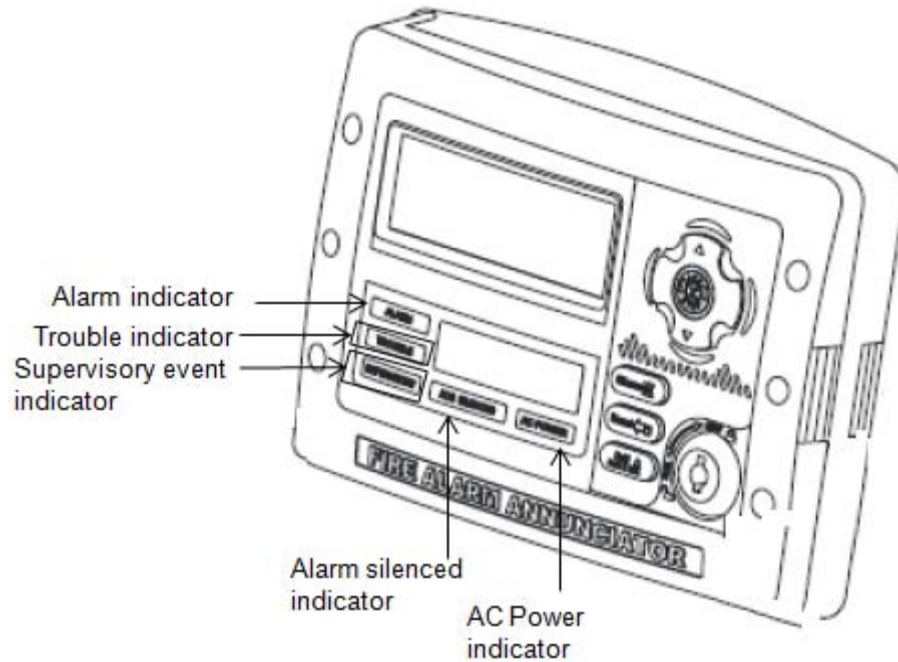


Figure 3.7 Visual Indicators in ANN-80

Indicator buttons	Action
Alarm	Not Used
Trouble	The trouble LED blinks yellow for any unacknowledged trouble event, and it glows steady for acknowledged trouble events
Supervisory	The Supervisory LED blinks yellow for any unacknowledged tamper event, and it glows steady for acknowledged tamper events
Alarm Silenced	Not Used
AC Power	Not used

Table 3.6

3.9.3 Audible Indicators

The wireless events are sent to the FACP as generic trouble or supervisory events by the W-GATE and the details of the specific events are sent to the ANN-80 by the W-DIS-D. The FACP piezo activates for the first trouble event and the first supervisory event. The FACP piezo will not activate for additional trouble events or supervisory events when the initial event is still active. The ANN-80 piezo will not activate for the first event but will sound for each event after the initial event.

Use the ACK button to acknowledge the piezo. The reset function can be enabled in the ANN-80 using the key switch. To enable the reset button, insert the key into the key switch and turn the key switch counter clockwise to the **ON** position.

To silence the buzzer, press the ACK key on the ANN-80 (Figure 3.6).

3.9.4 Event Messaging

The wireless specific events are related to the wireless W-GATE and devices. These events are displayed and notified on the FACP and N-ANN 80 in the form of messages. These messages are displayed based on their occurrences. You can scroll through the messages using the up arrow and down arrow buttons.

LCD UI Not in Network

The message, 'RF COMM LOSS' is displayed when the W-DIS-D is not in the network. The message displayed is if the W-DIS-D is in Bootloader, factory default, or profile assigned state but not a part of a mesh network. RF COMM LOSS is a tracking event that will clear once the W-DIS-D joins a mesh network.

R F C O M M L O S S

Mesh Formation In Progress

The message, 'MESH FORMATION IN PROGRESS' is displayed when the network is in mesh formation mode. Mesh Formation in Progress is a tracking trouble that will clear once the W-GATE exits mesh formation mode.

T R O U B L E W I R E L E S S
M E S H F O R M A T I O N
I N P R O G R E S S

NOTE: The ANN-80 must join the network to show this message. If it is not present in the network, 'RF Comm Loss' message is displayed.

Low Battery Event

The low battery event denotes that:

- The device has less than one month power left to perform the required operations.

Or

- Presence of less than four viable batteries.

The low battery event is a latching condition. To clear the low battery event, tamper the device and replace all the four batteries. When a device is tampered, it drops out of the mesh network and attempts to rejoin as soon as the batteries are replaced and the tamper event is cleared. The low battery levels on the wireless devices are displayed as a trouble in the ANN-80 and generic trouble on the FACP. Initiate a RESET at the ANN-80 to clear the low battery event.

It is displayed as the following ASCII text on the ANN-80.

```

T R O U B L E   B A T T E R Y   L O W
                A D D R E S S - D 0 5 0
O f f   N o r m   E v e n t s -   0 0 3

```

Trouble Jamming Event

Jamming occurs when a device is overloaded with an interfering RF signal; but is able to send the messages out. A jamming event is detected after 20 seconds of exposure to the jamming signal. The jamming event is displayed as a trouble event in the ANN-80 and generic trouble event on the FACP. Jamming is a tracking trouble. To clear the jamming trouble, remove any interference sources near the point that is reporting the trouble.

```

T R O U B L E   J A M M I N G
                A D D R E S S - D 0 5 0
O f f   N o r m   E v e n t s -   0 0 2

```

Duplicate Address

Two wireless devices on the same mesh network that are set to the same address reports a duplicate address trouble. Duplicate address is a tracking trouble that will self restore once the conflict has been resolved.

The following graphic illustrates the duplicate address trouble.

```

T R O U B L E   D U P L I C A T E
                A D D R E S S
                A D D R E S S - D 0 5 0
O f f   N o r m   E v e n t s -   0 0 3

```

Degraded Connection

The class A fault denotes a single connection path from the device. The wireless system is a class A system requiring two communication paths for normal operations. To remedy the class A fault, ensure adequate device spacing or the use of a repeater may be required. The wireless mesh is a self healing network. If the trouble is not cleared within 5 minutes, additional actions may be required. Refer to the troubleshooting section for tips on resolving class A fault conditions.

The following graphic illustrates the Class A trouble.

```

T R O U B L E   C L A S S   A
M I S S I N G   2 N D   L I N K
                A D D R E S S - D 0 5 0
O f f - N o r m   E v e n t s -   0 0 1

```

System Initialization

ANN-80 displays the below displayed message when it initializes. Gateway initializing is a tracking trouble that is active during the first mesh optimization. Once the first mesh optimization routine executes, the trouble will clear.

```

T R O U B L E   W I R E L E S S
G A T E W A Y   I N I T I A L I Z I N G

```

System Normal

ANN-80 displays the below displayed message when the system is functioning normally and there are no wireless troubles in the system.

```

W I R E L E S S   G W   D I S P L A Y
M E S H   I D   0 2 5

```

Tamper Event

A tamper trouble indicates that a detector is not firmly attached to the base or, cover plate is not properly attached in a module. The Tamper events are displayed as supervisory events in the ANN-80 and generic supervisory events on the FACP. Tamper is a latching condition that requires a reset at the ANN-80 to clear.

```

S U P E R V I S O R Y   T A M P E R
                A D D R E S S - D 0 5 0
O f f   N o r m   E v e n t s -   0 0 4

```


Weak Link

A weak link trouble indicates that the connection of a device with its parent device is weak, since the signal strength fails to meet the minimum RSSI threshold. The threshold is -50 dB during commissioning mode and -58 dB during normal mode. The trouble will be cleared only if the parent-child signal strength goes above the required RSSI threshold, or if a mesh optimization is triggered.

```

T R O U B L E   W E A K   L I N K
L O W   S I G N A L   S T R E N G T H
                A D D R E S S - D 0 5 0
O f f - N o r m   E v e n t s -   0 0 1

```

Key Bus Trouble

A Key bus trouble indicates that the ANN-80 has lost connection with W-DIS-D.

```

1 2 4 1 2 3 1   1 2 / 1 2 / 0 5
K e y   B U S   T r o u b l e

```

Capacity Exceeded

A device count trouble indicates that there are fifty devices that are already present in the mesh and one more device is trying to join the network.

```

T R O U B L E   M E S H
C A P A C I T Y   E X C E E D E D
                A D D R E S S - M 0 5 0
O f f   N o r m   E v e n t s -   0 0 3

```

Maximum Gateways

Gateways Exceeded trouble indicates that the number of overlapping gateways exceeds the limit of 4 gateways. The trouble will be cleared only when the number of overlapping gateways is reduced to 4.

```

T R O U B L E   M A X I M U M
G A T E W A Y S   E X C E E D E D
                A D D R E S S - M 0 5 0
O f f   N o r m   E v e n t s -   0 0 3

```

3.9.5 Clearing messages

The events that are tracking will clear once the event returns to the normal state. Events that are latching require a reset at the ANN-80. To reset messages, press the **Reset** button in the ANN-80. Refer Figure 3.5. To reset messages in the panel, initiate a system reset in the FACP.

3.9.6 LED Indications

The LED Indications in the ANN-80 are provided below.

DEVICE/MODULES	LED COLOR	FUNCTION
Annunciator	Yellow	The trouble button blinks yellow until it is acknowledged, to indicate trouble state.
	Yellow	The supervisory button blinks yellow until it is acknowledged, to indicate supervisory state.

Section 4: Devices

4.1 Description

Subsystem Overview

The Wireless Sensor Network consists of the following devices:

■ W-SD355 - Wireless Photoelectric Smoke Detector - FCC ID AUBWFSSD

The wireless photoelectric smoke detector is powered by four CR123A batteries. It has a sensor head to detect smoke and LEDs to indicate the activation & trouble status. For further details, refer to the table in 4.7.2, "LED Indications".

■ W-SD355T- Wireless Photo/Heat Detector - FCC ID AUBWFSSD

The wireless Photo/Heat detector is powered by four CR123A batteries. It has a sensor head to detect heat and LEDs to indicate activation & trouble status. For further details, refer to the table in 4.7.2, "LED Indications".

■ W-H355R- Wireless Rate of Rise Heat Detector - FCC ID AUBWFSSD

The Rate of Rise heat detectors are powered by four CR123A batteries. The detectors have LEDs, to indicate the activation & trouble status. For further details, refer to the table in 4.7.2, "LED Indications".

■ W-H355- FIX135 Wireless Fixed Heat Detector - FCC ID AUBWFSSD

The Fixed heat detectors are powered by four CR123A batteries. The detectors have LEDs, to indicate the activation & trouble status. For further details, refer to the table in 4.7.2, "LED Indications".

■ W-MMF- Wireless Monitor Module - FCC ID AUBWFSMM

The wireless monitor module is powered by four CR123A batteries. It can be connected to a switch within three feet of its location or wired directly to the pull station. The module has LEDs, to indicate the activation & trouble status. For further details, refer to the table in 4.7.2, "LED Indications".

4.2 Agency Approvals

4.2.1 FCC

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.

WARNING: CHANGES OR MODIFICATIONS NOT EXPRESSLY APPROVED BY THE MANUFACTURER COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.

4.3 Specifications

The following are the specifications for the devices.

Specification	Data
Radio Frequency	Lower ISM Band (915 MHz)
Maximum power output	+17dBm
Minimum signal strength level needed at the receiver for a primary path with weak link trouble reporting enabled.	-50dBm
Minimum signal strength level needed at the receiver for a secondary path or primary path with weak link trouble reporting disabled.	Must be 15 dBm higher than the noise floor down to -87dBm
Maximum ambient noise level	-90dBm
Minimum battery life	1 year

Table 4.1 Device Specifications

The below table provides details on the device references.

Model	Description	Manual
W-SD355	Wireless LiteSpeed Detector, Photo	W-SD355 and W-SD355T Intelligent Wireless Photoelectric Smoke Sensors. Manual part number for the above devices- I56-4081-000
W-SD355T	Wireless LiteSpeed Detector, Photo/Heat	
W-H355R	Wireless LiteSpeed Heat sensorHeat, Rate Of Rise 135	W-H355R and W-H355 and Intelligent Wireless Temperature Sensors. Manual part number for the above devices- I56-4082-000
W-H355	Wireless LiteSpeed Heat sensor Heat, Fixed Temp135	
W-MMF	Monitor Module	W-MMF Wireless Monitor Module Manual part number - I56-4083-000

Table 4.2 Device References

4.4 Installing Devices

For information on installing the devices, refer to the manuals mentioned in the above table.

4.5 Mounting & Wiring

For information on mounting and wiring, refer to the manuals mentioned in the table 4.2.

4.6 Configuration and Programming

The configuration of a device starts with assigning a profile. Refer to the instructions below for assigning a profile.

- Assigning profiles using PC Tools.
- Assigning profile to a detector with a W-GATE or distributor.
- Assigning profile to a module with a W-GATE or distributor.

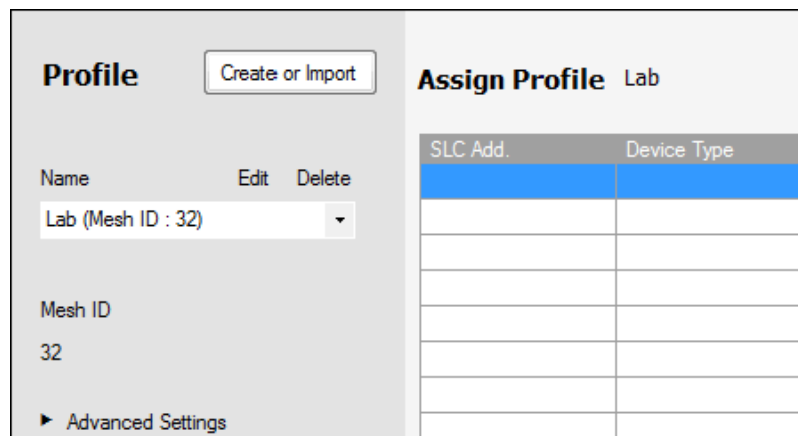
4.6.1 Assigning Profiles

NOTE: To assign a profile, the device must be in a factory default state. A single red light flashes on the LED confirming that the device is in the default state. To restore the device to factory default state, refer to 4.6.4, "Restoring a Device to Factory Default".

Assigning Profile Using PC Tools

To assign a profile to the device using the PC Tools application, do the following:

1. Connect the W-USB dongle device to your computer. For more information on USB dongle, refer to Section 5:, "USB Adapter".
2. Launch the PC tools application. Refer to Appendix B:, "PC tools" to know about launching the PC tools application.
3. Go to the **Create Mesh Network** step.
4. Create a new profile or import an existing profile as required.
5. Select and open the profile to be assigned to the device from the **Name** drop down list in the left panel.



6. Switch on the device in range of the USB adapter, which is connected to the laptop or PC where PC tool is installed.
7. Select the device from the **Communicator** panel.

SLC Add.	Device Type	Device Status	Mesh ID	More Info
No Mesh Networks in range of USB adapter				
13 Devices in range of USB adapter				
007	Detector	Factory Default	-	ⓘ
008	Detector	Factory Default	-	ⓘ
011	Gateway	Profile Assigned	5	ⓘ
022	LCD UI	Profile Assigned	5	ⓘ

8. Click **Assign**.

SLC Add.	Device Type	Mesh ID	Version No.	Device Status	Remove Device
141	LCD UI	0	40	Factory Default	x

The device is now included in the list of devices with a profile assigned. When the profile is assigned, the LEDs emit a solid green light for 10 seconds.

Assigning a Profile to a Detector with a W-GATE or Distributor

A W-GATE that has a profile can be used to distribute the profile to other devices. The W-GATE must be in a state where it can distribute a profile. For more information on converting a W-GATE to a distributor, refer to 2.6.3, "Profile Distribution". A device with a profile can be used to distribute the profile. To put a device into distributor mode, refer to topic, "Converting a Device into a Distributor".

■ Transfer Profile from W-GATE/Distributor to Detector

To transfer profile from W-GATE/distributor to the detector, do the following:

1. Bring the detector within the range of the W-GATE/distributor.
2. Power on the detector. Ensure the detector is in factory default state. A single or double red light flashes on the detector confirming that the detector is in the default state.
3. To make the detector request the profile, activate the magnetic test switch shown in the below figure.

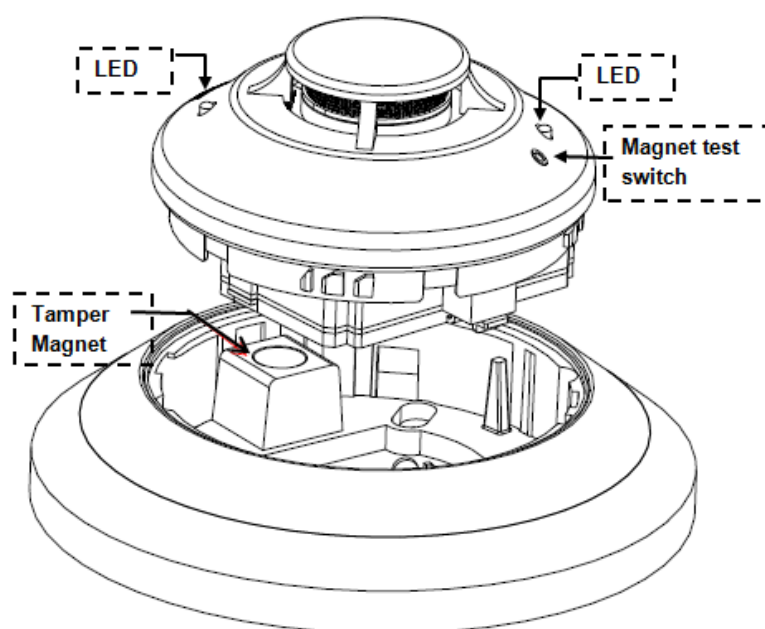


Figure 4.1 Magnet in a detector

Once the magnet test switch is activated, the LED flashes red light every half second indicating that it is requesting a profile. If the profile is successfully received, the LED emits a solid green light for 10 seconds. If the profile is not received within a minute, the LED flashes a red light every ten seconds indicating that it has stopped requesting for a profile.

■ Transfer Profile from W-GATE/Distributor to Module

To assign a profile to a module, perform the following steps:

1. Bring the module in range of the W-GATE or the distributor.
2. Power on the module. Ensure the module is in factory default state. If the module is in factory default state, the LED blinks red once.
3. To make the module request the profile, toggle the state of the tamper condition. To toggle the tamper condition state, start with the faceplate removed.

- Place the faceplate over the module temporarily, and remove the faceplate again in less than 1 second. Do not attach the mounting screws for the faceplate during this step. The LED flashes red light every half a second indicating that it is requesting a profile. The LEDs blink solid green for ten seconds indicating that the profile is assigned.

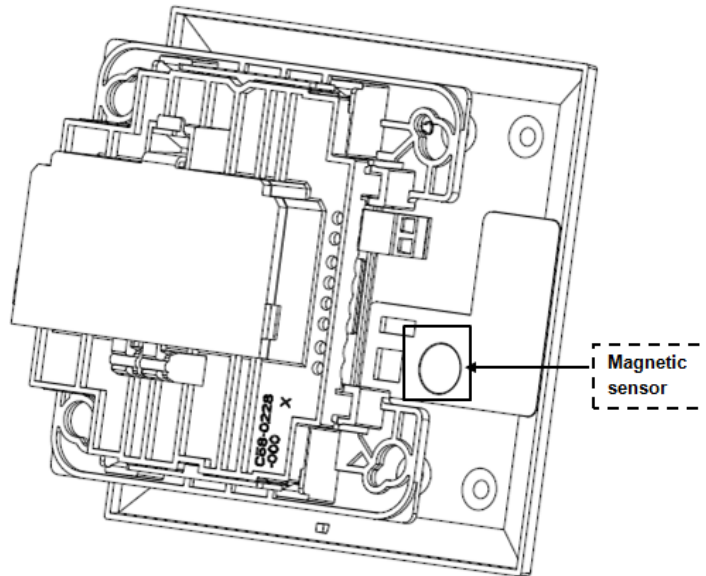


Figure 4.2 Magnetic sensor in a module

4.6.2 Distributor Mode

Converting a Device into a Distributor

NOTE: Only a device with a profile can be made as a distributor.

To turn a device into a distributor, do the following:

- Power up the device with one battery.

NOTE: Ensure that the device is in the profile modification mode. This is indicated by a single yellow blink every 5 seconds. The profile modification mode times out if it has not received a command in one minute.

- Toggle the SLC code wheel address to pattern of 0-1-0-1. To toggle the SLC code wheel address,
 - Set the address to 0.
 - Change the address to 1.
 - Change the address back to 0.
 - Change the address back to 1.

NOTE: The LED flashes a single green every half a second when the device is functioning as a distributor.

Converting a Distributor Back into a Device

To turn a distributor device back to a network device, replace the battery and provide a proper code wheel address. A normal device requires four batteries for trouble-free operation. It is recommended to use fresh batteries after the distributor mode.

4.6.3 Mesh Formation

To add a device to a mesh, refer to the topic, "Mesh Formation with PC Tools" or, to form a mesh network, ensure that the W-GATE is powered on and contains a profile. Activate the mesh formation" (Figure 2.8, "Mesh Formation Magnetic Sensor on a W-GATE") magnet sensor on the W-GATE.

■ Repeater

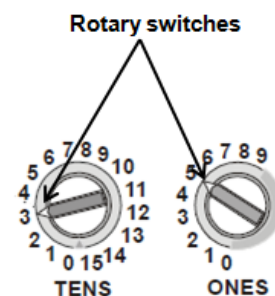
The Firelite Wireless Sensor Network does not require the use of a dedicated repeater; all wireless devices act as repeaters. When the repeater function is needed in a location where there is no specific fire function is required, a wireless monitor module or another device can be installed to fulfill the function as a repeater.

4.6.4 Restoring a Device to Factory Default

Removing Profiles Without PC-based Configuration Tool

A device can be restored to factory default state by following the below steps.

1. Start with the device powered off. The process is performed during the start-up.
2. Power on the device by inserting a single battery into any slot in the device. The LEDs blink yellow twice every five seconds for one minute continuously after inserting the battery.
3. Toggle the code wheel address pattern to 0-159-0. To toggle the SLC code wheel address,
 - Set the address to 0.
 - Change the address to 159.
 - Change the address back to 0.



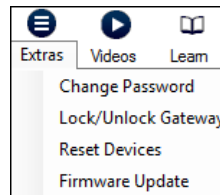
NOTE: The above illustration depicts the rotary switches being set at address 35 (rotary switch on 'TENS' set at 3 and rotary switch on 'ONES' set at 5). Ensure that the code wheel address pattern is toggled within 1 minute of inserting the battery.

After the code wheel pattern is set, the LEDs in the device blink green five times followed by a single or double red blink confirming that the device has been reverted back to factory default condition.

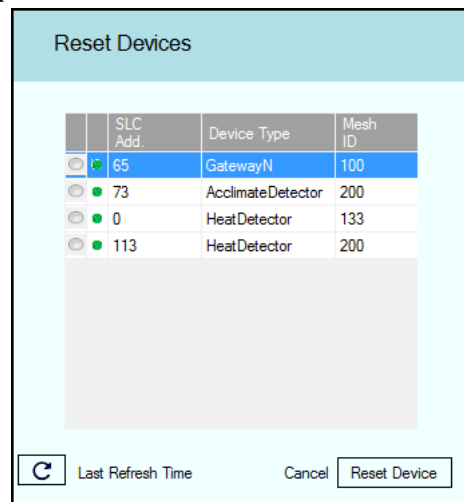
Removing a Profile with PC Tools

To remove a profile in a device using the PC Tools application, do the following:

1. Connect the W-USB dongle device to your computer. For more information on USB dongle, refer to Section 5:, "USB Adapter".
2. Launch the PC tools application. Refer to Appendix B:, "PC tools" to know about launching the PC tools application.
3. Go to **Site Survey**, **Create Mesh Network** or **Diagnostics** step.
4. Click **Extras** and select **Reset Devices**. The **Reset Devices** screen appears, displaying the W-GATE and other devices that have the profile assigned.



5. Click to select the required device and click **Reset Device** to remove the profile.



The profile is removed and the device is reset to factory default state.

4.7 Device Operations

4.7.1 Modes of Operation

Factory Default

In this mode, the devices are not associated with the W-GATE. A profile must be assigned to associate the device with the W-GATE. For further information on assigning a profile, refer to, "Assigning a Profile to a Detector with a W-GATE or Distributor". A device in factory default can be used for site survey. Refer to Appendix A:, "Site Survey".

The device cannot perform any fire protection in the factory default state. In this mode, the devices will be viewable in the communicator window of the PC tool with the state displayed as "Factory Default".

Profile Assigned

In this mode, the devices are associated with the W-GATE but are not an active participant in the mesh network. A device that is not in the tampered state can join the mesh network in formation or in the rescue mode. For further information on mesh formation, refer to "Mesh Formation Mode" and for further information on rescue mode, refer to "Rescue Mode". A device in the profile con-

figured state can also be used to distribute profiles. For further information on distributing a profile, refer to “4.6.2, “Distributor Mode””. To remove a profile from a device, refer to the topic , “Removing Profiles Without PC-based Configuration Tool”.

A device cannot perform any fire protection until it becomes a part of the mesh network. The device will be an invalid reply or no answer at the FACP.

In this mode, the devices will be viewable in the communicator window of the PC tool and indicates a status of “Profile Assigned”.

Bootloader

In this mode, the device cannot participate in a mesh and cannot provide fire protection. The device will be viewable in the communicator window of the PC Tool with a status “Bootloader”. To get a device out of bootloader, refer to Appendix C:, “Troubleshooting and Testing”.

Distributor

In this mode the device is functioning as a profile distributor. The device cannot participate in a mesh and cannot provide fire protection. It can be used to share the profile with any device that requests a profile. The device will be viewable in the communicator window of the PC Tool with a status “Distributor”.

Mesh Participant

Devices that are in the mesh network, no longer communicates directly with the PC Tools application. The PC Tools application must communicate with the W-GATE for status information from the device. The W-GATE will respond to the FACP for the device at the address set with the code wheels. The following states are applicable for a device in a mesh network.

■ Mesh Formation Mode

In this mode, the devices are active participants in a mesh that is forming. The LED flashes in the following pattern. First blink green, second blink yellow every 6.8 seconds. The device cannot perform any fire protection in this state.

For further information on this state (mesh formation), refer to the topic “Mesh Formation”.

■ Initial Mesh Optimization Mode

In this mode, the mesh network is formed and is in the process of establishing stronger communication paths. The LED pattern flashes in the following pattern. Single yellow blink every 6.8 seconds. The device cannot perform any fire protection in this state.

For further information on initial mesh optimization mode, refer to the topic, “Initial Mesh Optimization Mode”.

■ Normal Mode




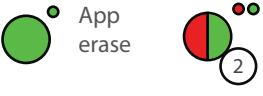

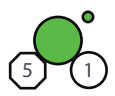
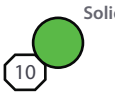
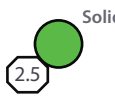

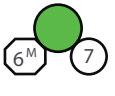
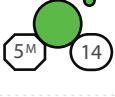

In the normal mode, the mesh network is formed and provides fire protection. The LED pattern is single green blink every 13.6 seconds. The LED flash can be disabled by panel configuration. If a device is in trouble, it is indicated by the trouble states.

■ Rescue Mode






In the rescue mode, devices that are active participant in the mesh search and retrieve the devices that have lost the communication link. The rescue mode is indicated by the LED pattern of 1 green blink every 6.8 seconds. For more information on rescue mode, refer to the topic, “Rescue Mode”.

4.7.2 LED Indications





The two LEDs on the devices blink in the same pattern to allow the LED to be viewed from any angle. The LED indications are provided in the table below.

LED Pattern	Condition	Action Required
 <p>Bootloader</p>	Device is ready to update	Use PC based configuration tool to initiate the download
 <p>Slot request rejected</p>	Device not permitted into the mesh	Confirm device count and software version
 <p>Mesh Forming</p>	Device is in the mesh & looking for devices that are not in the mesh	
 <p>App erase</p>  <p>App loading</p>	New application code is being downloaded	
 <p>Profile removed</p>	Device has returned to factory default state	
 <p>Profile received</p>	Device is now profile assigned.	
 <p>Battery Check - All batteries are fresh</p>	Minimum of 2.5 years battery life remaining	
 <p>Distributor mode</p>	Device is distributing its profile to other devices which requested profile	
 <p>Rescue mode</p>	Device is functioning as normal and searching for lost devices	
 <p>Background mesh optimization</p>	Device is functioning as normal and optimizing parent-child connectivity	
 <p>Normal mode</p>	Device is functioning as normal	


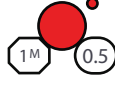
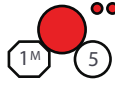




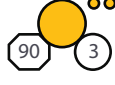


Legend

-  No. of blinks
-  LED color
-  Interval between blink patterns
-  Duration of LED state
-  Approximate duration

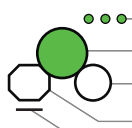
Example:

-  Two blinks in this pattern
-  First blink is green. Second is yellow
-  7 sec between blink patterns
-  Will transition to next state after 30 min (approx)

All units are in seconds. Minute is indicated by M.

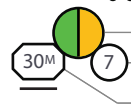
LED Pattern	Condition	Action Required	
	Waiting for profile	Device is factory default	Use PC tool to assign profile or activate switch to search for profile
	Searching for profile	Device is factory default and requesting a profile from a distributor or gateway	
	Pending site survey	Device is factory default and is ready to enter site survey	Clear the tamper condition within 1 minute to enter site survey
	Self test fail	Device has failed internal self diagnostics	Restart the device. If problem persists. Contact customer support
	Factory Command	Device is in a configuration state.	Restart the device. If problem persists. Contact customer support
	Profile modification	Device has a profile and can be set as distributor or have profile removed	Set code wheel pattern to enter the desired mode
	Battery Check - All batteries are present	Minimum of 6 months battery life remaining	
	Searching for mesh (in rescue mode)	Profile is assigned and device is searching for the mesh	Ensure the mesh is in rescue mode or wait for timeout to search mesh in formation mode
	Searching for mesh (in formation mode)	Profile is assigned and device is searching for the mesh	Ensure the mesh is in formation mode
	1st Mesh optimization	Mesh is formed and initializing	

Legend









- No. of blinks
- LED color
- Interval between blink patterns
- Duration of LED state
- Approximate duration

Example:








- Two blinks in this pattern
- First blink is green. Second is yellow
- 7 sec between blink patterns
- Will transition to next state after 30 min (approx)





All units are in seconds. Minute is indicated by M.

LED Pattern	Condition	Action Required
 <p>Device generic trouble (Eg: Low battery, Partial link condition)</p>	Device is in the mesh and in trouble condition.	Refer to the panel to identify the trouble and possible resolution
 <p>Device address trouble (Eg: Dual address, Zero address)</p>	Device is in the mesh but has a incorrect SLC address	Verify the address is non duplicate and non zero
 <p>Sustained tamper</p>	Device is tampered	Ensure detector is in the base and module has the face-plate on
 <p>Tamper entry</p>	Device has just been tampered	Ensure detector is in the base and module has the face-plate on
 <p>Battery Check - Weak</p>	Less than 6 months or not all 4 batteries present	Ensure all 4 batteries are present or replace the batteries.
 <p>Alarm state</p>	Device is functioning as normal and has been activated	

Legend

-  No. of blinks
-  LED color
-  Interval between blink patterns
-  Duration of LED state
-  Approximate duration

Example:

-  Two blinks in this pattern
-  First blink is green. Second is yellow
-  7 sec between blink patterns
-  Will transition to next state after 30 min (approx)

All units are in seconds. Minute is indicated by M.

Section 5: USB Adapter

5.1 Introduction

The W-USB is an interface that can be connected to a PC through USB. It communicates with the RF devices using the same frequencies as the mesh protocol. This device is powered directly by the USB port.

The LED gives an indication of power and initialization status.

The W-USB has an adjustable USB connector to facilitate the connection by reducing the size when connected to a laptop/tablet.

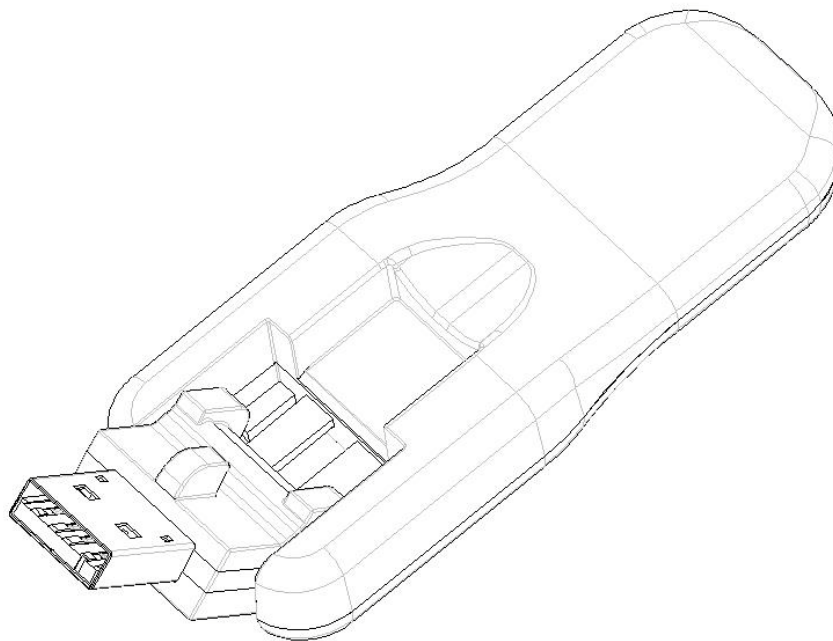


Figure 5.1 USB Adapter

5.2 Agency Approvals

5.2.1 FCC

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 PV3WFSADPT

WARNING: CHANGES OR MODIFICATIONS NOT EXPRESSLY APPROVED BY THE MANUFACTURER COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.

5.3 Specifications

5.3.1 Electrical Specifications

ITEM	TYP	MIN	MAX	UNITS	Comments
Operating Voltage	5	4.3	5.5	VDC	
Supply Current	33	25	85	mA	

5.3.2 Serial Communication Specification

ITEM	Comments
USB Standard	USB 2.0 full speed

5.3.3 Mechanical Specifications

ITEM	TYP	UNITS	Comments
USB connector type	A		
Length	76.2	mm	Connector closed
Length	96.2	mm	Connector open
Thickness	13	mm	Connector side
Thickness	8.4	mm	Antenna side
Width	31.2	mm	
Weight	19.5	g	

5.3.4 Environmental Specifications

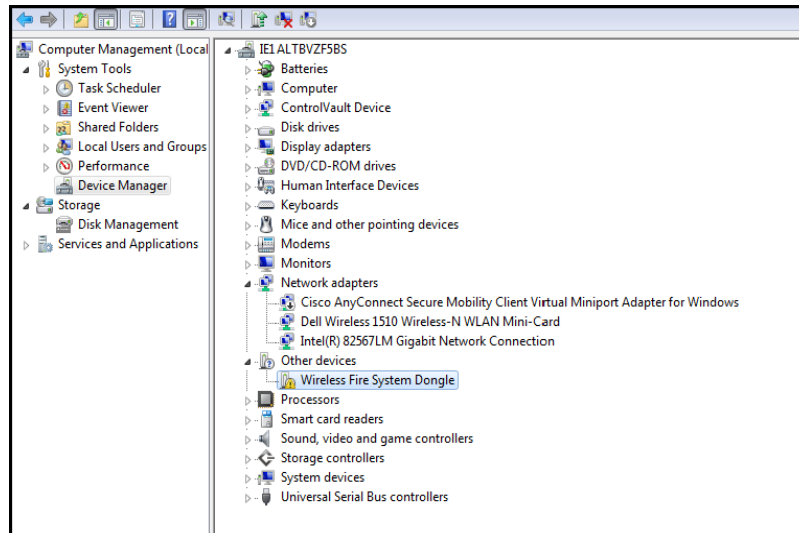
Specification	MIN	MAX	UNITS	Comments
Humidity	10	93	%RH	Non Condensing
Temperature	0°C/32°F	49°C/ 120°F		Maximum operating temperature range
Storage Temperature	-10°C	60°C		

5.4 Driver Installation

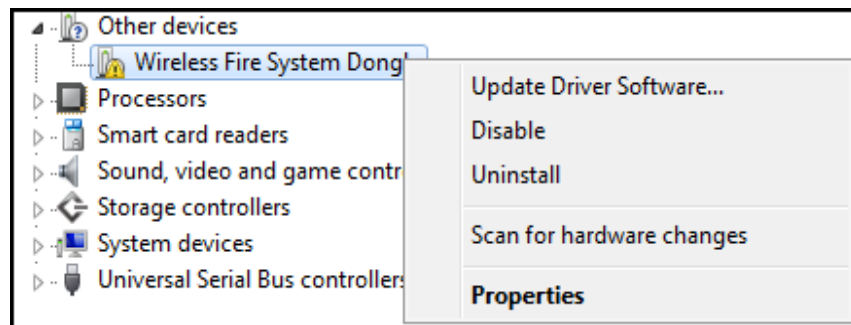
NOTE: Install PC Tools application before attempting to install the driver.

To install a driver, perform the following steps:

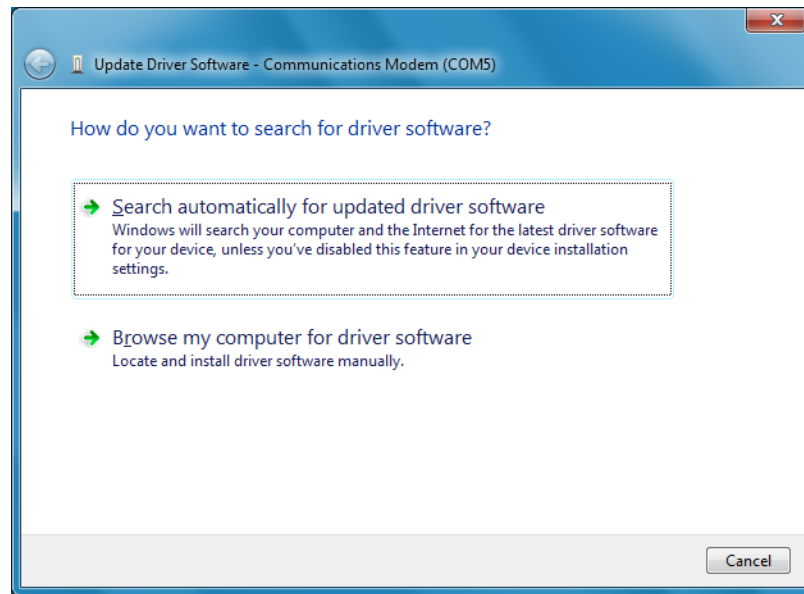
1. Insert the adapter into the PC. The adapter is detected and is displayed in the Computer Management screen as a **Wireless Fire System Dongle**.



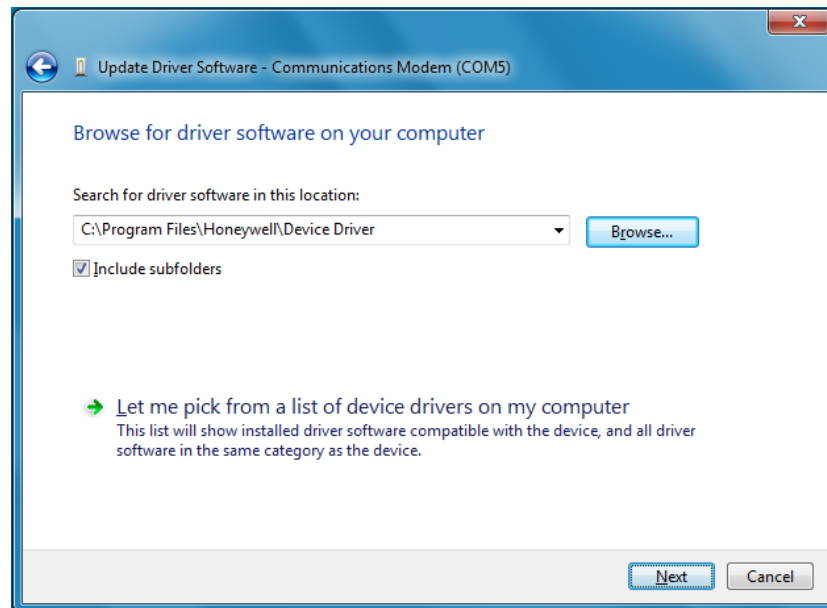
2. Right click on **Wireless Fire System Dongle** and select **Update Driver Software**.



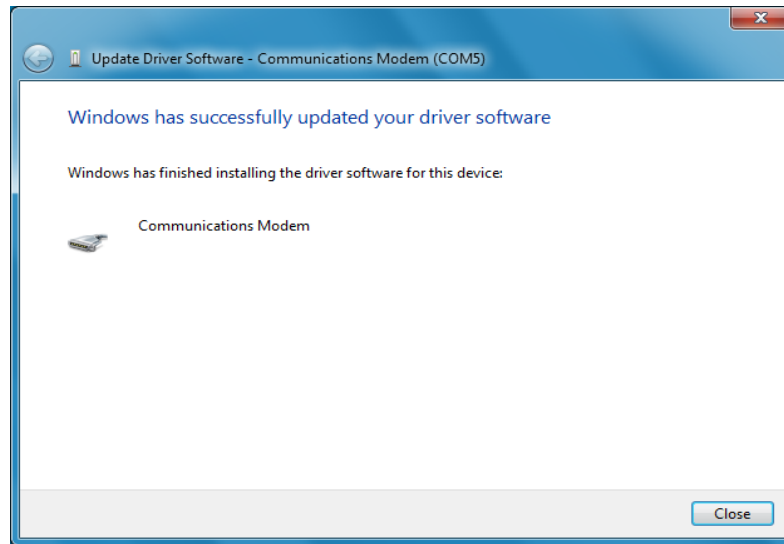
3. Select **Browse my computer for driver software** option.



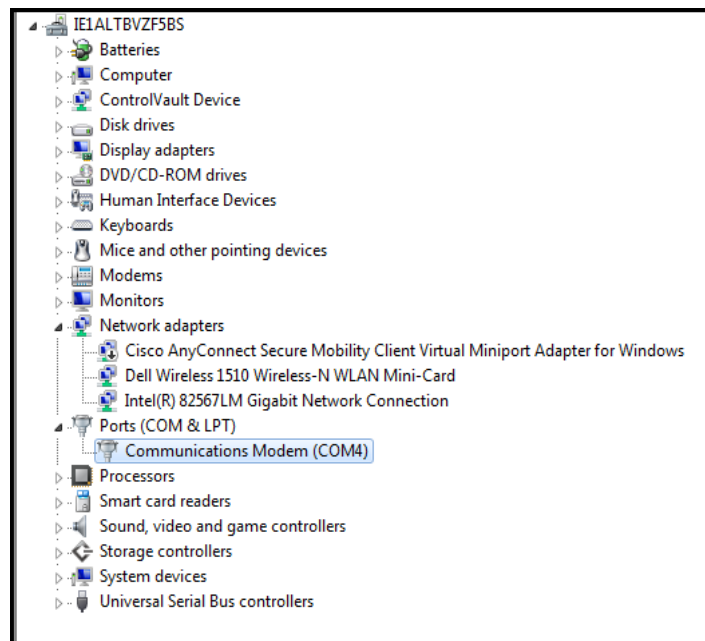
4. Browse to the location of the driver software by clicking **Browse**. Select the file and click **Next**. To locate the driver software, go to c:\Program Files\Honeywell\Device Driver. The file resides inside the Device Driver folder.



5. The confirmation message is displayed that the driver software is updated.



6. The device is displayed under ports.



The driver is installed.

Appendix A: Site Survey

A.1 Description

The site survey allows you to assess and qualify the site for installing the wireless fire alarm system. The site survey view in the PC tool allows you to view the Radio Frequency (RF) assessment of the site. The tool reports the suggested device spacing based on the data collected during the site survey. This helps to optimize the reliability and performance of the wireless network in the wireless fire alarm system.

A.1.1 Conducting Site Survey at the Job Site

The site survey includes two tests:

- Link quality test
- RF Scan Test

The link test can be conducted individually or it can be done followed by the RF Scan test. This section explains the steps for a link quality test and a link quality test followed by RF Scan test.

Link Quality Test

A link quality test is a quick and repeatable test that provides immediate feedback on the device connectivity. It is conducted primarily to check if there is an event of packet loss during data transmission between devices. In a link test, the device addresses are set in the range of 001 to 100.

■ Basic Requirements

To conduct a link test, ensure that

- You possess two or more devices.
- The devices are in factory default condition.

NOTE: The LEDs in the device blink red (single or double blink) upon starting the device if it is in a factory default condition. Refer to 4.6.4, "Restoring a Device to Factory Default" for more information on setting the device to factory default state.

■ Conduct a Link Test

NOTE: The below procedure lists the steps for conducting only a link test. Hence, examples on the setting the address on devices is explained considering only link test.

To conduct a link test, perform the following steps.

1. Remove the batteries if any present, from the devices and set the address of the first device as 001.

NOTE: For each subsequent device, use the next highest SLC address. For example, set the first device address as 001, second device as 002 and third device as 003. The upper address limit for a device address is 100 while doing a link test.

2. Bring the first device to the required location to conduct the test.
3. Insert one battery in to the factory fresh device. After inserting the battery, the LEDs in the device blink red twice every five seconds, if the device is ready for site survey.

NOTE: You could insert the battery into any available slot. Inserting more than one battery deters the device from entering the site survey mode.

4. Clear the tamper condition within one minute of the device startup, to enter the site survey mode. To clear the tamper condition, position the decorative ring around the base of the detector and rotate it in either direction until the ring snaps to its place (Refer to the below image). When you clear the tamper, the device starts the transmission that is denoted by LEDs. Refer to the Table A.1, "Link Test Results-LED Pattern"



NOTE: Due to the absence of the second device that is yet to be introduced, the transmission fails. Hence, the LEDs in the first device emits solid red.

5. Bring the second device to the required location and repeat the steps 3 and 4. The LEDs in the second device emit yellow light while the test is being conducted.

Results of Link Test

Once you have introduced the two devices, the devices start communicating and the link quality test is started. The blinking pattern of the LEDs in the device 002 communicates the results of the link test. To repeat the test, follow the steps 1 to 4 listed under "Conduct a Link Test"

The following table explains the LED patterns during a link test.

State	Pattern	LED	Results & Description
Link Test in progress	Single blink every 0.5 seconds.	Yellow	Transmission of data packets to another device.
	Solid	Red	Failure - No Packets received
	Single blink every 5 seconds.	Red	Poor - Received only half of the total transmission of data packets or poor signal strength
	2 blinks every 5 seconds.	Red	Marginal - Packets partially received or marginal signal strength.
	3 blinks every 5 seconds.	Green	Good - All packets received and good signal strength
	4 blinks every 5 seconds.	Green	Excellent - All packets received and excellent signal strength

Table A.1 Link Test Results-LED Pattern

■ Tasks After Link test

- Reboot the devices of the link test. To do this, remove and insert the batteries.
- After rebooting, do not push the detector back in the base.
- The devices can be moved around different locations in the site to optimize the results.
- The results of the link quality test (or) the LED indications will exist until the battery lasts in the devices.
- Upon completion of the link test using the devices numbered 001 and 002, you can test the link quality using different set of devices in other required locations. To do so, follow the steps 1 to 5 listed under “Conduct a Link Test”
- Retrieve the site survey results. To retrieve the site survey results, refer to the topic “Retrieving Site Survey Results” at the end of this section.

Link Quality Test and RF Scan Test

An RF Scan test can be conducted following a link test. A Radio Frequency scan test is conducted to assess and measure the background noise and interference, from other wireless systems if any, in the site. The RF Scan test is conducted following the link test. While doing a RF Scan test, the device addresses are set starting from 100 till 159.

The below procedure lists the steps for conducting a link test followed by a RF Scan test. Hence, examples on the setting the address on devices is explained considering both the tests.

Conduct a Link Test

To understand the basic requirements of a link test, refer to the section A.1.1.

To conduct a link test, perform the following steps.

1. Remove the batteries if any present, from the devices and set the address of the first device as 101. For each subsequent device, use the next highest SLC address. For example, set the first device address as 101, second device as 102 and third device as 103. The upper address limit for a device address is 100 while doing a link test.
2. Bring the first device to the required location to conduct the test.
3. Insert one battery in to the factory fresh device in any available slot. Inserting more than one battery deters the device from entering the site survey mode. If the device is ready for site survey, after inserting the battery, the LEDs in the device blink red twice every five seconds.
4. Clear the tamper condition within one minute of the device startup to enter the site survey mode. To clear the tamper condition, position the decorative ring around the base of the detector and rotate it in either direction until the ring snaps to its place. Refer to the below image. At this stage, the device starts the transmission. Due to the absence of the second device that is yet to be introduced, the transmission fails. Hence, the LEDs in the first device emits solid red. For more information, Refer to table A.2.



5. Bring the second device to the required location and repeat the steps 3 and 4. The LEDs in the second device emit yellow light while the test is being conducted.

Results of Link Test

Once you have introduced the two devices, the devices start communicating and the link quality test is started. The blinking pattern of the LEDs in the device 102 communicates the results of the link test. To repeat the test, follow the steps 1 to 4. The link test results stay for 5 minutes and then the RF test begins. You can repeat the test any number of times; the only condition being that the next test should be conducted within five minutes of the last concluded test. Refer to Table A.1, "Link Test Results-LED Pattern" for LED patterns that convey the link quality results.

This concludes the link test and the RF Scan test starts. The devices addressed 101 or higher, transition to RF Scan test. On devices addressed below 100, the link test results stay until the battery last. If you are conducting the link test with several devices started in various time frames, it is possible that the devices that start and complete the link test first can transition to RF Scan test, when the devices that began later are still in the link test mode. The RF Scan test may take up to 70 minutes and you have to check the LED patterns for results. The LED patterns are given below.

Results of RF Scan Test

State	Pattern	LED	Result
In Progress- 70 minutes remaining	7 short blinks (Solid) every 30 seconds	Red	Bad
In Progress- 70 minutes remaining	7 short blinks (Solid) every 30 seconds	Yellow	Marginal
In progress- 70 minutes remaining	7 short blinks (Solid) every 30 second	Green	Good

Table A.2 RF Scan Test Results - LED Pattern

■ Retrieving Site Survey Results

To retrieve the site survey results, do the following:

1. Reboot the devices by removing and inserting the battery back in to the device.
2. Plug in the USB adapter in to the laptop/PC where you have installed the PC tool.
3. Bring the devices within a range of 20ft from the USB adapter.
4. Launch PC tools application and retrieve the data.

Appendix B: PC tools

B.1 Description

The PC Tool is a standalone desktop windows application. It is a configuration and maintenance tool for the W-GATE and devices of the Wireless Sensor Network. It allows you to survey the site, configure the devices and diagnose the wireless network of the Wireless Sensor Network. This tool can be installed on a PC or a laptop. The tool communicates with the W-GATE and wireless devices through USB based user interface. You have to connect the USB adapter to the computer to invoke the PC tools application. At any point of time, only one instance of PC Tool can run on a laptop or PC.

The tool has the following utilities.

- Site Survey view
- Creating Mesh Network
- Diagnostic view

NOTE: At any point of time, only one instance of PC Tool can run on a laptop or PC.

The PC tool works in a wireless environment with the W-GATE and devices within the range of 25 feet.

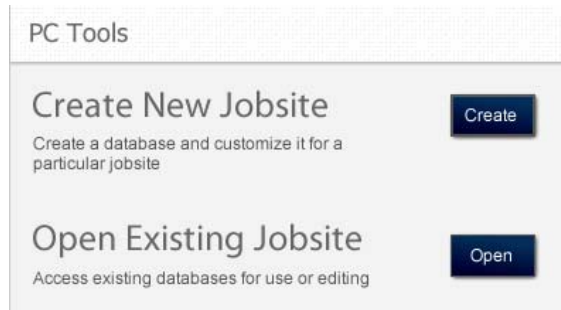
B.1.1 Launching PC Tools

To Launch PC Tools application,

1. Click **Start**, point to **All Programs**, click **Wireless Tool**, and then **Wireless Tool**. The following screen is displayed. Alternatively, you can double click the Wireless Tool shortcut in your desktop.



2. Click **Start Using**. The **PC Tools** screen is displayed.



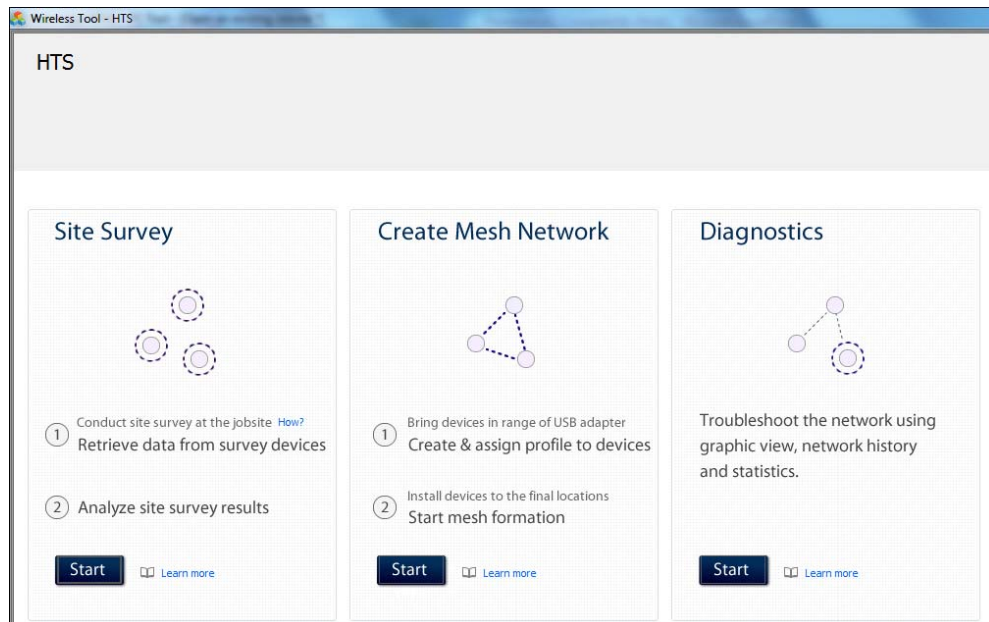
B.1.2 Creating Jobsite

You can create a new jobsite or open an existing one.

To create a new jobsite,

1. Perform the steps listed to launch the PC Tools application.
2. Click **Create** from PC Tools screen.
3. Enter the name of the new jobsite in the **Jobsite Name** field.
4. Enter the **Location/Description** if any, and click **Create**.
5. The **Create Project** window opens and displays the name of the jobsite that you created.
6. Click **Save**.

The jobsite is created, and the following screen is displayed. You can go to the required function that you want to perform by clicking the Start button in the respective function.



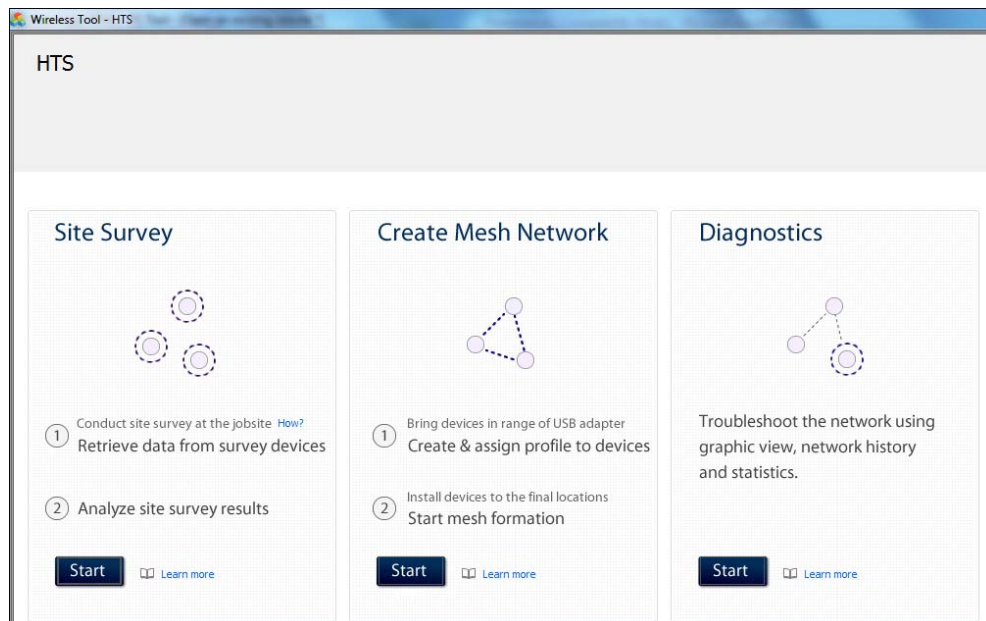
B.1.3 Opening Jobsite

If you have a jobsite already created, you can open the existing jobsite.

To open an existing jobsite,

1. Perform the steps listed to launch the PC Tools application.
2. Click Open from the PC tools screen.
3. Choose the required file from your local drive and click **Open** against **Open Existing Jobsite** option. Enter the name of the new jobsite in the **Jobsite Name** field.

The following screen is displayed. You can go to the required function that you want to perform by clicking the **Start** button in the respective function.



Appendix C: Troubleshooting and Testing

C.1 Troubleshooting

Trouble Type	Trouble Description	Action
Weak link condition	The weak link trouble denotes a connection of insufficient primary signal strength.	Ensure spacing between devices, or use repeaters.
Class A fault condition	Device loses the connection with any of the parent devices.	Ensure spacing between devices, or use repeaters.
Jamming	Jamming occurs when a device is overloaded with an interfering RF signal; but is able to send the messages out.	If any jammers are installed in the vicinity of the devices, remove them.
Low battery	The low battery event denotes that the device has less than one month power left to perform the required operations. Or presence of less than four viable batteries.	To clear the low battery event, tamper the device and replace all the four batteries. When a device is tampered, it drops out of the mesh network and attempts to rejoin as soon as the batteries are replaced and the tamper event is cleared.
Duplicate address	Two wireless devices on the same mesh network that are set to the same address reports a duplicate address trouble.	Change the address of a device to avoid duplication.

C.2 Testing W-GATE and Devices

The W-GATE must be tested after installation and as an integral part of a periodic maintenance program. The testing methods must satisfy the Authority Having Jurisdiction (AHJ). The W-GATE provides optimum performance when tested and maintained in compliance with NFPA 72 ordinances.

NOTE: The W-GATE used with this base must be tested and maintained regularly following the NFPA 72 ordinances. The W-GATE should be cleaned at least once a year.

C.2.1 Testing LED Indications

For more information on LED indications, refer to the respective chapters and the attachments provided for LED indications.

C.3 Testing Wireless Network

The PC Tools application allows you to,

- Diagnose and troubleshoot the wireless network and connectivity of the devices.
- Monitor the wireless network topology, quality of the communication links between the devices, live and historical event reports for the troubleshooting purpose.
- View the parent-child relationship and the signal strength between the two devices, and identifies the device that has lost the communication link with the wireless network.

In addition to the above, the PC tools application

- Communicates with the W-GATE to retrieve the live information about the connectivity and status of the devices.
- Stores the wireless network data such as network map, parent-child information, device information, history events, and network statistics.

The PC Tools application allows you to retrieve the following information for diagnosing and troubleshooting purpose.

- Network Topology
- History Events
- Network Snapshots
- Network Statistics
- Device Attributes

C.3.1 Network Topology

Parent-Child Devices

The parent child relationship between the devices in the wireless network is displayed using the directional arrows.

Orphan Devices

The device that is not linked with any other device in the wireless topology is an orphan device. The device is represented as an orphan device due to one of the following reasons:

- The device was originally a part of the wireless network and due to a 'Device Connected' live event, the device sets out of wireless network range.
- The device was system configured with the same network ID and hence it was a part of the same wireless network. When the network topology was retrieved, the device detail was not retrieved.
- The network connections are saturated and hence parent-child connection with the device is not established.

Class A Compliance

Each device must comply with Class A guidelines. The guidelines provide instructions on the required number of parent device for each device to be compliant with the guideline. Following are the compliance requirements.

- Class A guideline requirement:
Every device must have two parent devices.

NOTE: The device image is changed to depict that it does not meet the required guidelines.

NOTE: The Class A guidelines are not applicable for the W-GATE.

Selecting a device from the graphical representation and clicking either left or right allows you to view the following details. The Network Topology window allows you to click either left or right on any connected or orphan device.

C.3.2 History Events

The PC Tools application allows you to retrieve and view the history events of the wireless network for troubleshooting purpose. This report provides information on when the device gets connected with the wireless network, mode change, and the slot change details.

C.3.3 Network Snapshots

The PC Tools application allows you to retrieve and view the network snapshot for troubleshooting purpose. The network snapshot helps you to analyze on how the wireless network is functioning over a period of time.

C.3.4 Network Statistics

The PC Tools application allows you to retrieve and view the network statistics for troubleshooting purpose. The network statistics provides information on the attributes and RSSI of a device. The attributes provide information on the retransmission count and device re-join events. The retransmission count is a value equal to the number of times a device retransmits the wireless signal. The device re-join events is a value equal to the number of times the devices gets disconnected from the wireless network and gets connected with the wireless network. The RSSI of a device displays the parent-child relationship between the devices.

C.3.5 Device Attributes

The PC Tools application allows you to retrieve and view the attributes of a device for troubleshooting purpose. The attributes of a device such as low indication, removal indication, level, tamper fault and others are retrieved.

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Changes & Comments LS10036-000FL-E:N0

Revise to:	UL change?	Brief description:

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