

Emerson™ Wireless 1410H Gateway and 781 Field Links



Safety messages

NOTICE

Read this manual before working with the product. For personal and system safety, and for optimum product performance, make sure you thoroughly understand the contents before installing, using, or maintaining this product.

⚠ WARNING

Failure to follow safe installation guidelines could result in death or serious injury.

- Make sure only qualified personnel perform the installation.

Explosions could result in death or serious injury.

- Verify that the operating environment of the transmitter is consistent with the appropriate hazardous locations certifications.
- Do not make or break connections to the Emerson 1410H while circuits are live unless the area is known to be non-hazardous.
- Potential electrostatic charging hazard. Enclosure is a polymer, use care when handling or cleaning.

Electrical shock can result in death or serious injury.

- Use extreme caution when making contact with the leads and terminals.
- If the device is installed in a high-voltage environment and a fault condition or installation error occurs, high voltage may be present on transmitter leads and terminals.

Potential electrostatic charging hazard

- The Emerson 1410H enclosure is engineered polymer. Use care in handling and cleaning when in explosive environments to avoid an electrostatic discharge.
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1 Introduction

1.1 Wireless 1410H Gateway and 781 Field Links

The Emerson™ Wireless 1410H Gateway and 781 Field Links provides two *WirelessHART*® networks to allow for redundancy or to add more field devices. Modbus® communications over RS-485 or Ethernet provide universal integration and system interoperability. The optional OPC or EtherNet/IP™ functionality from the Gateway offers a means to connect to newer systems and applications while providing a richer set of data.

1.2 Using this manual

This manual will help you to install, configure, operate and maintain the Gateway.

- Section 2: Configuration describes how to initially connect to the Gateway and the settings that should be configured before placing it on a live control network.
- Section 3: Installation describes how to properly mount the Gateway and make electrical connections including electrical wiring, grounding, and host system connections.
- Section 4: Commissioning describes installation and setup of the optional software included with the Wireless Gateway. This software aids in secure host integration and wireless field device configuration.
- Section 5: Operation and Maintenance describes how to connect the Gateway to a host system and integrate data gathered from the field device network. It covers network architectures, security, and data mapping.
- Section 6: Troubleshooting provides troubleshooting tips and contact information for technical support.
- Appendices provide additional and more specific information on a variety of subjects including Product Certifications.

1.3 Product recycling/disposal

Recycling of equipment and packaging should be taken into consideration and disposed of in accordance with local and national legislation/regulations.

2 Configuration

2.1 Safety messages

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Potential electrostatic charging hazard

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- Do not make or break any connections to the Emerson 1410H while circuits are live unless area is known to be non-hazardous.

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2.2 Wireless planning

Power up sequence

The Gateway should be installed and functioning properly before power modules are installed in any wireless field devices. Wireless field devices should also be powered up in order of proximity from the Gateway beginning with the closest. This will result in a simpler and faster network installation.

Antenna position

The 781 Field Links should be positioned vertically and be approximately 6 ft. (2 m) from large structures or buildings to allow for clear communication to other devices.

2.3 PC requirements

Operating system (optional software only)

- Microsoft® Windows™ Server 2008 (Standard Edition), Service Pack 2
- Windows Server 2008 R2 Standard Edition, Service Pack 1
- Windows 7 Professional, Service Pack 1
- Windows 7 Enterprise, Service Pack 1
- Windows 8 Enterprise, Service Pack 1
- Windows 10 Enterprise, Service Pack 1

Applications

Configuration of the Gateway is done through a secure web interface. Recent versions of the following browsers are supported:

- Internet Explorer®
- Chrome™ browser
- Mozilla Firefox®
- Microsoft Edge

Hard disk space - (*WirelessHART* only)

- AMS Wireless Configurator: 1.5 GB
- Gateway Security Setup CD: 250 MB

2.4 Initial connection and configuration

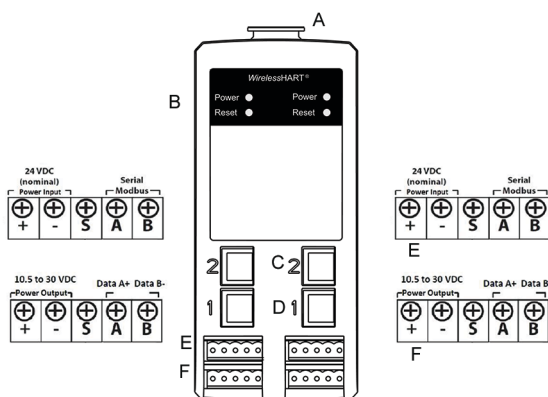
Initial connection

To configure the Gateway, a local connection between a PC/MAC/laptop and the Gateway needs to be established. The *WirelessHART*® networks in the Emerson™ 1410H Gateway are operationally equivalent and the following instructions are applicable to both.

Powering the Gateway

For both the *WirelessHART*® networks in the Emerson 1410H, bench top power will be needed to power the Gateway by wiring a 10.5–30 VDC (20–30 VDC if a 781 is connected with I.S. barriers) power source, with a capacity of at least 250 mA to the power terminals.

Figure 2-1: Emerson 1410H Gateway Wiring



- A. DIN Rail clip
- B. Power light. During normal operation the power indicator will be green.
- C. Ethernet port 2. When this port is activated, the factory IP address is 192.168.2.10.
- D. Ethernet port 1. When this port is activated the factory IP address is 192.168.1.10.
- E. Emerson 1410H Power and Serial connections. Black terminal included in the box.
- F. Emerson Wireless 781 Field Link power and data connections. Black terminal included in the box.

2.5 Establishing a connection

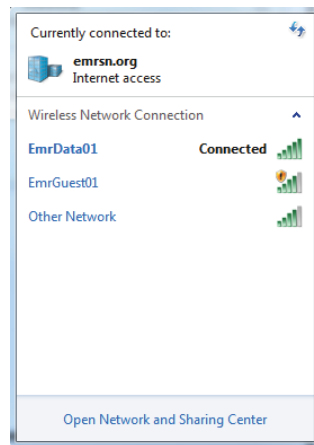
Connect the PC/laptop to the Ethernet 1 (Primary) receptacle on the Gateway using an Ethernet cable. This process will need to be done for the two *WirelessHART* networks separately. It is important that the networks have two different IP addresses if you are running two separate networks.

2.6 Windows 7

Procedure

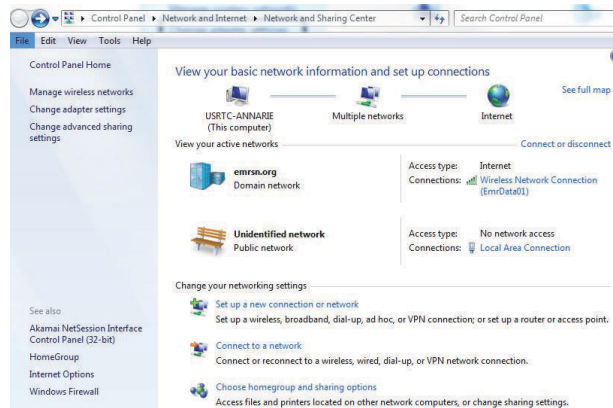
1. Click the **Internet Access** icon on the bottom right of the screen.

Figure 2-2: Internet Access



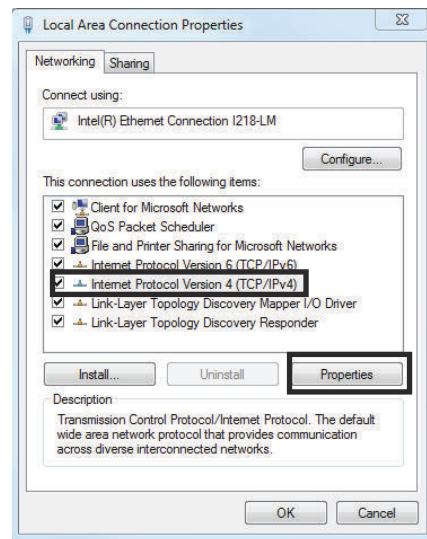
2. Select the **Network and Sharing Center**.
3. Select **Local Area Connection**.

Figure 2-3: Local Area Connection



4. Select **Properties**.
5. Select **Internet Protocol Version 4 (TCP/IPv4)** then select **Properties**.

Figure 2-4: Internet Protocol Version 4 (TCP/IPv4)

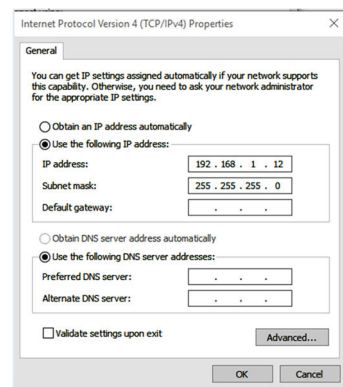


Note

If the PC/laptop is from another network, record the current IP address and other settings so the PC/laptop can be returned to the original network after the Gateway has been configured.

6. Select the **Use the following IP address** button.

Figure 2-5: IP Address



7. In the *IP address* field, enter 192.168.1.12 (DeltaV Ready enter 10.5.255.12).
8. In the *Subnet mask* field, enter 255.255.255.0.
9. Select **OK** for both the *Internet Protocol (TCP/IP) Properties* window and the *Local Area Connection Properties* window.

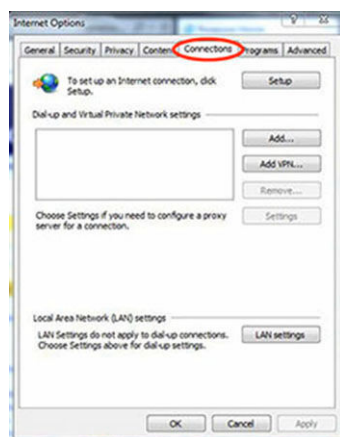
2.7 Disable proxies

Use these steps to disable proxies.

Procedure

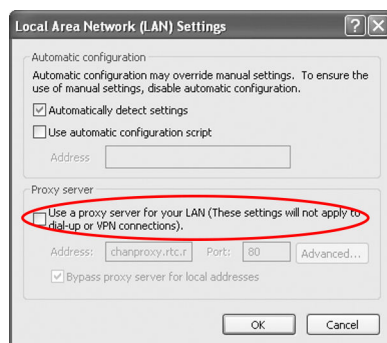
1. Open web browser.
2. Navigate **Tools > Internet Options > Connections > LAN Settings** (may be a different process for other browsers).

Figure 2-6: Internet Options



3. Under *Proxy server*, uncheck the **Use a proxy server...** box.

Figure 2-7: Proxy Server Settings



2.8 Configure the Gateway

Use these steps to complete the initial configuration for the Gateway. This will need to be done for both the *WirelessHART* and *ISA100* networks.

Procedure

1. Access the *WirelessHART* default web page for the Gateway at <https://192.168.1.10>. You will have to configure both networks individually.

- a) Log on as Username: admin
- b) Type in password: default

Figure 2-8: User Name and Password

Unlock?

Please enter your password to unlock this section.

Username

Password

Do not attempt to log on unless you are an authorized user. Unauthorized access will be prosecuted to the fullest extent of the law.

Login

2. Navigate to *System Settings > Gateway > Ethernet Communication* to enter the Network Settings.
 - a) Configure a static IP Address or set for DHCP and enter a Hostname.

Figure 2-9: Ethernet Communication

Ethernet Communication

Primary Interface [Port 1]

☐ Specify an IP address (recommended)
☒ Obtain an IP address from a DHCP server
☐ Obtain Domain Name from DHCP Server

Domain Name:

IP Address:

Net Mask:

Gateway:

Interface Physical Address: 00:26:16:01:00:E8

Full Primary Host Name:

Host Name:

Secondary Interface [Port 2]

- b) If not prompted, restart application at *System Settings > Gateway > Backup and Restore > Restart Apps*.

Note

Resetting applications will temporarily disable communications with field devices.

2.9 User accounts

There are four role-based user accounts for the Gateway with varying levels of access. The access can be changed on the *System Settings>Users>User Accounts* by the admin user. The figure below displays this access.

Figure 2-10: User Privileges

User Privileges			
Admin Privileges	Executive	Operator	Maintainer
Certificate Management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Change ACL Settings	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Change EtherNet/IP Settings	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Change IP Address	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Change Modbus Settings	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Change OPC Settings	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Change Protocols and Ports	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Change Time Settings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Delete Inactive Devices	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Edit HART Details	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Enable Logging	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reset To Default	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Restart The Gateway	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Restore Backup	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Save Backup	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Upgrade Features	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Upgrade Firmware	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
View HART Gateway Details	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
View Network Settings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Save Changes Cancel

2.10 Change passwords

It is a secure practice to change the user account passwords from the default ones. This should be done on both *WirelessHART* networks. To change the User Account passwords, follow the steps below.

Procedure

1. Navigate to *System Settings > Users > User Accounts*.
2. Click on the **Edit** button of the user password to be changed.
3. Set the new password for the role based account, and confirm.

4. Select **Save Changes**.

Note

It is suggested the default security settings in *System Settings > Users > User Options* be changed to the local IT best practices or the “Normal” setting after initial login. Strong or custom settings are available for more robust passwords.

2.11 Time settings

The Gateway is the timekeeper for the *WirelessHART* network, so it is imperative that the Gateway’s time is accurate for timestamp data to be meaningful. Time settings can be found by navigating to *System Settings > Gateway > Time* as shown in Figure 2-2 on page 7. Any changes made to the time settings will have to be done to both networks for consistency. There are three ways to set the Gateway time:

Procedure

1. Network Time Protocol (recommended). This option uses a Network Time Protocol (NTP) server to adjust the Gateway’s time to match the time of the control network. Enter the IP address for the NTP server and select the packet version (1, 2, 3, or 4).
2. Set with PC Time. This option will match the Gateway’s time to the PC/Laptop.
3. Manual Entry. This option allows the user to enter a specific date (MM:DD:YY) and time (HH:MM:SS).

Note

Network Time Protocol (NTP) is recommended for the best network performance because it always adjusts time to match the network time server.

Figure 2-11: Setup > Time Settings

The screenshot shows the Emerson Wireless Gateway web interface. The top navigation bar includes 'Home', 'Devices', and 'System Settings'. The left sidebar lists various configuration categories: Gateway, Network, Protocols, and Users. The 'Time' settings page is displayed, featuring a warning message: 'Warning: Changing the time or time settings may result in the temporary loss of data updates from all devices.' Below this, a table compares the PC's time (04/30/18 13:56:41.130) with the Gateway time (04/30/18 14:20:43.578), showing a difference of 0 days 00:33:02.448. The 'Method used to set time' is set to 'Network Time Protocol (NTP, recommended)'. The 'Primary' section contains fields for 'Time server' (10.224.50.1), 'NTP server type' (Unicast), and 'NTP packet version' (1). The 'Secondary' section has similar fields but is currently empty. At the bottom, there are 'Save Changes' and 'Cancel' buttons.

2.12 TCP/IP network settings

2.12.1 To change TCP/IP network settings

Procedure

1. Navigate to *System Settings > Gateway > Ethernet Communication*.
2. Select **Specify an IP address** (recommended).
3. Enter the following:
 - Hostname
 - Domain Name
 - IP Address
 - Netmask
 - Gateway
4. Select **Save Changes**.
5. When prompted, select **Restart Apps**.
6. Select **Yes** to confirm restart.
7. Close the web browser.

Note

Once the IP Address of the Gateway has been changed, communications to the web interface will be lost. Restart the web browser, then log back into the Gateway using the new IP address and other TCP/IP network settings. The PC/Laptop TCP/IP network settings may need to be changed. During a Restart Apps the wireless network will be temporarily lost.

2.13 System backup

The Gateway has a System Backup and Restore feature that saves all user-configured data. It is best practice that a System Backup be performed periodically throughout the installation and configuration process. Starting with firmware version 4.7.53, a passphrase is required when taking a backup. The passphrase is used to encrypt and decrypt the backup. This will need to be done two times, for both *WirelessHART* networks.

Procedure

1. Navigate to *System Settings > Gateway > Backup and Restore*.
2. Enter in a passphrase, confirm, and select **Save Backup**.
3. The Gateway collects the configuration data; when the file download pop up appears, select **Save**.
4. Enter a save location and file name.
5. Select **Save**.
6. Select **Return to form**.

Note

System backup contains user passwords and keys used for encrypting communication. Store downloaded system backups in a secure location. The actual files are also encrypted.

2.14 Web page usage

It is not recommended that users stay logged on to a single page or a large number of users on multiple pages for long periods of time. This additional loading can slow the flow of data. The Gateway by default logs users out who are logged on for long periods of time with no activity.

2.15 Resetting to factory defaults

In the event that the user name, password, or IP address of the Gateway is lost, the Gateway can be restored to factory defaults by the procedure below.

Note

Following this procedure will cause the network to reform and all configuration parameters will be reset to factory defaults. Once the Gateway is reset, the user is strongly recommended to change the default password to maintain system security.

Procedure

1. Turn off power to the Gateway, remove connectors, and un-mount the device from the DIN rail.
2. Locate the Reset switch label on the back of the Gateway. There is a reset switch for each network on the left and right sides. If the left side needs to be reset, the left reset switch should be used. The left switch will only work for the left network.
3. Break the label in the center and slide the switch up.
4. Mount and reconnect the Gateway; turn power ON on to the Gateway.
5. Let the Gateway completely boot up (approximately 2 minutes). During this time the red Reset light on the front of the unit will be ON.
6. Turn off power to the Gateway, remove connectors and un-mount it from the rail again.
7. Return the Reset switch to lower position.
8. Mount and reconnect the Gateway; turn power ON on to the Gateway.
9. Verify the reset light is off, indicating the Reset switch is in the lower position. The Gateway will now be programmed back to factory defaults including IP addresses. The factory default IP addresses can be found in the table in the Initial connection section of [Troubleshooting](#).

2.16 Disconnect the power

Disconnect the power and Ethernet cables from the Gateway.

3 Installation

3.1 Safety messages

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3.2 Installation overview

This section describes how to properly mount the Gateway and make electrical connections, including wiring, grounding, and host system connections.

General considerations

The unit itself is not designed for outdoor mounting without a suitable enclosure. The Gateway should be mounted in an approved electrical enclosure or building.

The Gateway should be mounted in a location that allows convenient access to the host system network (process control network) as well as the wireless field device network and protects the Gateway from moisture and contamination. It is also best practice to install the 781 Field Links centrally in the network for the most direct connections for the Gateway.

Physical description

The Gateway electronics is enclosed in a polymer housing. The front of the enclosure has connections for power, Ethernet, and serial communications. The unit is designed to be mounted on a DIN rail inside an electronic enclosure.

3.3 Installing the Gateway

3.3.1 Power

The Gateway is designed to be powered by 24 VDC (nominal) Class 2 supply and requires 250 mA of current per network. Both networks can be powered by the same input power using the combined terminal block provided in the Gateway box. The combined input power should be 24 VDC with 500mA of current per network. Both networks can be powered by the same input power using the combined terminal block provided in the Gateway box. The combined input power should be 24 VDC with 500mA of current.

The wiring should include an external power shut-off switch or circuit breaker that is located near the Gateway.

The terminals on this connector can accommodate wires from 24 AWG to 12 AWG. Use of 18 AWG wire is recommended. Tighten screws to 4.4 to 5.3 lbf-in (0.5 to 0.6 Nm).

In ambient temperatures greater than +60 °C use wire rated for at least 5 °K above the maximum ambient temperature.

Note

Using an uninterruptible power supply (UPS) is recommended to ensure availability during power failure.

3.3.2 Mounting the Gateway

The unit can be snapped onto a DIN TS35/7.5 or TS35/15 rail system.

Procedure

1. Push the DIN rail lever downwards so the spring compresses, and hold.

2. While holding the lever downwards, place the Gateway so it rests the top lip of the bigger chassis on the DIN rail.
3. Release the DIN rail lever, and make sure the Gateway is secured.

Figure 3-1: Installing



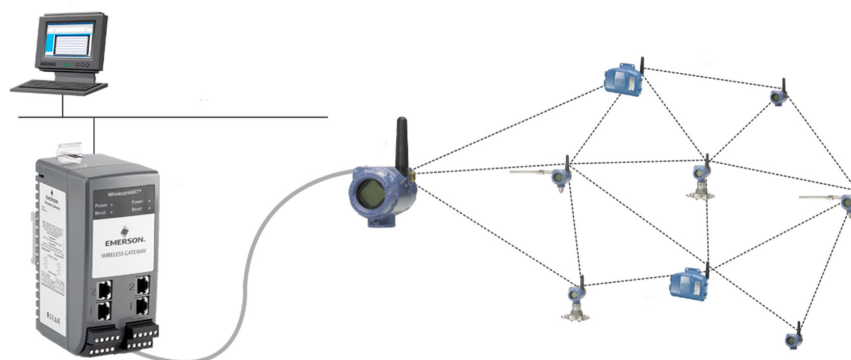
4. To remove the unit, press the DIN rail lever, and hold while pulling the bottom half of the Gateway from the DIN rail.
5. Release the lever, and lift the Gateway away from the DIN rail.

3.4 Installing the 781 Field Links

3.4.1 Intended use

The Field Link must be used in conjunction with a network manager or network Gateway. The Field Link then functions as a translator between the wired network and a wireless field network. [Figure 3-2](#) shows one of the networks being used.

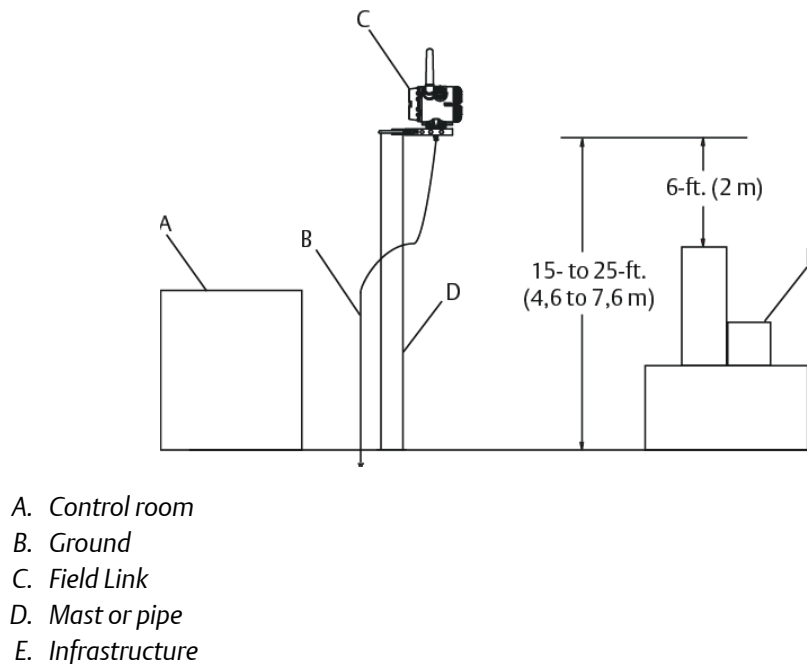
Figure 3-2: System Architecture Example



3.4.2 Mounting location

The Field Link should be mounted in a location that allows convenient access to the host system network (wireless I/O) as well as the wireless field device network. Find a location where the Field Link has optimal wireless performance. Ideally this will be 15 - 25 ft. (4,6 - 7,6 m) above the ground or 6 ft. (2 m) above obstructions or major infrastructure. The two 781s do not need to be installed near each other, unless the Emerson 1410H is being used for redundancy (Appendix D). There should be at least 3 ft. (1m) between the two.

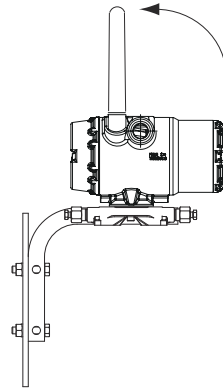
Figure 3-3: Mounting Location



3.4.3 Antenna position

The antenna should be positioned vertically, either straight up or straight down, and it should be approximately 3 ft. (1 m) from any large structure, building, or conductive surface to allow for clear communication to other devices.

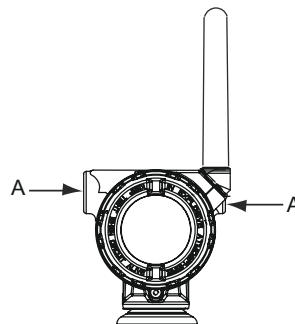
Figure 3-4: Antenna Position



3.4.4 Conduit entry

Upon installation, ensure each conduit entry is either sealed with a conduit plug using approved thread sealant, or has an installed conduit fitting or cable gland with appropriate threaded sealant. Note the conduit entries on the Emerson 781 Field Link are threaded $\frac{1}{2}$ –14 NPT.

Figure 3-5: Conduit Entry



A. Conduit entry

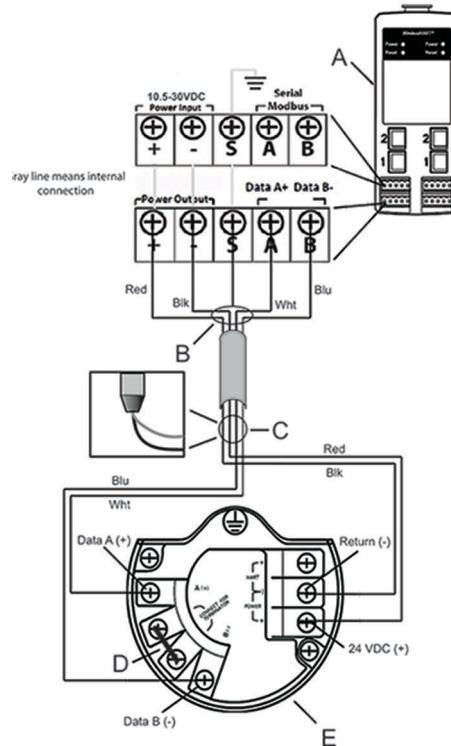
3.5 Connecting the Emerson 1410H with 781 Field Links

There are two main connection configurations for the Emerson 1410H and 781 Field Links: with and without barriers. The location and hazardous approval option of the Emerson 781s determine whether it needs to be installed with barriers. This connection will have to be done for both networks.

3.5.1 Installation without barriers

A shielded twisted-pair cable is needed for connecting the Emerson 1410H and 781 Field Links. Each Emerson 781 can be located up to 656 ft. (200m) from the Emerson 1410H. This will need to be done twice for the two networks.

Figure 3-6: Emerson 1410H and 781 Field Links without Barriers Installation



- A. Emerson Wireless 1410H Gateway
- B. Attach shield pair cable (Belden 3084A or equivalent)
- C. Tape back shield wire and foils
- D. Short these terminal for a 250Ω terminating resistor
- E. Emerson Wireless 781 Field Link

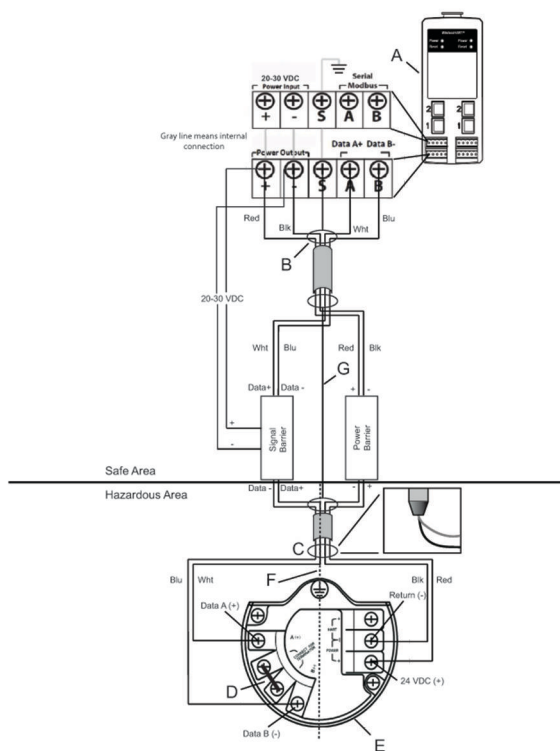
3.5.2 Installation with barriers

When installing the Emerson 781 in a hazardous area there are two I.S. barriers that need to be installed: a power barrier and a signal barrier. The signal and the power are two separate I.S. circuits so they must comply with proper I.S. segregation distance. When using the Emerson recommended barriers the individual input powers of the Gateway should be 20–30 VDC, with current capacity of at least 330 mA per 781. If one power supply is used, the current capacity needs to be at least 660 mA.

A shielded twisted-pair cable is needed for connecting the Emerson 1410H and 781 with barriers (refer to Figure 3-6). The Emerson 781 can be located up to 656 ft (200 m) from the 1410H.

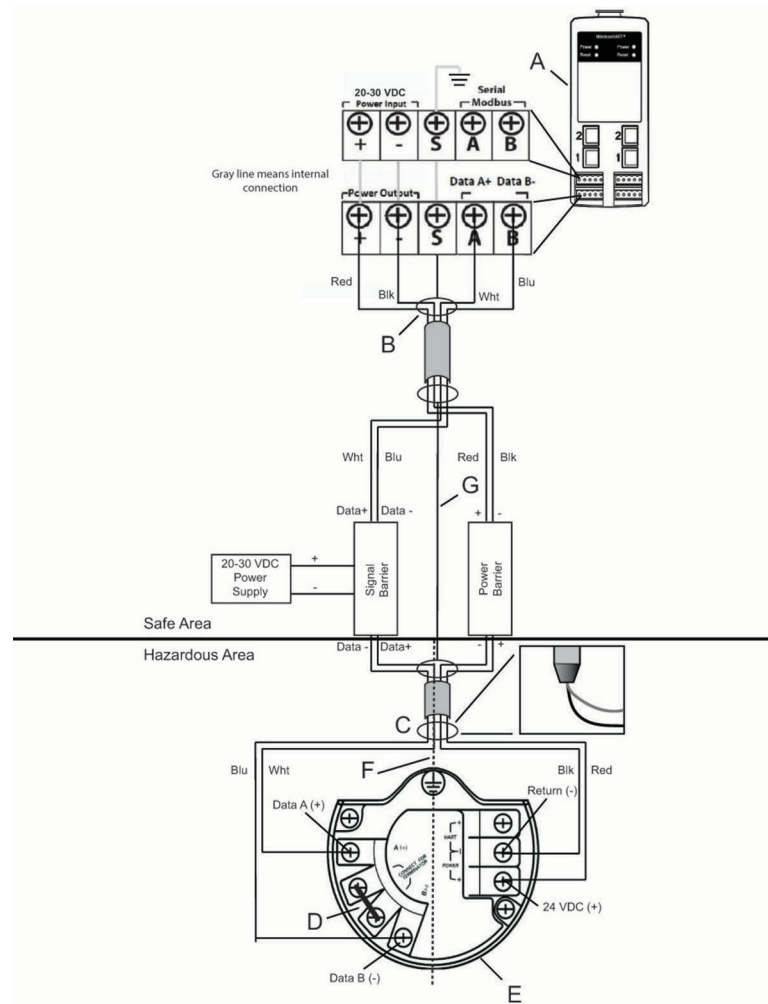
The signal barrier needs additional power. You can wire it to the Emerson 1410H terminals or to a separate power supply. Make sure power supply is rated to handle power drawn for the barrier. [Figure 3-7](#) and [Figure 3-8](#) show the two variations of powering the signal barrier.

Figure 3-7: Emerson 1410H and 781 with Gateway Powered Barrier Installation



- A. Emerson Wireless 1410H Gateway
- B. Attach shield pair cable (Belden 3084A)
- C. Tape back shield wire and foils
- D. Short these terminals for 250Ω
- E. Emerson Wireless 781 Field Link
- F. I.S. segregation

Figure 3-8: Emerson 1410H and 781 with Additional Power Supplied Barrier Installation



- A. Emerson Wireless 1410H Gateway
- B. Attach shield pair cable (Belden 3083A)
- C. Tape back shield wire and foils
- D. Short these terminals for 250Ω
- E. Emerson Wireless 781 Field Link
- F. I.S. segregation

Recommendation

Signal barrier

- GM-International D1016S

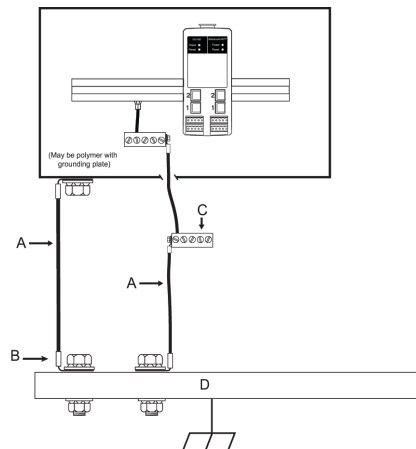
Power barrier

- Stahl 9176 10-16-00

3.5.3 Shield grounding

The shields of the twisted-pair cables need to be grounded using the grounding terminal on the Emerson 1410H, and it should be taped back on the Emerson 781 side.

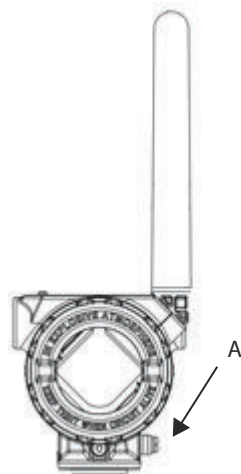
Figure 3-9: Emerson 1410H Grounding



- A. #6 AWG copper wire
- B. Protective ground
- C. Reference ground (when present)
- D. Earth

3.5.4 Emerson 781 grounding

Grounding of the electronics enclosure should be done in accordance with local and national installation codes. Grounding is accomplished through the external case grounding terminal.



- A. Grounding lug

3.6 Verify operations

Operation is verified through the web interface by opening a web browser from any PC on the host system network and entering the Gateway IP address or DHCP host name in the address bar. If the Gateway has been connected and configured properly, the security alert will be displayed followed by the log in screen. This will need to be done for both networks.

Figure 3-10: Gateway Log In Screen

Unlock?

Please enter your password to unlock this section..

Username

Password

Do not attempt to log on unless you are an authorized user. Unauthorized access will be prosecuted to the fullest extent of the law.

Login

The Gateway is now ready to be integrated into the host system. Make sure the field devices to be used with each network have the Network ID and Join Key that is on the Gateway (found on the Network Setting page). Once the field devices are powered, they will appear on the wireless network and communications can be verified under the Explore tab using the web interface. The time needed for the network to form will depend on the number of devices.

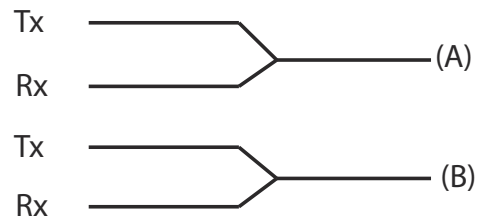
3.7 RS-485

The Gateway can be ordered with an optional RS-485 (serial) connection (reference). Modbus terminals are labeled A and B on the wiring diagram. This connection is used to communicate Modbus RTU on an RS-485 data bus, and it is available for both networks.

Use 18 AWG single twisted shielded pair wiring to connect the Gateway to the RS-485 data bus. The total bus length should not exceed 4000 ft. (1220 m). Connect the Tx - (negative, receive) wire to terminal A and the Rx + (positive, transmit) wire to terminal B. The wiring shield should be trimmed close and insulated from touching the Gateway enclosure or other terminations.

If the existing data bus uses a 4-wire Full Duplex configuration, see Figure 3-11 to convert to a 2-wire Half Duplex configuration.

Figure 3-11: Convert from Full to Half Duplex



3.8 Terminating resistors

Three DIP switches are provided to enable various terminating resistors to the RS-485 data bus. The switches are found inside the electronics housing, located behind an access slot on the upper right side. The switches number bottom to top 1 through 3 and the upward position is ON.

4 Commissioning

4.1 Overview

This section discusses the installation and setup of the optional software included with the Emerson™ Smart Wireless Gateway. The following table describes what items are installed and on which disk they can be found.

Table 4-1: Software Applications

Name	Description	Location
Security Setup Utility	This utility allows the setup of SSL enabled communications between the Gateway and host system.	Disk 1
AMS Wireless Configurator	This application allows complete configuration of wireless field devices and provides added security through drag and drop provisioning.	Disk 2
Network Configuration	This application configures AMS Wireless Configurator to interface to a wireless network or a HART® Modem.	Disk 2

Additional system components may be installed depending on the current configuration of the system.

4.2 System requirements

Table 4-2: PC Hardware Requirements

Minimum	Recommended
Intel™ Core 2 Duo, 2.0 GHz	Intel Core 2 Quad, 2.0 GHz or greater
1 GB Memory	3 GB Memory or Greater
1.5 GB free hard disk space	2 GB or more of free hard disk space

Note

Additional hard disk space is required for SNAP-ON™ applications. The minimum monitor requirements are 1024 x 768 resolution and 16-bit color.

Table 4-3: Supported Operating Systems

Operating system	Version
Windows Server 2008	Standard, Service Pack 2
Windows Server 2008 R2	Standard, Service Pack 1
Windows 7	Professional, Service Pack 1
Windows 7	Enterprise, Service Pack 1
Windows 8	Enterprise, Service Pack 1
Windows 10	Enterprise, Service Pack 1

Note

Only 32-bit versions of the operating systems are supported for AMS Wireless Configurator.

4.3 Software installation

The software can be found on the two-disk pack, included with the Gateway. Depending on the PC system configuration, installation may take 30-35 minutes. Installing disk one followed by disk two is recommended. The Security Setup Utility is located on Disk 1. To install the software: task.

Procedure

1. Exit/close all Windows programs, including any running in the background, such as virus scan software.
2. Insert Disk 1 into the CD/DVD drive of the PC.
3. Follow the prompts.

AMS Wireless Configurator is located on Disk 2. To install the software:

4. Exit/close all Windows programs, including any running in the background, such as virus scan software.
5. Insert Disk 2 into the CD/DVD drive of the PC.
6. Select **Install** from the menu when the AMS Wireless Configurator setup begins.
7. Follow the prompts.
8. Allow AMS Wireless Configurator to reboot PC.
9. Do not remove the disk from the CD/DVD drive.
10. Installation will resume automatically after login.
11. Follow the prompts.

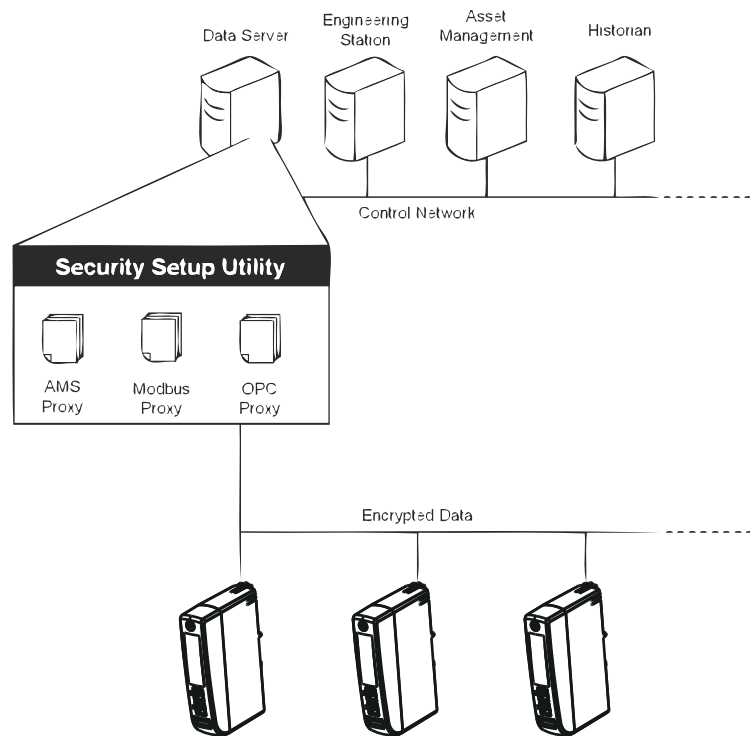
Note

If the autorun function is disabled on the PC, or installation does not begin automatically, double click D:\SETUP.EXE (where D is the CD/DVD drive on the PC) and select OK.

4.4 Security setup utility

The Security Setup Utility enables secure communications between the Gateway and host system, asset management software, data historians, or other applications. This is done by encrypting the standard data protocols (AMS Wireless Configurator, Modbus[®] TCP, and OPC) used by the Gateway and making them available through various proxies within the Security Setup Utility. These proxies can function as a data server for other applications on the control network. The Security Setup Utility can support multiple Gateways at once and each proxy can support multiple client application connects. [Figure 4-1](#) shows a typical system architecture using the Security Setup Utility.

Figure 4-1: Typical Host System Architecture Using Security Setup



Note

OPC communications requires the use of the Security Setup Utility regardless of whether encryption is required.

4.5 AMS Wireless Configurator

AMS Wireless Configurator helps deploy and configure wireless field devices. It provides an HART® integrated operating environment that leverages the full capabilities of WirelessHART®, including embedded data trending, charting, and graphical display capabilities provided by enhanced EDDL technology.

- Display and modify device configuration
- View device diagnostics
- View process variables
- Provision a wireless device using the drag-and-drop operation so it can join a Gateway's self-organizing network
- Enhance AMS Wireless Configurator functionality with the AMS Wireless SNAP-ON Application
- Restrict access to AMS Wireless Configurator functions through the use of security permissions

See the release notes for information specific to the current release of AMS Wireless Configurator. To display the release notes, navigate to *Start>Programs>AMS Wireless Configurator>Help*.

4.6 Licensing and credits

The latest licensing agreements are included on each disk of the software pack.

This product includes software developed by the OpenSSL Project for use in the [OpenSSL Toolkit](#).

5 Operation and Maintenance

5.1 Overview

This section describes how to connect the Gateway to a host system and integrate data gathered from the field device network. It covers network architectures, security, and data mapping.

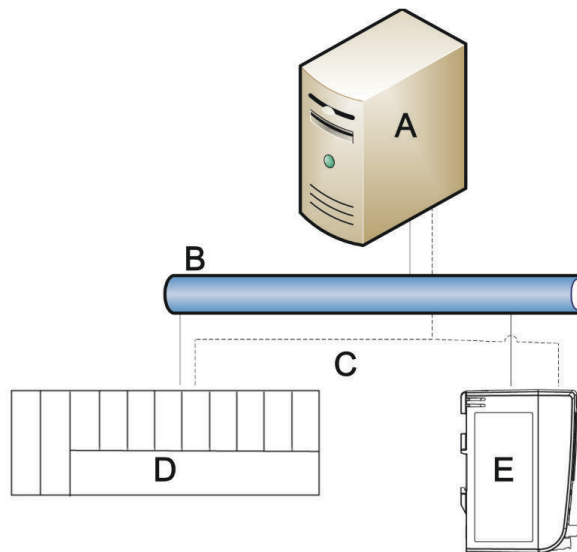
5.2 Network architecture

Physical connection types are important when determining the network architecture and usable protocols for integration. Ethernet is the primary physical connection type; RS485 is also available. The following network architecture diagrams will help when integrating data from the Gateway into the host system.

Ethernet

An Ethernet connection supports Modbus[®] TCP, OPC, AMS Wireless Configurator, EtherNet/IP,[™] and HART[®] TCP protocols. Using this connection type, the Gateway is wired directly to a control network (see [Figure 5-1](#)) using a network switch, router, or hub. Often there are two networks for redundancy purposes.

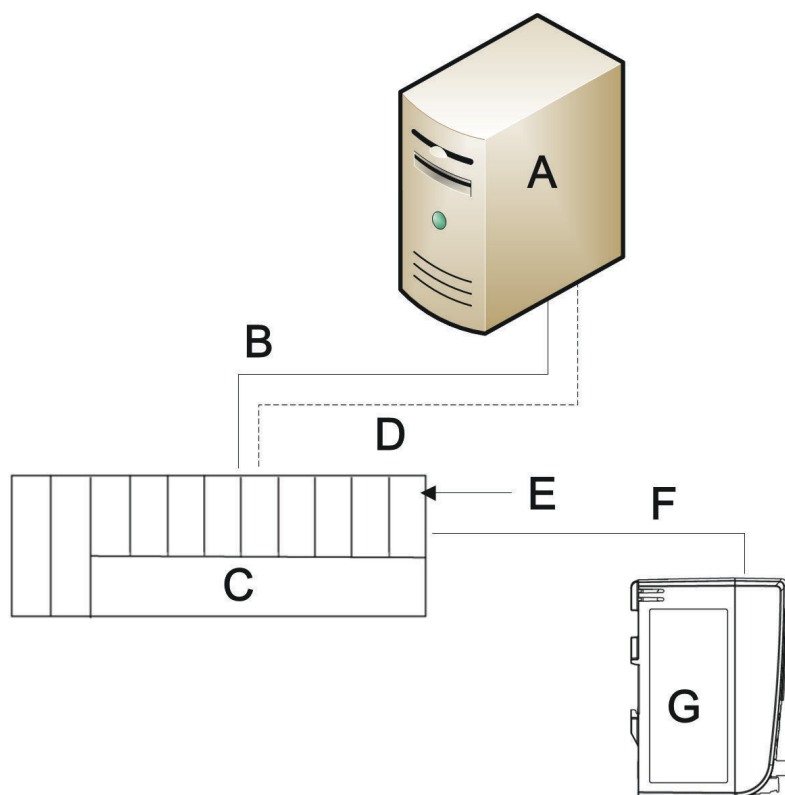
Figure 5-1: Ethernet Architecture



- A. Engineering station
- B. Primary control network
- C. Secondary control network
- D. Controller and I/O
- E. Wireless Gateway

RS485 (serial)

An RS485 connection supports Modbus RTU protocol. Using this connection type, the Gateway is wired to an RS485 bus which typically leads to a serial I/O card or Modbus I/O card (see Figure 5-2). Up to 31 Gateways can be connected to a single I/O card in this manner.

Figure 5-2: RS485 Architecture

- A. Engineering station
- B. Primary control network
- C. Controller and I/O
- D. Secondary control network
- E. Serial I/O card
- F. RS485 bus
- G. Wireless Gateway

5.3 Modbus

The Gateway supports both Modbus RTU over the RS-485 serial port and Modbus TCP over Ethernet. It functions as a sub device on the Modbus network and must be polled by a Modbus master or client (host system).

Communication settings

It is important that the Modbus communication settings in the Gateway match the settings in the Modbus master or client. Please refer to host system documentation for more information on how to configure these settings. The Modbus communication settings can be found by navigating to **System Settings > Protocols > Modbus**.

Figure 5-3: Modbus Communications Page

Communication Settings

Addresses

☒ Single Modbus Address

☐ Multiple Modbus Addresses

Baud Rate

Response Delay Time(ms)

Parity

☐ None ☒ Even ☐ Odd

Stop Bits

☒ One ☐ Two

Unmapped Register Read Response?

☐ Zero Fill ☒ Illegal Data Address

Unmapped Register Write Response?

☐ OK ☒ Illegal Data Address

Format Settings

Floating point representation

☒ Float ☐ Round ☐ Scale

☒ Incorporate values associated status as error?

Byte Swap

☐ Use swapped floating point format?

Value reported for error (floating point)

☒ NaN ☐ Infinity ☐ -Infinity ☐ Other

Value reported for error (rounded and native integer)

Single Modbus Address: When selected, this address is used by the Gateway for Modbus RTU communications.

Multiple Modbus Addresses: When selected, a new address column will appear on the Modbus mapping page.

Modbus TCP Port: This is the TCP/IP port the Gateway uses for Modbus TCP (Ethernet). To change TCP/IP port settings, see the Internal Firewall section for more details.

Baud Rate: The data rate or speed of serial communications. This setting is only required for Modbus RTU.

Parity: This setting determines parity (none, even, or odd) used for error checking purposes. This setting is only required for Modbus RTU.

Stop Bits: This setting determines the number (1 or 2) of stop bits used when ending a message. This setting is only required for Modbus RTU.

Response delay time (ms): This setting determines how long (ms) the Gateway waits before responding to a Modbus request. This setting is only required for Modbus RTU.

Unmapped register read response?: This is the value returned by the Gateway if the Modbus master requests a register with no data assigned to it (empty register). It is recommended this be set to zero fill to prevent errors.

Floating point representation: This setting determines if the Gateway uses floating point values or integer values. There are three options for this setting.

- Float—uses 32 bit floating point values
- Round—rounds the data value to the nearest whole number
- Scaled—uses scaled integers to offset negative values or increase decimal point resolution. The equation for scaled integers is:

$$y = Ax - (B - 32768)$$

Where:

y = Scaled integer returned by the Gateway

A = Gain for scaled integer value

x = Measured value from wireless field device

B = Offset for scaled integer value

Use swapped floating point format?: This setting switches which register is sent first for a floating point value. This setting is only used for floating point values.

Incorporate value's associated status as error?: This setting causes the Gateway to report a predetermined value when a communications or critical diagnostic error is received from the wireless field device. The value is user configurable depending on which floating point representation is chosen. See Value reported for error below.

Value reported for error (floating point): This setting determines what value is reported if the wireless field device reports a failure or stops communicating to the Gateway. This setting is used for floating point values. The choices are NaN (not a number), +Inf (positive infinity), -Inf (negative infinity), or Other (user specified).

Value reported for error (rounded and native integer): This setting determines what value is reported if the wireless field device reports a failure or stops communicating to the Gateway. This setting is used for rounded or scaled integers. The choice is a user specified value between -32768 and 65535.

Scaled floating point maximum integer value: This determines the maximum integer value for the purpose scaling integers. 999-65534

Use global scale gain and offset?: This setting determines if a global gain and offset is applied for scaled integers or if each value has a unique gain and offset. Unique gain and offsets are found on the Modbus Mapping page.

Global scale gain: This value is multiplied by the data values for the purpose of scaling integers. If global scaling is not selected, a gain value will be available for each separate data value on the Modbus Mapping page.

Global scale offset: This value is added to the data values for the purpose of scaling integers. If global scaling is not selected, an offset value will be available for each separate data value on the Modbus Mapping page.

6 Troubleshooting

6.1 Service support

To expedite the return process outside of the United States, contact the nearest Emerson representative.

Within the United States, call the Emerson Instrument and Valve Response Center using the 1-800-654-RSMT (7768) toll-free number. This center, available 24 hours a day, will assist you with any needed information or materials.

The center will ask for product model and serial numbers, and will provide a Return Material Authorization (RMA) number. The center will also ask for the process material to which the product was last exposed.

⚠ CAUTION

Individuals who handle products exposed to a hazardous substance can avoid injury if they are informed of and understand the hazard. Returned products must include a copy of the required Safety Data Sheet (SDS) for each substance.

Emerson Instrument and Valve Response Center representatives will explain the additional information and procedures necessary to return goods exposed to hazardous substances.

NOTICE

Shipping considerations for wireless products.

- The unit was shipped to you without the Power Module installed. Please remove the Power Module prior to shipping the unit.
- Each Power Module contains two "C" size primary lithium/thionyl chloride batteries. Primary lithium batteries (charged or discharged) are regulated during transportation by the U.S. Department of Transportation. They are also covered by IATA (International Air Transport Association), ICAO (International Civil Aviation Organization), and ARD (European Ground Transportation of Dangerous Goods). It is the responsibility of the shipper to ensure compliance with these or any other local requirements. Consult current regulations and requirements before shipping.

6.2 Initial connection

Symptom	Recommended action
Web browser returns page not found	<ul style="list-style-type: none"> • Connect the Gateway and PC/laptop. • Verify the Gateway is properly powered, 24 VDC (nominal) and 250 mA. • Verify which Ethernet port is being used on the Gateway. • Verify the IP address for the Gateway (default for the right primary port is 192.168.1.10, default secondary port is 192.168.2.10, or for the left primary port 192.168.1.20 and 192.168.2.20). • Verify the IP address of the PC/laptop is in the same subnet range as the Gateway (i.e. If the Gateway IP is 155.177.0.xxx, then the PC/laptop IP address should be 155.177.0.yyy). • Disable Internet browser proxy settings.
Cannot find Gateway after changing IP address	<ul style="list-style-type: none"> • Verify the IP address of the PC/laptop is in the same subnet range as the Gateway (i.e. If the Gateway IP is 155.177.0.xxx, then the PC/laptop IP address should be 155.177.0.yyy). Consider resetting the Gateway to factory defaults.
Cannot find Gateway using Secondary Ethernet Port	<ul style="list-style-type: none"> • Verify which Ethernet port is being used on the Gateway. • Verify the IP address for the Gateway (default for the right primary port is 192.168.1.10 and default secondary port is 192.168.2.10, or the default for the left port is 192.168.1.20 and default secondary port is 192.168.2.20). • Verify the IP address of the PC/laptop is in the same subnet range as the Gateway (i.e. If the Gateway IP is 155.177.0.xxx, then the PC/laptop IP address should be 155.177.0.yyy). Verify this option was ordered with the Gateway.
Cannot log into the Gateway	<ul style="list-style-type: none"> • Verify the user name and password. The administrator user name is admin and the default password is default. • If unable to connect, consider resetting the Gateway.

6.3 AMS Wireless Configurator

AMS Wireless Configurator helps deploy and configure wireless field devices. It provides an HART® integrated operating environment that leverages the full capabilities of WirelessHART®, including embedded data trending, charting, and graphical display capabilities provided by enhanced EDDL technology.

- Display and modify device configuration
- View device diagnostics
- View process variables
- Provision a wireless device using the drag-and-drop operation so it can join a Gateway's self-organizing network
- Enhance AMS Wireless Configurator functionality with the AMS Wireless SNAP-ON Application
- Restrict access to AMS Wireless Configurator functions through the use of security permissions

See the release notes for information specific to the current release of AMS Wireless Configurator. To display the release notes, navigate to *Start>Programs>AMS Wireless Configurator>Help*.

6.4 Wireless field devices

Symptom	Recommended action
Wireless device does not appear on the network	<ul style="list-style-type: none">• Verify the device has power.• Verify the device is within effect communications range.• Verify the proper Network ID has been entered into the device.
Wireless device appears in the join failure list	<ul style="list-style-type: none">• Re-enter the Network ID and Join Key into the device.
Wireless device appears with service denied	<ul style="list-style-type: none">• Verify the total number of devices on the network (100 max per network).• Reduce the update rate for the device.

6.5 Modbus communications

Symptom	Recommended action
Cannot communicate using Modbus RTU	<ul style="list-style-type: none"> • Verify the use of RS-485 • Verify wiring connections. RS-485 • Verify if termination or pull up is required. • Verify Modbus serial communications setting in the Gateway match the Modbus Host settings. Log on to the Gateway and navigate to SYSTEM SETTINGS > PROTOCOLS > MODBUS. • Verify the Modbus address for the Gateway. • Verify Modbus register mapping in the Gateway. Log on to the Gateway and navigate to SYSTEM SETTINGS > PROTOCOLS > MODBUS.
Cannot communicate using Modbus TCP	<ul style="list-style-type: none"> • Verify secure/unsecure Modbus protocol settings in the Gateway. Log on to the Gateway and navigate to SYSTEM SETTINGS > PROTOCOLS > PROTOCOLS AND PORTS. • Verify the Modbus TCP communications settings in the Gateway. Log on to the Gateway and navigate to SYSTEM SETTINGS > PROTOCOLS > MODBUS. • Verify Modbus register mapping in the Gateway. Log on to the Gateway and navigate to SYSTEM SETTINGS > PROTOCOLS > MODBUS.
Cannot communicate using secure Modbus TCP	<ul style="list-style-type: none"> • Verify the Security Setup Utility has been installed. • Configure a Secure Modbus Proxy for the Gateway. See "Security setup utility". • Verify secure/unsecure Modbus protocol settings in the Gateway. Log on to the Gateway and navigate to SYSTEM SETTINGS > PROTOCOLS > PROTOCOLS AND PORTS. • Verify the Modbus TCP communications settings in the Gateway. Log on to the Gateway and navigate to SYSTEM SETTINGS > PROTOCOLS > MODBUS. • Verify Modbus register mapping in the Gateway. Log on to the Gateway and navigate to SYSTEM SETTINGS > PROTOCOLS > MODBUS.

6.6 OPC communications

Symptom	Recommended action
OPC application cannot find a Gateway OPC server	<ul style="list-style-type: none"> Verify the Security Setup Utility has been installed on the same PC as the OPC application. Configure an OPC proxy for the Gateway. See "Security setup utility".
Gateway OPC server does not show any Gateways	1. Configure an OPC proxy for the Gateway. See " Security setup utility ".
Gateway OPC server does not show any data tags	<ul style="list-style-type: none"> Verify the connection status for the OPC proxy in the Security Setup Utility. Verify the OPC proxy is configured for secure or unsecure communications. Verify secure/unsecure OPC protocol settings in the Gateway. Log on to the Gateway and navigate to SYSTEM SETTINGS > PROTOCOLS > PROTOCOLS AND PORTS. Verify network firewall and port settings.

6.7 EtherNet/IP™

Symptom	Recommended action
The Gateway is not publishing the parameters	<ul style="list-style-type: none"> Verify connection is established with EtherNet/IP. Navigate to SYSTEM SETTINGS > PROTOCOLS > PROTOCOLS AND PORTS.

6.8 Return of materials

To expedite the return process outside of North America, contact your Emerson™ representative.

Within the United States, call the Emerson Response Center toll-free number 1 800 654 7768. The center, which is available 24 hours a day, will assist you with any needed information or materials.

The center will ask for product model and serial numbers, and will provide a Return Material Authorization (RMA) number. The center will also ask for the process material to which the product was last exposed.

7 Appendix A

7.1 Product Certifications

To view current Product Certifications, follow these steps:

Procedure

1. Go to [Emerson.com/Rosemount/1410H](https://emerson.com/rosemount/1410H).
2. Scroll as needed to the green menu bar and click Documents & Drawings.
3. Click Manuals & Guides.
4. Select the appropriate Quick Start Guide.

7.2 Ordering Information, Specifications, and Dimensional Drawings

To view current Rosemount 1410H Ordering Information, Specifications, and Dimensional Drawings, follow these steps:

Procedure

1. Go to [Emerson.com/Rosemount/1410H](https://emerson.com/rosemount/1410H).
2. Scroll as needed to the green menu bar and click Documents & Drawings.
3. Click Data Sheets & Bulletins.
4. Select the appropriate Product Data Sheet.

8 Appendix B

8.1 Emerson 1410H Product Certifications

Rev. 2.0

European Directive Information

A copy of the EC Declaration of Conformity can be found at the end of the Quick Start Guide. The most recent revision of the EC Declaration of Conformity can be found at Emerson.com/Rosemount.

Telecommunication compliance

All wireless devices require certification to ensure that they adhere to regulations regarding the use of the RF spectrum. Nearly every country requires this type of product certification. Emerson™ is working with governmental agencies around the world to supply fully compliant products and remove the risk of violating country directives or laws governing wireless device usage

FCC and IC

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions: This device may not cause harmful interference. This device must accept any interference received, including interference that may cause undesired operation. This device must be installed to ensure a minimum antenna separation distance of 20 cm from all persons.

Ordinary Location Certification

As standard, the transmitter has been examined and tested to determine that the design meets the basic electrical, mechanical, and fire protection requirements by a nationally recognized test laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

Installing Equipment in North America

The US National Electrical Code® (NEC) and the Canadian Electrical Code (CEC) permit the use of Division marked equipment in Zones and Zone marked equipment in Divisions. The markings must be suitable for the area classification, gas, and temperature class. This information is clearly defined in the respective codes.

USA

N5 U.S.A. Division 2

Certificate CSA 2646342

Standards ANSI/ISA-12.12.01-2012 UL 61010-1

Markings NI CL 1, DIV 2, GPA, B, C, D T4; Suitable for use in CL II, III, DIV 2, GP F, G T4; T4(-40 °C ≤ Ta ≤ 60 °C);

Special Conditions for Safe Use (X):

1. When installed as Division 2 equipment, the Model 1410 Smart Wireless Gateway shall be mounted within a tool-secured enclosure which meets the requirements of ANSI/ISA 61010-1 and be capable of accepting the applicable wiring methods per the NEC.

Canada

N6 Canada Division 2

Certificate 2646342 (CSA)

Standards CAN/CSA C22.2 No. 0-10, CSA C22.2 No. 213-M1987 (R2013), CSA C22.2 No. 61010-1 – 2012, ANSI/ISA-12.12.01 – 2012, UL61010-1, 3rd Edition

Markings Suitable for CL I, DIV 2, GP A, B, C, D; T4 ($-40^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$)

- Shall be powered by a class 2 power supply.
- Suitable for dry indoor locations only.
- Equipment must be installed in a suitable tool accessible enclosure subject to the end use application.
- Using the 1410H and the 781 Field Links in a hazardous location requires barriers between the two units.

Europe

N1 ATEX Type n

Certificate Baseefa14ATEX0125X

Standards EN 60079-0: 2012, EN 60079-15: 2010

Markings II 3 G Ex nA IIC T4 Gc, T4 ($-40^{\circ}\text{C} \leq T_a \leq +75^{\circ}\text{C}$), $V_{\text{MAX}} = 30\text{Vdc}$

Special Conditions for Safe Use (X):

1. The equipment must be installed in an area of not more than Pollution Degree 2 as defined in IEC 60664-1, and in an enclosure that provides a degree of protection of at least IP54 and meets the relevant requirements of EN 60079-0 and EN 60079-15.

2. External connections to the equipment must not be inserted or removed unless either the area in which the equipment is installed is known to be non-hazardous, or the circuits connected have been de-energised.

3. The equipment is not capable of withstanding the 500V electrical strength test as defined in clause 6.5.1 of EN 60079-15: 2010. This must be taken into account during installation.

4. When fitted, the surface resistivity of the remote antenna is greater than 1G. To avoid electrostatic charge build up, it must not be rubbed with a dry cloth or cleaned with solvents.

International

N7 IECEx Type n

Certificate IECEx BAS 14.0067X

Standards IEC 60079-0: 2011, IEC 60079-15: 2010

Markings Ex nA IIC T4 Gc, T4(-40 °C ≤ Ta ≤ +75 °C), V_{MAX} = 30Vdc

Special Conditions for Safe Use (X):

1. The equipment must be installed in an area of not more than Pollution Degree 2 as defined in IEC 60664-1, and in an enclosure that provides a degree of protection of at least IP54 and meets the relevant requirements of EN 60079-0 and EN 60079-15.
 2. External connections to the equipment must not be inserted or removed unless either the area in which the equipment is installed is known to be nonhazardous, or the circuits connected have been de-energised.
 3. The equipment is not capable of withstanding the 500V electrical strength test as defined in clause 6.5.1 of EN 60059-15: 2010. This must be taken into account during installation.
 4. When fitted, the surface resistivity of the remote antenna is greater than 1GΩ. To avoid electrostatic charge build-up, it must not be rubbed with a dry cloth or cleaned with solvents.
- Currently not available for 1410H option.

8.2 Emerson 781 Product Certifications

Rev. 1.1

European Directive Information

A copy of the EC Declaration of Conformity can be found at the end of the Quick Start Guide. The most recent revision of the EC Declaration of Conformity can be found at Emerson.com/Rosemount.

Ordinary location certification

As standard, the Gateway has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

Installing in North America

The US National Electrical Code (NEC) and the Canadian Electrical Code (CEC) permit the use of Division marked equipment in Zones and Zone marked equipment in Divisions. The markings must be suitable for the area classification, gas, and temperature class. This information is clearly defined in the respective codes.

USA

I5 USA Intrinsically Safe (IS), Nonincendive (NI) and Dust-ignitionproof

Certificate FM17US0235X

Standards FM Class 3600 – 1998, FM Class 3610 – 2010, FM Class 3611 – 2004, FM Class 3810 – 2005, ANSI/NEMA 250 – 2003, ANSI/IEC 60529 – 2004;

Markings IS CL I, DIV 1, GP A, B, C, D; CL II, DIV 1, GP E, F, G; Class III T4; Class 1, Zone 0 AEx ia IIC T4; NI CL I, DIV 2, GP A, B, C, D T4; DIP CL II, DIV 1, GP E, F, G; CL III T4; when installed per dwg 00781-1010 T4(-40 °C ≤ Ta ≤ +70 °C)

Canada

I6 Canada Intrinsically Safe

Certificate CSA 2330424

Standards CSA C22.2 No. 0-10, CSA C22.2 No.94-M91, CSA Std. C22.2 No. 142-1987, CSA-C22.2 No. 157-92, CSA Std. C22.2 No. 60529 – 2005

Markings Intrinsically Safe Class I, Division 1, Groups A, B, C, and D T3C (Ta ≤ +60 °C) Type 4X; IP 66/67; when installed per 00781-1011

Europe

I1 ATEX Intrinsic Safety

Certificate Baseefa11ATEX0059X

Standards IEC EN 60079-0:2018, EN 60079-11:2012

Markings Ⓔ II 1G Ex ia IIC T4 Ga (-40 °C ≤ Ta ≤ +70 °C)

Input parameters (power terminals)	Input parameters (RS485)	Output parameters (RS485)
U _i = 30V	U _i = 11V	U _o = 7.14V
I _i = 200mA	I _i = 300 mA	I _o = 112 mA
P _i = 1W	P _i = 1W	P _o = 1W
C _i = 0μF	C _i = 5.1 nF	C _o = 13.9μF
L _i = 0mH	L _i = 0mH	L _o = 1000μH

Special Conditions for Safe Use (X):

1. The plastic antenna may present a potential electrostatic ignition hazard and must not be rubbed or cleaned with a dry cloth.
2. The Model 781 enclosure is made of aluminum alloy and given a protective paint finish; however, care should be taken to protect it from impact or abrasion if located in a zone 0 environment
3. The apparatus is not capable of withstanding the 500V isolation test required by EN 60079-11. This must be taken into account when installing the apparatus.

International

I7 IECEx Intrinsic Safety

Certificate IECEx BAS 11.0028X

Standards IEC 60079-0: 2011, IEC 60079-0: 2007-10, IEC 60079-11: 2011

Markings Ex ia IIC T4 Ga (-40 °C ≤ Ta ≤ +70 °C)

Input parameters (power terminals)	Input parameters (RS485)	Output parameters (RS485)
$U_i = 30V$	$U_i = 11V$	$U_o = 7.14V$
$I_i = 200mA$	$I_i = 300\text{ mA}$	$I_o = 112\text{ mA}$
$P_i = 1W$	$P_i = 1W$	$P_o = 1W$
$C_i = 0\mu F$	$C_i = 5.1\text{ nF}$	$C_o = 13.9\mu F$
$L_i = 0mH$	$L_i = 0mH$	$L_o = 1000\mu H$

Special Conditions for Safe Use (X):

1. The plastic antenna may present a potential electrostatic ignition hazard and must not be rubbed or cleaned with a dry cloth.
2. The Model 781 enclosure is made of aluminum alloy and given a protective paint finish; however, care should be taken to protect it from impact or abrasion if located in a zone 0 environment
3. The apparatus is not capable of withstanding the 500V isolation test required by EN 60079-11. This must be taken into account when installing the apparatus.

China

I3 China Intrinsic Safety

Certificate	GYJ18.1480
Standards	GB3836.1-2010, GB3836.4-2010, GB3836.20-2010
Markings	Ex ia IIC T4 Ga, -40 ~ + 70 °C

Special Conditions for Safe Use (X):

1. See certificate for special conditions.

EAC – Belarus, Kazakhstan, Russia

IM EAC Intrinsic Safety

Certificate: RU C-US.Gb05.B.00643

Markings	0Ex ia IIC T4 Ga X -40°C ≤ Ta ≤ 70°C
-----------------	--------------------------------------

Input parameters (power terminals)	Input parameters (RS485)	Output parameters (RS485)
$U_i = 30B$	$U_i = 11B$	$U_o = 7.14B$
$I_i = 200_{MA}$	$I_i = 300_{MA}$	$I_o = 112_{MA}$
$P_i = 1B_T$	$P_i = 1B_T$	$P_o = 1B_T$
$C_i = 0_{MK}$	$C_i = 5.1_H$	$C_o = 13.9_{MK}$
$L_i = 0_{MH}$	$L_i = 0_{MH}$	$L_o = 0_{MH}$

Special Conditions for Safe Use (X):

1. See certificate for special conditions.

Combinations

KD Combination of I1, I5, and I6

KL Combination of I1, I5, I6, and I7

Japan

I4 CML Intrinsic Safety

Certificate	CML 18JPN2024X
Markings	Ex ia IIC T4 Ga, -40 ~ + 70 °C

Special Conditions for Safe Use (X):

1. See certificate for special conditions.

Brazil

I2 INMETRO Intrinsic Safety

Certificate	UL-BR 16.0478X
Standards	ABNT NBR IEC 60079-0:2013 ABNT NBR IEC 60079-11:2013
Markings	Ex ia IIC T4 Ga, -40 ~ + 70 °C IP66, UL BR

Special Conditions for Safe Use (X):

1. See certificate for special conditions.

9 Appendix C

9.1 Overview

Redundancy for the Emerson™ Wireless 1410H Gateway (Gateway) increases the availability of the wireless field network by providing two sets of physical hardware which operate as a single Gateway system. This section covers setup and installation of a redundant Gateway system. It also covers diagnostics and integration to help monitor the health of the redundant Gateway system.

- Where to mount the respective antennas
- Illustration of maximum redundancy including dual switch and UPS
- Understanding how the fail over works and experience to expect
- How to leverage the multimaster capability for Modbus® integrations

9.2 Requirements

Gateway

- Static IP Address
- Must have matching output protocols (e.g. Modbus or OPC) on each Gateway

Host system

- Ethernet connection for Modbus TCP or OPC DA communications
- Serial (RS-485) connection for Modbus RTU communications

9.3 Setup

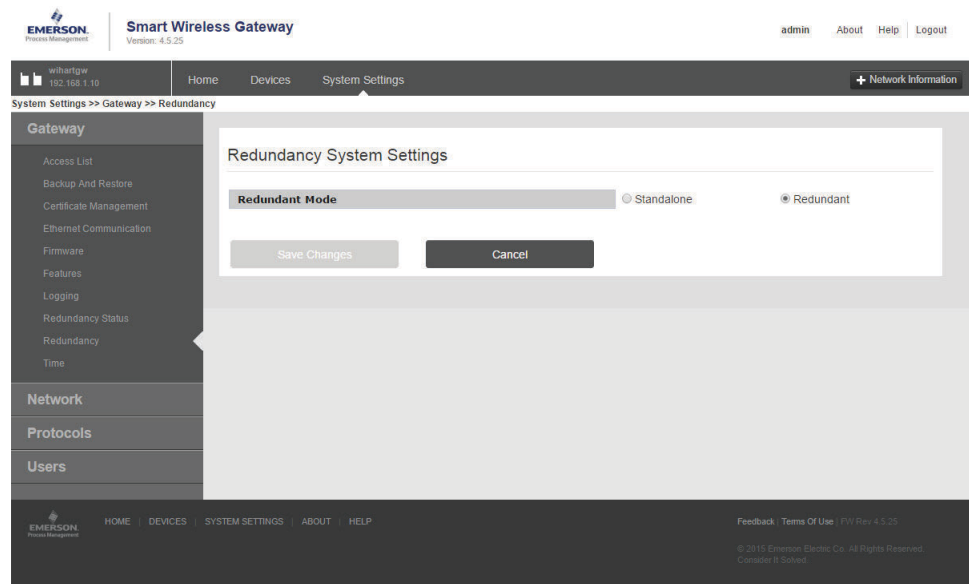
When configuring redundant Gateways, it is only necessary to configure one system. The other Gateway will be configured automatically when it is paired with the first Gateway. Both networks will need to be powered for this process.

Choose one side of the Gateway as the starter Gateway. For the purposes of this document, it will be referred to as Gateway A and be the left side of the Gateway. The right side of the Gateway will be referred to as Gateway B.

To configure redundancy system settings:

1. Connect a PC/laptop to the Ethernet 1 port on Gateway A.
2. Log in using the admin user account.
3. Navigate to *System Settings>Gateway>Features* and make sure Redundancy is selected. If it is not, select it and then **Save**. A restart apps will also be required.
4. Navigate to *System Settings>Gateway>Redundancy*.

Figure 9-1: System Settings>Gateway>Redundancy



<https://192.168.1.10/themes/default/views/index.html#settings/gateway/redundancy>

5. Select **Redundant** in the Redundant Mode section.
6. Do this process for Gateway B as well.

The Gateway serial number will be used in diagnostic messages and host system integration to help identify each Gateway. It is recommended that these numbers be marked on each physical Gateway, in addition to the configuration settings.

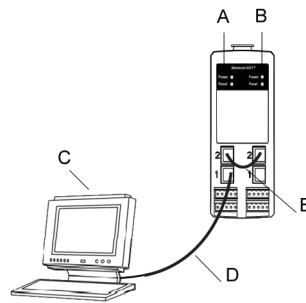
Selecting left or right for Gateway A is for visualization purposes only. It has no effect on performance or functionality.

After the redundancy system settings have been configured, the two Gateways must be connected and undergo a pairing process.

To pair both Gateways and form a redundant system:

1. Connect a PC/laptop to the primary Ethernet port on Gateway A.
2. Log in using the admin user account.
3. Navigate to *System Settings>Gateway>Redundancy Status*.
4. Connect the secondary Ethernet port on Gateway A to the secondary Ethernet port on Gateway B (see [Figure 9-2](#), Redundancy Setup Connections).
5. After a few minutes, a dialog will appear on the page; select Form redundant pair.
6. Wait for the Pairing to redundant peer status to turn green.

Figure 9-2: Redundancy Setup Connections



- A. Gateway A
- B. Gateway B
- C. PC/Laptop
- D. Primary Ethernet
- E. Secondary Ethernet

Figure 9-3: Redundant Pair

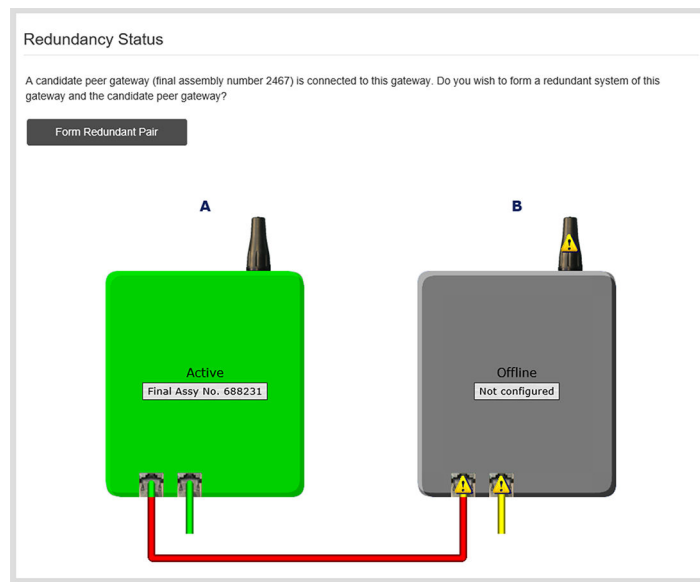


Figure 9-4: Pairing Gateways

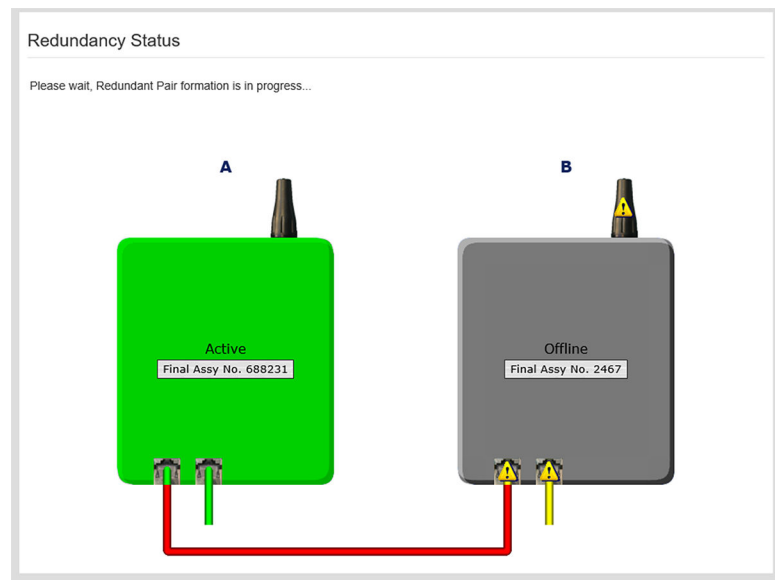
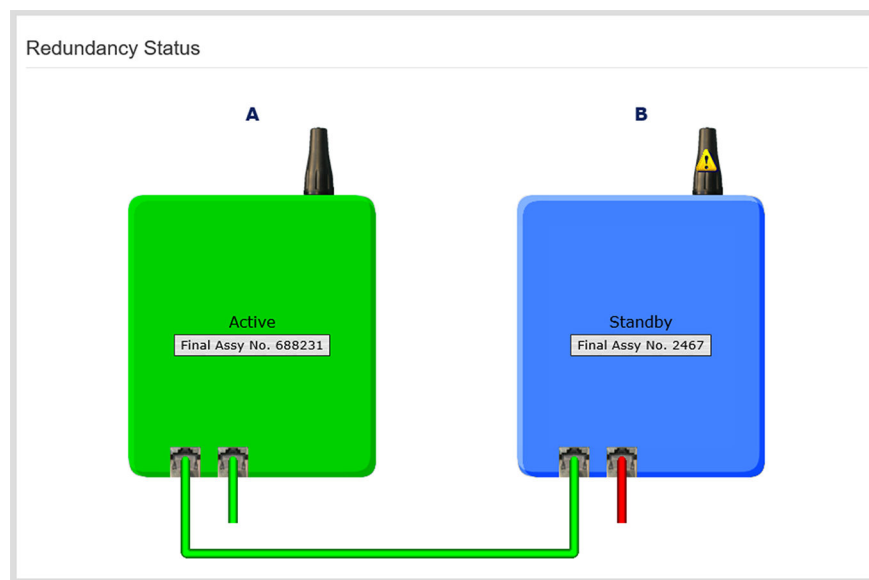


Figure 9-5: Paired Gateways



Once the Gateways have finished the pairing process, Gateway A will appear as the current active Gateway on the left hand side and Gateway B will be the standby Gateway on the right. If significant configuration changes need to be downloaded to the standby Gateway, it may temporarily go offline shortly after the pair process is complete. This is expected behavior and does not represent instability in the system.

9.4 Mounting and connections

Redundant Gateways follow similar mounting and connection practices as a standalone Gateway. Refer to [Mounting the Gateway](#) for more information. In addition to the standard practices, the following considerations should be taken when installing redundant Gateways.

Mounting

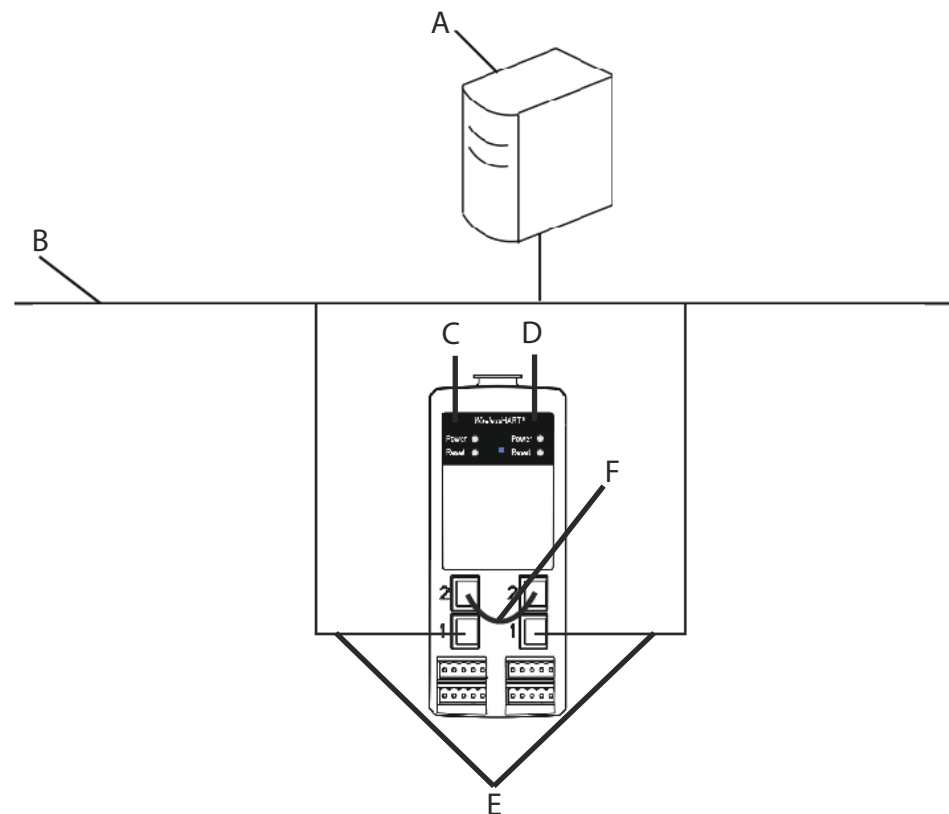
The Emerson 1410H Gateway should be mounted in a location that allows convenient access to the process control network as well and provides good coverage for the wireless field network.

The two Emerson 781 Field Links should be mounted at the same height and be spaced between 3–9 ft. (1–3 m) horizontally. This is to ensure that they provide identical coverage for the wireless field network and to help eliminate coverage gap in the event of a switch over.

Ethernet

An Ethernet connection to the host system will support Modbus[®] TCP, OPC, AMS Wireless Configurator, and HART-IP[™] protocols. When using this architecture, connect the secondary Ethernet port on Gateway A directly to the secondary Ethernet port on Gateway B. Then connect the primary Ethernet ports for both Gateways to a process control network using separate/redundant network switches. See [Figure 9-6](#).

Figure 9-6: Ethernet Connection Architecture



- A. Engineering station
- B. Process control network
- C. Gateway A
- D. Gateway B
- E. Primary Ethernet
- F. Secondary Ethernet

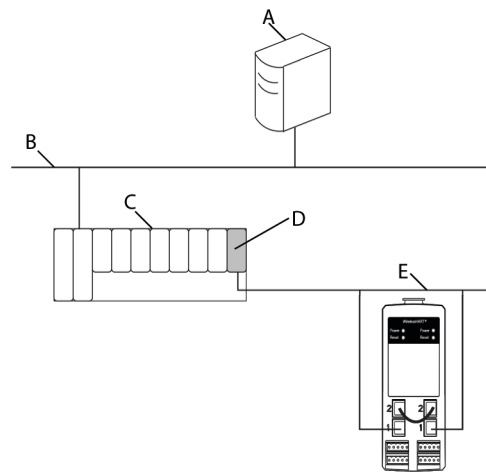
Note

The primary Ethernet port for each network should be connected to separate network switches on the same process control network. Consult a control system administrator for more details about available redundant network switches.

Simplex RS-485

A simplex RS-485 host connection supports Modbus RTU protocol. When using this architecture, connect the secondary Ethernet port on Gateway A directly to the secondary Ethernet port on Gateway B. Then wire the RS-485 ports for both Gateways in parallel to a single serial card at the host system. See Figure D-5, Simplex RS-485 Architecture.

Figure 9-7: Simplex RS-485 Architecture



- A. Engineering station
- B. Process control network
- C. Controller and I/O
- D. Serial card
- E. RS-485 bus
- F. Secondary Ethernet

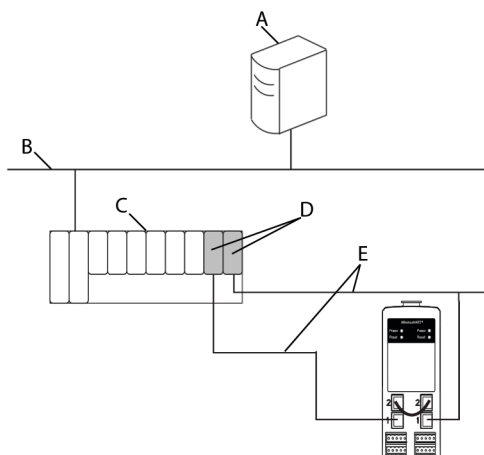
Note

In either a simplex or dual RS-485 architecture, the primary Ethernet ports can be connected to an asset management network to provide connectivity to AMS Device Manager or AMS Wireless Configurator.

Dual RS-485

A Dual RS-485 host connection support Modbus RTU protocol. When using this architecture, connect the secondary Ethernet port on Gateway A directly to the secondary Ethernet port on Gateway B. Then wire the RS-485 ports for both Gateways separately to dual serial cards at the host system. See Figure D-6, Dual RS-485 Architecture.

Figure 9-8: Dual RS-485 Architecture



- A. Engineering station
- B. Process control network
- C. Controller and I/O
- D. Dual serial card
- E. RS-485 bus
- F. Secondary Ethernet

Note

By default, only the active Gateway in a redundant system will respond to Modbus polling requests. If simultaneous polling is desired, login to the Gateway web interface, navigate to *Setup>Modbus>Communications* and set “Respond when running as redundant standby?” to **Yes**. Only use this setting in a dual RS-485 architecture.

Power

Power for the redundant Gateways should be applied after all primary and secondary Ethernet and RS-485 connections have been made. Using separate uninterruptible power supplies (UPS) is recommended to ensure availability of the redundant Gateway system.

9.5 Diagnostics

The redundant system will perform many diagnostic checks to verify the health and connectivity of the system. In the event of a failure, it can take up to 30 seconds for the Gateway to trade positions.

These diagnostics can also be mapped to Modbus registers or OPC tags. The following table covers what diagnostics are included on the Redundancy Status page as well as how they can be mapped as parameters in Modbus or OPC.

Table 9-1: Redundancy Diagnostics

Parameter	Description	Data type
REDUNDANT_HEALTHY	Overall redundancy status indicating the system is ready for a switch-over	Boolean
RF_COVERAGE_FAILURE	Check to verify that both Gateways have the same RF coverage of the wireless field network	Boolean
REDUNDANT_A_ONLINE	Operational status of Gateway A	Boolean
REDUNDANT_A_MASTER	Indication if Gateway A is the active system	Boolean
REDUNDANT_A_PING	Indication if Gateway A is able to ping designated host IP address	Boolean
REDUNDANT_A_ETH0	Electrical connection status of the primary Ethernet port for Gateway A	8-bit unsigned int
REDUNDANT_B_ONLINE	Operational status of Gateway B	Boolean
REDUNDANT_B_MASTER	Indication if Gateway B is the active system	Boolean
REDUNDANT_B_PING	Indication if Gateway B is able to ping designated host IP address	Boolean
REDUNDANT_B_ETH0	Electrical connection status of the primary Ethernet port for Gateway A	8-bit unsigned int

In addition to the redundancy diagnostics, an additional check may be configured to test network connectivity to a host system or other application. The redundant system will use this check to determine the best connectivity option and which Gateway should be set to the active Gateway.

To configure network connectivity check:

1. Navigate to *System Settings>Gateway>Ethernet Communication*.
2. Enter the host system IP address in the Check Network Connectivity IP Address field.
3. Select **Save Changes**.

Figure 9-9: Network Connectivity Check (System Settings>Gateway>Ethernet Communication)

The screenshot displays the Emerson Smart Wireless Gateway web interface. The top navigation bar includes the Emerson logo, 'Smart Wireless Gateway' title, version '4.3.25', and links for 'Admin', 'About', 'Help', and 'Logout'. Below this, a secondary navigation bar shows 'Home', 'Devices', 'System Settings', and a 'Network Information' button. The main content area is titled 'Ethernet Communication' and contains the following fields: 'System Address' (with a sub-label 'Host Name' and value 'wfhgwgr'), 'IP Address' (value '192.168.1.10'), 'Net Mask' (value '255.255.255.0'), 'Gateway' (value '192.168.1.1'), and 'Check Network Connectivity IP Address' (empty). At the bottom of the form are 'Save Changes' and 'Cancel' buttons. A left-hand sidebar lists various system settings categories: Gateway, Address List, Backup And Restore, Certificate Management, Ethernet Communication (selected), Firmware, Features, Logging, Redundancy Status, Redundancy, Time, Network, Protocols, and Users. The footer of the page contains 'Feedback', 'Tools (2) User', 'PDF User', '4.3.25', and copyright information for Emerson Process Management.

<https://192.168.1.25/Emerson/default/Screen/Screen.html#/Settings/gateway/ethernet>

9.6 Gateway replacement

When replacing or reintroducing a Gateway in a redundant system, always connect both the primary and secondary Ethernet connections before powering the standby Gateway. If the Gateway is being reintroduced (i.e. it was a part of the original redundant system), it will automatically rejoin the redundant system. If the Gateway is new or has been set to default configuration, it will need to be paired to the current active Gateway. Navigate to *System Settings>Gateway>Redundancy* and follow the recommended actions on that page or follow the procedure above to pair Gateways and form a redundant system.

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