

SensEnable™ 52WM Wireless Sensor User Guide



This guide covers:

1. Installation of a new wireless sensor system, including factory-new Emerson Wireless Gateway™, wireless modules and sensor strings
2. Adding new wireless modules and sensor string (and Emerson Wireless Gateways, if necessary) to expand an existing wireless network.

NOTE: For complete details for installing the Emerson Wireless Gateway or wireless modules consult the device documentation. Emerson highly recommends that new users review the device documentation prior to installation.

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Introduction



Product Description

The 52WM is a WirelessHART based wireless electronic sensor. Emerson's SensEnable 52WM powered by Smart Wireless transmits data through an open standard wireless network. Designed and integrated with Emerson's iCOM-S, Trellis, SITESCAN, and various other monitoring and control systems, the 52WM provides a highly secure and reliable environmental sensing solution for critical data center environments.

Approved manufacturing locations

Emerson Therm-O-Disc - Mansfield, OH USA

Wireless Certifications

TCB	GRANT OF EQUIPMENT AUTHORIZATION	TCB			
Certification Issued Under the Authority of the Federal Communications Commission By:					
Interlink Testing Services NA, Inc. 70 Codman Hill Road Bedborough, MA 01719		Date of Grant: 10/12/2014 Application Date: 10/11/2014			
Therm-O-Disc, Inc. 1020 South Main Street Mansfield, OH 44907					
Attention: Tuong Nguyen - Manager, Technical Service					
NOT TRANSFERABLE					
EQUIPMENT AUTHORIZATION is hereby issued to the named GRANTEE, and is VALID ONLY for the equipment identified herein for use under the Commission's Rules and Regulations listed below.					
FCC IDENTIFIER: 5YR42UM					
Name of Grantee: Thermo-O-Disc, Inc.					
Equipment Class: Digital Transmission System					
Notes: Electronic Sensors with Wireless HART					
Grant Notes:	FCC Rule Parts	Frequency Range (MHz)	Output Power	Frequency Tolerance	Emerson Designator
	15C	2410.0 - 2483.8	700mW 0.800		
Output Power is Conducted					
					

52WM Technical Specification

Specification	Description
Power Source	Two AA lithium ion batteries or USB Micro 5V supply
Operating Range	0° C to 60° C (32° F to 158° F)
Measurements	Temperature (°F or °C), Relative Humidity (%)
Accuracy	Temperature $\pm 0.5^{\circ}\text{C}$, Relative Humidity $\pm 2\%$

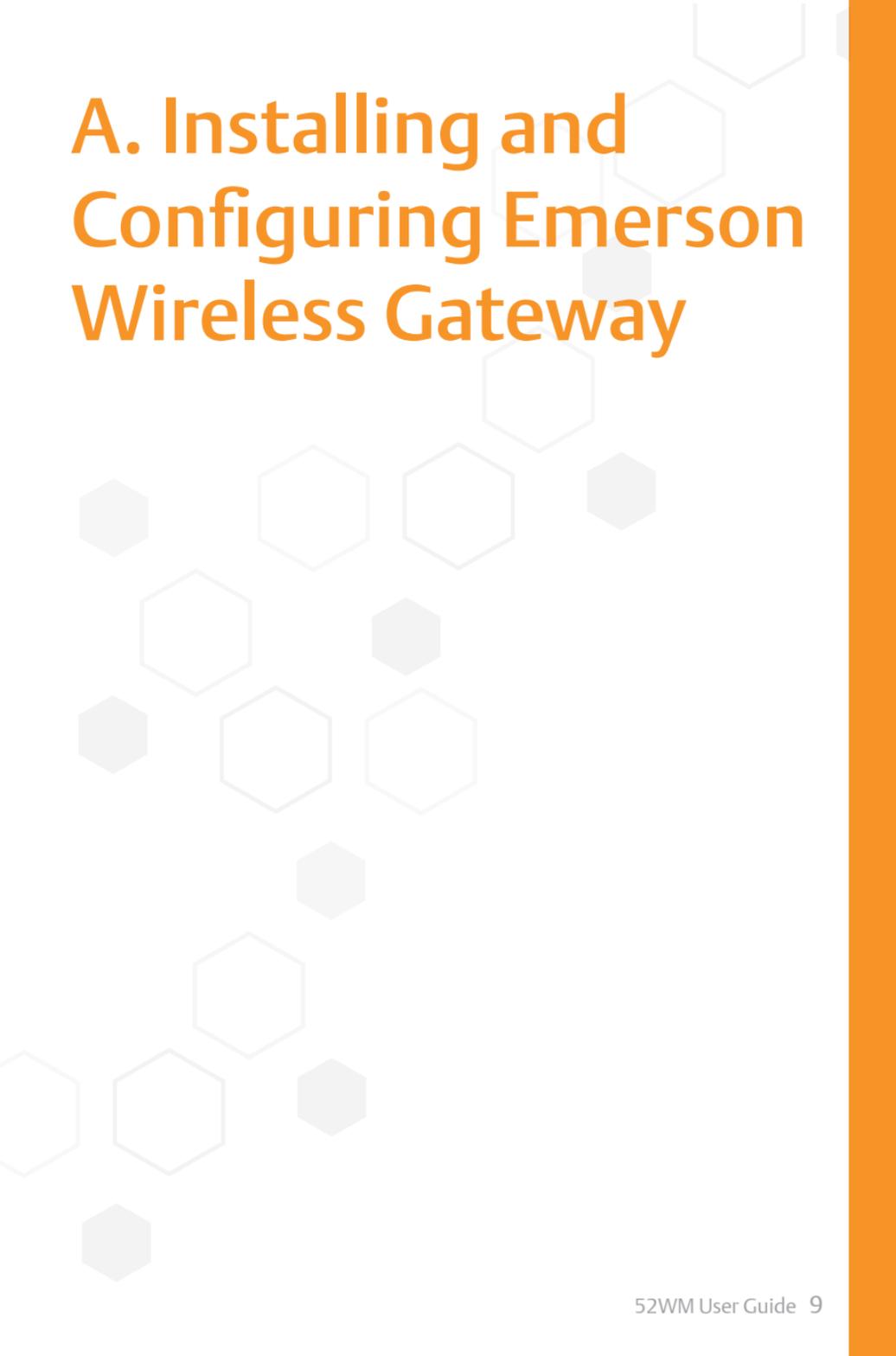
Communication

Communication Standard	IEEE 802.15.4, IEC 62591 (WirelessHART)
Transmission Frequency	2.4 GHz ISM band, 15 radio channels
Channel Hopping	Time Synchronized Channel Hopping to avoid interference from other radios, Wi-Fi, and EMC sources
DSSS	Direct Sequence Spread Spectrum technology
Mesh Network	Self Organizing, Self Healing, Adaptive Mesh routing

Accessories

Mounting Kit	DualLock™ fasteners, zip ties, magnets (if purchased)
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A. Installing and Configuring Emerson Wireless Gateway

The background of the page is white with a decorative pattern of hexagons. Some hexagons are solid light gray, while others are hollow with a light gray outline. The hexagons are scattered across the page, with a higher concentration in the upper left and middle sections. A solid orange vertical bar runs along the right edge of the page.

A.1 – Tools and Materials Required

Laptop/PC – recommended requirements: operating system

- Windows XP Professional, Service Pack 3
- Windows Server 2003, Service Pack 2
- Windows Server 2003 R2, Service Pack 2
- 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

Recommended applications

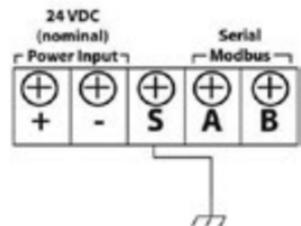
- Internet Explorer 8.0 or greater

Installation Materials

- Emerson Wireless Gateway
- Gateway power supply (120VAC)
- USB drive preloaded with HART Talk configuration utility (supplied)
- 52WM sensor w/mounting hardware

A.2 – Assemble and Connect Emerson Wireless Gateway

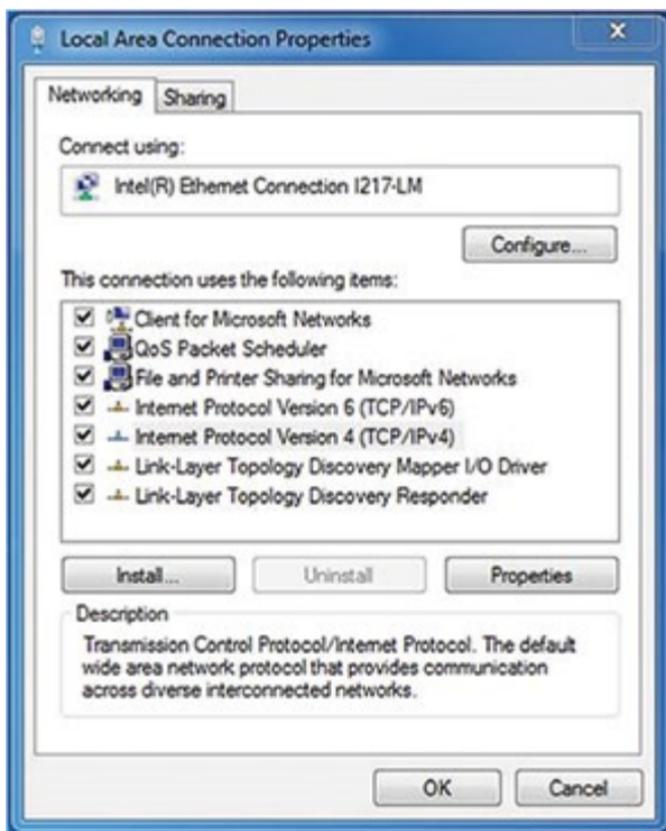
1. Connect AC power adapter to the Emerson Wireless Gateway.
2. Screw on the Emerson Wireless Gateway device antenna.
3. Connect the Ethernet (LAN) cable to Port 1 on Emerson Wireless Gateway and connect the other end to the PC/laptop.
4. Wire power supply to power input terminals of the terminal block (supplied). Verify that the polarity is correct.



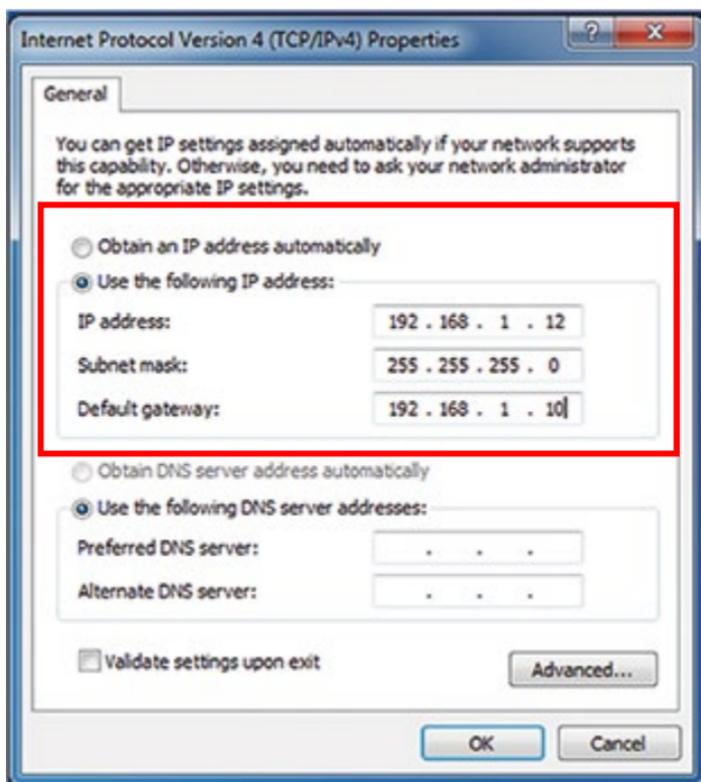
A.3 – Configure Emerson Wireless Gateway

1. On the PC/laptop, navigate to: **Control Panel>Network and Internet>Network Connections>Change Adapter Settings**
2. Look for the LAN (Local Area Network) adapter.
3. Right click to view **Properties**.
4. In **Properties**, find and click on **TCP/IPv4** then click the **Properties** button.

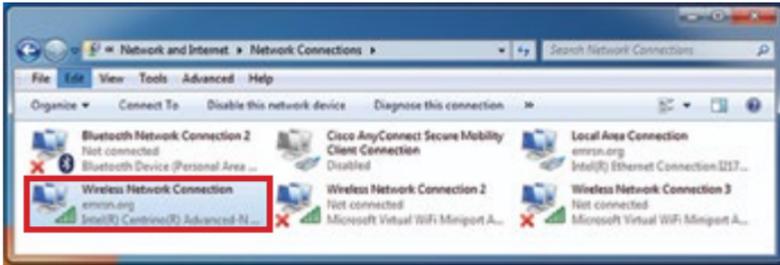
NOTE: TCP/IPv6 may be unchecked to facilitate connectivity.



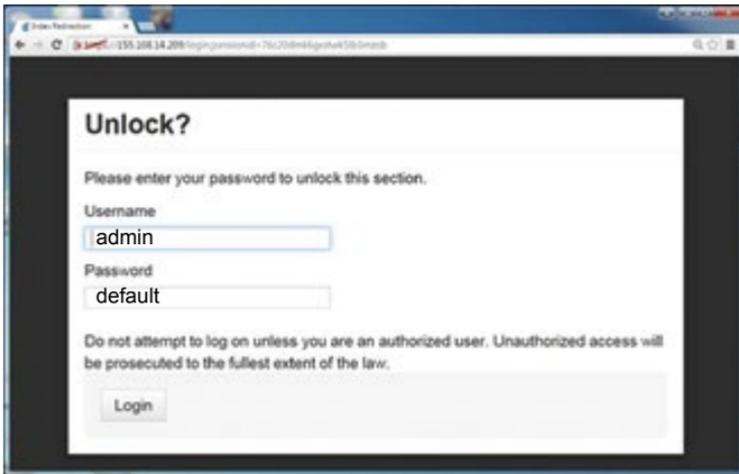
5. Click **Use the following IP address** then enter **192.168.1.12** in the IP address block, **255.255.255.0** in the Subnet Mask block and **192.168.1.10** in the Default gateway block. Click **OK**.



6. Disable all other network connections.



7. Open Internet Explorer and type **192.168.1.10** in the address bar then press **Enter**.
8. When the security certificate warning appears, click **Continue to this website**.
9. Log in to the Emerson Wireless Gateway interface with the factory default credentials:
User Name: **admin**
Password: **default**



You have now accessed the Emerson Wireless Gateway.

A.4 – Mount Emerson Wireless Gateway

1. Locate the Emerson Wireless Gateway to ensure line-of-sight to as many 52WM sensors as possible. See Best Practices in the Appendix for additional information.
2. Install the provided DIN rail using appropriate fasteners.
3. Apply pressure forward to snap the back of the Emerson Wireless Gateway unit securely onto the DIN rail.
4. To remove the Emerson Wireless Gateway, place a flat or round object (i.e. a screwdriver) into the DIN clip and apply slight pressure downwards. Once released, pull the unit backwards and down to disengage it.

B. Installing 52WM



Wireless Components



52WM-3T/3TH with integrated sensor string

NOTE: Not all 52WMs will have an integrated sensor string.

Fully Installed

A typical installation would have a 52WM-3T/3TH connected to a sensor string positioned on top of the rack. The sensor string runs up the inner rack door, through the door hinge or other perforation in the rack, and onto the top of the rack.

For other rack mounting options, see Best Installation Practices in the Appendix.

B.1 – Choose Rack Mounting Option

Determine the desired position for the Sensor points in the rack, being sure not to impede airflow.

Mount to Rack Door (most common)

1. Use the factory-supplied cable fasteners.

B.2 – Attach Sensor String to Rack Face

Attach the Sensor String to the inside middle of the rack door (see illustration). Start 6"-12" from the bottom and work up.

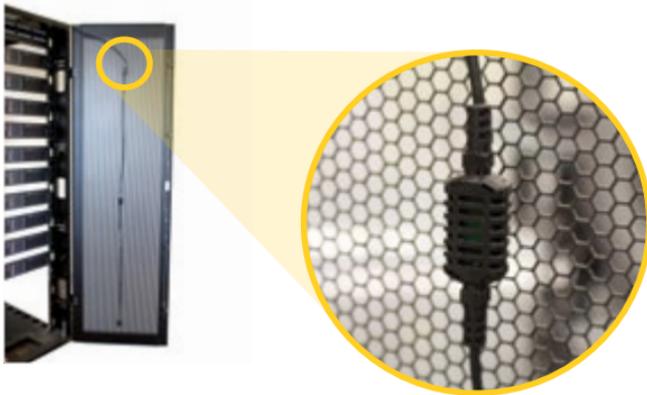
1. Use at least one cable fastener to secure each sense point on the sensor string. See image for fastener positioning. Multiple cable ties may be used to secure the sense points both above and below the sensor housings.
2. Keep cable straight and tight while securing sensors.
3. Trim excess cable tie material and discard.

NOTE: See Rack Installation Considerations in the Best Practices sec-

tion of the Appendix for more information related to different equipment racks.

B.3 – Secure Excess Sensor String

A common mounting location for the wireless modules is on the top of the rack (outside). The low profile design of the 52WM allows an additional mounting option on the inside of the rack door.



1. For top of rack mounting, route sensor string through hole in rack top panel (1) or corner of door hinge (2). Leave enough slack to allow door to open and shut completely. Verify cable is not pinched during door use.
2. For inside rack door mounting, determine the final mounting location for the 52WM.
3. Wrap excess cable into a loop and secure it to itself with cable fasteners. Avoid blocking ventilation ports.
4. Ensure that the cable is bound and secure on the rack and is not interfering with other cabling or hardware.

B.4 – Power On the 52WM

Ensure the Smart Wireless Gateway is turned on, then establish connectivity to the 52WM:

1. Turn on the 52WM by pressing and holding the **Config** button B1 until LEDs L1 and L2 light up momentarily.

NOTE: See Appendix for 52WM troubleshooting and LED behavior.

B.5 – Attach 52WM Module

1. Record the 52WM MAC number and physical location in the facility.*
2. Determine the final mounting location of the 52WM, either on the inside of rack door or the top of rack.
3. If needed, clean area for mounting on rack and the back of the 52WM with alcohol pad.
4. Apply half of the dual-lock strip to the back of the 52WM and the other half to the cleaned area of the rack.
5. Firmly attach the 52WM to the rack and neatly secure excess cable nearby.



Repeat the above steps for each rack.

***NOTE:** See installer notes and worksheets in the Appendix for planning and record keeping.

C. Configuring Wireless Network



C.1 – For Deployment of New Systems

This is the most common form of deployment. In batch deployment, you will be installing a factory-new Emerson Wireless Gateway and 52WM.

1. 52WM is shipped with a factory default NetID and Join Key already programmed. Therefore the NetID and Join Key of the factory-new Emerson Wireless Gateway and 52WM will match. The factory default NetID and Join Key are listed below:

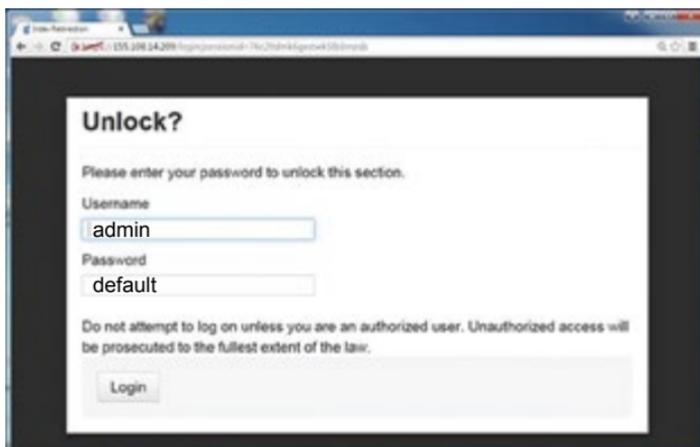
NetID: 1229

Join Key: 44555354 4e455457 4f524b53 524f434b

2. Once a zone is established at the site, the technician will mount and turn on the Emerson Wireless Gateway first, following the instructions in this guide.
3. Make sure there is no other Emerson Wireless Gateway in the area with the same NetID and Join Key.
4. Turn on the 52WM, following instructions in this guide, preferably after installing them in their final locations. Start with the 52WM located nearest to the Emerson Wireless Gateway.
5. To log in to the Emerson Wireless Gateway Web Interface, obtain the login credentials for the Emerson Wireless Gateway. The factory default login credentials are:

User: **admin**

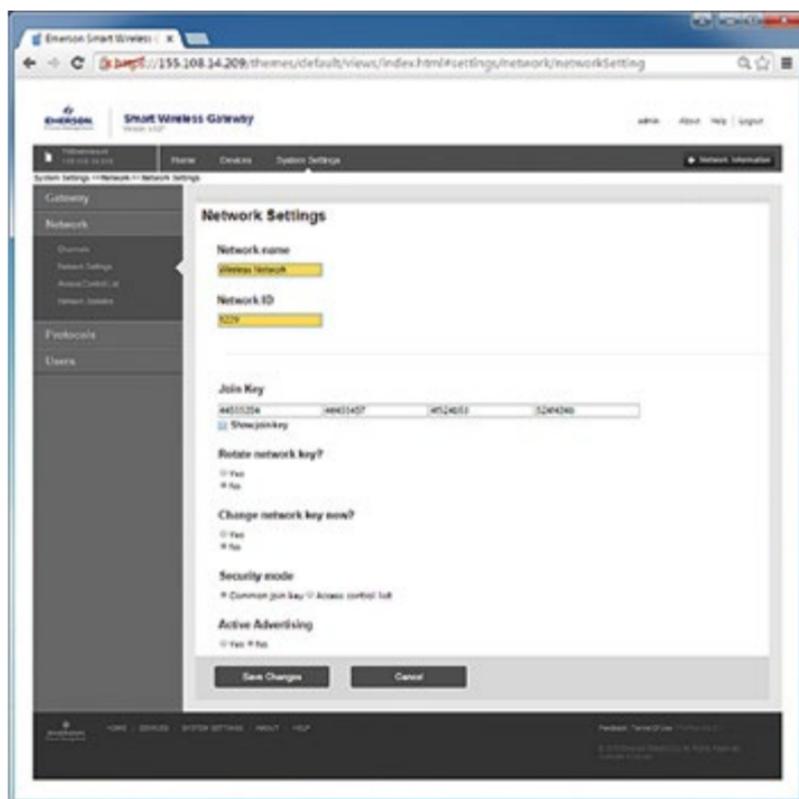
Password: **default**



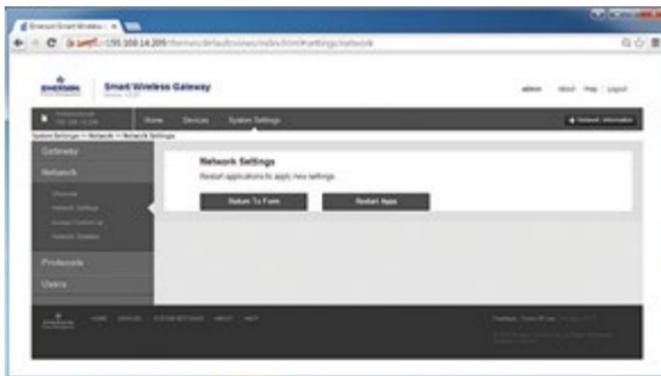
- Wait until all of the 52WMs have appeared and are reporting sensor data on the Emerson Wireless Gateway Web Explorer. (*Network Formation*)

NOTE: The time for the network formation will vary depending on the wireless module count and configuration. If individual wireless modules fail to connect, see *Troubleshooting instructions in the Appendix*.

- Go to the Emerson Wireless Gateway menu at **System Settings > Network > Network Settings** and type in the new or specified NetID and Join Key.



- Press **Save Changes**. The Emerson Wireless Gateway will push the new NetID and Join Key to the 52WM in the network. The time for this to occur will vary depending on the 52WM count and configuration.
- Wait until the Emerson Wireless Gateway updates the Network Settings page, do not refresh the browser page during this process. When the Network Settings have been updated select **RESTART APPS** button. A reboot can take several minutes. Wait for the network to form and then move on to the next network deployment.
- After the Network Settings have been updated if the Emerson



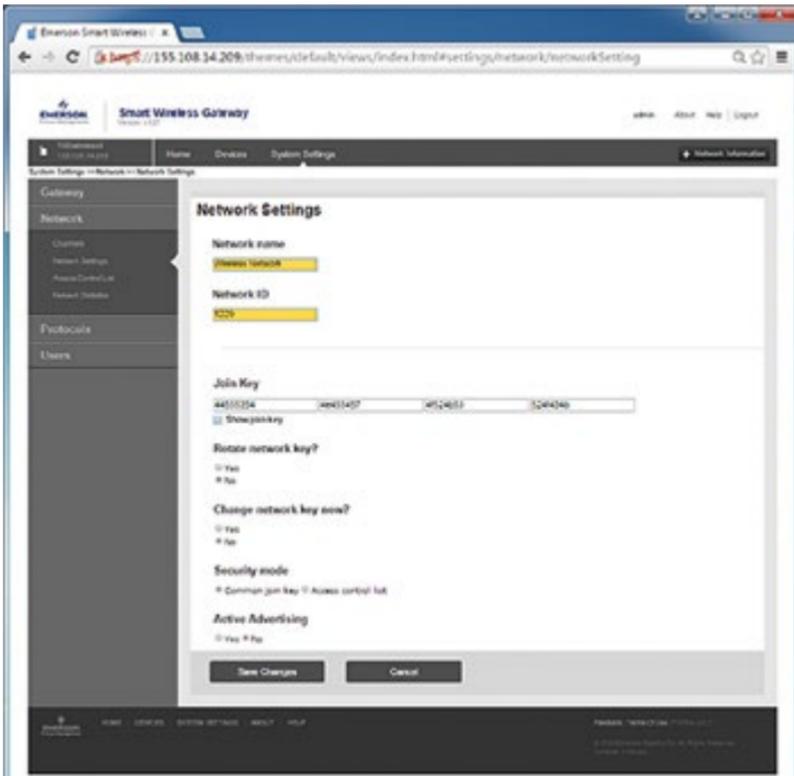
Wireless Gateway does not include a prompt with the **RESTART APPS** button, the Emerson Wireless Gateway will need to be manually restarted. To manually restart the Emerson Wireless Gateway go to the menu **System Settings > Gateway > Backup & Restore** and click **Restart App** to restart the Emerson Wireless Gateway.

C.2 – For Expansion of Existing Systems

- Acquire the IP address of the Emerson Wireless Gateway from IT Manager. [Ex. 192.168.1.10] Open the web browser, type in IP Address as a URL [Ex. <http://192.168.1.10>] then press **Enter**.
- When the security certificate warning appears, click **Continue to this website**.

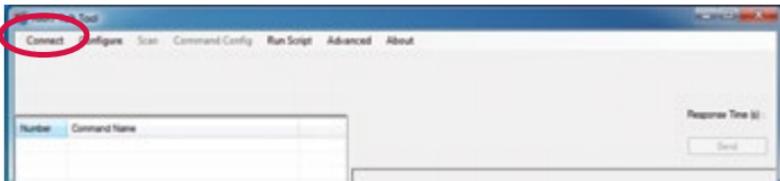
3. To log in to the Emerson Wireless Gateway Web Interface, obtain the login credentials for the Emerson Wireless Gateway. The factory default login credentials are:
 User: **admin**
 Password: **default**
4. Go to the Emerson Wireless Gateway network menu at **System Settings > Network > Network Settings** (see illustration below)
5. Go to the Show Join Key option, click **Yes**. (see illustration below)
6. Make note of the Network ID and Join Key.
7. Next turn on the 52WM to begin expanding the existing network. To turn on 52WM, press and hold B1 until the LEDs illuminate.

NOTE: See installer notes and worksheets in the Appendix for planning and record keeping.

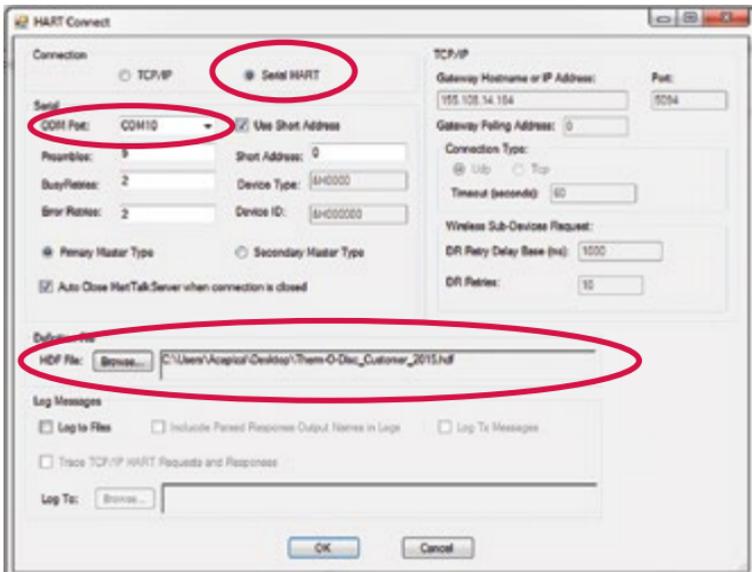


C.3 – Configuring WirelessHART Interface

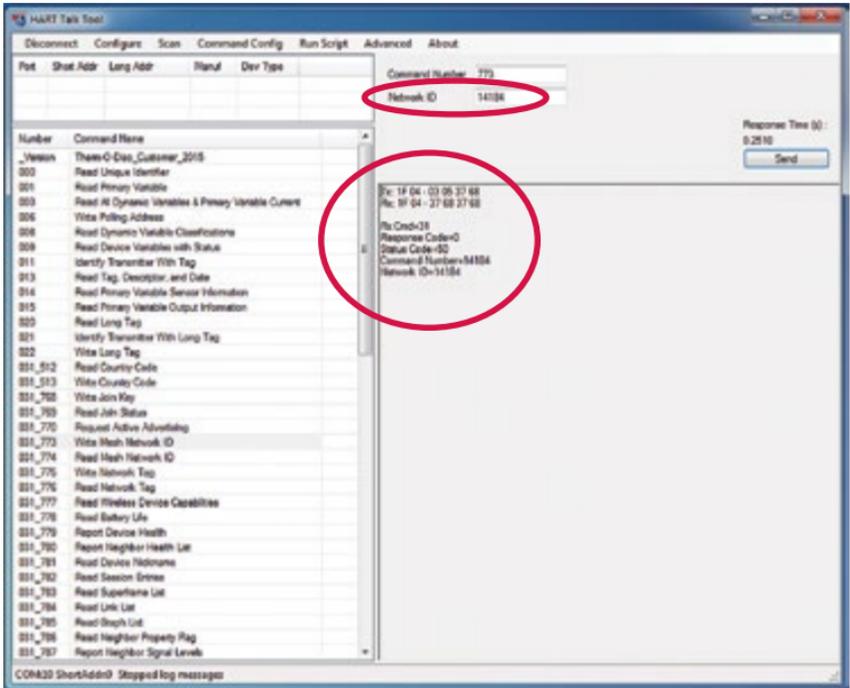
1. Configure 52WM Wireless Device Settings
2. Install necessary USB drivers
3. Install HART Talk (Desktop icon shown to right)
4. Device can be configured through the USB interface cable connected to a PC
5. Instructions for USB connection to PC
 - a. Open HART Talk
 - b. Device must be powered on through USB (LEDs should illuminate green and cycle in series)
 - c. Press **Connect**



- d. Select the Serial HART option and then choose the correct COM port. Then choose the correct HDF file by using the **Browse** feature. Then Press **OK**.



- f. To set the Network ID, use Command 031_773 'Write Mesh Network ID'. Enter the desired Net ID in the dialogue box and press the **Send** button. A confirmation will be shown once the command is sent.



- g. The Network Join Key can be written to the device using Command 031_768. Each of 4 Join Key dialogue boxes must be filled in. The first two characters should always be &H to indicate that the string is in Hex.



- h. After performing a 'Write Mesh Network ID' or 'Write Join Key' a 'Perform Master Reset', 'Command 042' must be sent.

D. Appendix



Troubleshooting and Support

Emerson Wireless Gateway Related

Problem	Solution(s)
The 52WM cannot connect to the Emerson Wireless Gateway	Ensure that the 52WMs are configured with the correct NetID and Join Key. If using Access Control List (ACL) ensure that the 52WMs are joining the gateway by adding the 52WMs from the Join Failures list to the ACL table.
The Emerson Wireless Gateway cannot retrieve data from the 52WM	Restart both the Emerson Wireless Gateway and the 52WM.
The 52WM is reporting out of range, bad or invalid values for its readings on the Emerson Wireless Gateway	Restart the 52WM.
The client software is not displaying the sensor data	Verify that the Modbus variables are mapped correctly in the Emerson Wireless Gateway and the client software. Verify that the correct values are being reported in the client software. If the problem persists, contact manufacturer for support.
There is a warning icon displayed on the Emerson Wireless Gateway Explorer view and/or on the third-party client software	Verify that the user-configurable alarm threshold has been met then consult the local manufacturer field technician
How to find additional information about the Emerson Wireless Gateway	Go to the Emerson Wireless Gateway web interface then go to Help>Manual and follow the link.

Problem	Solution(s)
The 52WM is not displaying its status	Press config button B2 for greater than 1 second but less than 5 seconds. If the LEDs blink, release the config button B2. This indicates the 52WM is turned on. If the LEDs do not flash, press config button B1 for greater than 1 second but less than 5 seconds to turn on the 52WM. If the 52WM is turned on but not reporting data to the Smart Wireless Gateway, see the Smart Wireless Gateway Related troubleshooting and support section for additional support.
How to turn ON, OFF, reset the 52WM	To turn on a 52WM see Section B of this document. To turn off a 52WM press and hold Config button B1 for at least 10 seconds. To reset a 52WM press and hold Config button B2 for at least 10 seconds
The 52WM cannot connect to the Smart Wireless Gateway	Send HART commands to check Net-ID, Join Key, Firmware Rev, Hardware Rev, Network Join status, Battery Life, Device Status Flags, Disconnect a device from the network, etc.

Configuration Button and LED Behavior

Operation	Config Button	Button Hold Time (t) (seconds)	LED "L1" Behavior	LED "L2" Behavior
Turn ON the 52WM	B1	$1 < t < 5$	Solid for 1 second – ON	Solid for 1 second – ON
Turn OFF the 52WM sensor	B1	$t > 10$	Blinking – OFF Solid – ON	Blinking–OFF Blink once–OFF Solid–ON
Verify the 52WM is turned on	B2	$1 < t < 5$	Blinking	Blinking
Reset the 52WM sensor	B2	$t > 10$	Blinking – OFF Solid – ON	Blinking – OFF Solid – ON

To Get Support

On the Web: www.tod.com

Email: anthony.capizzi@emerson.com

By Phone: Anthony Capizzi
Application Engineer
419-525-8343

Best Practices

Emerson Wireless Gateway Location and Installation

1. Emerson Wireless Gateways should be mounted 6 feet above the majority of facility infrastructure and equipment to ensure maximum range across data center and penetration into the zone.
2. Maximize the number of wireless modules in line-of-sight with the Emerson Wireless Gateway. This may lead to longer battery life, more efficient network formation and faster overall start-up time.

Configuring Wireless Systems

Below are the manufacturer's **default NetID and Join Key**:

NetID: 1229

Join Key: 44555354 4e455457 4f524b53 524f434b

USB Interface Cable

The required drivers for the USB interface cable are included with wireless system startup kit on a USB drive. If additional drivers are needed please visit:

<http://www.ftdichip.com/Drivers/VCP.htm>

Identifying the Correct Serial Port

It is critical to verify that you choose the correct serial port for the HART programming cable when configuring the wireless module with a terminal program. Use the following steps to find the correct serial port.

1. Navigate to the **Desktop** of your computer
2. Right-click on **My Computer** and select **Properties**
3. In the Properties menu of My Computer, select **Device Manager** from the left pane.
4. In Device Manager, expand the **Ports** option and make note of the serial port number for the **FTDI USB-to-Serial Comm Port**. Use this serial port number in the terminal program.

Expansion of Existing Networks

In an existing network where the Network ID and Join Key of the new wireless modules and the existing Emerson Wireless Gateway do not match:

More Than 10 Wireless Modules:

- Change the Network ID and Join Key of the existing Emerson Wireless Gateway to match the Network ID and Join Key of the new wireless modules.
- After all Wireless Modules (existing and new) have joined the Emerson Wireless Gateway, change the Emerson Wireless Gateway back to its unique Network ID and Join Key.

Less Than 10 Wireless Modules:

- Change the Network ID and Join Key of each wireless module to match the existing gateway.

System Commissioning Guidelines

When commissioning a wireless network the items below are key in optimizing network performance:

- Verify that each wireless module has at least three neighbors.
- Verify that each wireless module is updating at the desired rate. To achieve the published battery life, use a 32 second update rate with a maximum of two descendants.
- Verify that each wireless module is connected with a reliability >99.99%.
- Verify that a minimum of 5 wireless modules or 10% of the network, whichever is larger, are connected directly to the Emerson Wireless Gateway.

Additional technical documents are available from the following websites:

<http://www2.emersonprocess.com/>

http://www.linear.com/products/smartmesh_wireless.htm

<http://en.hartcomm.org/>

Large-Scale Deployments

Information Collection

1. Network credentials and other sensitive information should only be written on documentation that will be transferred to the end user upon completion of the installation and start-up.
2. It is critical to record the physical location information and MAC addresses. Varying applications may require different measurement tolerances for X, Y, and Z locations. The installer should start with X and Y location coordinates which are easily identifiable if the facility is using the ANSI/TIA-606-B grid layout. X/Y location markings are often indicated on signs, a facility floor plan and on a rack label at the top and/or bottom of the rack face. A label marked as **AB01** represents the X coordinate **AB** and the Y coordinate **01**. In instances where grid coordinates are not used or accessible, the racks can be marked by row and rack number in place at the facility.
3. Consider using cable tags, a hand-held label maker or marking utensils to add the following notations to modules or strings for ease of maintenance, troubleshooting and traceability:
 - Commissioning date
 - Relationships to cooling units and/or zones, and grid coordinates
 - Firmware update notes



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T-O-D Form #2448

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