SKF Wireless Machine Condition Sensor

CMWA 8800

User Manual Part No. 32257600-EN
Revision H

⚠️ **WARNING! –** *Read this manual before using this product. Failure to follow the instructions and safety precautions in this manual can result in serious injury, damage to the product, or incorrect readings. Keep this manual in a safe location for future reference.*

SKF (UK) Ltd.

Product Support – Contact Information

Product Support – To request a Return Authorization, Product Calibration or a Product Support Plan, use the web page links for direct contact and support.

Product Sales – For information on purchasing condition monitoring products, services or customer support, contact your local SKF sales office.

General Product Information

For general product information (i.e., product data sheet, accessories catalog, etc.), visit the Condition Monitoring Products page on SKF.com and select the appropriate product link.

Technical Support Group

Discuss/review issues of specific interest with maintenance and reliability specialists from around the world at the SKF Knowledge Centre.

For technical support on issues like troubleshooting product installation, troubleshooting product performance, etc., use our technical support web page to contact one of our Technical Support Groups.

Product Registration

Please take a moment to register your product at www.skf.com/cm/register to receive exclusive benefits offered only to our registered customers, including receiving technical support, tracking your proof of ownership, and staying informed about upgrades and special offers. (Please visit our website for more details on these benefits.)

Tell us how we're doing!

It's important that you're satisfied with the quality of our product user manuals. We appreciate your feedback; if you have comments or suggestions for improvement, please tell us how we're doing!

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SKF – Limited Warranty

WARRANTY

Subject to the terms and conditions contained herein and provided that there is no applicable written agreement between the selling entity in the SKF Group ("SKF") and the Buyer specifically covering the sale of the Products (as defined below) that includes a product warranty, SKF warrants to the Buyer that for the warranty period indicated below the products sold by SKF that are listed below (the "Products"), when properly installed, maintained and operated, will be free from defects in material and workmanship and shall be fit for the ordinary purposes for which the Products are designed.

BUYER'S LIMITED REMEDIES

This limited warranty defines SKF's sole and exclusive liability and Buyer's sole and exclusive remedy for any claim arising out of, or related to, any alleged deficiency in any Product sold by SKF, even if such claim is based on tort (including negligence or strict liability), breach of contract, or any other legal theory. If the Product does not conform to this limited warranty, Buyer must notify SKF or SKF's authorized service representative within thirty (30) days of discovery of the nonconformity; provided, however, that SKF shall not be liable for any claim for which notice is received by SKF more than thirty (30) days following the expiration of the applicable warranty period for the Product. Upon receipt of timely notification from Buyer, SKF may, at its sole option, modify, repair, replace the Product, or reimburse Buyer for any payment made by Buyer to SKF for the purchase price of the Product, with such reimbursement being pro-rated over the warranty period.

WARRANTY PERIOD

Except as expressly provided below, the warranty period for each Product shall commence on the date the Product is shipped by SKF to Buyer.

90-DAY WARRANTY

Products warranted for ninety (90) days by SKF are as follows: cable assemblies, MARLIN QuickConnect (MQC), magnetic temperature probes, and all refurbished equipment.

ONE-YEAR WARRANTY

Products warranted for one (1) year by SKF are as follows: all Microlog products and accessories, all Microlog Inspector applications including hand-held computers, all MARLIN data managers (MDM), all MARLIN Condition Detectors (MCD), all Wireless Machine Condition Detectors (WMCD), all Multilog Condition Monitoring Units (CMU, TMU), Multilog Local Monitoring Units (LMU), all Multilog Wireless Monitoring Units (WMx), Multilog On-line System Wireless Vibration Transmitter ISA100, all Wireless Monitoring Systems V/T, all Vibration PenPlus, all Machine Condition Advisors (MCA), all Machine Condition Indicators (MCI), all transmitters, all Monitor Interface Modules (MIM), all Machine Condition Transmitters (MCT), all MicroVibes and Custom Products with the prefix of CMCP (with the exception of any consumable or expendable items), Shaft Alignment Systems TKSA 60 and TKSA 80 including hand-held computer, measuring units and accessories.

TWO-YEAR WARRANTY

Products warranted for two (2) years by SKF are as follows: all standard Eddy Probes, Eddy Probe Drivers, and Eddy Probe Extension Cables, all Multilog On-line Systems (DMx, IMx), all Wireless Machine Condition Sensors, and all M800A and VM600 Machinery Monitoring Systems.

For all On-line Systems (as defined below) that have satisfied Criteria 1 and 2 below, the warranty period shall be either thirty (30) months from the date the On-line System is shipped by SKF to Buyer, two (2) years from the date the On-line System is installed and commissioned by SKF, or two (2) years from the date on which the installation of the On-line System has been audited and commissioned by SKF or its authorized service representative, whichever period ends first.

Criteria 1.

Devices used with a Multilog On-line System (IMx), Multilog Condition Monitoring Unit (CMU), Multilog Local Monitoring Unit (LMU), including, but not limited to, the sensing device, the interconnect cabling, junction boxes, if any, and the communications interface, must consist only of SKF-supplied or SKF-approved devices and/or components. The computer provided by Buyer must meet the requirements stipulated by SKF.

Criteria 2.

SKF or its authorized service representative has installed the On-line System or has audited the installation and commissioned the On-line System.

"On-line Systems" are defined as systems consisting of Multilog On-line System (IMx), Multilog Condition Monitoring Unit(s) (CMU), Multilog Local Monitoring Unit(s) (LMU), and any sensing or input devices, the interconnect cabling between the sensing or input devices and the Multilog On-line System (IMx), Multilog Condition Monitoring Unit(s) (CMU), Multilog Local Monitoring Unit(s) (LMU), and the cabling between the Multilog On-line System (IMx), Multilog Condition Monitoring Unit (CMU), Multilog Local Monitoring Unit (LMU) and the proprietary SKF communications interface with the host computer.

FIVE-YEAR WARRANTY

Products warranted for five (5) years by SKF are as follows: special seismic sensors.

LIMITED LIFETIME WARRANTY

Products covered under this Limited Lifetime Warranty (as set forth below) are as follows: standard seismic sensors of the CMSS 2XXX and CMSS 7XX series (accelerometers and velocity transducers) as marked and published in the SKF Vibration Sensor Catalogue.

(A)   Subject to the terms herein, SKF will provide a "Limited Lifetime Warranty" for the products specified above sold by SKF after April 15, 2014. Under the Limited Lifetime

Warranty, those products shall, at the time of shipment, be free from defects in material and workmanship. If any of these products fail to meet the terms of this Limited Lifetime Warranty during the life of such products, SKF, in its sole discretion, will repair, replace or exchange the products for the same model if the necessary components for the products are still available to SKF on a commercially reasonable basis. SKF will not provide a Limited Lifetime Warranty on products damaged by accident, abuse, misuse, neglect, improper installation, problems with electrical power, natural disaster, or by any unauthorized disassembly, repair or modification.

(B)   Upon receipt of any product covered by the Limited Lifetime Warranty, SKF will pay all shipping charges to send the repaired, replaced or exchanged product to the original point of shipment. SKF reserves the right to decline repair or replacement if no fault is found in the product.

(C)   For any warranty claim, the original Buyer must provide SKF with the applicable model and serial numbers, the date of purchase, the nature of the problem, and proof of purchase. SKF, in its sole discretion, will determine if the Buyer must return the product covered under this warranty to SKF.

(D)   The express warranty set forth in the Limited Lifetime Warranty is in lieu of and excludes any and all other warranties express or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose.

(E)   SKF's sole obligations under this Limited Lifetime Warranty are set forth in paragraphs (A) and (B), and SKF's liability under this Limited Lifetime Warranty shall not exceed the purchase price of the product, plus any shipping and handling charges that SKF may be obligated to pay pursuant to paragraph (B).

(F) **IN NO EVENT SHALL SKF BE LIABLE OR OBLIGATED TO THE BUYER OR ANY OTHER PERSON FOR SPECIAL, EXEMPLARY, PUNITIVE, INCIDENTAL, DIRECT, INDIRECT, GENERAL OR CONSEQUENTIAL DAMAGES (INCLUDING, BY WAY OF EXAMPLE ONLY, LOST PROFITS OR SAVINGS, LOSS OF BUSINESS OR LOSS OF USE) OR ANY OTHER LOSS, COST OR EXPENSE IN CONNECTION WITH THE PRODUCTS REGARDLESS OF WHETHER OR NOT ANY OF THE FOREGOING WERE FORESEEABLE OR THAT SKF WAS ADVISED AS TO THE POSSIBILITY OF SUCH DAMAGES, LOSS, COST, OR EXPENSE.**

(G) The Limited Lifetime Warranty applies solely to the original Buyer and is non-transferrable.

OTHER SKF PRODUCTS

Any SKF product supplied hereunder but not covered by this limited warranty shall be either covered by the applicable SKF limited warranty then in place for such product or, if no such warranty exists, shall be covered by the 90-day warranty stated above.

THIRD PARTY PRODUCT WARRANTIES

For any third party products sold to Buyer by SKF, SKF will transfer to Buyer any warranties made by the applicable third party product vendor to the extent such warranties are transferable.

CONDITIONS

As a condition to SKF's warranty obligations hereunder and if requested or authorized in writing by SKF, Buyer shall forward to SKF any Product claimed by Buyer as being defective. Buyer shall prepay all transportation charges to SKF's factory or authorized service center. SKF will bear the cost of shipping any replacement Products to Buyer. Buyer agrees to pay SKF's invoice for the then-current price of any replacement Product furnished to Buyer by SKF, if the Product that was replaced is later determined by SKF to conform to this limited warranty.

SKF shall not be obligated under this limited warranty or otherwise for normal wear and tear or for any Product which, following shipment and any installation by SKF (if required by the contract with the Buyer), has, in SKF's sole judgment, been subjected to accident, abuse, misapplication, improper mounting or remounting, improper lubrication, improper repair or alteration, or maintenance, neglect, excessive operating conditions or for defects caused by or attributable to the Buyer, including without limitation Buyer's failure to comply with any written instructions provided to Buyer by SKF.

SKF shall be free to conduct such tests, investigations and analysis of the Products returned to SKF, as it deems reasonable and proper in the exercise of its sole judgment. As a further condition to SKF's obligations hereunder, Buyer shall offer its reasonable cooperation to SKF in the course of SKF's review of any warranty claim, including, by way of example only, Buyer's providing to SKF any and all information as to service, operating history, mounting, wiring, or re-lubrication of the Product which is the subject of the Buyer's warranty claim.

EXCEPT WARRANTY OF TITLE AND FOR THE WARRANTIES EXPRESSLY SET FORTH IN HEREIN, IT IS UNDERSTOOD AND AGREED THAT:

(A) SKF MAKES NO OTHER WARRANTY, REPRESENTATION OR INDEMNIFICATION, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT;

(B) IN NO EVENT SHALL SKF BE LIABLE OR OBLIGATED FOR SPECIAL, EXEMPLARY, PUNITIVE, INCIDENTAL, DIRECT, INDIRECT, GENERAL OR CONSEQUENTIAL DAMAGES (INCLUDING, BY WAY OF EXAMPLE ONLY, LOST PROFITS OR SAVINGS, LOSS OF BUSINESS OR LOSS OF USE) OR ANY OTHER LOSS, COST OR EXPENSE IN CONNECTION WITH THE

PRODUCTS AND RELATED SERVICES, IF ANY, PROVIDED BY SKF, AND THIS DISCLAIMER SHALL EXTEND AS WELL TO ANY LIABILITY FOR NONPERFORMANCE CAUSED BY SKF'S GROSS OR ORDINARY NEGLIGENCE, AND IN ALL CASES REGARDLESS OF WHETHER OR NOT ANY OF THE FOREGOING WERE FORESEEABLE OR THAT SKF WAS ADVISED AS TO THE POSSIBILITY OF SUCH DAMAGES, LOSS, COST, OR EXPENSE; AND

(C) NO PERSON HAS BEEN AUTHORIZED BY SKF TO MAKE ANY FURTHER OR CONTRARY INDEMNITIES, REPRESENTATIONS OR WARRANTIES ON BEHALF OF SKF. THE FOREGOING LIMITATIONS AND DISCLAIMERS OF LIABILITY SHALL BE MADE APPLICABLE TO THE SALE OF ANY PRODUCT BY SKF TO THE FURTHEST EXTENT PERMITTED BY APPLICABLE LAW.

The exclusive remedies provided in this limited warranty shall not be deemed to have failed of their essential purpose so long as SKF is willing and able to perform to the extent and in the manner prescribed in this limited warranty.

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1
System Setup

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> **Important!** *Your Wireless Sensor Device Manager software (Device Manager) requires a Permanent License Key. Please reference the Wireless Sensor Device Manager user manual, Chapter 3 section 'How to Acquire your License Key'. Contact our customer service group at csg-lulea@skf.com to obtain a Time Limited License Key that enables the use of up to 50 sensors until you receive your Permanent License Key that is specific to your computer and number of sensor licenses. If you experience any license key issues, please email our customer service group at csg-lulea@skf.com.*

Assumptions

It is assumed that the reader is familiar with vibration monitoring technologies, wireless technologies, and WirelessHART networks.

Related Documentation

Document	Part No.
Wireless Sensor Device Manager User Manual	P/N 32286200
PEPPERL+FUCHS WirelessHART Gateway WHA-GW User Manual	
Emerson™ Smart Wireless Gateway 1420 Reference Manual	
Endress+Hauser WirelessHART Fieldgate SWG70 Manual	
Siemens Industrial Ethernet/WirelessHART IE/WSN-PA Link Manual	

Before setting up the system, we recommend copying the following files from the Product CD to your hard drive to make it easier to reference the documents during the installation / commissioning process:

- SKF Wireless Machine Condition Sensor – System Setup Guide (this document)

- Wireless Sensor Device Manager – User Manual

- Relevant WirelessHART Gateway user manual (Pepperl+Fuchs, Endress+Hauser, Emerson or Siemens)

⚠ Safety Messages

> ⚠ *WARNING! Your safety is extremely important. Read and follow all warnings in this document before handling and operating the equipment. You can be seriously injured, and equipment and data can be damaged if you do not follow the safety warnings.*

WARNING! Warning messages can alert you to an operating procedure, practice, condition, or statement that you must strictly observe to prevent equipment damage or destruction, or corruption or loss of data.

IMPORTANT: Important messages mean that there is a risk of product or property damage if you do not heed the instruction.

Patent Information

This product is covered by patents owned or licensed by SKF USA Inc. and is intended for use only with components authorized by SKF. Any use of this product in combination with other components not purchased from SKF may subject the user to liability for patent infringement.

FCC and IC Regulatory Text (English and French)

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. (ref: 47 CFR part 15 subpart A Section 15.21)

This device complies with FCC Part 15 and Industry Canada license exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

Toute modification non approuvée expressément par la partie en charge de la conformité peut annuler le droit d'utilisation de l'appareil par le consommateur. (Voir 47 CFR Sec. 15.21)

Cet appareil est conforme à FCC Partie15 de Industrie Canada RSS standard exempts de licence (s). Son utilisation est soumise à Les deux conditions suivantes: (1) cet appareil ne peut pas provoquer d 'interférences et (2) cet appareil doit accepter Toute interférence, y compris les interférences qui peuvent causer un mauvais fonctionnement du dispositif.

L'antenne utilisée pour ce transmetteur doit être installé pour fournir une distance de séparation d'au moins 20 cm de toutes les personnes et ne doit pas être co-localisés ou fonctionner en conjonction avec une autre antenne ou transmetteur.

Hazardous Locations

Warning! Read the provided **Ex Instruction Manual** (located on the product CD) before installing sensors in a hazardous area.

Do not twist plastic top; doing so voids warranty and hazardous area certification.

Personnel Safety

Dress properly. Do not wear loose clothing or jewelry. Keep your hair, clothing, and gloves away from moving parts.

Do not overreach. Keep proper footing and balance at all times to enable better control of the device during unexpected situations.

Use safety equipment. Always wear eye protection. You must use non-skid safety shoes, a hard hat, or hearing protection for appropriate conditions.

Do not repair or adjust energized equipment alone, under any circumstances. Someone capable of providing first aid must always be present for your safety.

To work on or near high voltage, you should be familiar with approved industrial first aid methods.

Always obtain first aid or medical attention immediately after an injury. Never neglect an injury, no matter how slight it seems.

Device Safety

Use only accessories that the manufacturer recommends.

Do not attempt to open the device.

Device service must be performed only by qualified SKF repair personnel.

Energized Equipment

Never work on energized equipment unless authorized by a responsible authority. Energized electrical equipment is dangerous. Electrical shock from energized equipment can cause death. If you must perform authorized emergency work on energized equipment, be sure that you comply strictly with approved safety regulations.

No Submersion/Immersion

This equipment is IP 66 rated, is dust-tight and resistant to powerful jets of water. Do not immerse in any liquid. If the instrument is subjected to these conditions, adverse operation may result, and there is a risk of serious injury or damage should fire occur.

Avoid Damage and Injury

To avoid costly damage to the instrument or injury from a falling instrument, place the instrument on a solid stable surface when not in use and do not place any heavy objects on it.

Use a damp, clean cloth for cleaning. Do not use cleaning fluids, abrasives, or aerosols.

> ⚠ *WARNING! Contact with aggressive chemicals may cause severe damage to the sensor's mechanical construction.*
> *Sensors that have mechanical damage should be removed from hazardous areas as soon as possible.*

Do Not Open Device

Unauthorized personnel shall not open the device.

Do not twist plastic top; doing so voids warranty and hazardous area certification.

Technical Support

If you have questions regarding the installation or operation of this SKF product, please visit the self-help portal before contacting the help desk to see if the answer is already published:

Technical Support Self-help Portal: www.skf.com/cm/tsg

If further assistance is needed, please submit a support request by clicking on the SUPPORT tab and one of our support engineers will contact you shortly.

The technical support team can be reached during normal business hours (7:00 a.m. to 4:00 p.m. local time) by phone, e-mail, or live chat:

- *Customers in Europe, Middle East and Africa:*
  Phone: +46 31 337 6500
  E-Mail: TSG-EMEA@skf.com
  Chat: www.skf.com/cm/tsg

- *Customers in all other locations:*
  Phone: 1-858-496-3627 or toll-free (USA) 1-800-523-7514
  E-Mail: TSG-Americas@skf.com
  Chat: www.skf.com/cm/tsg

Note: Standard technical support will be provided at no cost on products or software covered under an SKF Product Support Plan (PSP), whenever applicable. Many SKF Machine Health products include limited technical support for the first 180 days after purchase. Support obtained after 180 days or without PSP coverage will be subject to a per-incident fee. Contact the technical support team for more information.

System Overview

The SKF Wireless Machine Condition Sensor system automatically forms or joins a mesh network of wireless vibration and/or temperature sensors – ideal for expanding condition based maintenance into plant areas where costs to install wired systems are prohibitive.

The wireless sensor uses the WirelessHART communication protocol, which offers a simple, reliable and secure means of transmitting machine vibration, bearing condition and temperature data wirelessly back to a host computer network.

The system provides:

Automatic, wireless collection of vibration measurements (velocity and enveloped acceleration measurements), temperature data, and battery condition data.

Automatic export of overall vibration readings, waveform vibration data, temperature readings, and battery condition data to SKF @ptitude Analyst software.

System integration with plant control systems and asset monitors over **HART, OPC or MODBUS.** OPC server software can be obtained from the HART Communication Foundation and is not included in the SKF product offering.
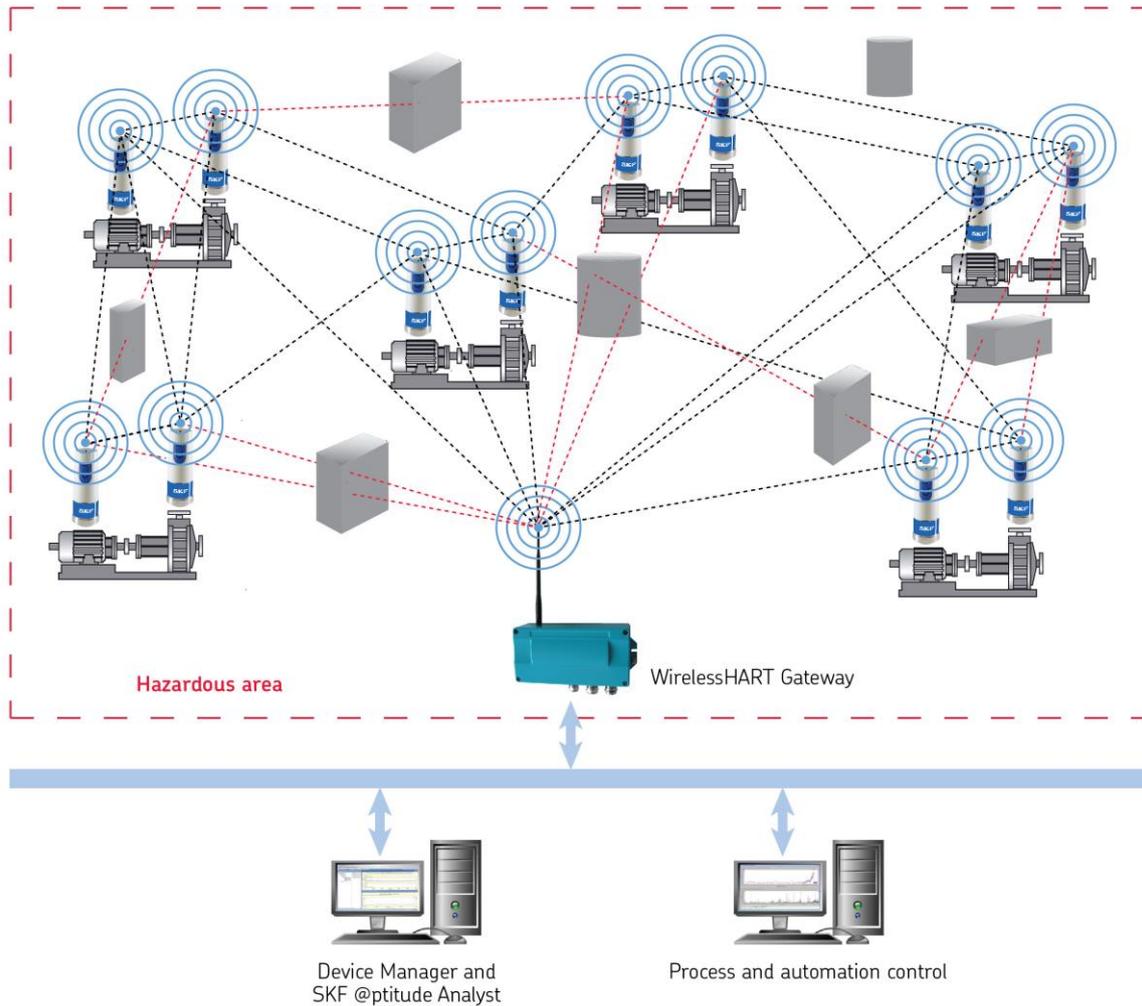
Figure 1-1.
Diagram of the SKF Wireless Sensor Network,
Red Lines Indicate Communication Paths Blocked by Obstacles.

The system consists of the following components:

SKF Wireless Machine Condition Sensors – CMWA 8800 – Wireless sensors that measure vibration velocity (general purpose vibration measurement), SKF Acceleration Enveloping band 3 and temperature values on rotating machinery.

SKF Wireless Machine Condition Sensors may also be configured as router nodes, enabling wireless communication access to difficult locations.

WirelessHART gateway (the supported gateway types are discussed below)

Wireless Sensor Device Manager Software – The application used to configure, commission, and operate the 8800 wireless system – supporting:

- Wireless sensor setup

- Trending of measurement overall values (vibration velocity, enveloped acceleration vibration, and temperature).

- Upload and display of velocity and enveloped acceleration vibration waveforms and spectral data.

- Performance of regular, automatic upload and export of waveforms / spectral data, overall measurement values, temperature values, and battery condition data to SKF @ptitude Analyst.

- Performance of system maintenance tasks (e.g., sensor firmware upgrades).

SKF @ptitude Analyst Software – Provides fast, efficient and reliable storage, analysis, and retrieval of vibration and temperature measurements and makes the information accessible throughout your organization.

HART Server from HART Communication Foundation – Provides HART-OPC access to vibration overalls and temperature data in the system.

Supported WirelessHART Gateways

The device is the gateway between the wired and the wireless domains. The following brands and types are supported:

- Pepperl+Fuchs [both Ethernet and EthernetIP versions]

- Endress+Hauser WirelessHART Fieldgate SWG70

- Emerson Smart Wireless Gateway 1420

- Siemens IE/WSN-PA LINK

These gateways also provide wired Modbus connectivity, enabling simple integration to most control systems. Modbus access is not included in the scope of this manual, please refer to the relevant gateway manual.

The System Installation/Commissioning Process

The wireless sensor system setup, in general, is a two-step process:

- The first step in the process is to use this Setup Guide to configure your wireless sensors to communicate with the gateway. This Setup Guide describes this process using the Pepperl+Fuchs WirelessHART gateway and the Emerson gateway. The process is very similar for the other supported brands and types of gateways and is described in the manuals that come with the specific products.

- Once the gateway and sensors can communicate with each other, the second step is to install the Wireless Sensor Device Manager software and then use Device Manager to complete the sensor setup and commissioning. Reference the *Wireless Sensor Device Manager User Manual* for specifics.

Minimum Requirements to Set Up the Wireless Network

- 1 each: CMMA 9170 Phoenix MINI-PS_100 24 VDC power supply, or other suitable 24 VDC power supply, for the WirelessHART Gateway

- 1 each: CMWA 8850-PF-SS Pepperl+Fuchs WirelessHART Gateway with firmware release 2.5, version 2.00.02 or later, or one of the other supported brands and types of gateways.

- 1 each: CMWA 8800 SKF Wireless Machine Condition Sensors and associated mounting studs

- 1 each: Wireless Condition Monitoring Sensor Product CD containing:

  – System Setup Guide (this document)

  – Pepperl+Fuchs WirelessHART Gateway User Manual
    Select the following link, then on the P+F **WirelessHART Gateway's** web page, in the **Documents** section, select **Manual**. http://www.pepperl-fuchs.us/usa/en/classid_2975.htm?view=productdetails&prodid=43457

  – Emerson™ Smart Wireless Gateway 1420 User Manual
    http://www.emerson.com/resource/blob/87246/450b46c54a43d25f2ef16bc02ca7c90d/manual--smart-wireless-gateway-data.pdf

  – CMSW 8810 Wireless Sensor Device Manager Software

  – Wireless Sensor Device Manager User Manual

  – ATEX certification and Ex instruction manual

System Setup Checklist

The checklist example below provides a general guideline for setting up the CMWA 8800 sensors in a WirelessHART network.

> ➢ For brevity, in this checklist the Wireless Sensor Device Manager User Manual title is shortened to the "WSDM User Manual."

Step	Done	Task and Reference
1.		Set up the WirelessHART Gateway. *This Guide (P/N 32257600), Chapter 1, System Setup*
2.		Next, How to Activate the Sensor and join the sensors to the commissioning gateway. *This Guide, Chapter 1, System Setup*
3.		Install Device Manager. *WSDM User Manual, Chapter 2, Device Manager Software Installation (P/N 32286200)*
4.		Build the wireless system's hierarchy in Device Manager. *WSDM User Manual, Chapter 3, Sensor Setup and Commissioning* (For a new Device Manager installation, acquire the License Key.)
5.		Change the gateway's/sensor's network ID and join key to join the production network. Deactivate the sensors. *WSDM User Manual, Chapter 3, Sensor Setup and Commissioning*
6.		Mount the sensors in the plant and power on the sensors. *This Guide, Chapter 2, How to Mount the SKF Wireless Machine Condition Sensor*
7.		Verify communication quality. *WSDM User Manual, Chapter 3, Sensor Setup and Commissioning*
8.		If needed, add a P+F WHA-ADP Wireless HART Adapter to improve routing connections. *This Guide, Chapter 5, Configuration of the P+F WHA-ADP WirelessHART Adapter*
9.		When using a P+F gateway, set the Power Profile in Device Manager to Full Routing for all sensors. Then in the P+F gateway's Operating Modes web page disable routing for sensors not needed as routers to maximize their battery life. When using an Emerson gateway, only set the Power Profile in Device Manager to Full Routing for those sensors that need to act as router, set the rest to Leaf Node to maximize their battery life. *WSDM User Manual, Chapter 3, Sensor Setup and Commissioning*
10.		Configure the sensors' data collection schedule (plus bursting of measurement results to the gateway and schedules for retrieving results by Device Manager software). *WSDM User Manual, Chapter 3, Sensor Setup and Commissioning*
11.		Start the Device Manager batch service. *WSDM User Manual, Chapter 3, Sensor Setup and Commissioning*
12.		Set up the data export process to SKF @ptitude Analyst. *WSDM User Manual, Chapter 5, Exporting Data to SKF @ptitude Analyst*

Overview of the WirelessHART Gateway

The WirelessHART gateway organizes wireless network communication to provide the best reliability with the lowest energy consumption. On the wired end, the WirelessHART gateway communicates using Ethernet or RS-485.

This section first explains how to configure the WirelessHART gateway to join your existing LAN, and then explains how to set up the gateway to communicate with the wireless sensors (using the SKF default WirelessHART gateway and sensor configurations).

> ➢ To mount the WirelessHART gateway, follow mounting instructions provided in the relevant User Manual.

WirelessHART gateways and WirelessHART field devices identify each other using a "network ID" and "join key". Meaning, both the gateway and the wireless devices connected to the gateway must be configured with the same network ID and join key.

Typically, the SKF factory ships wireless sensors and gateways with a default network ID and join key:

Default network ID: 1229
Default join key: 44555354-4E455457-4F524B53-524F434B

> ➢ When you have an existing WirelessHART network to which you are adding wireless sensors, SKF may configure the gateways and wireless sensors with your existing network ID and join key prior to shipment. The part numbers for pre-configured gateways and sensors end with "-C."

When setting up a new wireless sensor network, typically you use a commissioning gateway (one set up with the SKF default network ID and join key) to connect, configure and test the wireless sensors prior to mounting the gateway and sensors in the production environment. After commissioning is complete, you may modify the gateway and/or sensors' network ID and join key to match those of your target network.

Typically, you will use both a configuration computer and a host computer to set up the gateway. The configuration computer is used to configure the gateway so it can communicate with your LAN. This is easiest if the configuration computer is a computer whose IP address may be changed without consequences. Once the gateway is set up to communicate with your LAN, you use the host computer (running Device Manager and @ptitude Analyst) to complete the gateway's setup.

Setting Up a Pepperl+Fuchs Commissioning Gateway

The procedures for setting up an Emerson commissioning gateway are presented later in this chapter.

1. For new networks, follow the instructions in the Pepperl+Fuchs gateway user manual (**Installation / Connecting to Power Supply and Grounding** section) to connect the power supply to the gateway.

2. Follow instructions in the Pepperl+Fuchs gateway user manual to connect an Ethernet cable to the gateway's Ethernet terminal, and connect the gateway to the configuration computer (**Installation / Connecting to Ethernet** section).
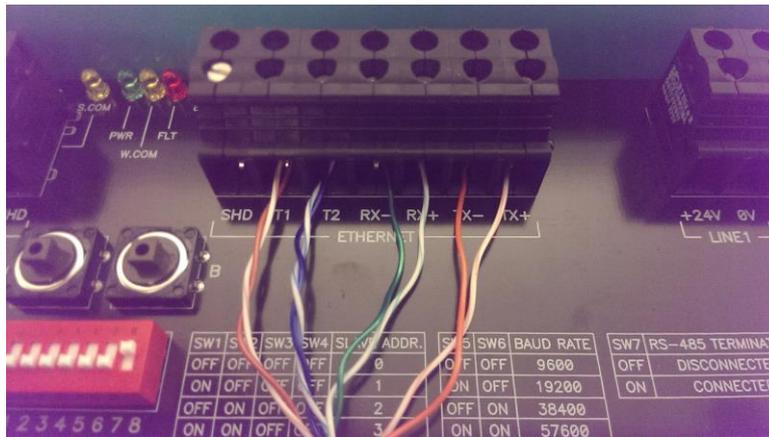
Figure 1 - 2.
Ethernet Cable Connection to the Gateway's Ethernet Terminal.

The table below provides a guide to tightening the cable glands and cover in order to maintain the Pepperl+Fuchs gateway's IP rating.

Installation Torque for Cable Glands	Type of Cable Glands
2.5 Nm (22 lb.-in.)	Plastic
4.11 Nm (36 lb.-in.)	Nickel plated brass
4.11 Nm (36 lb.-in.)	Stainless steel
Installation Torque for Housing Cover	
2.5 Nm (22 lb.-in.)	

3. Follow the **Installation / Connecting via Ethernet** section of the Pepperl+Fuchs user manual to set up the configuration computer so it can establish peer-to-peer connection with the gateway.

4. With the Ethernet cable connecting the gateway to the configuration computer, use Windows Internet Explorer or an equivalent browser to set up the gateway's LAN configuration as shown in the following figure. The gateway's default IP

address is **192.168.1.1**. Enter this IP address into your browser's address bar to access the Pepperl+Fuchs gateway's configuration web page (the default username is "admin" and the default password is also "admin").

> ➢ The Pepperl+Fuchs gateway's configuration web page resides inside the gateway, not the Internet.

Before proceeding, be sure to verify that the version of the gateway firmware you plan to use is suitable. You must use firmware release 2.5, version 02.00.02 or later. If your gateway's firmware version is older, please contact Technical Support for upgrade instructions.

Figure 1 - 3.
Verify the Gateway Firmware Version.

> ➢ Note that the firmware release number appears without a period –as 25– in the **Software Revision** field.

5. On the web page, set **Parameter / Wired Communications / Interfaces / Ethernet / IP configuration mode** to **Manually**. Then, enter the **IP address** and **NetMask** your gateway is to use, as shown in the figure below.
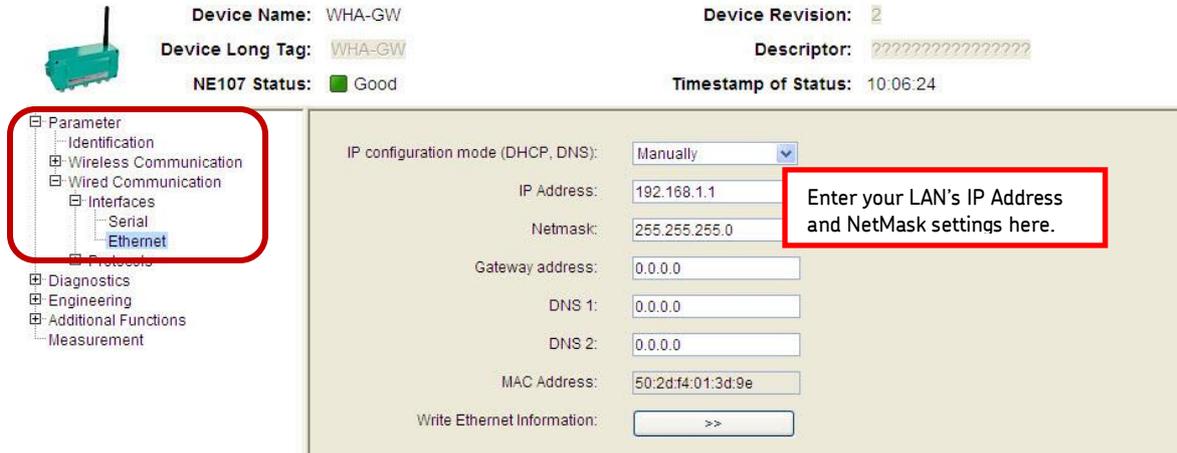
Figure 1 – 4.
Setting up the Gateway LAN Configuration.

6. Obtain a "static" IP address and Netmask for your LAN from your local IT department and enter them as described in the above figure. Avoid using the DHCP IP address, because the IP address may be changed when the address lease expires and you will lose the connection to the host software.

7. After setting your gateway's **IP Address** and **Netmask** settings, press the **Write Ethernet Information** button, confirm the prompt, and then press **OK**. The gateway is now configured to communicate using your LAN.

8. You will proceed to complete the gateway setup using the host computer. To do so, disconnect the Ethernet cable from the configuration computer and connect it directly to your LAN. After connecting the gateway to your LAN, on your host computer (also on the LAN), type the gateway's new IP address into your internet browser to again access the gateway's web page.

    Your next step is to set up the identification of the gateway in the **Parameter / Identification** web page as shown in the figure below. Reference the Pepperl+Fuchs user manual's **Configuration / Identification Parameters** section for further details.

    ➢   You should change the information in the screen capture's fields to best identify the gateway as it will be used in your wireless network, while adhering to company naming conventions.
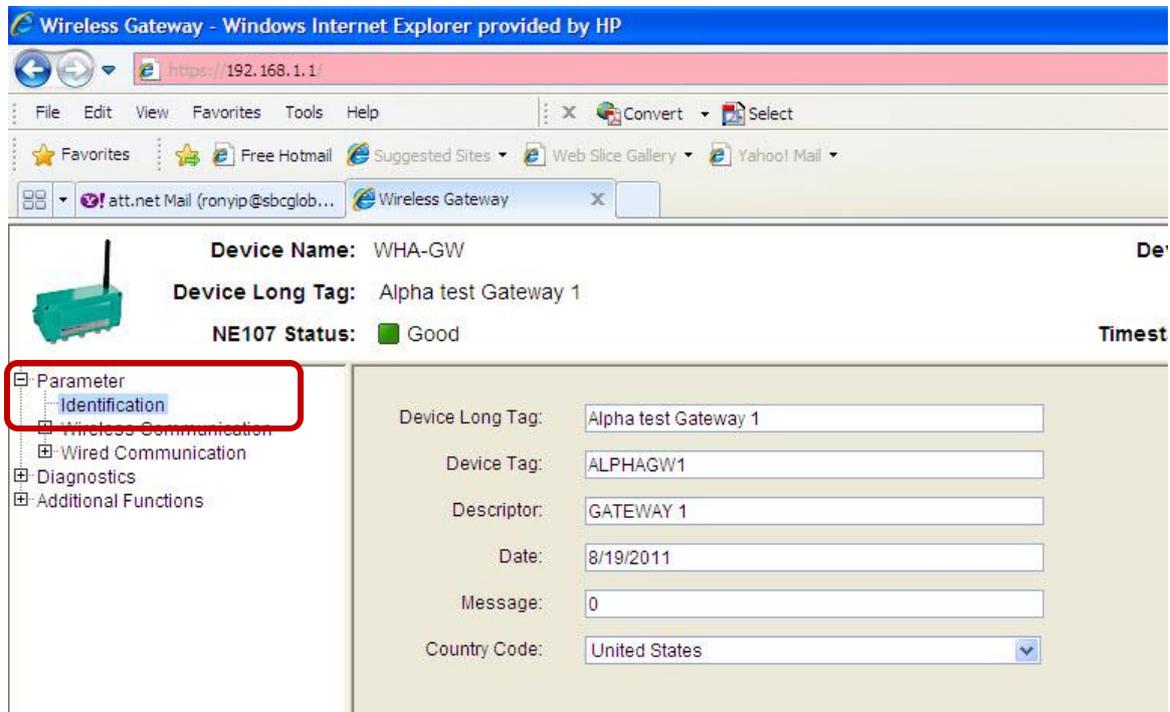
Figure 1 – 5.
Setting the Gateway's Identification Parameters.

9. Next, use the **Parameter / Wireless Communication / Setup** web page to set the gateway's **Network ID** to **1229** and **Join Key** (in four parts, as specified below) as shown in the following figure.

   ➤ If the P+F gateway comes from SKF, it should already be configured with these parameters.

   Reference the Pepperl+Fuchs user manual for further details (Configuration / Wireless Communication Parameters section).

   - Join Key part 1 = 44555354
   - Join Key part 2 = 4E455457
   - Join Key part 3 = 4F524B53
   - Join Key part 4 = 524F434B
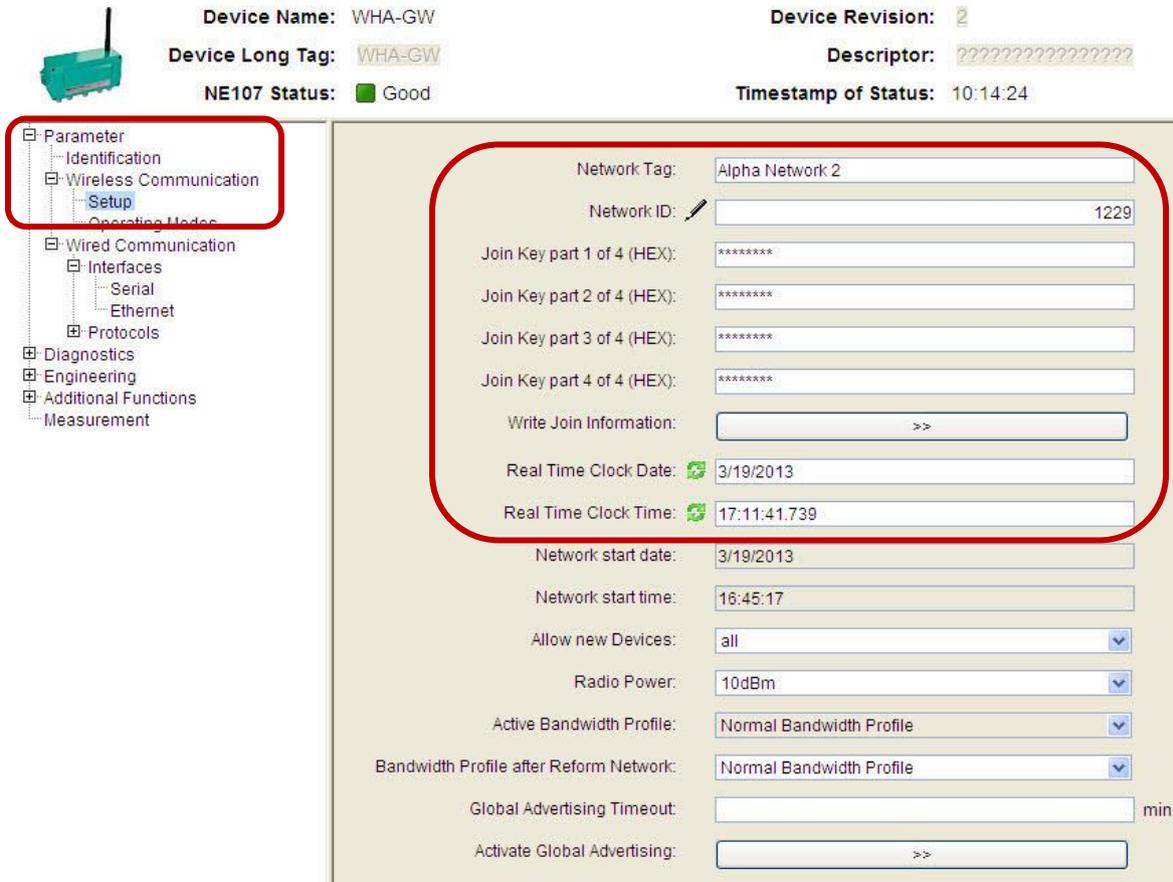
Figure 1 – 6.
Setting the Gateway's **Network ID** and **Join Key**.

Before clicking the **Write Join Information** button, open the gateway's cover and locate the DIP switch terminal inside. Make sure switch number 8 on the gateway's DIP switch is set to **OFF** (the up position) to allow writing the join information. Reference the Pepperl+Fuchs gateway user manual section **Operation / Buttons and DIP Switches** for more information.

Click the **Write Join Information** button and confirm the prompts.

Important! *For security reasons, after writing the join information, return DIP switch 8 to ON (the down position) to disable the write function.*

10. Also on the Setup web page, set the gateway's Real Time Clock Date and Real Time Clock Time to the current local date and time.

Important! *On the **Wireless Communication / Setup** web page, make sure the **Active Bandwidth Profile** setting is set to **Normal Bandwidth Profile**. Configuration of higher performance profiles will significantly decrease battery life for all battery powered devices in the wireless network.*

11. Using the Parameter / Wired Communication / Protocols / HART web page, set the gateway's Ethernet Port Number to 20004, as shown below.

> If the P+F gateway comes from SKF, it should already be configured with this setting.
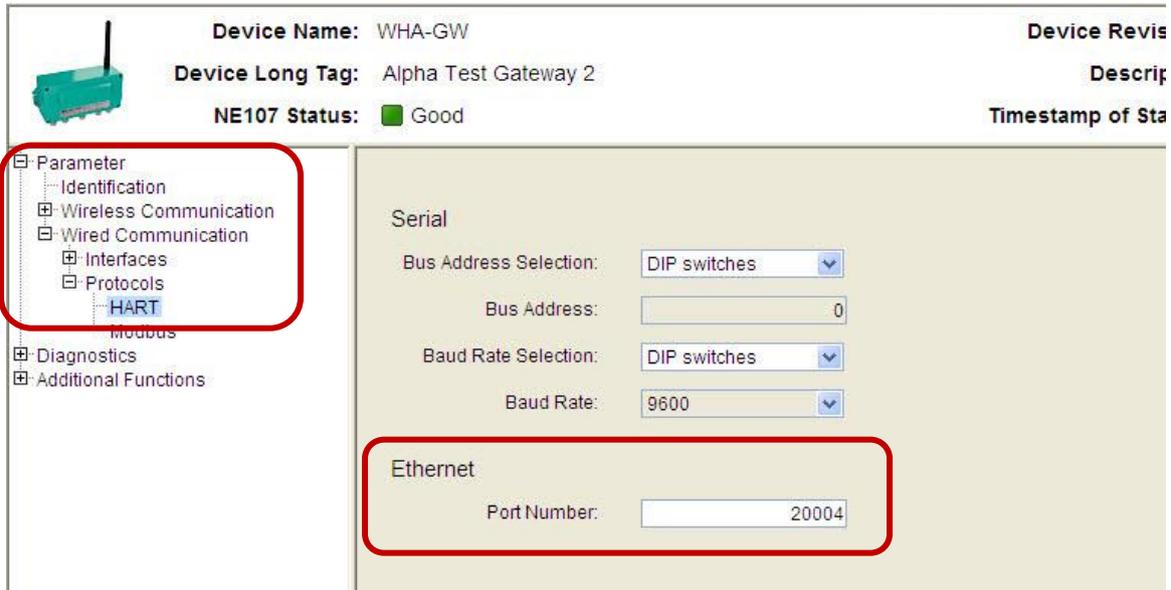
Figure 1 – 7.
Setting the HART Ethernet Port Number.

12. Using the **Additional Functions** / **Reset** web page, press the **Reform Network** button to activate the new configuration.

> At this time, leave the Pepperl+Fuchs gateway configuration web page open, as you will need it for future steps. Proceed to the next step, **How to Configure the Sensors to Join the Network**.
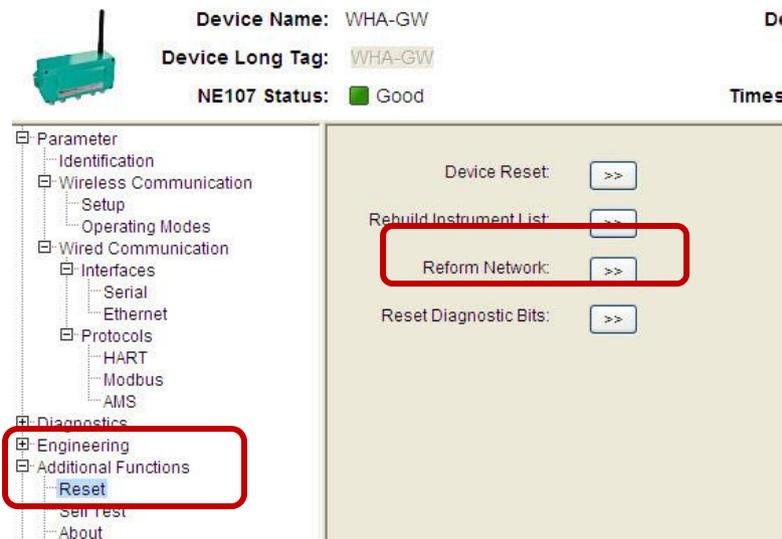
Figure 1 – 8.
Activating New Parameters.

Configure the Sensors to Join the Network

➢ You may want to reference this manual's **Chapter 3, Manual Operation** for more information on how to manually issue commands to the wireless sensor prior to proceeding.

1. First, activate the sensors. Press the sensor's button for one second to activate it. You will see the sensor's LED flash immediately, then pause, then flash progressively faster, then stop. After a short pause (approximately three seconds), the LED flashes a short burst, which indicates the command was acknowledged.
If you need to deactivate the sensor, press and hold the button until the LED flashes four times, then release. After releasing the button, you will see the LED flash progressively slower until it completely stops, which indicates the sensor is deactivated.

➢ The sensor's factory default network ID and join key match those that you set in the gateway in the previous section, so it is now ready to connect to the gateway.

Repeat step 1 for each sensor.

2. Your next step is to go to the gateway's **Parameter / Wireless Communication / Operating Modes** web page and wait for the joining process to complete for all the sensors. Depending on the number of sensors, it may take up to thirty minutes for all the sensors to appear, as shown in the figure below.

➢ Each gateway is limited to a theoretical maximum of 250 wireless field devices. We recommend a maximum of 50 wireless sensors per gateway for performance reasons.

➢ The P+F gateway's web page user interface becomes slower as the number of sensors in the network increases. Adding gateways will decrease the number of sensors per gateway and improve the user interface response and network communication speed.

Device Name:	WHA-GW				Device Revision:	2	
Device Long Tag:	WHA-GW				Descriptor:	??????????????????	
NE107 Status:	■ Good				Timestamp of Status:	14:32:57	

Operating Modes

Long Tag	IO-Card	Channe...	Device Type	Com. Stat...	Dev. Status	Routing Devic
⊟ WHA-GW	251	1	WHA-GW			
▪ WHA-ADP Router	1	0	WHA-ADP	⊗	☑	
▪ SKF_CMWA_8800_00...	2	0	E1A2	⊗	☑	
▪ _____...	3	0	WHA-ADP	☑	☑	☑
▪ SKF_CMWA_8800_00...	4	0	E1A2	⊗	☑	
▪ SKF_CMWA_8800_00...	5	0	E1A2	⊗	☑	
▪ SKF_CMWA_8800_00...	6	0	E1A2	⊗	☑	
▪ EMERSONTEMPTRAN...	7	0	2658	☑	⊗	☑
▪ SKF_CMWA_8800_00...	8	0	E1A2	⊗	☑	
▪ SKF_CMWA_8800_00...	9	0	E1A2	⊗	☑	
▪ SKF_CMWA_8800_00...	10	0	E1A2	⊗	☑	
▪ SKF_CMWA_8800_00...	11	0	E1A2	⊗	☑	
▪ SKF_CMWA_8800___...	12	0	E1A2	⊗	☑	
▪ East Bldg PUMP123 IB H	13	0	E1A2	☑	☑	☐
▪ East Bldg MTR234 OB H	14	0	E1A2	☑	☑	☐
▪ SKF_CMWA_8800_00...	15	0	E1A2	⊗	☑	
▪ SKF_CMWA_8800_00...	16	0	E1A2	☑	☑	☐
▪ SKF_CMWA_8800_00...	17	0	E1A2	⊗	☑	
▪ SKF_CMWA_8800_00...	18	0	E1A2	⊗	☑	
▪ SKF_CMWA_8800_00...	19	0	E1A2	⊗	☑	
▪ West Bldg Motor 234...	20	0	E1A2	⊗	☑	
▪ West Bldg Pump 123...	21	0	E1A2	⊗	☑	

Figure 1 – 9.
Waiting for the Joining Process to Complete.

➢ The web page does not automatically update as devices join the network. You must click the **Refresh** button to update the list.

Figure 1 – 10.
Click the **Refresh** Button During the Join Process.

3. When all the sensors appear in the list and display a green checkbox in the **Com. Status** column, your WirelessHART network configuration is complete.

Activate Advertising to Reduce the Time Required for Sensors to Join the Network

When installing large systems (that is, 10 or more sensors), the **Global Advertising** (or **Active Advertising**) function can save considerable time when joining new sensors / devices to the network. This function can be activated either from the P+F gateway's **Setup** web page or from the Device Manager software. The only cost for the time saved is higher battery consumption temporarily on all devices in the network during the advertising phase. For example, a service engineer needing to build or expand a large network can activate advertising in the morning – and advertising will turn off automatically by the end of the working day.

If **Global Advertising** is activated, the network sends advertising messages to announce the network's existence. When a WirelessHART field device receives such an advertising message, it tries to join the network. The gateway and the network devices will send a series of identification messages at a higher frequency than normal to identify new wireless devices and to reduce the network join time. The messages will be sent until the specified **Global Advertising Timeout** is reached.

Because **Global Advertising** increases energy consumption of the network's devices, it is recommended that you use it only when needed, i.e., when you expect new devices to join the network. Note that you can activate **Global Advertising** without reforming the network.

To activate the advertising function from the P+F gateway's Setup web page:

- In the **Global Advertising Timeout** field, specify the number of minutes (1…255) to occur before the global advertising function times out.

- Click the **Activate Global Advertising** button.

Figure 1 – 11.
P+F Gateway's Setup Web Page – **Global Advertising** Fields.

To activate the advertising function from Device Manager:

- Click the **gateway** hierarchy item to select it.

- Click the **Set Active Advertising On** button.
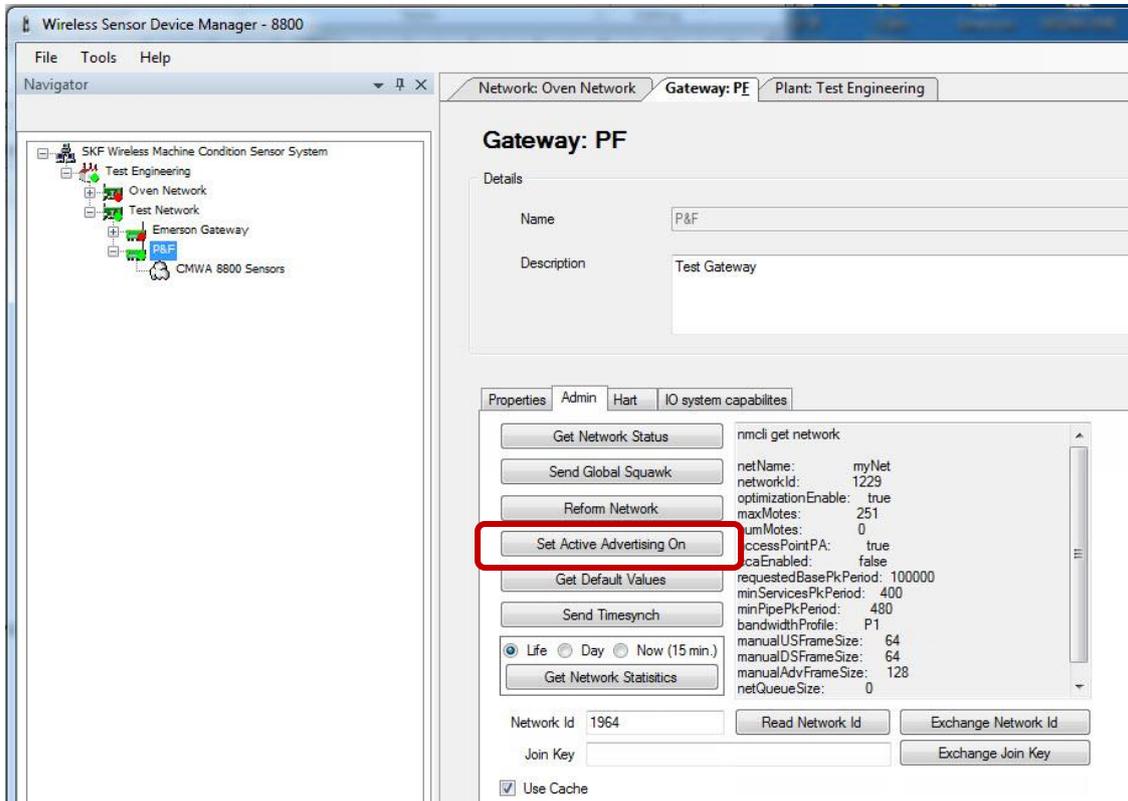
Figure 1 – 12.
Device Manager – **Set Active Advertising On** Button.

Setting Up an Emerson Commissioning Gateway

This document provides instructions for a commissioning engineer to set up an Emerson Smart Wireless Gateway 1420, enable CMWA8800 sensors to connect via the gateway and allow the Device Manager software to receive sensor data.

The gateway in this document was connected locally to a PC. In the field this may not always be the case. The commissioning engineer should confirm the IP address of the gateway before commencing installation.

This document relates to Emerson firmware release: 4.5.32. It assumes that the commissioning PC is operating with Windows 7 and that the commissioning engineer has experience in configuring network settings within the operating system.

The Emerson gateway requires a 10/100Base TX Ethernet connection to be attached to the gateway at location 'Ethernet 1' and a 24v (nominal) PSU supply capable of supplying at least 250mA to the 'Input Power' terminals. (See the figure below for port identification details.)
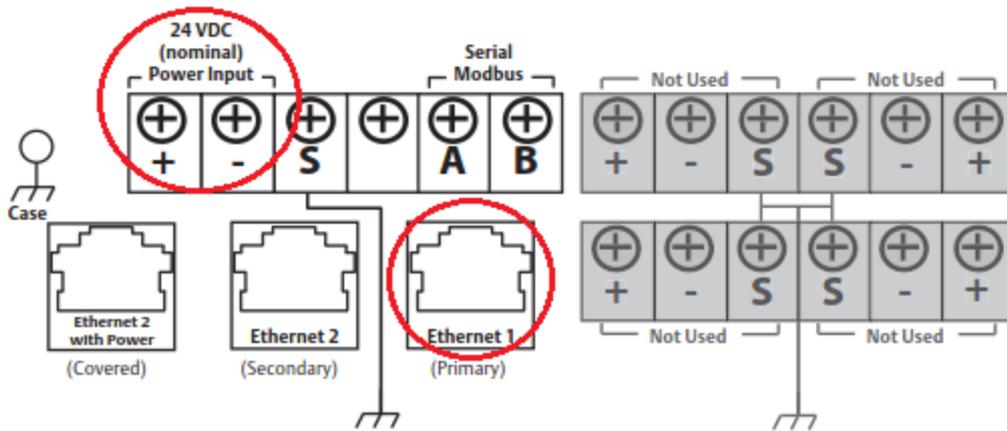
Figure 1 – 13.
Emerson Gateway Electrical Diagram.

Configuring the PC Network Connection

1. Click the PC Start button, and then click the **Computer** button on the right.

2. Click the **Open Control Panel** tool on the upper bar.

3. Click the **Network and Sharing Centre** icon in the list.

4. Click the **Change Adapter Settings** link on the left menu bar.

5. Right click **Local Area Connection** and then click the **Properties** menu item.

6. In the Local Area Connection Properties dialog, select the **Internet Protocol Version 4 (TCP/IPv4)** list item, and then click the **Properties** button.

7. In the General tab, select the option button **Use the following IP address**.

8. Enter the IP address: **192.168.1.12** the Subnet Mask should be **255.255.255.0**.

9. Click the **OK** button.

Connecting to the Emerson Gateway

1. Open a suitable Internet browser and enter the IP address **192.168.1.10** in the URL field. A login dialog displays.
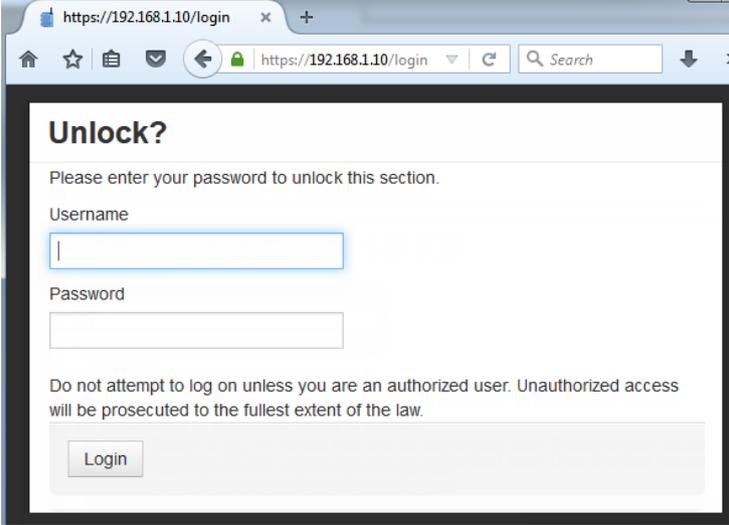
Figure 1 – 14.
Browser Connection to Emerson Gateway.

2. Enter **admin** in the 'Username' field. And **default** into the 'Password' field.

3. The browser displays the Emerson gateway home page.
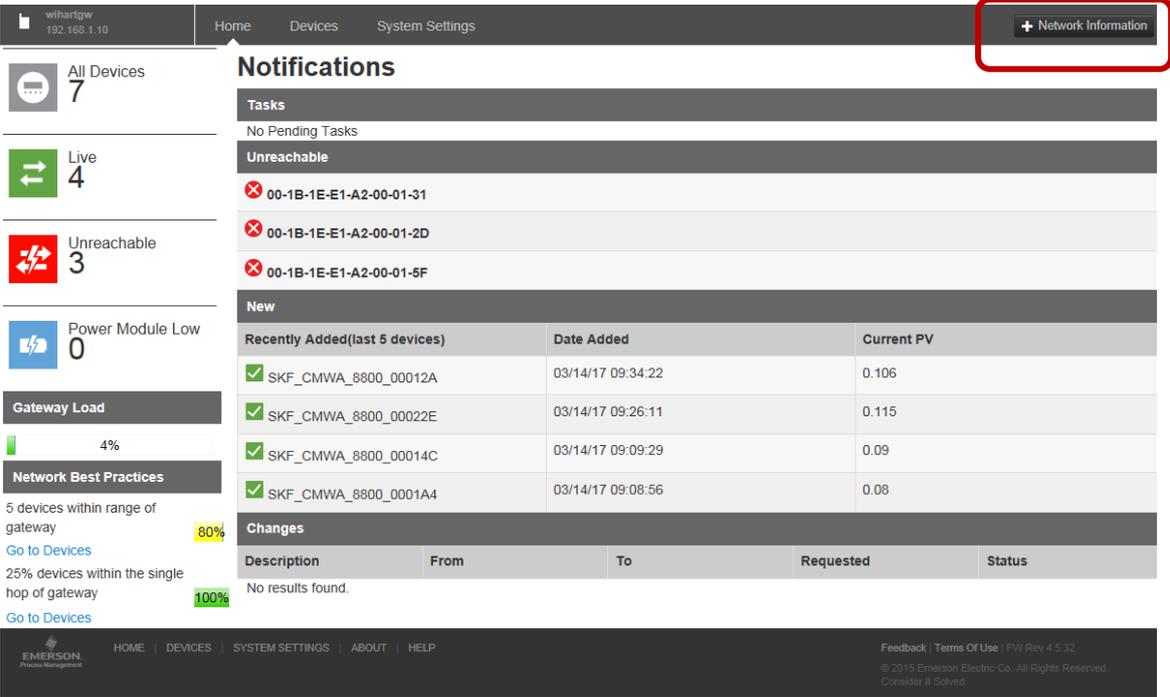
Figure 1 – 15.
Emerson Gateway Home Page.

Configuring the Emerson Gateway

In order to allow sensors to connect to the gateway, follow the configuration steps below.

1. Click the **Network Information** button located in the upper right of the home page menu bar. The Network Information dialog displays.
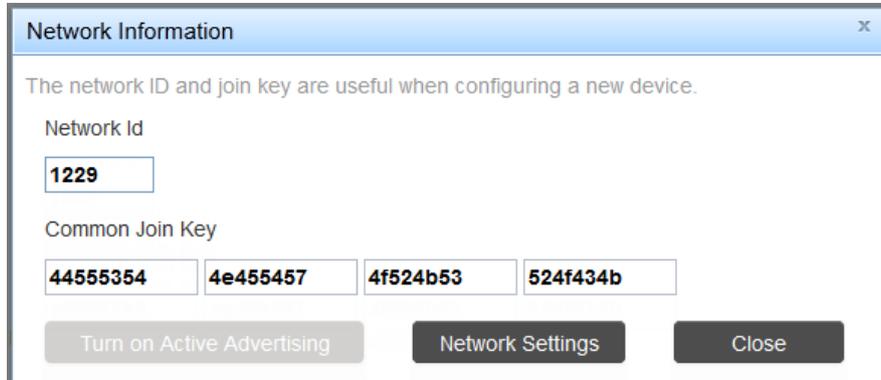
Figure 1 - 16.
Network Information Dialog Page.

2. Click the **Network Settings** button to open that dialog.
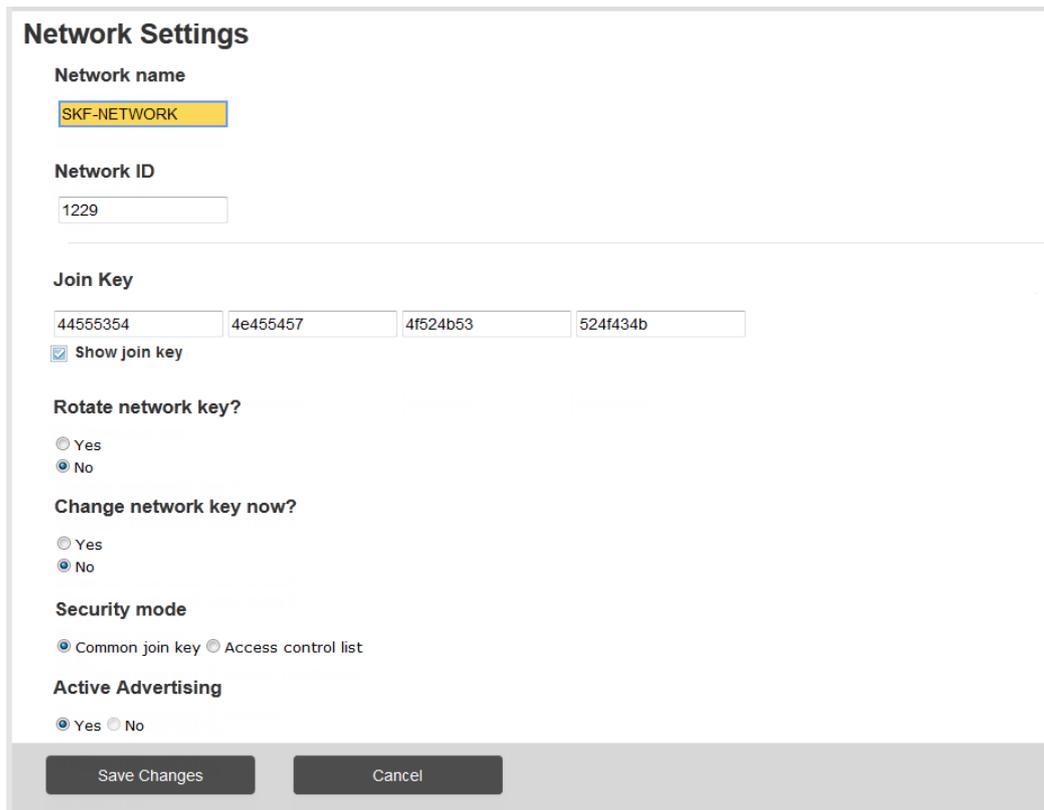
Figure 1 - 17.
Network Settings and Join Key Details.

3. Enter **1229** for the 'Network ID'.

4. Ensure that the 'Security mode' option button **Common join key** is selected.

5. Enable the **Show join key** check box.

6. Enter **44555354 4E455457 4F524B53 524F434B** for the Common Join Key (the fields are not case sensitive).

7. For 'Rotate network key?' select **No**.

8. For 'Change network key now?' select **No**.

9. Click the **Save Changes** button to activate the settings.

10. Click **OK** to confirm the changes. A message notifies you that the changes will be implemented.

You are returned to the home page.

11. Go to 'System Settings' on the upper bar.

12. Select 'Protocols > Protocols And Ports' from the left menu.
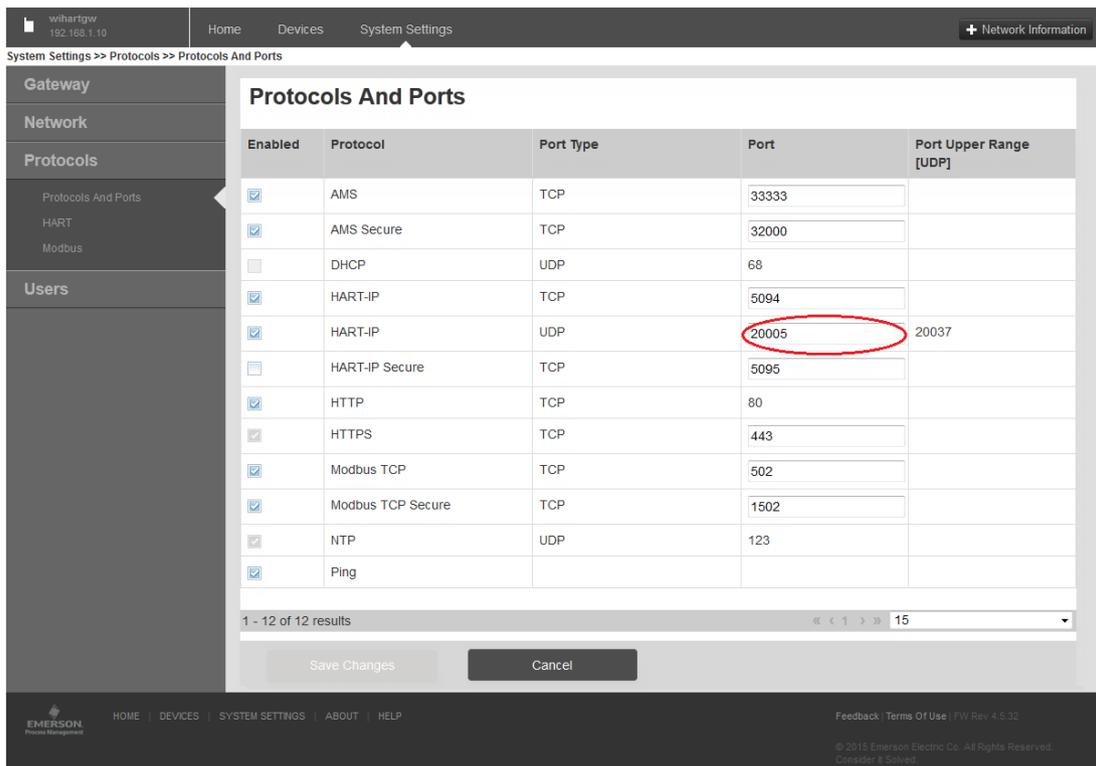
Figure 1 - 18.
Protocols and Ports Details.

13. Ensure that the Protocol **HART-IP** Port Type **UDP** check box is **Enabled**.

14. Ensure that the HART-IP UDP **Port** number matches exactly the port number displayed in the Device Manager software (once installed).

➢ If you edit the UDP port number on the web page, click the **Save Changes** button to preserve the changes.

Figure 1 – 19.
Port Number on the Device Manager Software Gateway/Properties Tab.

Detecting the Sensors

1. Switch on the sensor by pressing the button for 1 second. If the sensor has been configured previously to a non–default Network ID and Join Key, then reset the sensor to the default Network ID and Join Key by pressing and holding down the button for 9 flashes, then release and wait for the sensor to connect.

    ➢ For more details, refer to this setup guide, Configure the Sensors to Join the Network and How to Activate the Sensor.

2. Click 'Devices' on the Emerson gateway web page upper menu bar to open the Devices web page. Use this page to determine the quantity and status of devices connected to the gateway.
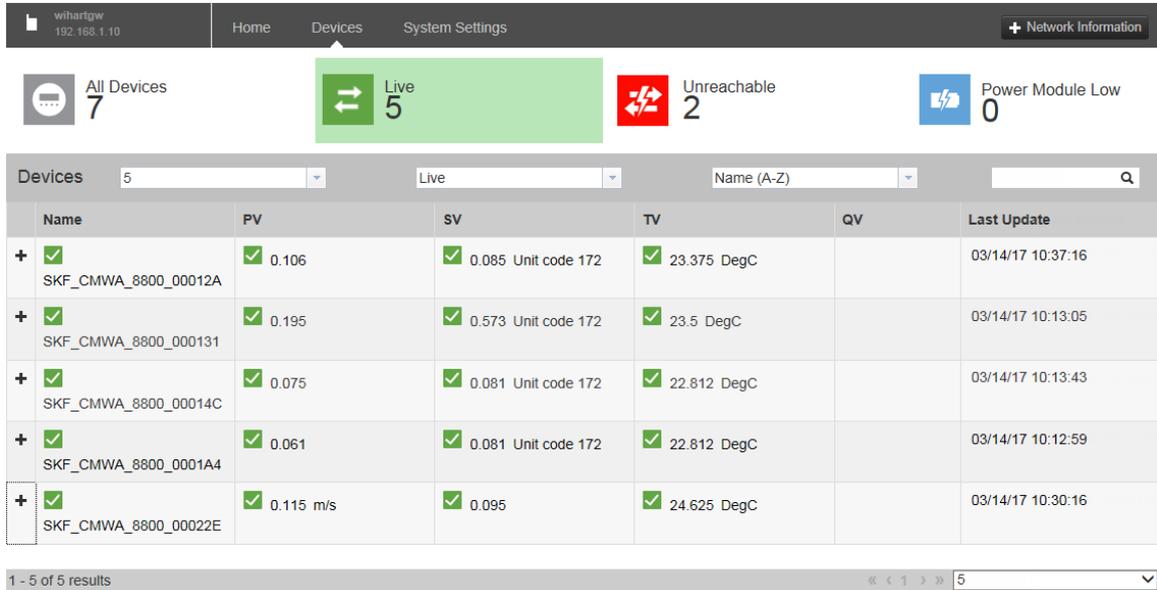
Figure 1 – 20.
Emerson Devices Web Page Showing Connected Sensors

Once the Device Manager software is installed (see Install and Use the Wireless Sensor Device Manager Software later in this chapter), the commissioning engineer can also use the Gateway/**Find sensors** option in Device Manager to detect sensors that are connected to the gateway.

Once the sensors have been detected by Device Manager, the commissioning engineer can proceed to configure the network and the sensor measurements required.

Configuring the Network ID

In order to configure sensors to a designated network ID and join key, follow the instructions below.

1. Check the Devices web page (shown above) to confirm that all the sensors you want to move to another network ID have successfully joined the current network ID.

2. Click the **Network Information** button located to the right on the home page menu bar. The Network Information dialog displays.

3. Click the **Network Settings** button to open that dialog.

Figure 1 – 21.
Emerson Network Settings Web Page.

4. Enter the appropriate **Network ID** number you want to assign to the gateway and sensors. Optionally, change the **Join Key**.

5. The Network ID field will change colour to indicate that a change has been made. To activate this change, click the **Save Changes** button.
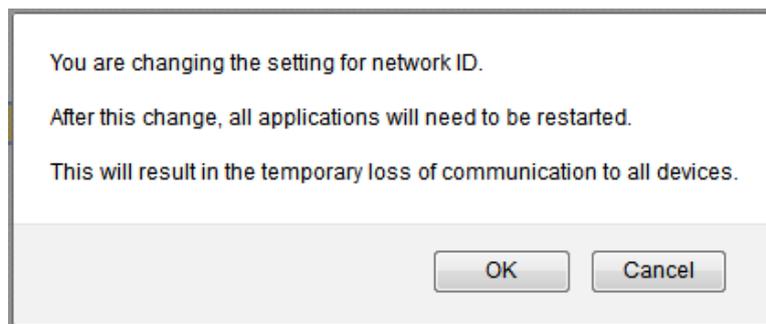
Figure 1 – 22.
Confirmation Prompt.

6. Click **OK** to confirm the changes. Notice that a restart is required. A second message displays confirming that the changes have been submitted successfully.
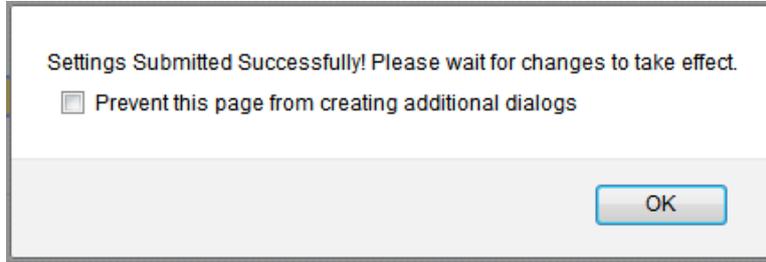
Figure 1 - 23.
Settings Submitted Successfully.

7. You are returned to the home page. Navigate to **System Settings** > **Network** >
    Network Settings.
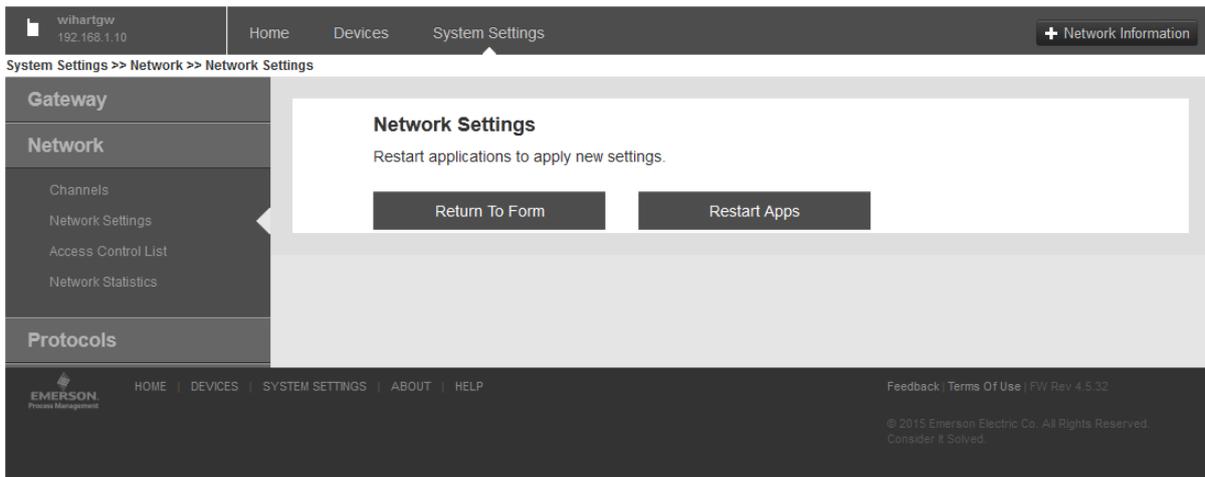
Figure 1 - 24.
Network Settings > Restart Apps.

8. Click the **Restart Apps** button to apply new network settings.

Figure 1 - 25.
Confirm the Restart.

9. You are informed that the gateway operation will be temporarily suspended. You
    are prompted to confirm that you want to restart the application. Click **OK**.

10. A message displays describing how to log in again.

Figure 1 - 26.
User Login Instructions.

After a short period of time, the gateway will be accessible again from the web browser. The gateway will be using the new Network ID and Join Key. In parallel, the wireless field devices will restart, change to the same new Network ID and Join Key, and then rejoin the gateway over time. If the Device Manager software was connected to the gateway prior to the gateway Network ID change and subsequent restart, Device Manager will also have lost connection to the gateway. The Device Manager-gateway connection can be re-established from the gateway **Properties** tab. Disable and then re-enable the connection to the gateway.
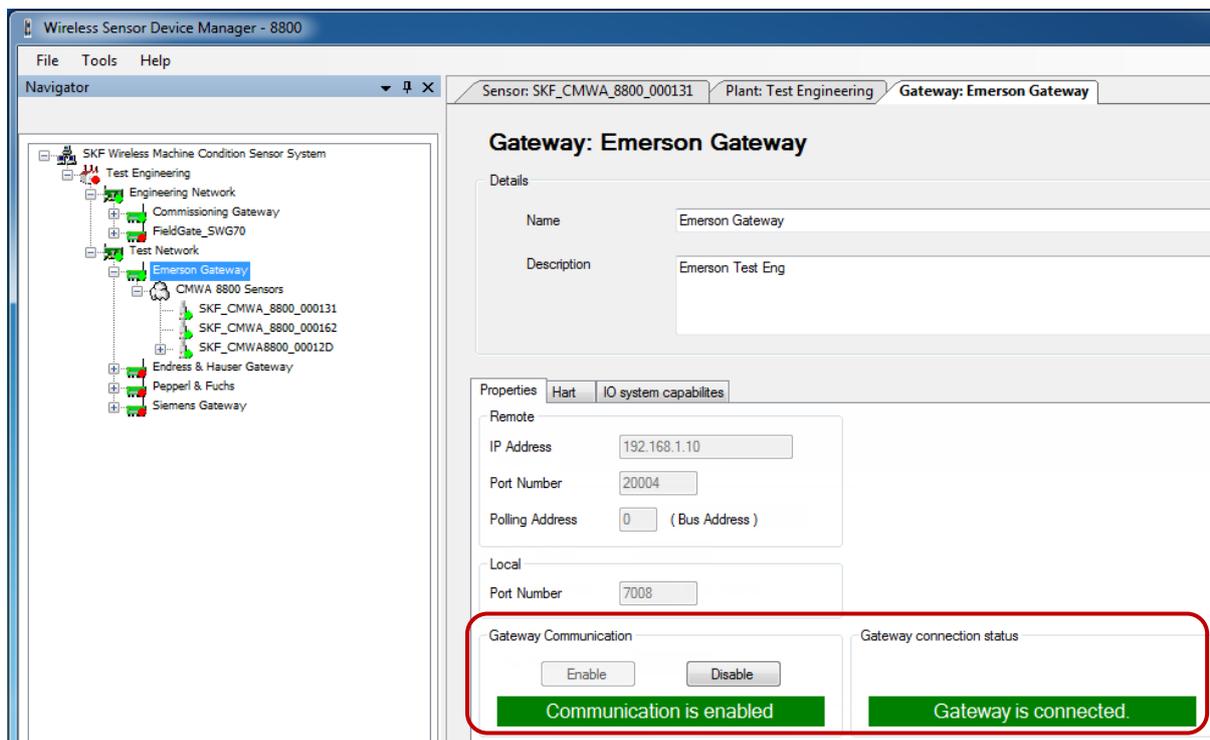
Figure 1 - 27.
Device Manager > Properties tab > Gateway Communication.

Active Advertising to Reduce the Time Required for Sensors to Join the Network

The Emerson gateway allows the use of active advertising to reduce the time required for sensors to join the network. This function saves considerable time but be aware that it consumes more power. For further details about active advertising, refer to Activate Advertising to Reduce the Time Required for Sensors to Join the Network, discussed previously in this chapter.

1. Navigate to System Settings > Network > Network Settings.

2. The **Active Advertising** option is in the lower left. Select **Yes** to enable active advertising.

3. Then, the **Duration** drop down list displays, enabling you to select the desired duration of the advertising function.

4. Click Save Changes.

Figure 1 – 28.
Active Advertising on the Network Settings Page.

For a discussion of the differences between command bursting in Emerson and P+F gateways, refer to A Comparison of Command Bursting in Emerson and P+F Gateways later in this chapter.

Install and Use the Wireless Sensor Device Manager Software

At this point, the commissioning gateway and sensors are able to communicate. You may now proceed to install and utilize the system's Wireless Sensor Device Manager software to complete the system's setup, commissioning, and operation. Reference the Wireless Sensor Device Manager User Manual located on the software CD.

➢ After system commissioning, return to subsequent sections and chapters in this manual to determine how to best install your sensors in the production environment.

Wireless Communication Stability Considerations

Location and Signal Strength

Radio signal strength decreases in free space with the inverse square of distance. In an industrial environment, there are several potential obstacles for radio waves, for example buildings, walls, pipes, or even moving obstacles like trucks. These obstacles can reflect, bend, diffuse or block radio waves. The effects of reflection, bending and diffusion create new waves which interact with the original ones and with each other. They can amplify or nullify each other. Radio waves do not penetrate metal surfaces but do penetrate concrete

or wooden walls to some extent. If there are obstacles blocking transmission between wireless devices, add additional devices to provide alternative communication paths around the obstacles. The table below lists radio signal attenuation through common obstacles.

Table of Radio attenuation through typical obstacles (source: Dust Networks Inc.)	
Material	**Signal attenuation**
Clear glass window	2 dB
Brick wall	2 to 8 dB
Solid wood door	3 dB
Cubicles	3 to 5 dB
Cinder block wall	4 dB
Drywall/sheetrock wood framed	4 to 6 dB
Marble	5 dB
Metal frame glass with reflective coating (wall or window)	6 dB
Interior office wall	6 dB
Glass window with security wire	8 dB
Concrete wall	10 to 15 dB

The wireless sensor's sensitivity is approximately –90 dBm. The system margins can be determined by comparing this sensitivity with the received signal level. Even with good signal strength, stability can be negatively influenced by wireless networks or other noise emitters in the 2.4 GHz band.

Device Name:	WHA-GW				Device Revision:	2
Device Long Tag:	Alpha Test Gateway 3				Descriptor:	GATEWAY3
NE107 Status:	Good				Timestamp of Status:	09:34:52

Details

☑ Tree-View   Export Refresh

Long Tag	IO-Card	Channel	Device Type ▲	Com. Status	Neighbors	RSSI	Stability
⊟ Alpha Test Gateway 3	251	1	WHA-GW				
▪ AHU2 - SAF Motor	4	0	E1A2	🔴			
▪ AHU2 - RAF Motor	8	0	E1A2	☑	SKF_CMWA_8800_000...	0	0
				☑	SKF_CMWA_8800____...	0	0
				☑	AHU1 - SAF	-73 dBm	50
				☑	Boiler Pump - Motor 2	0	0
				☑	_____...	-66 dBm	62.5
				☑	AHU1 - RAF Motor	0	0
				☑	SKF_CMWA_8800____...	0	0
				☑	AHU2 - SAF	-45 dBm	81.08099...
				☑	AHU2 - SAF Bearing	-45 dBm	84.78199...
				☑	Alpha Test Gateway 3	-73 dBm	39.78099...
				☑	SKF_CMWA_8800_000...	0	0
				☑	New _Name_00003F	0	0
▪ AHU1 - SAF Bearing	11	0	E1A2	🔴			

Tree navigation panel:
- ⊟ Parameter
  - Identification
  - ⊞ Wireless Communication
  - ⊞ Wired Communication
- ⊟ Diagnostics
  - Identification
  - ⊟ Wireless Communication
    - Overview
    - Details
    - Burst Lists
    - Topology View
  - ⊞ Wired Communication
- ⊟ Engineering
  - Instrument List
  - ⊟ Modbus Mapping
    - Modbus Settings
    - Input Status
    - Input Register
  - Topology View
- ⊞ Additional Functions
- Measurement

Figure 1 – 29.
The Gateway's Web Page Showing Received Signal Strength Indicator (RSSI).

Co-existence with Wireless Local Area Networks (WLAN)

The WLAN and WirelessHART networks both fully utilize the 2.4 GHz band. WLAN divides the 2.4 GHz band into eleven overlapping channels (see the figure below), whereas WirelessHART divides the 2.4 GHz band into 16 distinct channels. To avoid interference between WLAN channels, it is typical to only use channels 1, 6, and 11 within the same frequency space, as they do not overlap. This allows WirelessHART to use some channels between 1 and 6, and some between 6 and 11. However, efficiency will be adversely affected.

Also, WLAN does not utilize the channels on a continuous basis. This allows WirelessHART to use the full bandwidth when there is no WLAN traffic. In this case, the efficiency of WirelessHART will be severely affected in periods with a lot of WLAN activity (as transmit power for WLAN is high compared with WirelessHART).

A much better solution is achieved, for example, if the frequency space between WLAN channels 7 through 11 is reserved for WirelessHART only, which is equivalent to WirelessHART channels 10 to 16. This allows for continuous activity with reasonable efficiency for the WirelessHART network.
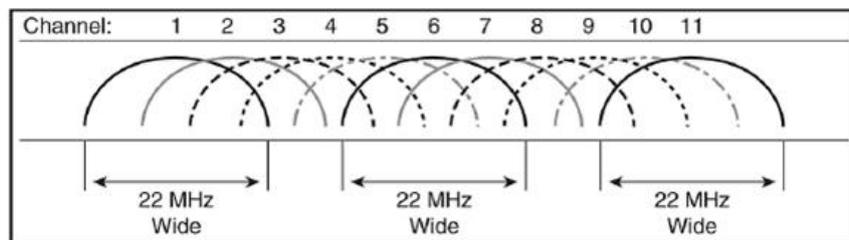
Figure 1 – 30.
WLAN Channels in the 2.4 GHz Frequency Band.

Table of WirelessHART Channel Frequencies

WHART Channels	Frequency (GHz)	WHART channel Frequency Range (GHz)	
	Center	min	max
1	2.405	2.4025	2.4075
2	2.41	2.4075	2.4125
3	2.415	2.4125	2.4175
4	2.42	2.4175	2.4225
5	2.425	2.4225	2.4275
6	2.43	2.4275	2.4325
7	2.435	2.4325	2.4375
8	2.44	2.4375	2.4425
9	2.445	2.4425	2.4475
10	2.45	2.4475	2.4525
11	2.455	2.4525	2.4575
12	2.46	2.4575	2.4625
13	2.465	2.4625	2.4675
14	2.47	2.4675	2.4725
15	2.475	2.4725	2.4775
16	2.48	2.4775	2.4825

Table of WLAN Channel Frequencies

WLAN Channels	Center Frequency (GHz)	WLAN channel Frequency Range (GHz)	
	Center	min	max
1	2.412	2.401	2.423
2	2.417	2.406	2.428
3	2.422	2.411	2.433
4	2.427	2.416	2.438
5	2.432	2.421	2.443
6	2.437	2.426	2.448
7	2.442	2.431	2.453
8	2.447	2.436	2.458
9	2.452	2.441	2.463
10	2.457	2.446	2.468
11	2.462	2.451	2.473
12	2.467	2.456	2.478
13	2.472	2.461	2.483

WirelessHART Connectivity

The SKF Wireless Machine Condition Sensor system offers a robust and flexible wireless connection between the WirelessHART gateway and the wireless sensor network. It is, however, important to note that machinery targeted for monitoring may not be located in an area that is optimal for wireless communication. Not to worry, WirelessHART provides features that simplify establishment of an efficient wireless network with good noise margins.

Possible Communication Distances for the 8800 Wireless Sensor

The achievable communication distance is very dependent upon location of the wireless sensors and the WirelessHART gateway. Optimal communication conditions are achieved if the wireless sensors are located one meter (3.28 feet) or more above ground and have line of sight of the gateway.

> ➢ It is more important to obtain a good vibration reading vs. obtaining the best wireless sensor signal range. When mounting sensors, prioritize vibration signal response vs. wireless sensor signal range.

Using line of sight test conditions, and with optimal installation of the components, a communication distance of approximately 150 meters (492 feet) between the WirelessHART gateway and a wireless sensor has been achieved. However, real life issues will lower communication distance, as exampled below:

- Line of sight is often difficult to achieve.

- Walls / obstacles may exist between wireless sensors.

- Reflection from machinery and walls may make communication even more difficult (although it may also help).

However, good communication connectivity can normally be achieved over several tens of meters without router nodes, and more distance may be attained by strategically locating router nodes.

Installation of Wireless Sensor Router Nodes

In addition to its vibration and temperature data collection / retrieval duties, the wireless sensor can also be configured to work as a router node that helps route measurement data from other wireless sensors in the mesh network.

A wireless sensor's **Power profile** options are **Leaf node**, **Some routing**, and **Full routing**.

Leaf Node – Default setting – With this lowest **Power profile** setting, the gateway does not allow the wireless sensor to route traffic from other nodes. This setting provides the longest sensor battery life.

Some Routing – (Not active at this time) with this intermediate **Power profile** setting, the gateway allows the wireless sensor to route traffic from two to three wireless sensors (or other WirelessHART nodes). Background power consumption increases with this setting (i.e., battery life is shortened).

Full Routing - With this highest **Power profile** setting, the gateway does not restrict the wireless sensor as to the number of other sensors for which it can route traffic, it allows the gateway's Network Manager to decide what devices will route through this device. Radio power consumption is proportional to the number of

connections being maintained and the amount of network traffic being routed across them.

When you select the **Full Routing Power Profile**, the gateway's Network Manager provides the sensor fast pipe(s) for block transfer. You typically want the fast pipe(s) to transfer waveform data, but you don't want every sensor to act as a router for other sensors unnecessarily, as this shortens sensor battery life.

Sensor battery life is an important consideration when using router nodes. A wireless sensor that is also set up for router node function in a meshed network will consume several times the amount of battery just maintaining connections to its neighbors, compared to a leaf node.

When using a Pepperl+Fuchs gateway there is a solution to this situation. In Device Manager, set every sensor's **Power Profile** to **Full Routing** – every sensor is provided a fast pipe for waveform data transferal. Then, using the P+F gateway's web page, uncheck the **Routing Device** option to disable routing for those sensors you want to use as leaf nodes (no routing capability). Reference the following figure.

When using an Emerson gateway, sensors that do not need to be setup as routing nodes should be set to **Leaf Node** in Device Manager to not be tasked with routing but will not get a fast pipe for waveform data transferal, consequently the upload of waveforms will take longer.

> ➢ The velocity / envelope waveform upload is subdivided in 104 packets. Depending upon availability of a communication fast pipe, the transfer rate will be approximately one packet per second (with a fast pipe), or approximately one packet every four seconds (without a fast pipe) for a single hop node. This depends on other usage of the available WirelessHART bandwidth (e.g., by cyclic data capture). For multi hop nodes, the upload time is proportionally longer.
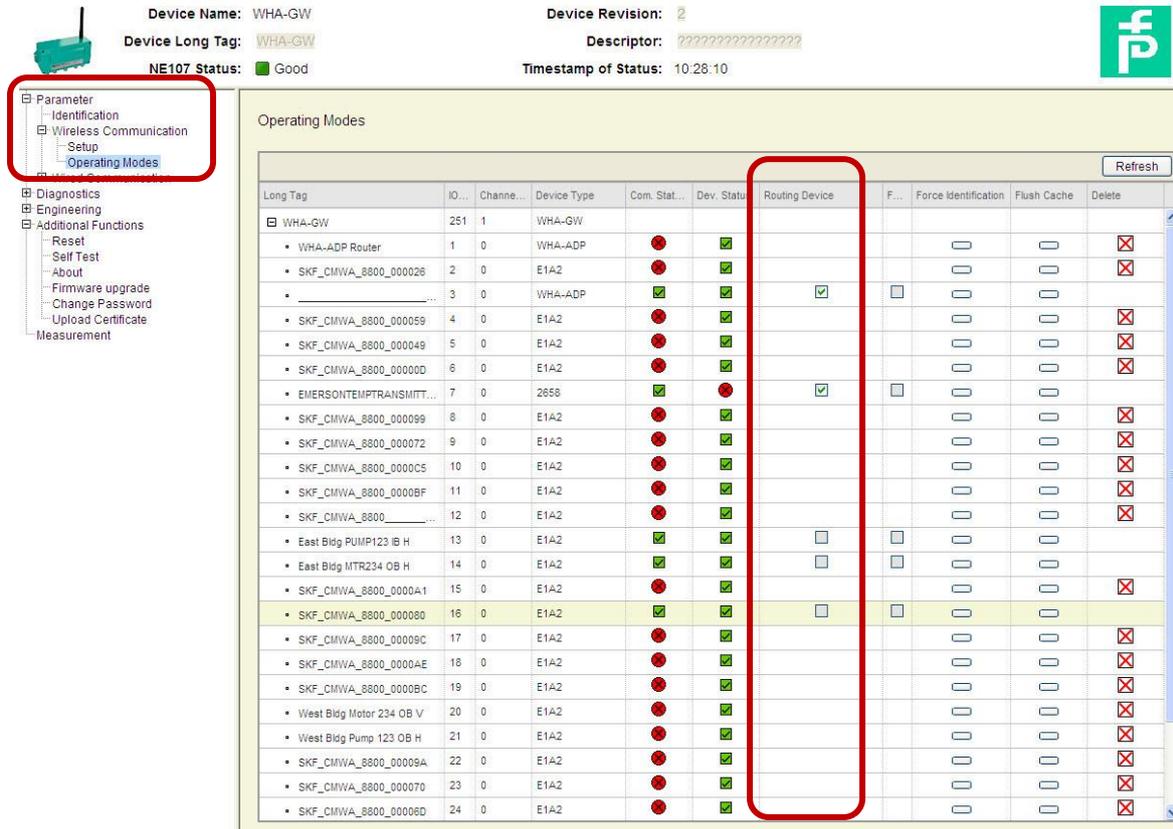
Figure 1 - 31.
The P+F Gateway's Web Page Showing Routing Device Check Boxes.

When setting up the meshed wireless network, the WirelessHART gateway considers **Power profile** settings for all its connected field devices / sensors before it decides how to route the data through the meshed network.

At times, you may need a router node in a location where you are not collecting machinery condition data, and therefore not using a wireless sensor. In this scenario, you may set up a wireless sensor in **Full Routing** mode and not enable measurements on the sensor (effectively turning it into a dedicated router node). Alternatively, you could apply a third party WirelessHART router node (i.e., the P+F WirelessHART adapter) with the added benefits of longer battery life and easier battery replacement. Refer to Chapter 5 of this Setup Guide.

For the router nodes, ideal conditions are achieved if:

- There is line of sight between the gateway (or more router nodes) and the wireless sensors.

- They are located one meter (3.28 feet) or more above ground.

  ➢ It is more important to obtain a good vibration reading vs. obtaining the best wireless sensor signal range. When mounting sensors, prioritize vibration signal response vs. wireless sensor signal range.

Redundancy

Each wireless sensor should have at least two communication paths to the gateway.

A Comparison of Command Bursting in Emerson and P+F Gateways

Some of the features that are present in the Device Manager software when using a P+F gateway are not available with the Emerson wireless gateway. The difference in functionality is discussed below to enable commissioning engineers to understand how best to configure sensors for use with an Emerson gateway.

When using a P+F gateway, both burst commands 9 or 93 can be used for bursting (publication) of the overall measurement data by the sensor to the gateway. A WirelessHART gateway stores the overall measurement data received from (burst by) each individual sensor in its cache memory. These values can then be retrieved swiftly from the gateway cache by Device Manager or other software. Whereas caching of commands 9 and 93 is available on a P+F gateway, at the time of writing, an Emerson gateway does not support caching of command 93. Using command 93 with an Emerson gateway is still possible but will not benefit from the caching mechanism. Consequently, all queries by software that use command 93 will be passed on to the sensors, rather than being answered by the gateway from its cache, which increases communication latency and power consumption of the wireless field devices.

The benefit of using command 93 is that it retrieves the last 12 trend readings with the exact timestamps of when the data was originally acquired by the sensor. Command 9 however retrieves only the last reading and the timestamp is created at time of retrieval by the software from the gateway rather than at time of acquisition by the sensor, therefore time stamps are not strictly accurate and can vary by as much as the sensors' cyclic measurement update interval. For further information, please refer to the *Wireless Sensor Device Manager User Manual*, *Section 3*, *How to Configure Wireless Sensors*.
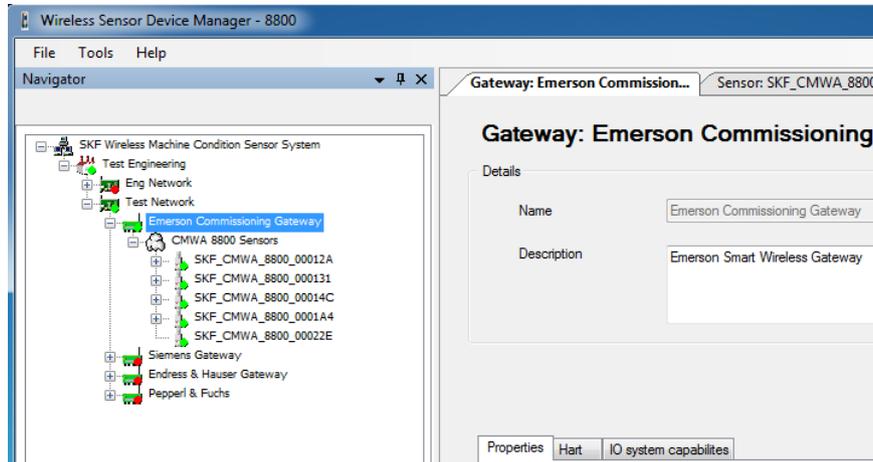
Figure 1 – 32.
Device Manager's Admin Tab Functionality Is Unavailable with Emerson or Siemens Gateways.
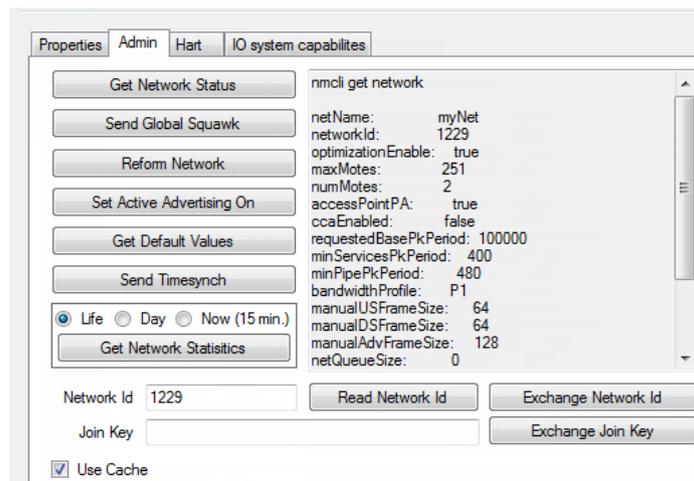
Figure 1 – 33.
Device Manager's Admin Tab Functionality.

Command 9 Example

This example illustrates the setup using Command 9. If the network is using a non–P+F gateway, such as an Emerson gateway, then it is recommended that you use Command 9 to burst (publish) the sensor's Velocity RMS, Acceleration envelope Pk-Pk, and Temperature measurement results to the gateway's cache (with less accurate date/time stamps).

The default sensor Burst Control settings and software Data Collection settings are shown below. For further details, refer to *Wireless Sensor Device Manager User Manual, Section 3, How to Configure Wireless Sensors*.
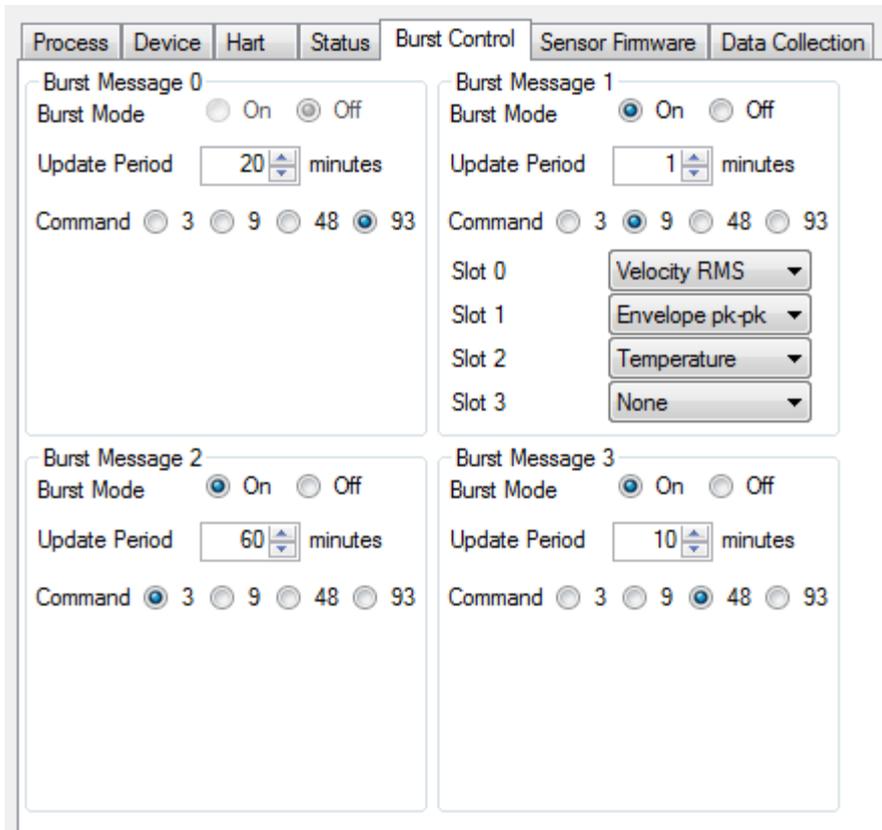
Figure 1 – 34.
Device Manager Burst Mode Settings with Command 9 Active.

Notice that the example CMWA8800 sensor has the following settings:

- Burst Message 0: Command 93 disabled (Off)

- Burst Message 1: Command 9 enabled and the **Velocity**, **Envelope pk-pk** and **Temperature** values will be burst on slots 0-2 every update period setting.

- Burst Message 2: Command 3 enabled. This will allow data to be collected by a configured OPC server every update period setting.

- Burst Message 3: Command 48 enabled. This will update the status information bits that are displayed in the Status tab of each sensor device.

The next figure shows the scheduled times that the overalls and waveforms will be collected by Device Manager.

Figure 1 – 35.
Device Manager, Data Collection Tab.

Enable – enable the type(s) of data to collect cyclically.

Start time – specifies when the upload occurs.

Period - specifies the frequency of the upload.

Trending command – for an Emerson gateway, select **Command 9** in order to match the burst control settings of the sensors. The Device Manager will use command 9 to read the overall values from the gateway's cache memory, which is periodically refreshed with new data by burst messages from the sensor. The overall values will have timestamps of when the software retrieved them from the gateway, not when they were acquired by the sensor.

Configuration of the sensor measurement cycle – when enabled, these settings determine how often a measurement will be taken and at what times. In this example, the measurement is taken every hour, at the hour.

2
How to Mount the SKF Wireless Machine Condition Sensor

> ⚠ **WARNING!** *Your safety is extremely important. Read and follow all warnings in this document before handling and operating the equipment. You can be seriously injured, and equipment and data can be damaged if you do not follow the safety warnings. Refer to the beginning of this guide for important safety messages.*

> ⚠ **WARNING!** *Do not twist plastic top; doing so voids warranty and hazardous area certification.*

> ⚠ **WARNING!** *Contact with aggressive chemicals may cause severe damage to the sensor's mechanical construction.*
> *Sensors that have mechanical damage should be removed from hazardous areas as soon as possible.*

Installation in Hazardous Locations

The Wireless Machine Condition Sensor - CMWA 8800 is certified for mounting in Zones 0, 1, and 2 and Safe Area according to the following standard:

IEC 60079-11, Explosive atmospheres – Part 11: Equipment protection by intrinsic safety "i"

Reference the available Ex Instruction Manual for specific instructions for use in hazardous locations: Document Part Number 32286800

> ⚠ **WARNING!** *It is imperative that the sensor is grounded to the machine when installed in hazardous areas. The resistance to earth must be less than 10^9 Ω.*

Machine Grounding

You must mount the wireless sensor so that it is grounded to the machine. If you use mounting pads that are adhesively mounted onto a machine, then the adhesive used must be conductive. If a coupling fluid is used between the machine or mounting pad and the sensor, then it is recommended the fluid to be conductive (even though the stud itself will make an electrical coupling to the machine or mounting pad). The resistance to earth must be less than 10^9 Ω.

Dimensions

The following features allow easy mounting and un-mounting of the wireless sensor:

- Standard 1/4-28 UNF mounting hole threading

- A robust metal base for applying mounting torque with a 33.34 mm or 1-5/16 in. wrench

You can access the wireless sensor nut from the top with a 100 mm long socket wrench. See the figure below for sensor dimension details.
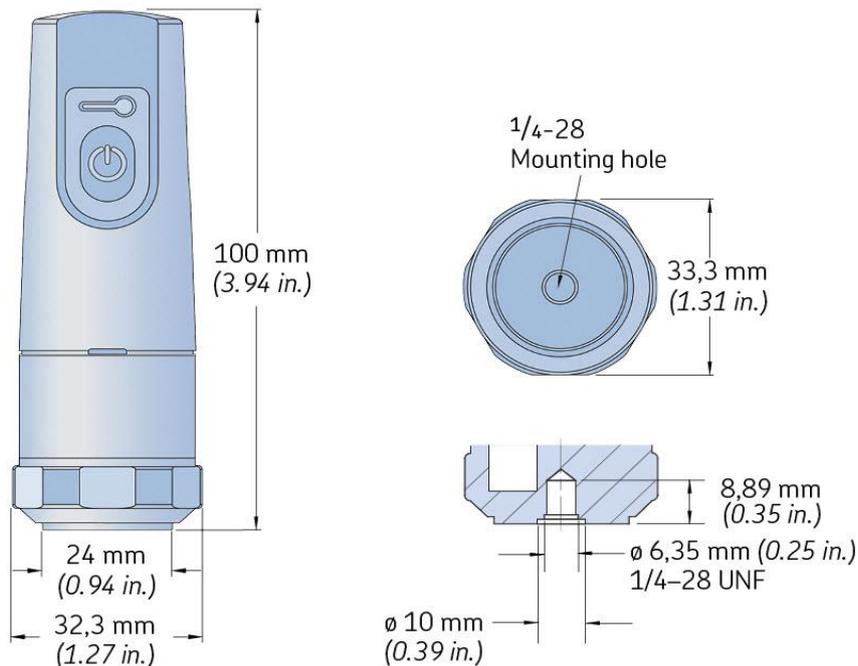
Figure 2 - 1.
SKF Wireless Machine Condition Sensor Main Dimensions.

Mounting Requirements

⚠ *WARNING! Request a work permit from the site responsible Safety Officer prior to commencing any installation work. Drilling is not allowed in ATEX Zone 0, 1, and 2 areas without a work permit. Magnetic or adhesive mounting pads may be allowed.*

The mounting configuration depends upon the dynamic measurement requirements, such as frequency and amplitude range. Other factors to consider are mounting location, prohibitions, accessibility, and temperature. In general, there are three mounting options:

- Threaded studs

- Adhesives

- Magnets

The mounting method affects the frequency range that can be measured; the less rigid the method, the lower the maximum frequency.

Threaded Studs

The use of stud mounting results in the widest frequency measurement range. It is recommended for permanent monitoring systems, high frequency testing, and harsh environments.

Figure 2 - 2.
Example Mounting Studs from SKF Condition Monitoring.

The mounting point on the structure should be spot-faced to 25.4 mm (1 inch) diameter; the mounting face of the sensor is 24 mm *(0.945 in.)* in diameter. The surface should be flat within 25 µm *(0.001 in.)* and have surface texture no greater than 0.8 µm *(32 µin.)*. The tapped hole must be perpendicular to the mounting surface and at least two threads deeper than the stud. This prevents a gap between the sensor and the mounting surface, and produces optimum frequency response.

> ⚠ *WARNING! Never tap mounting holes on machines in a hazardous zone area.*
> *Instead, use magnetic or adhesive mounting pads.*
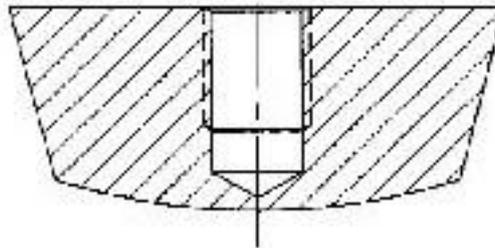
Figure 2 - 3.
Mounting Hole for Wireless Sensor.

Dimension: 1/4-28 UNF

Depth: 8 mm *(0.31 in.)*

Mounting surface shall be flat (within 25 µm *(0.001 in.)*).

Drill perpendicular to mounting surface, within +/- 1°

Mounting Torque

- Recommended mounting torque: 2.9 Nm (2.13 ft. lbs.)

Proper torque on the mounting stud is also required. Under-torque of the sensor reduces the stiffness of the coupling. Over-torque can cause permanent thread damage to the sensor. To facilitate mounting, SKF provides an installation kit, CMWA8800-INSTALL KIT, which includes:

- 1/4" drive deep reach socket

- A low range torque wrench

- CMCP212 Silicone Dielectric sensor coupling compound (to obtain the best transmission of vibration signals)

> ⚠️ *WARNING! When mounting the sensor, DO NOT apply torque by twisting the sensor cap, which can damage the sensor. Apply the correct torque – 2.9 Nm (2.13 ft. lbs.) - directly to the metal base.*
>
> *Do not twist plastic top; doing so voids warranty and hazardous area certification.*
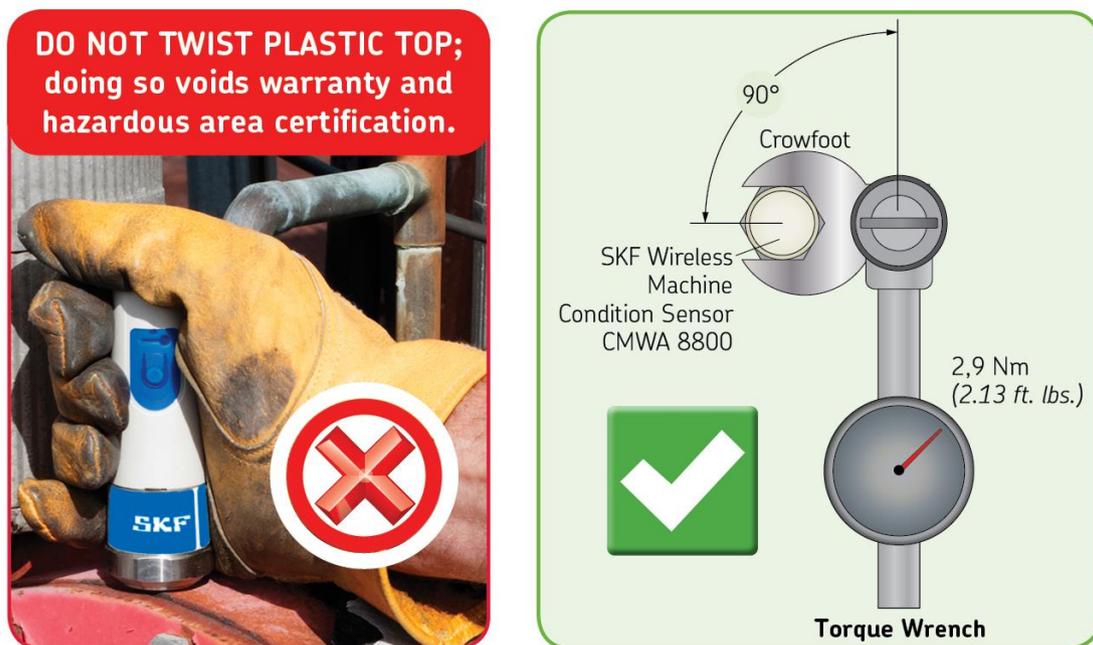
Figure 2 - 4.
Correct Method of Mounting/Dismounting a Sensor.

> ⚠️ *WARNING! To obtain proper torque when using a crowfoot wrench, you must attach the crowfoot 90 degrees of the torque wrench shaft.*

Adhesive Mounting

If you cannot tap a hole properly into the machine, an adhesive mount is recommended. When using an adhesive, you may directly attach the sensor to the machine or onto an adhesive mounting pad. Use of an adhesive mounting pad is recommended if repeated removal of the sensor is required. After the pad is adhered to the machine, the sensor is torqued onto the stud. Apply a coupling fluid to the stud face that mates with the sensor.

> ➤ The sensor case must be grounded to the machine and the installer must ensure that the adhesive mounting pad is electrically grounded to the machine. The resistance to earth must be less than 10^9 Ω.

The rigidity of an adhesive mount is very dependent on the suitability of the adhesive used for the environment and whether it has been applied in accordance to the manufacturer's instructions. The SKF Wireless Sensor wireless condition monitoring node needs to be grounded to the machine; therefore, a conductive adhesive must be used. The resistance to earth must be less than 10^9 Ω.

To obtain the best transmission of vibration signals, prior to fixing the wireless sensor to the machine, apply a thin layer of sensor coupling fluid on the mounting surface.

Magnetic Mounting

Magnetic mounts are also popular in walk-around monitoring programs and the frequency response is better than hand held sensors (for example, stingers), although still dramatically reduced when compared to stud or adhesive mounts.

Magnetic mounts are available with flat surfaces for flat locations or two pole configurations for curved surfaces. Ensuring the magnet is firmly attached is vital for good measurements.

3
Manual Operation

Overview

Figure 3 - 1.
Wireless Sensor LED and Push Button.

① LED
② Push Button

The wireless sensor may be interfaced manually, using its push button and LED. In this chapter, we define manual operations.

You activate and issue commands to the wireless sensor by pressing and holding its push button for various durations – as you count a number of LED blinks. Releasing the button after a specific number of blinks issues a specific command to the sensor.

How to Activate the Sensor

To activate the wireless sensor:

- Firmly press and then quickly release the sensor's button. The sensor's green LED immediately blinks once, pauses, then blinks in an accelerating manner, pauses again, and then blinks a short burst to indicate the sensor is active.

How to Manually Issue Commands to an Activated Sensor

Once the sensor has been activated, you may issue commands to the sensor by pressing and holding its push button down for a specific number of blinks. Reference the following table:

Press and hold for:	To issue this command ...	... and elicit this LED response
1 blink	Not used after sensor is activated	None (verifies the sensor is active)
2 blinks	(Not available at this time) Communicate with the gateway for identification purposes	None
3 blinks	Reset (reboot) the sensor for troubleshooting purposes (wait five seconds after resetting the sensor before issuing new commands to the sensor)	Short burst
4 blinks	Deactivate the sensor	Blinks in a decelerating manner, then stops
5 blinks	Deactivate the sensor	Blinks in a decelerating manner, then stops
6 blinks	Deactivate the sensor	Blinks in a decelerating manner, then stops
7 blinks	Set Network ID to 101, and reset sensor	Short burst
8 blinks	Set Network ID to 102, and reset sensor	Short burst
9 blinks	Set Network ID to 1229 (default setting) and set Join Key to 44555354-4E455457-4F524B53-524F434B and reset sensor	LED immediately blinks once, pauses, then blinks in an accelerating manner, pauses again, then blinks a short burst

4
Specifications

Data acquisition

- Single axis vibration overall levels , time waveforms of 2 048 samples
  - Post processed FFTs of 800 lines to 1 144 Hz
- Temperature
- Data acquisition modes:
  - Polling (triggered over radio)
  - Bursting (programmable interval)

Measurements

- Temperature:
  - Range: -40 to + 85 °C (−40 to +185 °F)
  - Accuracy: ±2 °C (±3.6 °F)
- Vibration:
  - Velocity:
    - Units: mm/s or in./s
    - Frequency range: 10 Hz to 1 kHz
    - Amplitude range: 0.2 to 350 mm/s (0.008 to 13.8 in./s)
    - Accuracy at 20 °C (68 °F): ±10% in passband, 3 dB corners 10 Hz and 1 kHz
    - Detection type: RMS
  - SKF Acceleration Enveloping Filter 3
    - Units: $m/s^2(E)$ or gE
    - Input filter frequency range: 500 Hz to 10 kHz
    - Amplitude range: 0.25 to 245 $m/s^2(E)$ (0.025 to 25 gE)
    - Detection type: Peak to Peak

Wireless communications

- IEEE WirelessHART protocol*

- IEEE 802.15.4 radio

- Firmware update via WirelessHART Network (OTAP)

- Range: 50 m (165 ft.) typically in plant (actual range depends on specific site topology and device placement)

Power

- Internal 3.6 V Primary lithium-thionyl chloride (Li-SOCl$_2$) bobbin cell

- Up to 5 year battery life, depending on settings, usage and operating temperature. Please refer to the datasheet for more details.

Firmware update

- Via WirelessHART Network*

Certifications

- Radio:
  - FCC: Part 15 Subpart C
  - IC: RSS-210 issue 8
  - ETSI:
    - EN 300 328 v.1.8.1
    - EN 301 489-1 v.1.9.2
    - EN 301 489-17 v.2.2.1
  - Japan: MPT Ordinance No. 37 of 1981
- Hazardous area certification:
  - ATEX Zone 0
    - Ex II 1G
    - Ex ia IIC T4 –40 °C ≤ Ta ≤ 85 °C

- China RoHS compliant

Physical

- Dimensions: See fig. 16

- Weight: 190 g (6.7 oz.)

- Case material:

  – Base: stainless steel

  – Cover: thermoplastic

- Sealing: IP 66

Environmental

- Operating temperature: –40 to +85 °C (–40 to +185 °F)

- Recommended storage temperature: +30 °C (86 °F) maximum

> ⚠ *WARNING! Contact with aggressive chemicals may cause severe damage to the sensor's mechanical construction.*
> *Sensors that have mechanical damage should be removed from hazardous areas as soon as possible.*

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5
Configuration of the P+F WHA-ADP WirelessHART Adapter

This procedure defines the equipment and steps for using a Pepperl+Fuchs WHA-ADP WirelessHART Adapter as a routing node with a deployment of SKF CMWA 8800 sensors.

Requirements

Hardware:

* PC connected to Gateway
* USB HART Modem (Modem used was ProComSol HM-USB-ISO)
* Resistor, anywhere from 250 Ω to 1 KΩ
* Crosshead screwdriver and small flathead screwdriver

Software:

* Pepperl+Fuchs PACTware software. See **Appendix A, Installing P+F PACTware**.
* DTM (Device Type Manager) file

Procedure

How to Prepare the P+F WHA-ADP Wireless HART Adapter

- Open the device by unscrewing the four screws on the corners of the faceplate.

Figure 5 - 1.
The Opened P+F Wireless HART Adapter.

- Install the battery, but do not connect the battery yet.

Figure 5 - 2.
The Installed, but Not Yet Connected Battery.

- Acquire a resistor (anywhere from 250 Ω to 1 KΩ) and bend the resistor's leads as shown below.

Figure 5 - 3.
Bent Resistor Leads.

- Install the terminating resistor in terminals 5 and 6 as shown below.

Figure 5 - 4.
Resistor Installed.

- Connect the battery as shown below.

Figure 5 - 5.
The Connected Battery.

This completes the adapter's hardware setup. Next you must configure the adapter's network ID and join key.

By default, the adapter is configured to use the P+F factory default network ID and join key.

Default network ID: 1945
Default join key: 44555354-4E455457-4F524B53-524F434B

Because your production wireless network is more than likely set up with a unique network ID and join key, you must now proceed to update the adapter's settings to match those of your existing network. This can be accomplished in two ways: you may contact SKF's customer service group at csg-lulea@skf.com to arrange for SKF's Pre-configuration Service or you may update the settings by using a USB HART modem. The second method is described in the following section.

How to Configure the Adapter's Network ID and Join Key

A Note about Adapters Currently in Use

If you want to move an adapter that is currently connected to a gateway to use it with a different gateway, the network ID and join key of the adapter must be changed to match that of the new target gateway. To accomplish this, *you must first* **disconnect the power to the adapter** *to end the connection to the current gateway.* Then, restore power to the adapter. You can follow the procedure presented here to set the adapter's network ID and join key to that of the target gateway.

To set the adapter's network ID and join key using a USB HART modem:

- Connect the HART modem to terminals 7 and 8. Don't be concerned about the polarity of the terminals.

Figure 5 – 6.
HART Modem Connected to Terminals 7 and 8.

- Connect the HART modem's USB connector to the host PC.
- On the host PC, open PACTware.

Figure 5 – 7.
PACTware Initial Screen.

- In the left pane's device list, right click on **HOST PC** to open the drop down menu. Select the menu's **Add device** option to launch the **Device for** dialog.
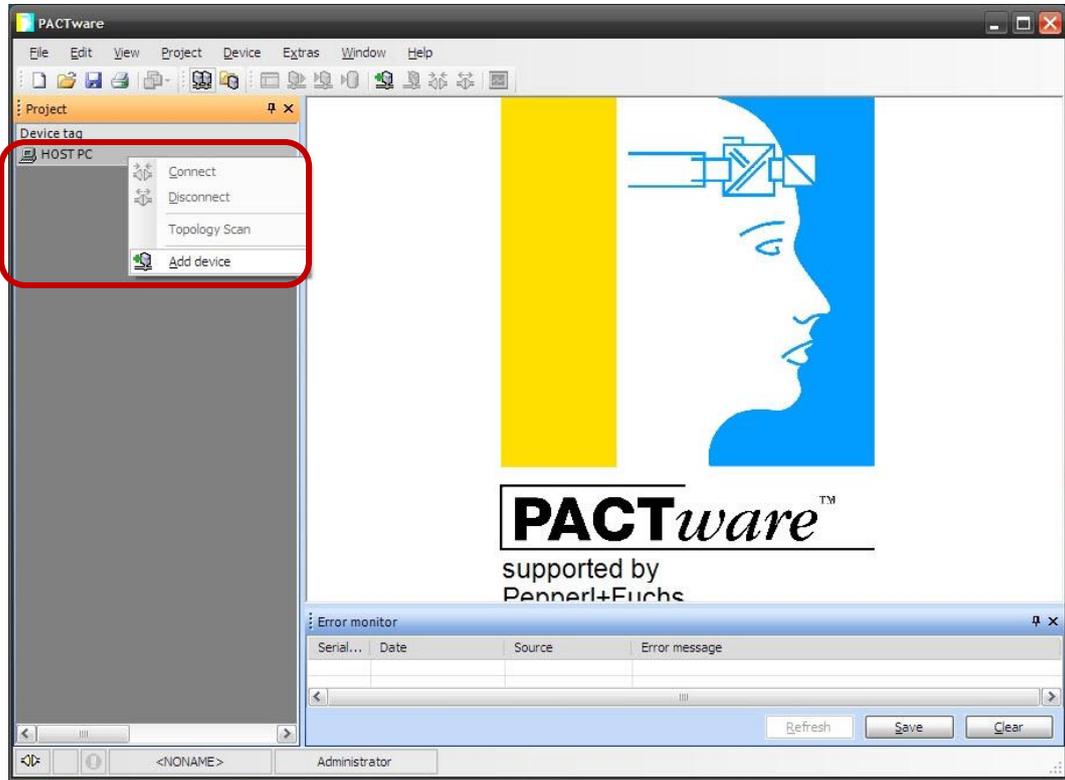
Figure 5 - 8.
Drop Down Menu, **Add Device**.
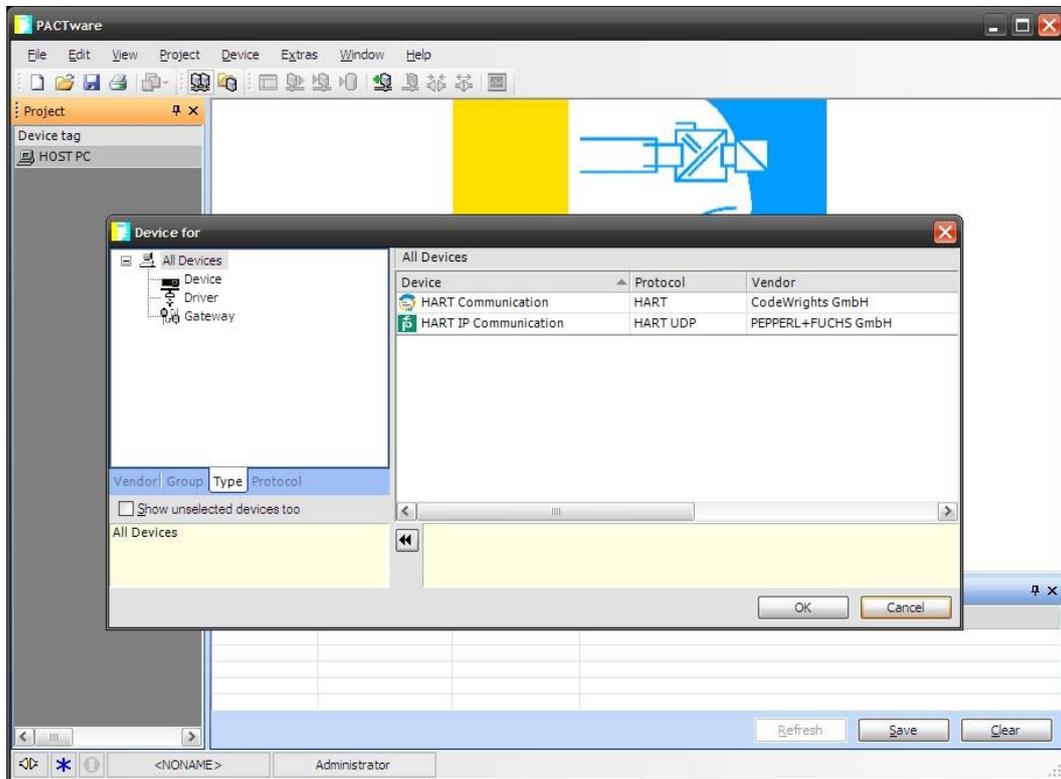
Figure 5 – 9.
The **Device for** Dialog.

- In the **Device for** dialog, select the **HART Communication Device** and click **OK**. On the left of the display, you will see a new **COM#** item created in the device list under **HOST PC.**

- Double click the **COM#** item to open the **COM# Parameter** tab.
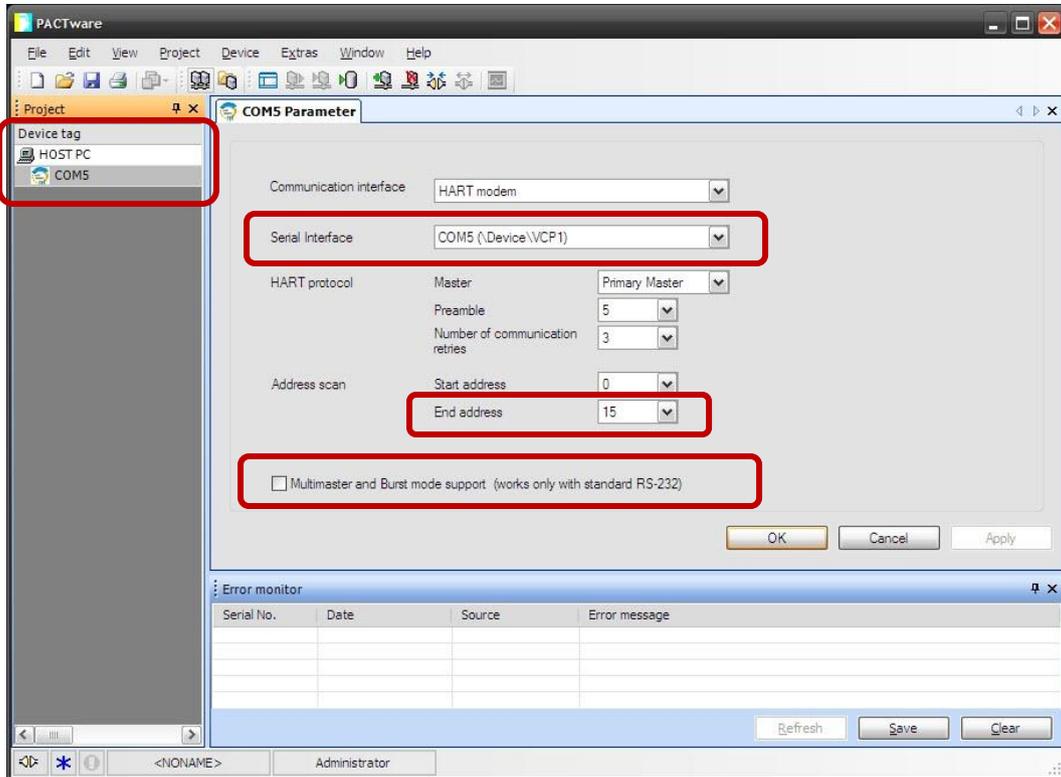
Figure 5 – 10.
COM# Parameter Tab.

- In the tab's **Serial Interface** drop down list, specify the correct **COM** port for the HART Modem (See **Appendix B, How to Identify the Correct COM Port for the HART Modem**.)

  ➤ A quick way to determine your HART modem's COM port is to:
  * In the Serial Interface list, note all the available COM ports
  * Close the COM# tab,
  * Disconnect the modem's USB connector from the host computer.
  * Reopen the COM# tab and select the Serial Interface drop down list. The COM port option that disappeared from the drop down list is the modem's COM port.
  * Close the COM# tab,
  * Reconnect the modem's USB connector to the host computer.
  * Reopen the COM# tab and select the Serial Interface drop down list again. The modem's COM port option is again available for selection.

- In the **End Address** field, select the end address **15**.

- Deselect the **Multimaster and Burst mode support** check box at the bottom of the tab.

- Click the tab's **OK** button. The tab closes and the COM port selected is saved.

- Next, in the left pane, right click on **COM#** to open the drop down menu. Select the menu's **Connect** option. **COM#** should turn bold.

- Right click on the bold **COM#** to open the drop down menu. Select the menu's **Add Device** option to launch the **Device for** dialog.
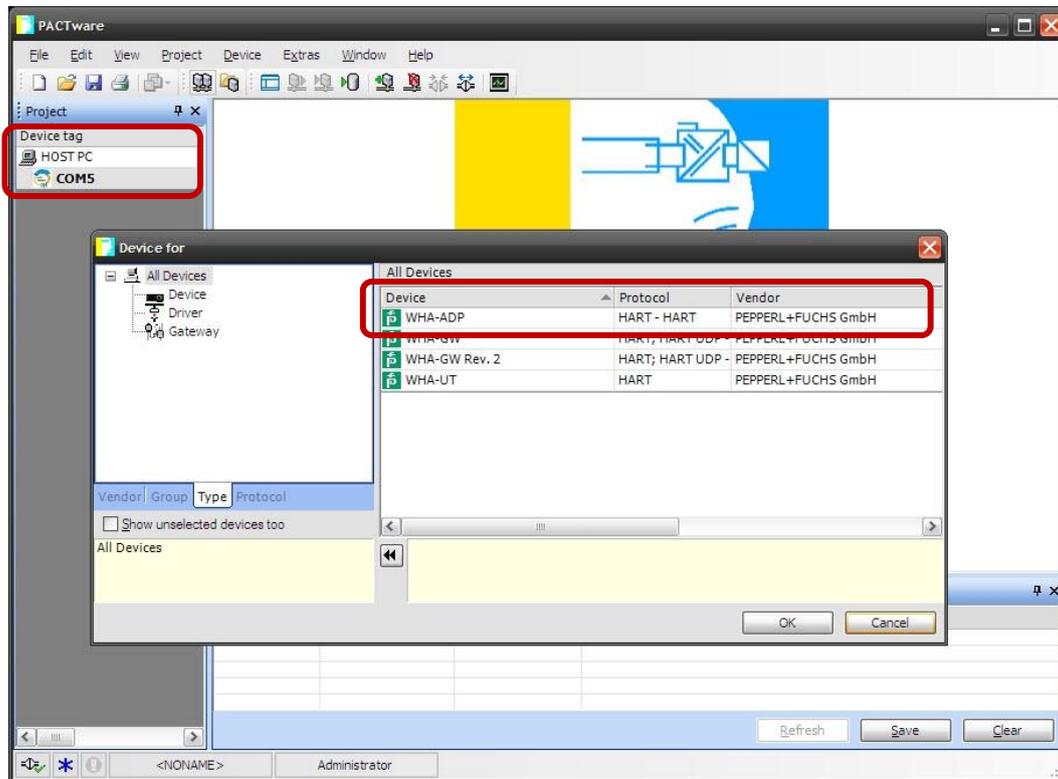
Figure 5 – 11.
Device for Dialog, Device List.

- In the **Device for** dialog, select the **WHA-ADP** device, and then click **OK**. The **Device for** dialog closes and the new **WHA-ADP** device displays in the left pane.
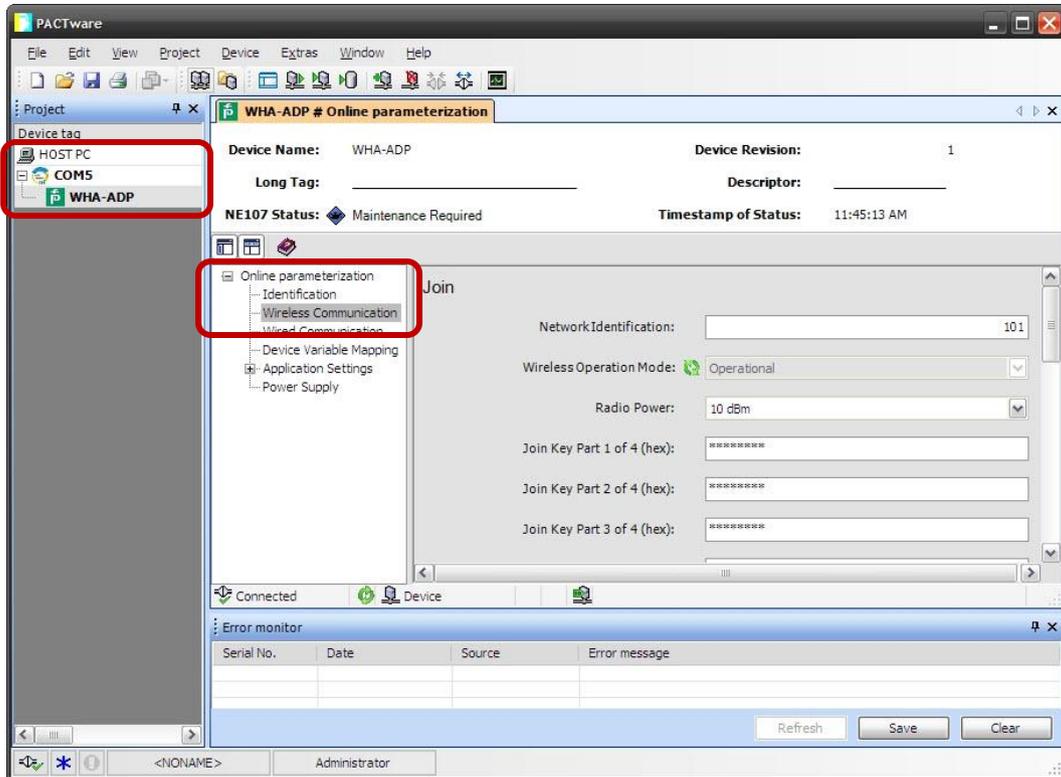
Figure 5 - 12.
Select **Wireless Communication**.

Once the WHA-ADP displays in the left pane, you are ready to configure the adapter's device settings and join it to the network.

- In the left pane, right click on the **WHA-ADP** device to open the drop down menu. Select **Connect** from the menu. **WHA-ADP** should turn bold. A message briefly displays indicating that you are connected to the adapter.

- Again in the left pane, this time double click the **WHA-ADP** device. An **Online parameterization** tab displays and the adapter's LED begins to blink.

- On the **Online parameterization** tab, expand the **Online parameterization** item and select the **Wireless Communication** sub-item.

- In the **Join** dialog's **Network Identification** field, enter your wireless network's network ID.

- For the initial join, if the adapter has not yet joined your existing or commissioning networks, the **Join Key** fields are editable. Simply enter your wireless network's join key (in four parts).

- After entering your network's join key, use the scroll bar to scroll down to **Join Mode**.
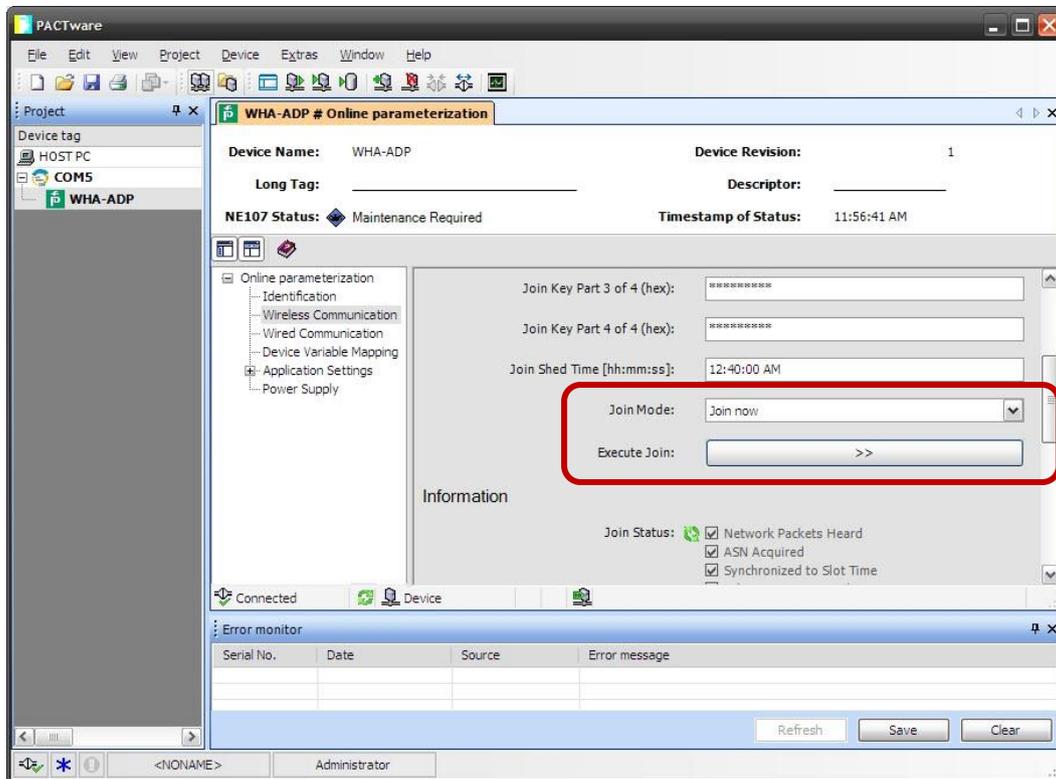
Figure 5 – 13.
Join Mode and **Execute Join**.

- In the **Join Mode** drop down list, select **Join now**.

- Click the **Execute Join** button.

The device should appear soon after in the wireless HART device list in the P+F gateway's web page. On the web page, you may want to edit the device's Tags and Descriptors in the Identification menu item.

Appendix A
Installing P+F PACTware

Please refer to the Pepperl + Fuchs Manual for the WHA-ADP-*-Z1(-EX1) for further information on operating, configuring, or troubleshooting the wireless HART adapter. Select the following link, then on the P+F **WirelessHART Adapter's** web page, in the **Documents/Manuals** section, select **Manual WirelessHART Adapter**.

http://pepperl-fuchs.us/usa/en/classid_2976.htm?view=productdetails&prodid=55133

Additionally, step 4.4 in the manual details how to obtain and install the P+F PACTware software. Note that the install order may be important. You should install the PACTware software first, followed by the HART Comm DTM, and then the WirelessHART DTM.

To download the PACTware software, select the following link.

http://www.pepperl-fuchs.com/global/en/classid_163.htm

From the **PACTware** products page, click the link **View All Products in Group** to see specific available PACTware versions. Select version **4.X**, and then click the **Software** button to initiate the download. Save the .ZIP file to the host PC.

To install PACTware:

- Right click on the saved ZIP file, and then select **Extract All...** from the menu. The Extraction Wizard launches. Follow the prompts to copy files from inside the ZIP archive.

- Double click the **setup.exe** file.

- Select a language.

- The Installation Wizard launches. Follow the prompts to complete the installation. A shortcut to PACTware is created on the Desktop.

Please contact Technical Support if you need help getting set up.

Appendix B
How to Identify the Correct COM Port for the HART Modem

To find the correct COM port, you will want to open Device Manager. Then, click the Windows **start** button in the lower left corner of your PC monitor display.
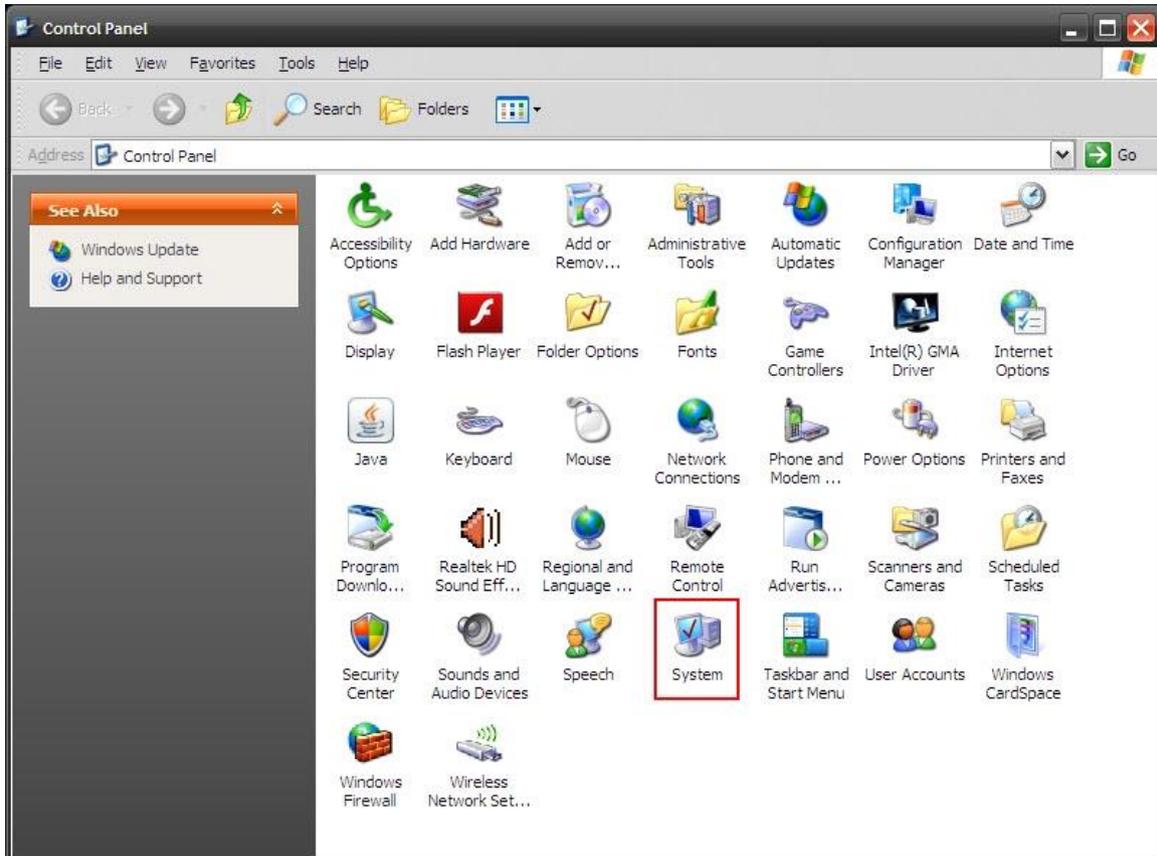
Figure B – 1.
Select **System**.

- Open the Windows **Control Panel** and select **System**. The System Properties dialog opens.
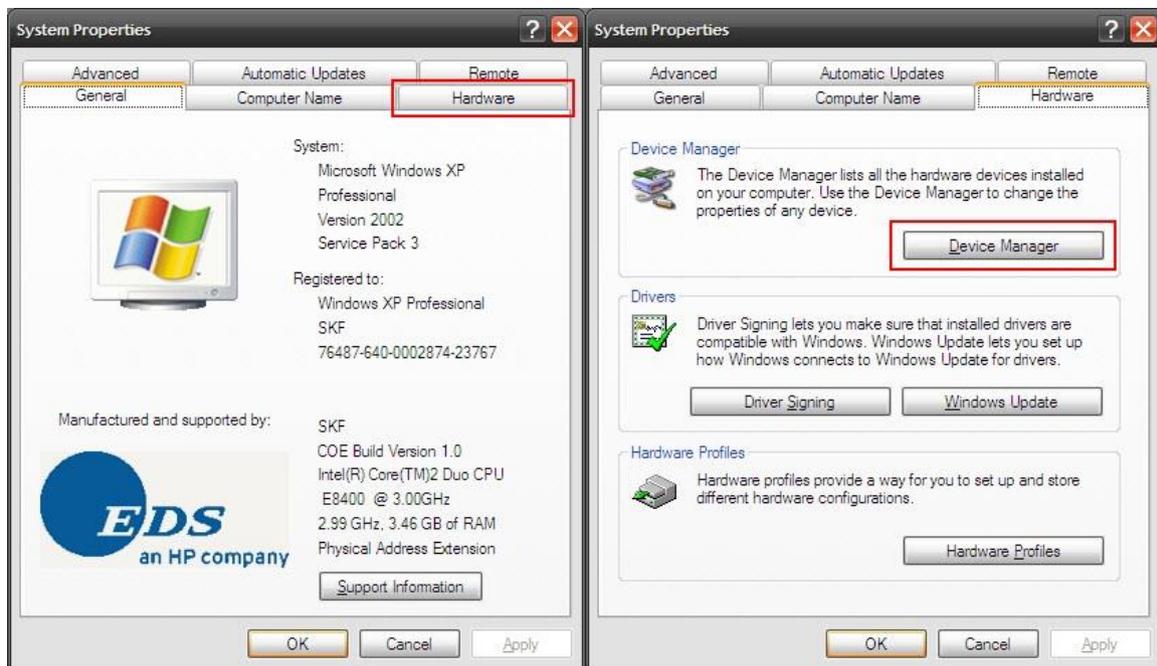
Figure B - 2.
Device Manager Button.

- In Windows XP, select the **Hardware** tab and then click on **Device Manager**.

- In Windows Vista or Windows 7, select the link on the left side labeled **Device Manager**.
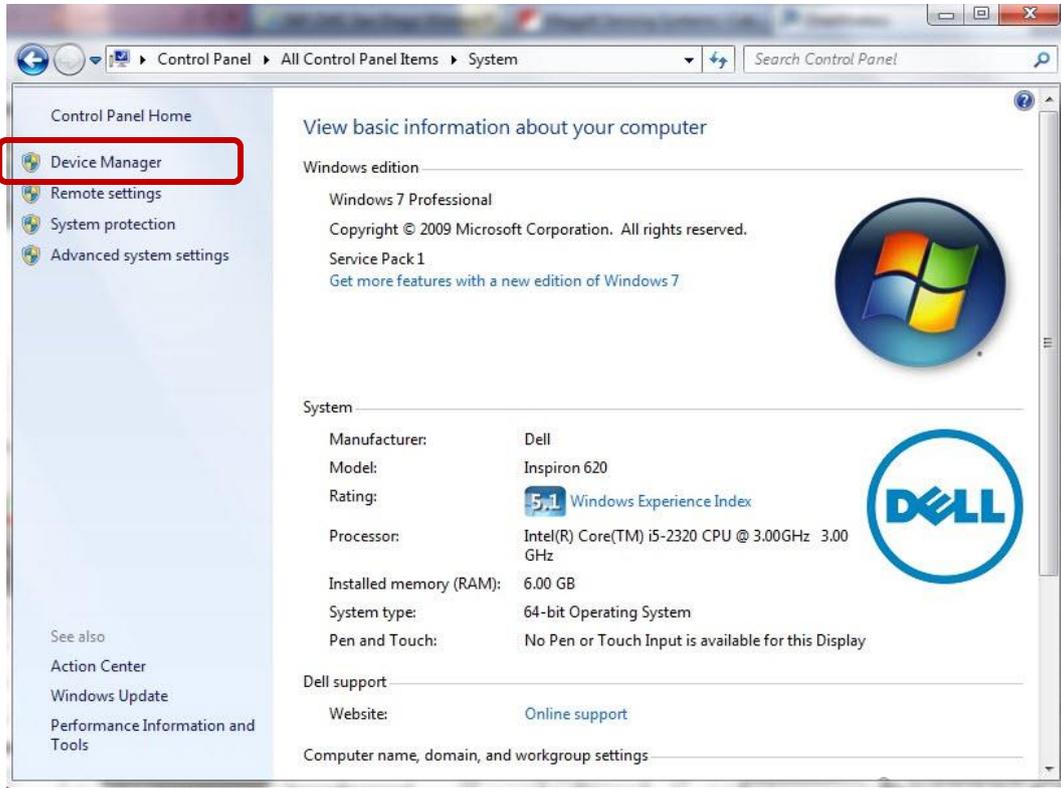
Figure B - 3.
Device Manager Link.

- In the Device Manager, expand the tree if it isn't expanded already and expand **Ports**. This will list all com ports in use on your computer.

- Identify your HART Modem in the list and note the port number it is assigned. The **Communications Port** for the HART modem will appear when the modem is connected to the PC and disappear when removed from the PC.

Figure B - 4.
List of Ports.