

SKF Wireless Machine Condition Sensor

Supports CMWA 8800

P/N 32257600-EN

Revision A

System Setup Guide

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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

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.)

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Limited Warranty

WARRANTY

Subject to the terms and conditions contained herein, 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.

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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 On-line Systems (IMx), all Multilog Condition Monitoring Units (CMU, TMU), Multilog Local Monitoring Units (LMU), all Multilog Wireless Monitoring Units (WMx), all Wireless Monitoring Systems V/T, all Vibration PenPlus, all Machine Condition Advisers, all transmitters, all Monitor Interface Modules (MIM), all Machine Condition Transmitters (MCT), MicroVibe P and Custom Products with the prefix of CMCP (with the exception of any consumable or expendable items), SKF Wireless Machine Condition Sensor, Shaft Alignment Systems TKSA 60 and TKSA 80 including hand-held computer, measuring units and accessories.

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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), and all M800A and VM600 Machinery Monitoring Systems.

For all On-line Systems 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: all standard seismic sensors (accelerometers and velocity transducers).

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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.

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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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CM-F0001 (Revision T, June 2011)

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System Setup


This guide is intended for SKF Field Engineers.

Assumptions: The reader is familiar with vibration monitoring technologies, wireless technologies, and WirelessHART networks.

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

- Setting up an @ptitude Analyst / OPC connection Quick Start Guide
- SKF Wireless Machine Condition Sensor Network System Setup Guide (this document)
- Pepperl+Fuchs WirelessHART Gateway User Manual

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.

FCC and IC Regulatory Text

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 RSSstandard(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.

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.

Use only accessories recommended or provided by SKF USA Inc.

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.

Hazardous Locations

Instructions for use in hazardous locations are included with this product.

No Submersion/Immersion

This equipment is IP66 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.

Do Not Open Device

Unauthorized personnel shall not open the device.

System Setup

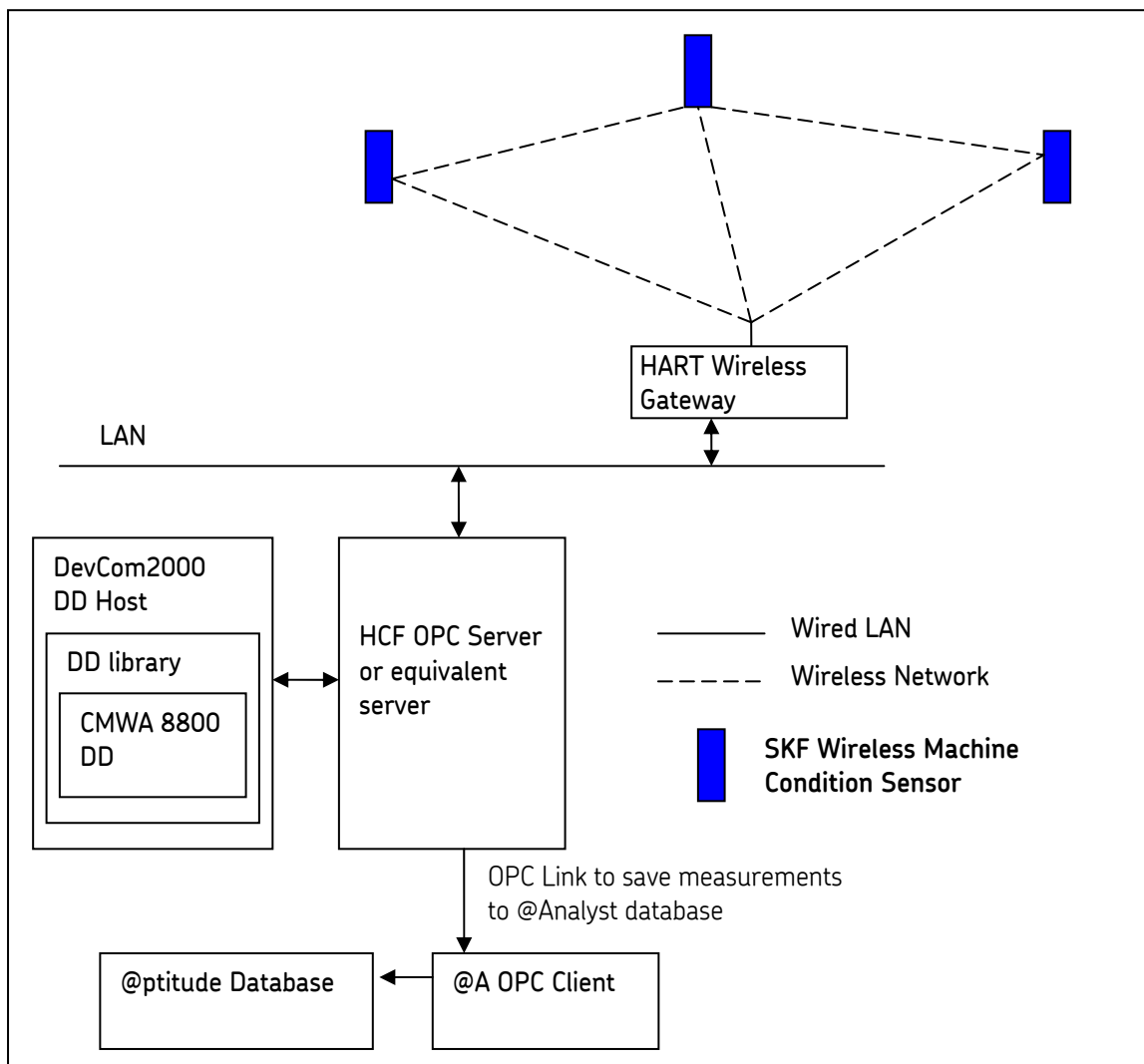


Figure 1. Diagram of the SKF Wireless Sensor Network.

Hardware package checklist:

- 1 each: 24 VDC power supply for the WirelessHART gateway
- 1 each: Pepperl+Fuchs WirelessHART gateway (standard from the factory)
 - You may use a different gateway if the beta site already has an existing WirelessHART network.
- 6 each: SKF Wireless Machine Condition Sensor
- CD with HART OPC Server application, version 3.2.0; communicates with wireless sensors through WirelessHART gateway
- CD – SKF @ptitude Analyst 2010 Edition MR2

- 1 each: Product Beta CD containing:
 - ProComSol DevCom2000 version 4.7D, HART software, communicates with OPC Server
 - SKF Wireless Machine Condition Sensor Device Descriptions file
 - @ptitude Analyst with @ptitude Analyst OPC client
 - Beta 1 System Setup Guide (this document)
 - Pepperl+Fuchs WirelessHART gateway users manual
 - Setting up an @ptitude Analyst / OPC connection Quick Start Guide
 - PuTTY.exe Telnet client

General installation steps:

- A. Set up the Pepperl+Fuchs WirelessHART gateway.
- B. Configure the wireless sensors to join the network.
- C. Install and configure the required software.

A. How to set up the WirelessHART gateway

- For this first beta release, for new WirelessHART networks, configure the sensors with the default network ID and join keys. For sites with an established WirelessHART network, the sensors' network ID and join keys must be preconfigured in the SKF factory. SKF will add network ID and join key modification functions in later beta releases.
1. For new networks, follow the instructions in the Pepperl+Fuchs gateway user manual (section 3.6, **Connecting to Power Supply and Grounding**) to connect the power supply to the gateway.
 2. Follow instructions in the Pepperl+Fuchs user manual to connect an Ethernet cable to the gateway's Ethernet terminal, and connect the gateway to the configuration computer (section 3.3, **Connecting to Ethernet**).
 3. Follow section 4.4, **Connecting via Ethernet**, of the Pepperl+Fuchs user manual to configure the computer to 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 LAN configuration as shown in the following figure. The default IP address of the gateway 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 and then modify the gateway's **IP Address** and **Netmask** settings to configure the gateway for your local area network.
 - The Pepperl+Fuchs gateway's configuration web page resides inside the gateway, not the internet.

System Setup

How to set up the WirelessHART gateway

- Use the **manually** IP configuration mode setting to configure a static IP address.

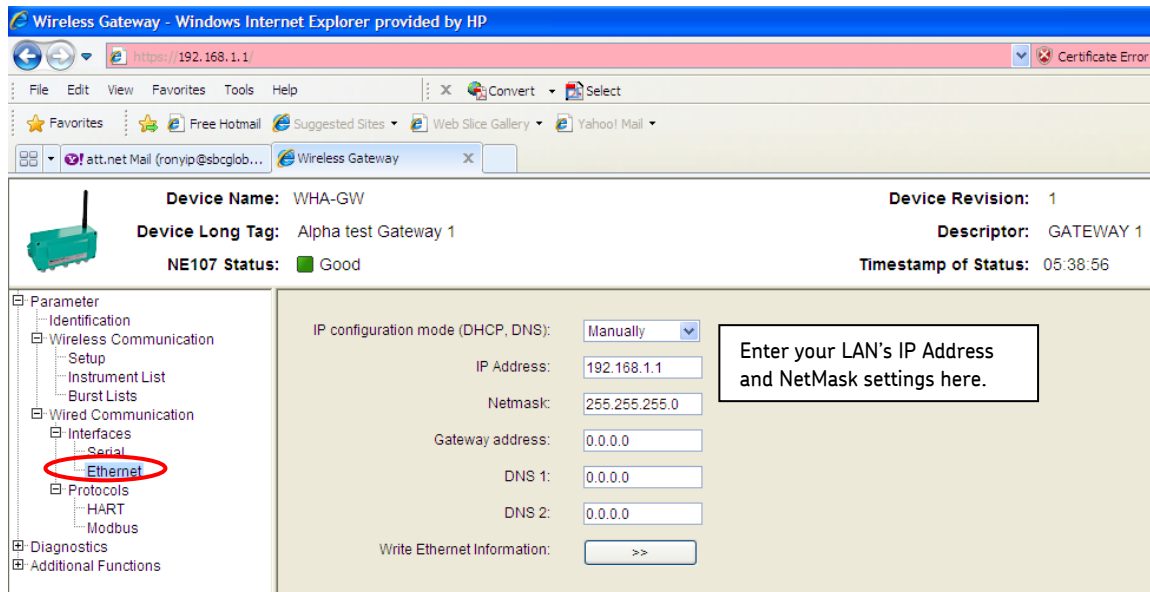


Figure 2. Setting up the Gateway LAN Configuration.

5. 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.
6. Now you may disconnect the Ethernet cable from the configuration computer and connect it directly to your LAN. After connecting the gateway to LAN, on your configuration computer (which also connects to your LAN) use your internet browser (reference step 4 above) to set up the identification of the gateway as shown in the figure below. Reference the Pepperl+Fuchs user manual for further details (section 5.3, **Identification Parameters**).

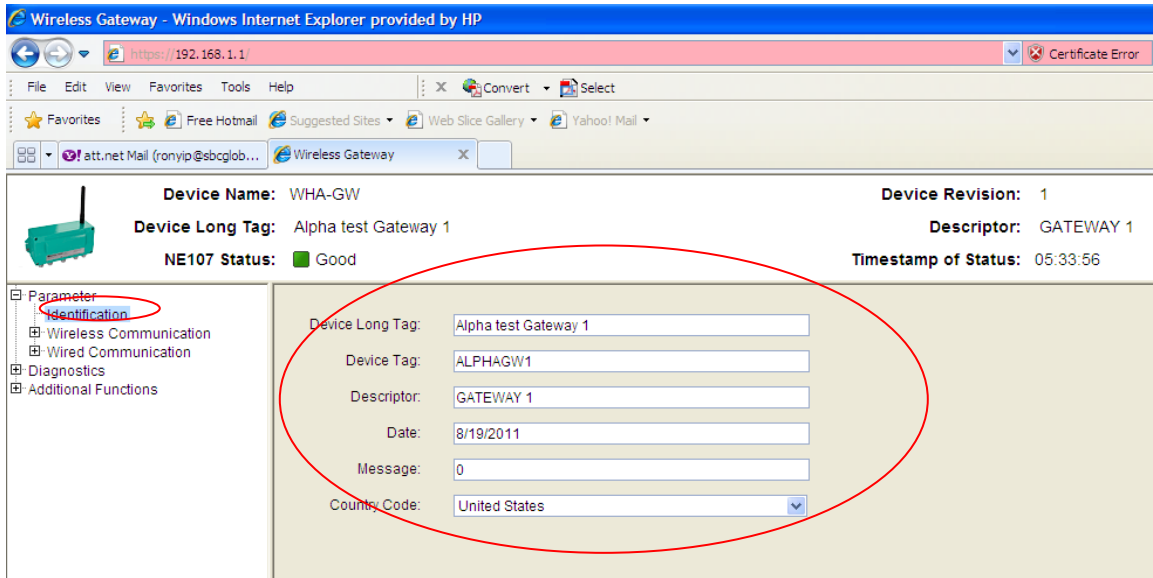


Figure 3. Setting the Gateway's Identification Parameters.

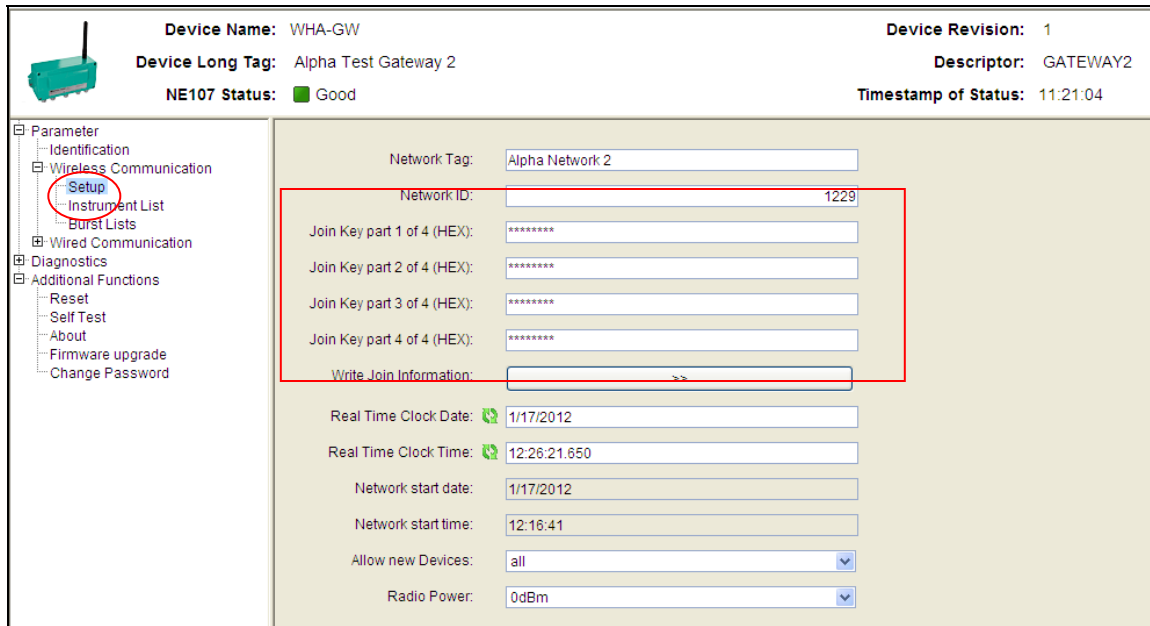
7. Next, set the gateway's network ID to **1229** and join keys as shown in the figure below. Reference the Pepperl+Fuchs user manual for further details (section 5.4, **Wireless Communication Parameters**).

- Join Key part 1 = 44555354
 - Join Key part 2 = 4E455457
 - Join Key part 3 = 4F524B53
 - Join Key part 4 = 524F434B
- Before clicking the **Write Join Information** button, make sure the eighth switch on the gateway's DIP switch (inside the gateway) is set to **ON** to allow writing the join information. Reference the Pepperl+Fuchs gateway user manual (section 6.1.2, **Buttons and DIP Switches**) for more information.

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

System Setup

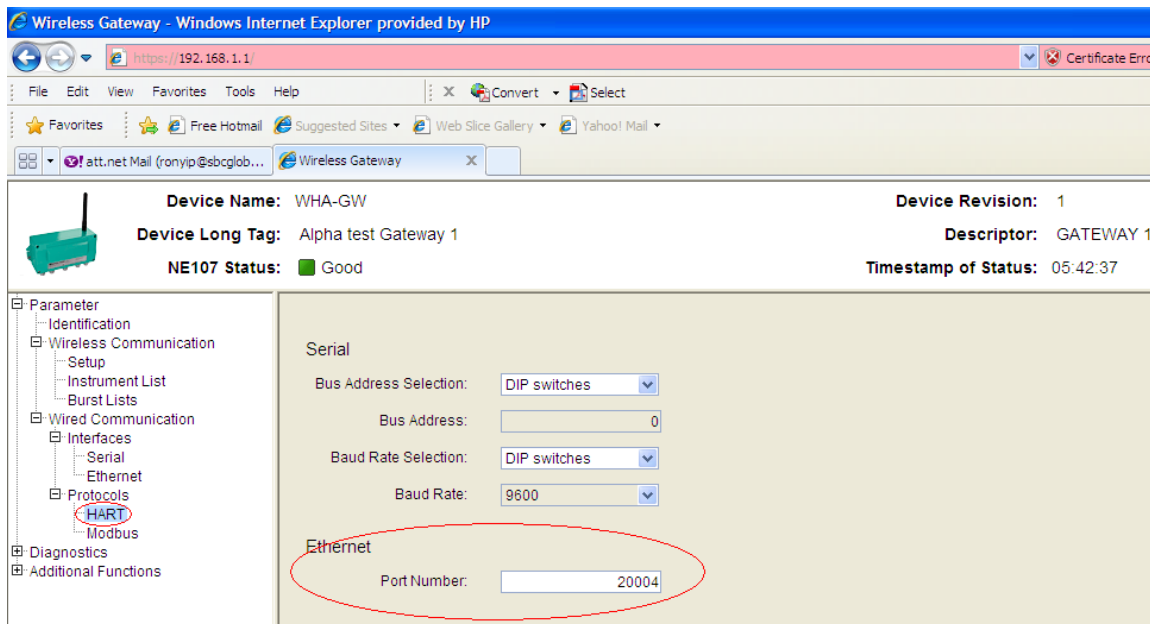
How to set up the WirelessHART gateway



The screenshot shows the configuration page for a Wireless Gateway (WHA-GW). The device name is "WHA-GW", the long tag is "Alpha Test Gateway 2", and the NE107 status is "Good". The device revision is 1, and the descriptor is "GATEWAY2". The timestamp of status is 11:21:04. The left sidebar shows a tree view of parameters, with "Setup" under "Wireless Communication" circled in red. The main content area shows various configuration fields. A red box highlights the "Network ID" field, which is set to "1229", and the four "Join Key" fields (part 1, 2, 3, and 4 of 4 (HEX)), all of which are empty. Below these are fields for "Real Time Clock Date" (1/17/2012), "Real Time Clock Time" (12:26:21.650), "Network start date" (1/17/2012), "Network start time" (12:16:41), "Allow new Devices" (set to "all"), and "Radio Power" (set to "0dBm").

Figure 4. Setting the Gateway's Network ID and Join Keys.

8. Set the gateway's HART Ethernet port to **20004**, as shown below.



The screenshot shows the configuration page for a Wireless Gateway (WHA-GW) in a Windows Internet Explorer browser window. The device name is "WHA-GW", the long tag is "Alpha test Gateway 1", and the NE107 status is "Good". The device revision is 1, and the descriptor is "GATEWAY 1". The timestamp of status is 05:42:37. The left sidebar shows a tree view of parameters, with "HART" under "Protocols" circled in red. The main content area shows configuration fields for "Serial" and "Ethernet". Under "Serial", there are fields for "Bus Address Selection" (set to "DIP switches"), "Bus Address" (set to "0"), "Baud Rate Selection" (set to "DIP switches"), and "Baud Rate" (set to "9600"). Under "Ethernet", there is a field for "Port Number" set to "20004", which is circled in red.

Figure 5. Setting up HART Ethernet Port Number.

9. Your next step is to activate these new parameters in the gateway, as shown in the figure below.

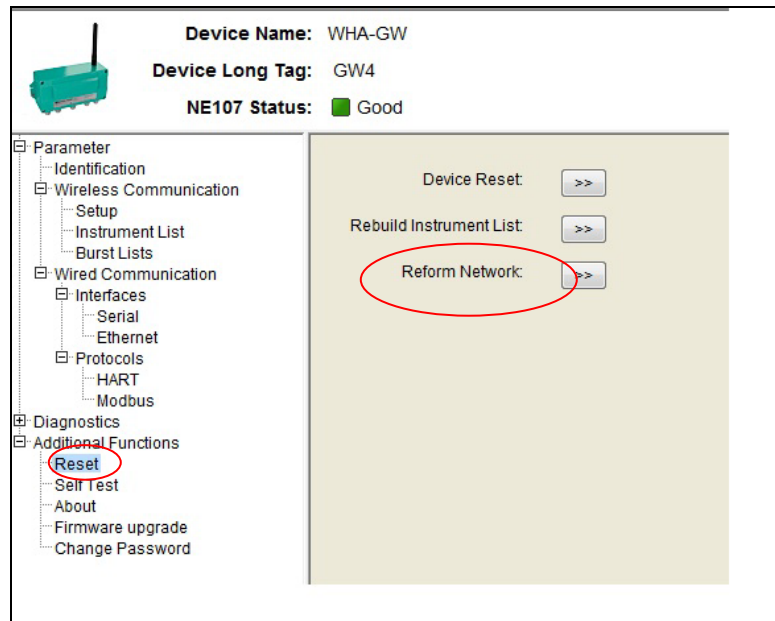


Figure 6. Activating New Parameters.

10. 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: configuring the sensors to join the network.

B. How to configure the SKF Wireless Machine Condition Sensors to join the network

1. Press the sensor's button once to activate the sensor. You should see the sensor LED flash progressively faster and then stop (approximately three seconds), immediately followed by a short burst of quick flashes, which indicates the command was acknowledged. The sensor is now activated and ready to join the gateway in section A above.
 - If you need to deactivate the sensor, press the button and hold it for four LED flashes. After releasing the button, you should see the LED flash progressively slower until it completely stops, which indicates the sensor is deactivated.
 - The sensor's default network ID is **1229** from the factory, which means it is ready to connect to the gateway as configured in the previous section. The sensor has three optional network IDs from the factory: 101, 102, and 1229. To reset it to the default 1229, press the sensor's button and hold it for nine LED flashes, then release. After releasing the button, you should see a short burst of quick flashes, which indicates the command was acknowledged.

The sensor's network ID is now set to 1229. Hold for seven flashes to set to 101 or eight flashes to set to 102.

- If you wish to reset the sensor, press and hold the button for three LED flashes.

Repeat step 1 for each sensor.

- Your next step is to return to the Pepperl+Fuchs gateway configuration web page, and using the **Instrument List** menu option, wait for the joining process to complete for all the sensors. Depending on the number of sensors, it may take up to ten minutes for all the sensors to appear in the joining **Instrument List**, as shown in Figure 7.

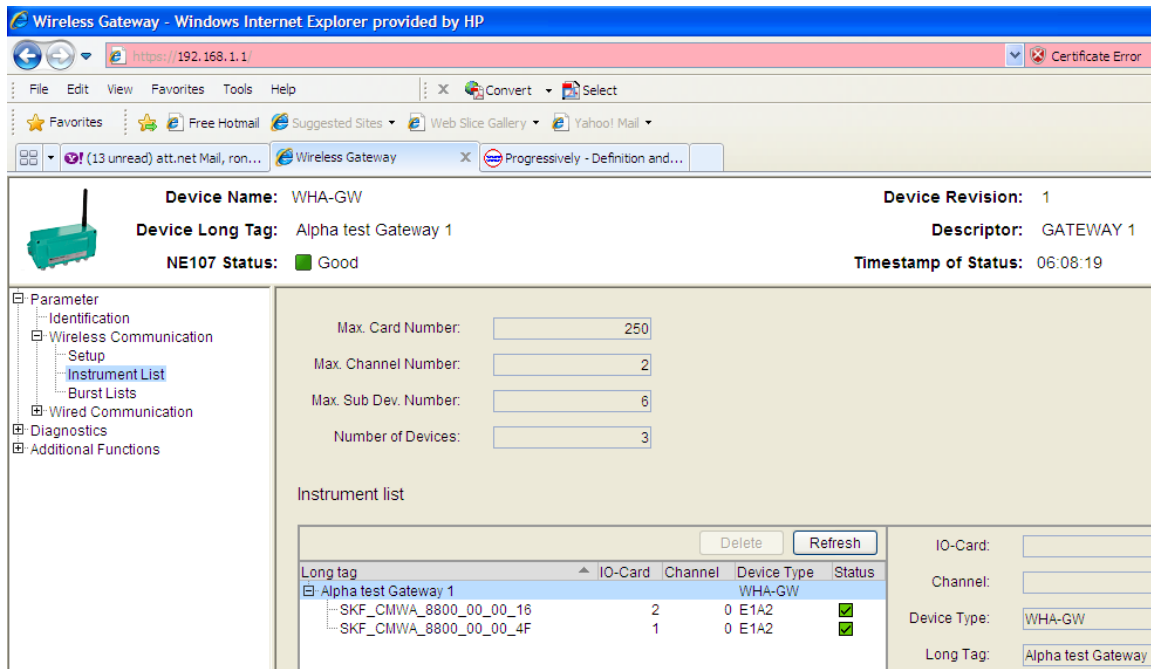


Figure 7. Waiting for the Joining Process to Complete.

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

C. Software Setup Procedure

This section details how to install and configure multiple software applications and utilities, including:

- HART OPC Server, version 3.2.0
- SKF Wireless Machine Condition Sensor Device Descriptions file (DD file)
- ProComSol DevCom2000 version 4.7D
- @ptitude Analyst
- @ptitude Analyst OPC client

Software Installation

This section guides you through the software installation process. After installing the software, we will proceed to configure the software using the **Software Configuration** section later in this guide.

➤ Install all software on the @ptitude Analyst database server.

1. **Install the HART Server version 3.2.0** – Insert the Hart Server CD into your @ptitude Analyst database server's CD drive. If the CD doesn't autorun automatically, start the installation by double clicking the **setup.exe** file on the HART Server CD, and follow the onscreen instructions to complete installation (accept all defaults). During the installation, you will need to enter the registration key, which you can find on the CD case.
2. **Install the ProComSol DevCom2000 version 4.7D** – The beta CD provides a ProComSol **DevCom2000 User Manual.pdf** in the **DevCom2000_4_7D** folder. Locate this file and follow the instructions in section 4, **DevCom2000 Installation**, to install the software (accept all default settings). When it prompts you to select the activation type, either:
 - Evaluate the software
 - Activate manually
 - Activate online

Select the **Activate the software online** option, which requires the computer to have internet access. The next dialog prompts you for a **License ID** and **Password**. These have been previously emailed to you from SKF USA Inc., San Diego. If you have not received your license ID and password, contact ron.yip@skf.com.

- If you do not have internet access, you may choose the **Activate the software manually** option. After selecting this option, a dialog provides you a **User Code 1** and **User Code 2**. You must call, email, or fax these user codes, along with the previously mentioned License ID, to ProComSol (reference the ProComSol user manual for contact information). ProComSol will respond with two registration keys that you must enter to run the software.
3. Next, copy the SKF Wireless Machine Condition Sensor Device Descriptions file (DD file) to the configuration computer. On the product CD, copy the **006052** folder located in the **CMWA8800 DD** folder to your computer's hard drive into the **C:\HCF\DDL\Library** folder.
 4. Install the @ptitude Analyst software, if not already installed. Follow instructions in the @ptitude Analyst Installation Manual located on the @ptitude Analyst product CD.
 5. Install the @ptitude Analyst OPC Client. Place the SKF Wireless Machine Condition Sensor Product Beta CD in the @ptitude Analyst database server computer and double click the **setup.exe** file located in the @A OPC Client Manager folder. Follow the onscreen prompts (accept all defaults) to install the software.

Software Configuration

The general steps for configuring the various software applications are:

1. Import the wireless sensors into the WirelessHART Server application.
2. Configure the sensors using the DevCom2000 application.
3. Configure the @ptitude Analyst OPC client to link to the measurements in the HART OPC Server.

1. Import the SKF Wireless Sensors into HART OPC Server.

- a) Launch the HART Server using **Start/All Programs/HART Server**.
The **HARTServer.hoc – HART Server** window opens.

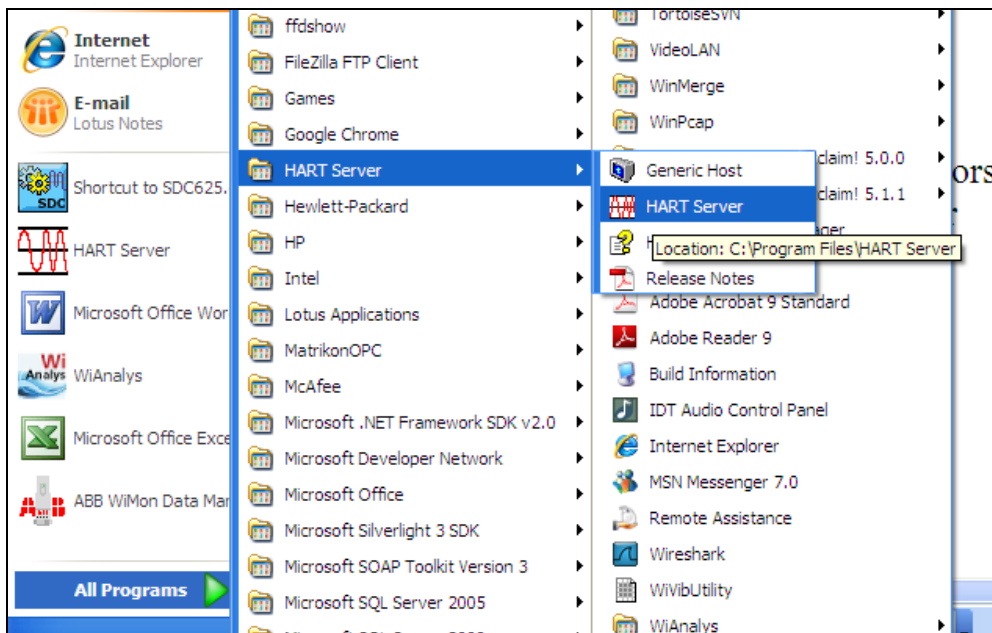


Figure 8. Launching the HART Server.

- b) The first step is to add a new network to the HART Server. In the left pane, right-click the **HARTServer** root node and select **Add Network**.

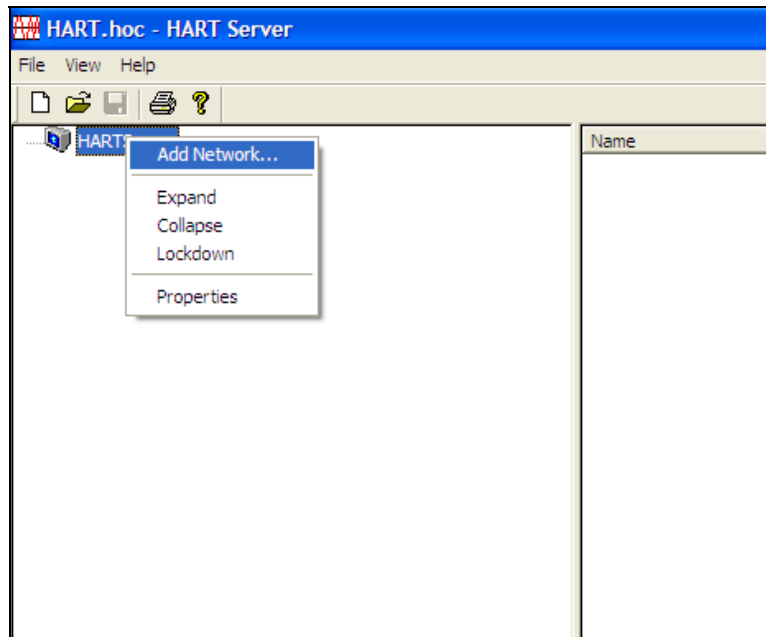


Figure 9. Select Add Network.

- c) An **Add Network** dialog opens. In the **Network Type** drop down list, select the **TCP/UDP** option and click the **Add** button.

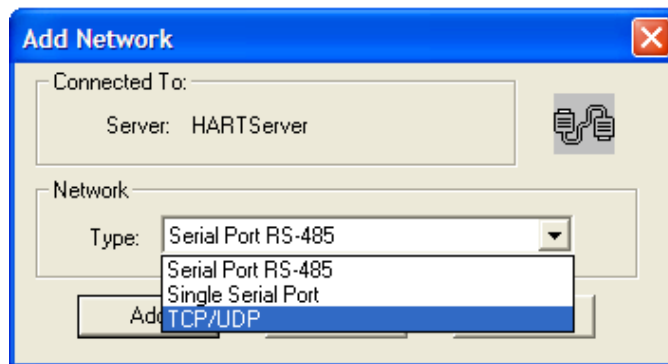


Figure 10. Add Network Dialog.

- d) A **Network Properties** dialog opens. Enter a **Network Name** (e.g., “wireless sensor network”) and click the **OK** button.

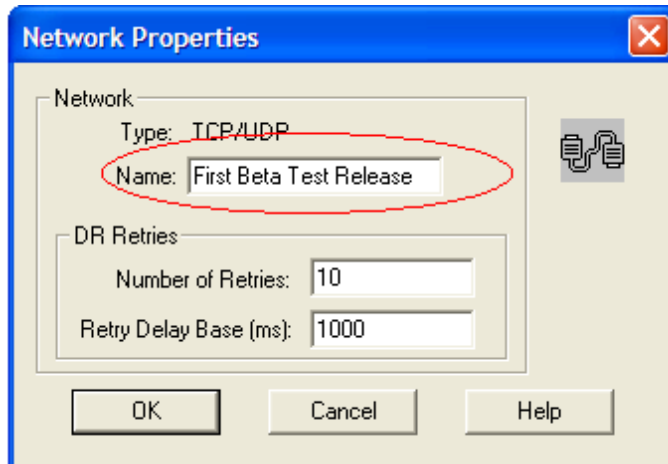


Figure 11. Network Properties Dialog.

The new network appears under the HARTServer node in the left pane.

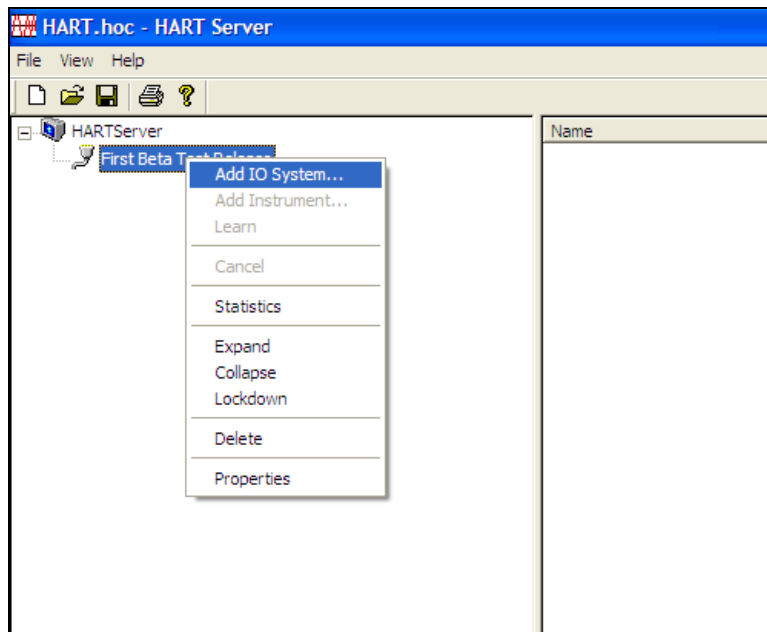


Figure 12. Select **Add IO System**.

- e) Select the new network name and right-click it to **Add IO System**. An **Add Device** dialog opens.

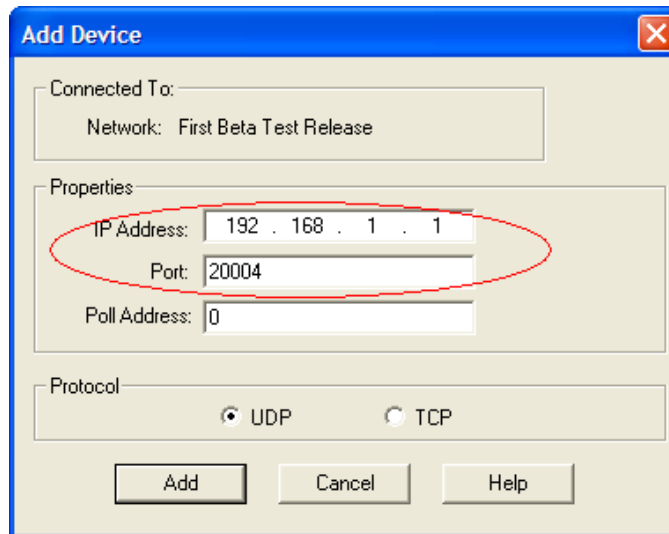


Figure 13. Add Device Dialog.

- f) Enter the gateway's **IP Address** and **Port Address** (as detailed earlier in this document), and click the **Add** button to connect to the gateway through the LAN connection. The **IO System Properties** dialog appears and displays the gateway's information.

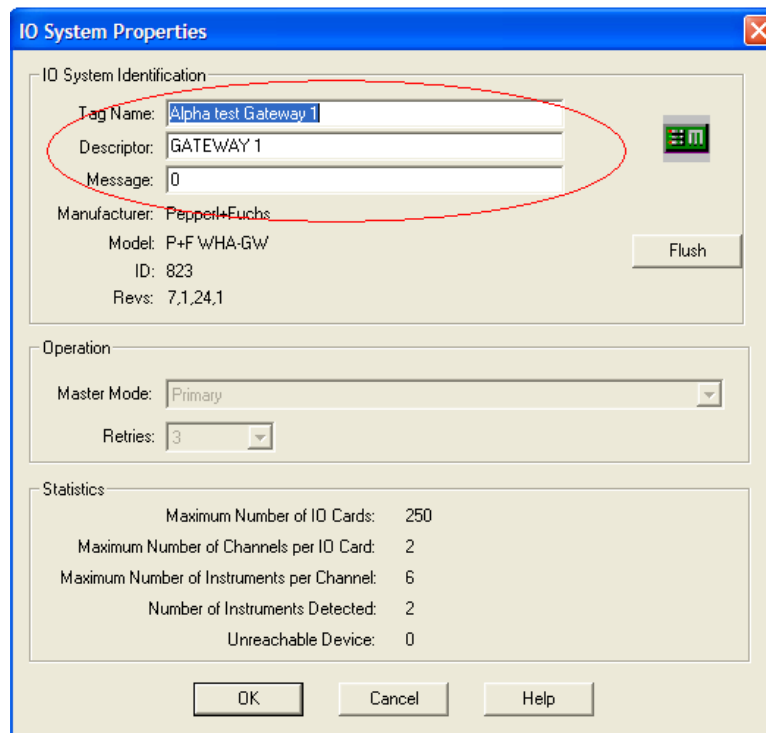


Figure 14. IO Systems Properties Dialog.

- g) Click the **OK** button to complete the connection process. The newly connected gateway now appears under the new network in the **HART Server** dialog's left pane.

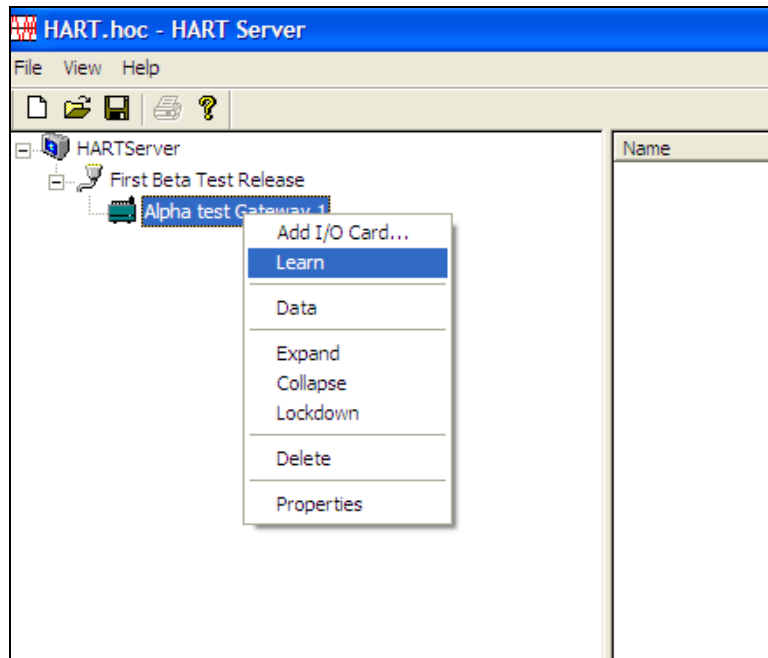


Figure 15. Select the **Learn** Option.

- h) Select the new gateway and right-click the **Learn** option. After selecting the **Learn** option, a confirmation prompt appears. Click **Yes** and the gateway will then import all the sensors connected to gateway (this will take a minute). As the import proceeds, the hierarchy updates to show the gateway's IO Card and wireless sensor channel information.

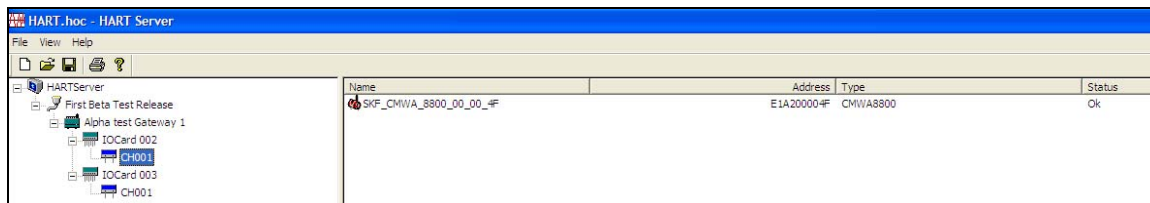


Figure 16. HART Server Hierarchy.

Note that when running the system for the first time, a dialog will appear after the confirmation prompt asking for the manufacturer name and the device model. Enter **SKF** for the manufacturer name and **CMWA8800** for the model name.

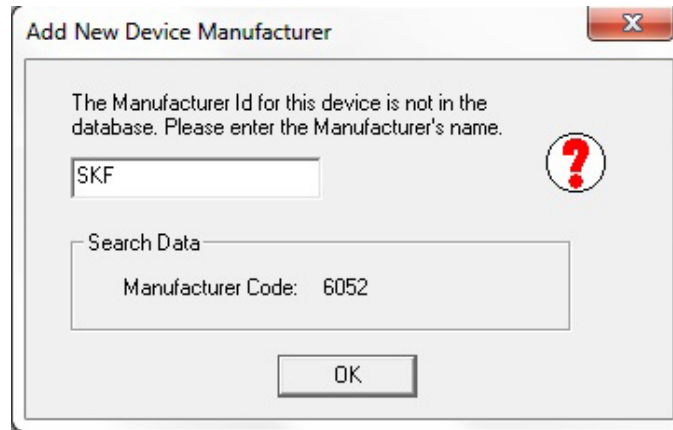


Figure 17. Add New Device Manufacturer Dialog.

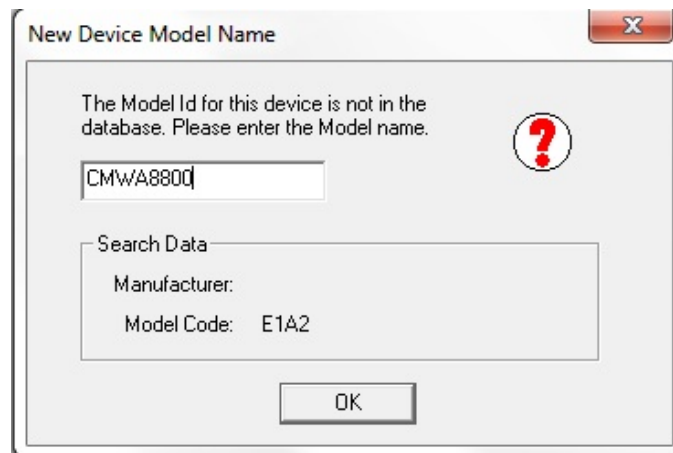


Figure 18. New Device Model Name Dialog.

- i) After the import process is complete, you may select an IO card's channel (e.g., CH001) and the channel's wireless sensor appears in the right pane.

- j) At this point, the sensor import to the HARTServer process is complete. Click **File/Save** to save the imported sensor setup (if you select **Save as**, use the default file name: **HART.doc**).
- Leave the HARTServer application open, as you will return to it later in the setup process.

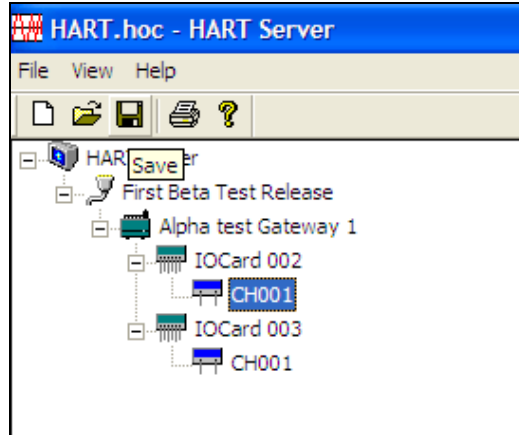


Figure 19. Save the Imported Sensor Setup.

- You must now run a batch file to register the HART **HSelect.dll** file with the Windows operating system. To do so, using Windows Explorer, navigate to: **c:\Program Files\ProComSol\Common\RegisterSELECT.bat** (for Windows XP applications) or **c:\Program Files\ProComSol\Common\RegisterSelect64.bat** (for Windows 7, 64-bit applications). Double click the **.bat** file to run it. A success message appears; click **OK** and close Windows Explorer.
- **Important:** Leave the HART.hoc HART Server application open during the rest of the installation and during network operation after installation.

Proceed to the next configuration step, configuring the sensors.

2. Configure the SKF Wireless Sensors in DevCom2000.

The next procedure will detail how to configure identification settings and sensor update settings for the wireless sensors.

- a) Use Windows' **Start/All Programs/ProComSol/DevCom2000** to launch the application, as shown below.

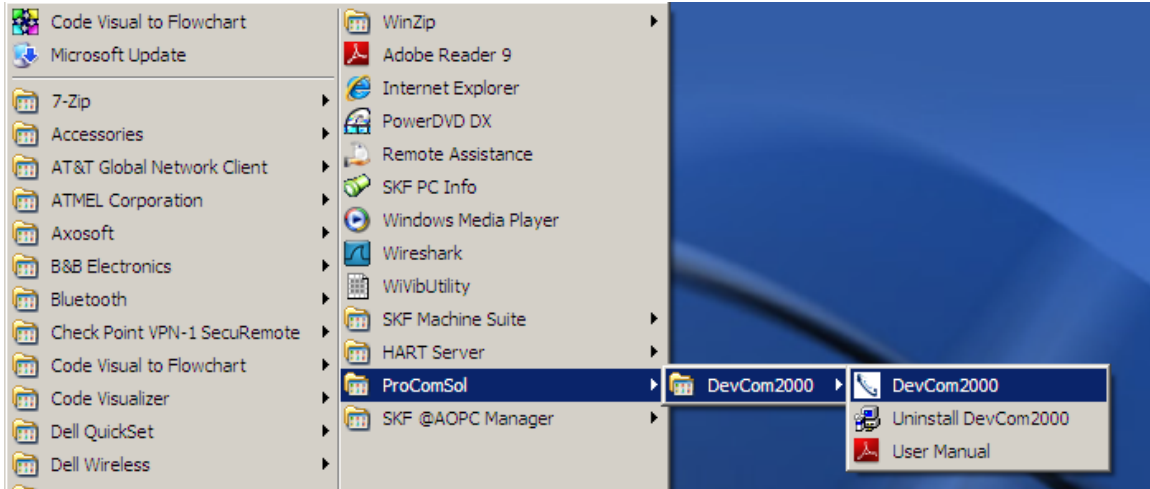


Figure 20. Launch the Application.

The DevCom2000 window displays.

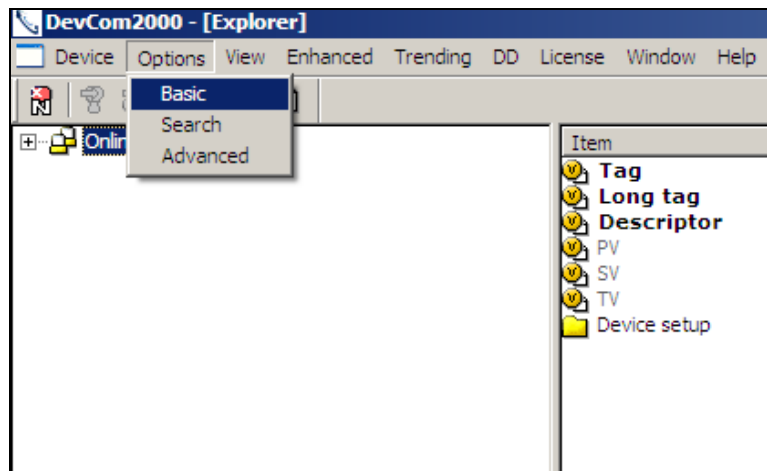


Figure 21. DevCom2000 Window.

- b) When the DevCom2000 launches the first time, it displays a warning dialog about not being able to connect to a serial port. Simply dismiss the dialog, as we are not using a serial port.
- c) Configure the software to connect using the HART Server. To do so, select the **Options/Basic** menu option as shown above. The **Options** dialog displays.

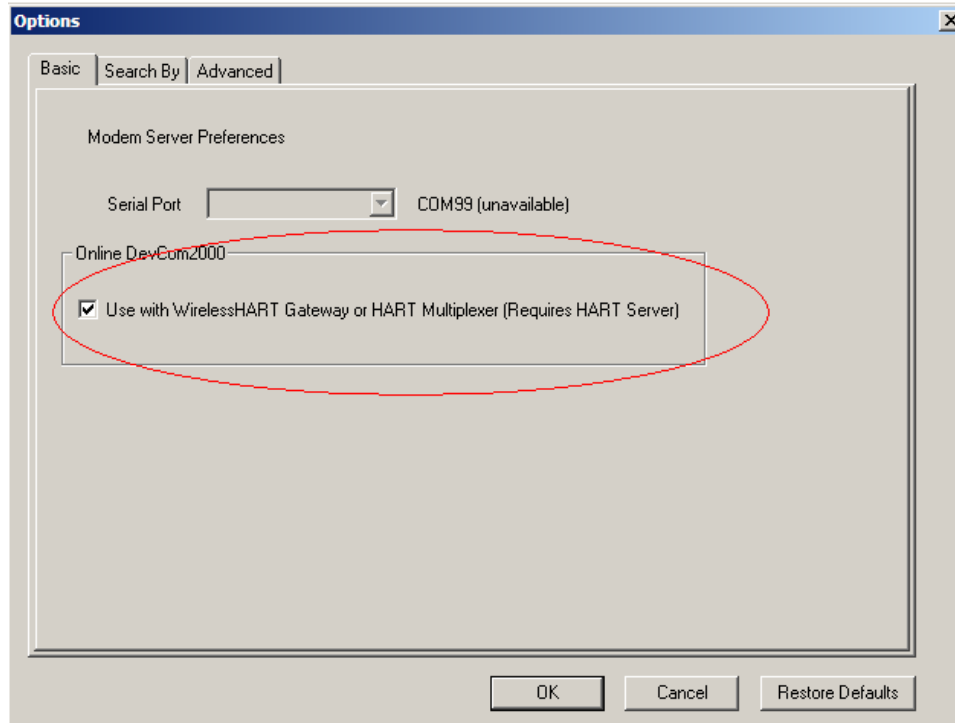


Figure 22. Options Dialog.

- d) Enable the **Use the WirelessHART Gateway or HART Multiplexer (Requires HART Server)** checkbox, click the **OK** button, and press **Yes** at the confirmation prompt. A dialog informs you that your preferences are saved; press **OK**. The DevCom2000 window remains empty.
- e) The wireless setting is not effective until DevCom2000 is exited and re-launched. Exit and re-launch DevCom2000.
- f) When DevCom2000 is re-launched, it will automatically launch the HART Server application to connect to the gateway.

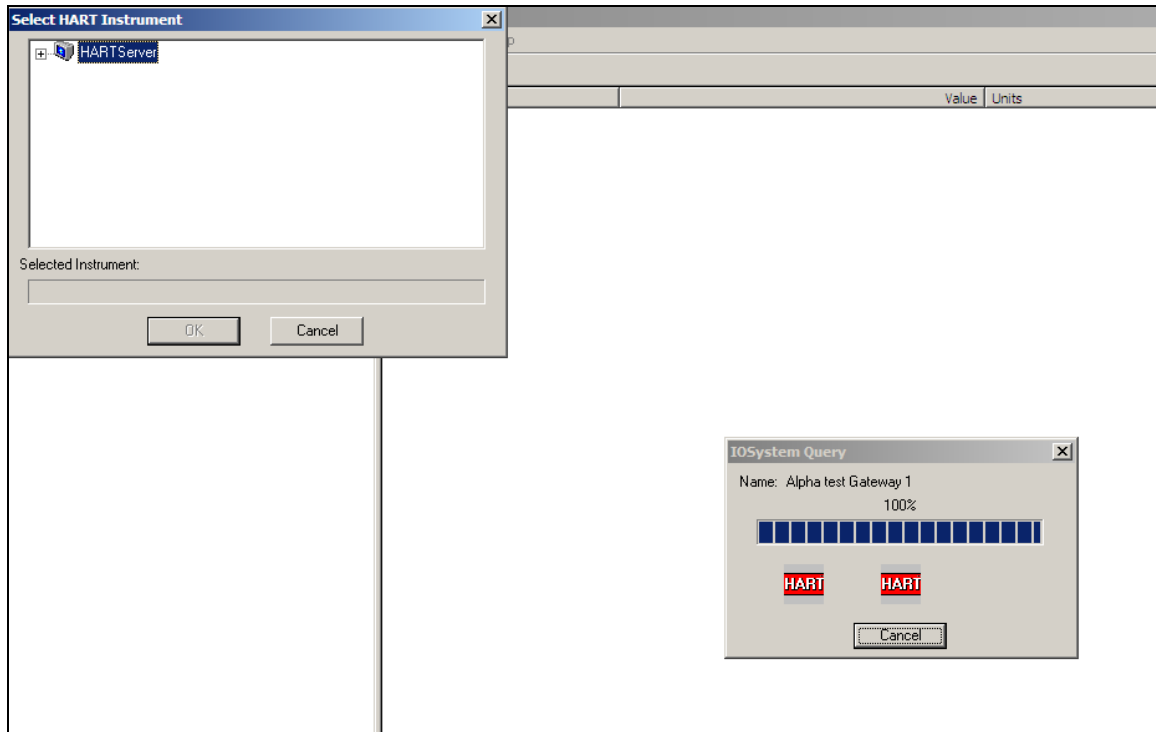


Figure 23. Launching the HART Server Application.

- g) DevCom2000 now provides a **Select HART Instrument** view window (upper left) that allows you to select connected wireless sensors to configure. In the **Select HART Instrument** view window, all previously connected sensors should display.

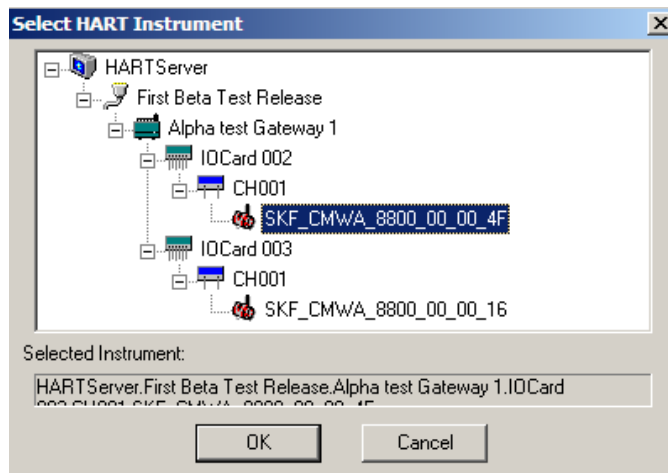


Figure 24. Select HART Instrument Window.

- At this time, ignore the **Reading device information, Please wait...** prompt in the DevCom2000 window.

- h) Select a sensor from the **Select HART Instrument** list and press the **OK** button. The software will start uploading data from the sensor and the window will update (this will take a minute).

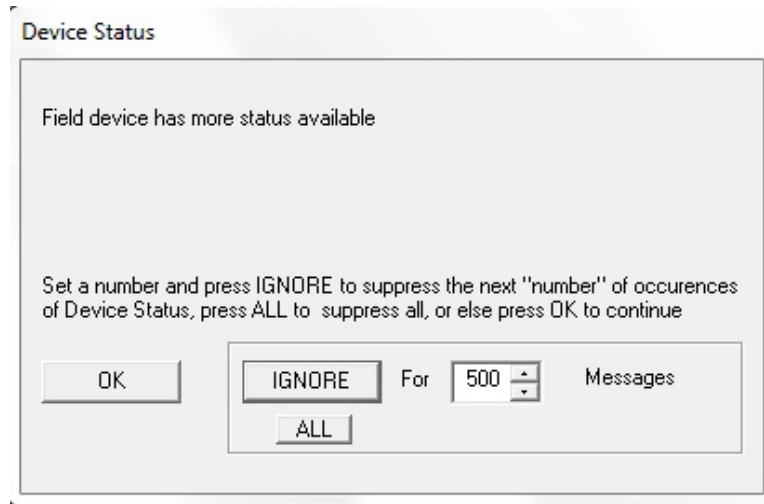


Figure 25. Device Status Window.

- i) When the software connects to the sensor, a **Device Status** dialog informs you that modifications have been made. Press **ALL** to suppress all future similar messages. You return to the DevCom2000 Window's main view showing the sensor's identification. DevCom2000 uses the DD file to display configuration data for the selected sensor.

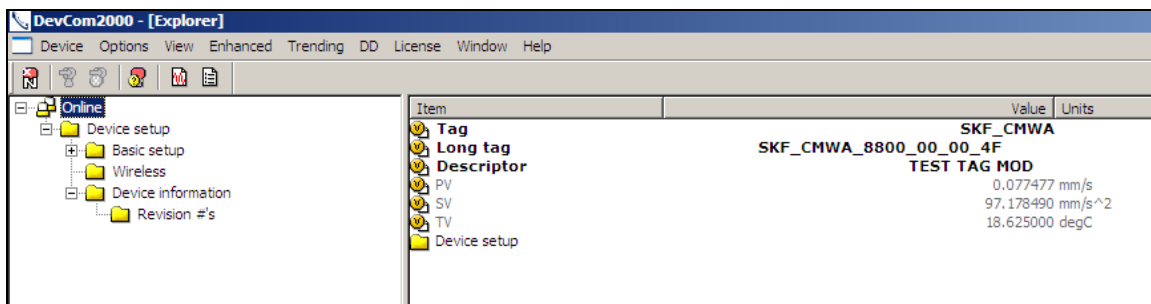


Figure 26. DevCom2000 Window with Sensor Identification Information.

- j) With the **Online** hierarchy item selected, the sensor's identification information and the sensor's three measurements results display in the right pane. The Primary Value (PV) is the overall velocity in mm/s. The Secondary Value (SV) is the overall Acceleration Enveloped measurement in mm/s squared, and the Tertiary Value (TV) is the temperature in degrees Celsius.
- k) The next task is to configure the data collection interval for the sensor (i.e., how often the sensor refreshes its measurement results inside the sensor); the default is 720 minutes, or every 12 hours. To configure this, select the **Basic Setup/Cache Update**

Period option from the left pane. The right pane updates to show the current settings.

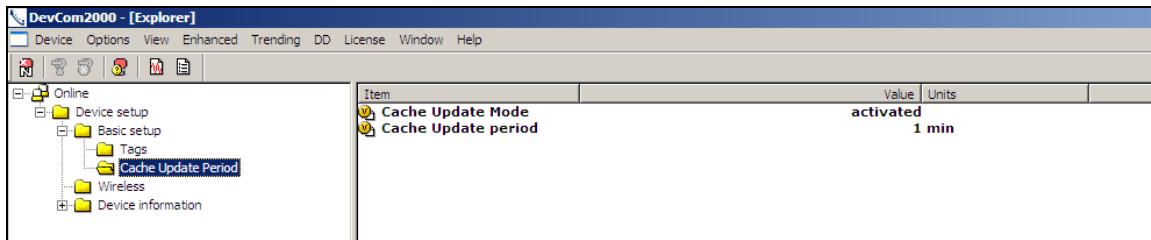


Figure 27. DevCom2000 Window, Cache Update Period Selected.

- l) From the right pane, double click the **Cache Update period** option to display the **Write As One Edit Display** dialog (both settings are always updated to the sensor).

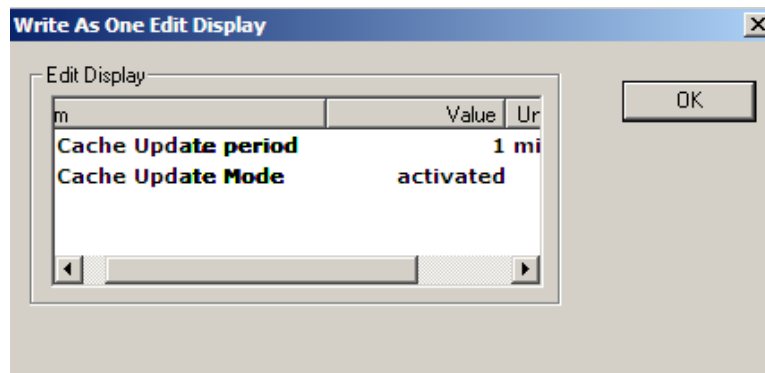


Figure 28. Write As One Edit Display Dialog.

- m) In the **Item** column, double click the **Cache Update period** item; a **Cache Update period** dialog displays. Set the time interval in minutes to one half the setting for @ptitude Analyst measurement updates (set in step 3.g later in this document). We recommend no more than 12 measurements per day (one measurement every two hours) for battery conservation, in which case the update period should be set to 60 minutes. Click **Set** to proceed.

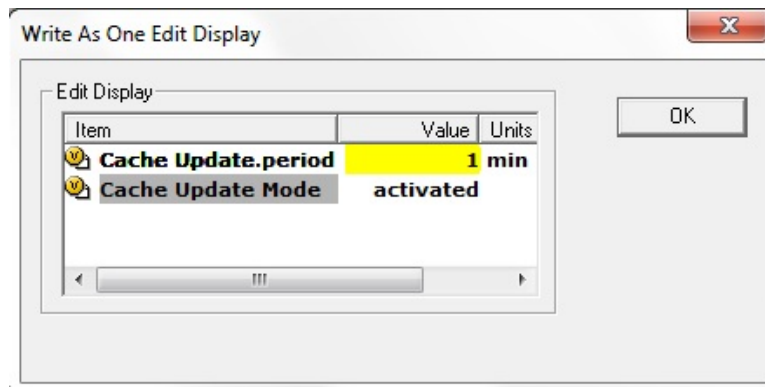


Figure 29. Write As One Edit Display Dialog.

- n) Back in the **Cache Write As One Edit Display** dialog, the background color of the modified setting changes to yellow to indicate that the setting has been modified, but the modification has not been sent to the sensor. Click **OK** to exit the dialog. You return to the main view window, where the **Cache Update period** setting is also highlighted to indicate the new setting needs to be sent to the sensor.

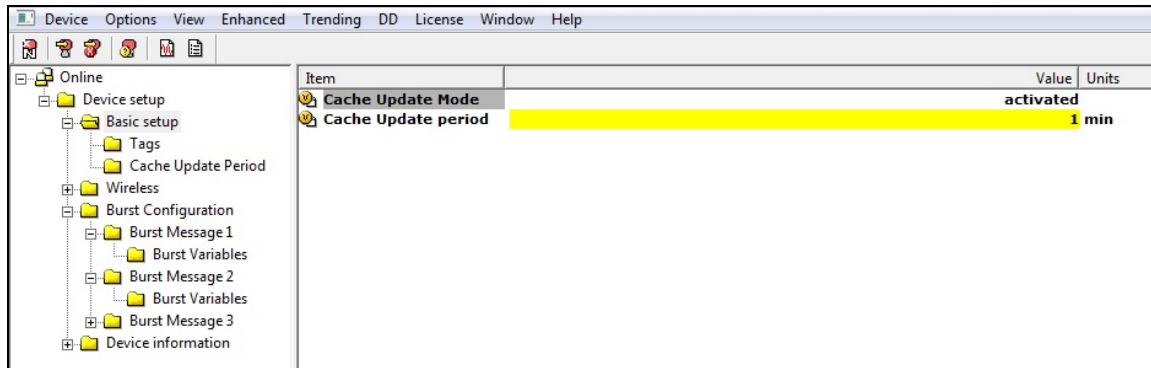


Figure 30. Main View Window with Cache Update Period Setting Highlighted.

- o) In the toolbar, select the **Send to device** button to send the new Cache Update settings to the sensor. When the highlight disappears, the setting is stored in the sensor.

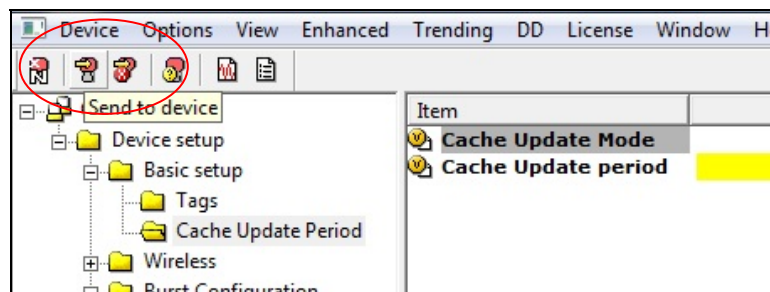


Figure 31. Send Cache Update Settings to the Sensor.

- p) The next task is to enable the **Burst** mode setting to burst the response for the **Cmd 3: Dyn vars / current** query. Burst mode is a special HART communication mode in which the sensor sends the response of a query at a preprogrammed interval to the gateway, without being polled. This reduces network traffic and stress on the sensor firmware. When burst mode is enabled for Cmd 3, the sensor sends overall velocity, acceleration enveloping, and temperature measurements to the gateway at regular time intervals, eliminating the need for the gateway to poll the sensor each time the HART OPC server sends the Cmd 3 query. To configure the burst mode, select the **Burst Configuration / Burst Message1** option from the left pane. The right pane updates to show the current settings.

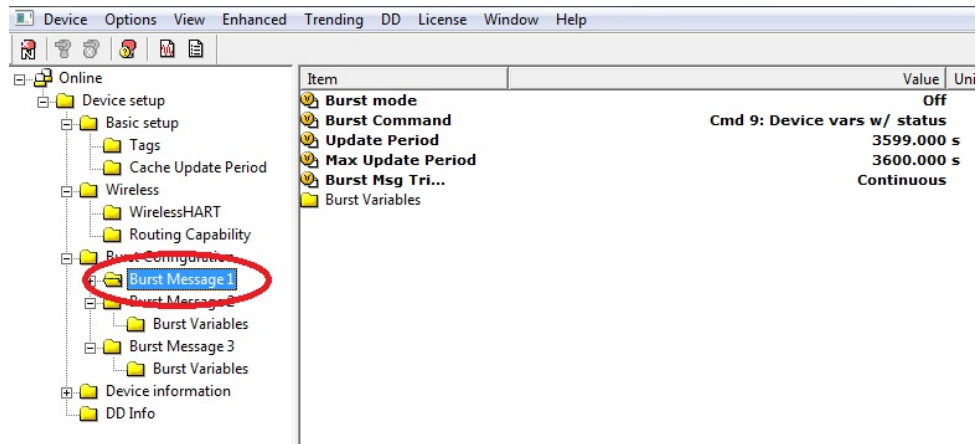


Figure 32. Burst Configuration Window, Burst Message1 Selected.

- q) In the right pane, double-click the **Burst Mode** item to display the **Burst Mode** dialog. On the **Burst Mode** dialog, select the **Wireless HART Enabled** option from the drop-down list and click **Set** to enable the setting and return to the main view window. The background color of the modified setting changes to yellow to indicate that the setting has been modified, but the modification has not been sent to the sensor.

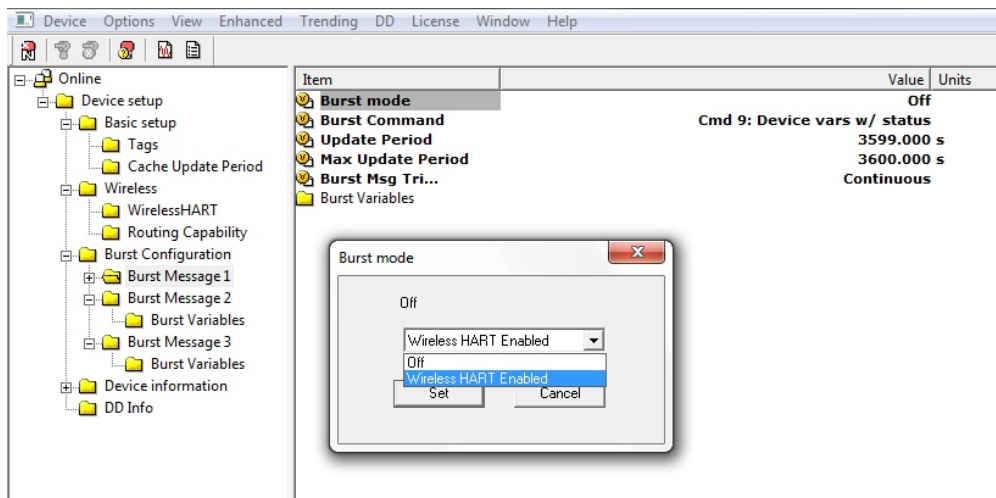


Figure 33. Enable the Burst Mode Setting.

- r) Double-click the **Burst Command** item on the right pane. The **Burst Command** dialog displays. Select the **Cmd 3: Dyn vars/current** option from the drop-down list. Click **Set** to save the setting and return to the main view window. Again, the background color changes to yellow.

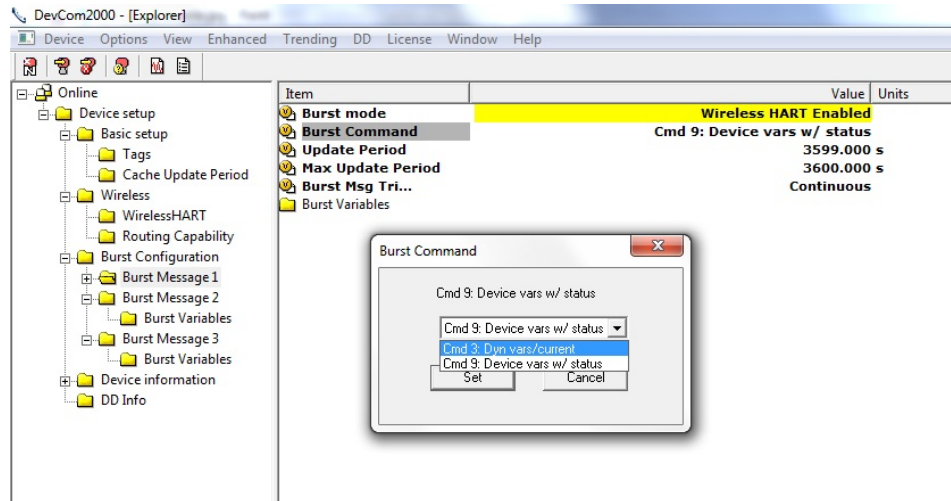


Figure 34. Select the Cmd 3: Dyn vars/current Burst Command Option.

- s) Double-click the **Update Period** item to set the interval period for how often the sensor will send its measurement data to the gateway. The recommended burst update period is half of the cache updated period set in step m, above. If the cache updated period is set to 60 minutes, the recommended burst update period is 30 minutes (1800 seconds). Click **Set** to save the setting and return to the main view window. The background color changes to yellow.
 - The **Update Period** value must always be less than the **Max Update Period** value. The sensor must send data to the gateway at least once before the **Max Update Period** expires.

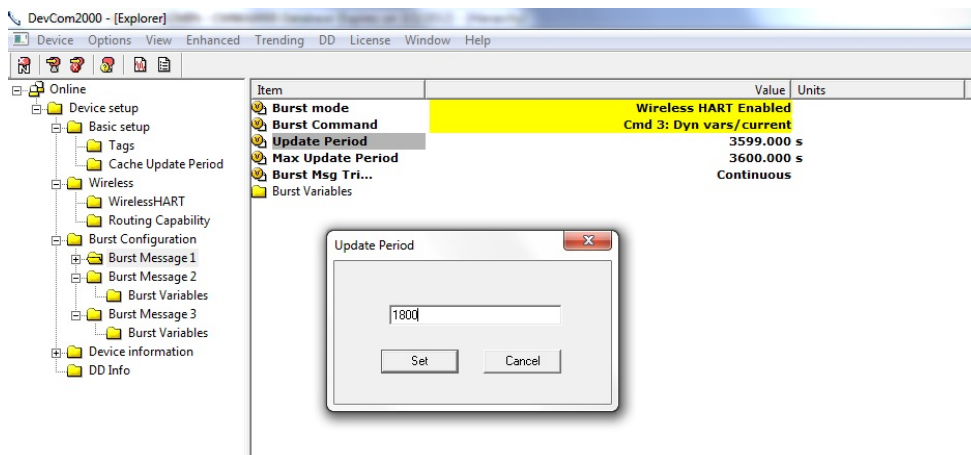


Figure 35. Enter the Update Period Interval.

- t) In the toolbar, select the **Send to device** button to send the new **Burst Message1** settings to the sensor. When the highlight disappears, the setting is stored in the sensor. You may confirm that the burst mode is working on the gateway's **Burst Lists** web

page. The first burst packet should appear in the Burst Lists after the specified update period elapses.

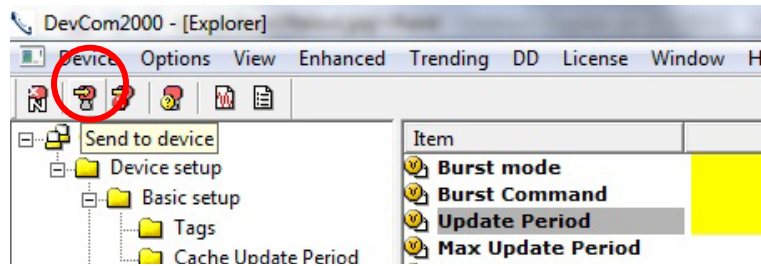


Figure 36. Send Burst Message1 Settings to the Sensor.

- u) The sensor's **Tag**, **Long Tag**, and **Descriptor** settings are initially set to factory defaults. You may use the **Basic setup/Tags** option to modify these settings in a manner similar to the **Cache Update period** setting. Note that the **Long tag** setting initially displays the sensor's MAC address at the end of the tag (e.g., 00_00_4A). This is useful information, so it is best to leave this as is. However, you may wish to modify the **Descriptor** setting to identify the sensor's location, orientation, etc.
- v) Repeat steps **j** through **u** for all connected sensors. To easily do so, select the **Device/New Device** menu option. The **Select HART Instrument** list appears, where you may select a different IO card/channel/sensor whose settings you wish to modify.

3. Configure the @ptitude Analyst OPC client to link to the measurements in the HART OPC Server.

- a) On the Product Beta CD, in the @A OPC Client Manager folder is the **QUICK START - SETTING UP AN @PTITUDE ANALYST - OPC CONNECTION.DOC** document. Open this document and follow the five steps detailed in section 1.4, **Prepare the @ptitude Analyst database**, to manually create the MAOPCMGR and MAOPCSRVR users in @ptitude Analyst. **Note:** The MAOPC_Create_Users.sql script file does not work.
- b) Next, From Windows' Start menu, select **Start/All Programs/SKF @AOPC Manager/@A OPC Manager** to launch the **SKF @A OPC Manager - @AOPC** software.
- c) In the same document, follow the instructions in section 1.5.1, **@A Database connection**, to establish the @A database connection as the OPC client.

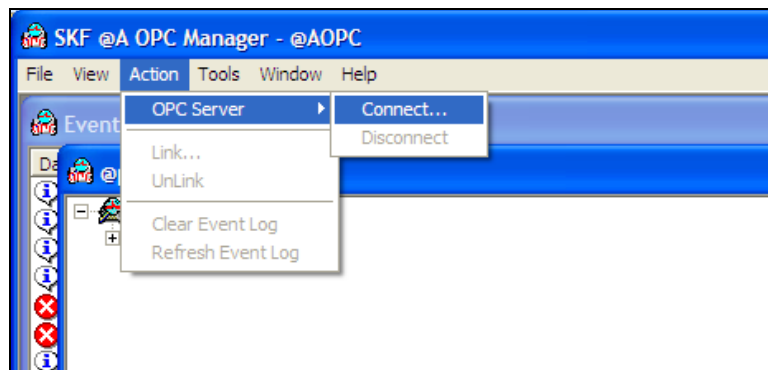


Figure 32. Establish a Connection as the OPC Client.

- d) The following steps show how to connect the @AOPC manager to the HART OPC server.
 - i. In the SKF @A OPC Manager application, select the **Action/OPC Server/Connect** menu option to view a list of servers in your LAN. The **OPC Connection Settings** dialog opens.

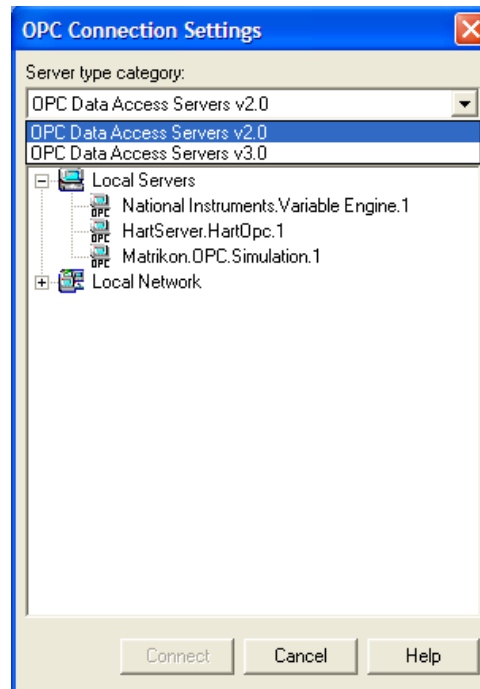


Figure 33. OPC Connection Settings Dialog.

- ii. In the **Server type category** drop down list, select the **OPC Data Access Servers v2.0** option to display the **HartServer.HartOpc.1** HART OPC server in the list of Local Servers.
 - iii. Select the **HartServer.HartOpc.1** server, and press the **Connect** button to complete the connection to the HART OPC server. You return to the OPC Manager's main view.
- e) The following steps set up the link to import the measurements from one SKF Wireless Machine Condition Sensor to the @ptitude Analyst database through the connection to HART OPC Server.
- i. Open @ptitude Analyst.
 - ii. Create a new hierarchy for the wireless sensors (e.g., SKF Wireless Machine Condition Sensor database).
 - iii. In the new hierarchy, create a new **Machine** hierarchy item for each sensor (e.g., T1FeedPumpDS).

- iv. For each new Machine (sensor) hierarchy item, create three **Manual** type POINTs, one for each sensor measurement (velocity, enveloped acceleration, and temperature) as detailed in the figures below.

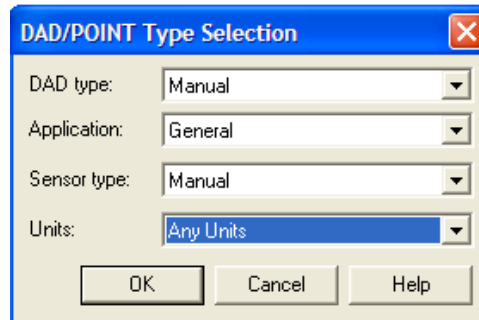


Figure 34. DAD/POINT Type Selection Window.

- v. Use the **POINT Properties/General** tab to name each new POINT with a descriptive name.

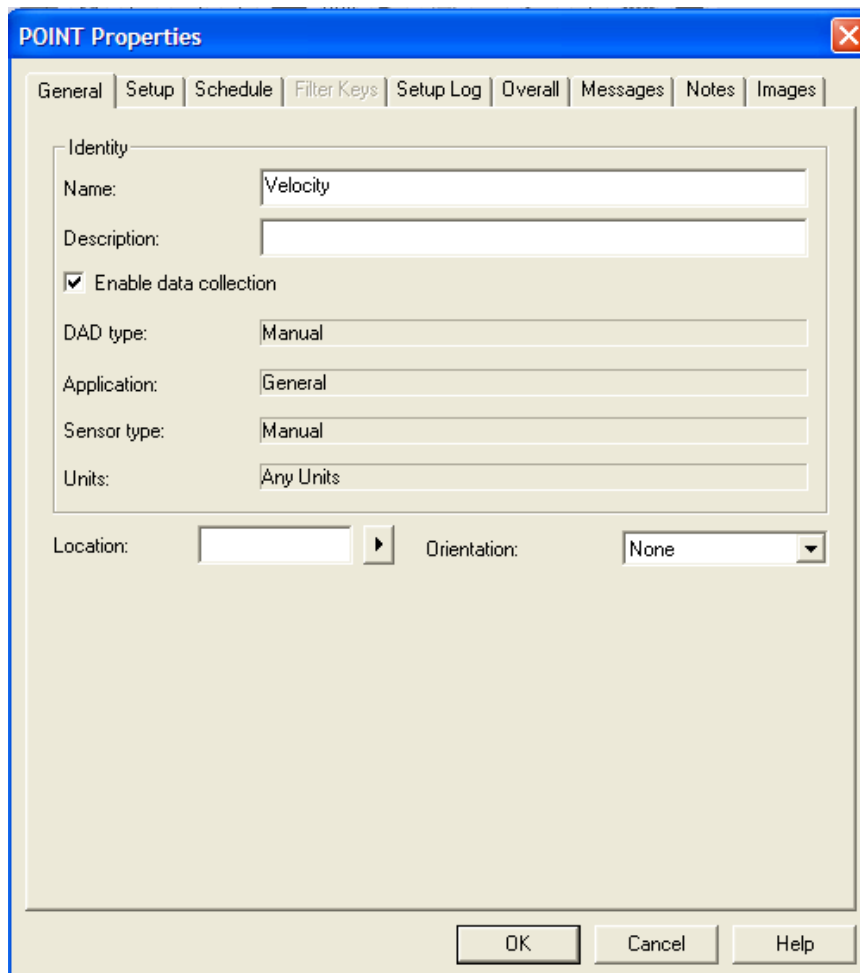


Figure 35. POINT Properties Window, General Tab.

- vi. Use the **POINT Properties/Setup** tab to modify the new POINT's units to **mm/s**, **m/s²** or **C** for three respective POINTs.

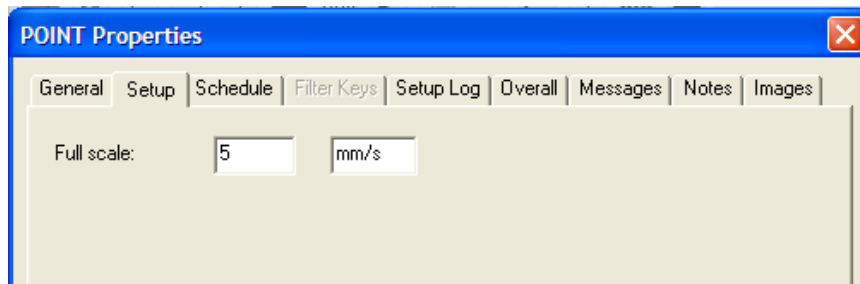


Figure 36. POINT Properties Window, Setup Tab.

- **POINT Properties/Schedule** settings are not applicable for wireless sensor networks.
- vii. Back in the **SKF @AOPC Manager - @ptitude Analyst** application, select the **View/@ptitude Analyst** menu option to open the @ptitude Analyst hierarchy window.

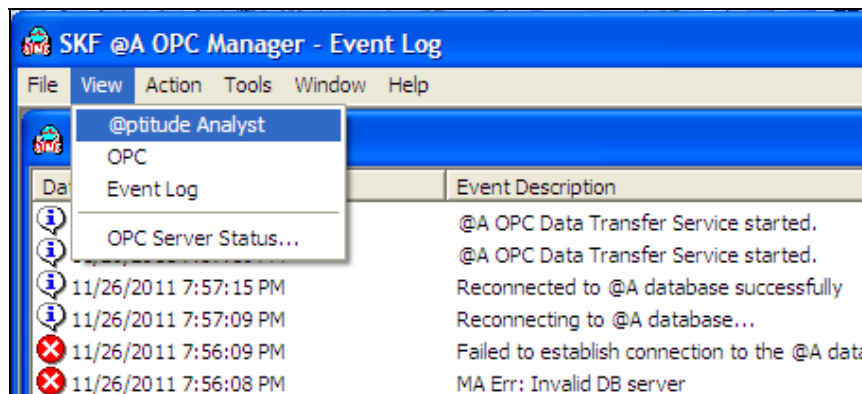


Figure 37. SKF @A OPC Manager Window, View @ptitude Analyst.

- viii. Open the Analyst hierarchy to show the newly created Velocity, Acc Env and Temperature points.

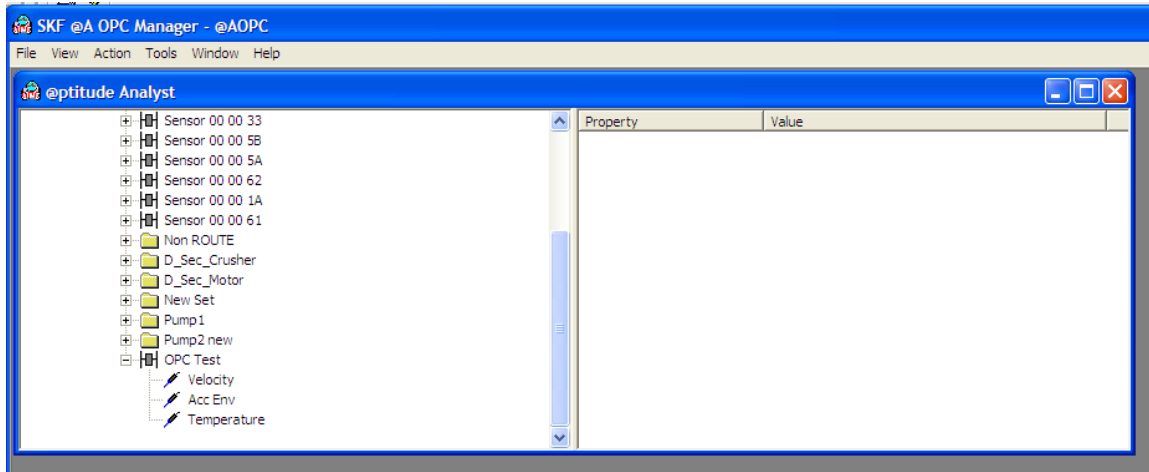


Figure 38. @ptitude Analyst Hierarchy.

- ix. Next, in @AOPC Manager, select the **View/OPC** menu option to open the HART **OPC Server** window.

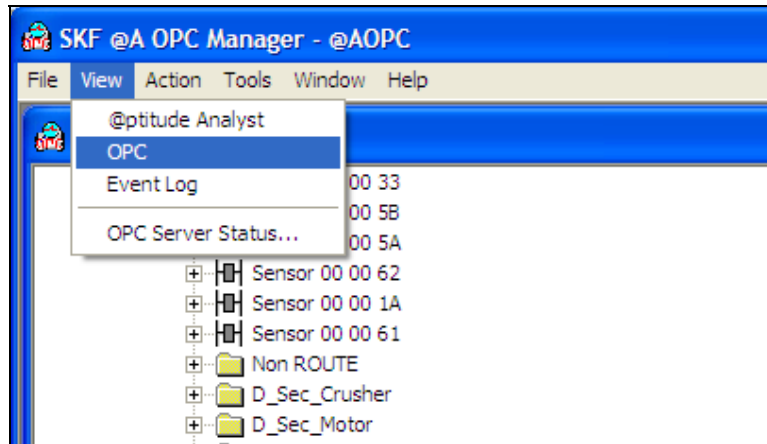


Figure 39. SKF @A OPC Manager Window, View OPC.

- x. In the **OPC Server** window, open the **HartServer.HartOpc.1** server's hierarchy and double click to open the sensor for which you would like to create a link.

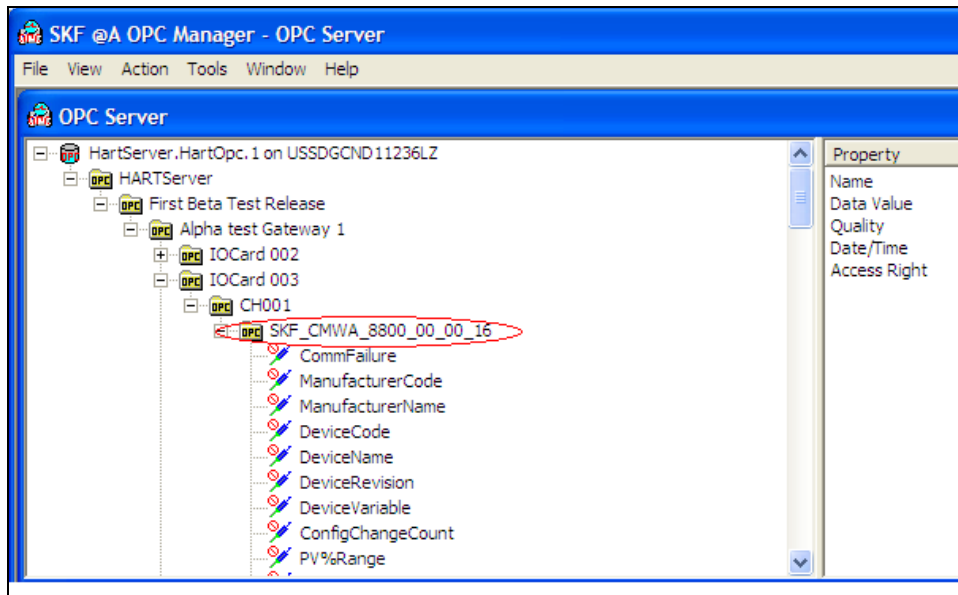


Figure 40. Open Sensor to Create a Link.

- xi. To simplify the display for the two open windows (the **OPC Server** window and the **@ptitude Analyst** window), select the **Windows/Tile Horizontal** menu option to tile the two windows.

- xii. Next, in the **OPC Server** window, for the open sensor, select the **PV** hierarchy item and drag it to the same sensor's (machine hierarchy item) velocity POINT in the **@ptitude Analyst** window to create the link.

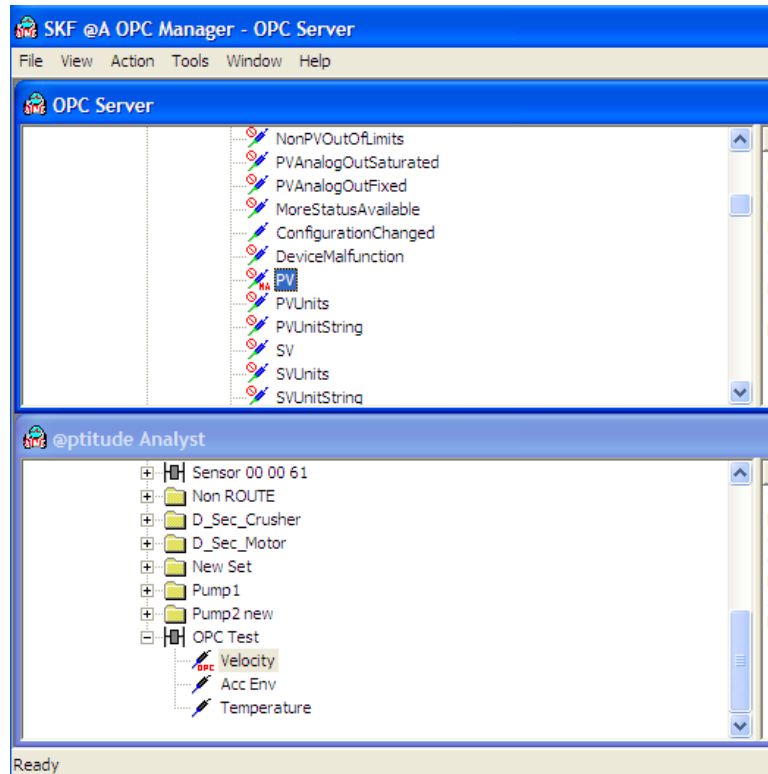


Figure 41. Select PV Hierarchy Item.

- xiii. Repeat this process to link the **SV** hierarchy item to the sensor's Env. Acc. POINT and the **TV** item to the sensor's temperature POINT. Now, for the selected sensor, all three measurements link to the @ptitude Analyst database. Hierarchy icons for the linked items update to display they are linked; i.e., in the **OPC Server** window, the hierarchy items show an **MA** icon (Machine Analyst), and in the **@ptitude Analyst** window, the hierarchy items show an **OPC** icon.

Repeat the above process for all the other sensors.

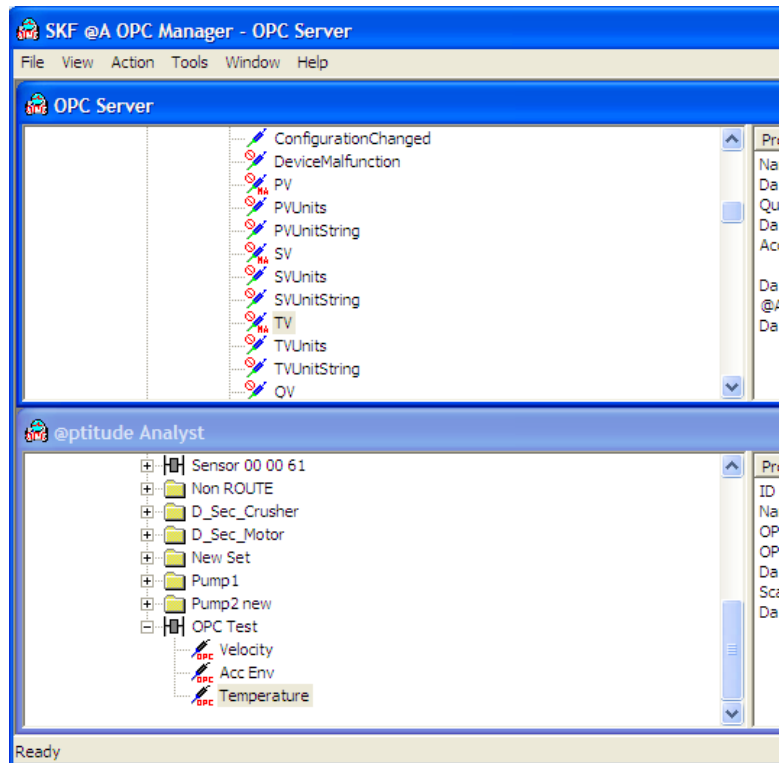


Figure 42. Repeat Process for Other Sensors.

- f) The remaining task is to configure the time interval at which the OPC Server will update measurement results in @ptitude Analyst. To do this, in the @AOPC Manager application, select the **Tools/Preferences** menu option. The **Preferences** dialog displays.

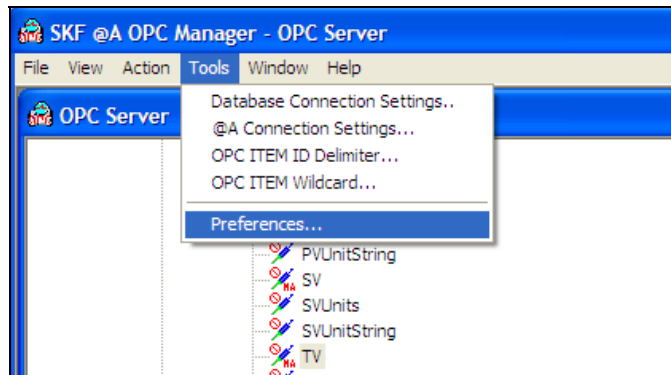


Figure 43. Select Tools/Preferences.

- g) In the **Transfer data every** field, set the time interval in minutes at which the OPC Server updates the linked measurements in @ptitude Analyst. The setting should be at least twice the **Cache Update period** setting in the sensor (previously discussed in step 2.m above) to avoid sending stale measurements to @ptitude Analyst. We recommend no more than 12 measurements per day (one measurement every two hours) for battery conservation. For example, set to 120 minutes for measurement every two hours. Click **OK** to accept the new transfer period.

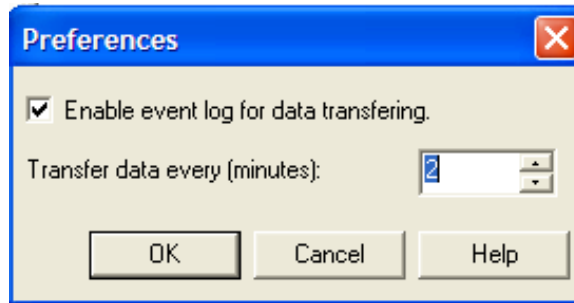


Figure 44. Preferences Dialog.

- h) Note that the @Analyst OPC client does not work when run as a Windows service. Therefore, you must stop the “SKF OPC to @A Service” in the Windows **Services** manager. To do so, in the Windows **Control Panel**, select **Administrative Tools**, then select **Services**, then right-click the **SKF OPC to @A Service**, and select **Stop**.

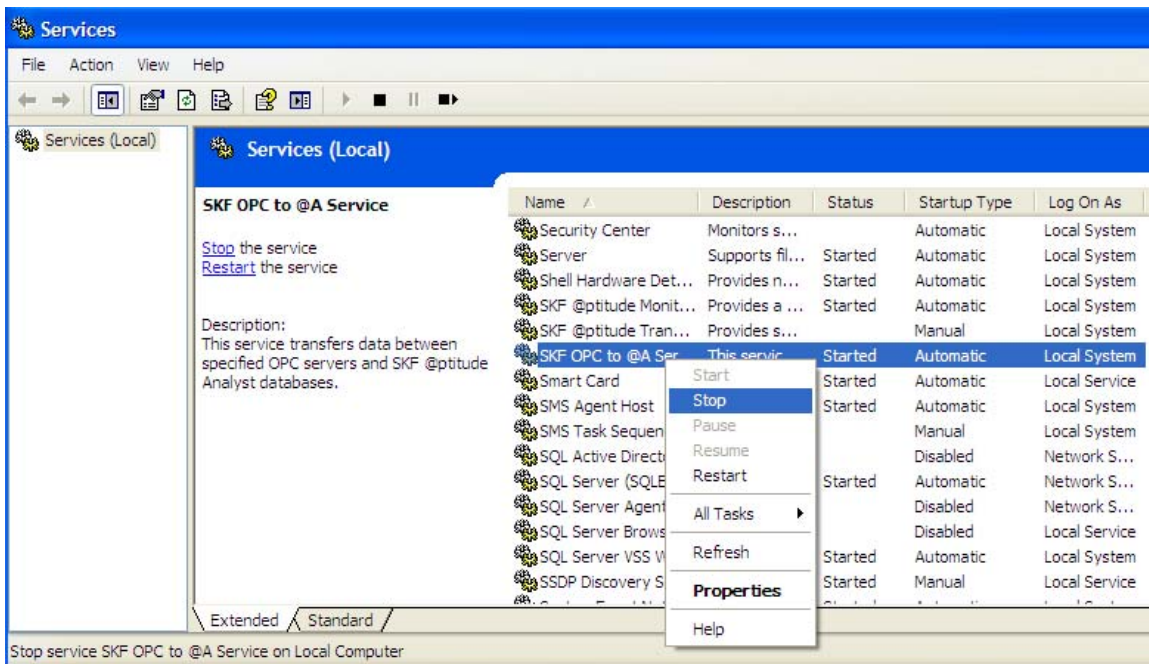


Figure 45. Stop the SKF OPC to @A Service.

- i) Next, you need to launch the **MAopcSrv.exe** to run as process. Using Windows Explorer, open the **Program Files/SKF/MAOPCMGR** folder and double click the **MAopcSrv.exe** file. A waiting indicator briefly appears.

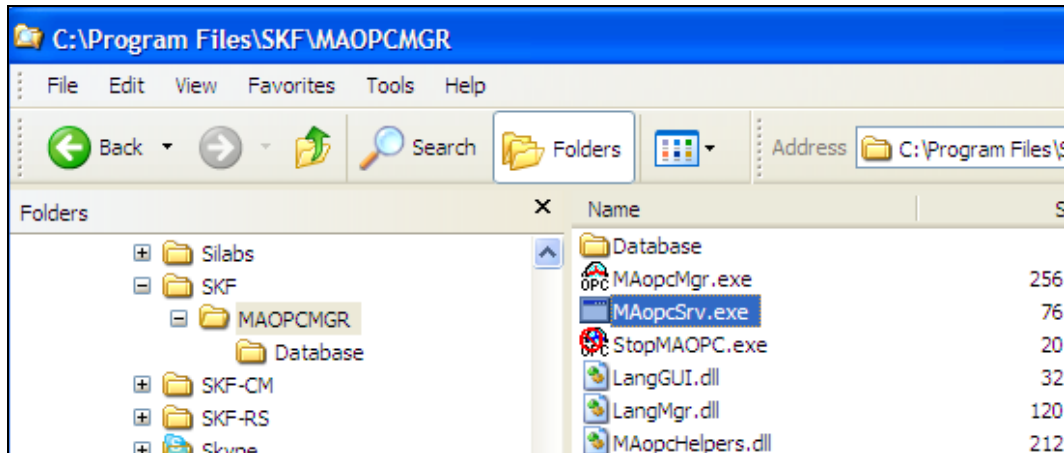


Figure 46. Launch MAopcSrv.exe to Run as Process.

- j) Once the @A OPC Data Transfer Service is started, the HART OPC Server initiates and proceeds to send measurement results to @ptitude Analyst according to the previously set transfer data period.

The software configuration is now complete.

Regular Operation

At the end of step 1, we stated that you need to leave the **HART.hoc HART Server** application open during the rest of the installation and during network operation after installation. This application and the **MAopcServer.exe** running as a process (detailed above) are the only two applications required to be running to collect measurements for regular wireless sensor operation.

Troubleshooting

If new measurements are not updating to @plitude Analyst, check the following:

- Confirm the sensor is currently connected using the gateway's **Instrument List** web page.
- In the Windows Task Manager, confirm the MAopcSrv.exe is running as a process. If not, launch MAopcSrv.exe in **C:\Program Files\SKF\MAOPCMGR** as detailed above. In the Windows Services, verify that MAopcSrv.exe is not running as a service.
- In the Windows Task Manager, confirm that **Hartopc.exe** is running. If not, launch **C:\Program Files\HART Server\Hartopc.exe**.
- Verify the OPC link using the @AOPC Manager.

Known Bugs

- The SKF @AOPC client does not work as a windows service. The work around is to launch it as a process.
- The sensor LED may stop responding if, by press of the button, selecting the reset command is immediately followed by selecting the shutdown command. The work around is to wait at least 30 seconds between the reset and a shut down.

Recovery Process

After a shut down, follow this procedure to restart the system:

- Power up the gateway.
- Turn on all sensors.
- Power up the computer running the HART OPC Server and OPC client.
- In the gateway's web page, verify all sensors are connected.
- Launch DevCom2000 to verify connection to the sensors. This step will automatically launch the HART OPC server.
- Stop @A OPC client running as a service and restart running as a process by launching MAOPCSrv.exe manually.
- Launch @Analyst to verify the system resumed collecting measurements.

Configuring the Network ID

The WirelessHART protocol allows only the network manager to modify the field device's network ID. Any attempt to change the network ID by a non-network manager will result in getting an "Access Restricted" error code returned by the field device.

In order to change the network ID in this first beta release, the user must use the free telnet client, **PuTTY.exe**, to send the command through the CLI of the network manager in the Pepperl+Fuchs gateway. You will find the PuTTY.exe file in the first Beta release CD. Use the WirelessHART gateway IP address and Port **9000** to connect to the CLI as a Telnet client, as shown below.

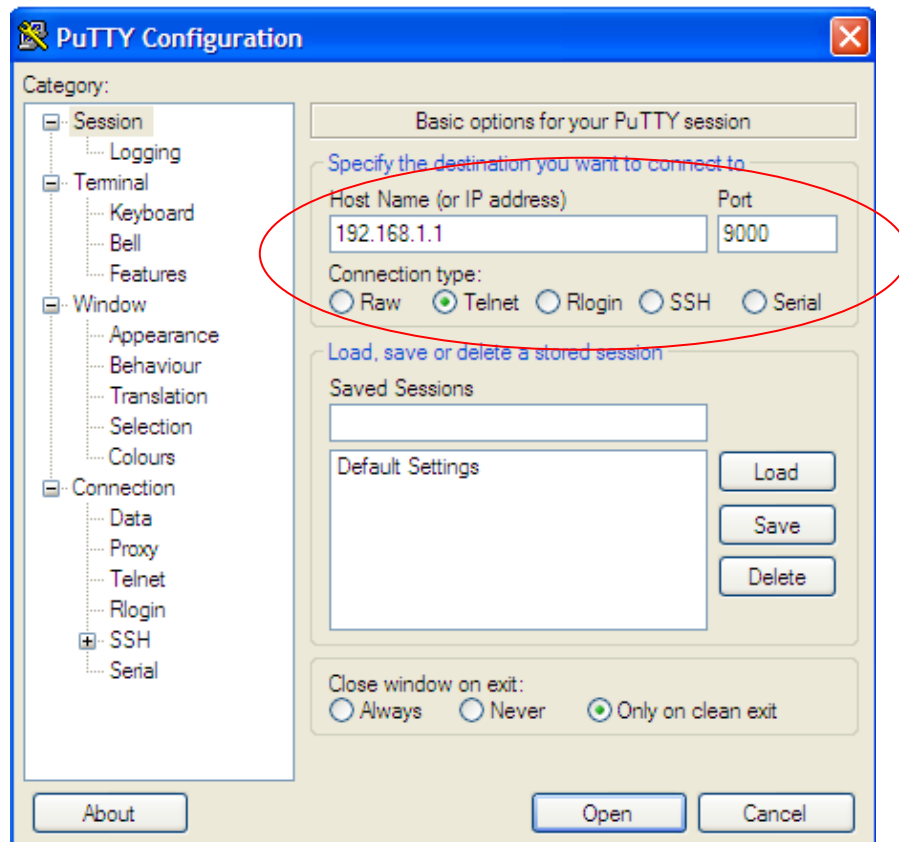
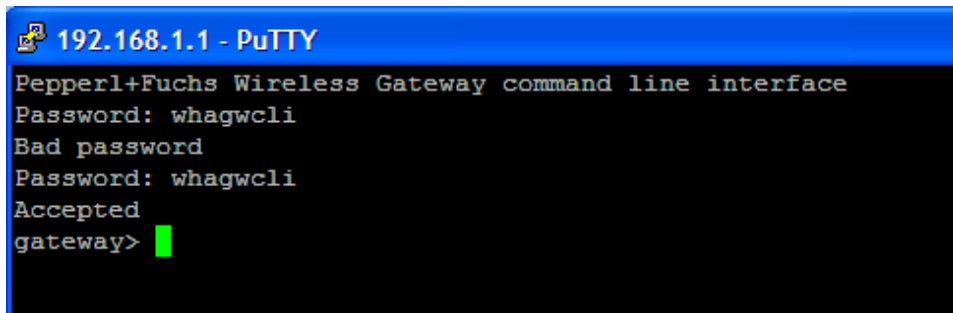


Figure 47. PuTTY Configuration Window.

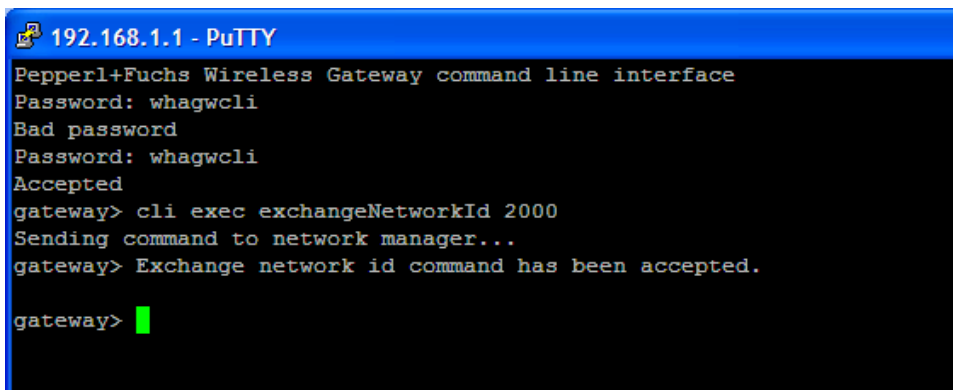
Once connected, enter the password, **whagwcli**, twice to log in.



```
192.168.1.1 - PuTTY
Pepperl+Fuchs Wireless Gateway command line interface
Password: whagwcli
Bad password
Password: whagwcli
Accepted
gateway>
```

Figure 48. PuTTY Password Prompt.

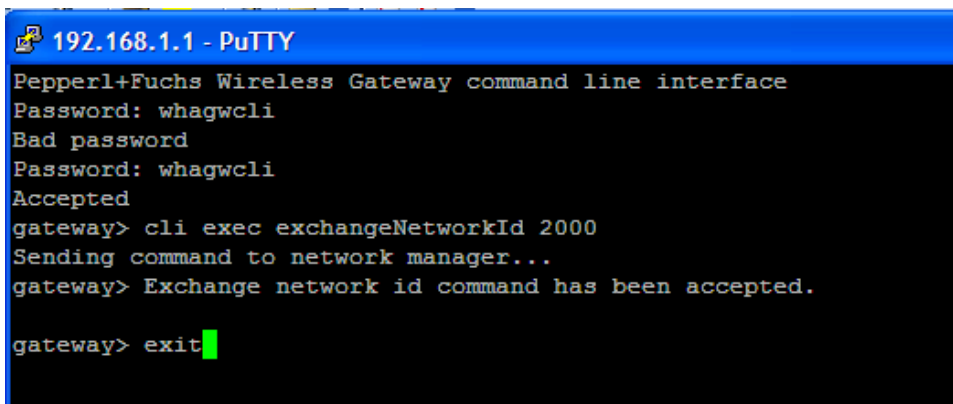
Enter **cli exec exchangeNetworkId xxx** to modify the network ID of all field devices connecting to the gateway, where **xxx** is the new network ID.



```
192.168.1.1 - PuTTY
Pepperl+Fuchs Wireless Gateway command line interface
Password: whagwcli
Bad password
Password: whagwcli
Accepted
gateway> cli exec exchangeNetworkId 2000
Sending command to network manager...
gateway> Exchange network id command has been accepted.
gateway>
```

Figure 49. PuTTY Gateway Prompt.

Enter **exit** to terminate the Telnet client program.



```
192.168.1.1 - PuTTY
Pepperl+Fuchs Wireless Gateway command line interface
Password: whagwcli
Bad password
Password: whagwcli
Accepted
gateway> cli exec exchangeNetworkId 2000
Sending command to network manager...
gateway> Exchange network id command has been accepted.
gateway> exit
```

Figure 50. Terminate the Telnet Client Program.

For a beta network using six to ten SKF Wireless Machine Condition Sensor units, wait 15 minutes after sending the command before activating the new network ID by reforming the network.

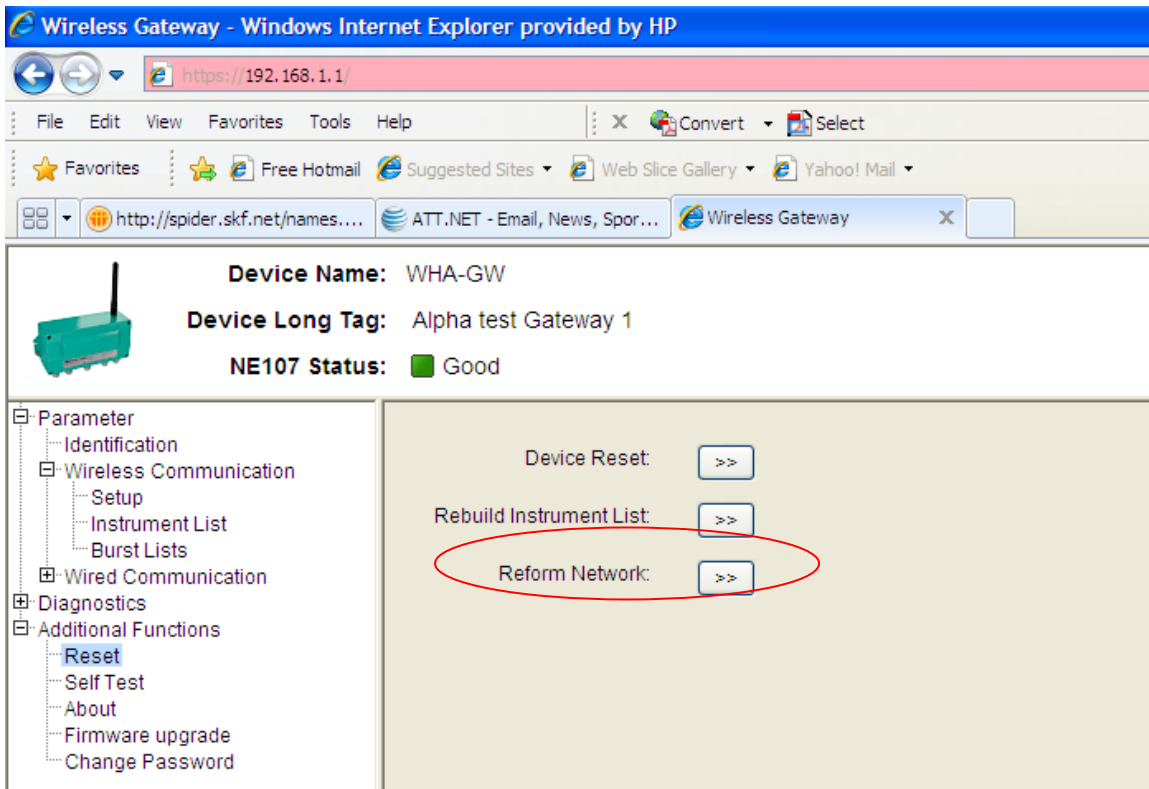


Figure 51. Reform the Network.

Verify that all SKF Wireless Sensors are reconnecting after the network ID change in the Instrument List web page.

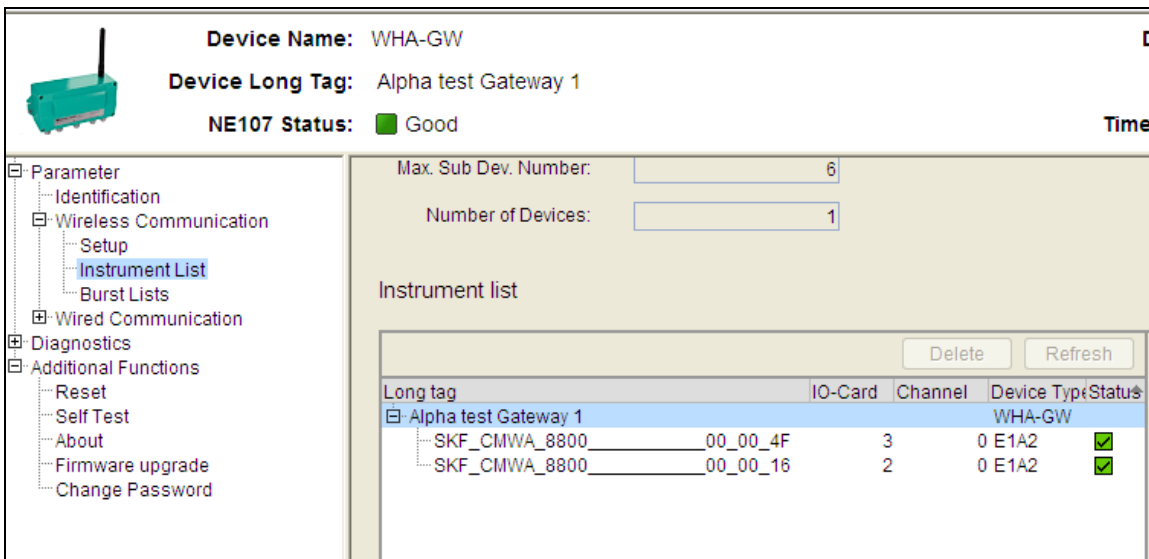


Figure 52. Instrument List Page.

Installation of 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.*

Installation in Hazardous Locations

The SKF Wireless Machine Condition Sensor is certified for installation in safe areas, and in ATEX Zone 0, 1, and 2 areas.

SKF Wireless Machine Condition Sensor Dimensions

The following features allow easy mounting and un-mounting of the SKF Wireless Sensor:

- Standard 1/4-28 UNF mounting hole threading
- Robust metal base for applying mounting torque with 33.34 mm wrench

You can also access the SKF Wireless Sensor nut from top with a 100 mm long socket wrench. See the figure below for sensor dimension details.

Error! Objects cannot be created from editing field codes.

Figure 53. 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. 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 configurations:

- Magnets
- Adhesives
- Threaded studs

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

Magnetic Mounting

Magnetic mounts are also popular in walk-around monitoring programs and the frequency response is better, 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.

Adhesive Mounting

If you cannot tap a hole properly into the machine, an adhesive mount is recommended. 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.

Mounting Pads

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.

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.

The mounting point on the structure should be spot-faced to 1 in. 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 $\mu\text{in.}$). The tapped hole must be perpendicular to the mounting surface and at least two threads deeper than the stud. This will prevent a gap between the sensor and the mounting surface, and produce optimum frequency response.

Proper screw 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.

It is recommended to use a thread adhesive such as Loctite 222.

Pipe Thread Adapters

Pipe thread mounting adapters provide a mounting location for either magnetically mounted or permanently mounted sensors, but avoid the need to drill a hole in the machine and spot-face. They can make use of existing plugged holes on the machine.

Securing the SKF Wireless Sensor to the Machine Surface

You must mount the SKF Wireless Sensor so that it is grounded to the machine. If using 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 we recommend the fluid to be conductive (even though the stud itself will make an electrical coupling to the machine or mounting pad).

Mounting Torque

- Recommended SKF Wireless Machine Condition Sensor mounting torque: 2.9 Nm