

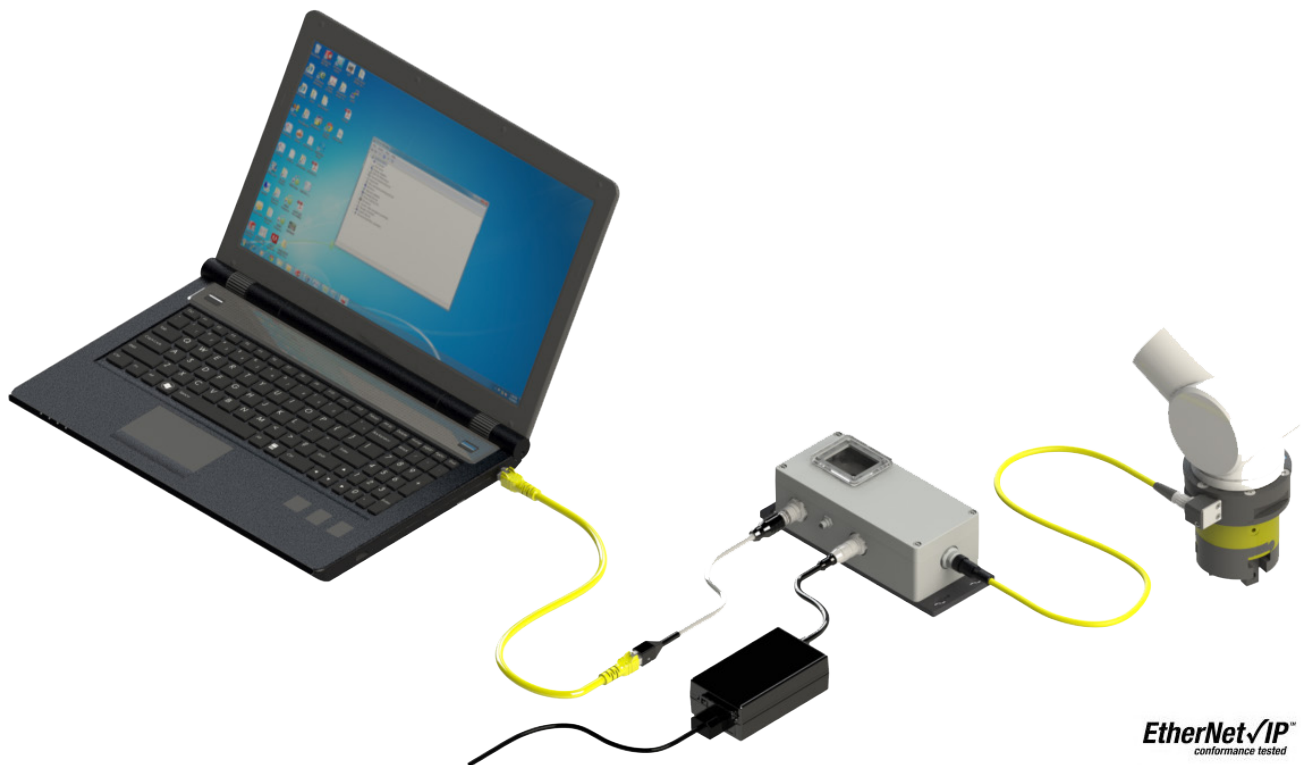


A Novanta Company
Net F/T

Network Force/Torque Sensor System

Quick Start Guide

For Firmware Versions up to 2.0.012 Standard



Document #: 9610-05-1022 Quick Start

Engineered Products for Robotic Productivity

Pinnacle Park • 1031 Goodworth Drive • Apex, NC 27539 • Tel: 919.772.0115 • Fax: 919.772.8259 • www.ati-ia.com

Foreword

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Note

Please read the manual before calling customer service. Before calling, have the following information available:

1. Serial number (e.g., FT01234)
2. Transducer model (e.g., Nano17, Gamma, Theta, etc.)
3. Calibration (e.g., US-15-50, SI-65-6, etc.)
4. Accurate and complete Description of the question or problem
5. Computer and software information (operating system, PC type, drivers, application software, and other relevant information about the configuration)

If possible, be near the F/T system when calling.

For additional information or assistance, please refer to one of the following contacts:

Sale, Service and Information about ATI products:

ATI Industrial Automation

1031 Goodworth Drive

Apex, NC 27539 USA

www.ati-ia.com

Tel: +1.919.772.0115

Fax: +1.919.772.8259

E-mail: ft_support@ati-ia.com

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1. Getting Started

This quick-start guide provides information to:

- Set up the Net F/T system and guide you through unpacking the equipment.
- Setting the Net Box DIP switches, connecting the equipment, powering up the Net Box.
- Configuring the computer Ethernet using Windows 7 or Windows XP,
- Connecting the computer to the Net Box.
- Running the Net F/T Demo, Changing the IP Address Settings.

Before you begin, ensure that Java is installed on your computer. You can download Java from www.java.com/getjava; a LAN Ethernet connector is required. Once the system has been setup, the transducer is used to monitor the forces while installing the transducer to the robot arm (or other device) and attaching the tool to the transducer.

1.1 Unpacking

1. Check the shipping container and components for damage that occurred during shipping. Any damage should be reported to ATI Industrial Automation.
2. Check the packing list for omissions.
 - Standard components of a Net F/T system are:
 - Net F/T Transducer
 - Transducer cable (which may be integral to the transducer)
 - Net Box
 - ATI Industrial Automation CD containing software, calibration documents, and manuals.
 - Optional components:
 - Power supply: Plugs into a 100–240 VAC (50–60 Hz) power outlet and supplies power to the Net Box through the Pwr/CAN connector
 - Ethernet switch supporting Power-over-Ethernet: Provides network connection and supplies power over the Ethernet connector
 - RJ45 to M12 Ethernet cable adapter
 - Mini to Micro (M12) DeviceNet adapter (for the Pwr/CAN connector)
 - DeviceNet cabling (for the Pwr/CAN connector)
 - Ethernet cabling
 - Robot-grade transducer cables of different lengths.

1.1.1 Suspension Packaging for Large Transducers

1. Open the container and remove any cabling, manuals, and loose equipment from the container.
2. Remove the top suspension packaging.
3. Remove the equipment and place on the work area.

1.1.2 Retention Packaging for Small Transducers

1. Open the container and remove any cabling, manuals, and loose equipment from the container.
2. Lift out the retention package. Do not let the package handles separate.
3. Place the package on the work area and allow the package handles to separate.
4. The bottom flaps release and free the equipment.

Figure 1.1—Retention Packaging

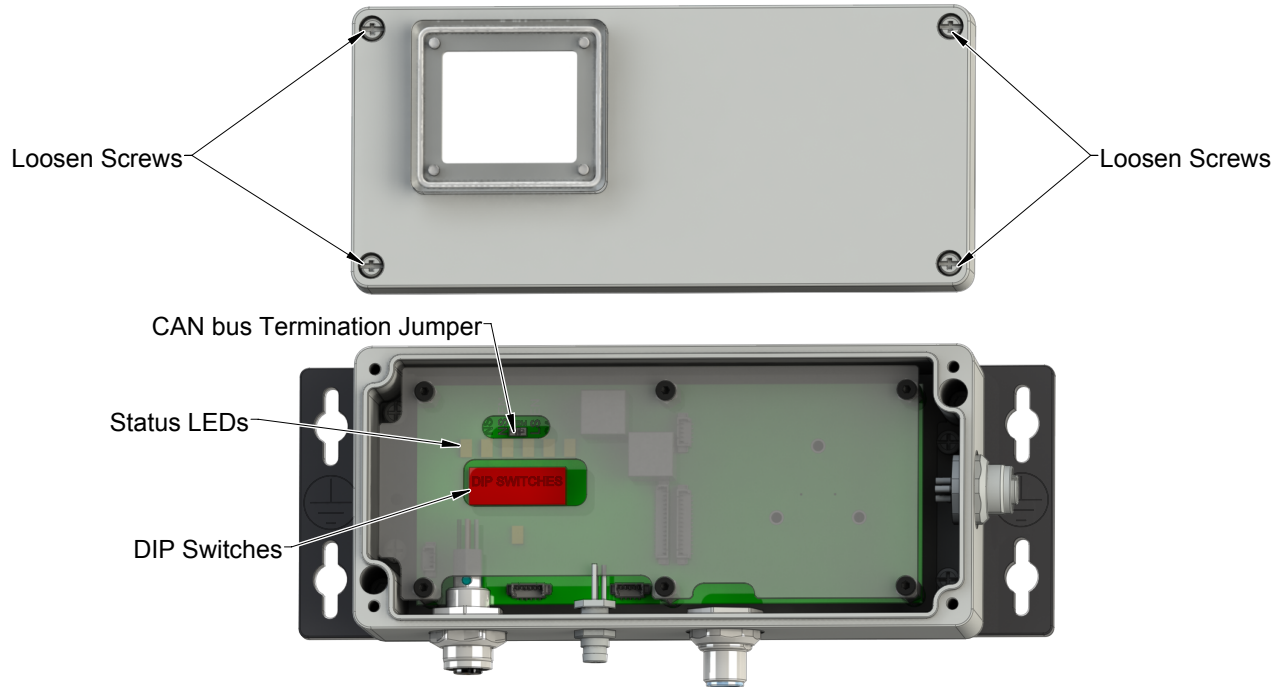


2. Preparing the Net Box

The configuration DIP switches are located inside of the Net Box. Before opening the Net Box, make sure that the box is not powered and that you and the Net Box are electrically grounded.

1. Loosen the (4) screws that secure the cover on the Net Box.
2. Lift the cover straight up and off the chassis.

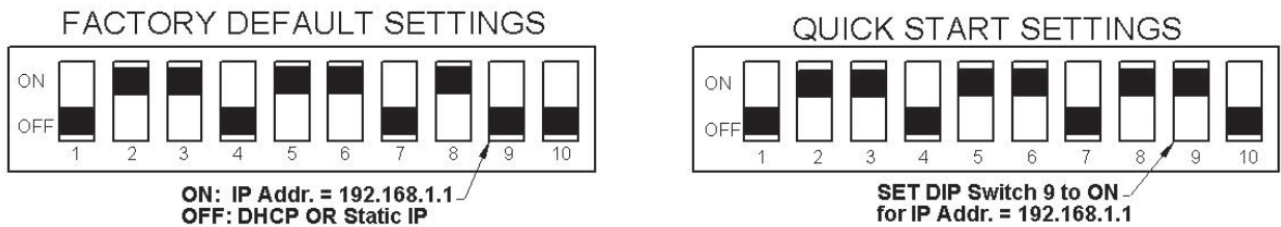
Figure 2.1—Net Box Dip Switches



NOTICE: The internal electronics have a shield to help protect them from debris or errant tool movements. There are access holes in the shield for the DIP switches and termination resistor jumper.

3. Set DIP switch 9 to the ON position.

Figure 2.2—Net Box Dip Switches



NOTICE: Before replacing the Net Box cover, you must ensure that no debris or liquids are in the chassis.

4. Place the cover back on the chassis (verify that the window is above the LEDs and DIP switches).
5. Tighten the (4) screws to secure the cover.

3. Connecting the Equipment

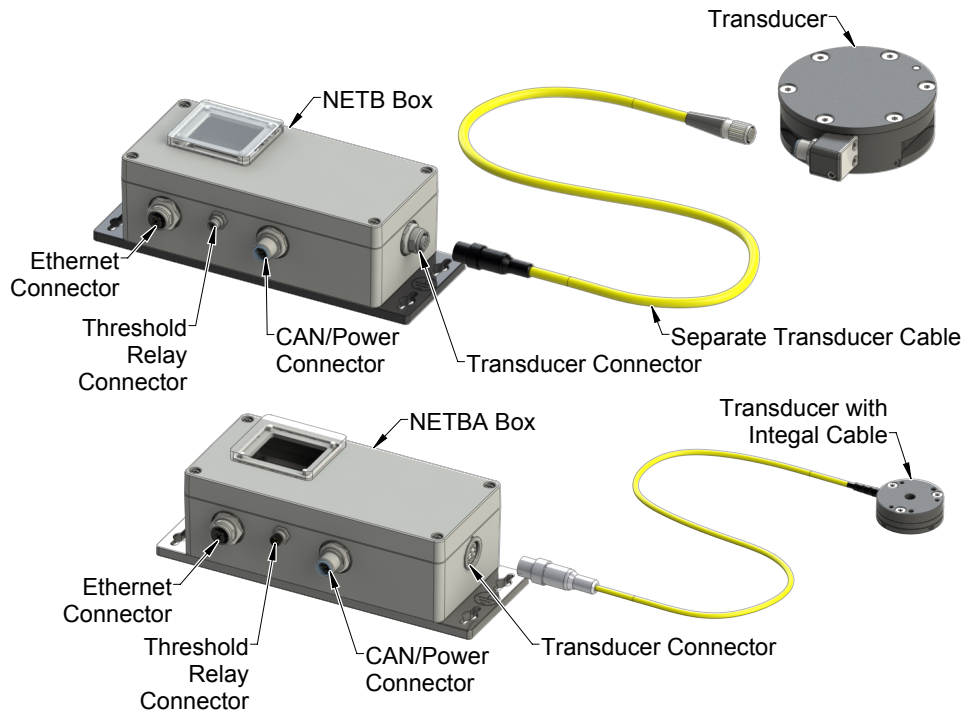
3.1 Connecting Transducers

Some transducers have an integral cable; others have a cable that must be connected to the transducer. Connect the transducer cable to the transducer connector on the end of the Net Box.

CAUTION: Do not exert excessive force on the transducer. The transducer is a sensitive instrument and can be damaged by applying force exceeding the single-axis overload values of the transducer and cause irreparable damage. Refer to the F/T Transducer Installation and Operation Manual (9620-05-Transducer Section) for transducer overload values.

CAUTION: When setting up the Net F/T system, than the minimum bend radius. Bending the cables tighter less than the minimum will damage the cable. Refer to [Section 9.3—Routing the Transducer Cable](#) for minimum bend radii.

Figure 3.1—Transducer Connection



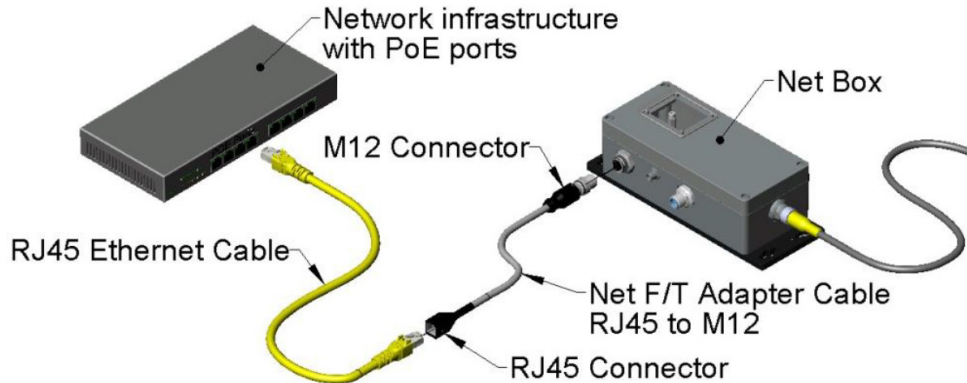
3.2 Connecting Power

There are (2) ways to power the Net F/T system using a separate power supply or Power-over Ethernet (PoE).

3.2.1 Power-over-Ethernet

Use a Power-over-Ethernet (PoE) switch to deliver power to the Net box. To do this you will need an Ethernet switch that supports PoE is required. Power is automatically delivered to the Net F/T when you make the Ethernet connection to a PoE port on the switch. Net F/Ts that have the optional fieldbus do not support PoE.

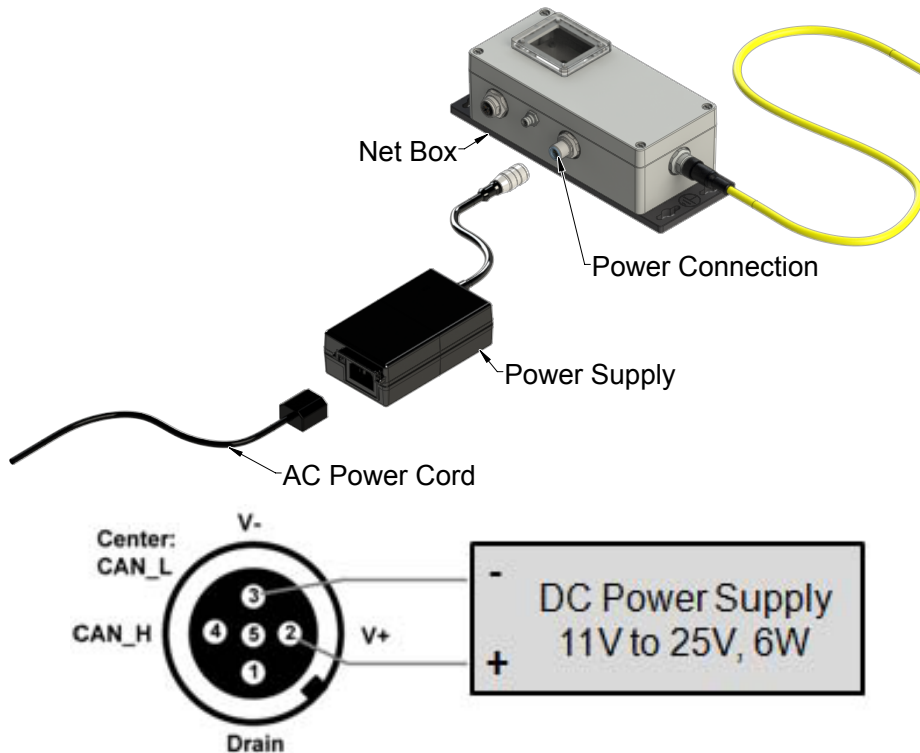
Figure 3.2—Power-over-Ethernet Connection



3.2.2 Separate Power Supply

Connect a 25 VDC power supply to the Net box's *Pwr/CAN* connector. The power supply must provide 10 Watts of power, and should be Class 1 (has an earth ground connection).

Figure 3.3—Separate Power Supply Connection



3.3 Connecting to the Network

For purposes of this quick start, your computer will be connected directly to the Net F/T and disconnected from your LAN. You will be temporarily giving your computer a fixed IP address of 192.168.1.100. It is important that the Ethernet cable to the Net F/T is disconnected from your computer during this step.

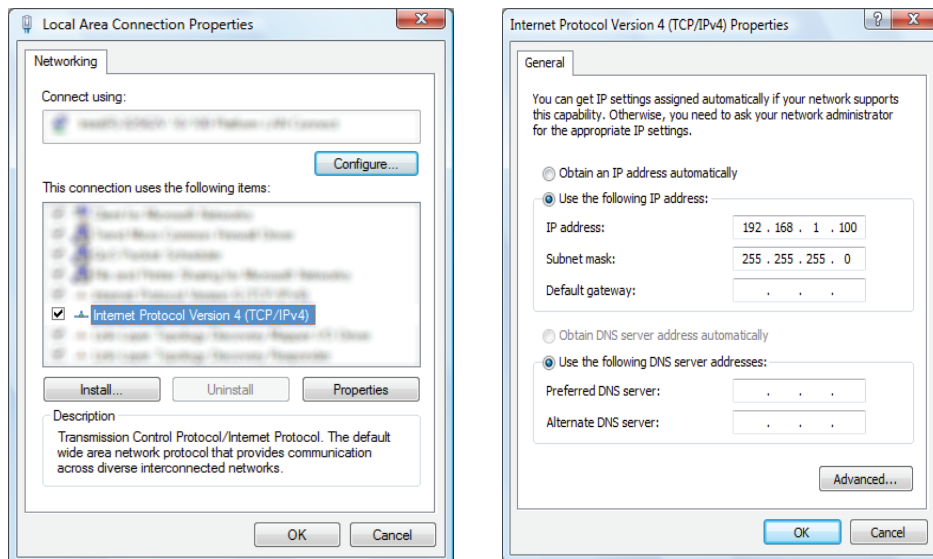
Please contact your IT department for assistance if you are uncomfortable making the following temporary changes to your computer's network configuration.

1. Unplug the Ethernet cable from the LAN port on your computer.
2. Open your computer's *Internet Protocol (TCP/IP)* Properties window. Use the following the instructions for your computer's operating system.

3.3.1 Configuring Ethernet on Windows New

1. From the *Start* menu, select *Control Panel*.
2. For Vista, click *Control Panel Home*.
3. Click *Network and Internet* icon.
4. Click *Network and Sharing Center* icon.
5. For Vista, click *Manage Network Connections* task link. For Windows 7, click *Local Area Connection* link.
6. For Vista, right-click *Local Area Connection* and select *Properties*. For Windows 7, click *Properties*.
7. Select *Internet Protocol Version 4 (TCP/IPv4)* connection item and click *Properties*.

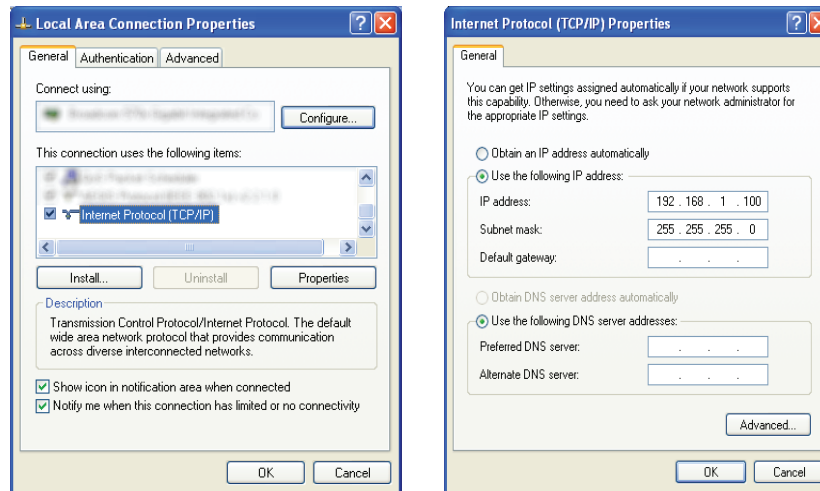
Figure 3.4—Windows Vista and Windows 7 Networking Information



3.3.2 Configuring Ethernet on Windows New

1. From the *Start* menu, select *Control Panel*.
2. Click *Network Connections*. If your *Control Panel* says *Pick a category* at the top, click *Network and Internet Connections*.
3. Click *Network Connections*.
4. Right-click *Local Area Connection* and select *Properties*.
5. Select *Internet Protocol (TCP/IP)* connection item and click *Properties*.

Figure 3.5—Windows XP Networking Information



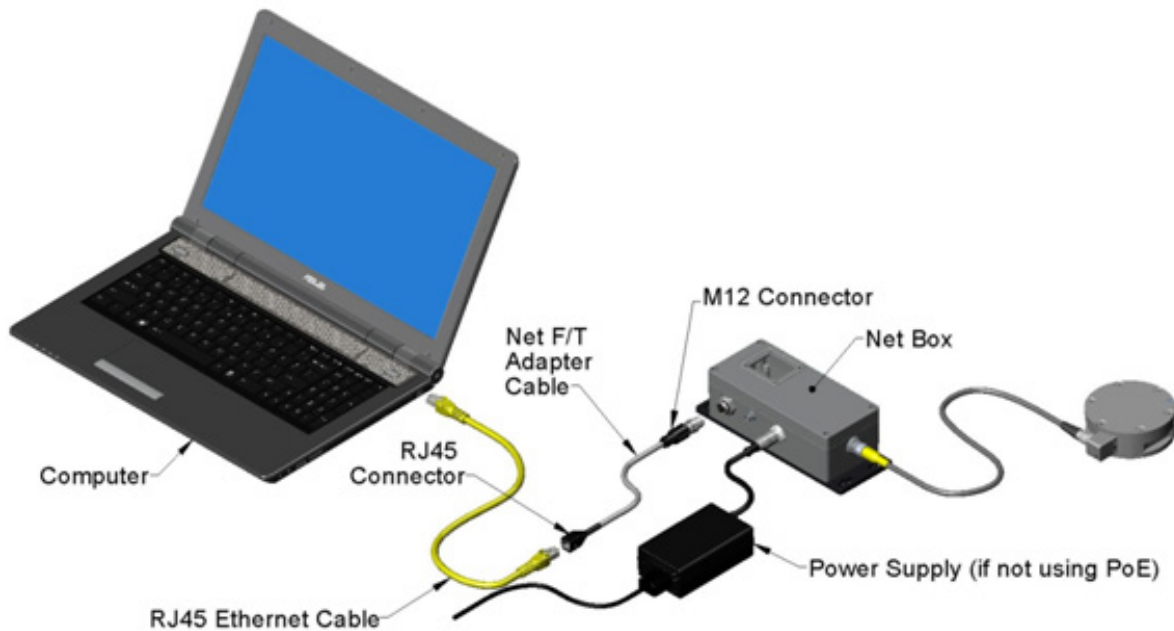
6. Record the values and settings shown in the properties window. You will need these later to return your computer to its original configuration.
7. Select *Use the following IP address:*.
8. In the *IP address:* field, enter *192.168.1.100*.
9. In the *Subnet mask:* field, enter *255.255.255.0*.
10. Click *OK*.
11. Click *Close*.

3.4 Connecting to the Computer

Connect the computer to the Net Box, this will allow you to connect to the Net Box and later run the demo software. You can monitor the forces during installation of the transducer.

1. Connect the RJ-45 to M12 Ethernet adapter to the Net Box, if not previously connected.
2. Connect the Ethernet cable to the Ethernet adapter, if not previously connected.
3. Connect the other end of the Ethernet cable to your computer's LAN connection. You may need to wait a short while so your computer has time to recognize the connection.

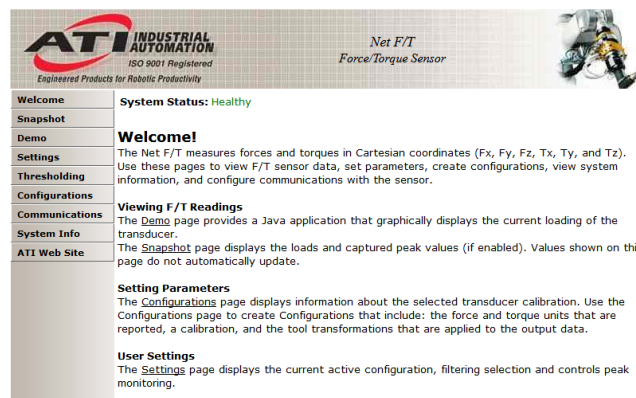
Figure 3.6—Connecting to Computer



3.4.1 Viewing the Net F/T's Web Pages

Enter the address *192.168.1.1* in your browser to view the Net F/T's *Welcome* page. (If the page is not found, you may need to clear previous *192.168.1.1* device entries from the computer by restarting the computer or, if you have administrative privileges, by going to the computer's *Start* menu, selecting *Run...*, and entering "*arp -d **".)

Figure 3.7—The Net F/T's Welcome Page



3.4.2 Monitoring Loads During Installation using Demo Program

The demo program must be configured to monitor raw strain gage values used to monitor for gage saturation during installation. This will give feedback to help to avoid overloads and causing irreparable damage to the transducer. Smaller transducers can easily be irreparably damaged by applying small loads using tools (moment arm increases applied loads) when mounting the transducer. After the installation is completed, the NET F/T will need to be reconfigured to the #1 sensor calibration and desired output units selected to give F/T measurements per Step 12.

NOTICE: Each transducer has a maximum measurement range and a maximum overload capacity. Exceeding the transducer's overload capacity can cause permanent damage. Smaller transducers have lower overload capacities. Tx and Ty are usually the easiest axes to accidentally overload. Strain gage saturation is the first indication that you are approaching a mechanical overload condition, and saturation always causes inaccurate F/T data, so it is critical that you monitor the F/T system for strain gage saturation.

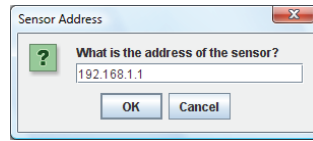
1. Click *Configuration*.
2. Click the down arrow in the Calibration Select field and select #16-FT00000. (Note: Must be the factory default setting for #16-FT00000). The #16-FT00000 with the units field set to lbf and lbf-in configures the NET FT to output the six raw gage values.
3. Click the down arrow in the Force Units field and select *lbf*.
4. Click the down arrow in the Torque Units field and select *lbf-in*.
5. Click *Apply*. The NET FT is now configured to output gage values, not F/T measurements.
6. Verify the Counts per Force: field value is 1 and the Counts per Torque field value is 1. If not, make sure you have selected *lbf* for the Force Units and *lbf-in* for the Torque units. Click *Apply* to activate the changes.

Figure 3.8—Configurations Page

7. Click *Download Demo Application*. This launches the demo application.

8. In the Sensor Address window, enter *192.168.1.1* as the address.

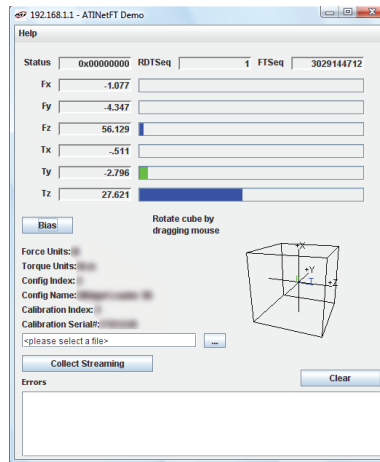
Figure 3.9—Sensor Address



9. Click *OK*.

NOTICE: The Demo application lists Fx, Fy, Fz, Tx, Ty, and Tz, but has been configured to display gage values. Fx = SG0, Fy=SG1, Fz = SG2, Tx=SG3, Ty=SG4, Tz=SG5 The Demo should indicate lbf, lbf-in and FT00000 calibration serial number with index #16.

Figure 3.10—Java Demo Application (for reference only)



10. If the demo lists *IO Exception* errors without updating the values and bar graphs, and the LEDs in the Net Box are all green, then visit *192.168.1.1/comm.htm* and enable the RDT interface. Click *Apply*.
11. Use the demo application to monitor for raw strain gage saturation for the transducer. This helps avoid reaching the overload value of the transducer. If a gage saturation error is reported, stop applying force immediately and wait until error clears. If the gage saturation does not clear, it is possible the sensor has been overloaded and is damaged beyond repair. An overloaded sensor will have a permanently saturated gage output and the F/T measurements will be invalid. Contact ATI F/T Support if there is a permanently saturated gage.
12. When the installation is complete and the sensor is indicating healthy, close the NET F/T Demo program. The NET FT system will need to be reconfigured to output FT measurements. Go to Net F/T Web browser, click *Configuration*, click the down arrow in the Calibration Select field and select the #1 calibration that will match the FT serial number of the sensor #1-FTxxxxx. Set the Force and Torque units to match the calibration units or the desired units output and click *Apply*. The NET F/T system is now set to output F/T measurements in calibrated units, not raw gage values. Restart the NET F/T Demo to read FT measurements.

4. Installing the Transducer

Refer to the Net F/T manual.