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FESTO

User Guide

Networked Data Acquisition

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FESTO

Electric Power Technology

Solar/Wind Energy Training System

User Guide

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Electricity and New Energy

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Training System

Networked Data Acquisition

User Guide

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The following table lists the safety and common symbols that may be used in this document and on the equipment. Before performing manipulations with the equipment, you should read all sections regarding safety in the User Guide accompanying the equipment.

If applicable, following subsections give general procedures related to the tasks you may be asked to perform in this document. Additional safety procedures are given before any task requiring specific safety precautions.

Symbol	Description
⚠ DANGER	**DANGER** indicates a hazard with a high level of risk, which, if not avoided, will result in death or serious injury.
⚠ WARNING	**WARNING** indicates a hazard with a medium level of risk, which, if not avoided, could result in death or serious injury.
⚠ CAUTION	**CAUTION** indicates a hazard with a low level of risk, which, if not avoided, could result in minor or moderate injury.
CAUTION	**CAUTION** used without the "Caution, risk of danger" sign, indicates a hazard with a potentially hazardous situation, which, if not avoided, may result in property damage.
	Caution, risk of danger. Consult the relevant user documentation.
	Caution, risk of electric shock.
	Caution, lifting hazard.
	Caution, hot surface.
	Caution, risk of fire.
	Caution, risk of explosion.
	Caution, belt drive entanglement hazard.
	Caution, chain drive entanglement hazard.
	Caution, gear entanglement hazard.
	Caution, hand crushing hazard.
	Static sensitive contents. Observe precautions for handling electrostatic discharge sensitive devices.
	Notice, non-ionizing radiation.
	Consult the relevant user documentation.
	Radio Equipment Directive (RED) geographical restrictions – consult the relevant user documentation.

Symbol	Description
	Direct current.
	Alternating current.
	Both direct and alternating current.
	Three-phase alternating current.
	Earth (ground) terminal.
	Protective conductor terminal.
	Frame or chassis terminal.
	Equipotentiality.
	On (supply).
	Off (supply).
	Equipment protected throughout by double insulation or reinforced insulation.
	In position of a bi-stable push control.
	Out position of a bi-stable push control.

Table of Contents

1 Introduction

The Model 46120-J0 Networked Data Acquisition System (NDAS) allows users to remotely monitor power and energy levels on the Model 46120 Solar/Wind Energy Training System (the following figure). The NDAS can be web-based on a wide area network (WAN), or it can run on a local area network (LAN).

Figure 1: The Model 46120 Solar/Wind Energy Training System.

Real-time electrical, environmental, and ecological data can be viewed online via the Internet or via an intranet connection by simply accessing the Model 46540 Networked Data Acquisition Interface (NDAI) unit from within one of the common web browsers that are available today. Multiple users (up to 30) can access the data simultaneously, as well.

The 10/100Base-TX network controller supports TCP/IP and Modbus/TCP networking protocols. The standard port 80 is used for TCP/IP (as a default setting), and port 502 is used for Modbus/TCP. IP addresses and ports can be changed as needed. Personal preferences can be saved and restored automatically. The data can also be sent via e-mail in comma-separated values (CSV) file format. CSV text files are recognized by many computer programs, including Microsoft Excel.

Ten analog input signals are continuously measured by the NDAS. The first two channels monitor AC power levels, the following six channels measure DC power levels, and the last two channels monitor environmental conditions. At least 22 calculated values are displayed in addition to the 10 measured values. Ecological data is calculated and displayed by the embedded web server, such as the amounts of renewable and sustainable energy generation and consumption, and various forms of savings, such as electricity cost and carbon dioxide emissions. Battery and communication status is displayed at all times, and the indicated units of measure for many parameters can be quickly changed between Metric (SI) and Imperial (US). All measured and calculated

data is extremely accurate due to the 10-channel, 16-bit analog-to-digital converter (ADC) that operates at about 3.33 samples per second. This 3.33 Hz sample rate updates the displayed data every 300 ms.

The ten differential analog inputs are protected to 240 Vac (4 kV ESD), and present a 2 MΩ impedance to circuits under test for voltage measurements (or a 125 Ω resistance in DC current loop configurations). The high input impedance helps to provide greater measurement accuracy while the differential mode helps to reduce noise, and eliminate ground loop and other potential ground-related issues that could prevent the ground-fault protection device (GFPD) on the training system from working properly.

Signal conditioners are used for AC signals and optional temperature measurements, and shunts are used for DC current measurements. Precision resistors are used to scale down (divide) high voltage measurements to DC levels below 5 Vdc. The solar irradiance feature uses a specialized, calibrated light sensor to provide a DC voltage level to the NDAI unit. The wind speed feature uses an AC alternator with a simple passive peak detector circuit to provide a small DC voltage level to the DAQ unit. Platinum (Pt) 100 Ω resistance temperature detectors (RTDs) are used for optional temperature sensing of the ambient air or the solar cell surface. The input specifications for all ten measurement channels are listed in the following table.

Table 1: Input specifications for the ten measurement channels.

Chnl	Description	Setting	Scaling	Specifications
1	AC Load/Inverter Voltage	±20 mA	mA x 7.5	0-150 Vac ±0.25% of FS, change internal jumper J1 to arrow
2	AC Load/Inverter Current	±20 mA	mA x 0.25	0-5 Aac ±0.25% of FS, change internal jumper J2 to arrow
3	DC Load Current	±150 mV	mV / 2.5	0-60 Adc ±0.5% of FS (HW limit 15 A)*
4	Wind Turbine Current	±150 mV	mV / 2.5	0-60 Adc ±0.5% of FS (HW limit 20 A)*
5	Solar Module Voltage	±5 V	V x 5	0-25 Vdc ±0.5% of FS
6	Solar Module Current	±150 mV	mV / 2.5	0-60 Adc ±0.5% of FS (HW limit 20 A)*
7	Battery/Turbine/DC Load Voltage	±5 V	V x 5	0-25 Vdc ±0.5% of FS
8	Battery Bank Current	±150 mV	mV x 1	0-150 Adc ±0.5% of FS (HW limit 40 A)*
9	Solar Irradiance	±500 mV	mV x 5	0-1750 W/m² (300-1175 nm) ±5% of FS (5 W/m² per mV)
9	Temperature (optional)	4-20 mA	((mA - 4) x 19.1875) - 99	-60°C to 208°C ±0.9% of FS, change internal jumper J9 to arrow
10	Wind Speed	±5 V	(V + 0.09) x 33.8	8-172 mph ±3% of FS (displays ›4 mph)
10	Temperature (optional)	4-20 mA	((mA - 4) x 19.1875) - 99	-60°C to 208°C ±0.9% of FS, change internal jumper J9 to arrow

* = Hardware limited to a lower current level. FS = Full-scale.

Hint

The specified accuracy for AC measurements may not be valid below 5% of the full span (‹7.5 V ac or ‹0.25 A ac).

2 Hardware

The NDAI unit provides both the data acquisition and web server functions.

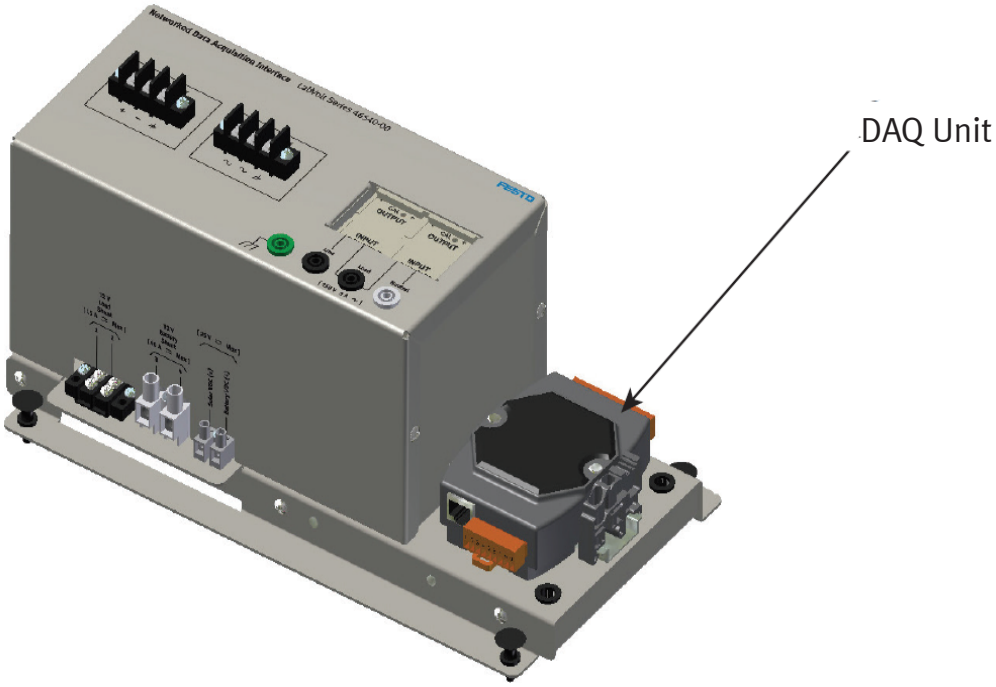

Figure 2: The Model 46540 NDAI Unit.

The NDAI unit shown in the preceding figure contains a standard 35 mm DIN rail for mounting the DAQ unit (visible in lower right) and any necessary signal conditioners (mounted internally). A 24 Vdc supply is provided to power the NDAI unit. However, the NDAS operates with a power supply voltage that is between 10 Vdc and 30 Vdc. Sensors are provided to monitor environmental conditions. The pyranometer, anemometer, and optional thermometer functions are provided by a combination of signal conditioning, analog-to-digital conversion, firmware algorithms, system networking, and computerized web browsing capabilities.

2.1 Tools required

The following six tools are required to install the NDAI unit onto a Model 46120.

- ¼" combination or socket wrench, or nut driver.
- ½" combination or socket wrench, or nut driver.
- 9/16" combination or socket wrench, or nut driver.
- 2.4 mm flat-blade screwdriver.
- 1/8" flat-blade screwdriver.
- #2 Phillips screwdriver.

3 Hardware installation

The electrical wiring of the NDAS is represented in the figures in this section, as well as in the following table. If it is not already wired, connect your NDAS to the training system by following the instructions below. Connectors on the NDAI unit offer a convenient method of wiring the NDAI unit to the other system components and to the training system.

The following voltages and currents on the training system are directly monitored by the NDAS. Refer to the following figure.

1. AC load voltage
2. AC load current
3. DC load current
4. Wind turbine current
5. Solar module voltage
6. Solar module current
7. Battery bank/wind turbine/DC load voltage
8. Battery bank current

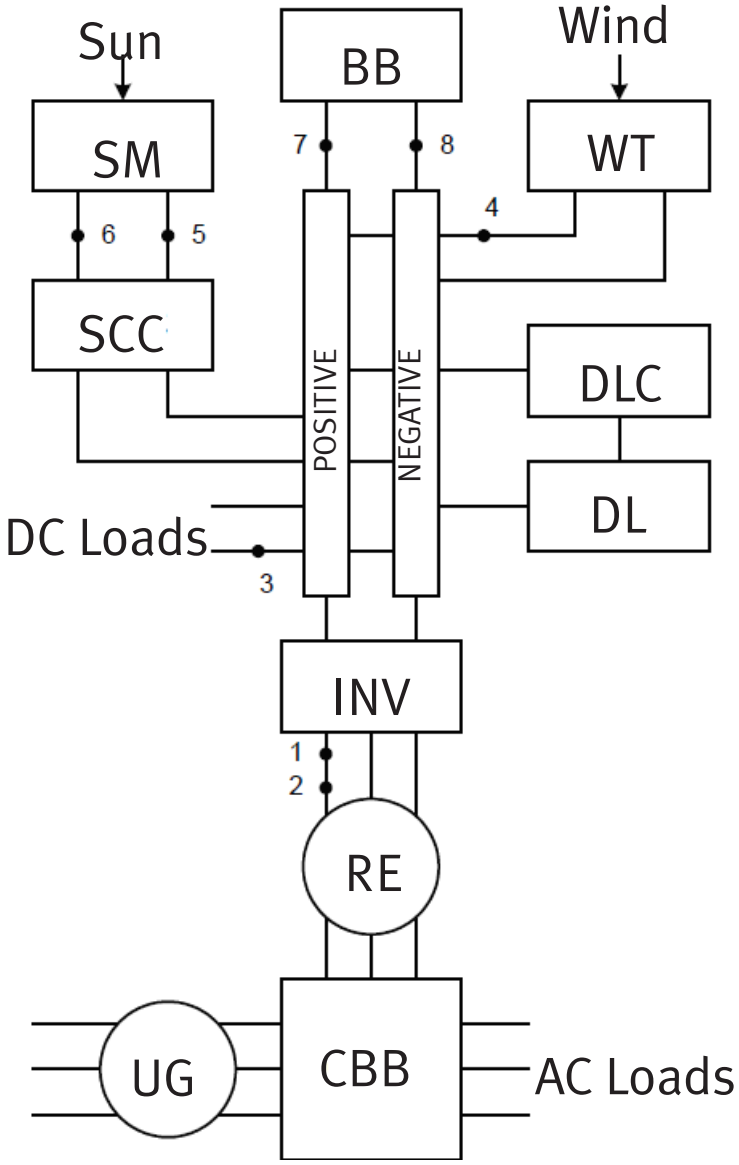

Figure 3: Sensor Location Block Diagram.

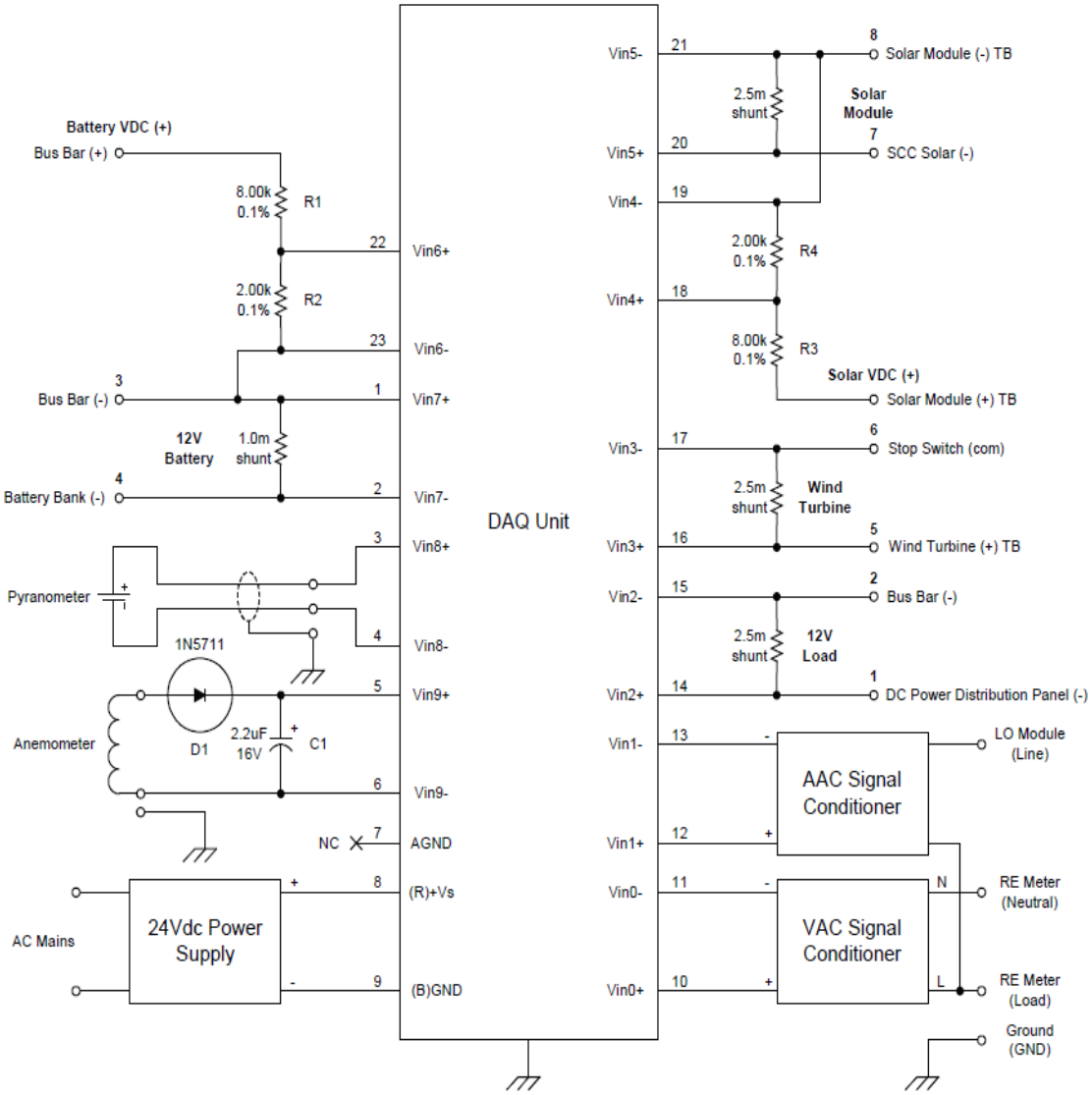

Figure 4: NDAS Schematic Diagram.

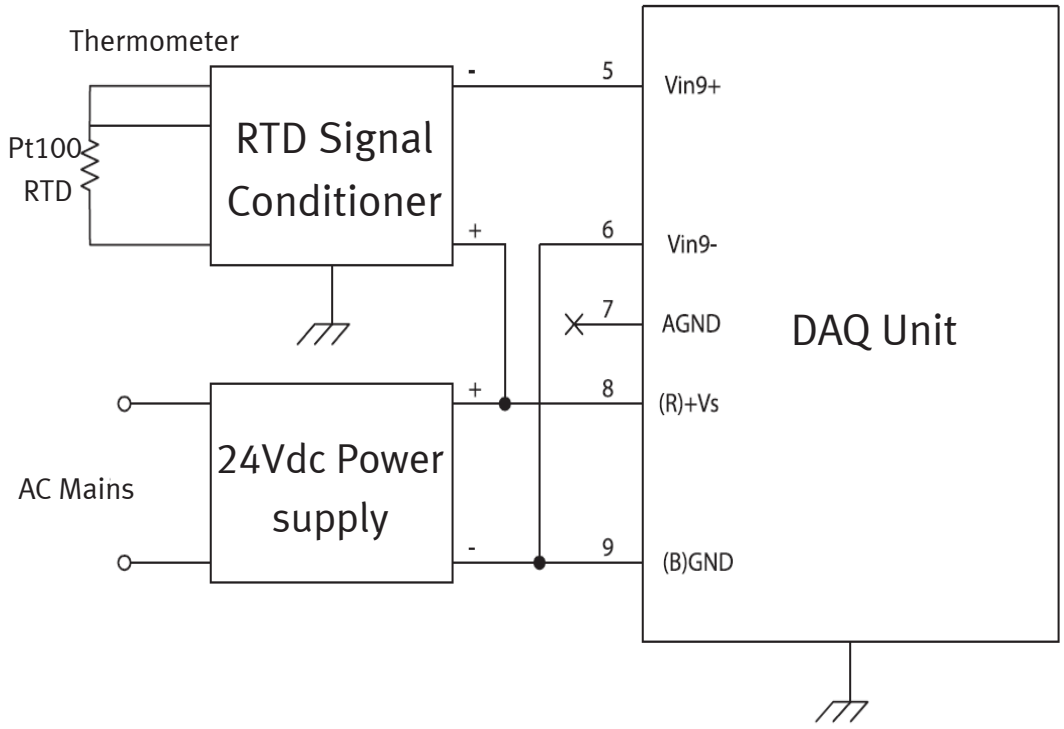

Figure 5: NDAS Schematic Diagram (Temperature Option).

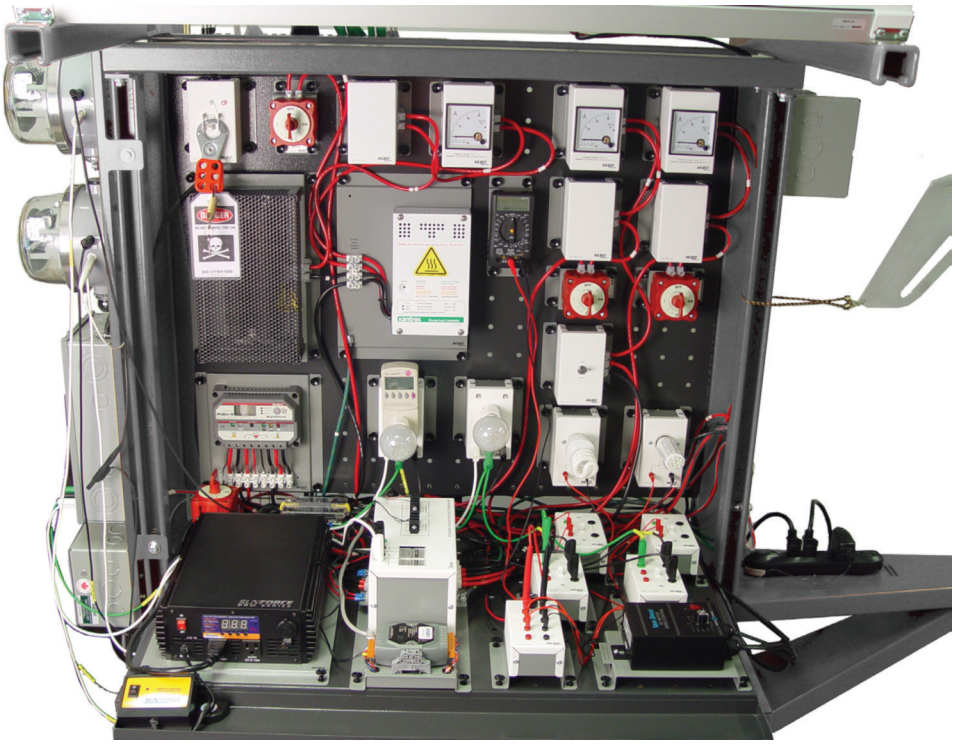

Figure 6: Electrical Wiring and Module Placement.

Connect the necessary NDAS wiring in the order listed in the following table. Optional thermometer wiring is listed in the following table.

Table 2: Wire run list.

Wire	From	To	Color	AWG	Terminals	Comments
*	Lockout Module Black (Load) plug p/o 66061	AAC Input Black (Line) jack p/o 46540	Black	14	4mm plug to 4mm plug	Mate the male/female 4mm connectors at one end.
*	AAC/VAC Input Black (Load) jack p/o 46540	RE Utility Meter Black (Line) jack p/o 66059	Black	14	4mm plug to 4mm plug	-
*	VAC Input White (Neutral) jack p/o 46540	RE Utility Meter White (Neutral) jack p/o 66059	White	14	4mm plug to 4mm plug	Lockout Module White (Neutral) plug also connected.
38	12V Battery Shunt terminal 3 p/o 46540	Power Bus Bar (Negative) rail terminal 7 p/o 66062	Black	8	tin to 5⁄16" lug	-
39	Battery Bank (Negative) wire p/o 65917	12V Battery Shunt terminal 4 p/o 46540	Black	8	5⁄16" lug to tin	Remove Black (Negative) wire #35.
*	12V Battery Shunt terminal 3 p/o 46540	DC Power Distribution Panel (Negative) wire p/o 66053	Black	14	#10 lug to module	-
40	Power Bus Bar (Negative) rail terminal 5 p/o 66062	12V Load Shunt terminal 2 p/o 46540	Black	14	#10 lug to #10 lug	-
41	Battery VDC (+) terminal p/o 46540	Power Bus Bar (Positive) rail terminal 3 p/o 66062	Red	22	tin to #10 lug	-
42	Wind Turbine (Positive) upper terminal block p/o 46801-J0	Wind Turbine Shunt terminal 5 p/o 46540	Red	8	tin to tin	-

Wire	From	To	Color	AWG	Terminals	Comments
43	Wind Turbine Shunt terminal 6 p/o 46540	Stop Switch (Center/ Common) terminal p/o 66066	Red	8	tin to tin	Remove Red (Positive) wire #11.
44	Solar Module Shunt terminal 7 p/o 46540	Solar Charge Controller (Solar -) terminal p/o 66065	Black	8	tin to tin	Remove Black (Negative) wire #3.
45	Solar Module (Negative) upper terminal block p/o 46801-J0	Solar Module Shunt terminal 8 p/o 46540	Black	8	tin to tin	-
46	Solar VDC (+) terminal p/o 46540	Solar Module (Positive) upper terminal block p/o 46801-J0	Red	22	tin to pin term.	-
47	NDAI mounting plate (GND) stud p/o 46540	Training System Chassis Ground (GND) stud p/o 46801-J0	Green/ Yellow	8	#10 lug to 5⁄16" lug	-
*	Anemometer Input terminal (AC) p/o 46540	Wind Speed Sensor	Black	22	tin on one end	-
*	Anemometer Input terminal (AC) p/o 46540	Wind Speed Sensor	Black	22	tin on one end	-
*	Pyranometer Input terminal (+) p/o 46540	Solar Irradiance Sensor	Red	22	tin on one end	-
*	Pyranometer Input terminal (-) p/o 46540	Solar Irradiance Sensor	Black	22	tin on one end	-
*	Pyranometer Input terminal (GND) p/o 46540	Solar Irradiance Sensor	Clear	22	tin on one end	-
*	AC Adapter (Positive) output wire	DAQ Unit power supply input terminal 8	Black	22	pin term. on one end	Red insulation on pin terminal.

Wire	From	To	Color	AWG	Terminals	Comments
*	AC Adapter (Negative) output wire	DAQ Unit power supply input terminal 9	Black	22	pin term. on one end	Yellow insulation on pin terminal.

* Wire not labeled.

NOTE 1: Wire ends listed as being tinned may have a crimped pin termination instead.

NOTE 2: Wires #3, #11, and #35 are spares. Save these three wires for future removal of the NDAI unit from the training system.

NOTE 3: You can move the power inverter negative (–) wire #10 on the power bus bar (negative) rail from terminal 7 to terminal 1.

Table 3: Wire Run List (for Optional Thermometer).

Signal	Color	AWG	From	To	Comments
RTD Signal Conditioner	Red	24	RTD Signal Conditioner (+)	DAQ Unit input (R)+Vs pin 8	Option replaces Vin8 or Vin9 sensor.
RTD Signal Conditioner	Black	24	DAC Unit input Vin8- pin 4 or Vin9- pin 6	DAQ Unit input (B)GND pin 9	Option replaces Vin8 or Vin9 sensor.
RTD Signal Conditioner	Black	24	RTD Signal Conditioner (-)	DAC Unit input Vin8+ pin 3 or Vin9+ pin 5	Option replaces Vin8 or Vin9 sensor.
RTD Signal Conditioner	Clear	24	RTD Signal Conditioner (shield)	NDAI chassis (ground)	Attach ground lug using screw below DAQ Unit.

NOTE: Ensure that the two anemometer wires are connected to the wind speed sensor by securing each ring lug between two brass hex nuts on each sensor terminal post. There should be one ring lug and two brass hex nuts per threaded terminal post on the sensor body. Be careful not to remove the existing nut that retains each terminal post.

Figure 7: AC Wiring.

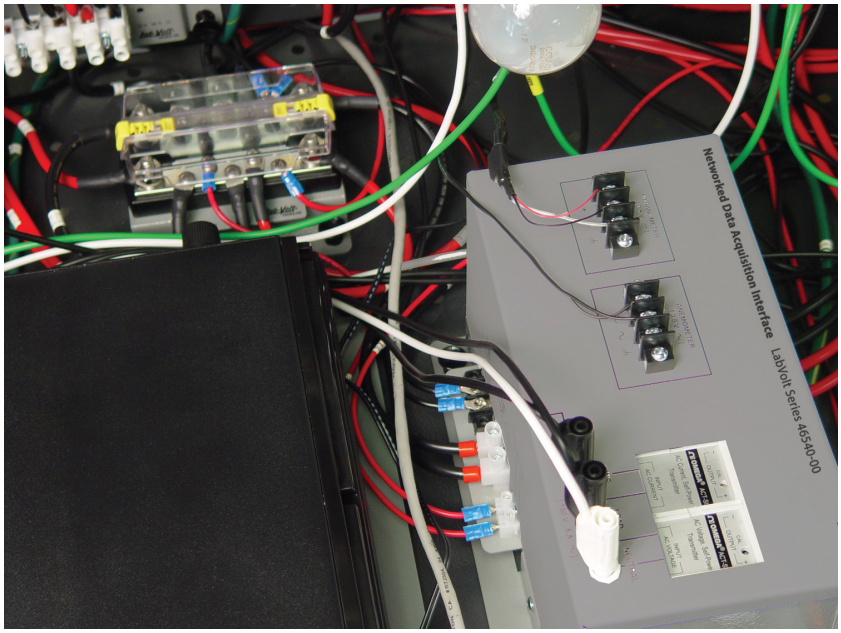

Figure 8: DC Wiring.

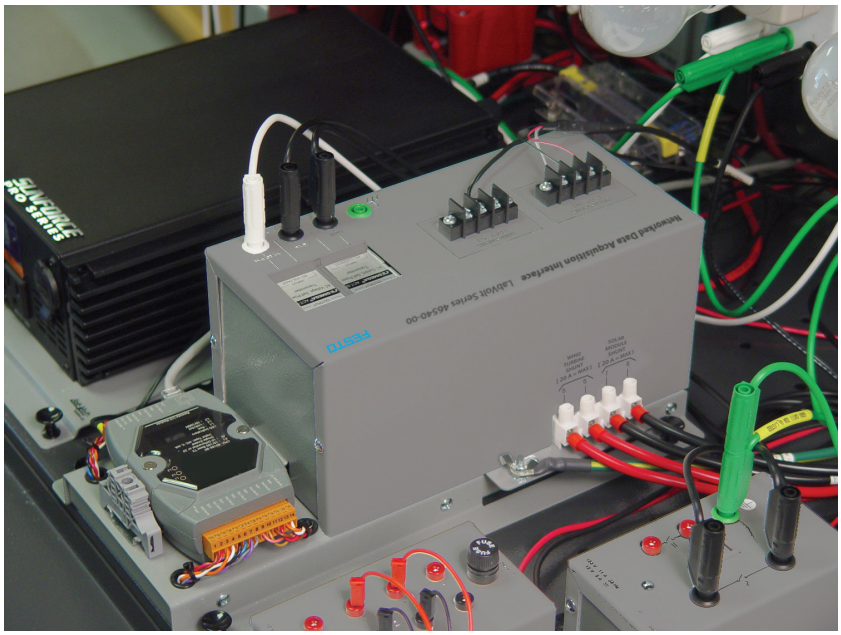

Figure 9: Solar/Wind Current Shunt Wiring.

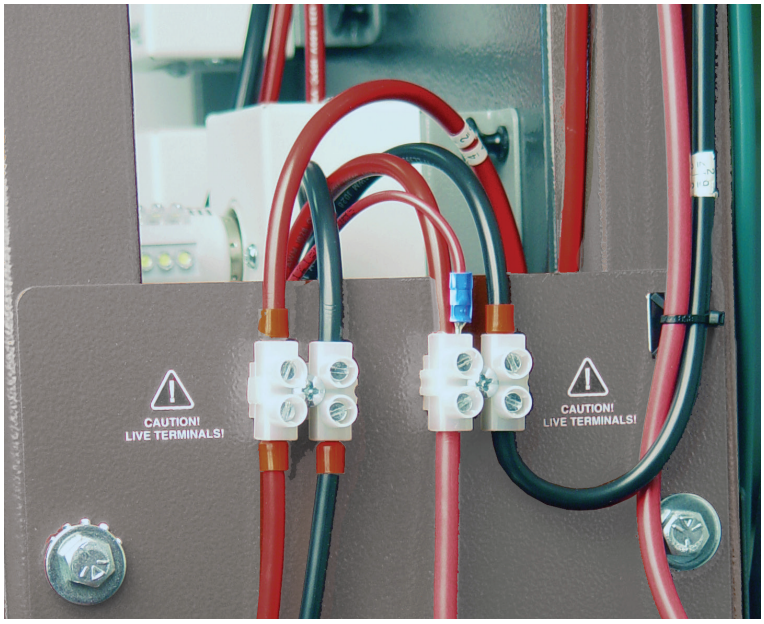

Figure 10: Solar/Wind Terminal Block Wiring.

After the NDAS wiring is completed, three wires should have been removed from the original system. Store these three wires for possible use in the future. Also, remember to install the safety cover on the bus bar module after wiring the NDAI unit to the training system. Apply 24 Vdc power to the NDAI unit and check software operation.

Hint

At some point in time, the AC signal conditioners may require calibration by using a meter calibrator (not supplied).

3.1 Pyranometer

The pyranometer (see the following figure) measures shortwave solar radiation, or irradiance.

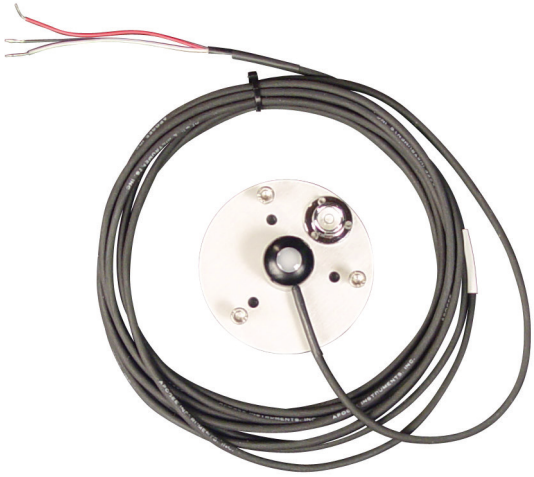

Figure 11: Solar Irradiance Sensor.

Mount the solar irradiance sensor so that it is horizontally level while keeping the cable oriented toward the nearest magnetic pole to minimize azimuth error. For example, if you are located in the northern hemisphere, you should point the cable toward magnetic north. Use a compass to help determine the proper direction for the cable routing. Install the sensor high in the air and free from obstructions. The 5 m (16.4 ft) long, 3-wire cable provided can be extended, if necessary. The sensor is intended for outdoor operation. At the building entry point, form a drip loop in the cable and caulk any openings in the wall.

3.2 Anemometer

The anemometer (see the following figure) measures average wind speed.

Figure 12: Wind Speed Sensor.

Mount the wind speed sensor on the supplied mast and secure it by using the cotter pin provided. The mast should be installed vertically, perpendicular to the Earth's surface. You can attach the supplied mast to a larger mast by using the two stainless steel hose clamps provided. Install the sensor high in the air (at least 2.5 m (8 ft) above the roof) and free from obstructions. The 18.3 m (60 ft) long, 2-wire cable provided can be extended, if necessary. The sensor is intended for outdoor operation, provided that the silicone sealant and the rubber boot are used to protect the electrical wire terminations. At the building entry point, form a drip loop in the cable and caulk any openings in the wall.

Hint
The anemometer ships with a digital readout unit and an associated power supply, which are not needed for the NDAS.

3.3 Optional thermometer

The optional thermometer (see figure bellow) can measure air and surface temperatures.

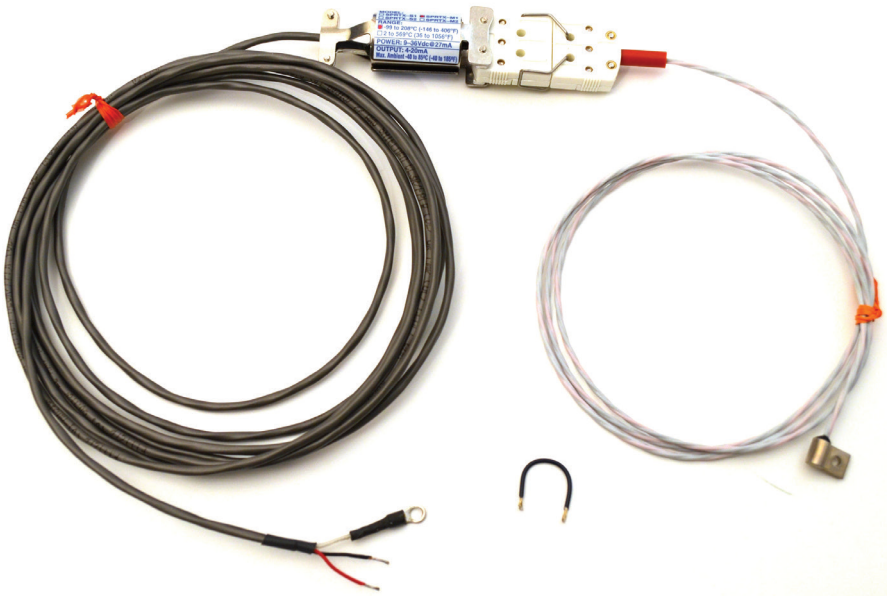

Figure 13: Temperature Sensor and RTD Signal Conditioner.

Using the optional temperature sensors requires the removal of an existing sensor from input channel 9 and/or channel 10. Follow the additional steps below to complete the installation of one or more temperature sensors.

- Ensure that the current loop configuration is wired properly between the DAQ unit and the RTD signal conditioner, as shown in Figure 5 and Table 3.
- Set the associated jumpers inside the DAQ unit (J9 and/or J10) to change each input type from voltage to current. The arrow (on the printed-circuit board) indicates the jumper position for current measurement.
- Set the ch9 and/or ch10 measurement range to 4-20 mA in the Configure section of the website. Click the Configuration and Module I/O Settings menu items. Only the administrator can perform this step.
- Set ch9 and ch10 appropriately in the Customize (Preferences) section of the web page (each guest and the administrator must perform this step, once per computer). Reload the web page after selecting channel data.

The RTD probe can be left exposed to the ambient (room) air or attached to the solar module on the training system. The sensor is intended for either indoor or outdoor use.

Hint

The RTD signal conditioner cable length can be increased up to 305 m (1000 ft) total.

4 Software

The following figure shows an example of the embedded web page that is typically displayed on your computer or computing device via its web browser application.

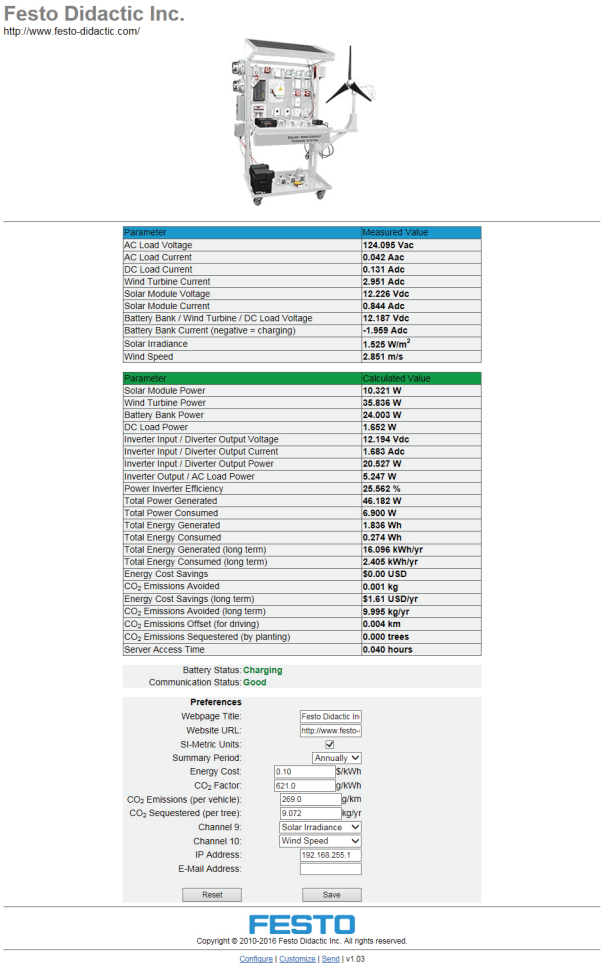

Figure 14: The NDAS Web Page.

5 Software operation

In order to operate the NDAS across a network, you must provide 24 Vdc power to the NDAI unit and connect the DAQ unit to a 10/100Base-TX network. Connect a CAT-5 Ethernet cable (with RJ-45 connectors) between your network and the NDAI unit. In most cases, this connection is at a network router or switch. The DAQ unit supports the use of either straight or crossover Ethernet cables. Configure your router to use port forwarding to provide two paths through the firewall. Set the port to 80 or assign your own value (0-65535) for TCP/IP, and use port 502 for Modbus/TCP. The firewall settings should be configured as listed below. If the TCP/IP port address must be changed due to conflicting equipment, refer to “Changing the IP Address” in the Firmware section of this book. Regarding DNS configurations, IP delivery cloaking is not recommended.

- TCP/IP Port 80 (default – adjustable)
- Modbus/TCP Port 502 (default – fixed)

1. Connect 24 Vdc power to the NDAI unit, and access the new web page by entering the following URL into your web browser address bar:

   http://192.168.255.1 (or other IP address, if changed from the default value)

2. Log in to the embedded web server. Two default login options are available. They can be modified once you are logged in as an administrator.
   - Full configuration capabilities
   - Username: Admin
   - Password: Admin
   - Limited configuration capabilities
   - Username: Guest
     Password: Guest

Logins are case sensitive.

3. Once logged in, you should see the new NDAS web page in your web browser window.

   Hint
   Cookies should be enabled to simplify the use of your personal preferences on the embedded web page.

   The measured and calculated parameter values and other information are displayed and updated continually for near real-time operation.

The web page continually displays Battery Status (Unconnected, Charging, or Discharging) and Communication Status (Good or Failed). The word "Timeout" indicates a temporary loss of network communication, which may occur occasionally; but is usually brief. The Unconnected battery status is displayed when the battery bank current is less than 100 mAdc (flowing in either direction).

You can customize the NDAS with your own personal preferences by selecting the Customize link (at the bottom of the web page) and entering your selections in the area provided. Your settings are saved to your computer when you click the Save button. If you have cookies enabled in your web browser, your personal choices are restored each time you visit the NDAS web page. Click the Reset button to restore the factory default values for all user preferences.

Webpage Title—enter your own name, or your school or company name here (30 characters maximum).

Website URL—enter your own personal website address, or the website address of your school or company here (60 characters maximum).

SI-Metric Units—select this checkbox for the measured and calculated values to be displayed in SI-Metric units, or uncheck this checkbox for the data to be displayed in US-Imperial units.

Summary Period—choose a duration or period of time (daily, weekly, monthly, or annually) to calculate projected estimates of long-term energy generation and consumption that are based upon presently displayed power data. The long-term cost savings and emissions avoided are also affected.

Energy Cost—enter a U.S. dollar value for the cost of electricity delivered by the public utility energy provider at your location. The national average is 0.10$/kWh.

CO_2 Factor—enter a value that represents the amount of carbon dioxide emitted by your local fossil fuel-based power plant. Some national averages are 621 g/kWh or 718 g/kWh. This factor is used to determine the amount of carbon dioxide that is being avoided (CO_2 prevention) by generating alternative, renewable, and sustainable (green) energy.

CO_2 Emissions (per vehicle)—enter a value that represents the amount of carbon dioxide emitted by your automobile under typical driving conditions. Some national averages are 269 g/km or 271 g/km, which are based upon average tailpipe emission estimates for gasoline-powered automobiles.

CO_2 Sequestered (per tree)—enter a value that represents the amount of carbon dioxide sequestered (removed or absorbed) by an average 100-year-old tree over its lifetime. The national average is 9.072 kg/yr (20 lb/yr). Other commonly used values can vary greatly, ranging from 4 lb/yr to 85 lb/yr, which are based upon various tree planting and foresting studies for different locations.

Channel 9—choose a name for the 9th analog input signal (Solar Irradiance, Air Temperature, or Cell Temperature). It is important to note that, in order for the system to operate properly in modes other than the default setting (Solar Irradiance), an external sensor and wiring, an internal hardware jumper setting, and settings on the configuration screens all need to be changed. For further details, refer to the page dealing with the thermometer in the Hardware section of this user guide.

Channel 10—choose a name for the 10th analog input signal (Wind Speed, Air Temperature, or Cell Temperature). It is important to note that, in order for the system to operate properly in modes other than the default setting (Wind Speed), an external sensor and wiring, an internal hardware jumper setting, and settings

on the configuration screens all need to be changed. For further details, refer to the page dealing with the thermometer in the Hardware section of this user guide.

E-mail Address—enter your e-mail address here (120 characters maximum) in order to send e-mail messages over the Internet that contain all monitored values in CSV text format. Multiple addresses can be included by separating them with a semicolon (;). Do not include any spaces in this text field.

The Configure link (at the bottom of the screen) is not needed under normal circumstances. This feature was included for convenience, in the event that the administrator needs to make changes to the hardware settings within the DAQ unit.

The Send link (at the bottom of the screen) provides a means to send an e-mail message that contains the 32 measured and calculated values in CSV text format. Your client-side e-mail software is used to send the message, usually after requiring a confirmation from you.

The EZ Data Logger and DCon software can be used on your personal computer (PC) to create your own data acquisition program that runs on your desktop. However, programming experience is required (for DCon), and the features offered by these applications may not be available across the Internet or other wide area network (WAN). You can use the applications to provide custom data logging features to your NDAS. Refer to the EZ Data Logger and DCon manuals for more detailed information and operating instructions.

6 Firmware

At some point in time, it may be desirable or necessary to upgrade the embedded firmware that runs the DAQ unit microprocessor.The following instructions describe how you can perform a firmware upgrade to the non-volatile Flash memory that resides in your DAQ unit.

Before upgrading your system firmware, you must obtain the following file and applications. Afterward, it will be possible to go ahead with the instructions that follow. Note that the original firmware file can be located on the CD-ROM provided with your NDAI unit. If available a newer firmware file can be obtained directly from Festo Didactic or through your local sales representative.

ET701710FD_V####.hex, where #### is the version number (3002 or greater)

File location:

- CD:\Festo\Firmware

MiniOS7_Utility_V###.exe, where ### is the version number (326 or greater)

File location:

- CD:\NAPDOS

Hint
This application can also be downloaded for free from the website of ICP DAS.

7 Firmware installation

1. Install the MiniOS7 Utility on your Windows-based computer by double-clicking the executable file and following the on-screen instructions.
2. Set the switch on the bottom of the DAQ unit to its Init position to force UDP mode.
3. Connect 24 Vdc power and a CAT-5 Ethernet cable (with RJ-45 connectors) to the DAQ unit.
4. Connect the other end of the CAT-5 Ethernet cable to the Ethernet port on your personal computer (PC).

5. Temporarily configure your PC network connection by assigning to this one the IP address and Subnet mask which followes. Use these values, assuming that the DAQ unit has the default IP address of 192.168.255.1.
    - IP address: 192.168.1.100
    - Subnet mask: 255.255.0.0
6. Run the MiniOS7 Utility on your PC.

7. Connect to the device (using UDP mode for file transfers). You should then see a screen similar to the one shown in the following figure.

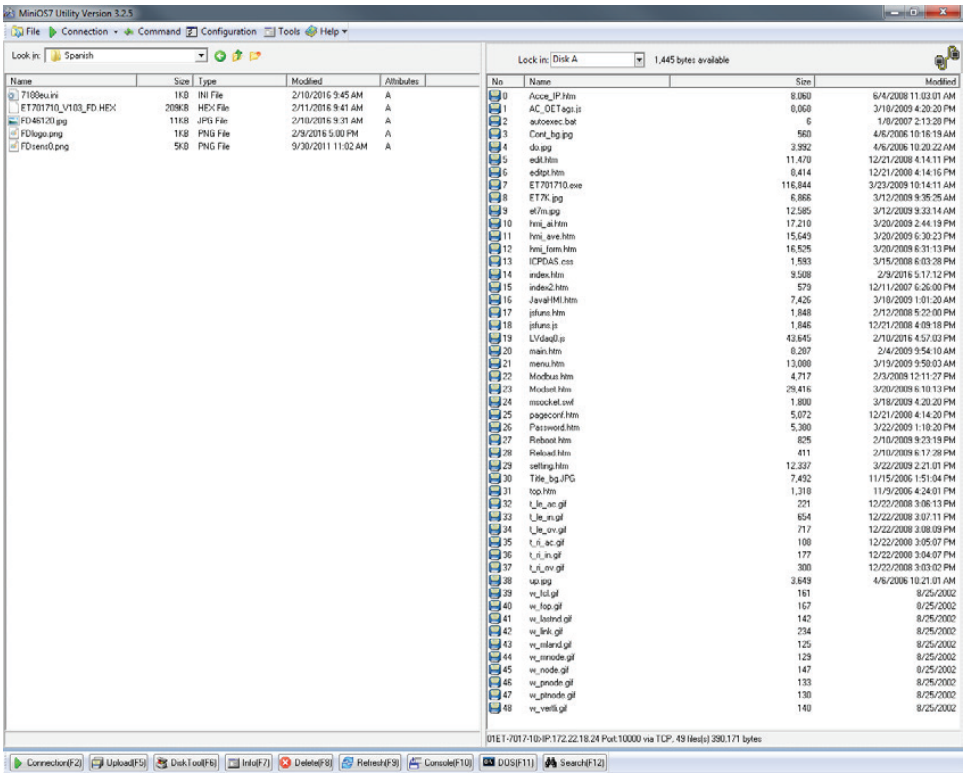

Figure 15: The MiniOS7 Utility Window.

8. Erase the contents of Disk A on the embedded web server by right-clicking your mouse (on the right half of the screen) and selecting Erase Disk. Confirm the file deletion by clicking the Yes button.
9. On the left screen, navigate to the following files from the CD-ROM or from your computer's hard drive and click on the Upload button. The file will then be uploaded in Disk A on the embedded server: ET701710FD_V####.hex, where #### is the version number (3002 or greater)
10. Select Disk B by using the drop-down selection box near the top of the window (on the right side).
11. Erase the contents of Disk B on the embedded web server by right-clicking your mouse (on the right half of the screen) and selecting Erase Disk. Confirm the file deletion, by clicking the Yes button.
12. Disconnect 24 Vdc power and return the switch on the bottom of the DAQ unit to its Normal position to force IP mode.
13. Reconnect 24 Vdc power to the NDAI unit and access the new web page by entering the following URL into your web browser address bar:
    - http://192.168.255.1 (or other IP address, if changed from the default value)
14. Log in to the embedded web server. Two default login options are available. They can be modified once you are logged in as an administrator.

Full configuration capabilities

- Username: Admin
- Password: Admin

Limited configuration capabilities

- Username: Guest
- Password: Guest

Logins are case sensitive.

15. Once logged in, you should see the new NDAS web page in your web browser window.
16. Now, you can disconnect 24 Vdc power and return the DAQ unit to its network connection.
17. Remember to restore your computer IP address settings that were temporarily modified in this step to communicate directly with the DAQ unit.

8 Changing the IP address

Here are the default IP address settings for the DAQ unit:

- IP address: 192.168.255.1
- Subnet mask: 255.255.0.0
- Default gateway: 192.168.0.1

There are at least three places that require the correct IP address for network communication to be successful with the DAQ unit.

If necessary to avoid network conflicts, you should perform IP address changes in the following order.

1. IP address (must be performed by the administrator only). Once the IP address has been changed, you must enter the new IP address into the web browser address bar to gain access to the web page again.

   If necessary to avoid port conflicts (i.e., the default port 80 is already used by another device on the network), change the port address (0-65535) by selecting the Basic Settings menu on the Configuration screen. If you do not know what port number to use, try port 5000. However, first ensure that this port address is not already in use on your network by using the router configuration manager. Power cycle (reboot) the DAQ unit for a new port setting to take effect.

2. Also, remember to change the IP address (and/or port address) within the MiniOS7 Utility by selecting the Connection and New Connection menu items in order to access the DAQ unit for firmware upgrades.

Below is just one example of settings for a DAQ unit and its computer network that is different from the default values:

- IP address: 192.168.1.101
- Subnet mask: 255.255.255.0
- Default gateway: 192.168.1.254 (router IP address)

To access the device locally on the network (intranet), enter the following URL in the web browser address bar:

- http://192.168.1.101:80 (or http://192.168.1.101)

or

- http://192.168.1.101:5000 (for port 5000)

To access the device remotely from the Internet, enter the following URL in the web browser address bar:

- http://xxx.xxx.xxx.xxx:80 (or http://xxx.xxx.xxx.xxx)

or

- http://xxx.xxx.xxx.xxx:5000 (for port 5000)

Where each xxx is an 8-bit (one byte) decimal value based upon the host IP address provided by your Internet Service Provider (ISP).