
This readme file is a quick introduction to the CVORG 8 PV Cell Tester (PVCT) instrument. This project is currently in BETA testing so please read this file and feel free to comment on both the manual's helpfulness as well as the Cell Testing software's features and functionality. Direct all these comments to kelly@udel.edu. If you have any urgent problems, please call Fouad Kiamilev at 302-494-6220. THANK YOU AND GOOD LUCK

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Hardware: Nick Waite
Software: Kelly Livingston

INSTRUMENT EXPLANATION

The CVORG 8 PV Cell Test is a hardware/software solution to quickly test 8 photovoltaic cells simultaneously. The hardware forces current on the junction and measures the voltage difference. The current is increased, sweeping the cell to the Short Circuit Current (Isc). The data is then displayed to the graph. Future versions will hopefully allow this data to be exported to Excel as .csv files. In the mean time, the graph displays the short circuit current and the open voltage in individual tet boxes.

INSTRUMENT PARTS

Before you start, make sure you have all the parts for the PVCT instrument. These parts include:

1. The PVCT Breakout Box



2. PCMCIA DATA Acquisition Card (DAQCard-6036e)



3. SHC68 cable to connect the Data Acquisition Card with the PVCT Breakout box.



4. Eight (8) BNC to alligator clip cables for connecting the PVCT breakout box with PV cells under-test. Connect the black clip to the N-side of the PV Cell, and the red clip to the P-side of the PV Cell.



5. One Installation CD.



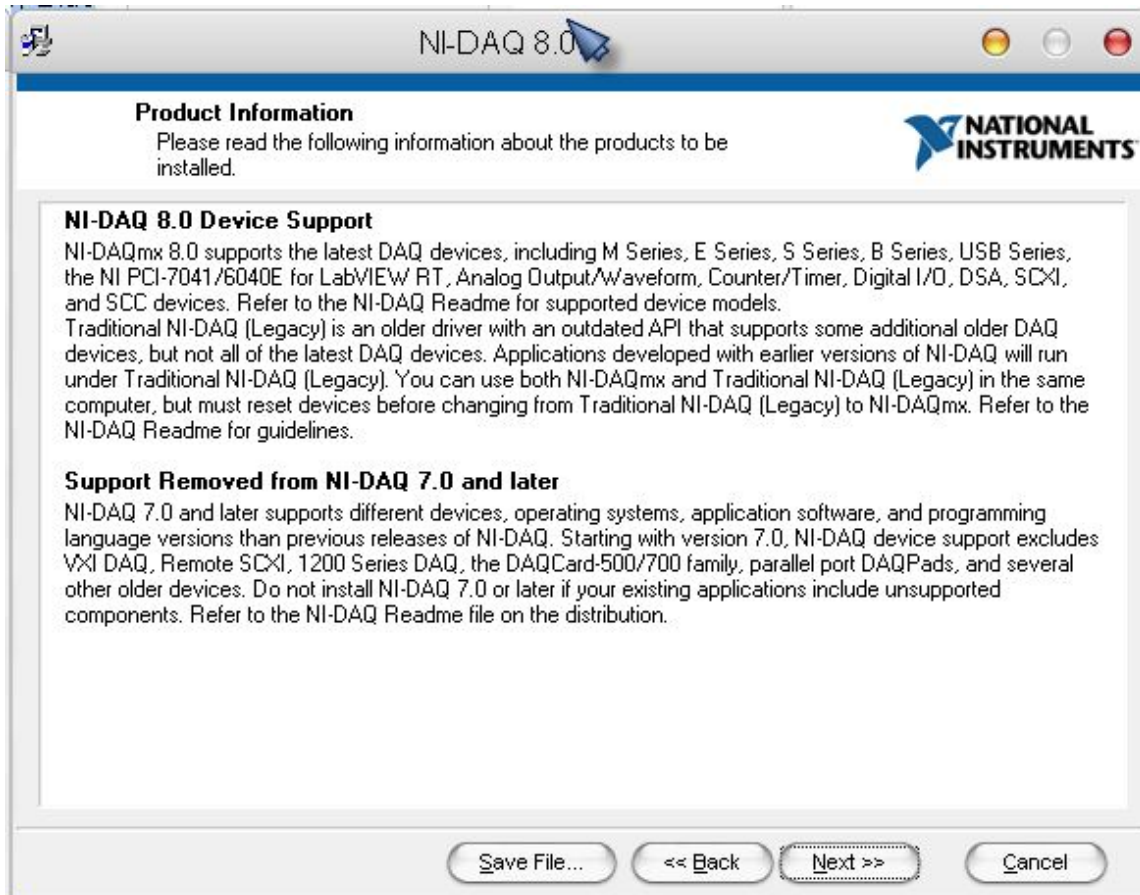
6. One PC laptop computer with an available PCMCIA slot. This is not included with the instrument; you need your own laptop!



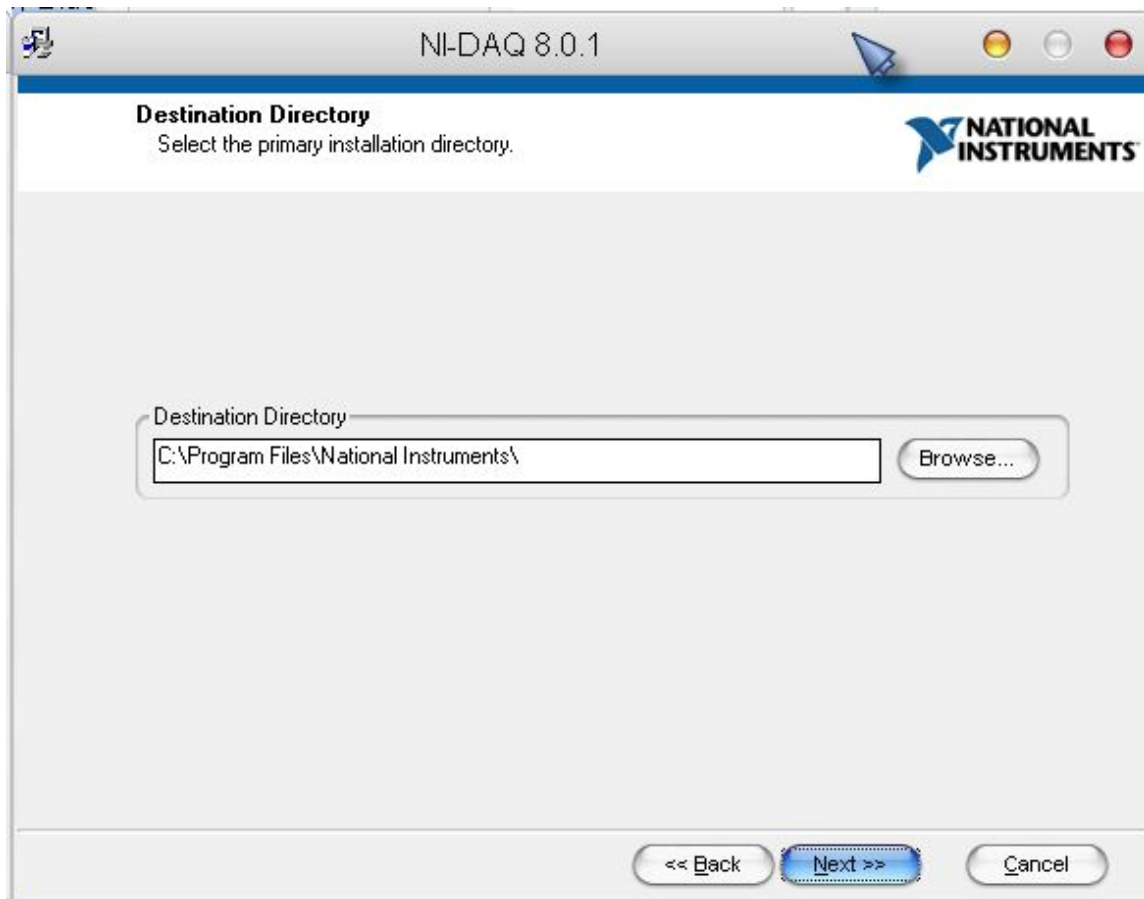
INSTRUMENT INSTALLATION

Please follow these steps carefully and in the exact order given.

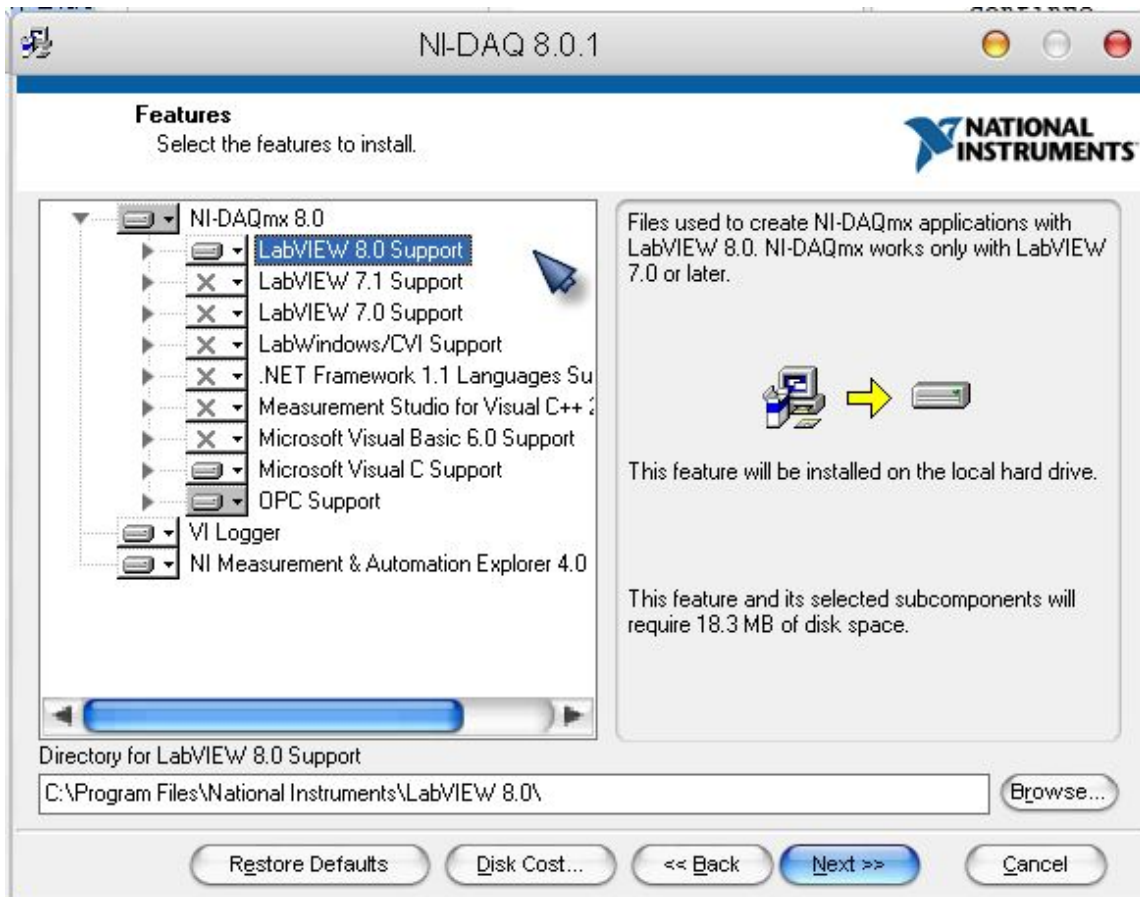
1. The first step is to install the device driver for the data acquisition card. This step takes a while to run, so be patient! Insert the CD and open the "NI-DAQmx 8" folder. In that folder, run the program **setup.exe**. When you see the following screen, click **Next** to continue.



Next you will see the screen show below. Again click **Next to continue.**



Next you will see the screen show below. This next step is critical - select **LabVIEW 8.0 Support** and when the drop down menu appears, select the option to "**install these features and subfeatures to a local drive**". Then click **Next** to continue.

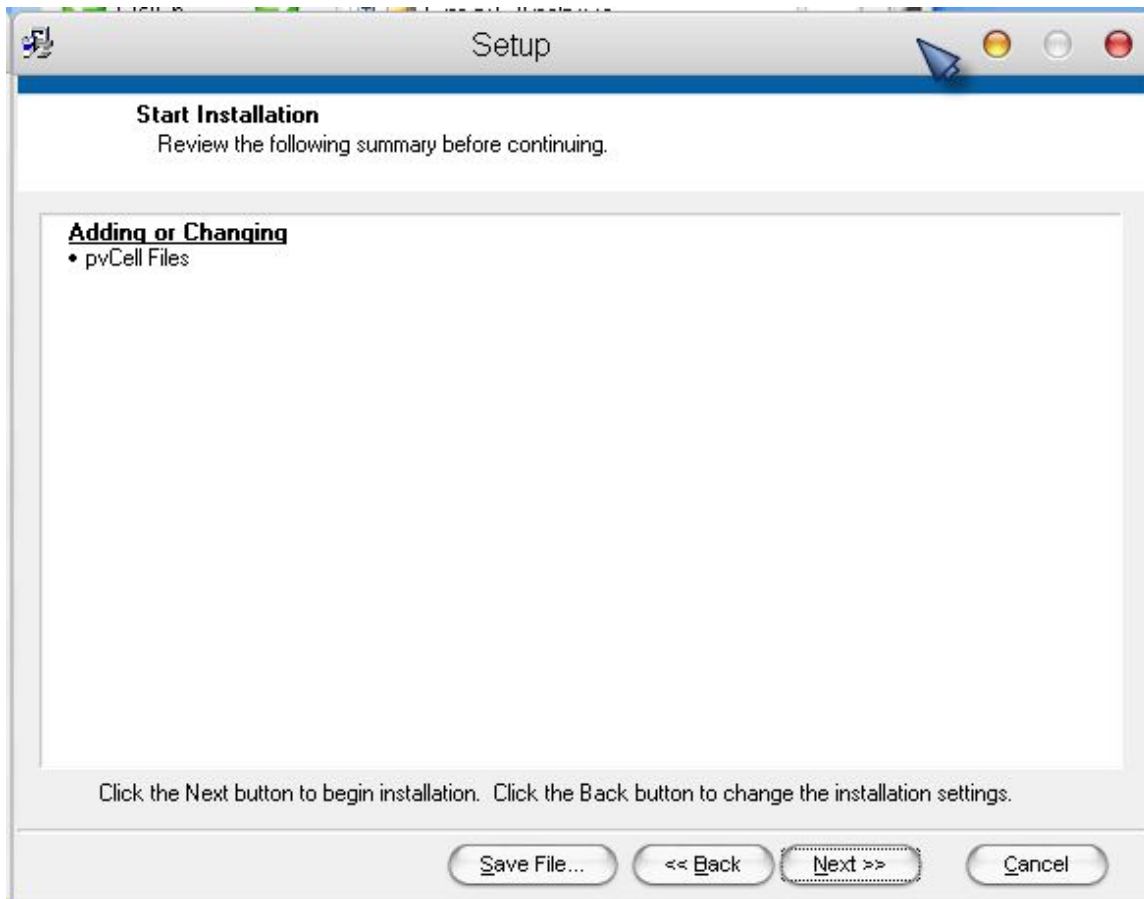


From then on, continue clicking **Next** button. At the end of installation, you will be asked to REBOOT. Please do so!

2. The second step is to install the PVCT instrument software. Insert the CD and open the "pvCellInstaller" folder. In that folder, run the program **setup.exe**. When you see the following screen, click **Next** to continue.



Next you will see the screen show below. Again click **Next to continue.**



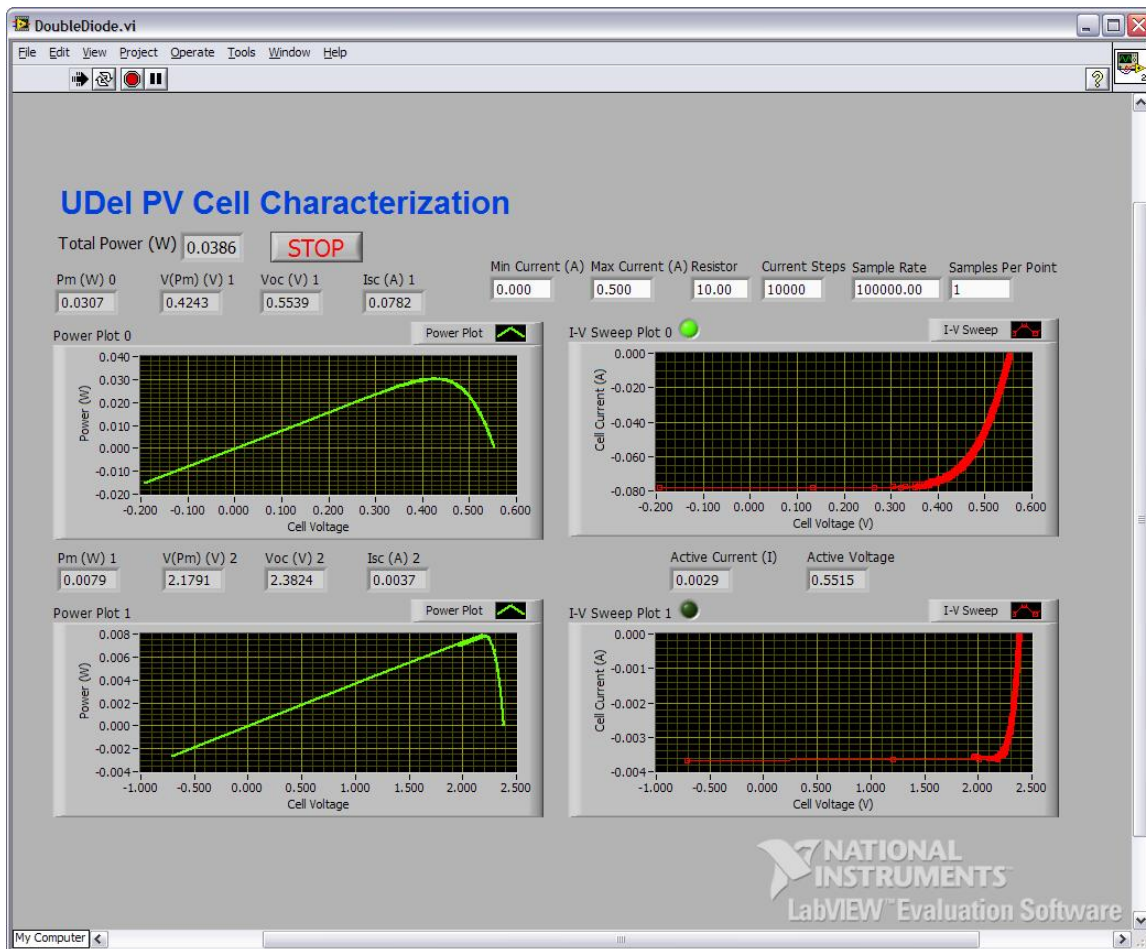
From then on, continue clicking **Next** button. At the end of installation, you will have a new icon on your desktop to start the instrument. The icon titled **dualPvCell** looks something like this:



3. The third step is to insert the PCMCIA Data Acquisition Card into the computer PCMCIA slot. On some Windows systems, the **Found New Hardware** wizard opens with a dialog box. In that dialog box, **Install the software automatically (Recommended)** is selected by default. Click Next or Yes to install the software for the PCMCIA data acquisition card.



4. The fourth step is to connect the PVCT Breakout box with the PCMCIA card using the included SHC68 cable. Then connect the PV Cells to the PVCT breakout box using the included BNC-to-Alligator cables. In this version of the instrument only "PV Cell 1" and "PV Cell 2" BNC connectors are supported. Connecting to other BNC connectors on the breakout box will not do anything.
5. The fourth step is to connect the PVCT Breakout box with the PCMCIA card using the included SHC68 cable. Then connect the PV Cells to the PVCT breakout box using the included BNC-to-Alligator cables. In this version of the instrument only "PV Cell 1" and "PV Cell 2" BNC connectors are supported. Connecting to other BNC connectors on the breakout box will not do anything.
6. Finally, you can run the PV instrument by double clicking the instrument icon on your desktop. You should see the window shown below appear. The instrument should start running and in a few seconds the curves for the two PV cells should appear on the screen. If no curves appear, try reversing the PV cell connections or see the trouble shooting guide on the next page.



Congratulations you have completed the installation of the instrument!

HINTS FOR INSTRUMENT OPERATION

There are currently 5 user configurable variables. The first 2 are minimum and maximum current both in units of AMPS. Typically, minimum is set to 0 and maximum is set to .100 amps. The maximum can be set lower but not higher. Setting the maximum higher than .1 amps requires a jumper change so please don't exceed .1 amps without knowing what to do (Contact Kelly Livingston at kelly@udel.edu if you need this feature). The current steps variable is used to configure how fine the sweep is on the diode. ***HINT*** The program stops the sweep once the Isc is met. Many times that means that less than the number of current steps is sampled. To increase the resolution of your sweep you can 1) add more current steps or 2) lower the Max Current which will make each current step smaller. ***END HINT*** The last two variables are used to control noise of the card. The Sample Rate determines the speed which the ADC operates and the higher, the more noisy. There is a maximum speed of 200000 for the card and the default, 100000, normally operates with minimal noise. If you don't mind waiting longer though, feel free to lower this number. Another variable used to control noise is the Samples per Point variable. This will take multiple measurements of a certain voltage and average the result, thus reducing noise. It does however slow the sweep down so use sparingly.

TROUBLESHOOTING

Q: I get a window that pops up and says:

Error -200324 occurred at DAQmx Start Task.vi:1

what does it mean?

A: It means the PCMCIA card isn't plugged all the way in.

Q: I load everything but I get NaN as the active voltage and nothing shows up.

A: Your DAQ card was not installed properly, go into device manager and reinstall the drivers.

Q: I don't see anything on the screen except garbage, what's up?

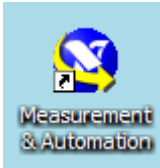
A: There are two possible problems, if it looks really weird then you probably don't have the cabling all the way in... the SCSI connector to the breakout box must be SHOVED into the box. Also, make sure the cell you are checking is in at least a little bit of sun, the hardware can only measure voltage if its there!

Q: The Cell is sweeping now but it's way to slow, what's with the hangup?

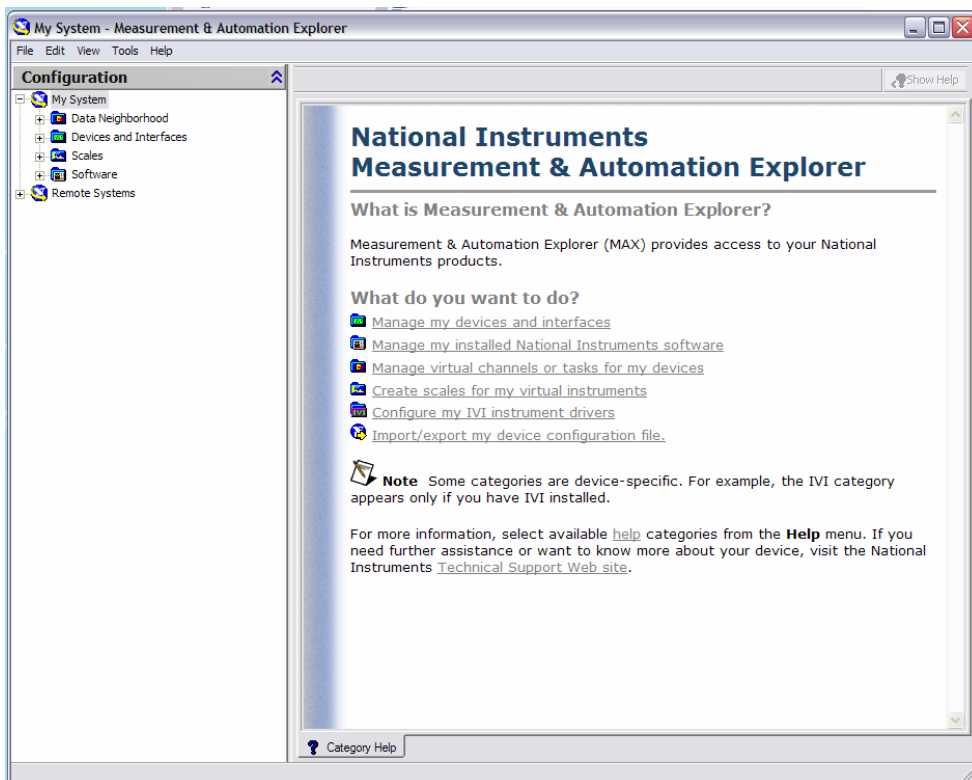
A: So when the sweep begins, the current steps are locked for a single sweep. If the cell never reaches it's short circuit current, then it will sweep the entire sample space which can take several seconds. If you are tired of waiting, press the stop button, reset the current samples or max current settings and press play again.

Q: How do I check that the PCMCIA Data acquisition drivers were properly installed and the card is functioning properly?

A: You should have already completed the "INSTRUMENT INSTALLATION" procedure described earlier in this guide. Turn off the computer. Insert the data acquisition card into the PCMCIA slot of your laptop. Turn on the computer and logon. You should see an icon on your desktop that looks like this:

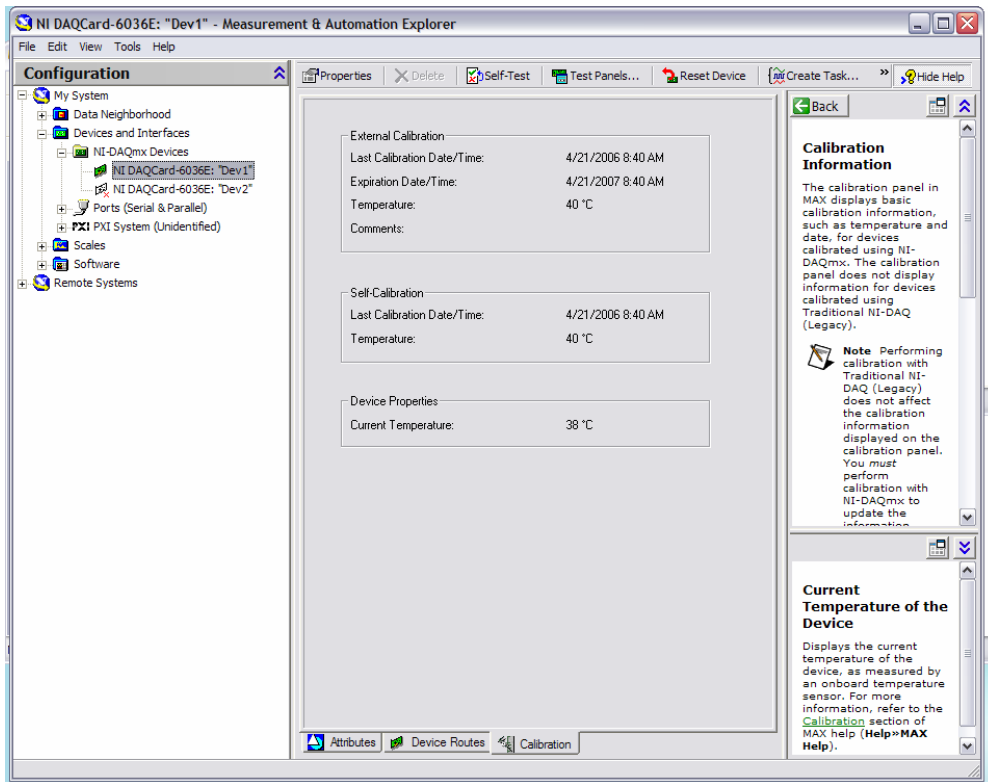


Double click on this icon and the following screen will come up:



Now mouse click on the + box next to "Devices and Interfaces". Then click on the + box next to "NI-DAQmx Devices" (this will appear after you complete the 1st click). Then click on "NI DAQCard-6036E: Dev 1". Now, if the data acquisition card is properly installed, you will see the following screen:

Note: If your laptop has two PCMCIA slots and the card did not install correctly, try swapping the data acquisition card into a different slot.



But if the card is not properly installed, then the screen will look like this:

