



XY Plotter, Time-Base Recorder, Automated Tester

Users Guide

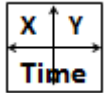
Rev 3.1.2

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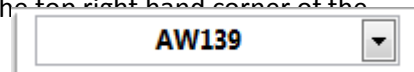
Quick Start Guide

The XY Plotter/ Time-base recorder software is a fully functional fixed 2 axis graph plotting utility designed to work with National Instruments USB cDAQ Data Acquisition boards. (cDAQ-USB-9215 BNC Recommended)

- 1) **Double Click** on the XY Time-base Plotter icon on the desktop to launch the software.



- 2) Once started the software defaults to the XY Plotter option, select the **Test Specification** required for your test using the drop down control at the top right hand corner of the screen.



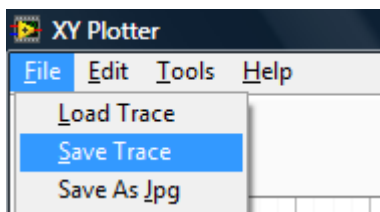
- 3) **Single Click** on the **PEN UP** button in the lower control bar to start plotting.



- 4) Click again on the same button (**PEN DOWN**) to stop plotting.

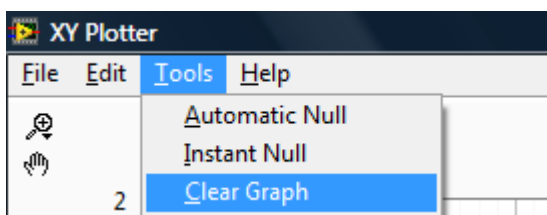
- 5) Select **File – Save Trace** to save the data to file as a text (.csv) file.

You will also be prompted whether to save a .pdf (screenshot) file for later printing.



- 6) Print the current screen to the selected print by selecting **File – Print**
- 7) Select **Tools – Clear Graph** to remove current data and start a new plot.

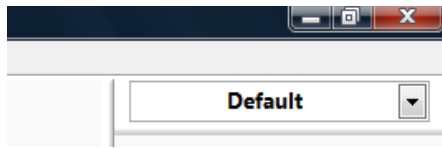
WARNING – all existing unsaved test data will be removed.



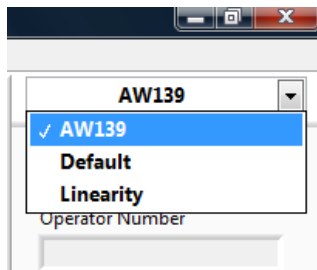
- 8) Select **File – Exit** to exit the software

Selecting a Test Specification

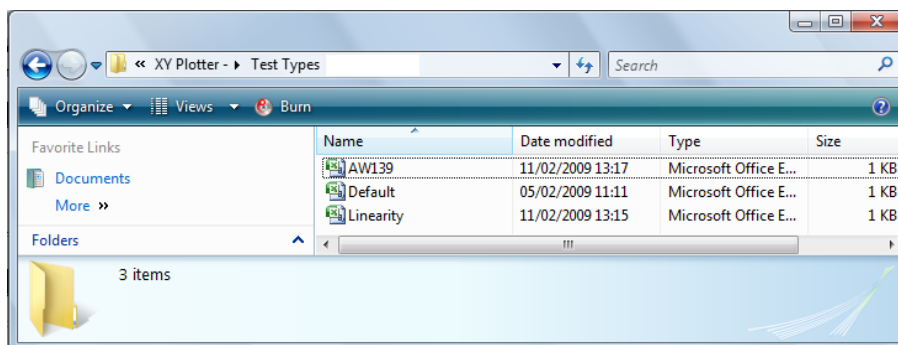
Select a pre-defined **test specification** from the list which can be accessed by clicking the **down arrow** in the top right hand corner of the front panel.



A list of tests will appear, **single left click** on one to select and load it.

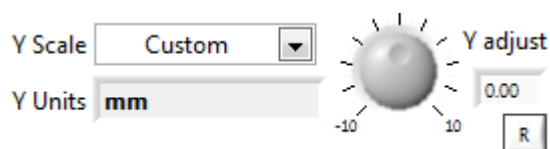


The tests listed are the names of those files found in the \Test Types directory.



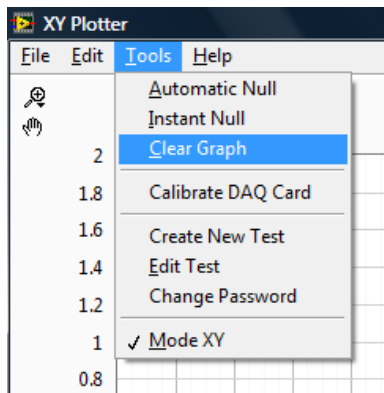
Once selected, the test loads the x and y scale maxima and minima, scaling, names, and the upper and lower limit lines (if any are defined).

The graph maxima and minimum change to reflect the **test maximum and minimum**. The X and Y scales will change to **Custom** and the units will change to reflect the units of the test.



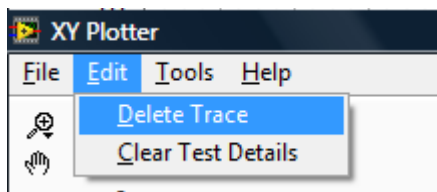
Clearing Graph

Select Menu options **Tools – Clear Graph** to clear all traces drawn **but retain the upper and lower limits (as well as other test specifications for the test loaded)**. All unsaved data will be lost.

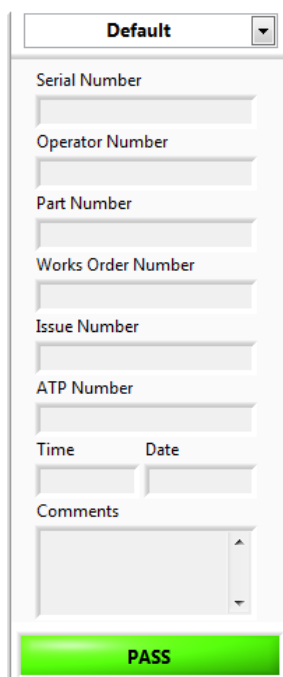


Clearing Individual Trace

The last trace drawn can be removed by selecting **Edit – Delete Trace**. All previous traces remain in memory and on the graph.



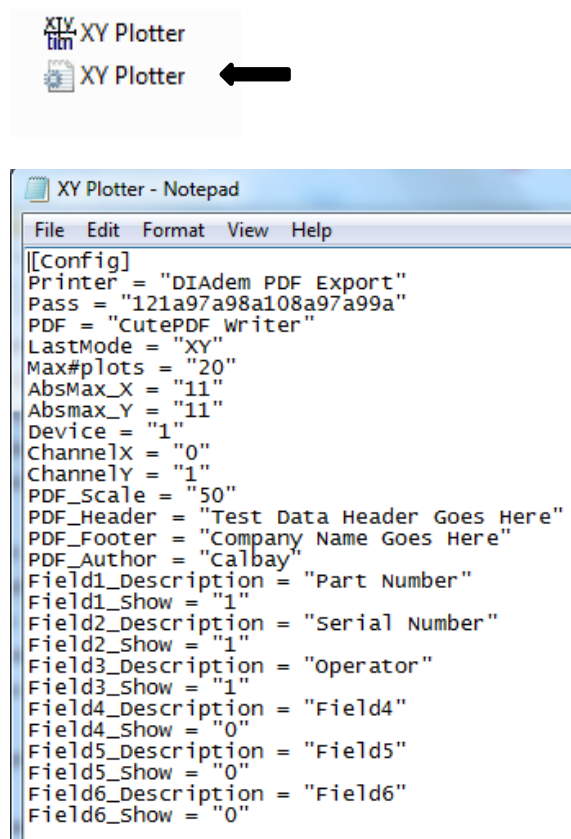
Clearing Test Details

A screenshot of the 'Test Details' form in the XY Plotter software. At the top, there is a dropdown menu set to 'Default'. Below this, there are several input fields for text entry: 'Serial Number', 'Operator Number', 'Part Number', 'Works Order Number', 'Issue Number', and 'ATP Number'. Below these are two smaller input fields for 'Time' and 'Date'. At the bottom of the form is a larger text area for 'Comments'. A green button labeled 'PASS' is located at the very bottom of the form.

The Test Details Fields (Serial Number, Operator Number etc...) can be cleared using the Clear Test Details option found on under the Edit menu (see above).c

Modifying the Test Details Fields

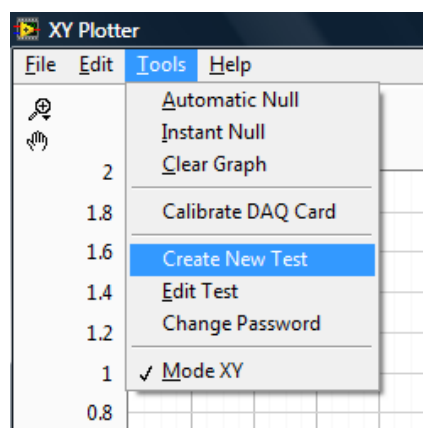
The Test Details Field Names can be modified and removed from this section. To modify these you will need to update the configuration settings file in the XY Time-base Plotter folder. Click on the file arrowed below



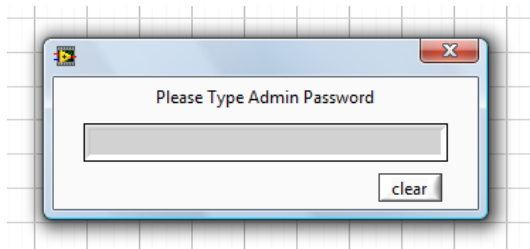
There a number of options you can configure. To show a field use 1 in the Field (Number)_Show = 1, a 0 will remove this from the display. The name can be modified in the same way by typing in the Field Description section. EXAMPLE: Field1_Description = "Part Number" will display Part Number as the title above the first Test Details field. You can also add a custom header and footer to the plot. As well as determining the max plots to be displayed using the same technique. You must save the modified notepad in the same file location and then restart the software which will then use the new settings you have made.

Creating New Tests

Select Menu option **Tools – Create New Test** to create a new test definition file.



You must type the current **Administrator password** to be able to create a new test specification.



You will be presented with the template for a new test definition file:

Test Name – appears above the working XY graph.

Subtitle –Provides a subtitle to the Test Name

Test Mode –Select either X vs Y, X vs Time or Y vs Time. Each option will change the options available

X or Y Scaling – this defines the number of **scaled units** which map to each **1V** sampled – this can be found in the calibration information from the sensors used on the rig.

X or Y maximum or minimum – this is the maximum/minimum reading the software will be expected to take in **scaled units**.

X or Y channel units – this is the name of the units for the measurement which will be displayed alongside the graph scale(s).

Time-base –Select a name, the page width, units and scale used as the Time-base axis. Select to display just a single page width with the checkbox

Filter Settings – allows you to alter the default filter settings of 5Hz and ON for this particular test. If Default is ticked, the other filter settings will appear greyed and cannot be edited.

Pass/Fail Indication – Select to show the Pass/Fail indicator on the screen when running

Overlay Default – Select to show the trace overlay on the screen when running

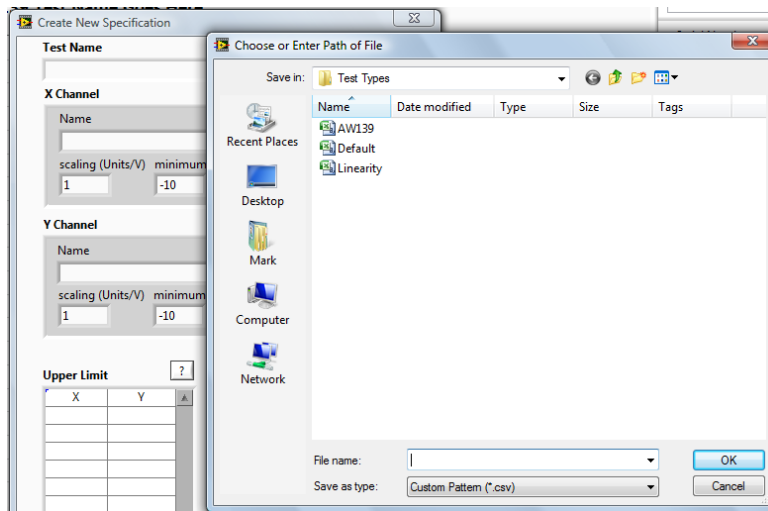
Upper or Lower Limits for the test overlay – defines the upper and lower limits (overlay) applied to the file.

The overlay needs to be defined as a series of pairs of X and Y values eg: an **Upper Limit** of:

1,2 2,2 3,2

Would define that Y has to be less than 2 when X is between 1 and 3.

Once created, click **SAVE** and you will be prompted to give the test definition file a name – **this** name appears in the drop down list of test types.



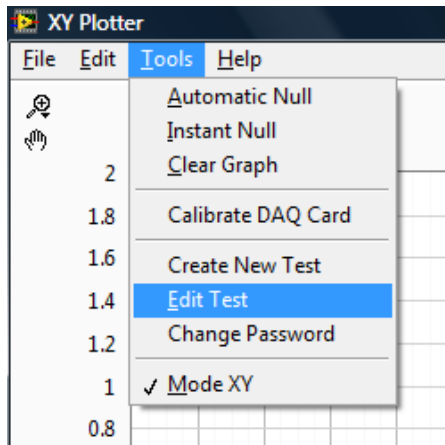
Click **CANCEL** to cancel test definition entering.

Editing Tests

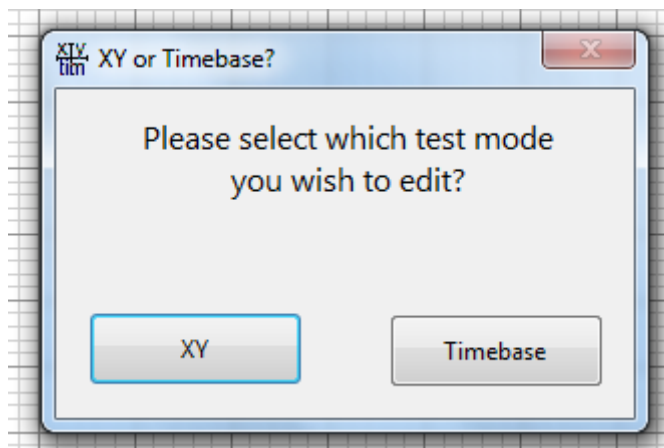
Select Menu option **Tools – Edit Test** to edit a previously defined test type.

The program will prompt you to select an existing test definition file found in the **Test Types** directory. The functions are similar to when setting up the test initially.

When a file is selected, its contents will be loaded into the same window as seen when you **Create** a test. At this point, the values can be edited by clicking in the required fields.



You will be asked which type of test you wish to edit



Click on either XY or Time-base to edit that type of test

XY Test Options (Time-base options greyed out)

Edit Test

Test Name
 XY Plotter Using Default Parameters

Filename Default.csv

Subtitle

Test Mode

☒ X
☐ Y

Versus
☐ Time

☐ Y
☒ Time

Filter Settings

☐ Default

Filter Cutoff (Hz) 13.3

Noise Filter ☒ ON

Y Channel

Name

scaling (Units/V)

minimum

maximum

units

1

-10

10

Default

X Channel

Name

scaling (Units/V)

minimum

maximum

units

1

-10

10

Default

Timebase

Name

Page Width 1

Units secs

Scale 1 unit/s

Single? ☒ Yes

Lower Limit

X	Y	
-10.00000	-10.00000	
10.00000	-10.00000	

Upper Limit

X	Y	
-10.00000	10.00000	
10.00000	10.00000	

Program Load Instruction

Pass/Fail Indication ☒ ON
 Overlay Default ☒ ON

CANCEL

SAVE TEST

X or Y vs Time-Base Options (Unused channel greyed out)

Create Test

Test Name

Filename

Subtitle

Test Mode

☒ X
 ☐ Y

Versus

☐ Y
 ☒ Time

Filter Settings

☒ Default

Filter Cutoff (Hz)

Noise Filter ☐ OFF

Y Channel

Name

scaling (Units/V)

minimum

maximum

units

X Channel

Name

scaling (Units/V)

minimum

maximum

units

Timebase

Name

Page Width

Units

secs ▼

Scale

1 unit/s ▼

Single? ☒ Yes

Lower Limit

X	Y

Upper Limit ?

X	Y

Program Load Instruction

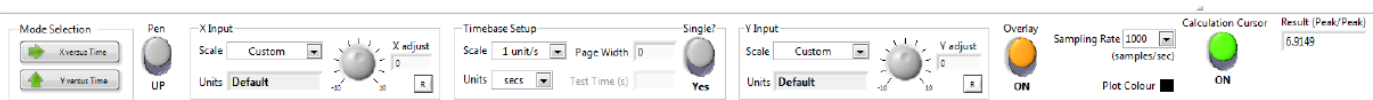
Pass/Fail Indication ☐ OFF
 Overlay Default ☐ OFF

CANCEL

SAVE TEST

Once the test specification has been edited, it can either be saved back as the same file, saved to a new file or the operation can be cancelled and the file left intact.

Lower Controls Bar



MODE SELECTION

Select which mode to run in. X vs Time or Y vs Time

PEN UP/PEN DOWN

Shows the current state of the plot pen – when the pen is up no line is drawn – when the pen is down a line is constantly drawn.

When the pen is lifted, then dropped again a **new trace** is generated, which isn't linked to the old one. This new trace will be a separate column in the saved data (.csv) file.

X Scale/Y Scale

Controls how the data being sampled is scaled to be plotted.

Normally leave on **Custom** and the scale defined in the test definition file loaded will be applied to the plots. This will automatically scale the Volts sampled into the custom units required eg: mm.

Clicking the drop down arrow allows you to access other possible scales, including *0.1V/div*, *1 V/div*, *10V/div*, *100V/div*. These scales fix the max and min at 10V, with the scaling factors below applied:

0.1V/div = 10x scaling

1 V/div = 1x scaling

10V/div = 0.1x scaling

100V/div = 0.01x scaling

X Adjust/Y Adjust

These allow manual control over adjustment of the X and Y axes (ie shifting the plot left and right for the x axis, and up and down for the y axis).

The R buttons **reset** the manual adjustment to 0.

The digital display shows to 3 d.p. the amount of adjustment applied to each axis.

TIMEBASE SETUP

Scale – Set up Units per Second

Units – Units can be selected including mm, inches, seconds

Page width – How much data you view in the X axis (X max value)

Test Time – How long the test runs for in one plot of the page

OVERLAY ON/OFF

Pressing this button toggles the overlays (Upper and Lower Limit Lines) on and off. This can be done at any stage during operation (once overlays have been loaded). The Pass/Fail indication will only update when the Overlays are turned On.

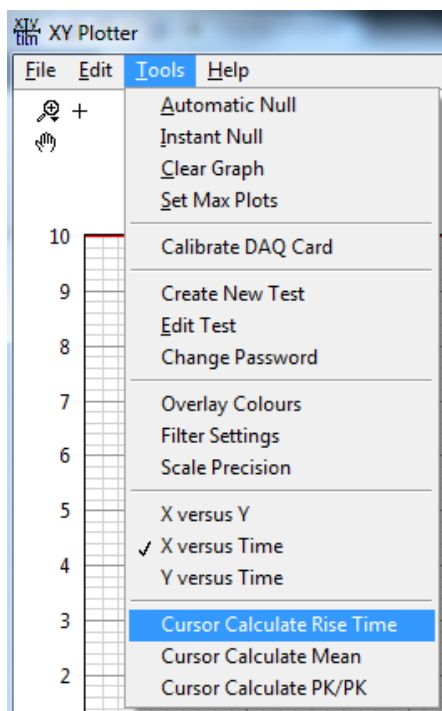
Plot Colour

Clicking this opens a colour palette which controls what colour the next (or current) plot is.

Sampling rate

Select the current sampling rate for the data acquisition here (in samples per second)

CALCULATIONS ON THE DATA



The Software can perform calculations on the trace data once the run has been stopped. Select the button to enable this function. Once the calculation type is selected from the pull down menu, cursor bars will appear on the trace. Move the cursors to the area of interest and the result will be shown on the lower bar.

AW139

Serial Number

Operator Number

Part Number

Works Order Number

Issue Number

ATP Number

Time Date

Comments

PASS

User Details Side Bar

Operators should enter test details to be saved with the test data (and printed) into the fields in this side bar (each field can be single clicked in and typed into).

Click in the boxes and type to fill the fields in: **NOTE:** Refer to **MODIFYING TEST DATA FIELDS** section to remove or modify these user details.

Serial Number

Operator Number

Part Number

Works Order Number

Issue Number

ATP Number

Time and Date – are filled in automatically when the pen is placed down

Comments

PASS/FAIL indicator – reflects whether the traces sampled fit within the Upper and Lower limits defined in the test specification (and applied as the Overlay).

This indicator is only updated when the Overlay is switched ON.

Mechanical Nulling

The XY plotter can automatically apply offsets to cope with sensors not reading 0 at the mechanical null when plotting.

This nulling can be achieved in either of 2 methods:

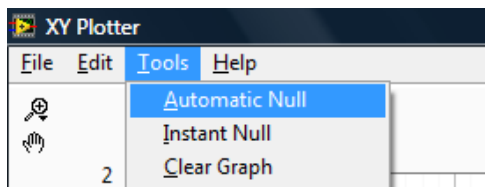
Automatic Nulling

This is a method where a line is drawn at the mechanical null **of each axis**.

This is done by sweeping one sensor while the other remains at null, starting a new line and sweeping the second axis whilst the other remains at null.

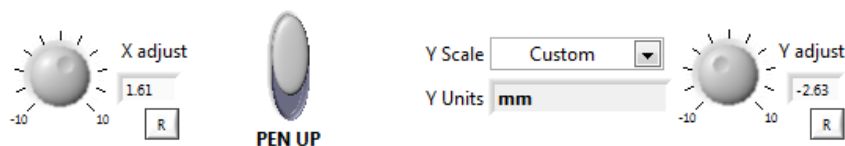
The resulting traces are a horizontal line and a vertical line.

Once these two lines have been defined, select **Tools – Automatic Null**



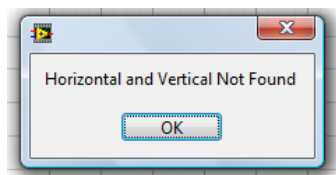
The software will determine whether it can define a proper offset in each axes (for this it requires well-defined horizontal and vertical lines).

If the software can determine the null lines, it applies the offsets using the offset controls on the lower control bar.



Do not adjust these offsets for the remainder of the test to remain the nulling applied.

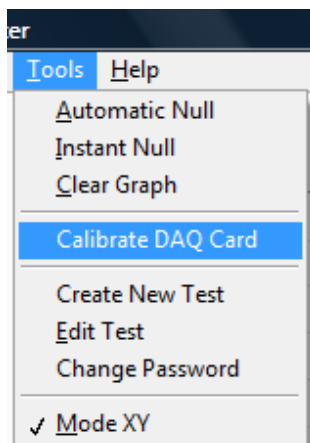
If the software cannot determine a clear vertical and horizontal line, it cannot perform an automatic null and will prompt the user:



Instant Null

The “instant null” performs the same offset but does not require a horizontal and vertical trace to be drawn – it assumes the axes are at the null positions at the instant the option is selected, and applies offsets from there. The operation takes around 2 seconds to complete. Select **Tools – Instant Null**.

Calibration Routine



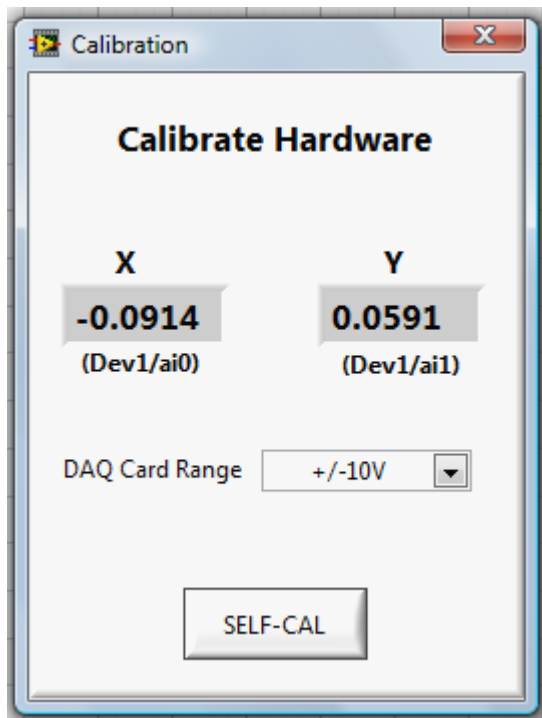
The DAQ card integrity can be checked by using the Calibration routine, this can be run by selecting **Tools – Calibrate DAQ Card**

This presents the user with a popup of live raw readings in volts from the Data Acquisition Device.

The device can have known voltages applied and the results from the device read back on the digital displays.

The range of the card can be adjusted using the drop down box – this should be selected to be the minimum range that exceeds the signal being applied for maximum precision in the measurement.

Eg: 4V test signal, select +/-5V range



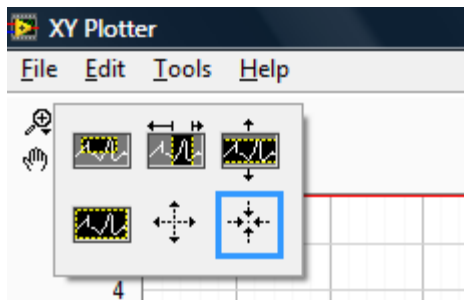
0.3V test signal, select 500mV range

To Self-Calibrate the device against its internal voltage source, first **disconnect all external signals** then press the **SELF-CAL** button. This will perform a self-calibration and return the results (if any).








Click the **Window Close** (top right hand icon) to dismiss the calibration dialogue.

Graph Zoom Functions

Use the graph zoom facility in the top left hand corner of the front panel to zoom into and out of sections of the graph.



The options represent:

-  Select and zoom on a defined portion of the graph
-  Select a slice of the graph in the x axis to zoom into
-  Select a slice of the graph in the y axis to zoom into
-  Return to unzoomed state
-  Zoom **in** on left mouse click
-  Zoom **out** on left mouse click
-  Pan Graph by clicking and dragging on graph

Changing Administrators Password

The Administrators password is required to access functions such as:

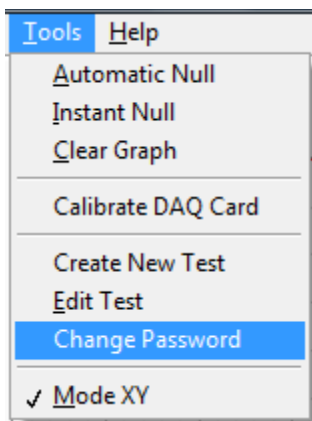
Select a new default printer

Create a new test specification

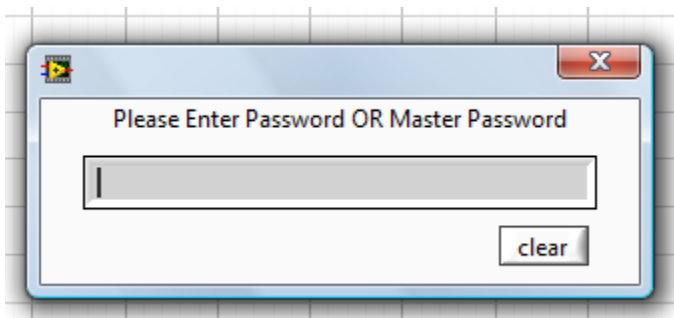
Edit test specification

The password can be changed by selecting the **Tools – Change Password** option

You will be prompted to enter the current administrator password **or** the Master (default) administrator password which is hard coded to **calbay**



You will be prompted to enter the current administrator password **or** the Master (default) administrator password. Master password is **calbay**

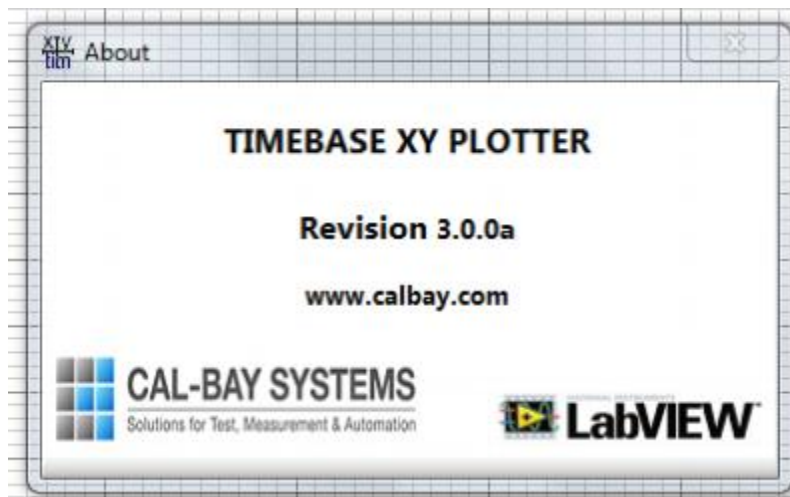
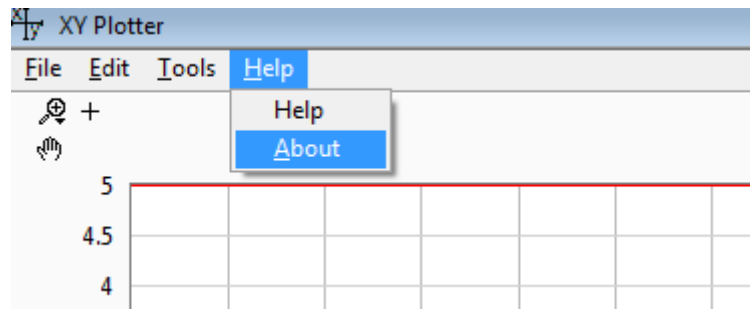


The passwords are case insensitive.

Once you have entered the current password or Master password, you will be prompted to enter the new password required, then to confirm it. This password should then be used as the administrator password to allow the functions detailed above.

Revision Number

The software revision number, as well as useful information for contacting support for the software can be found by opening the About Box. This can be located under the Help menu, on the far right hand side of the top menu bar.



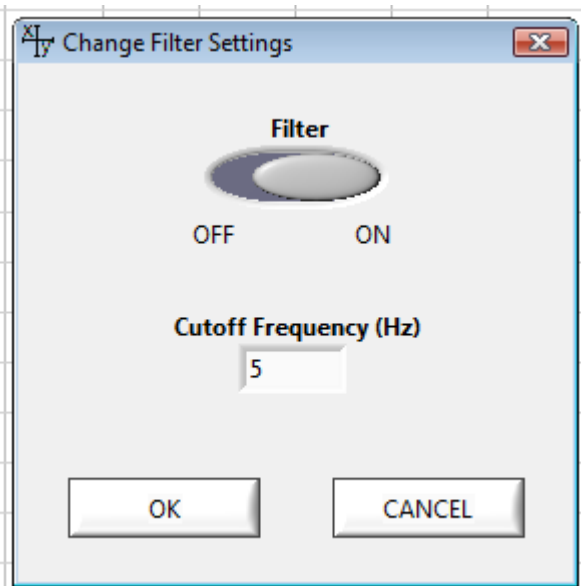
Dismiss the box by clicking anywhere on it – or it will automatically dismiss itself in 5 seconds.

Changing Filter Settings

The XY plotter contains internal software filters to aim to reduce noise impinged on the X and Y inputs, up to a certain cutoff frequency (specified in Hertz).

The filter can be turned on or off, and the cutoff frequency altered by means of a dialogue box which can be accessed from the **Tools menu – Filter Settings** sub-option.

You are required to supply the administrator password to make this change.



These filter settings apply to the test until another Test Type is loaded, when the settings saved against that test specification will be loaded in.

Filter settings can also be assigned to the Test Specification – see the sections on creating and editing tests (above).

NB: The filter settings abide by the Nyquist theorem, so settings over 500Hz will produce an error when saved.

Installation

Installation must be carried out when logged in as a Windows Administrator.

Installation should be carried out **before** installing your PCI DAQ card **if NI DAQmx is not already installed on your PC**. For details, please check NI Measurement and Automation Explorer, or contact your dealer.

XY Plotter Software

Open the Installation directory (Install) on the installation CD, and double click on **setup.exe**.

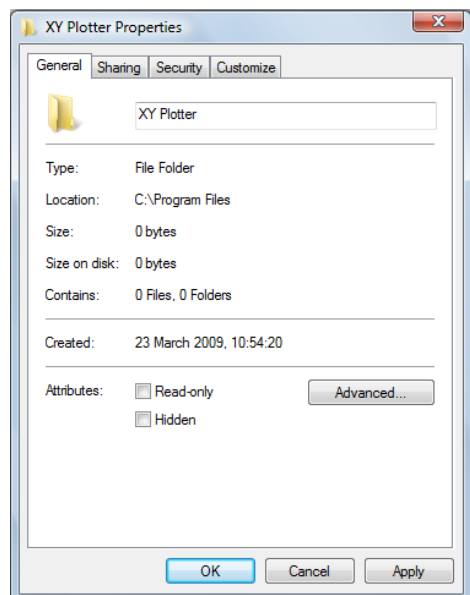
The installer should run and install the software. Click on all prompts and do not change the installation directories.

If no previous version of the software has been installed on the machine, when finished with installation you will be asked to reboot your PC. PLEASE NOTE: The software has been designed to make use of multi core processors and so is not supported on single core processors. The NI-cDAQ-9215 BNC card with the NI-cDAQ single slot carrier is recommended for use with the software.

Windows Vista

On Windows Vista, read and write access **must** be granted to the folder and sub-folders where the application is installed – otherwise certain functions will not be allowed (changing passwords, changing printers, creating and editing test specifications).

To grant this access, go to My Computer and browse to C:\Program Files\XY Plotter



Right click on the folder (XY Plotter) and select Properties.

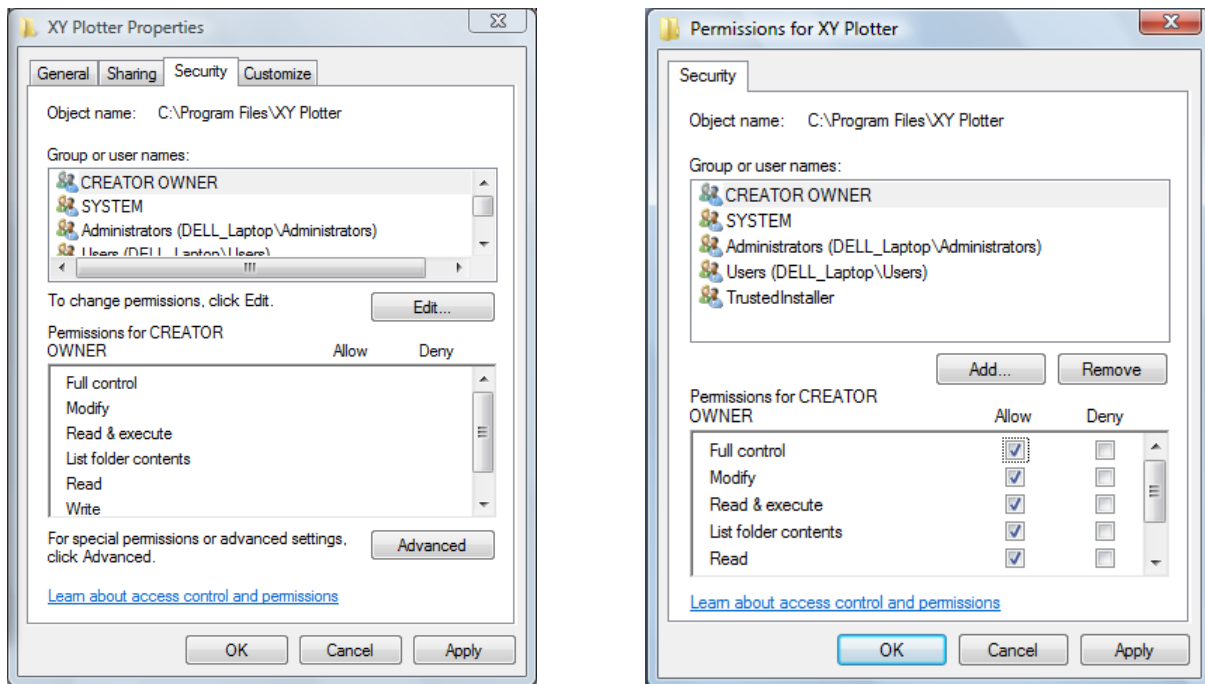
Click on the radio box next to Read-only until the square is clear (see figure). Then click Apply.

(continued on page 15)

continued....

Click on the Security tab (top of the panel). This opens up the directory security permissions for each users. Click the Edit button, and select the Full Control option for **each** user appearing in the list.

Click Apply after setting each user's permissions. If a dialogue box asks whether to set the same permissions for sub-folders – select OK.



Click OK when finished setting all permissions.

Check whether changing printer settings works in the XY Plotter program.

If there are still problems with permissions – please consult your IT department.

PDF creation

To create PDF files, a converter needs to be installed. Included with the Installer bundle is CutePDF – which is the default driver to create PDFs within the XY plotter program.

To install, navigate to the PDF directory on your installation media, double click on **converter.exe** to install the pdf converter. Once this is finished, double click on **CuteWriter.exe** to install the printer driver.

Once installed, you can check functionality by going to another application (eg: WORD) and selecting the Print option. You should see a new printer driver called CutePDF Writer. Printing a document to this printer will put up a dialogue box, and create a PDF file once the path is specified.

APPENDIX:

What to do if the software appears not to be working.....

If you have already installed National Instruments cards on your PC, or you have configured NI's MAX previously for another application, you may come across a situation where the XY Plotter software appears not to work. Please follow the guide below.....

Configuring the data acquisition card correctly.....

The recommended Data Acquisition (DAQ) card and USB carrier for use with the XY Plotter software is shown below:

Cal-Bay Systems XY Plotter recommended hardware			
Qty	Item description	Supplier	Part Number
1	NI- 9215 cDAQ 4 channel A input module with BNC connectivity	NI	779138-01
1	NI-cDAQ-9171, CompactDAQ Chassis (1 slot USB)	NI	781425-01

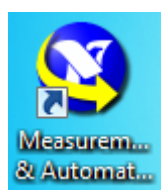
Once you have installed the software, plug in the USB cable into a spare USB port on your laptop or desktop PC. The hardware will be automatically recognized by the NI DAQmx software which is installed during the software installation.

Run the XY Plotter software. The cursor will move to the values of the X and Y inputs (Refer to the help window in the software for full operator instructions).

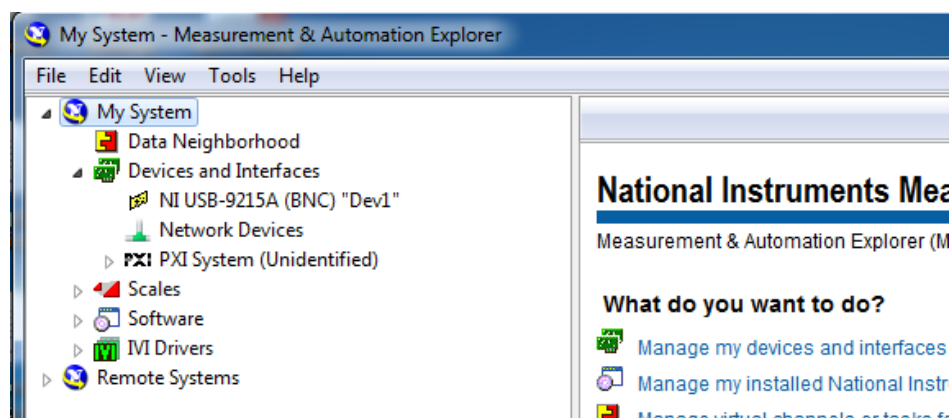
Should the cursor remain in the centre of the plot screen there may be an issue with the set up of the DAQ card. To enable further configuration you will need to download the latest full feature version of DAQmx including Measurement and Automation Explorer (MAX) from the National Instruments website. The link is shown below.

<http://search.ni.com/nisearch/app/main/p/bot/no/ap/tech/lang/en/pg/1/sn/catnav:du,n8:3478.41,ssnav:sup/L>

Once installed, click on the MAX icon on your desktop.

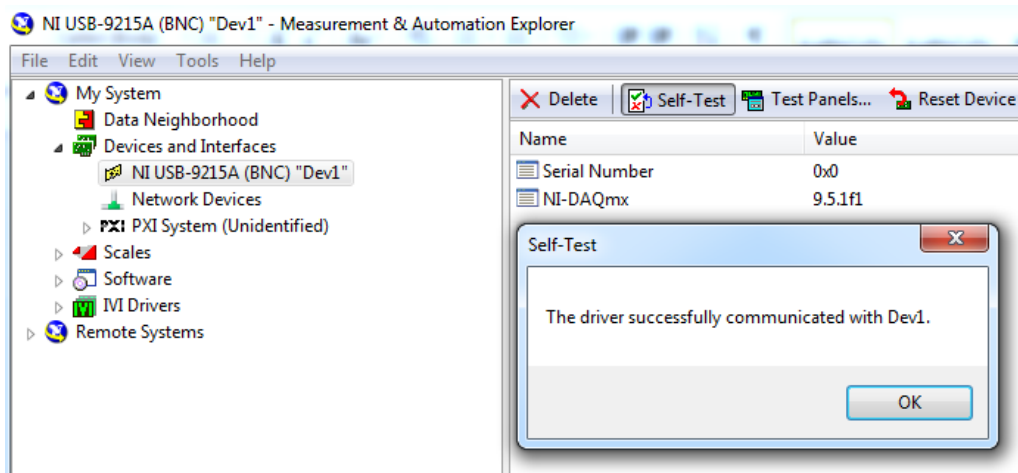


Once open click on the Devices and Interfaces option and check to see if the DAQ card is showing (see below)

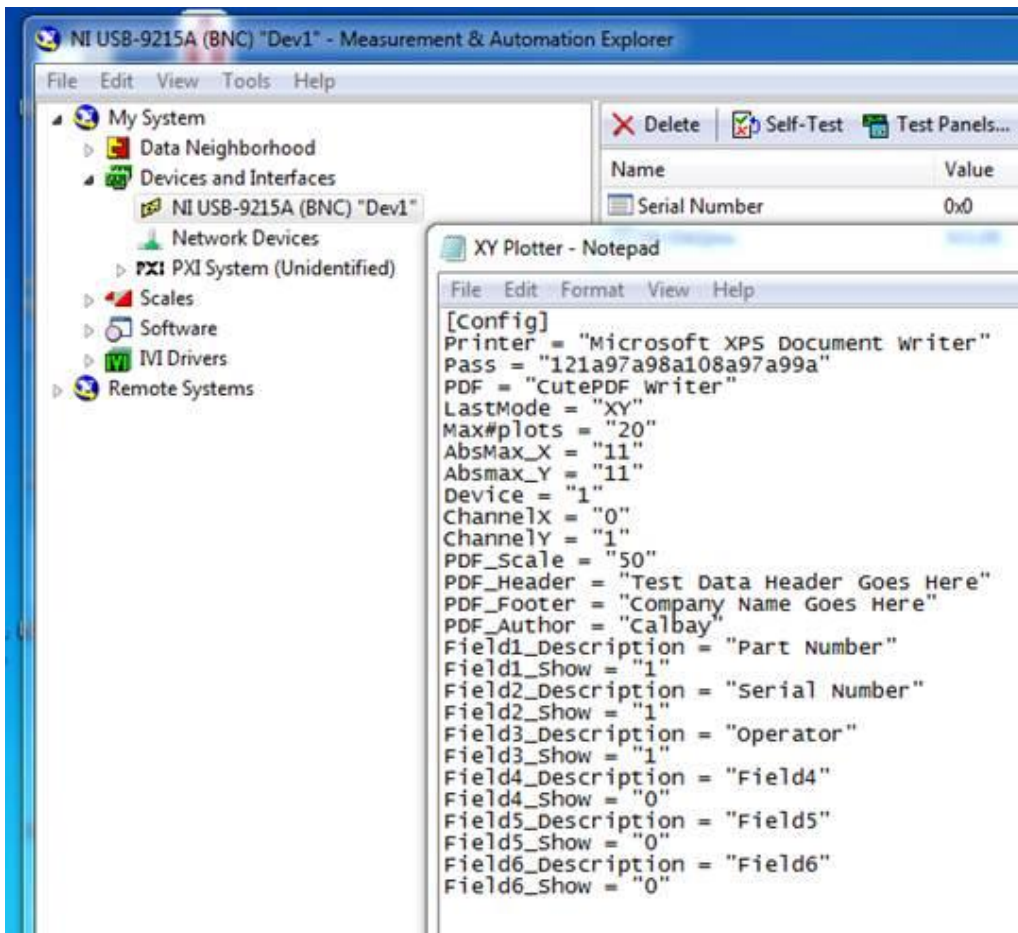


You should see the card listed, in this case it is showing the NI USB-9215A (BNC) "Dev1"

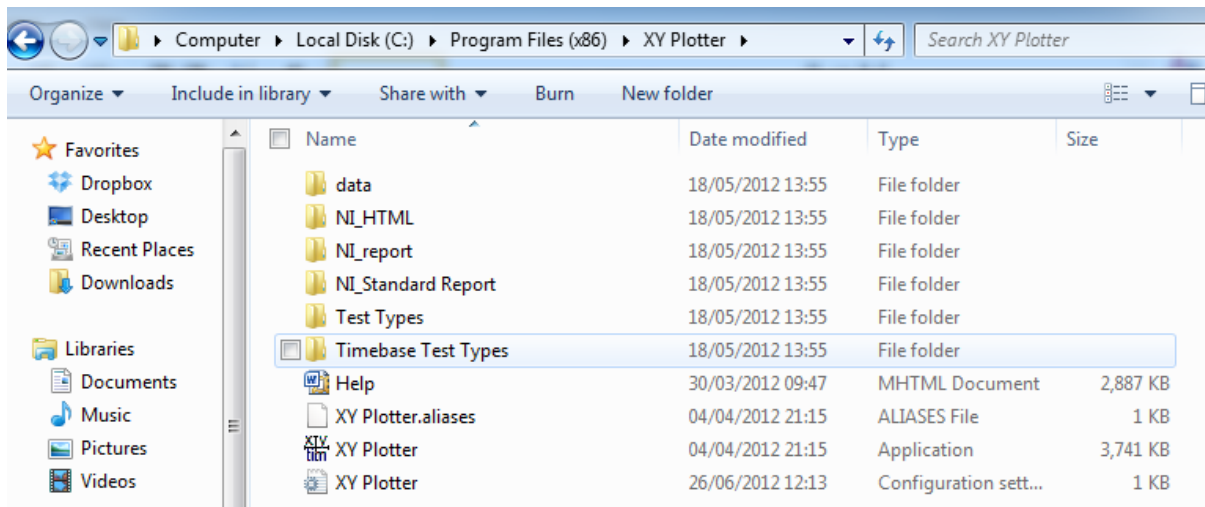
If you double click on this device name it will bring up the configuration page for this card. If you click on the tab called "Self-Test" you should get the following result. If not, there is possibly a problem with either your installation or the card itself.



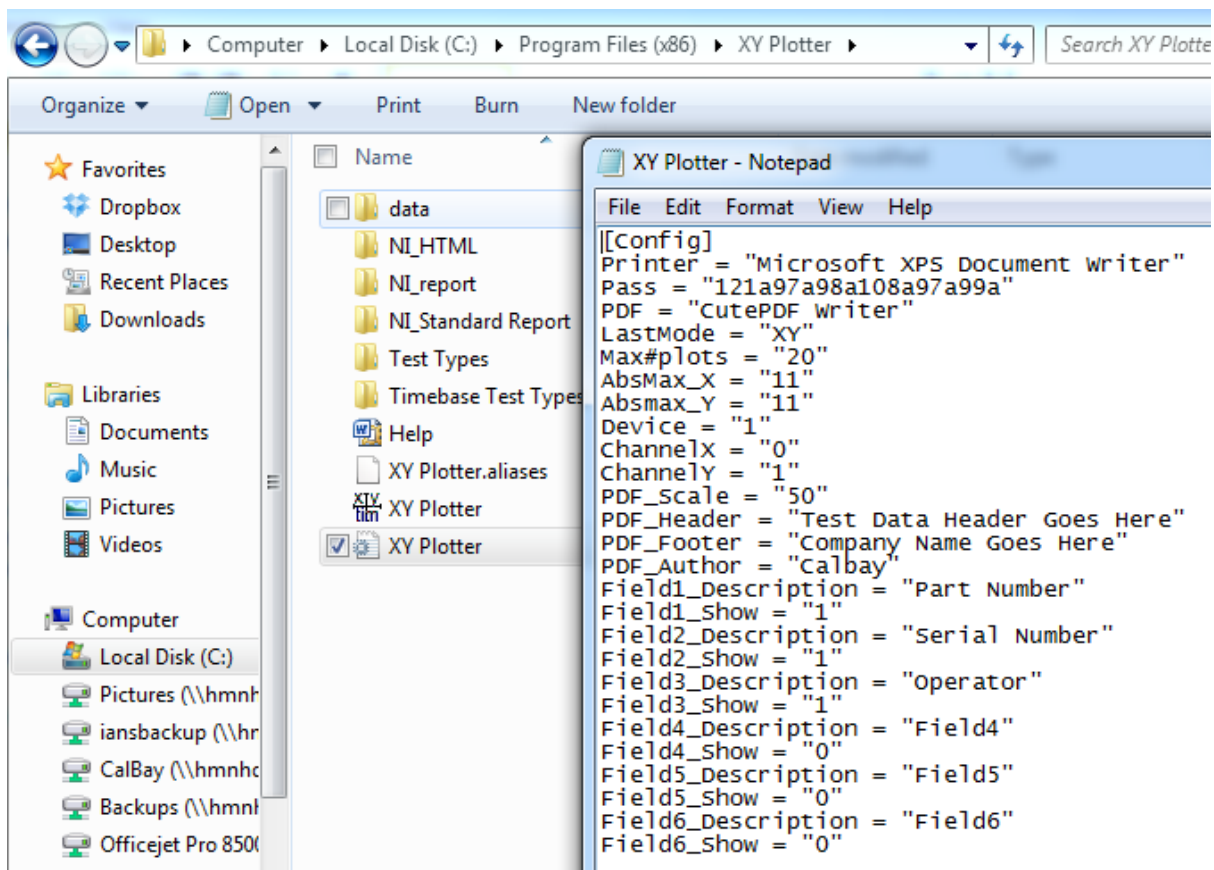
If, as shown above the driver has successfully communicated with the device but when you run the plotter software the cursor still does not move, there is likely to be a problem with the device name. This can occur if you have more than one DAQ card in your computer. You will need to set the XY plotter device name to the same as the one shown in MAX. An example is shown below.



To edit the XY Plotter Device name, open the XY Plotter config file which is located in the XY plotter folder on the drive you saved it to when installing. The config file is shown at the bottom of the list below.



If you click on this file it will open up the config file in Notepad.



Check to see if the device name in MAX and in this file are the same, if not change either to make them the same. In the example shown below, MAX is set to "Dev1" and the XY plotter Device = "1" meaning that the device will be recognized by MAX and the software will run correctly. If you change the device name or number in the XY Plotter config file you must then save it into the same file location before the changes will take effect. You will need to restart the XY Plotter software for these changes to be recognized by the software.

