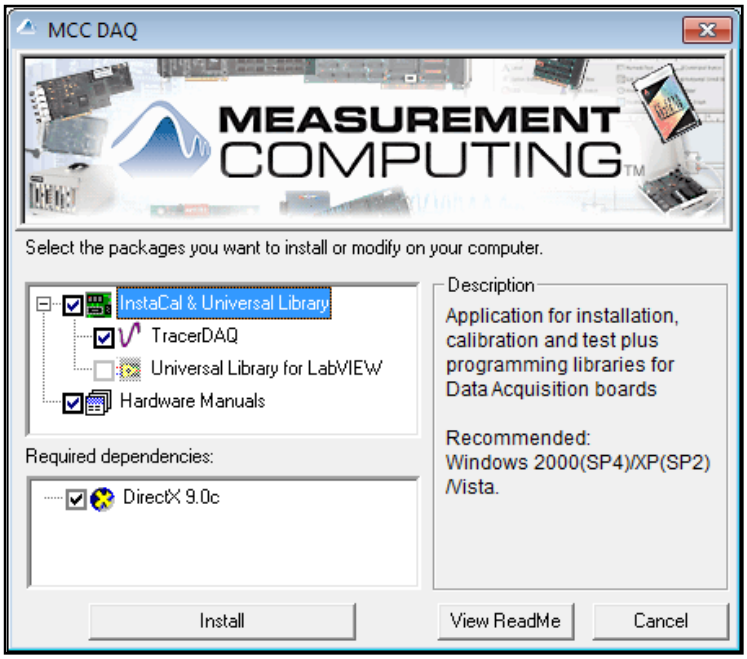
The MotionMonitor xGen Hardware Guide: Measurement Computing USB Device Configuration

The USB device must be configured before use in The MotionMonitor xGen. Configuration is accomplished using Measurement Computing's configuration software, Instacal.exe. For purposes of demonstration, this guide will walk through the installation and setup for a USB-1616HS-BNC device. However, the same general steps should apply for any Measurement Computing A/D device.

1. First, the Measurement Computing Software needs to be installed. This can be accomplished by running the installation executable from the Measurement Computing CD.

2. Next, you will be prompted to select the packages you want to install. The default selections should be installed, as seen in the following image. Click Install.



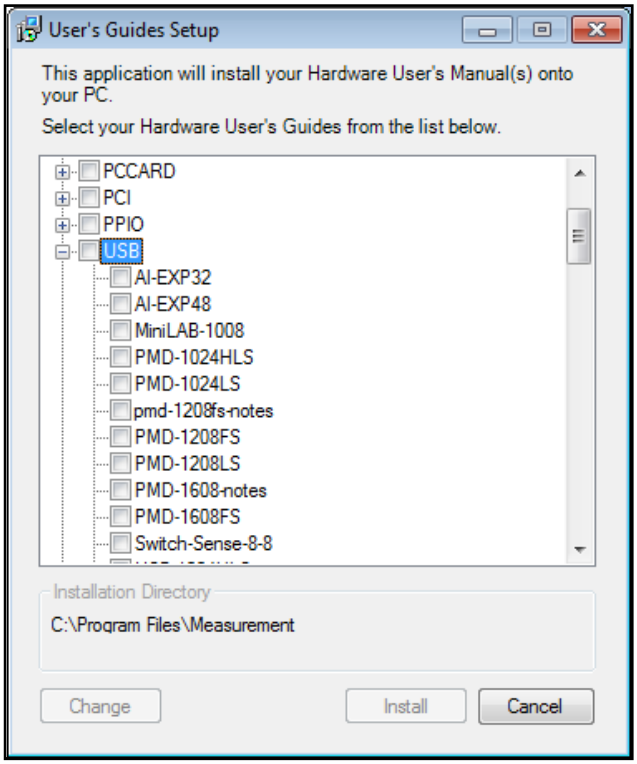
3. Click Next through all of the installation prompts. There should be no modifications made for the destination folder or the program features to be installed. When prompted, click Install.

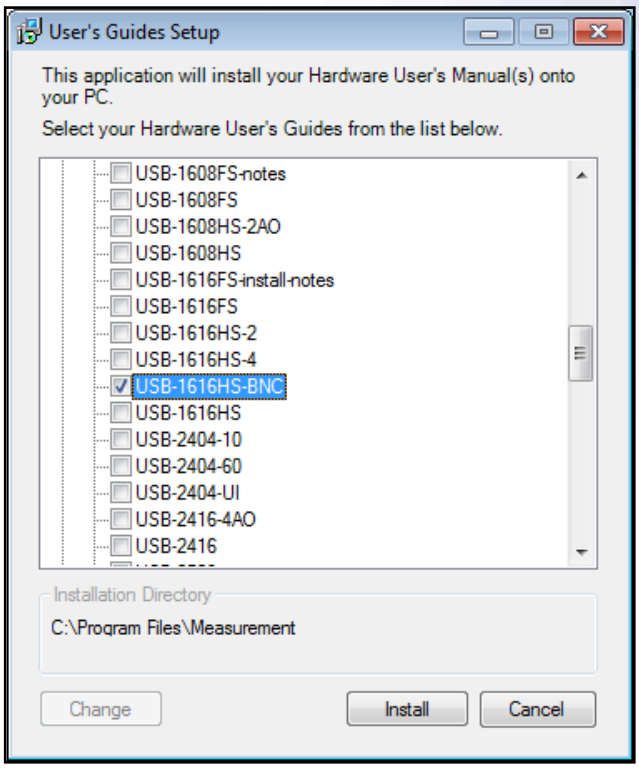
4. Select Finish after completing the installation of InstaCal and the Measurement Computing Universal Library for Windows.

5. Next, TracerDAQ will install, click Next to proceed. Accept the license agreement and click Next to proceed. You may be prompted to enter a user name and organization name for the computer. Be certain to select the install for everyone who uses this computer option, not just the current user. Then, click Next and Install to install the software.

6. Select Finish after completing the installation of the TracerDAQ software.

7. Then, the User's Guide Setup window should open, allowing you to select the User's Guide for your A/D board. Expand the USB option and check the option for USB-1616HS-BNC. Then, Install the Hardware User's Guide.





8. Finally, a window for the installation of DirectX will open. Accept the agreement and select Next until the software installation begins.

9. Select Finish after the installation for DirectX is completed.

10. Your computer must then be restarted for the configuration changes to take effect.

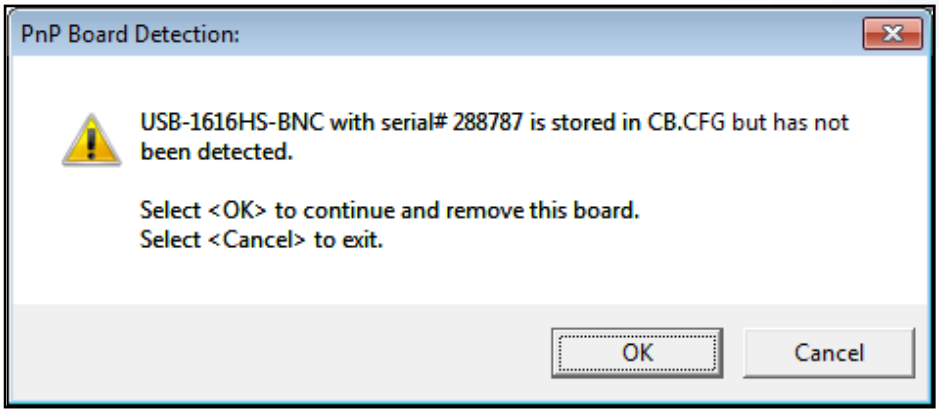
11. After restarting your computer, connect the power and USB cables to the A/D device and also connect the USB cable to the computer. It is important that the A/D device is **NOT** connected to the computer before the installation of InstaCal is completed.

12. If using Vista, Windows 7 or Windows 10 the device may install on its own. Otherwise, a Found New Hardware Wizard will open. Select No not at this time. Then select Install the software from specific location and click Next. Direct the Wizard to the Measurement Computing CD in the CD Drive and click OK. Then, click Finish.

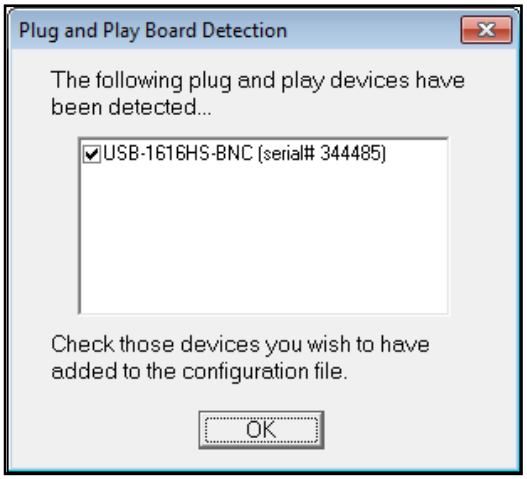
13. The Found New Hardware Wizard will open again, and prompt you to go though the same steps as above to complete the device configuration.

14. The USB A/D device is now ready to be used on this USB port. Note: This driver installation process must be completed the first time the device is connected to a new USB port. Each USB port the A/D device will be connected to should have this process completed. After completing the New Hardware Wizard process for a USB port, you should not have to repeat the process for that same USB port again.

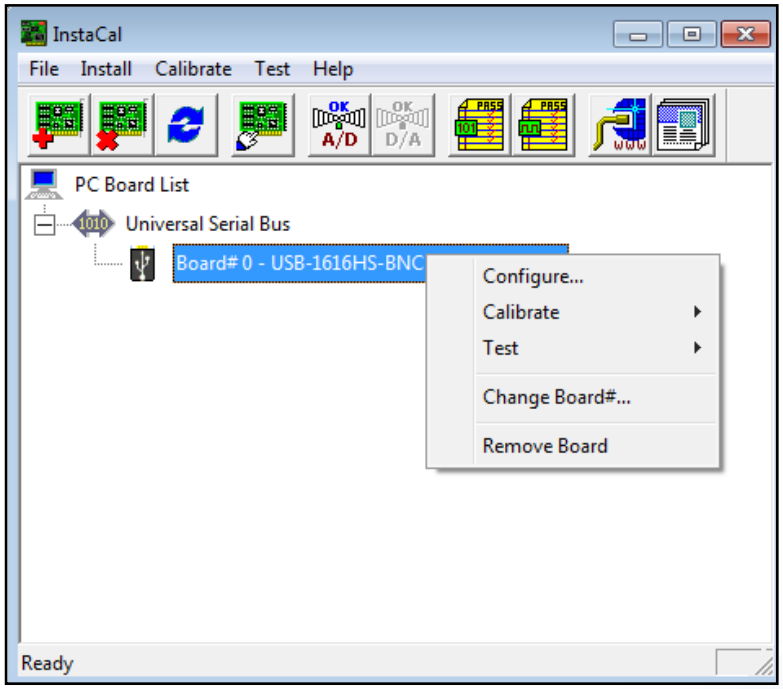
15. Before using the A/D device in The MotionMonitor, it will need to be configured in InstaCal. From the Start menu, go to All Programs and select Measurement Computing and then InstaCal. You may see a message similar to the following message. Click OK.



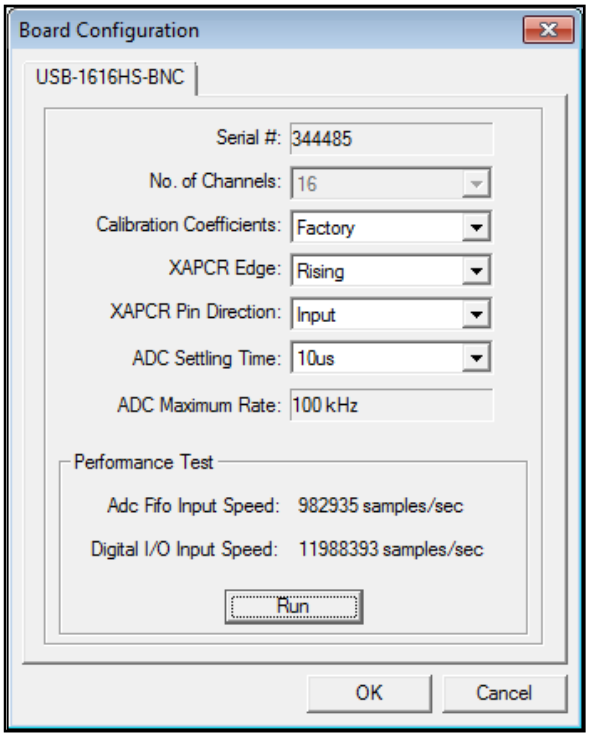
16. The Plug and Play Board Detection will notify you of any boards connected to the computer. Click OK.



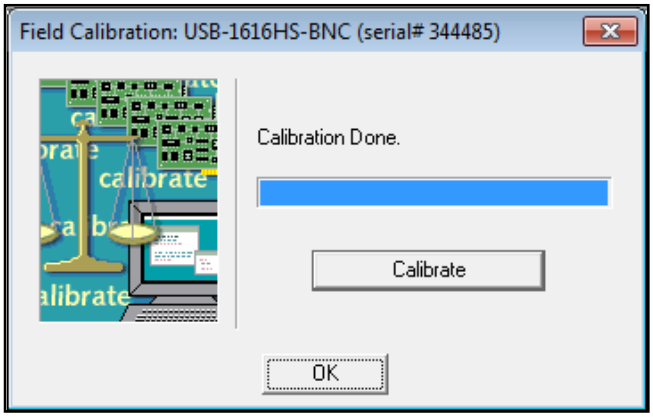
17. Right clicking on the board will give you the following options. The board number here is what will be referenced as the Board index in The MotionMonitor.



18. Select Configure and configure the board as seen in the image below. Run the performance test by clicking Run. Values similar in magnitude to those shown in the image below should be reported. Click OK.

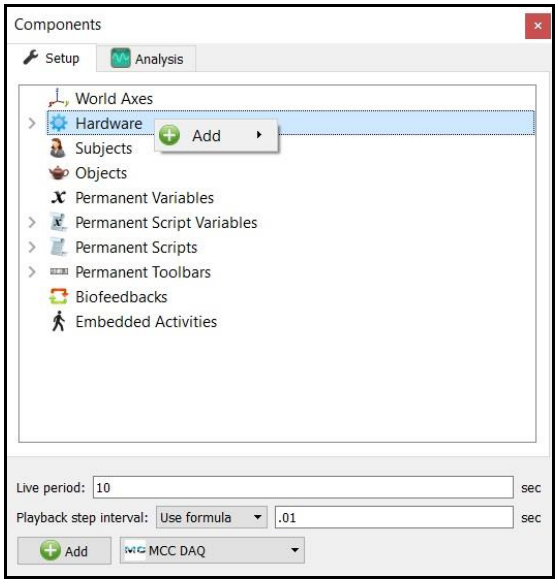


19. Right click on the board and select calibrate and then A/D. Click the calibration button and wait for the calibration process to complete. When completed, click OK.

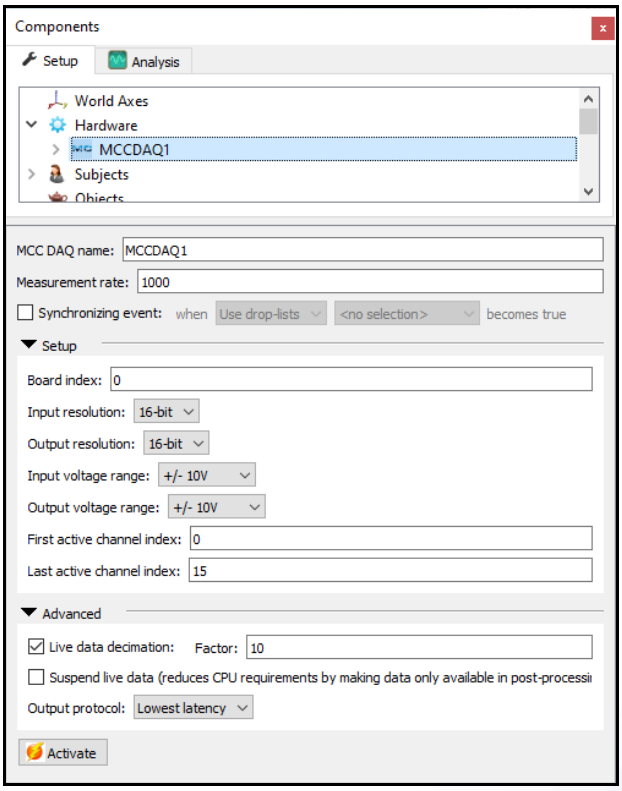


20. Then, right click on the board and select Test Analog. Connect a known voltage source, such as an event marker, EMG channel or Forceplate channel to channel 0 on the A/D board and confirm that the scan reports the proper voltage and that the signal looks appropriate.

21. Start The MotionMonitor xGen and go to the Hardware node in the Setup Components window. Add a MCC DAQ device from the Add button in the parameters panel at the bottom of the Components window or by right clicking the Hardware node and adding the device through the cascading drop list.



22. Click on the MCCDAQ1 device to bring up the parameters panel. The Measurement rate and parameters under the Setup tab, including Input and Output resolutions and voltages and the active channel indexes, can be configured here within the specifications of the Measurement Computing device. The Board index needs to match what was configured within the InstaCal application. The settings pictured below show the typical settings for the USB-1616HS-BNC device.

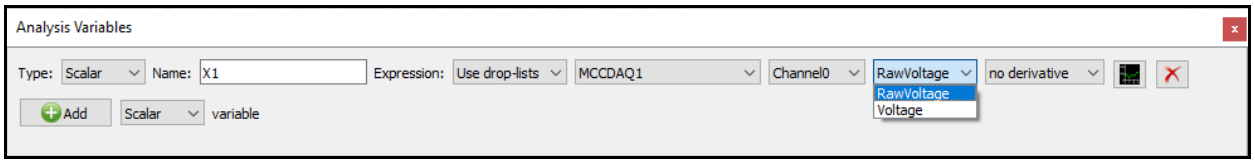


The "Live Decimation factor" checkbox provides a means for limiting the computer resources being used while running in the Live Window by displaying only a fraction of captured data points in real-time. This does not affect the measurement rate as data will still be captured at its full resolution. If visualizing or utilizing the data in real-time is not desired, the suspend live data checkbox will suppress any data from the device from being displayed in graphs or used in any equations. However, the data would immediately be available and presented in a recorded activity.

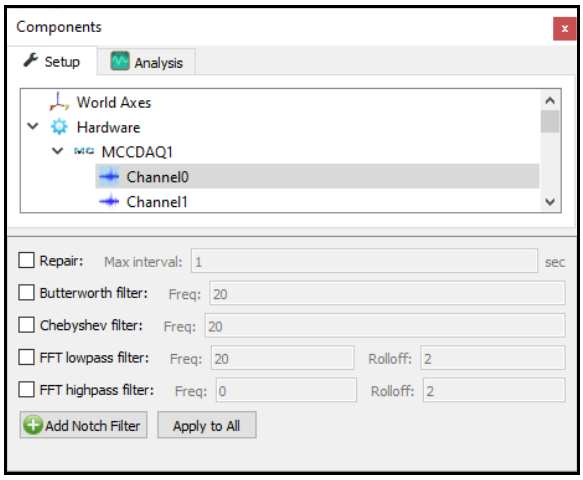
The Input and Output voltage ranges can be set depending on the data being captured but note that some boards do not support all voltage ranges. Bipolar devices would typically be ±.1, ±.2, ±.5, ±1, ±2, ±5 or ±10 volts. One should set the voltage range consistent with the input device to ensure maximum resolution and to avoid "clipping" of the signal. For example, many forceplate and EMG systems are specified as ± 5 Volts.

The Output protocol pertains to the A/D output channels and will be discussed later in this document.

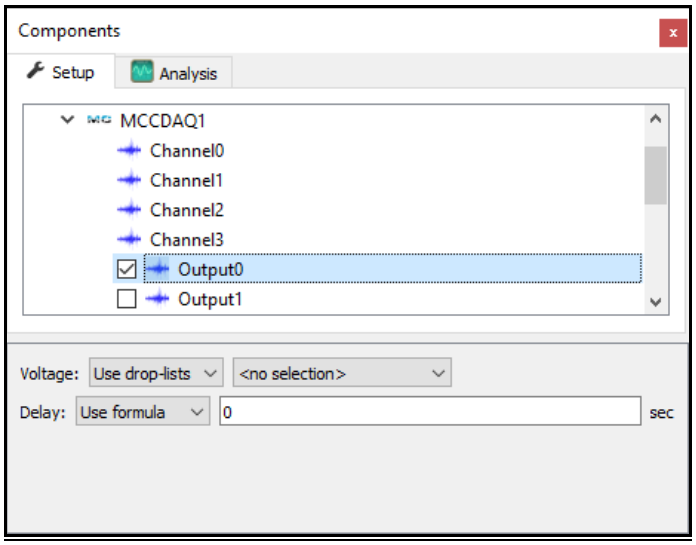
23. Once the device has been activated, data is available within the system and can be displayed in graphs or used in formulas. A sample data definition for the Raw Voltage for Channel 0 is displayed below.



Raw Voltage and Voltage can be selected from the drop-list. Raw Voltage will always return the raw voltage, regardless of any enabled smoothing parameters. Voltage will report the voltage including any smoothing, if enabled. Smoothing parameters can be enabled or disabled at any time through the nodes for Channels under the MCCDAQ1 device in the Setup Components tab, as shown below.



24. Some Measurement Computing devices support the ability to send output signals through screw terminal connections or D-sub connectors, such as through the event marker typically provided with USB-1616HS-BNC devices. The exact number of outputs available will depend on the device.



The output voltage can be specified through the drop-lists selector or formula field. If desired, a Delay can be specified in seconds to postpone the output of the desired voltage for the specified amount of time.

The Output protocol under the Advanced section of the MCCDAQ parameters panel can be set to either the Lowest latency or Synchronized method. The Lowest latency mode will ensure the least time between when an event is detected or variable is updated, to when it is sent out through the MCCDAQ output channel. However, there is no guarantee that multiple MCCDAQ output channels will update at the same time. The Synchronized method will ensure that all MCCDAQ outputs will update simultaneously.

Other differences between the two modes include how they can be used with the Delay. The Synchronized method can allow for delays down to 0.1 msec intervals while the Lowest latency method can't support less than 4 msec delays.

The Delay in this dialog is meant to be used for closely spaced outputs, such as when sending outputs on multiple channels in quick succession based on the same initial event. While the Lowest latency method can support longer delays, of up to several seconds, the Synchronized method can only support delays under 0.5 seconds. For longer delays, or when sub-msec precision isn't required, it is recommended to set the Delay value in this dialog to zero and define a time variable to create the delay within The MotionMonitor xGen application. For example, using the attime() operator and passing "now()-*Delay*" as the second argument, where "*Delay*" is a scalar given in seconds.

Note, it is possible that with a longer delay specified in this dialog, that if the output signal changes its state during the delay period, the signal could be missed or that the output delay could have a different duration than the one with the original signal.