SensorDAQ Automation

SENSORDAQ TERMINAL[1]

SensorDAQ has three connectors for Vernier analog sensors and one connector for Vernier digital sensors. These connectors provide an easy way to use many sensors. For extra versatility, the SensorDAQ is equipped with a screw terminal connector. The connector has terminals for analog input, analog output, digital input/output, and a general purpose counter/timer. A 5-volt terminal and several ground terminals are also included.

By combining LabVIEW programming with the SensorDAQ input/outputs, the concept of automation may be introduced. This can include creating programs that turn on and off electronic devices, sensor feedback and control projects, or using PID control to manage motor speed.

The SensorDAQ is not designed to directly power external devices (the outputs only provide a few milliamps of current), but instead should be used as the controller. This usually means controlling relays, using an amplifier like the Vernier Power Amplifier, or designing a proper circuit.

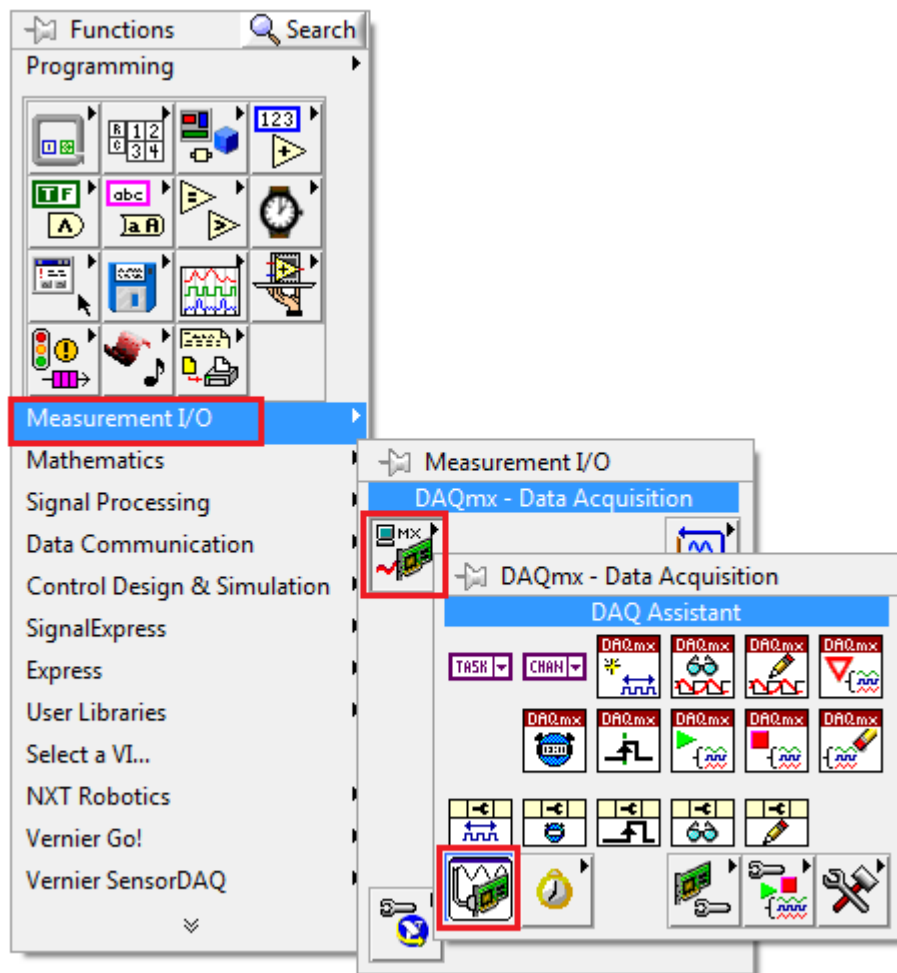A brief overview of the output terminals follows:

Terminal	Signal Name	Reference	Direction	Description
5,8,10	GND	—	—	**Ground**: Reference point for single-ended AI measurements, bias current return point for differential mode measurements, AO voltages, digital signals at the I/O connector, +5 VDC supply, and the +2.5 VDC reference.
11,12	AI <0..1>	Varies	Input	**Analog Input Channels 0 and 1**: For single-ended measurements, each signal is an analog input voltage channel. For differential measurements, AI 0 and AI 1 are the positive and negative inputs respectfully, of differential analog input channel 0.
9	AO 0	GND	Output	**Analog Output Channel 0**: Supplies the voltage output of AO channel 0 from 0–5 V with an output current drive value of 5 mA. The maximum update rate is 150 Hz, software timed.
1–4	P0.<0.3	GND	Input or Output	**Digital I/O Signals**: You can individually configure each signal as an input or output.
6	+5 V	GND	Output	**+5 V Power Source**: Provides +5 V power.
7	PFI 0	GND	Input	**PFI 0**: This pin is configurable as either a digital trigger, an event counter input, pulse generation output, or as a period, semi-period, two edge separation timer.

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[1] This chapter applies only to the Vernier SensorDAQ interface. If you are using a LabQuest or LabQuest Mini, skip this chapter.
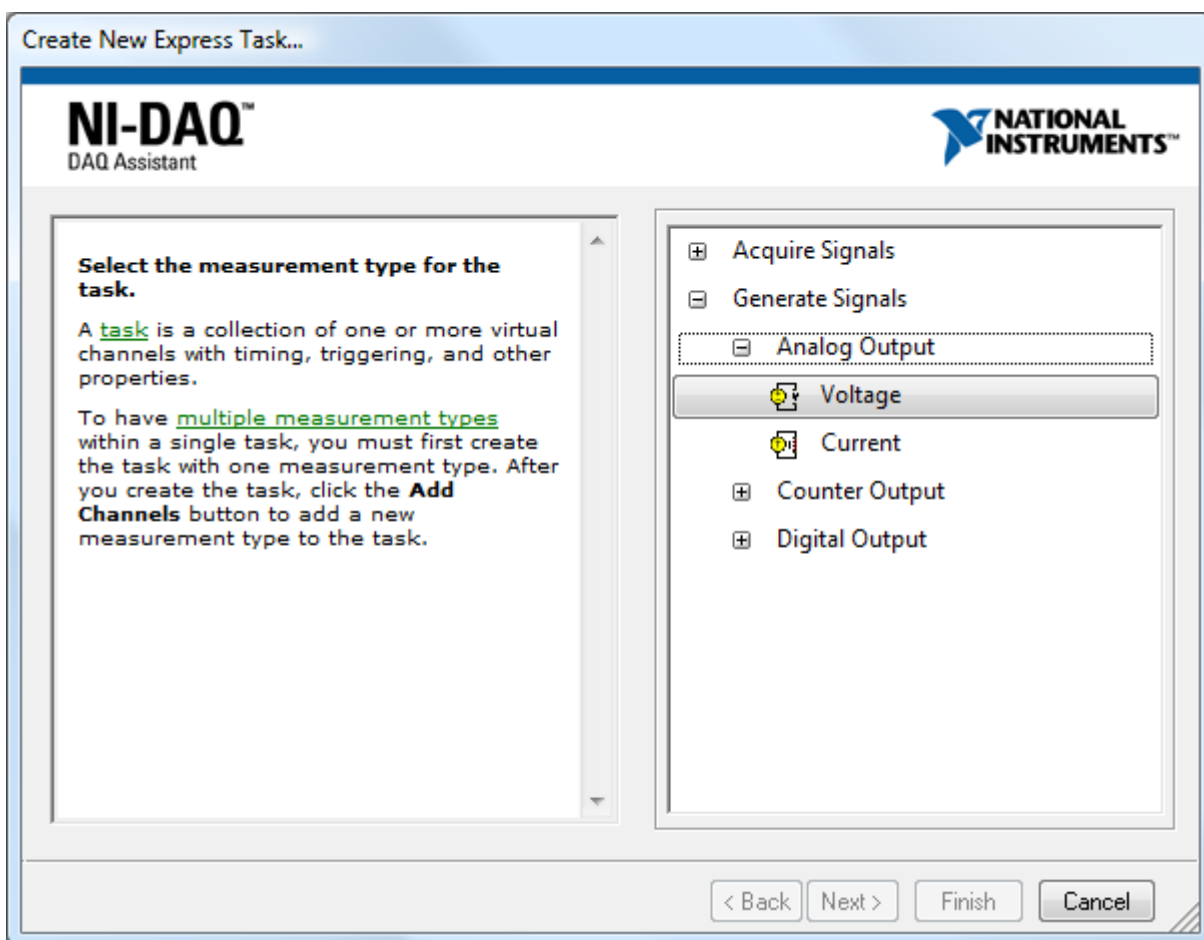
DAQ ASSISTANT

The Analog Express VI was used in the previous exercises to communicate and program the SensorDAQ analog channels. The Express VI for the screw terminal is called DAQ Assistant. This Express VI is used to configure and program National Instruments hardware. The DAQ Assistant Express VI can be used to configure and program the SensorDAQ screw terminals, but it cannot configure the Vernier analog or digital sensor channels.

The DAQ Assistant is located in the Measurement I/O ► DAQmx – Data Acquisition palette.
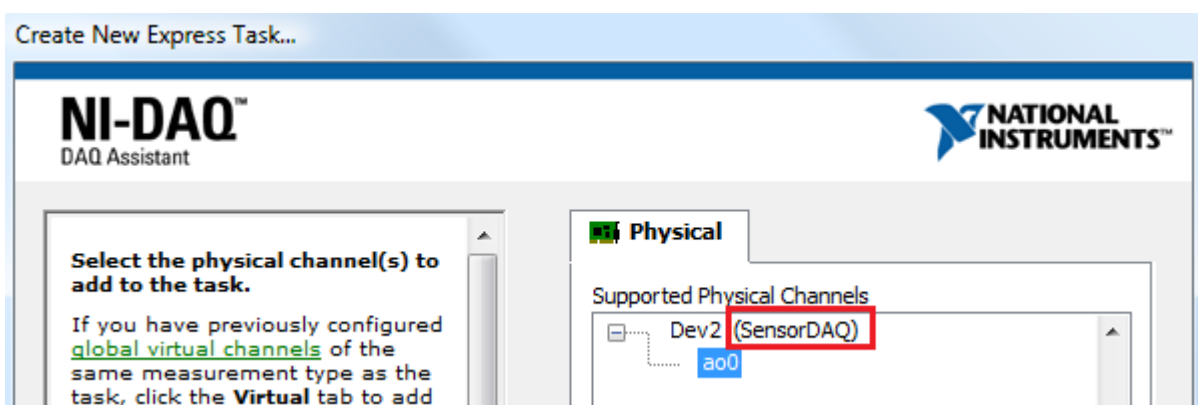

When you place the DAQ Assistant in the block diagram workspace, a configuration dialog box appears. Use the tree control in this popup to select the type of tasks you want to create. The DAQ Assistant is an Express VI designed for many pieces of hardware. Realize that some selections will not work with the SensorDAQ. For example, in the dialog window there is a task

for Analog Output ► Current. The SensorDAQ analog output line does not support this and it is not a valid selection. If you choose this, you will receive an error message. You must choose Analog Output ► Voltage.

After selecting the type of task, the next step is to choose the channel. Make sure that the device is SensorDAQ, and then click the channel name, such as ao0, to highlight it and continue.

The DAQ Assistant channel configuration and test dialog window now appears. Configure your channel, as needed, in the lower half of the dialog box. You can test your channel by running the test panel in the upper portion of the dialog box. Again, there may be configuration options that are not valid for the SensorDAQ screw terminal. If you choose an invalid option, you will get a warning message.