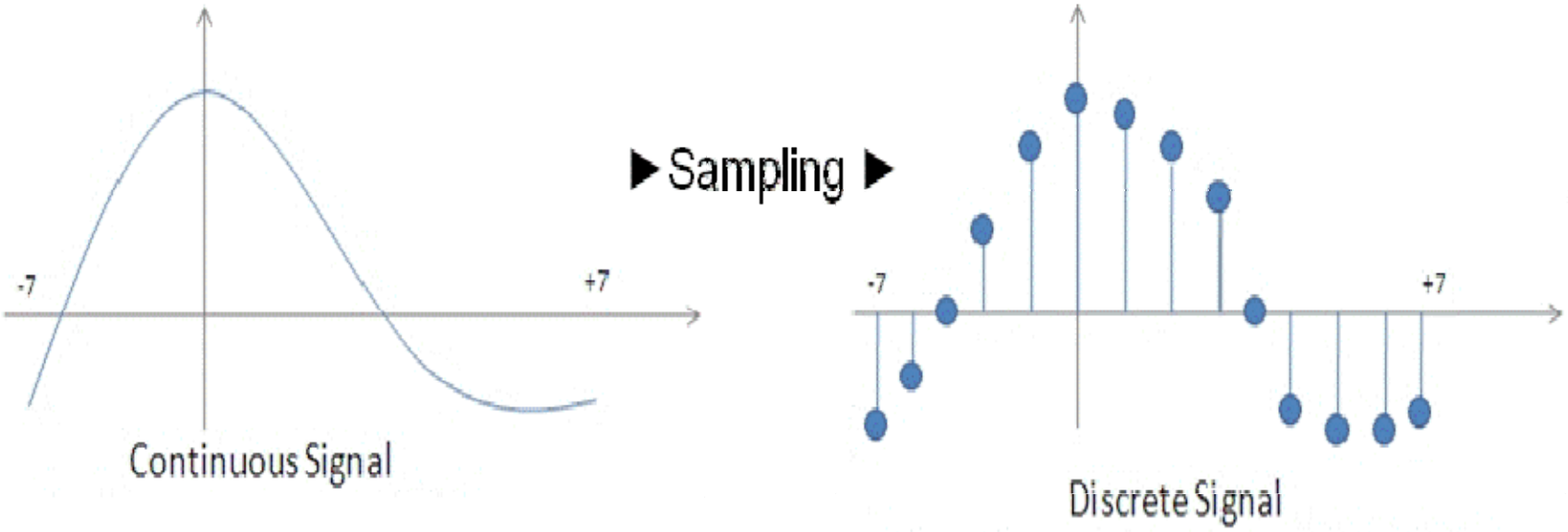
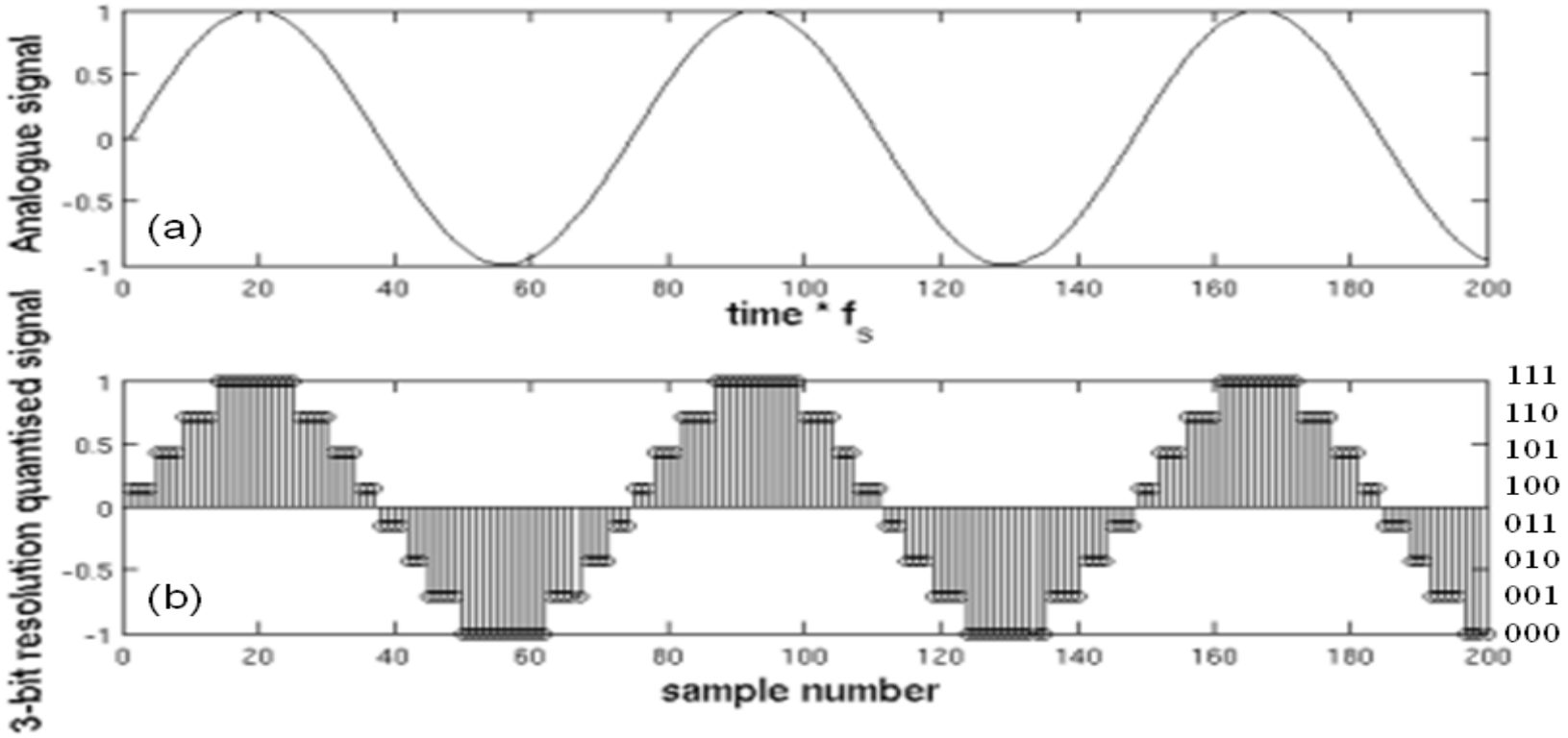
# DATA ACQUISITION USING LABVIEW/ELVIS

# Sampling



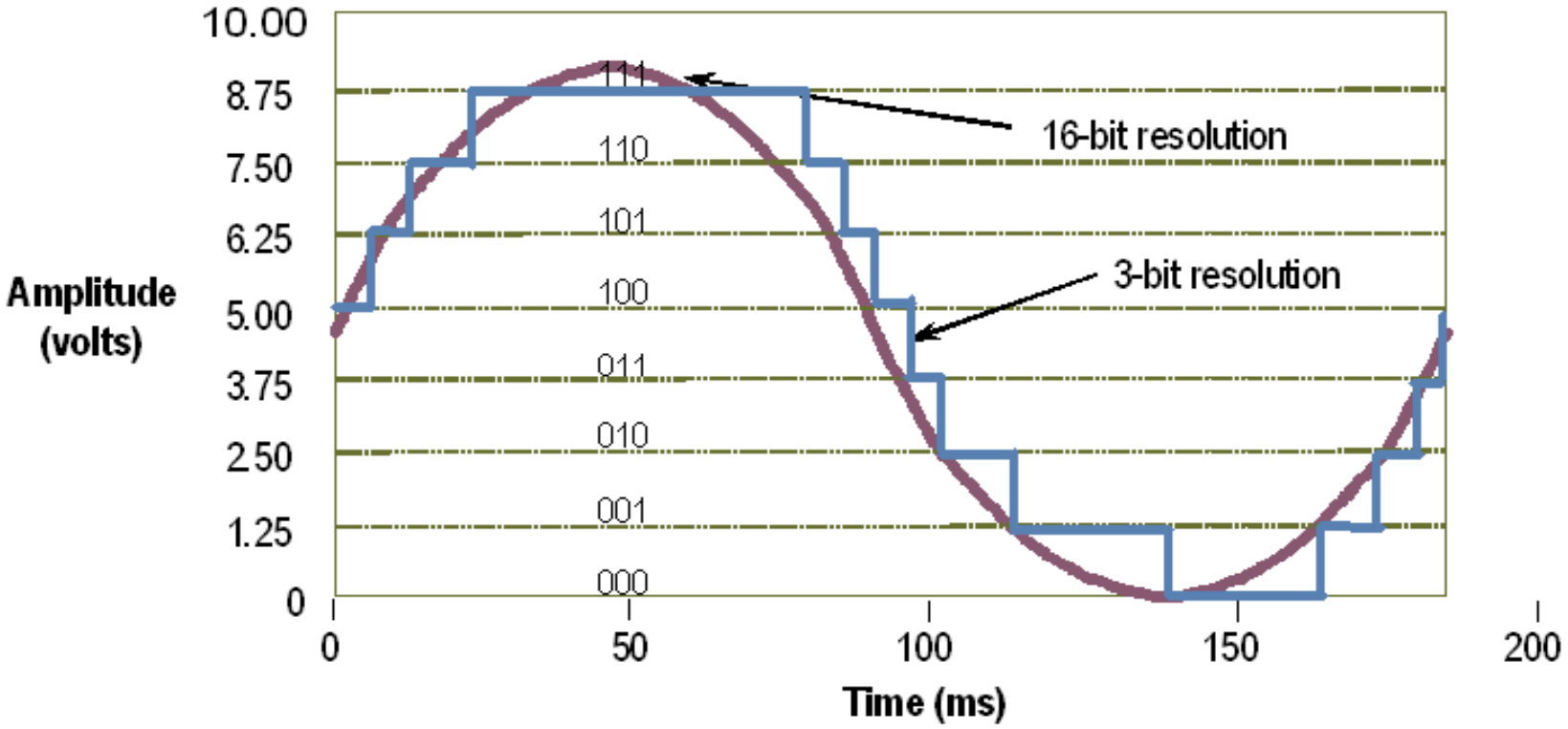

- Sampling is a process whereby data is acquired from an analog signal by an ADC at discrete time intervals.
- Sampling rate is the rate at which the signal is sampled.
- Higher sampling rate achieves better conversion of the analog signals.
- The minimum sampling rate required to represent the signal should be at least twice the maximum frequency of the analog signal under test – this is the Nyquist sampling rate.

# Analogue-to-Digital Converter




- Analog to digital conversion is the process whereby the analog signal is converted into a digital code.
- Resolution is the number of bits the ADC uses to represent the digital data.
- An 8 bit ADC gives 256 levels ($2^8$) compared to a 12 bit ADC that has 4096 levels ($2^{12}$).

# Digital-to-Analog Converter




- Digital to analog converter generates an analog output from a digital input.
- The DAC's performance is limited by the number of bits.
- The figure above shows how a sinusoid waveform is converted by a 3 bit DAC (a 16-bit one is also shown for comparison).

# Integrated DAQ on ELVIS

## Integrated DAQ

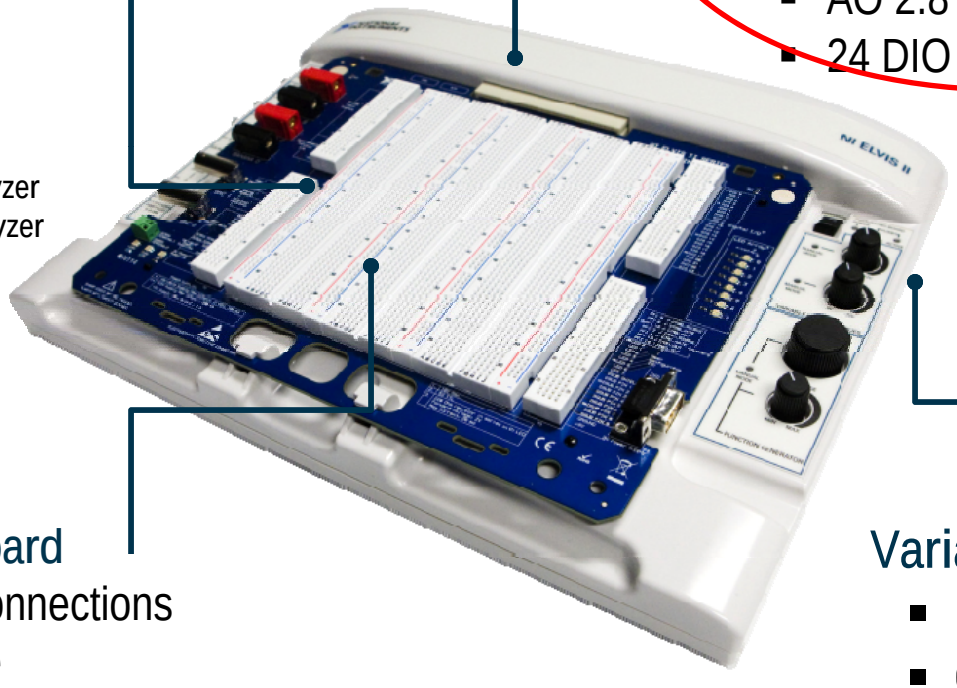
- AI sampling rate 1.25 MS/s single channel, 500kS/s two channel
- 16 bit resolution
- AO 2.8 MS/s update rate
- 24 DIO lines, 15 PFI, 2 CTR

## Impedance Analyzer

- 0.2 Hz to 35 kHz Range
- NPN, PNP, Diode

## Other Analyzers:

- Bode Analyzer
- 2-wire Current Voltage Analyzer
- 3-Wire Current Voltage Analyzer



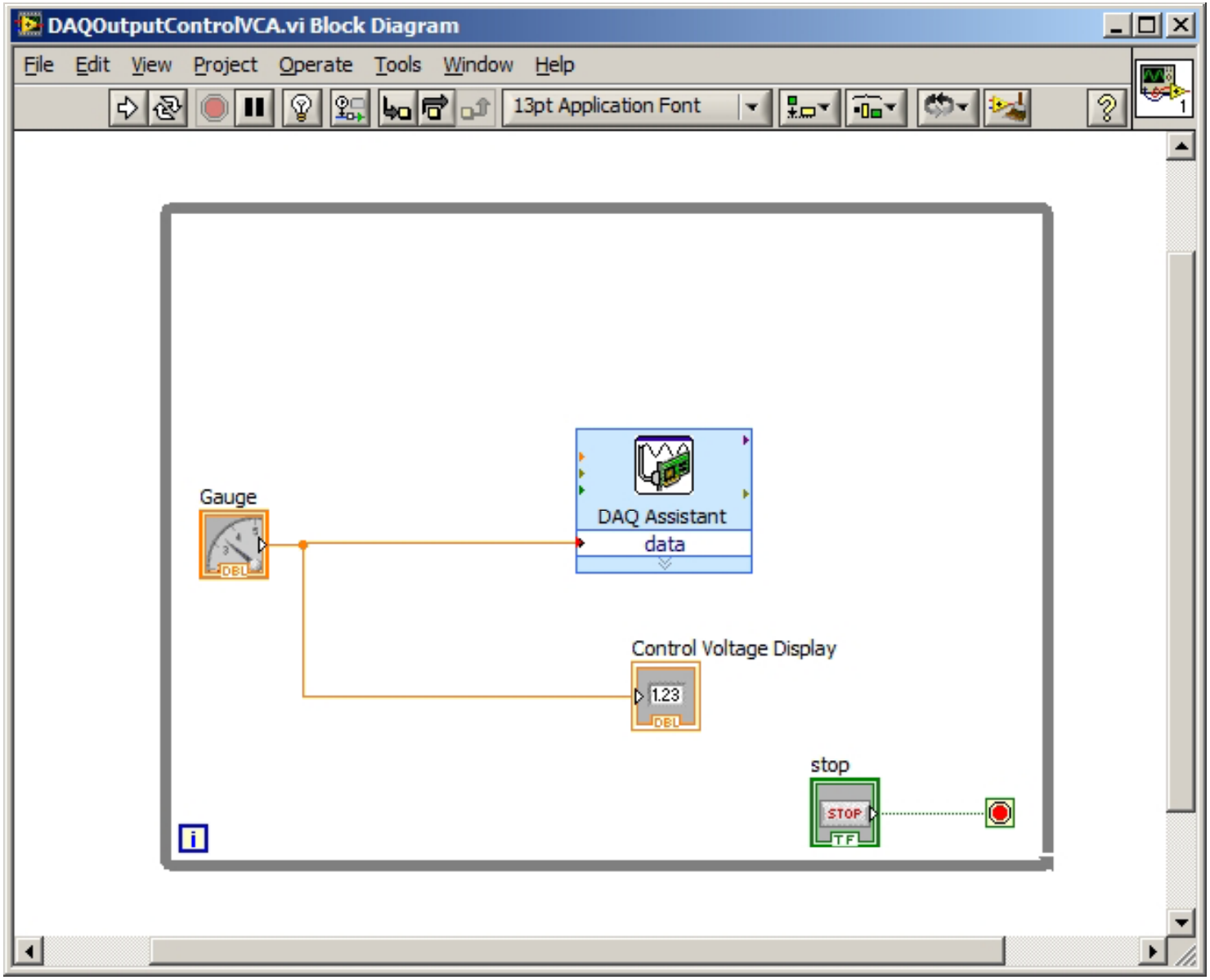
## Prototyping Board

- Updated connections
- Detachable
- User-defined Banana Plugs, BNC, D-Sub connectors

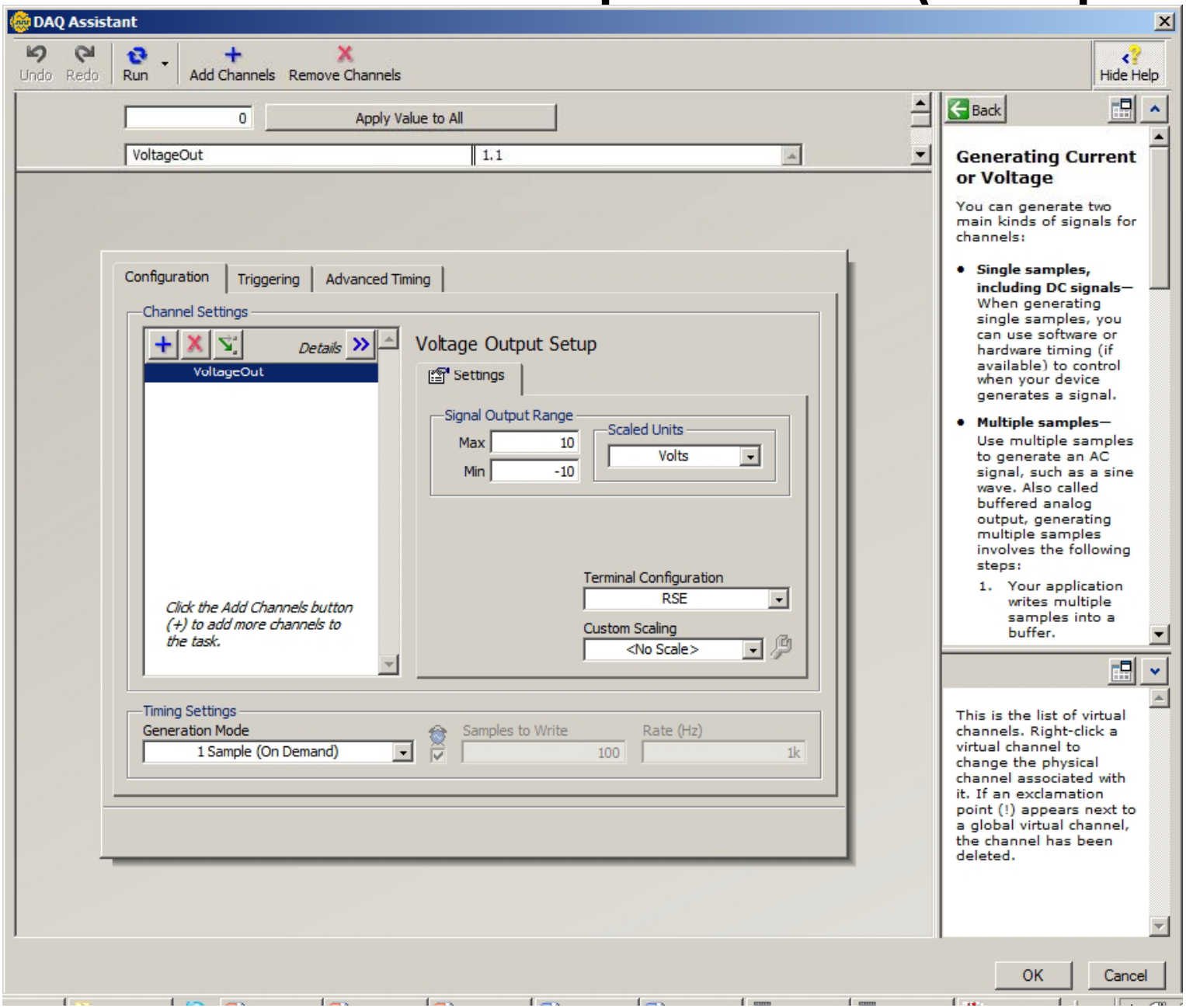
## Variable Power Supply

- 10 bit resolution
- 0 to +12V, 0 to -12V
- 500 mA current range

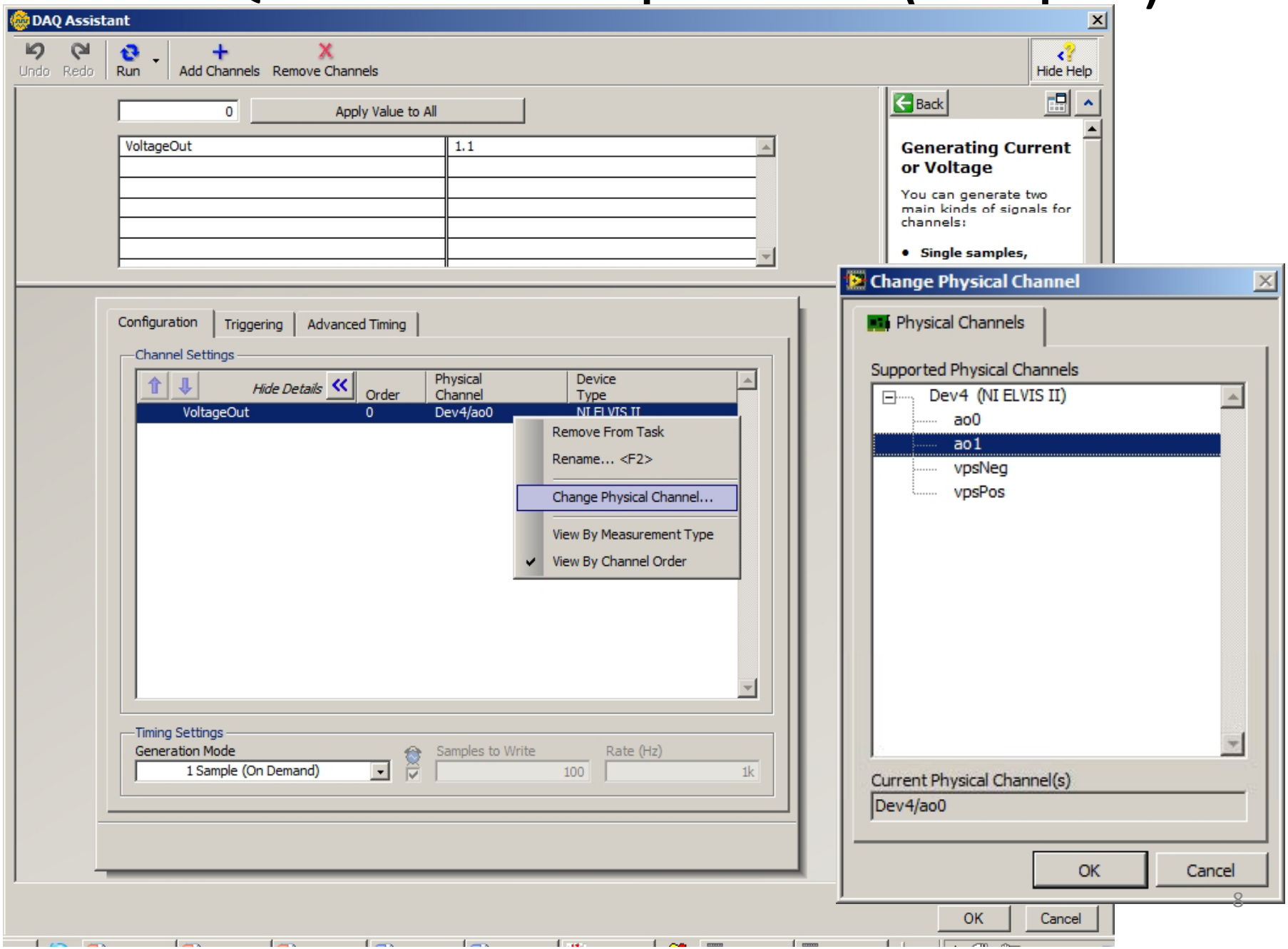
# DAQ Output on ELVIS using LabVIEW



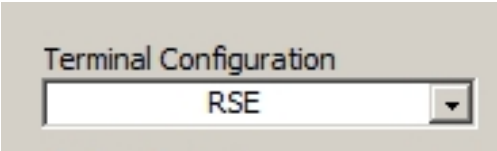
# DAQ Assistant Express VI (Output)



# DAQ Assistant Express VI (Output)



# Terminal Configuration

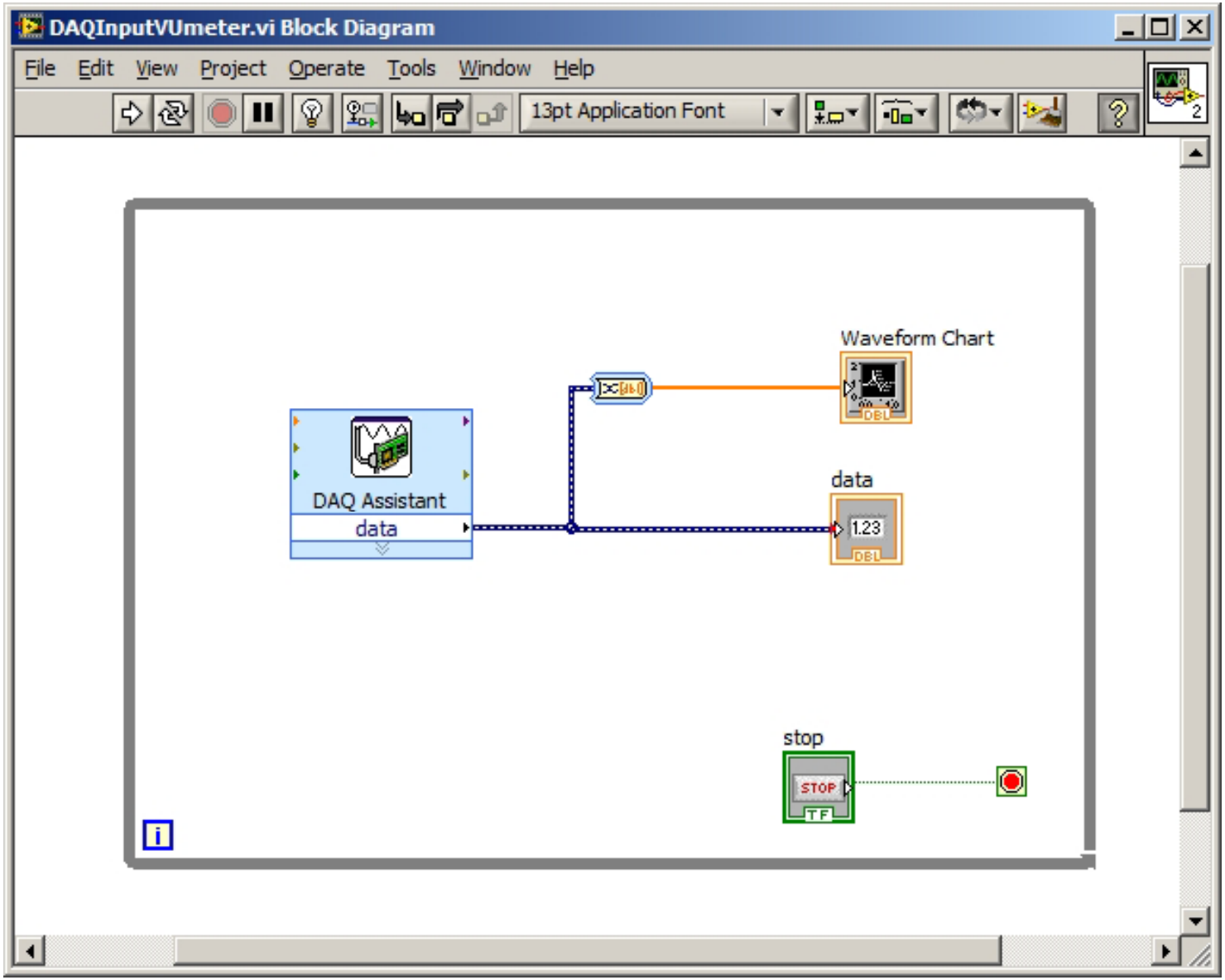



- Specifies the grounding mode used:
- **Differential**—Measures the difference between the positive and negative inputs and provides good rejection of common-mode voltage and noise.
- **RSE (Reference Single-Ended)**—Measurement made with respect to common ground.
- **NRSE**—Measurement made with respect to AISENSE.
- **Pseudodifferential**—The positive and negative inputs for the physical channel are referenced to measurement system ground through different impedances. The pseudodifferential terminal configuration measures the difference between the positive and negative inputs.
- **Let NI-DAQ Choose**—NI-DAQ decides which terminal configuration to use based on the physical channels you use.

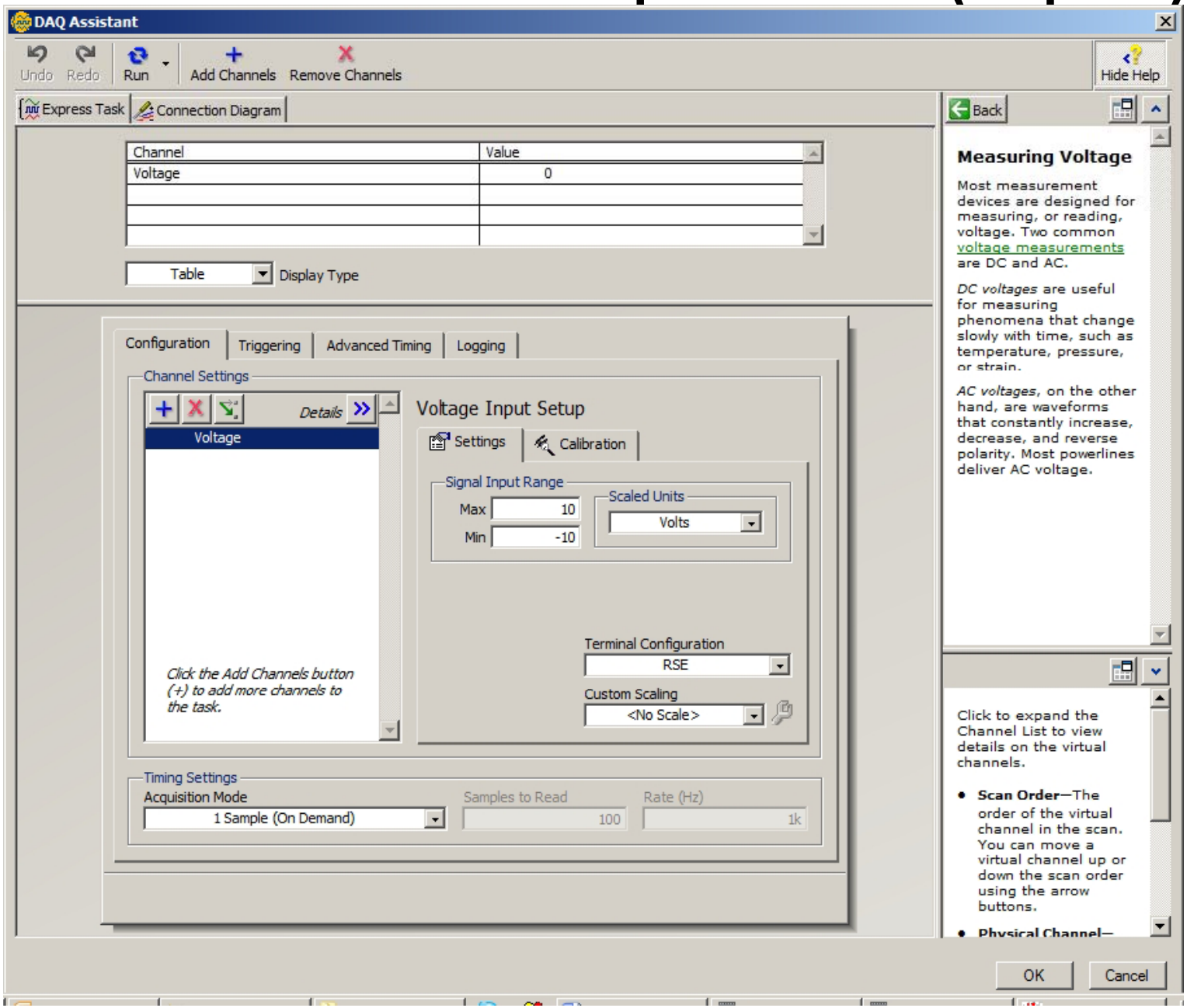
# Timing Mode


- **1 Sample (On Demand)** specifies that the task acquire or generate one sample.
- **1 Sample (HW Timed)** specifies that the task acquire or generate one sample on an edge of a hardware clock.
- **N Samples** specifies that the task acquire or generate a finite number of samples, specified by **Samples To Read/Write**.
- **Continuous Samples** specifies that the task acquire or generate data until stopped (buffer size).

# DAQ Input on ELVIS using LabVIEW



# DAQ Assistant Express VI (Input)



# DAQ Assistant Express VI (Input)