Multi-Instrument Mode

Combine instruments to build a customized test system

Multi-instrument Mode on Moku allows you to run up to four instruments simultaneously to create custom test sequences. Each instrument has full access to the analog inputs and outputs along with adjacent instrument slots. The slots are connected by low-latency signal paths so instruments can run independently or be connected together to build sophisticated signal processing pipelines. Dynamically swap instruments in and out without interrupting those running in tandem. For advanced applications, deploy custom algorithms in Multi-instrument Mode using Moku Cloud Compile.

Moku:Pro

- Up to four instrument slots
- 300 ppb stability onboard clock
- < 650 ns input-to-output latency
- 10-bit and 18-bit ADCs with frequency-dependent blending
- 1.25 GSa/s sampling rate

Moku:Go / Moku:Lab

- Up to two instrument slots
- < 1 μs input-to-output latency
- Moku:Go: 12-bit, 125 MSa/s ADCs, 25 ppm stability onboard clock
- Moku:Lab: 12-bit, 500 MSa/s ADCs, 500 ppb stability onboard clock

Deployable Instruments

- Arbitrary Waveform Generator
- Data Logger
- Digital Filter Box
- FIR Filter Builder
- Frequency Response Analyzer
- Laser Lock Box*
- Lock-in Amplifier
- Logic Analyzer
- Moku Cloud Compile
- Neural Network*
- Oscilloscope
- Phasemeter
- PID Controller
- Spectrum Analyzer
- Time & Frequency Analyzer
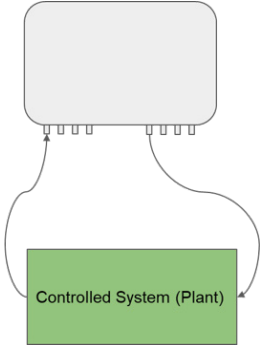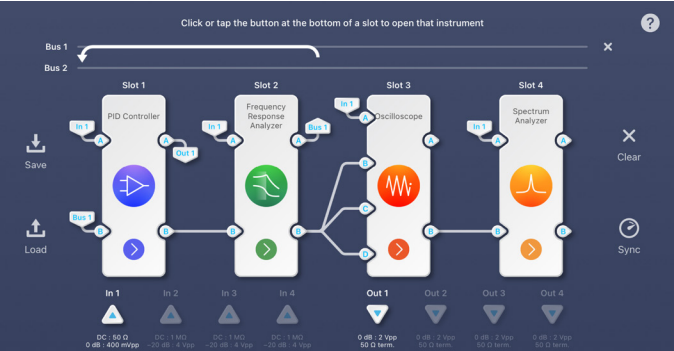- Waveform Generator

Applications

- Automated test sequences
- System prototyping and simulation
- Closed-loop control design
- Optical metrology and spectroscopy
- Control hub for optics, imaging, and other custom-made systems
- Quantum computing
- Signal processing modelling
- Deploying Simulink models to Moku hardware
- Signal classification and denoising with user-defined neural networks

*Not available in Multi-instrument Mode for Moku:Lab and Moku:Go

Application Highlights

Low-latency closed-loop control design and characterization

The Moku PID Controller provides a sub-µs input-to-output delay, ideal for high-speed closed-loop controller applications. The controller's transfer function and impulse response can be observed and measured in real-time by adding a Frequency Response Analyzer using Multi-instrument Mode. Measure the system's response in both time and frequency domains using the Oscilloscope and Spectrum Analyzer. Any adjustments in the controller are reflected in real-time in the monitoring instruments.

Generate signals with arbitrary modulation

Combine the Arbitrary Waveform Generator with multiple Waveform Generators to output high-stability complex signals. Connect Arbitrary waveforms to the input of the Waveform Generators as the modulation source. Frequency, phase, and amplitude modulation can also be added to the signal. This removes look-up table calculations and provides better control over the modulation and output signal. Add an Oscilloscope or Spectrum Analyzer to one of the slots to measure the signals in the time and frequency domains.
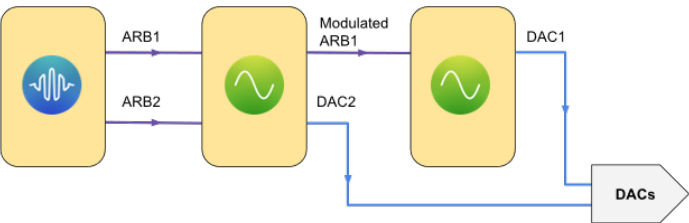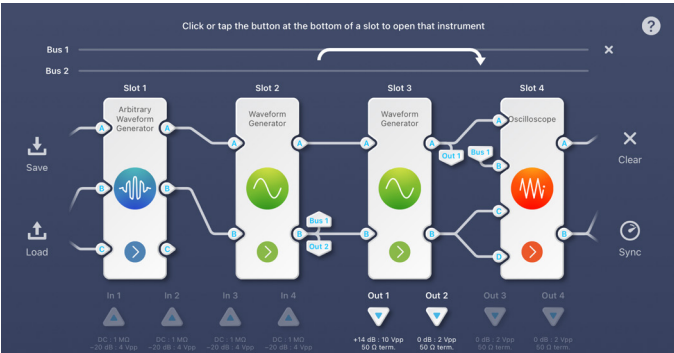
Multi-demodulator Lock-in Amplifier

Moku:Pro Multi-instrument Mode allows up to four Lock-in Amplifiers to run simultaneously. Each of the Lock-in Amplifiers can demodulate the signal at the fundamental, higher harmonics, or frequency divisions using an internal or external reference signal. With Moku's multi-window feature, the measured R/θ or X/Y components from each Lock-in Amplifier can be viewed in parallel on the embedded oscilloscope. Additionally, all four Lock-in Amplifiers can be triggered via a common external trigger.