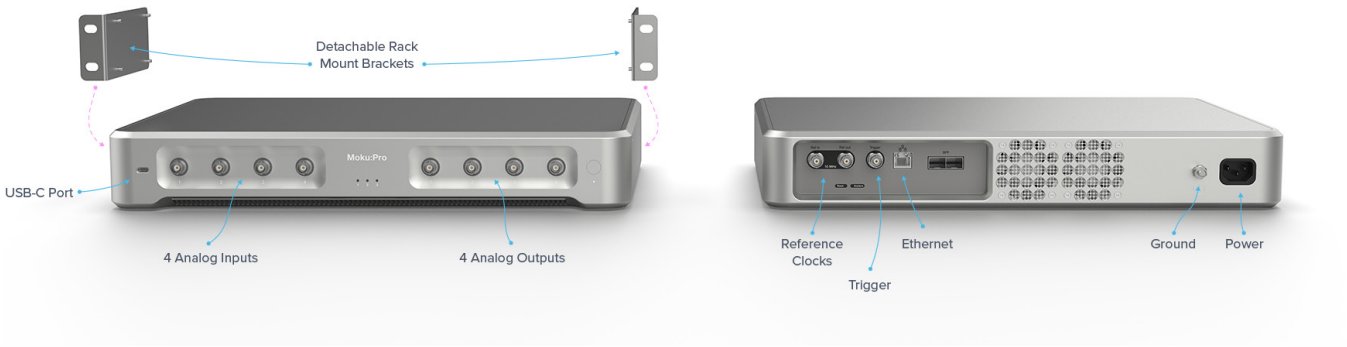
Moku:Pro

One integrated platform for the most demanding research and engineering applications

Moku:Pro combines high-performance hardware with the versatility of software-defined instrumentation to deliver the ultimate test and measurement solution. A powerful Xilinx Ultrascale+ FPGA is coupled with a high-bandwidth analog front end and robust networking and storage. The suite of software-defined instruments available for Moku:Pro supports high-speed data acquisition, processing and visualization, waveform generation, and real-time control applications. An innovative hybrid front-end design performs frequency-dependent signal blending from multiple ADCs, delivering exceptional noise performance from acoustic to radio frequencies.



Analog inputs	Input bandwidth	Analog outputs	Output bandwidth	Onboard data storage
4-channel, up to 5 GSa/s	**Up to 600 MHz**	**4-channel, 1.25 GSa/s**	**Up to 500 MHz**	**240 GB SSD**

14 powerful instruments

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

Hardware highlights

- Exceptional low-frequency noise performance: 500 µV RMS noise at full input bandwidth
- 0.3 ppm stability onboard clock
- < 650 ns input to output latency

Specifications

Four analog inputs

- 10-bit and 18-bit ADCs with frequency-dependent blending
- 5 GSa/s sampling rate with 1 channel, 1.25 GSa/s with 4 channels
- Input noise:
  - 30 nV/√Hz at 100 Hz
  - 20 nV/√Hz at 10 MHz @ 1.25 GSa/s
  - 13 nV/√Hz at 10 MHz @ 5GSa/s
- Selectable 300/600 MHz analog bandwidth
- AC or DC coupling, 50 Ω or 1 MΩ input impedance
- 400 mVpp, 4 Vpp, or 40 Vpp input range

Four analog outputs

- 16 bit, 1.25 GSa/s DACs
- ± 1 V up to 500 MHz, ± 5 V up to 100 MHz

Additional I/O

- Dedicated trigger input
- 10 MHz reference input and output
- Onboard Wi-Fi, Ethernet, and USB-C
- 240 GB high-speed SSD

Programming environment

- Full API support is available for all major languages, including Python, MATLAB, and LabVIEW
- Class-leading, multi-touch user interface
- Windows, macOS, iPadOS, and visionOS apps available

Applications

- Automated test sequencing
- Closed-loop control design
- Control hub for optical, imaging, and other custom-made systems
- High-speed data logging
- Optical metrology and spectroscopy
- Quantum computing
- System prototyping and simulation

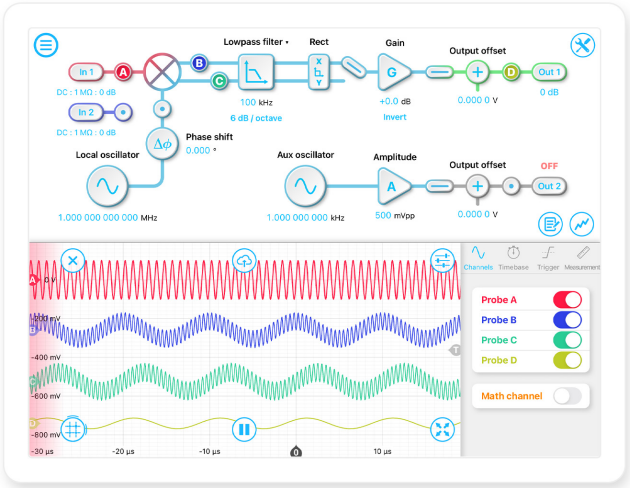
For full specifications and ordering, contact sales@liquidinstruments.com.

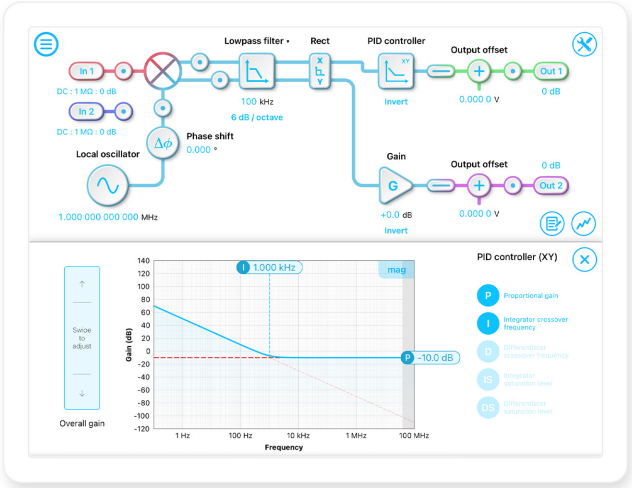
Multi-instrument Mode

Multi-instrument Mode for Moku:Pro 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. A low-latency, real-time 30 Gb/s signal path connects the slots, so instruments can run independently or connect together to build sophisticated signal processing pipelines. It's easy to swap instruments in and out dynamically as needed, and for advanced applications, you can quickly deploy your own custom algorithms in Multi-instrument Mode using Moku Cloud Compile.

600 MHz Lock-in Amplifier

The Moku:Pro digital Lock-in Amplifier supports dual-phase demodulation (X/Y or R/θ) from DC to 600 MHz, with more than 120 dB of dynamic reserve. Demodulate your signal using the onboard Waveform Generator or phase lock to an external signal at the fundamental, multiple, or division frequencies. Blended ADC technology provides a low noise floor across the entire 600 MHz input bandwidth. The built-in probe points allow you to monitor and log the signal at various stages of signal processing. A PID Controller is available for closed-loop control and phase-locked loop applications.





Blended ADCs

Moku:Pro is equipped with a 10 MSa/s, 18-bit ADC and a high-speed, 5 GSa/s 10-bit ADC. With the powerful FPGA, the system combines the information from the ADCs, providing class-leading input noise performance over the entire 600 MHz bandwidth. Our innovative blending algorithm ensures that the signal-to-noise ratio is optimized across all Fourier frequencies without impacting latency, or signal bandwidth.