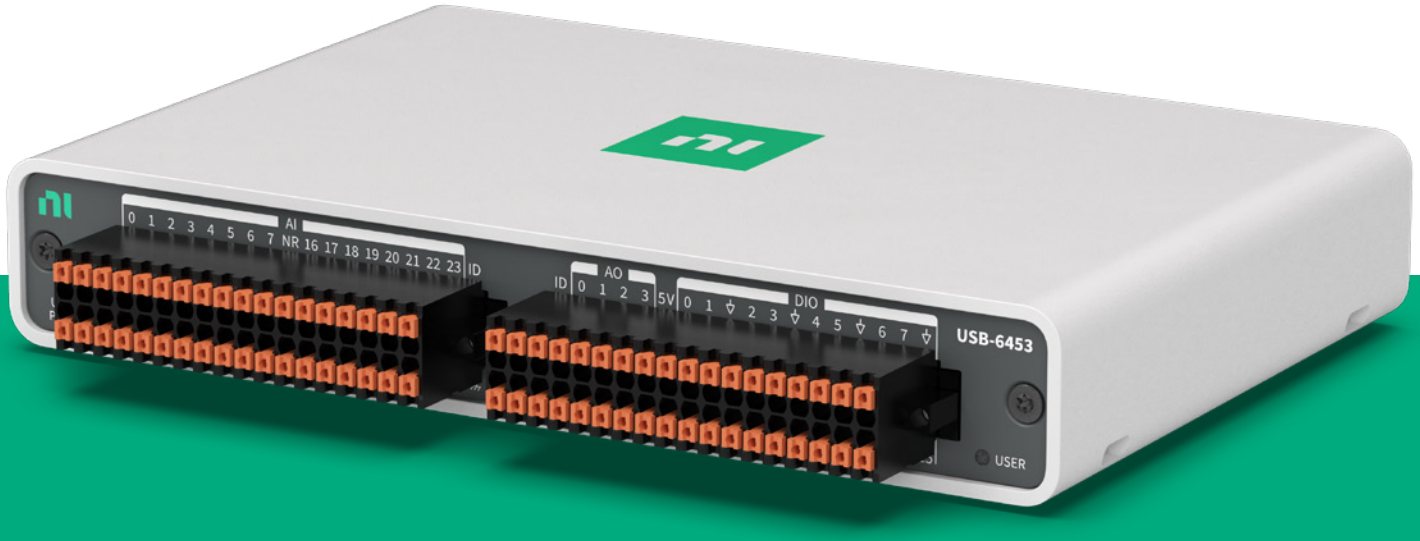
PRODUCT BROCHURE

NI mioDAQ



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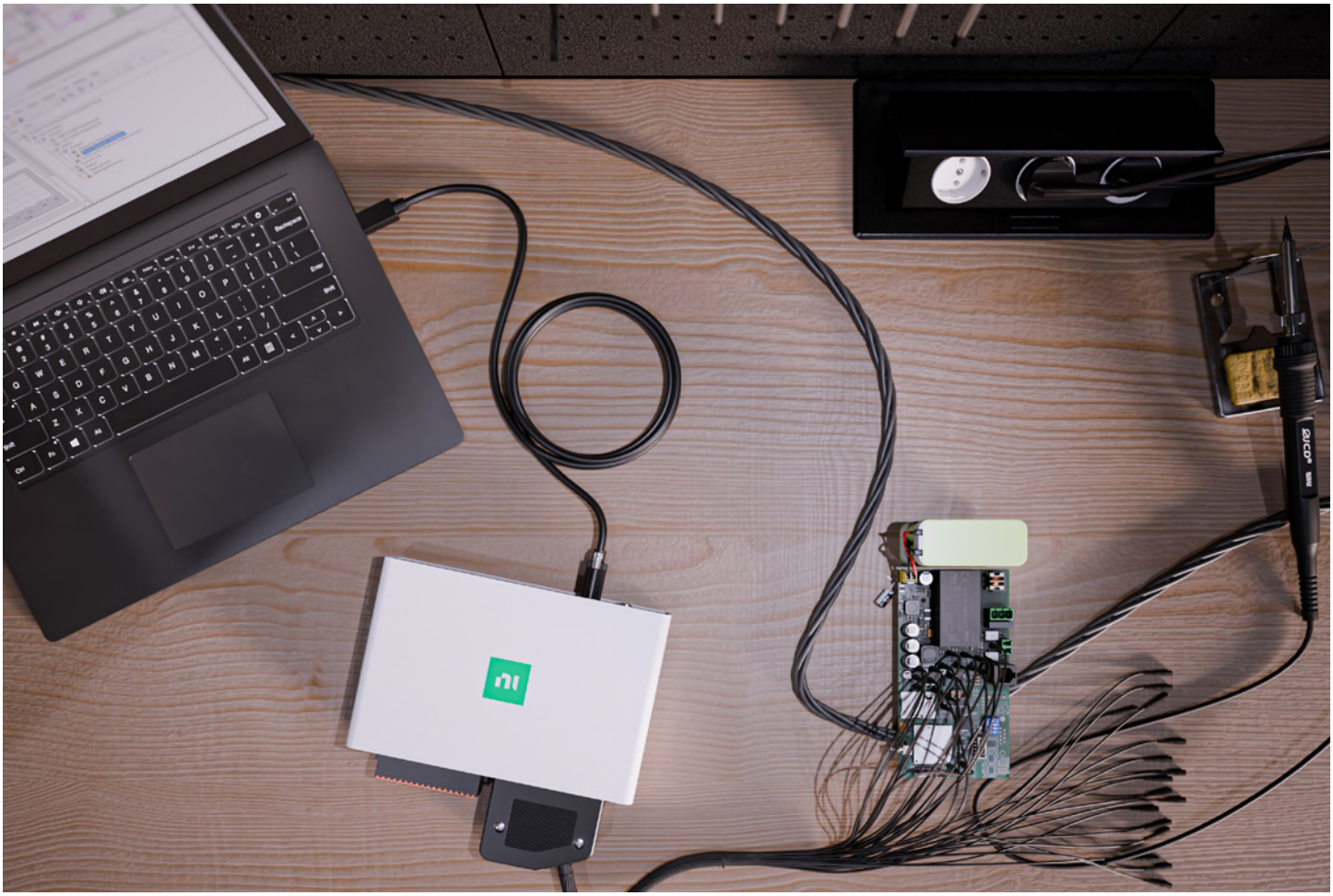


Overview

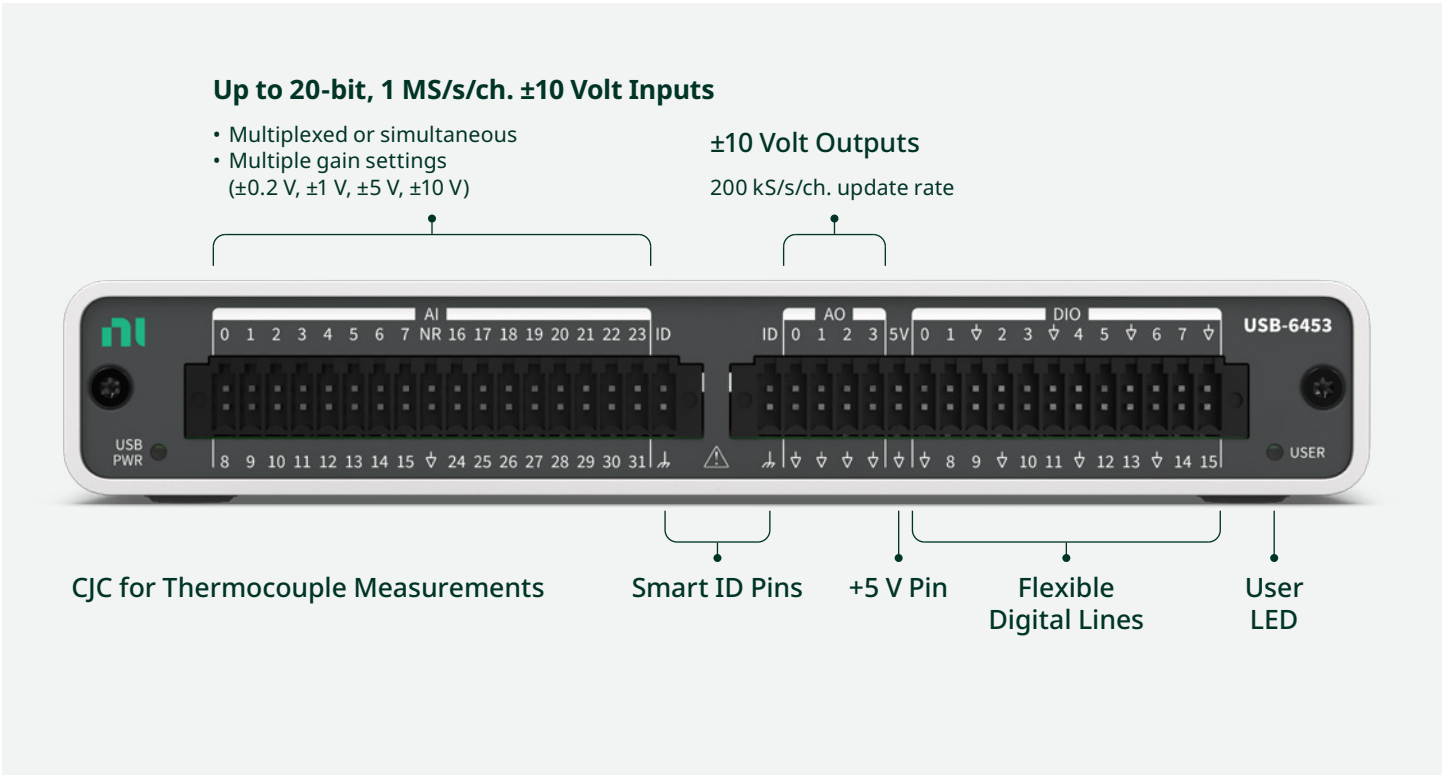
NI mioDAQ is a USB data acquisition (DAQ) device that combines modern measurement technology with a simplified user experience. Engineers use mioDAQ to take ±10 volt measurements, build electromechanical test systems, and validate complex electronic designs.

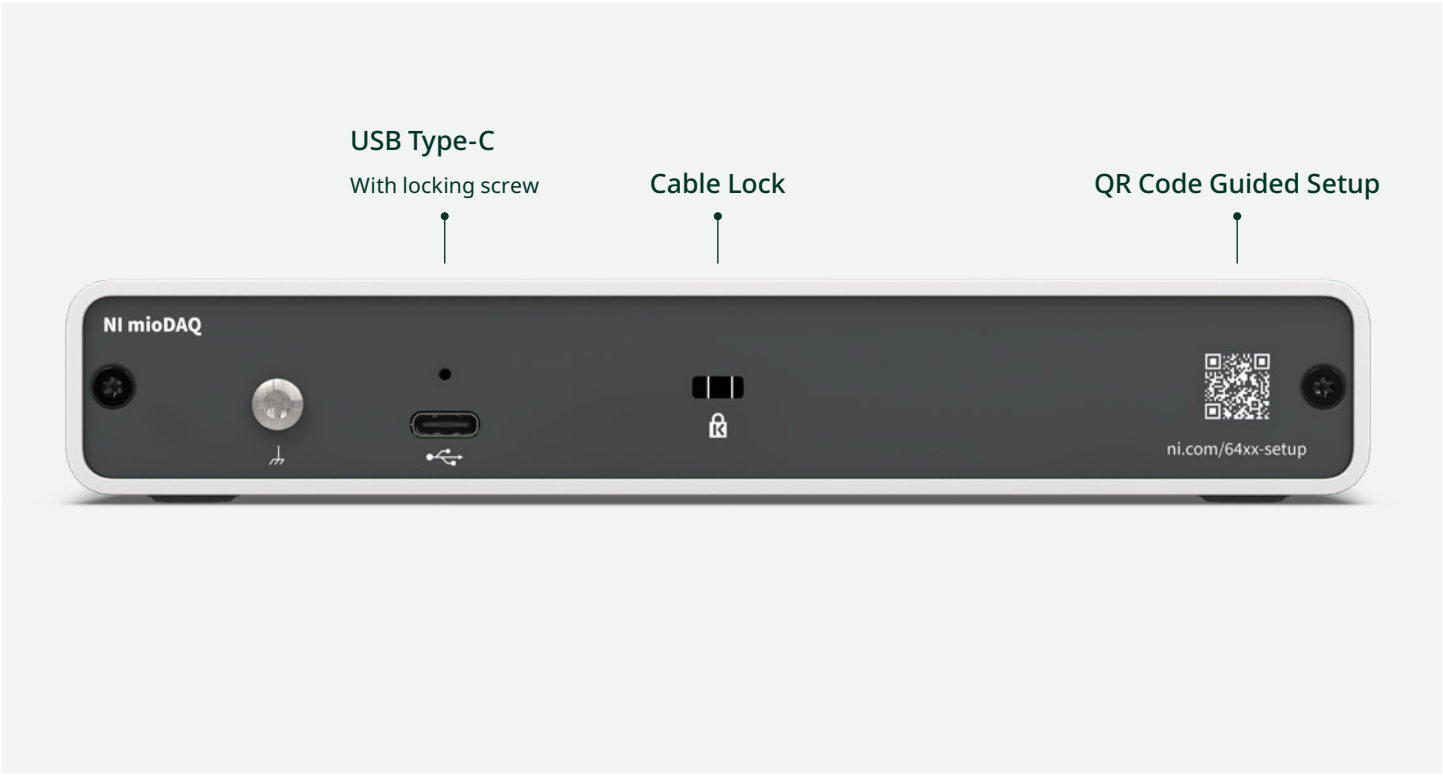
Pair mioDAQ with your favorite software including NI's free logging software, or APIs and example programs for NI LabVIEW, Python, and C/C++.

Choose mioDAQ for:

- Software options that fit your test needs
- Usability features that reduce the stress of test
- The measurement quality you need to release better products and advance your research

Better Measurements with a Better Experience





Software

NI has decades of experience as an industry leader for test and measurement software. Options for mioDAQ software include:

Developing custom software with drivers and example programs for:

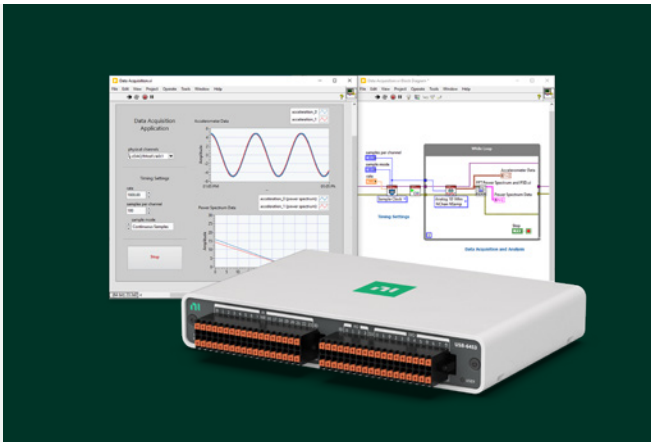
- LabVIEW
- Python, C/C++, VB.NET, and C#

Logging data with a real-time display using NI FlexLogger™ lite, free data acquisition software.

Modernizing your lab and standardizing your test frameworks with the NI LabVIEW+ Suite.

Get the Most Out of Your Test

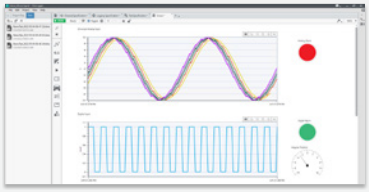
NI recommends LabVIEW for an automated test system that combines data acquisition with analysis, logic, logging, and a professional real-time display.



Keep Your Software. Upgrade Your Hardware.

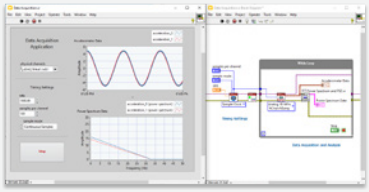
Software developed for your existing NI DAQ device using the NI-DAQmx driver should be generally compatible with NI mioDAQ.

NI Data Acquisition Software



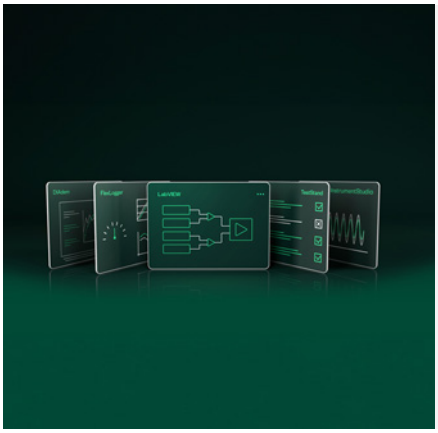
FlexLogger Lite (free download)

- Configure measurements
- Create real-time displays
- Log results



LabVIEW

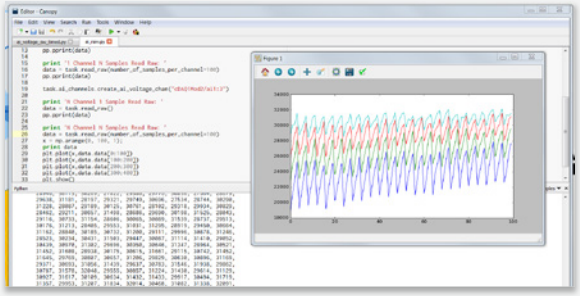
- Create a professional UI
- Integrate all your instruments
- Program like you think
- Integrate code from Python, C, or MathWorks® MATLAB® software



LabVIEW+ Suite for Test Professionals

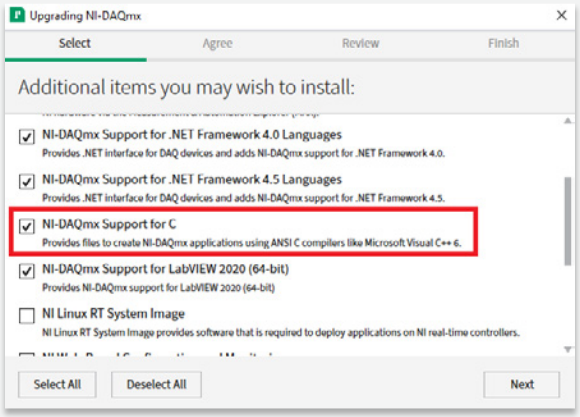
The LabVIEW+ Suite is built for test professionals in electronics and electromechanical test. It provides software solutions to reduce development time, increase data usage, and prevent rework.

Programming Language Support



Python

- nidaqmx package available on GitHub
- Support for Cpython 3.8 and PyPy3
- Example programs included



C/C++, VB 6.0, VB.NET, and C#

- API installs with the NI-DAQmx driver
- Libraries of functions for all DAQ operations
- Example programs included

What Can You Do with mioDAQ?

With ±10 V inputs, ±10 V outputs, TTL digital lines, and NI's patented counter/timer circuitry, there are hundreds of tasks engineers, researchers, and test professionals can accomplish using mioDAQ.

Measure

- Any ±10 volt signal
- Sensors that output ±10 volts
- Quadrature encoders
- Resolvers
- Pulse/event counting sensors like meters
- High-speed voltage signals
- Voltage drops across a shunt resistor for current measurement
- Battery cell voltages (±10 volt peak cell measurement)
- Power rails on USB/battery-powered electronic boards (PCBs)
- Linear potentiometers (string pots)
- Pulse-width-modulated (PWM) signals
- Low voltage current sensors
- Low voltage potential transformers
- And many more

Automate and Generate

- Read/write TTL digital lines
- Drive low current relays using digital lines
- Generate ±10 volt output control signals
- Generate ±10 volt signals to simulate sensors
- Generate pulse-width-modulated (PWM) signals
- Synchronize voltage, digital, and counter signals
- Connect to LEDs

Measurement Technology Features

Up to 20-bit, 1 MS/s/Ch Inputs

Higher-resolution, higher-speed measurements capture insight from your test that would be missed by lower-quality inputs. Use the high-resolution and multiple gain settings to zoom in on low-voltage systems.

Flexible Digital Lines

Optimize your hardware usage with 16 flexible digital lines that let you:

- Set each line independently as digital input or digital output.
- Route each line to one of the four counter/timers.
- Set the threshold for all 16 lines to 5 V, 3.3 V, or 2.5 V—a helpful feature when testing low-voltage electronic designs such as battery-powered devices.
- Connect and route external clocks or trigger signals.

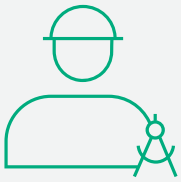
100 MHz Timebase

The onboard timebase is the internal heartbeat that drives all digital circuitry. Sample clocks, trigger lines, and the counter/timers use the timebase as an onboard reference to generate clock frequencies and latch digital edges. Analog triggers respond faster, and sampling frequencies are more accurate with a higher-speed timebase.

Independent Timing Engines for Analog and Digital I/O

You can set different rates for analog input channels, analog output channels, and digital lines because each channel type has a separate timing engine. Advanced DAQ functions include:

- Synchronizing subsystems to the same clock (AI, AO, DIO all at the same rate and time)
- Triggering multiple subsystems (start at the same time, run at different rates)
- Re-triggerable acquisition (acquire a set number of samples based on a trigger, then reset and wait for the next trigger)
- Analog measurement trigger (trigger on a voltage input value)



Self-Calibration

The self-calibration feature is as easy as clicking a button in the hardware configuration utility. NI mioDAQ uses precision circuitry to adjust for differences in operating environment and potential manufacturing component variances. NI's DAQ driver stores the adjustment in an onboard EEPROM as a multivariable polynomial. A linear calibration equation would be easier for NI R&D to implement—but quality is paramount, so NI optimized the driver for the multivariable equation without a noticeable impact on processing speed.

Guaranteed Specifications

NI mioDAQ has guaranteed specifications for two- and ten-year external calibration intervals. The two-year interval is for typical lab and validation use, and the ten-year targets OEM or deployed applications, where field calibration is difficult or not required.

User Experience Features

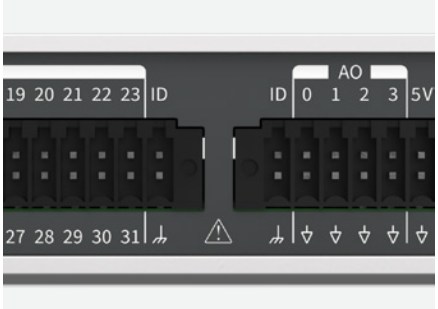
Many companies can design analog converters into a board, but NI has more than 40 years of experience in data acquisition and designed mioDAQ with engineers in mind. Some engineer-centric features that will reduce the stress of test and measurement tasks include:

QR Code Guided Setup

Finding setup resources is critical to a positive user experience whether you're opening the box new, or you've just found it on an equipment shelf in your lab. Scan the QR code on the back of the device for quick access to the user manual, specifications, pinout, and links to download FlexLogger Lite and drivers for LabVIEW, Python, and C/C#.

Zip Tie Mounting Holes

Sometimes you need expensive fixturing and rack mounts, but often you just need a quick way to secure your instrumentation. That's why NI designed zip tie holes in the device: to keep it simple.



Smart ID Pin

The Smart ID Pin communicates to a user-supplied 1-wire EEPROM so test professionals can build intelligence into their test bench. Connect a 1-wire EEPROM directly to the spring terminal plug—or design one into prototype boards, and you can query the EEPROM to:

- Make sure the cables are plugged in to the correct ports
- Capture DUT information for use in channel and constant mapping
- Automate metadata logging

Select Your mioDAQ Hardware

What Is in the Box?

- NI mioDAQ model USB-64xx
- One 2 m USB-C to USB-C cable with locking screw
- Spring terminals with back shells for strain relief
- NI screwdriver

Choose the Right Model Based on Resolution, Sample Rate, and Number of Channels

mioDAQ model	USB-6421	USB-6423	USB-6451	USB-6453
Part Number	789887-01	789882-01	789888-01	789884-01
Analog Input Channels (Single-ended/ Differential)	16/8	32/16	16/8	32/16
Maximum Sampling Rate	250 kS/s (1 channel)	250 kS/s (1 channel)	1 MS/s/ch (8 channels)	1 MS/s/ch (16 channels)
Number of ADCs	1	1	8	16
Simultaneous*	No	No	Yes	Yes
Resolution	16-bit	16-bit	20-bit	20-bit
Analog Output Channels	2	4	2	4
Digital I/O Channels	16	16	16	16
Counters	4	4	4	4

* USB-6451/53 have a multiplexed mode to achieve higher channel counts. See manual for details.

TABLE 1

Balance cost and performance with four mioDAQ models. See the following page for selection help.

Selection Guidance

Speed and Resolution

Getting better insight from your measurements with higher speed and resolution is like getting better picture quality with better specs on a camera.

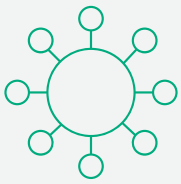
Select a mioDAQ model with a faster sample rate to capture transients and higher-bandwidth signals, correlate data between multiple test points, and get better resolution on low-voltage measurements as seen in board-level power rail or battery cell characterization and test.

Analog Input Channels

More test points, measurements, or testing multiple devices under test (DUTs) in parallel will need more channels.

Select a 32 SE/16 DI-channel model if your products are trending in complexity or you want test benches to test several DUTs at once. Plan on wiring in differential mode for the best-quality measurement.

Output Channels



Use voltage output channels and digital output lines to control other equipment in your test setup. Generate signals that simulate sensors with voltage output channels clocked at 200 kS/s/ch. All models include 16 flexible digital lines, four counter/timers, and two voltage output channels. The USB-6423 and USB-6453 have four analog output channels.

Accessories

The mioDAQ ships with everything you need to start taking measurements. But part of the engineering-centric design is knowing that the physical setup of a test needs due consideration. That's why there are multiple accessories to help you make using mioDAQ even easier.

789956-02

USB-C to USB-C with top screw lock, 2 m
Included with mioDAQ. Purchase as spare/replacement.

781015-01

Screwdriver sized for spring terminals (quantity: 15)

789957-02

USB-C to USB-C right-angle, 2 m (optional accessory)

785080-01

Backshell for 36-position spring terminal connector with mioDAQ. Purchase as spare/replacement. (quantity: 1)

789986-01

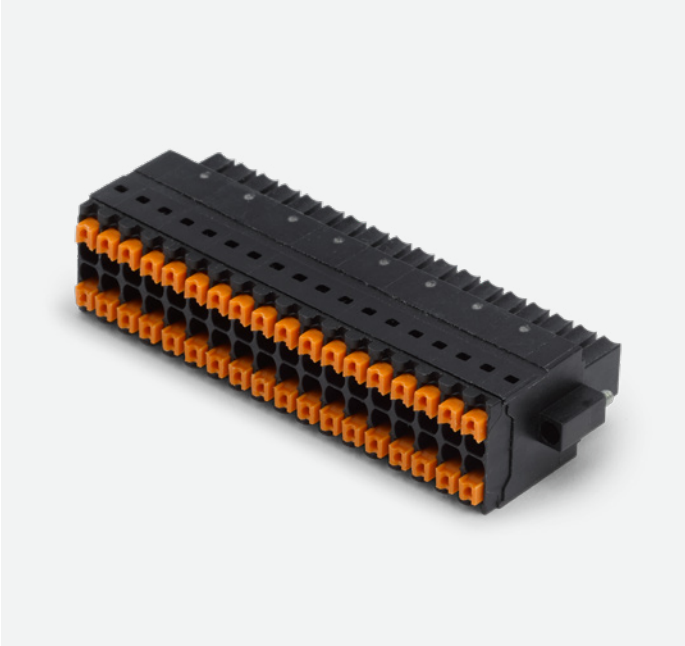
Mounting kit: DIN only for horizontal DIN mount

789955-01

Mounting kit: vertical DIN, panel, or keyhole
Includes USB-C cable with right-angle connector (PN 789957-02).

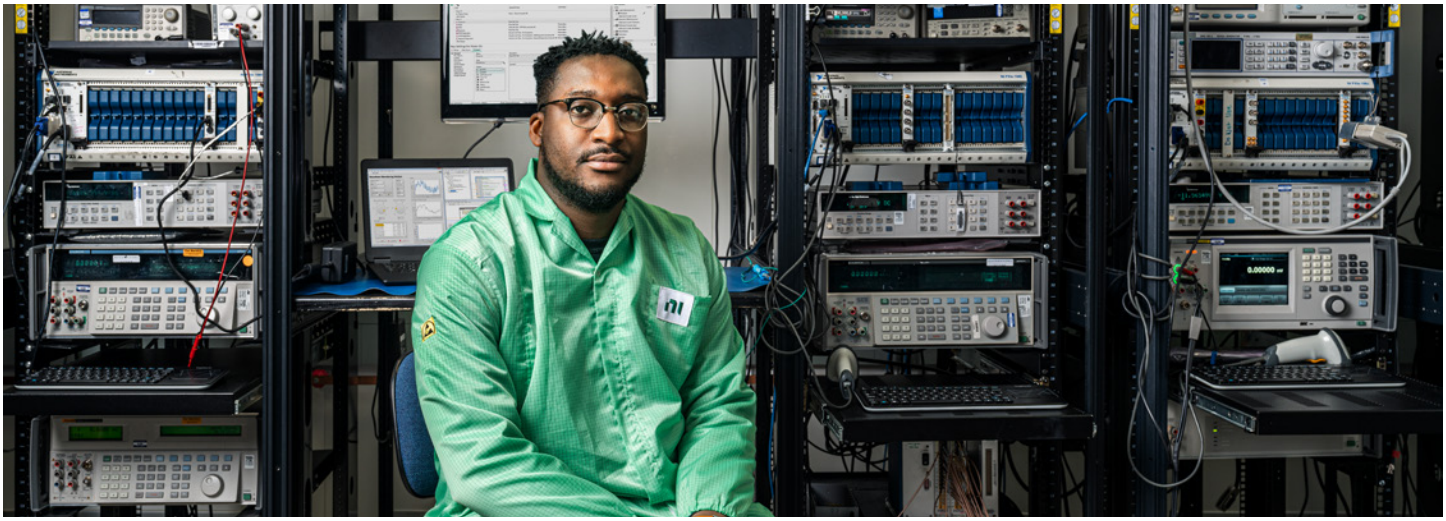
789953-01

Mounting kit for 19" rack (1U)
(mount up to two mioDAQ devices)
Includes two USB-C cables with right-angle connector (PN 789957-02).



785502-01

36-position front mount spring terminal connector with mioDAQ. Purchase as spare/replacement
(0.13 mm^2 to 1.5 mm^2)
(26 AWG to 16 AWG) (quantity: 1)



Have Confidence with NI Support

All NI hardware includes one year of:

Repair/replace warranty for manufacturing quality

Technical product support by your choice of phone or email

Need Something Else?

Learn about PXI to combine voltage and digital measurements with instrumentation for production test. PXI is an open standard for modular, high-performance hardware designed for automated test in the lab and on the manufacturing floor.

Check out CompactDAQ for more input/output options, modularity, ruggedness, and Ethernet connectivity. Save time and money by scaling your test system as your needs change.

NI

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