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PRODUCT FLYER

CompactDAQ Systems

CONTENTS

NATIONAL INSTRUMENTS

What Is CompactDAQ?

Platform-Based Approach to Conditioned Measurements

CompactDAQ is a portable, rugged data acquisition platform. It combines signal connectors, integrated signal conditioning, and converters in a single package to deliver higher accuracy measurements by eliminating error-prone cabling and connectors and reducing the number of components in a measurement system. With over 60 C Series I/O modules for nearly any sensor type, you can quickly design a custom hardware setup optimized for size, cost, and performance. The breadth of bus, chassis, and I/O conditioning options provides the best solution to meet your medium-channel-count application needs.

Any Bus, Any Form Factor
Choose from USB, Ethernet, and wireless bus options or stand-alone controllers to meet your application needs in either the lab or the field.

Accurate Conditioned Measurements
Take advantage of over 60 sensor-specific modules to directly connect to your sensor or signal.

Precise Timing and Synchronization
Easy timing customization for each sensor or signal with up to seven hardware-timed clocks per chassis.

Truly Customizable Software
Tailor the automation of your data acquisition, analysis, visualization, and reporting to meet specific application needs with LabVIEW software.

Measurements Closer to the Sensor
Distribute measurements closer to the sensor or signal using rugged form factors with -40 °C to 70 °C temperature ranges and fanless operation.

Increased Streaming
Increase data streaming over the same bus with NI Signal Streaming and the TDMS binary file format.

Key Features

Flexible to Meet Changing Requirements

Whether you are adding new sensors or deploying from the lab to the field, you can use CompactDAQ as a modular platform to meet the demands of your future applications. By simply changing to a different chassis or controller, you can add new functionality, like an integrated processor or extended operating temperature range. With 4-, 8-, and 14-slot chassis options, you can scale systems to higher channel counts by moving to a larger chassis or synchronizing multiple chassis. Because the same hardware driver, NI-DAQmx, is used to program all CompactDAQ hardware and C Series I/O modules, you can modify existing test systems without any significant software changes.

Precise Timing and Synchronization

CompactDAQ is a modular system, so you can add more measurement types and channels to the system by simply plugging in additional modules. All modules are automatically detected and synchronized to the clock in the backplane of the chassis. CompactDAQ has multiple timing engines that you can use to run multiple hardware-timed operations simultaneously with independent rates for analog input. For long-distance, distributed systems, you can use a Time Sensitive Networking (TSN) enabled CompactDAQ device. TSN is the next evolution of the IEEE 802.1 Ethernet standard. It provides sub-microsecond synchronization over a distributed network of DAQ nodes. Precise timestamps and packet-based communication are used to share a common notion of time on all nodes in the network, which allows for accurate synchronization over long distances and eliminates the need for lengthy, physical timing cables.

Figure 1. Easily expand your system with an integrated network switch for simple daisy chaining.

Rugged Design

With the rugged features of CompactDAQ, you can reconfigure and move a single test system from the lab to the field without having to purchase different equipment. CompactDAQ and all C Series I/O modules are constructed from A380 cast aluminum to withstand operating temperatures from -20 °C to 55 °C and up to 30 g of shock. You can minimize cabling costs and distribute measurements closer to your sensor or signal using rugged form factors with an extended operating temperature range as wide as -40 °C to 70 °C, 50 g shock, and 5 g vibration ratings. CompactDAQ chassis also meet a variety of international safety, Hazloc, and environmental certifications and ratings for operation in harsh industrial environments.

For applications requiring additional ruggedness, you can extend TSN enabled CompactDAQ systems with FieldDAQ™ devices. These devices are IP65/67 rated to be dust-tight and waterproof. They operate in a -40 °C to 85 °C temperature range with 100 g shock and 10 g vibration. You can synchronize FieldDAQ devices with TSN-enabled CompactDAQ devices within <1 µs.

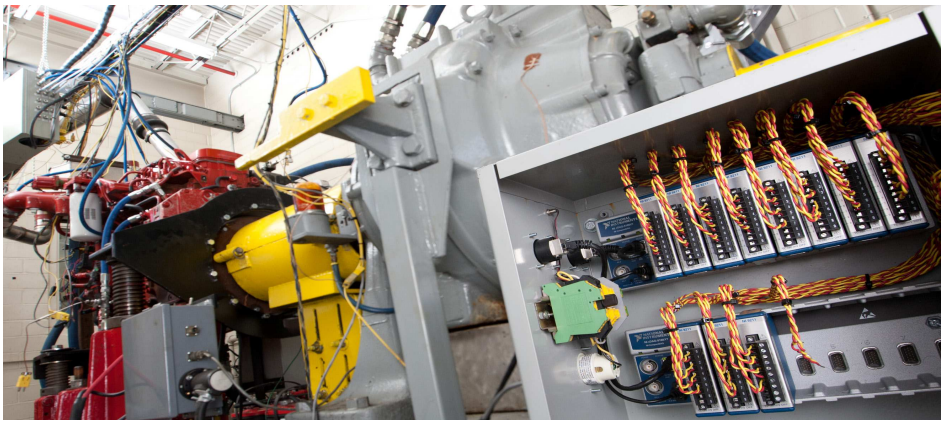


Figure 2. Spend less time preparing instrumentation for the rigors of field testing with an extended temperature range and high shock and vibration resistance.

CompactDAQ Chassis

cDAQ-9171, cDAQ-9174, cDAQ-9178, cDAQ-9179, cDAQ-9181, cDAQ-9184, cDAQ-9185, cDAQ-9188, cDAQ-9189, cDAQ-9191

- Customize your acquisition, analysis, visualization, and reporting with LabVIEW
- Choose from USB, Ethernet, or wireless bus options
- Take advantage of a wide variety of mixed measurement types to meet your application needs
- Easily customize timing with up to seven hardware-timed clocks per chassis
- Take distributed measurements with Time Sensitive Networking enabled Ethernet chassis
- Use rugged form factors that withstand -40 ºC to 70 ºC temperatures, 50 g shock, and 5 g vibration

Built for Accurate, Conditioned Measurements

With CompactDAQ chassis, you can perform mixed-measurement data acquisition all within one synchronized, mixed-measurement I/O system by combining the chassis with different C Series I/O modules. CompactDAQ chassis feature USB or Ethernet connectivity and are available with different slot counts to provide the right amount of I/O for various applications. You can then pair this system with the right software to customize how you acquire, analyze, present, and manage your measurement data.

Table 1. NI offers rugged chassis with a breadth of bus and size options to meet different application requirements.

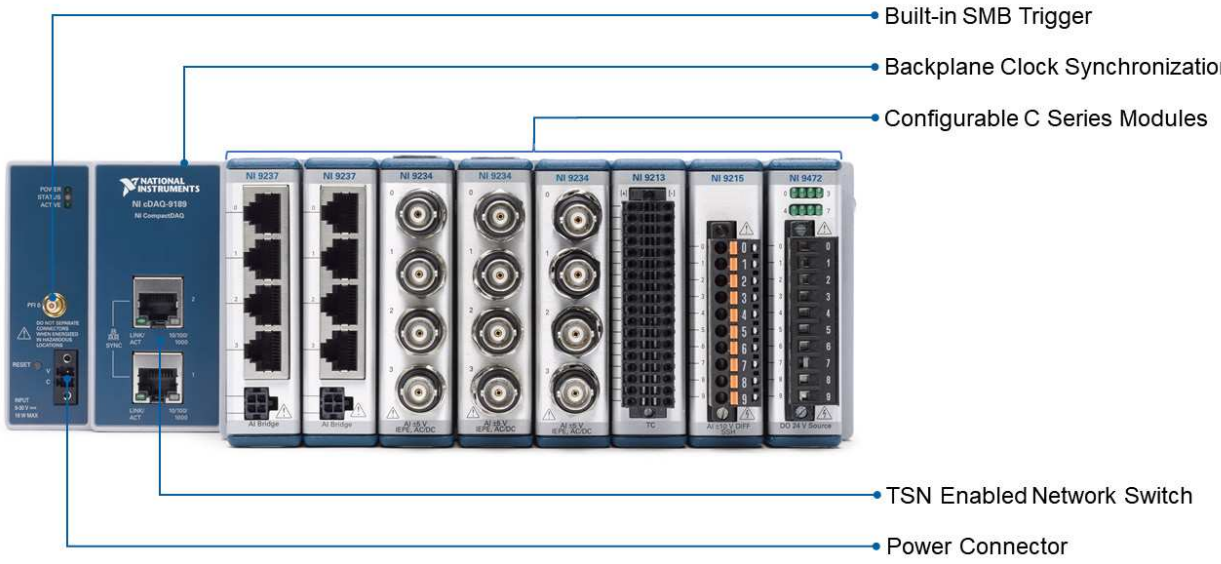
Models	Bus Connectivity	Slot Count	TSN Synchronization	Built-In Triggering	Operating Temperature Range
cDAQ-9171	USB 2.0	1	—	—	-20 °C to 55 °C
cDAQ-9174	USB 2.0	4	—	—	-20 °C to 55 °C
cDAQ-9178	USB 2.0	8	—	✓	-20 °C to 55 °C
cDAQ-9179	USB 3.0	14	—	✓	-20 °C to 55 °C
cDAQ-9181	Ethernet	1	—	—	0 °C to 55 °C
cDAQ-9184	Ethernet	4	—	—	-20 °C to 55 °C
cDAQ-9185	Ethernet	4	✓	✓	-40 °C to 70 °C
cDAQ-9188	Ethernet	8	—	✓	-40 °C to 70 °C
cDAQ-9189	Ethernet	8	✓	✓	-40 °C to 70 °C

Table 2. NI chassis controllers are rugged, reliable, and high performing for embedded applications.

Models[1]	Slot Count	Processor Core	Hard Drive Memory Size	Operating Temperature Range
cDAQ-9132	4	1.33 GHz Dual Core Intel Atom	16 GB	-20 °C to 55 °C
cDAQ-9133	8	1.33 GHz Dual Core Intel Atom	16 GB	-20 °C to 55 °C
cDAQ-9134	4	1.33 GHz Dual Core Intel Atom	32 GB	-40 °C to 70 °C
cDAQ-9135	8	1.33 GHz Dual Core Intel Atom	32 GB	-40 °C to 70 °C
cDAQ-9136	4	1.91 GHz Quad Core Intel Atom	32 GB	-20 °C to 55 °C
cDAQ-9137	8	1.91 GHz Quad Core Intel Atom	32 GB	-20 °C to 55 °C

[1]All models are available with Windows Embedded Standard 7 or NI Linux Real-Time OS.

Detailed View of cDAQ-9189



C Series Modules for CompactDAQ

- 60+ I/O modules to support a variety of input and output types
- Sensor-specific modules designed with built-in signal conditioning
- Ability to synchronize all modules through the CompactDAQ chassis backplane
- Rugged, portable, and hot-swappable design to easily customize your DAQ application
- A wide range of front connector types to meet your preferences

Built for Flexible Data Acquisition Applications

You can plug C Series modules into your CompactDAQ chassis to control the timing and synchronization of your data transfer. Each C Series module contains measurement-specific signal conditioning to connect directly to an array of sensors and signals. Meet your application requirements by customizing your system with a wide variety of modules for the I/O you need.

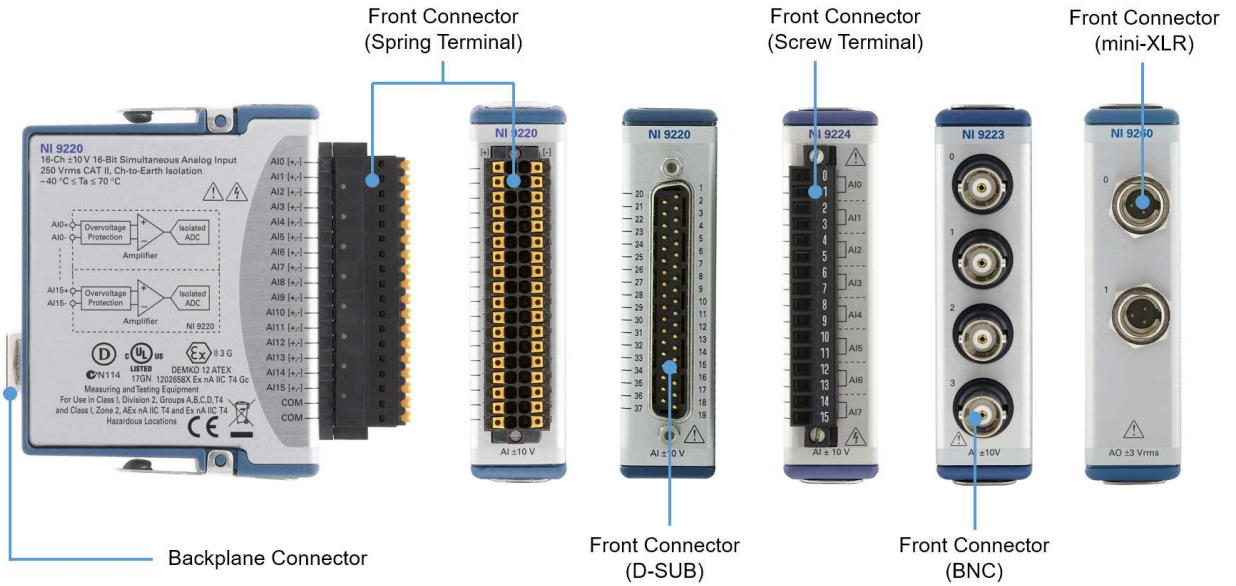
Table 3. C Series modules cover a wide range of signal types and specifications.

Signal Type	Channel Counts	Measurement Types	Max Sample Rate	Special Features
Analog Input[1]				
Voltage	2, 3, 4, 8, 16, 32	±200 mV, ±500 mV, ±1 V, ±5 V, ±10 V, ±60 V, 3 V_{rms}, 400 V_{rms}, 800 V_{rms}, 300 V_{rms}	20 MS/s/ch	Up to channel-channel isolation, anti-aliasing and configurable filtering
Current	3, 4, 8, 16	±20 mA, 0-5 A_{rms}, 0-20 A_{rms}, 0-50 A_{rms}	200 kS/s	Up to channel-channel isolation, built-in channel diagnostics
Voltage and Current	16	±20 mA and ±10 V	500 S/s	channel-earth isolation, built-in noise rejection
Universal	2, 4	V, mA, TC, RTD, strain, Ω, IEPE	51.2 kS/s/ch	Up to channel-channel isolation, bridge completion, anti-aliasing filters, built-in shunt resistors, amplification
Thermocouple	4, 8, 16	J, K, T, E, N, B, R, and S types	95 S/s/ch	Up to channel-channel isolation, amplification, filtering, CJC
RTD	4, 8	100 Ω, 1000 Ω	400 S/s	50/60 Hz filtering, bank isolation
Strain/Bridge Based	4, 8	¼, ½, full bridge (120 or 350 Ω)	50 kS/s/ch	External excitation, bridge completion, anti-aliasing filters
Sound and Vibration	2, 3, 4, 8	±5 V, ±30 V	102.4 kS/s/ch	IEPE, anti-aliasing filters
Analog Output				
Voltage[1]	2, 4, 6, 16	3 V_{rms}, ±10 V, ±40 V (stacked)	1 MS/s/ch	Up to bank isolation
Current[2]	4, 8	±20 mA	100 kS/s/ch	Channel-earth isolation, built-in open-loop detection
Digital I/O				
Input/Output	4, 6, 8, 16, 32	TTL (3.3 V or 5 V) RS422, 5 V, 12 V, 24 V, 48 V, 72 V, 96 V, 120 V AC, 120 V DC, 240 V AC, 240 V DC	55 ns	Up to channel-channel isolation, sinking or sourcing input, bidirectional channel options
Relay Output	4, 8	60 V DC, 30 Vrms, 250 Vrms	1 op/s	Up to channel-channel isolation, SPST or SSR relays
Other				
Counter	8	5 V differential, 24 V single ended	1 MHz	Channel-earth isolation
Digitizer	4	±10 V	20 MS/s	Built-in analog reference trigger
CAN	1	HS/FD, LS/FT CAN	1 Mb/s	—
LIN	1	LIN	20 kb/s	—

[1]Up to 24-bit resolution
[2]Up to 16-bit resolution

Filler Modules, Busbar Modules and User Interface Modules are also available.

Detailed View of C Series Modules



Software Integration

To keep pace with rapidly changing technology, test systems need to be flexible, and software is the key to making rapid changes. CompactDAQ seamlessly integrates with a wide array of application software and programming environments.

Application Software

FlexLogger

FlexLogger is data-logging application software for physical test. It provides sensor-focused configuration workflows for a flexible measurement system with a mix of analog sensors and automotive networks. FlexLogger can also extend the functionality of a system so you can integrate third-party components and custom analysis with LabVIEW plug-ins.

LabVIEW NXG

LabVIEW NXG helps you easily configure compatible measurement hardware, and view and analyze data using interactive analysis panels. With the option to take measurements without programming, you can quickly make data-driven decisions. Take your application to the next level by seamlessly transitioning your projects to the full-featured programming environment.

DIAdem

DIAdem is specifically designed to help you quickly locate, inspect, analyze, and report on measurement data using one software tool. With DIAdem, you can locate and load data from any source; interactively visualize, analyze, and report your data; and save time by automating tasks.

Programming Environments

LabVIEW

LabVIEW software is designed for applications that require test, measurement, and control. Expandable with real-time capabilities, graphical programming, and a variety of toolkits offering specialized functionality for specific applications, LabVIEW ensures seamless integration between hardware and software.

LabVIEW NXG

LabVIEW NXG is the next generation of LabVIEW. Test smarter with LabVIEW NXG by quickly automating your hardware, customizing tests to your specifications, and easily viewing measurement results from anywhere.

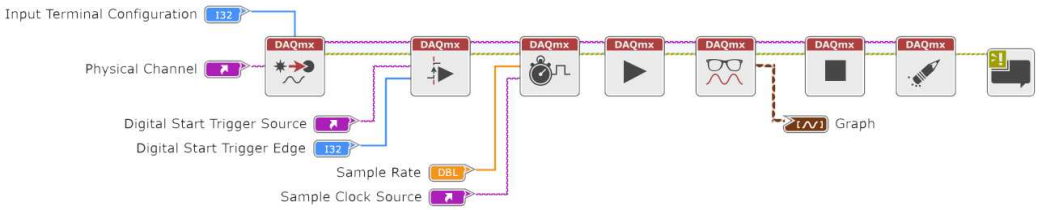
LabWindows/CVI

LabWindows/CVI is an ANSI C software environment with a comprehensive set of programming tools for creating test and measurement applications. You can use it to manage your project, edit and debug source code, build a user interface, and test code output and performance in one streamlined, tabbed workspace.

*__Measurement Studio__, an extension of Microsoft Visual Studio, is also available to provide .NET tools for creating test and measurement applications

NI-DAQmx Application Programming Interface (API)

The NI-DAQmx driver features a best-in-class API that works directly with a variety of development options including LabVIEW, C, C#, and Python. The native integration provides exceptional performance and a seamless experience without the need for manually wrapping functions. To ensure long-term interoperability of DAQ devices, the NI-DAQmx driver API is the same API used for all National Instruments DAQ products, so you can minimize your redevelopment efforts regardless of hardware changes or upgrades. Additionally, the driver provides access to help files, documentation, and dozens of ready-to-run shipping examples you can use as a starting point for your application.



NATIONAL INSTRUMENTS

Hardware Services

All NI hardware features a one-year warranty for basic repair coverage and includes calibration in adherence to NI specifications prior to shipment. PXI systems also include basic assembly and a functional test. NI offers additional entitlements to improve uptime and lower maintenance costs with service programs for hardware. Learn more at ni.com/services/hardware.

	Standard	Premium	Description
Program Duration	1, 3, or 5 years	1, 3, or 5 years	Length of service program
Extended Repair Coverage	•	•	NI restores your device's functionality and includes firmware updates and factory calibration.
System Configuration, Assembly, and Test[1]	•	•	NI technicians assemble, install software in, and test your system per your custom configuration prior to shipment.
Advanced Replacement[2]		•	NI stocks replacement hardware that can be shipped immediately if a repair is needed.
System Return Material Authorization (RMA)[1]		•	NI accepts the delivery of fully assembled systems when performing repair services.
Calibration Plan (Optional)	Standard	Expedited[3]	NI performs the requested level of calibration at the specified calibration interval for the duration of the service program.

[1]This option is available only for PXI, CompactRIO, and CompactDAQ systems.
[2]This option is not available for all products in all countries. Contact your local NI sales engineer to confirm availability.
[3]Expedited calibration includes only traceable levels.

PremiumPlus Service Program

NI can customize the offerings listed above or provide additional entitlements such as on-site calibration, custom sparing, and life-cycle services through a PremiumPlus Service Program. Contact your NI sales engineer to learn more.

Technical Support

Every NI system includes a 30-day trial for phone and email support from NI engineers that can be extended through a Standard Service Program (SSP) membership. NI has more than 400 support engineers around the globe to provide local support in more than 30 languages. You also can take advantage of NI's award-winning online resources and communities.