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For user manuals and dimensional drawings, visit the product page resources tab on ni.com.

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NI CompactDAQ USB Data Acquisition System

NI cDAQ-9172

- Accepts up to 8 C Series I/O modules
- Compact (25 by 9 by 9 cm)
- Hi-Speed USB connection to PC
- 11 to 30 V power supply included

Overview

The NI cDAQ-9172 is an eight-slot NI CompactDAQ chassis that can hold up to eight C Series I/O modules. The chassis operates on 11 to 30 VDC and includes an AC/DC power converter. The NI cDAQ-9172 is a USB 2.0-compliant device that includes a 1.8 m USB cable. See NI CompactDAQ Accessories for mounting options such as DIN-rail, panel mount, and enclosures. The NI cDAQ-9172 has two 32-bit counter/timer chips built into the chassis. With a correlated digital I/O module installed in slot 5 or 6 of the chassis, you can access all the functionality of the counter/timer chip including event counting, pulse-wave generation or measurement, and quadrature encoders.

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Requirements and Compatibility

OS Information

Windows
Windows 2000/XP
Windows Vista x64/x86

Driver Information

NI-DAQmx

Software Compatibility

LabVIEW

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Application and Technology

Mix Analog, Digital, and Sensor Measurements in the Same System

Many devices can measure temperature, voltage, or bridge-based sensors, but NI CompactDAQ can integrate all of these measurements and more into a single device that outputs all of the data via the same bus interface, such as USB. An NI CompactDAQ system can mix multiplexed voltage input signals, simultaneously sampled accelerometers, low-speed thermocouples, and TTL digital I/O all in the same four- or eight-slot chassis using the same driver, NI-DAQmx. NI CompactDAQ makes programming easier because the same driver is used for all measurements. This solution saves space and simplifies service and support. With NI CompactDAQ, there is only one box on your lab bench, and, if there are problems with any of the measurements or equipment, award-winning National Instruments support is your contact for all instrumentation needs.

Figure 1. NI cDAQ-9172 with Eight Analog and Digital Modules Connected to a Laptop

Key Features

Small, modular data acquisition system for industrial measurements
Hi-Speed USB plug-and-play connectivity to PC
Hot-swappable, autodetectable C Series I/O modules with direct sensor and signal connectivity
NI-DAQmx API that provides powerful and easy-to-use programming interface
Up to 2,300 V_{rms} isolation (withstand)
NI CompactDAQ environmental certifications and ratings:
0 to 55 °C operating temperature
30 g shock rating (operating)
PXI vibration specification
International safety, EMC, and environmental certifications

C Series Modules

You have more than 50 C Series modules, most of which work with NI CompactDAQ, to choose from for different measurements including thermocouple, voltage, resistance temperature detector (RTD), current, resistance, strain, digital (TTL and other), accelerometers, and microphones. Channel counts on the individual modules range from three to 32 channels to accommodate a wide range of system requirements. C Series modules combine signal conditioning, connectivity, and data acquisition into a small module for each specific measurement type. You can insert these modules into any of the C Series chassis to create a variety of systems. You can create a mix of channel counts and measurement types within one system by selecting the desired modules and installing them into one of several C Series systems. For this reason, systems built on the C Series platform are highly customizable. See ni.com/crio/cseries for the C Series compatibility table.

Figure 2. Three High-Speed Analog Input Modules

Rugged Design

NI CompactDAQ and all C Series modules are constructed from A380 cast aluminum for a rugged system that can withstand operating temperatures from -20 to 55 °C and up to 30 g of shock. NI CompactDAQ was built to be used in the lab but not to necessarily stay there. With a rugged, flexible system such as NI CompactDAQ, you can reconfigure and move a single test system from place to place without having to purchase different equipment for every lab or test stand. C Series modules are equally rugged and designed with spring loaded latches to lock into place when installed in the chassis. The shock and vibration specifications are all tested on an NI CompactDAQ system with modules installed, so modules do not fall out or come undocked under the specified conditions. For cable strain relief, a locking USB cable with thumbscrew is included to prevent accidental disconnection during use. The rugged features of NI CompactDAQ help you quickly begin testing because you need less time to prepare the instrumentation for the rigors of field testing. For added system portability, or to help track multiple systems around the lab, purchase the CASE-0750 rugged carrying case that has room for chassis, modules, power supplies, and signal wire.

Figure 3. The carrying case has removable foam blocks for further customization.

Driver Software

NI-DAQmx is the driver software included with NI CompactDAQ and most National Instruments data acquisition and signal conditioning products. This easy-to-use software integrates the full functionality of your NI CompactDAQ hardware with National Instruments LabVIEW, LabWindows™/CVI, or Measurement Studio for Visual Basic. High-performance features include multidevice synchronization, networked measurements, and simulated devices. Bundled with NI-DAQmx, the NI Measurement & Automation Explorer utility simplifies the configuration of your measurement hardware with device test panels, interactive measurements, and scaled I/O channels. NI-DAQmx also provides numerous example programs for LabVIEW and other application development environments to get you started with your application quickly.

Chassis	Module Slots	Connection to PC	Channels per Chassis	Analog Resolution	Analog Sampling Rate	Analog Throughput
cDAQ-9172	8	Hi-Speed USB	Up to 256 analog input, or 32 analog output, or 64 digital I/O	Up to 24 bits	Up to 400 kS/s per module	3.2 MS/s total throughput

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Ordering Information

For a complete list of accessories, visit the product page on ni.com.

Products	Part Number	Recommended Accessories	Part Number
cDAQ-9172			
NI cDAQ-9172 8-Slot USB 2.0 Chassis for NI CompactDAQ, U.S. (120 VAC) 1 Connectivity Accessory , 1 Not Applicable	779508-01	No accessories required.	

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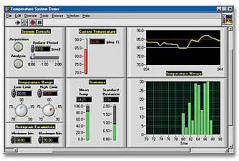
Software Recommendations

LabVIEW Professional Development System for Windows

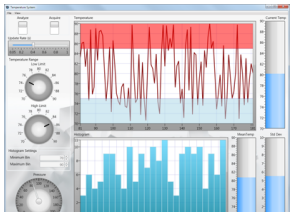


Advanced software tools for large project development
Automatic code generation using DAQ Assistant and Instrument I/O Assistant
Tight integration with a wide range of hardware
Advanced measurement analysis and digital signal processing
Open connectivity with DLLs, ActiveX, and .NET objects
Capability to build DLLs, executables, and MSI installers

NI LabWindows™/CVI for Windows

Real-time advanced 2D graphs and charts
Complete hardware compatibility with IVI, VISA, DAQ, GPIB, and serial
Analysis tools for array manipulation, signal processing statistics, and curve fitting
Simplified cross-platform communication with network variables
Measurement Studio .NET tools (included in LabWindows/CVI Full only)
The mark LabWindows is used under a license from Microsoft Corporation.

NI Measurement Studio Professional Edition



Customizable graphs and charts for WPF, Windows Forms, and ASP.NET Web Forms UI design
Analysis libraries for array operations, signal generation, windowing, filters, signal processing
Hardware integration support with native .NET data acquisition and instrument control libraries
Automatic code generation for all NI-DAQmx data acquisition hardware
Intelligent and efficient data-logging libraries for streaming measurement data to disk
Support for Microsoft Visual Studio .NET 2012/2010/2008

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Support and Services

System Assurance Programs

NI system assurance programs are designed to make it even easier for you to own an NI system. These programs include configuration and deployment services for your NI PXI, CompactRIO, or Compact FieldPoint system. The NI Basic System Assurance Program provides a simple integration test and ensures that your system is delivered completely assembled in one box. When you configure your system with the NI Standard System Assurance Program, you can select from available NI system driver sets and application development environments to create customized, reorderable software configurations. Your system arrives fully assembled and tested in one box with your software preinstalled. When you order your system with the standard program, you also receive system-specific documentation including a bill of materials, an integration test report, a recommended maintenance plan, and frequently asked question documents. Finally, the standard program reduces the total cost of owning an NI system by providing three years of warranty coverage and calibration service. Use the online product advisors at ni.com/advisor to find a system assurance program to meet your needs.

Calibration

NI measurement hardware is calibrated to ensure measurement accuracy and verify that the device meets its published specifications. To ensure the ongoing accuracy of your measurement hardware, NI offers basic or detailed recalibration service that provides ongoing ISO 9001 audit compliance and confidence in your measurements. To learn more about NI calibration services or to locate a qualified service center near you, contact your local sales office or visit ni.com/calibration.

Technical Support

Get answers to your technical questions using the following National Instruments resources.

Support - Visit ni.com/support to access the NI KnowledgeBase, example programs, and tutorials or to contact our applications engineers who are located in NI sales offices around the world and speak the local language.
Discussion Forums - Visit forums.ni.com for a diverse set of discussion boards on topics you care about.
Online Community - Visit community.ni.com to find, contribute, or collaborate on customer-contributed technical content with users like you.

Repair

While you may never need your hardware repaired, NI understands that unexpected events may lead to necessary repairs. NI offers repair services performed by highly trained technicians who quickly return your device with the guarantee that it will perform to factory specifications. For more information, visit ni.com/repair.

Training and Certifications

The NI training and certification program delivers the fastest, most certain route to increased proficiency and productivity using NI software and hardware. Training builds the skills to more efficiently develop robust, maintainable applications, while certification validates your knowledge and ability.

Classroom training in cities worldwide - the most comprehensive hands-on training taught by engineers.
On-site training at your facility - an excellent option to train multiple employees at the same time.
Online instructor-led training - lower-cost, remote training if classroom or on-site courses are not possible.
Course kits - lowest-cost, self-paced training that you can use as reference guides.
Training memberships and training credits - to buy now and schedule training later.
Visit ni.com/training for more information.

Extended Warranty

NI offers options for extending the standard product warranty to meet the life-cycle requirements of your project. In addition, because NI understands that your requirements may change, the extended warranty is flexible in length and easily renewed. For more information, visit ni.com/warranty.

OEM

NI offers design-in consulting and product integration assistance if you need NI products for OEM applications. For information about special pricing and services for OEM customers, visit ni.com/oem.

Alliance

Our Professional Services Team is comprised of NI applications engineers, NI Consulting Services, and a worldwide National Instruments Alliance Partner program of more than 700 independent consultants and integrators. Services range from start-up assistance to turnkey system integration. Visit ni.com/alliance.

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Detailed Specifications

These specifications are for the NI cDAQ-9172 chassis only. These specifications are typical at 25 °C unless otherwise noted. For the C Series I/O module specifications, refer to the documentation for the C Series I/O modules you are using.

Analog Input	
Input FIFO size	2,047 samples
Sample rate [1]	
Maximum	3.2 MS/s (multi-channel, aggregate)
Minimum	0 S/s
Timing accuracy [2]	50 ppm of sample rate
Timing resolution [2]	50 ns
Number of channels supported	Determined by the C Series I/O modules

Analog Output	
Numbers of channels supported	
In hardware-timed task	16
In non-hardware-timed task	Determined by the C Series I/O modules
Maximum update rate	1.6 MS/s (multi-channel, aggregate)
Timing accuracy	50 ppm of sample rate
Timing resolution	50 ns
Output FIFO size	8,191 samples shared among channels used
AO waveform modes	Non-periodic waveform, periodic waveform regeneration mode from onboard memory, periodic waveform regeneration from host buffer including dynamic update

Digital Waveform Characteristics (Slots 1 through 4 Only) [3]	
Waveform acquisition (DI) FIFO	2,047 samples
Waveform generation (DO) FIFO	2,047 samples
Digital input sample clock frequency	
Streaming to application memory	0 to 8 MHz, system dependent
Finite	0 to 10 MHz
Digital output sample clock frequency	
Streaming from application memory	0 to 8 MHz, system dependent
Regenerate from FIFO	0 to 10 MHz
Finite	0 to 10 MHz
Digital output or digital input sample clock source	Any PFI, analog sample or convert clock, analog output sample clock, Ctr *n* Internal Output, and many other sources

PFI Characteristics (Slots 5 and 6 Only) [4]	
Functionality	Static digital input, static digital output, timing input, and timing output
Timing output sources	Many analog input, analog output, counter, digital input, and digital output timing signals
Debounce filter settings	Selectable per input: 125 ns, 6.425 µs, 2.56 ms, disable, high and low transitions
Timing input frequency	0 to 20 MHz
Timing output frequency	0 to 20 MHz

General-Purpose Counter/Timers (Slots 5 and 6 Only) [5]	
Number of counter/timers	2
Resolution	32 bits
Counter measurements	Edge counting, pulse, semi-period, period, two-edge separation
Position measurements	X1, X2, X4 quadrature encoding with Channel Z reloading; two-pulse encoding
Output applications	Pulse, pulse train with dynamic updates, frequency division, equivalent time sampling
Internal base clocks	80 MHz, 20 MHz, 100 kHz
External base clock frequency	0 to 20 MHz
Base clock accuracy	50 ppm
Output frequency	0 to 20 MHz
Inputs	Gate, Source, HW_Arm, Aux, A, B, Z, Up_Down
Routing options for inputs	Any PFI, analog trigger, many internal signals
FIFO	2 samples
Data transfers	High-speed data stream, programmed I/O

Frequency Generator (Slots 5 and 6 Only)	
Number of channels	1
Base clocks	10 MHz, 100 kHz
Divisors	1 to 16 (integers)
Base clock accuracy	50 ppm
Output is available on any PFI terminal.	

External Digital Triggers (Slots 5 and 6 or with Some AI Modules)	
Source	Any PFI terminal
Polarity	Software-selectable for most signals
Analog input function	Start Trigger, Reference Trigger, Pause Trigger, Sample Clock, Sample Clock Timebase
Analog output function	Start Trigger, Pause Trigger, Sample Clock, Sample Clock Timebase
Counter/timer functions	Gate, Source, HW_Arm, Aux, A, B, Z, Up_Down

Module I/O States	
At power-on	Module-dependent. Refer to the documentation included with the C Series I/O module(s).
With USB cable removed	Reverts to power-on state

Power Requirements

You must use a National Electric Code (NEC) Class 2 power source with the NI cDAQ-9172 chassis.

Note Some I/O modules have additional power requirements. For more information about C Series I/O module(s) power requirements, refer to documentation included with the C Series I/O module(s).

Note Sleep mode for C Series I/O modules is not supported in the NI cDAQ-9172.

Input voltage range	11 V to 30 V
Maximum required input power	15 W
Power input connector	DC input jack with locking, threaded ring 0.8 in. (2 mm) center pin
Power input mating connector	Switchcraft S760K

Bus Interface	
USB specification	USB 2.0 Full-Speed
Power from USB	
4.10 to 5.25 V	500 µA maximum
High-performance data streams	
Number available	4
Types available	Analog input, analog output, digital input, digital output, counter/timer input

Safety

Safety Standards

This product is designed to meet the requirements of the following standards of safety for electrical equipment for measurement, control, and laboratory use:
IEC 61010-1, EN 61010-1
UL 61010-1, CSA 61010-1

Note For UL and other safety certifications, refer to the product label or the *Online Product Certification* section.

Environmental

The NI cDAQ-9172 chassis is intended for indoor use only. For outdoor use, mount the system in a suitably rated enclosure.

Operating temperature	
(IEC 60068-2-1 and IEC 60068-2-2)	–20 to 55 °C
Storage temperature	
(IEC 60068-2-1 and IEC 60068-2-2)	–40 to 85 °C
Ingress Protection	IP 30
Operating humidity	

(IEC 60068-2-56)	10 to 90% RH, noncondensing
Storage humidity	
(IEC 60068-2-56)	5 to 95% RH, noncondensing
Maximum altitude	2,000 m
Pollution Degree (IEC 60664)	2

Shock and Vibration

To meet these specifications, you must panel mount the system and affix ferrules to the ends of the terminal lines.

Operating shock	30 g peak, half-sine, 11 ms pulse (Tested in accordance with IEC-60068-2-27. Test profile developed in accordance with MIL-PRF-28800F.)
Random vibration	
Operating	5 to 500 Hz, 0.3 grms
Nonoperating	5 to 500 Hz, 2.4 grms (Tested in accordance with IEC-60068-2-64. Nonoperating test profile exceeds the requirements of MIL-PRF-28800F, Class 3.)

Electromagnetic Compatibility

This product is designed to meet the requirements of the following standards of EMC for electrical equipment for measurement, control, and laboratory use:
EN 61326 EMC requirements; Minimum Immunity
EN 55011 Emissions; Group 1, Class A
CE, C-Tick, ICES, and FCC Part 15 Emissions; Class A

Note For EMC compliance, operate this device with shielded cables.

CE Compliance

This product meets the essential requirements of applicable European Directives, as amended for CE marking, as follows:
2006/95/EC; Low-Voltage Directive (safety)
2004/108/EC; Electromagnetic Compatibility Directive (EMC)

Note For the standards applied to assess the EMC of this product, refer to the *Online Product Certification* section.

Online Product Certification

Refer to the product Declaration of Conformity (DoC) for additional regulatory compliance information. To obtain product certifications and the DoC for this product, visit ni.com/certification, search by module number or product line, and click the appropriate link in the Certification column.

Environmental Management

National Instruments is committed to designing and manufacturing products in an environmentally responsible manner. NI recognizes that eliminating certain hazardous substances from our products is beneficial not only to the environment but also to NI customers.

For additional environmental information, refer to the *NI and the Environment* Web page at ni.com/environment. This page contains the environmental regulations and directives with which NI complies, as well as other environmental information not included in this document.

Waste Electrical and Electronic Equipment (WEEE)

EU Customers At the end of their life cycle, all products *must* be sent to a WEEE recycling center. For more information about WEEE recycling centers and National Instruments WEEE initiatives, visit ni.com/environment/weee.htm.

电子信息产品污染控制管理办法 （中国 RoHS）

中国客户 National Instruments 符合中国电子信息产品中限制使用某些有害物质指令 (RoHS)。
关于 National Instruments 中国 RoHS 合规性信息，请登录 ni.com/environment/rohs_china。
(For information about China RoHS compliance, go to ni.com/environment/rohs_china.)

[1] Performance dependent on type of installed C Series I/O modules and number of channels in the task.
[2] Does not include group delay. Refer to C Series I/O module documentation for more information.
[3] Requires correlated digital I/O modules installed on the appropriate slot(s).
[4] Requires correlated digital I/O modules installed on the appropriate slot(s).
[5] Requires correlated digital I/O modules installed on the appropriate slot(s).

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