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NI cDAQ-9191

802.11 Wi-Fi Data Acquisition



- IEEE 802.11b/g (Wi-Fi) wireless communication interface
- Advanced security with 128-bit AES data encryption and IEEE 802.11i (WPA2) support
- 30 m indoor, 100 m line of sight wireless signal range
- 10/100BASE-T/X Ethernet port
- Up to 100 m Ethernet cabling distance per segment
- Choose from more than 50 NI C Series hot-swappable I/O modules with integrated signal conditioning
- Use 4 general-purpose 32-bit counter/timers built into the chassis (access through digital module)
- Measure in minutes with NI-DAQmx software and automatic code generation using the DAQ Assistant

Overview

Simple, Complete Wi-Fi Data Acquisition

The NI cDAQ-9191 is a 1-slot NI CompactDAQ 802.11 Wi-Fi chassis designed for remote or distributed sensor and electrical measurements. With support for over 50 NI C Series measurement-specific modules, this 1-slot chassis can transmit analog I/O, digital I/O, counter/timer, and sensor measurements over 802.11 Wi-Fi or Ethernet back to a host PC or laptop. With patented NI Signal Streaming technology, the NI CompactDAQ platform delivers high-speed data and ease of use in a flexible, modular system. Modules are available for a variety of sensor measurements including thermocouples, RTDs, strain gages, load and pressure transducers, torque cells, accelerometers, flow meters, and microphones. In addition, with NI-DAQmx driver software, you can log data for simple experiments on the benchtop or deploy a distributed test system across the factory floor using NI LabVIEW, ANSI C/C++, Visual Basic .NET, and other programming environments.

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Application and Technology

Extend the Reach of Your Measurement System

NI CompactDAQ 802.11 Wi-Fi chassis extend PC-based DAQ to measurement applications for which cables are inconvenient or uneconomical. These chassis combine IEEE 802.11g wireless or Ethernet communication; direct sensor connectivity; and the flexibility of NI-DAQmx driver software for remote monitoring of electrical, physical, mechanical, and acoustical signals. In addition, built-in NIST-approved 128-bit AES encryption and advanced network authentication methods offer the highest commercially available network security.



Figure 1. The NI cDAQ-9191 802.11 Wi-Fi chassis holds a single analog I/O, digital I/O, or sensor measurement module.

More Than 50 C Series Modules

You can choose from more than 50 NI C Series modules for different measurements including thermocouple, voltage, resistance temperature detector (RTD), current, resistance, strain, digital (TTL and other), accelerometers, and microphones. Each C Series module combines sensor connectivity, signal conditioning, and A/D converters into a small 2.8 by 3.5 in. package. Channel counts on the individual modules range from three to 32 channels to accommodate a wide variety of system requirements.



Figure 2. You can choose from more than 50 NI C Series measurement 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 0 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. The rugged features of NI CompactDAQ help you quickly begin testing because less time is needed to prepare the instrumentation for the rigors of field testing.

Four 32-Bit General-Purpose Counters

All NI CompactDAQ chassis include four 32-bit counters built into the backplane. These counters are accessed through an installed hardware-timed digital I/O module (sold separately) such as the NI 9401 or NI 9402. Once you have installed the digital module, you can create a counter task in software for operations such as quadrature encoder, period and frequency measurement, or finite pulse train and PWM generation.

NI Signal Streaming Technology

To take advantage of high-bandwidth 802.11 Wi-Fi and Ethernet, NI CompactDAQ chassis implement a TCP/IP

version of the same patented NI Signal Streaming technology on high-performance NI USB DAQ products. With this technology, high-speed C Series modules, such as the NI 9234, can continuously acquire up to 51.2 kS/s of simultaneous 24-bit data on each of four channels. Furthermore, multiple NI CompactDAQ chassis can share the same network for distributed, high-channel-count systems. Using sophisticated software architecture, the NI-DAQmx driver software maintains a double-buffered transfer mechanism between the chassis and host computer capable of sustaining several bidirectional continuous waveforms. At the same time, the driver monitors the state of the network to adjust for unexpected delays or temporary interruptions. All of this is abstracted from the user, so you can focus on the measurement application and not the network.

Zero Configuration Networking

To make networking technology more accessible to the non-IT professional, NI CompactDAQ uses the Zero Configuration Networking (Zeroconf) collection of standards. With Zeroconf technology, you can plug an NI CompactDAQ system directly into your computer or local subnet, and it appears automatically in NI Measurement & Automation Explorer (MAX) without any network setup or configuration. Once the chassis is autodetected in MAX, creating a wireless system is as easy as selecting the appropriate network, pressing save, and unplugging the Ethernet cable. In addition, a new Web configuration interface built into the NI cDAQ-9191 provides the ability to manage your system through a Web browser without installing any software on your host machine.

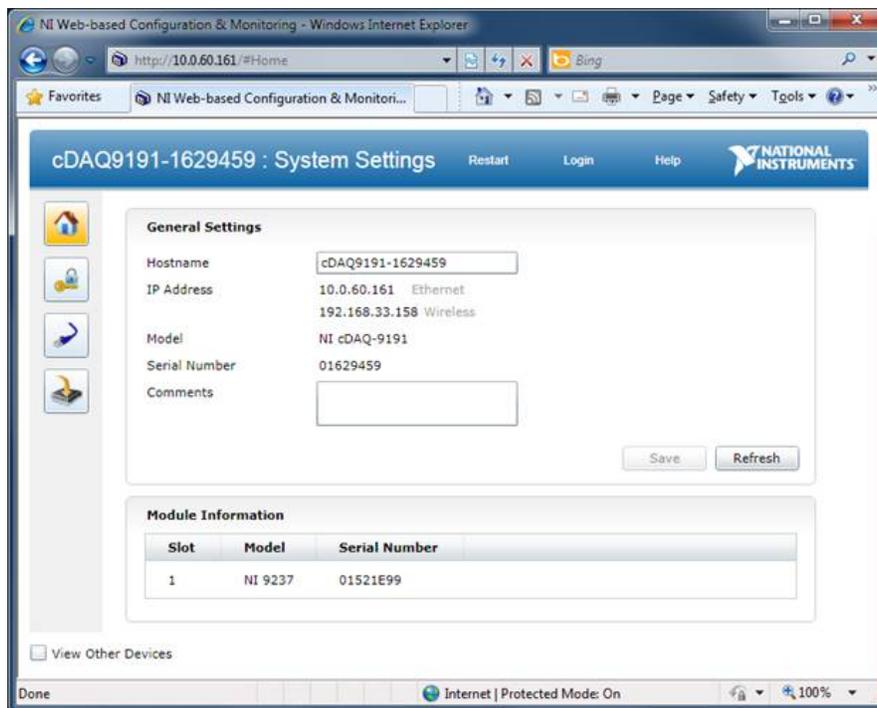


Figure 3. With the embedded Web server on the cDAQ-9191 chassis, you can remotely configure your NI CompactDAQ system from a Web browser.

Wireless Security

Wi-Fi NI CompactDAQ chassis implement the highest commercially available wireless network security standard, IEEE 802.11i (commonly known as WPA2 or WPA2 Enterprise), including network authentication and data encryption. IEEE 802.1X authentication ensures that only authorized devices have network access, and encryption prevents data packets from being intercepted. These chassis support multiple Extensible Authentication Protocol (EAP) methods that provide for mutual authentication between the data acquisition devices and wireless access points (WAPs). These devices also support the Advanced Encryption Standard (AES), a 128-bit cryptographic algorithm endorsed by the National Institute of Standards and Technology for use in many U.S. government facilities. By using standard security protocols, 802.11 Wi-Fi chassis make it easy to add wireless measurements to existing IT networks safely.

NI-DAQmx Software Flexibility

Recognizing the diversity of measurement applications, NI approaches programmatic data acquisition independent of specific PC bus technologies. You can use the same NI-DAQmx driver software to communicate with NI data acquisition hardware across PCI, PCI Express, PXI, PXI Express, USB, Ethernet, and Wi-Fi. You can use an application developed for an NI CompactDAQ USB system with an NI CompactDAQ Ethernet or Wi-Fi

system without making any changes to your software. Furthermore, the NI-DAQmx API is consistent across multiple programming platforms, so you can develop an application for NI CompactDAQ in NI LabVIEW, ANSI C/C++, C#, or Microsoft Visual Basic .NET.



Figure 4. NI-DAQmx driver software abstracts data acquisition bus technology and provides a consistent API across multiple programming languages.

National Instruments recommends using the latest version of NI-DAQmx driver software for application development in NI LabVIEW, LabVIEW SignalExpress, LabWindows™/CVI, and Measurement Studio software. To obtain the latest version of NI-DAQmx, visit ni.com/support/daq/versions. NI measurement services software speeds up your development with features including the following:

- * A configuration-based interface to create fast and accurate measurements with no programming using the DAQ Assistant
- * Automatic code generation to create your application in LabVIEW; LabWindows/CVI; LabVIEW SignalExpress; and C#, Visual Studio .NET, ANSI C/C++, or Visual Basic using Measurement Studio
- * Multithreaded streaming technology for 1,000 times performance improvements
- * More than 3,000 free software downloads at ni.com/zone to jump-start your project
- * A single programming interface for hundreds of PCI, PXI, USB, Ethernet, and Wi-Fi DAQ hardware devices

NI CompactDAQ Wi-Fi chassis are compatible with the following versions (or later) of NI application software: LabVIEW 8.6, LabWindows/CVI 8.x, and Measurement Studio 8.x. They are also compatible with ANSI C/C++, C#, and Visual Basic .NET.

Shipping Kit Contents

Every cDAQ-9191 shipping kit includes the following:

- * NI cDAQ-9191 1-slot NI CompactDAQ 802.11 Wi-Fi chassis
- * 12 VDC power supply (**region-specific power cord not included**)
- * NI-DAQmx 9.4 (or later) software DVD for Windows 7/Vista/XP
- * LabVIEW SignalExpress LE data-logging software
- * NI cDAQ-9191 Quick Start flyer

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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-9181/9188/9191 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 module you are using.

Analog Input	
Input FIFO size	127 samples per slot
Sample rate ¹	
Maximum	Determined by the C Series I/O modules
Timing accuracy ²	50 ppm of sample rate
Timing resolution ²	12.5 ns
Number of channels supported	Determined by the C Series I/O modules
Analog Output	
Numbers of channels supported	

In hardware-timed task using onboard regeneration	16
In hardware-timed task not using onboard regeneration	Determined by the C Series I/O modules
In non-hardware-timed task	Determined by the C Series I/O modules
Maximum update rate	
Regeneration	1.6 MS/s (multi-channel, aggregate)
Non-regeneration	Determined by the C Series I/O modules
Timing accuracy	50 ppm of sample rate
Timing resolution	12.5 ns
Output FIFO size	
Onboard regeneration	8,191 samples shared among channels used
Non-regeneration	127 samples per slot
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

Waveform acquisition (DI) FIFO	127 samples per slot
Waveform generation (DO) FIFO	
Slots 1–4	2,047 samples
Slots 5–8	1,023 samples



Note (NI cDAQ-9188) When modules are installed in slots 1 through 4, FIFO is 2,047 samples per slot for all slots. When any module is installed in slots 5 through 8, FIFO is 1,023 samples per slot for all eight slots.

Digital input sample clock frequency	
Streaming to application memory	System-dependent
Finite	0 - 10 MHz
Digital output sample clock frequency	
Streaming from application memory	System-dependent
Regeneration from FIFO	0 - 10 MHz
Finite	0 - 10 MHz

General-Purpose Counter/Timers

Number of counter/timers	4
Resolution	32 bits
Counter measurements	Edge counting, pulse, semi-period, period, two-edge separation, pulse width
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 - 20 MHz
Base clock accuracy	50 ppm
Output frequency	0 - 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	Dedicated 127-sample FIFO

Frequency Generator

Number of channels	1
Base clocks	10 MHz, 20 MHz, 100 kHz
Divisors	1 - 16 (integers)
Base clock accuracy	50 ppm

Output is available on any PFI terminal.

Module PFI Characteristics

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
Timing input frequency	0 - 20 MHz
Timing output frequency	0 - 20 MHz

Chassis PFI Characteristics (NI cDAQ-9188)

Max input or output frequency	1 MHz
Cable length	3m (10 ft)
Cable impedance	50 Ω
PFI 0, PFI 1 connectors	BNC
Power-on state	High impedance
Input/output voltage protection	

Voltage	Minimum	Maximum
Input	-20 V	25 V
Output	-15 V	20 V

Maximum operating conditions

Level	Minimum	Maximum
I_{OL} output low current	--	8 mA
I_{OH} output high current	--	-8 mA

DC input characteristics

Level	Minimum	Maximum
Positive going threshold	1.43 V	2.28 V
Negative going threshold	0.86 V	1.53V
Hysteresis	0.48 V	0.87 V

Cable length 3 m (10 ft).

DC output characteristics

Level	Conditions	Minimum	Maximum
High	--	--	5.25 V
High	Sourcing 100 μ A	4.65 V	--
High	Sourcing 2 mA	3.60 V	--
High	Sourcing 3.5 mA	3.44 V	--
Low	Sinking 100 μ A	--	0.10 V
Low	Sinking 2 mA	--	0.64 V
Low	Sinking 3.5 mA	--	0.8 V

Digital Triggers

Source	
NI cDAQ-9181/9191	Any PFI terminal
NI cDAQ-9188	Any chassis PFI BNC or module 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 C Series I/O module(s) documentation.
Network Interface	
Network protocols	TCP/IP, UDP
Network ports used	HTTP:80 (configuration only), TCP:3580; UDP:5353 (configuration only), TCP:5353 (configuration only); TCP:31415; UDP:7865 (configuration only), UDP:8473 (configuration only)
Network IP configuration	DHCP + Link-Local, DHCP, Static, Link-Local
High-performance data streams	
NI cDAQ-9181/9191	7
Data stream types available	Analog input, analog output, digital input, digital output, counter/timer input, counter/timer output
Default MTU size	1500
NI cDAQ-9188 jumbo frame support	Up to 9000
Ethernet	
Network interface	
NI cDAQ-9181/9191	100 Base-TX, full-duplex; 100 Base-TX, half-duplex; 10 Base-T, full-duplex; 10 Base-T, half-duplex
NI cDAQ-9188	1000 Base-TX, full-duplex; 1000 Base-TX, half-duplex; 100 Base-TX, full-duplex; 100 Base-TX, half-duplex; 10 Base-T, full-duplex; 10 Base-T, half-duplex
Communication rates	
NI cDAQ-9181/9191	10/100 Mbps, auto-negotiated
NI cDAQ-9188	10/100/1000 Mbps, auto-negotiated
Maximum cabling distance	100 m/segment
Wireless (NI cDAQ-9191)	
Radio mode	IEEE 802.11b, 802.11g
Wireless mode	Infrastructure and Ad-Hoc
Infrastructure	
Security types	WEP-40, WEP-104, WPA, WPA2
EAP types	EAP-TLS, EAP-TTLS ¹ , EAP-FAST, LEAP, PEAP ²
Ad-Hoc	
Security types	WEP-40, WEP-104
Channel ³	1–14
Center frequency	
11b	2412 to 2484 MHz
11g	2412 to 2472 MHz
Modulation type	
11b	DSSS (CCK, DQPSK, DBPSK)

11g	OFDM-CCK (64QAM, 16QAM, QPSK, BPSK)
Center interval	
11b	5 MHz
11g	5 MHz

TX power

Specification	11b		11g					
	Channel	1 - 14	1	2	3, 4	5 - 7	8 - 10	11 - 13
Maximum Radio Output		16 dBm	12 dBm	16 dBm	15.5 dBm	15 dBm	14.5 dBm	14 dBm

Receiver sensitivity

Specification	Rate	Sensitivity
11b, FER<8%	11 Mbps	-82 dB/minimum
11b, FER<8%	5.5 Mbps	-84 dB/minimum
11b, FER<8%	2 Mbps	-86 dB/minimum
11b, FER<8%	1 Mbps	-88 dB/minimum
11g, PER<10%	54 Mbps	-68 dB/minimum
11g, PER<10%	48 Mbps	-68 dB/minimum
11g, PER<10%	36 Mbps	-75 dB/minimum
11g, PER<10%	24 Mbps	-79 dB/minimum
11g, PER<10%	18 Mbps	-82 dB/minimum
11g, PER<10%	12 Mbps	-84 dB/minimum
11g, PER<10%	9 Mbps	-87 dB/minimum
11g, PER<10%	6 Mbps	-88 dB/minimum

Antenna (NI cDAQ-9191)

Connector	Bulkhead RP-SMA connector
Electrical performance	
VSWR	Maximum 2.0 (2.4 to 2.5 GHz)
Impedance	50 Ω nominal
Directivity	Omni
Maximum gain	2.0 dBi (2.4 to 2.5 GHz)

Power Requirements

-  **Caution** You must use a UL Listed ITE power supply marked LPS with the NI cDAQ-918x/919x chassis.
-  **Note** Some C Series 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-9188.

Input voltage range	9 - 30 V
Recommended power supply	15 W secondary
Maximum required input power	
NI cDAQ-9181	5 W
NI cDAQ-9188	15 W
NI cDAQ-9191	6 W
Power input connector	2 positions 3.5 mm pitch pluggable screw terminal with screw locks similar to Sauro CTM020F8
NI cDAQ-9181/9191	Phoenix Contact 1727566
NI cDAQ-9188	Sauro CTMH020F8-0N001
Power input mating connector	Sauro CTF020V8, Phoenix Contact 1714977, or equivalent

Physical Characteristics

NI cDAQ-9181

Weight (unloaded)	Approx. 470 g (16.6 oz)
Dimensions (unloaded)	194.0 mm x 88.7 mm x 33.6 mm (7.64 in. x 3.49 in. x 1.32 in.)
NI cDAQ-9188	
Weight (unloaded)	Approx. 900 g (31.7 oz)
Dimensions (unloaded)	254.0 mm x 88.1 mm x 58.9 mm (10.0 in. x 3.5 in. x 2.3 in.)
NI cDAQ-9191	
Weight (unloaded)	
Without antenna	Approx. 481 g (16.9 oz)
With antenna	Approx. 491 g (17.3 oz)
Dimensions (unloaded)	202.7 mm x 88.7 mm x 33.6 mm (7.98 in. x 3.49 in. x 1.32 in.)
Antenna connector; attached, fully extended	+109.9 mm (+4.33 in.)

If you need to clean the chassis, wipe it with a dry towel.

Safety Voltages

Connect only voltages that are within these limits.

V terminal to C terminal	30 V maximum, Measurement Category I
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Measurement Category I is for measurements performed on circuits not directly connected to the electrical distribution system referred to as MAINS voltage. MAINS is a hazardous live electrical supply system that powers equipment. This category is for measurements of voltages from specially protected secondary circuits. Such voltage measurements include signal levels, special equipment, limited-energy parts of equipment, circuits powered by regulated low-voltage sources, and electronics.

 **Caution** Do not connect the system to signals or use for measurements within Measurement Categories II, III, or IV.

RF Safety (NI cDAQ-9191)

This equipment complies with FCC radiation exposure limits set for uncontrolled equipment and meets the FCC radio frequency (RF) Exposure Guidelines in Supplement C to OET65. This product generates and radiates radio frequency energy. To comply with the radio frequency radiation exposure guidelines in an uncontrolled environment, this equipment should be installed and operated with at least 20 cm and more between the radiator and the person's body (excluding extremities: hands, wrists, feet, and legs).

This equipment complies with the European Council Recommendation (1995/519/EC) on the limitation of exposure of the general public to electromagnetic fields. Compliance was determined in accordance with the requirements in EN 50371.

Environmental

Temperature	
Operating temperature	
NI cDAQ-9181/9191	0 to 55 °C (IEC-60068-2-1 and IEC-60068-2-2)
NI cDAQ-9188	-20 to 55 °C (IEC-60068-2-1 and IEC-60068-2-2)
 Caution To maintain product performance and accuracy specifications when the ambient temperature is between 45 and 55 °C, you must mount the chassis to a metal panel or surface using the screw holes or the panel mount kit. Measure the ambient temperature at each side of the CompactDAQ system 63.5 mm (2.5 in.) from the side and 25.4 mm (1 in.) from the rear cover of the system. For further information about mounting configurations, go to ni.com/info and enter the Info Code cdaqmounting.	
Storage	-40 to 85 °C
NI cDAQ-9181/9191	-10 to 70 °C (IEC-60068-2-1 and IEC-60068-2-2)
NI cDAQ-9188	-40 to 85 °C (IEC-60068-2-1 and IEC-60068-2-2)
Ingress protection	IP 30
Humidity	
Operating	10 to 90% RH, noncondensing (IEC-60068-2-56)
Storage	5 to 95% RH, noncondensing (IEC-60068-2-56)
Maximum altitude	5,000 m

Indoor use only.

Shock and Vibration

To meet these specifications, you must panel mount the NI cDAQ-918x/919x system and affix ferrules to the ends of the terminal lines.

Operational 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 g _{rms}
Non-operating	5 to 500 Hz, 2.4 g _{rms} (Tested in accordance with IEC-60068-2-64. Non-operating test profile exceeds the requirements of MIL-PRF-28800F, Class 3.)

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.

Electromagnetic Compatibility

This product meets the requirements of the following EMC standards for electrical equipment for measurement, control, and laboratory use:

- EN 61326-1 (IEC 61326-1): Class A emissions; Basic immunity
- EN 55011 (CISPR 11): Group 1, Class A emissions
- AS/NZS CISPR 11: Group 1, Class A emissions
- FCC 47 CFR Part 15B: Class A emissions
- ICES-001: Class A emissions

The NI cDAQ-9191 also meets the requirements of the following EMC standards for intentional radiators:

- EN 300 328
- EN 301 489-1 and EN 301 489-17
- FCC 47 CFR Part 15C
- IC RSS-210



Note In the United States (per FCC 47 CFR), Class A equipment is intended for use in commercial, light-industrial, and heavy-industrial locations. In Europe, Canada, Australia and New Zealand (per CISPR 11) Class A equipment is intended for use only in heavy-industrial locations.



Note Group 1 equipment (per CISPR 11) is any industrial, scientific, or medical equipment that does not intentionally generate radio frequency energy for the treatment of material or inspection/analysis purposes.



Note For EMC declarations and certifications, and additional information, refer to the Online Product Certification section.

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)
- 1999/5/EC; Radio and Telecommunications Terminal Equipment (R&TTE) Directive

Online Product Certification

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

NI 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 the product life cycle, all products *must* be sent to a WEEE recycling center. For more information about WEEE recycling centers, National Instruments WEEE initiatives, and compliance with WEEE Directive 2002/96/EC on Waste Electrical and Electronic Equipment, visit ni.com/environment/weee.htm.



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(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 When operated in temperatures below 0 °C, you must use the PS-15 power supply, or another power supply rated for below 0 °C.

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