cDAQ-MIO4300 Bundle

CompactDAQ Multifunction I/O Measurement Bundle

Datasheet and Specifications

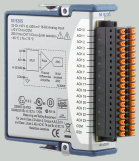
cDAQ 9174, NI-9205, NI-9263, and NI-9401

CompactDAQ Multifunction I/O Measurement Bundle

In-Box Components

cDAQ-MIO4300 Bundle
System P/N: 868015-01

cDAQ-9174


NI-9205

NI-9263

NI-9401

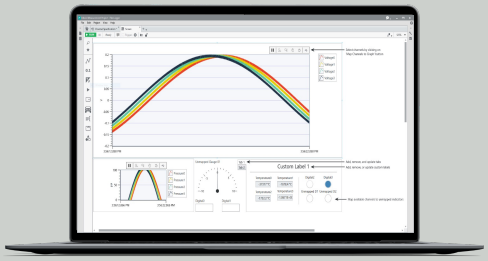
Included Accessories:

- cRIO-9940 Backshell
- NI-9981 Strain Relief Connector
- NI 9924 Terminal Block
- USB A to B Cable
- Desktop Mounting Kit
- AC/DC Power Supply*

*IEC Power Cord sold separately based on geographic region

Recommended Software

FlexLogger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No code software that accelerates measurement configuration and logging with NI DAQ Hardware.

- Acquire data and log test results to .tdms or .csv files
- Inline calculations for simple math, filtering, Boolean logic, and more
- Integrated TDMS Viewer for interactive data review

Table of Contents

This document combines the PDFs of this system together. The page numbers in the table of contents correspond to the page number of PDF the component's documentation begins.

cDAQ 9174 Specifications..... 3
NI-9205 Specifications..... 14
NI-9263 Specifications..... 29
NI-9401 Specifications..... 42

cDAQ-9174 Specifications

SPECIFICATIONS

NI cDAQ™-9174

NI CompactDAQ Four-Slot USB Chassis

These specifications are for the National Instruments CompactDAQ 9174 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

Maximum sample rate[1].....Determined by the C Series I/O module or modules

Timing accuracy[2].....50 ppm of sample rate

Timing resolution[3].....12.5 ns

Number of channels supported.....Determined by the C Series I/O module or modules

Analog Output

Number of channels supported

- Hardware-timed task
  - Onboard regeneration.....16
  - Non-regeneration.....Determined by the C Series I/O module or modules

[1] Performance dependent on type of installed C Series I/O module and number of channels in the task.

[2] Does not include group delay. For more information, refer to the documentation for each C Series I/O module.

[3] Does not include group delay. For more information, refer to the documentation for each C Series I/O module.

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Non-hardware-timed task.....Determined by the C Series I/O module or modules

Maximum update rate

Onboard regeneration.....1.6 MS/s (multi-channel, aggregate)

Non-regeneration.....Determined by the C Series I/O module or 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.....2,047 samples

Digital input sample clock frequency

Streaming to application.....System-dependent memory

Finite.....0 to 10 MHz

Digital output sample clock frequency

Streaming from application.....System-dependent memory

Regeneration from FIFO.....0 to 10 MHz

Finite.....0 to 10 MHz

Timing accuracy.....50 ppm

General-Purpose Counters/Timers

Number of counters/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 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 module PFI, analog trigger, many internal signals
FIFO	Dedicated 127-sample FIFO

Frequency Generator

Number of channels	1
Base clocks	20 MHz, 10 MHz, 100 kHz
Divisors	1 to 16 (integers)
Base clock accuracy	50 ppm
Output	Any module PFI terminal

Module PFI Characteristics

Functionality.....Static digital input, static digital output, timing input, and timing output

Timing output sources[4].....Many analog input, analog output, counter, digital input, and digital output timing signals

Timing input frequency.....0 to 20 MHz

Timing output frequency.....0 to 20 MHz

Digital Triggers

Source.....Any 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 function.....Gate, Source, HW_Arm, Aux, A, B, Z, Up_Down

Module I/O States

At power-on.....Module-dependent. Refer to the documentation for each C Series I/O module.

Note The chassis may revert the input/output of the modules to their power-on state when the USB cable is removed.

[4] Actual signals available dependent on type of installed C Series I/O module.

Power Requirements

Caution You must use a National Electric Code (NEC) Class 2 power source with the NI cDAQ-9174 chassis.

Note Some C Series I/O modules have additional power requirements. For more information about C Series I/O module power requirements, refer to the documentation for each C Series I/O module.

Note Sleep mode for C Series I/O modules is not supported in the NI cDAQ-9174.

Input voltage range.....9 to 30 V

Maximum required input power[5].....15 W

Power input connector.....2 positions 3.5 mm pitch pluggable screw terminal with screw locks similar to Sauro CTMH020F8-0N001

Power input mating connector.....Sauro CTF020V8, Phoenix Contact 1714977, or equivalent

Power consumption from USB, 4.10 to 5.25 V.....500 µA maximum

Bus Interface

USB specification.....USB 2.0 Hi-Speed

High-performance data streams.....7

Data stream types available.....Analog input, analog output, digital input, digital output, counter/timer input, counter/timer output, NI-XNET[6]

Note If you are connecting the NI cDAQ-9174 chassis to a USB hub, the hub must be externally powered.

[5] Includes maximum 1 W module load per slot across rated temperature and product variations.

[6] When a session is active, CAN or LIN (NI-XNET) C Series modules use a total of two data streams regardless of the number of NI-XNET modules in the chassis.

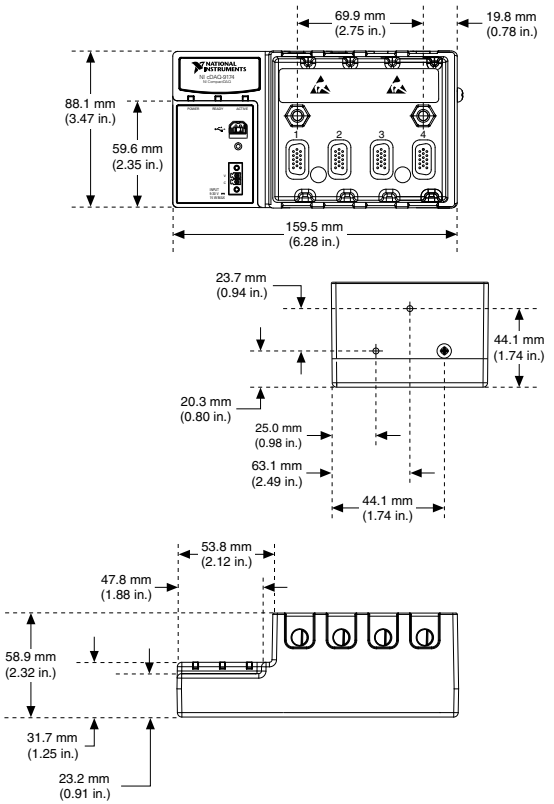
Physical Characteristics

Weight (unloaded).....Approx. 574 g (20.2 oz)

Dimensions (unloaded).....159.5 mm × 88.1 mm × 58.9 mm (6.28 in. × 3.47 in. × 2.3 in.) Refer to the following figure.

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

Figure 1. NI cDAQ-9174 Dimensions



Environmental

Operating temperature[7] ..... -20 °C to 55 °C (IEC-60068-2-1 and IEC-60068-2-2)

Storage temperature ..... -40 °C to 85 °C (IEC-600068-2-1 and IEC-60068-2-2)

Ingress protection ..... IP 30

Operating humidity ..... 10 to 90% RH, noncondensing (IEC-60068-2-56)

Storage humidity ..... 5 to 95% RH, noncondensing (IEC-60068-2-56)

Pollution Degree (IEC 60664) 2

Maximum altitude ..... 5,000 m

Indoor use only.

Shock and Vibration

To meet these specifications, you must panel mount the NI cDAQ-9174 system, use an NI locking USB cable, 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.)

[7] When operating the NI cDAQ-9174 in temperatures below 0 °C, you must use the PS-15 power supply or another power supply rated for below 0 °C.

Safety

This product meets 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

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, refer to the *Online Product Certification* section.

CE Compliance

This product meets the essential requirements of applicable European Directives as follows:

- 2006/95/EC; Low-Voltage Directive (safety)
- 2004/108/EC; Electromagnetic Compatibility Directive (EMC)

Online Product Certification

To obtain product certifications and the DoC for this product, visit *ni.com/certification*, search by model 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 *Minimize Our Environmental Impact* 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*.

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.)

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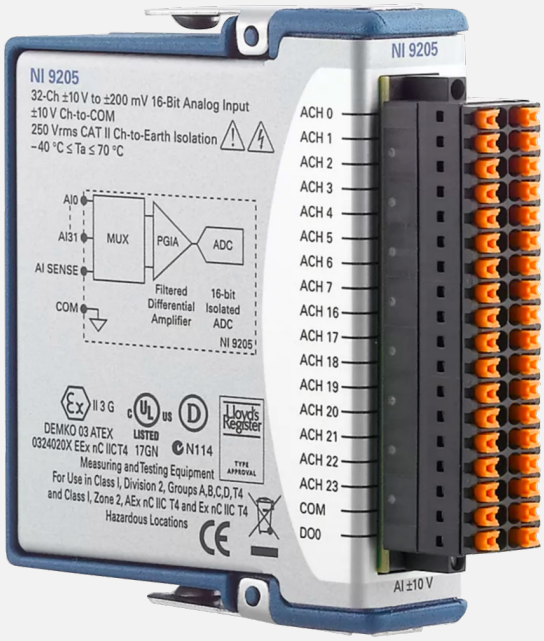
NI-9205 DataSheet



DATASHEET

NI 9205

16 AI Differential/32 AI Single-Ended, ±200 mV to ±10 V, 16 Bit, 250 kS/s Aggregate

- DSUB or push-in spring terminal connectivity
- 250 V RMS, CAT II, channel-to-earth isolation (spring terminal); 60 V DC, CAT I, channel-to-earth isolation (DSUB)

The NI 9205 is a C Series module for use with any CompactDAQ or CompactRIO system. Each channel has programmable input ranges of ±200 mV, ±1 V, ±5 V, and ±10 V. To protect against signal transients, the NI 9205 includes ±30 V of overvoltage protection between input channels and common (COM). In addition, the NI 9205 also includes a channel-to-earth-ground isolation barrier for safety, noise immunity, and high common-mode voltage range.

Kit Contents	• NI 9205 • NI 9205 Getting Started Guide
Accessories	**Spring-Terminal** • NI 9940 Backshell Kit (785080-01)
	DSUB Front-Mount • NI 9923 Screw-Terminal Block (781503-01) Cable • DSUB Cable, 1 m (778621-01) • 37-Pin DSUB to Screw-Terminal Block with Horizontal DIN-Rail Mount (778673-01)

NATIONAL INSTRUMENTS

NI C Series Overview

NI provides more than 100 C Series modules for measurement, control, and communication applications. C Series modules can connect to any sensor or bus and allow for high-accuracy measurements that meet the demands of advanced data acquisition and control applications.

- Measurement-specific signal conditioning that connects to an array of sensors and signals
- Isolation options such as bank-to-bank, channel-to-channel, and channel-to-earth ground
- -40 °C to 70 °C temperature range to meet a variety of application and environmental needs
- Hot-swappable

The majority of C Series modules are supported in both CompactRIO and CompactDAQ platforms and you can move modules from one platform to the other with no modification.

CompactRIO

CompactRIO combines an open-embedded architecture with small size, extreme ruggedness, and C Series modules in a platform powered by the NI LabVIEW reconfigurable I/O (RIO) architecture. Each system contains an FPGA for custom timing, triggering, and processing with a wide array of available modular I/O to meet any embedded application requirement.

CompactDAQ

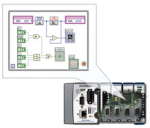
CompactDAQ is a portable, rugged data acquisition platform that integrates connectivity, data acquisition, and signal conditioning into modular I/O for directly interfacing to any sensor or signal. Using CompactDAQ with LabVIEW, you can easily customize how you acquire, analyze, visualize, and manage your measurement data.

Software

LabVIEW Professional Development System for Windows

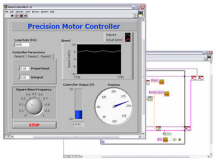
- Use advanced software tools for large project development
- Generate code automatically using DAQ Assistant and Instrument I/O Assistant
- Use advanced measurement analysis and digital signal processing
- Take advantage of open connectivity with DLLs, ActiveX, and .NET objects
- Build DLLs, executables, and MSI installers

NI LabVIEW FPGA Module



- Design FPGA applications for NI RIO hardware
- Program with the same graphical environment used for desktop and real-time applications
- Execute control algorithms with loop rates up to 300 MHz
- Implement custom timing and triggering logic, digital protocols, and DSP algorithms
- Incorporate existing HDL code and third-party IP including Xilinx IP generator functions
- Purchase as part of the LabVIEW Embedded Control and Monitoring Suite

NI LabVIEW Real-Time Module

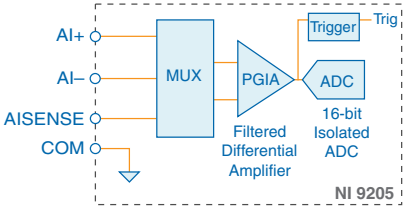


- Design deterministic real-time applications with LabVIEW graphical programming
- Download to dedicated NI or third-party hardware for reliable execution and a wide selection of I/O
- Take advantage of built-in PID control, signal processing, and analysis functions
- Automatically take advantage of multicore CPUs or set processor affinity manually
- Take advantage of real-time OS, development and debugging support, and board support
- Purchase individually or as part of a LabVIEW suite

Input Circuitry

The NI 9205 channels share a common ground (COM) that is isolated from other modules in the system. All channels share a programmable gain instrumentation amplifier and are multiplexed to an ADC. Each channel also has ±30 V overvoltage protection.

Figure 1. Input Circuitry for One Analog Input Channel on the NI 9205



NI 9205 Specifications

The following specifications are typical for the range -40 °C to 70 °C unless otherwise noted. All voltages are relative to COM unless otherwise noted.

Caution Do not operate the NI 9205 in a manner not specified in this document. Product misuse can result in a hazard. You can compromise the safety protection built into the product if the product is damaged in any way. If the product is damaged, return it to NI for repair.

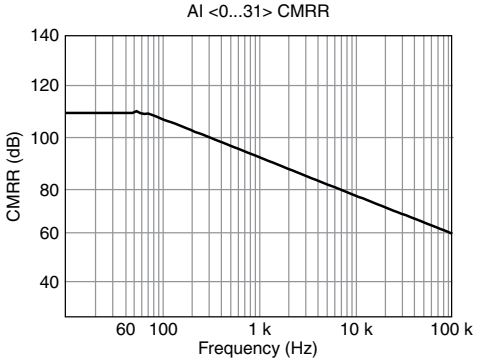
MTBF	775,832 hours at 25 °C; Bellcore Issue 6, Method 1, Case 3, Limited Part Stress Method

Analog Input Characteristics

Number of channels	16 differential/32 single-ended channels
ADC resolution	16 bits
DNL	No missing codes guaranteed
Conversion time (maximum sampling rate)	
CompactRIO & CompactDAQ chassis	4.00 µs (250 kS/s)
R Series Expansion chassis	4.50 µs (222 kS/s)
Input coupling	DC
Nominal input ranges	±10 V, ±5 V, ±1 V, ±0.2 V
Minimum overrange, ±10 V range	4%
Maximum working voltage for analog inputs (signal + common mode)	Each channel must remain within ±10.4 V of COM
Input impedance (AI-to-COM)	
Powered on	>10 GΩ in parallel with 100 pF
Powered off/overload	4.7 kΩ minimum
Input bias current	±100 pA

Crosstalk, at 100 kHz	
Adjacent channels	-65 dB
Non-adjacent channels	-70 dB
Analog bandwidth	370 kHz
Overvoltage protection	
AI channel, 0 to 31	±30 V, one channel only
AISENSE	±30 V
Settling time for multichannel measurements, accuracy, all ranges	
±120 ppm of full-scale step, ±8 LSB	4 µs convert interval
±30 ppm of full-scale step, ±2 LSB	8 µs convert interval
Analog triggers	
Number of triggers	1
Resolution	10 bits, 1 in 1,024
Bandwidth, -3 dB	370 kHz
Accuracy	±1% of full scale
Scaling coefficients	
±10 V range	328 µV/LSB
±5 V range	164.2 µV/LSB
±1 V range	32.8 µV/LSB
±0.2 V range	6.57 µV/LSB
CMRR, DC to 60 Hz	100 dB

Figure 2. CMRR, AI+ to AI-



Analog Input Absolute Accuracy

The following values are based on calibrated scaling coefficients, which are stored in the onboard EEPROM.

Table 1. Absolute accuracy

Range	Accuracy at Full Scale[1]	Random Noise[2], σ	Sensitivity[3]
±10 V	6,230 µV	237 µV RMS	96.0 µV
±5 V	3,230 µV	121 µV RMS	46.4 µV
±1 V	692 µV	29 µV RMS	10.4 µV
±0.2 V	175 µV	15 µV RMS	4.0 µV

Residual gain error	
±10 V range	115 ppm of reading
±5 V range	135 ppm of reading
±1 V range	155 ppm of reading
±0.2 V range	215 ppm of reading
Gain tempco	11 ppm/°C
Reference tempco	5
Residual offset error	
±10 V range	20 ppm of range
±5 V range	20 ppm of range
±1 V range	25 ppm of range
±0.2 V range	40 ppm of range
Offset tempco	
±10 V range	44 ppm of range/°C
±5 V range	47 ppm of range/°C
±1 V range	66 ppm of range/°C
±0.2 V range	162 ppm of range/°C
INL error	76 ppm of range

[1] Absolute accuracy values at full scale on the analog input channels assume the device is operating within 70 °C of the last external calibration and are valid for averaging 100 samples immediately following self-calibration.

[2] Differential mode

[3] Sensitivity is a function of noise and indicates the smallest voltage change that can be detected.

Analog Input Accuracy Formulas

Absolute Accuracy = *Reading* * *Gain Error* + *Range* * *Offset Error* + *Noise Uncertainty*

where

Gain Error = *Residual Gain Error* + *Gain Tempco* * *Temp Change from Last Internal Cal* + *Reference Tempco* * *Temp Change from Last External Cal*

Offset Error = *Residual Offset Error* + *Offset Tempco* * *Temp Change from Last Internal Cal* + *INL Error*

Noise Uncertainty = (*Random Noise* * 3) / √100 for a coverage factor of 3 σ and averaging 100 points

Absolute accuracy at full scale on the analog input channels is determined using the following assumptions:

Temp Change from Last External Cal = 70 °C

Temp Change from Last Internal Cal = 1 °C

Number of Readings = 100

Coverage Factor = 3 σ

For example, on the ±10 V range, the absolute accuracy at full scale is as follows:

Gain Error = 115 ppm + 11 ppm * 1 + 5 ppm * 70

Gain Error = 476 ppm

Offset Error = 20 ppm + 44 ppm * 1 + 76 ppm

Offset Error = 140 ppm

Noise Uncertainty = (237 µV * 3) / √100

Noise Uncertainty = 72 µV

Absolute Accuracy = 10 V * 476 ppm + 10 V * 140 ppm + 72 µV

Absolute Accuracy = 6,231 µV, rounds to 6,230 µV

Digital Characteristics

Number of channels	1 digital input channel, 1 digital output channel
Overvoltage protection	±30 V
Digital logic levels	
Input high, V_{IH}	
Minimum	2.0 V
Maximum	3.3 V

[4] The digital input and digital output channel are supported only in FPGA Interface mode in software.

Input low, V_{IL}	
Minimum	0 V
Maximum	0.34 V
Output high, V_{OH}, sourcing 75 µA	
Minimum	2.1 V
Maximum	3.3 V
Output low, V_{OH}, sinking 250 µA	
Minimum	0 V
Maximum	0.4 V
External digital triggers	
Source	PFI0
Delay	100 ns maximum

Power Requirements

Power consumption from chassis	
Active mode	625 mW maximum
Sleep mode	15 mW
Thermal dissipation (at 70 °C)	
Active mode	625 mW maximum
Sleep mode	15 mW

Physical Characteristics

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

Tip For two-dimensional drawings and three-dimensional models of the C Series module and connectors, visit *ni.com/dimensions* and search by module number.

Spring terminal wiring	
Gauge	0.13 mm^2 to 1.5 mm^2 (26 AWG to 16 AWG) copper conductor wire
Wire strip length	10 mm (0.394 in.) of insulation stripped from the end
Temperature rating	90 °C, minimum
Wires per spring terminal	One wire per spring terminal; two wires per spring terminal using a 2-wire ferrule
Ferrules	0.14 mm^2 to 1.5 mm^2

Connector securement	
Securement type	Screw flanges provided
Torque for screw flanges	0.2 N · m (1.80 lb · in.)
Weight	
NI 9205 with spring terminal	163 g (5.7 oz)
NI 9205 with DSUB	148 g (5.3 oz)

Safety Voltages

Connect only voltages that are within the following limits:

Maximum voltage[5]	
Channel-to-COM	±30 V DC

NI 9205 with Spring Terminal Isolation Voltages

Channel-to-channel	None
Channel-to-earth ground	
Continuous	250 V RMS, Measurement Category II
Withstand up to 5,000 m	3,000 V RMS, verified by a 5 s dielectric withstand test

Measurement Category II is for measurements performed on circuits directly connected to the electrical distribution system. This category refers to local-level electrical distribution, such as that provided by a standard wall outlet, for example, 115 V for U.S. or 230 V for Europe.

Caution Do not connect the NI 9205 with spring terminal to signals or use for measurements within Measurement Categories III or IV.

NI 9205 with DSUB Isolation Voltages

Channel-to-channel	None
Channel-to-earth ground	
Continuous	60 V DC, Measurement Category I
Withstand	
up to 2,000 m	1,000 V RMS, verified by a 5 s dielectric withstand test
up to 5,000 m	500 V RMS

[5] The maximum voltage that can be applied or output between AI and COM without creating a safety hazard.

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 NI 9205 with DSUB to signals or use for measurements within Measurement Categories II, III, or IV.

Note Measurement Categories CAT I and CAT O are equivalent. These test and measurement circuits are for other circuits not intended for direct connection to the MAINS building installations of Measurement Categories CAT II, CAT III, or CAT IV.

Hazardous Locations

U.S. (UL)	Class I, Division 2, Groups A, B, C, D, T4; Class I, Zone 2, AEx nA IIC T4 Gc
Canada (C-UL)	Class I, Division 2, Groups A, B, C, D, T4; Ex nA IIC T4 Gc
Europe (ATEX) and International (IECEx)	Ex nA IIC T4 Gc

Safety and Hazardous Locations Standards

This product is designed to meet the requirements of the following electrical equipment safety standards for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 61010-1, CSA C22.2 No. 61010-1
- EN 60079-0:2012, EN 60079-15:2010
- IEC 60079-0: Ed 6, IEC 60079-15; Ed 4
- UL 60079-0; Ed 6, UL 60079-15; Ed 4
- CSA C22.2 No. 60079-0, CSA C22.2 No. 60079-15

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; Industrial immunity
- EN 55011 (CISPR 11): Group 1, Class A emissions
- EN 55022 (CISPR 22): Class A emissions
- EN 55024 (CISPR 24): Immunity

- AS/NZS CISPR 11: Group 1, Class A emissions
- AS/NZS CISPR 22: Class A emissions
- FCC 47 CFR Part 15B: Class A emissions
- ICES-001: Class A emissions

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 CE

This product meets the essential requirements of applicable European Directives, as follows:

- 2014/35/EU; Low-Voltage Directive (safety)
- 2014/30/EU; Electromagnetic Compatibility Directive (EMC)
- 2014/34/EU; Potentially Explosive Atmospheres (ATEX)

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 model number or product line, and click the appropriate link in the Certification column.

Shock and Vibration

To meet these specifications, you must panel mount the system.

Operating vibration	
Random (IEC 60068-2-64)	5 g_{rms}, 10 Hz to 500 Hz
Sinusoidal (IEC 60068-2-6)	5 g, 10 Hz to 500 Hz
Operating shock (IEC 60068-2-27)	30 g, 11 ms half sine; 50 g, 3 ms half sine; 18 shocks at 6 orientations

Environmental

Refer to the manual for the chassis you are using for more information about meeting these specifications.

Operating temperature (IEC 60068-2-1, IEC 60068-2-2)	-40 °C to 70 °C
Storage temperature (IEC 60068-2-1, IEC 60068-2-2)	-40 °C to 85 °C
Ingress protection	IP40
Operating humidity (IEC 60068-2-78)	10% RH to 90% RH, noncondensing
Storage humidity (IEC 60068-2-78)	5% RH to 95% RH, noncondensing
Pollution Degree	2
Maximum altitude	5,000 m

Indoor use only.

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 to the environment and to NI customers.

For additional environmental information, refer to the *Minimize Our Environmental Impact* 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 NI products must be disposed of according to local laws and regulations. For more information about how to recycle NI products in your region, visit *ni.com/environment/weee*.

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`.)

Calibration

You can obtain the calibration certificate and information about calibration services for the NI 9205 at *ni.com/calibration*.

Calibration interval	2 years

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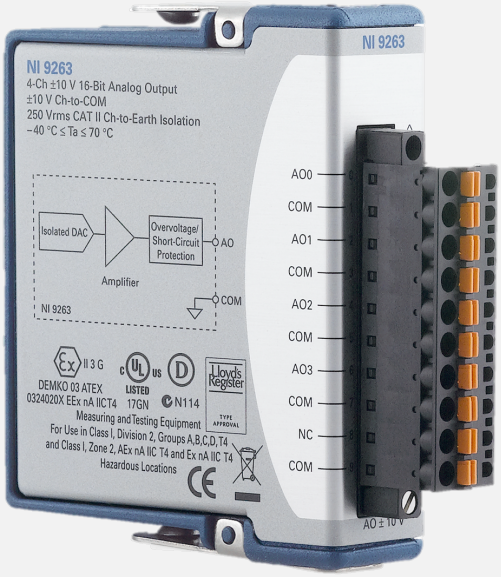
378020A-02 July 4, 2017

NI-9263 DataSheet



DATASHEET

NI 9263

4 AO, ±10 V, 16 Bit, 100 kS/s/ch Simultaneous

- Screw-terminal or spring-terminal connectivity
- 250 Vrms, CAT II, channel-to-earth isolation

The NI 9263 is an analog output module for any CompactDAQ and CompactRIO systems. It also features ±30 V overvoltage protection, short-circuit protection, low crosstalk, fast slew rate, high relative accuracy, and NIST-traceable calibration. The NI 9263 module includes a channel-to-earth ground double isolation barrier for safety and noise immunity.

Kit Contents	• NI 9263 • NI 9263 Getting Started Guide
Accessories	• NI 9927 backshell connector kit (screw terminal) • NI 9981 backshell connector kit (spring terminal)

NATIONAL INSTRUMENTS

C SERIES ANALOG OUTPUT MODULE COMPARISON							
Product Name	Module Type	Signal Ranges	Channels	Sample Rate	Simultaneous	Resolution	Connectivity
NI 9260	Voltage Output	3 Vrms	2	51.2 kS/s/ch	Yes	24-Bit	BNC, mini XLR
NI 9263	Voltage Output	±10 V	4	100 kS/s/ch	Yes	16-Bit	Screw-Terminal, Spring-Terminal
NI 9264	Voltage Output	±10 V	16	25 kS/s/ch	Yes	16-Bit	Spring-Terminal, 37-Pin DSUB
NI 9265	Current Output	0 mA to 20 mA	4	100 kS/s/ch	Yes	16-Bit	Screw-Terminal
NI 9269	Voltage Output	±10 V	4	100 kS/s/ch	Yes	16-Bit	Screw-Terminal

NI C Series Overview

NI provides more than 100 C Series modules for measurement, control, and communication applications. C Series modules can connect to any sensor or bus and allow for high-accuracy measurements that meet the demands of advanced data acquisition and control applications.

- Measurement-specific signal conditioning that connects to an array of sensors and signals
- Isolation options such as bank-to-bank, channel-to-channel, and channel-to-earth ground
- -40 °C to 70 °C temperature range to meet a variety of application and environmental needs
- Hot-swappable

The majority of C Series modules are supported in both CompactRIO and CompactDAQ platforms and you can move modules from one platform to the other with no modification.

CompactRIO

CompactRIO combines an open-embedded architecture with small size, extreme ruggedness, and C Series modules in a platform powered by the NI LabVIEW reconfigurable I/O (RIO) architecture. Each system contains an FPGA for custom timing, triggering, and processing with a wide array of available modular I/O to meet any embedded application requirement.

CompactDAQ

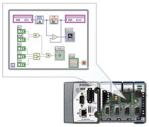
CompactDAQ is a portable, rugged data acquisition platform that integrates connectivity, data acquisition, and signal conditioning into modular I/O for directly interfacing to any sensor or signal. Using CompactDAQ with LabVIEW, you can easily customize how you acquire, analyze, visualize, and manage your measurement data.

Software

LabVIEW Professional Development System for Windows

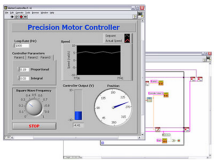
- Use advanced software tools for large project development
- Generate code automatically using DAQ Assistant and Instrument I/O Assistant
- Use advanced measurement analysis and digital signal processing
- Take advantage of open connectivity with DLLs, ActiveX, and .NET objects
- Build DLLs, executables, and MSI installers

NI LabVIEW FPGA Module



- Design FPGA applications for NI RIO hardware
- Program with the same graphical environment used for desktop and real-time applications
- Execute control algorithms with loop rates up to 300 MHz
- Implement custom timing and triggering logic, digital protocols, and DSP algorithms
- Incorporate existing HDL code and third-party IP including Xilinx IP generator functions
- Purchase as part of the LabVIEW Embedded Control and Monitoring Suite

NI LabVIEW Real-Time Module

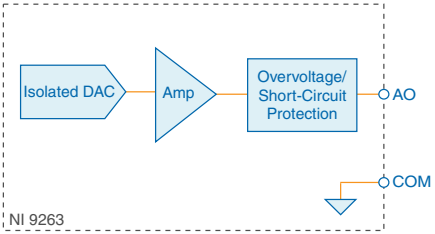


- Design deterministic real-time applications with LabVIEW graphical programming
- Download to dedicated NI or third-party hardware for reliable execution and a wide selection of I/O
- Take advantage of built-in PID control, signal processing, and analysis functions
- Automatically take advantage of multicore CPUs or set processor affinity manually
- Take advantage of real-time OS, development and debugging support, and board support
- Purchase individually or as part of a LabVIEW suite

Circuitry

Each channel has a digital-to-analog converter (DAC) that produces a voltage signal. Each channel also has overvoltage and short-circuit protection.

Figure 1. Output Circuitry for One Channel of the NI 9263



NI 9263 Specifications

The following specifications are typical for the range -40 °C to 70 °C unless otherwise noted. All voltages are relative to COM unless otherwise noted.

Caution Do not operate the NI 9263 in a manner not specified in this document. Product misuse can result in a hazard. You can compromise the safety protection built into the product if the product is damaged in any way. If the product is damaged, return it to NI for repair.

Output Characteristics

Number of channels	4 analog output channels
DAC resolution	16 bits

Type of DAC	String
Power-on output state	Channels off
Startup voltage[1]	0 V
Power-down voltage[2]	0 V
Output voltage range	
Nominal	±10 V
Minimum	±10.4 V
Typical	±10.7 V
Maximum	±11 V
Current drive	±1 mA per channel maximum
Output impedance	2 Ω

Table 1. Accuracy

Measurement Conditions		Percent of Reading (Gain Error)	Percent of Range[3] (Offset Error)
Calibrated	Maximum (-40 °C to 70 °C)	0.35%	0.75%
	Typical (25 °C, ±5 °C)	0.03%	0.1%
Uncalibrated[4]	Maximum (-40 °C to 70 °C)	2.2%	1.7%
	Typical (25 °C, ±5 °C)	0.3%	0.25%

Stability	
Gain drift	11 ppm/°C
Offset drift	110 µV/°C
Protection	
Overvoltage	±30 V
Short-circuit	Indefinitely

1 When the module powers on, a glitch occurs for 20 µs peaking at -1.5 V.

2 The power-down voltage peaks at 1.8 V before exponentially discharging to 0 V in 100 µs. You can add a 10 kΩ load to reduce the peak voltage.

3 Range equals ±10.7 V

4 Uncalibrated accuracy refers to the accuracy achieved when acquiring in raw or unscaled modes where the calibration constants stored in the module are not applied to the data.

Table 2. Update Time

Number of Channels	Update Time for All Other Chassis	Update Time for NI cRIO-9151 R Series Expansion Chassis
1	3 µs min	3.5 µs min
2	5 µs min	6.5 µs min
3	7.5 µs min	9 µs min
4	9.5 µs min	12 µs min

Noise	
Updating at 100 kS/s	600 µVrms
Not updating	260 µVrms
Slew rate	4 V/µs
Crosstalk	76 dB
Settling time (100 pF load, to 1 LSB)	
Full-scale step	20 µs
1 V step	13 µs
0.1 V step	10 µs
Capacitive drive	1,500 pF minimum
Monotonicity	16 bits
DNL	±1 LSB maximum
INL (endpoint)	±12 LSB maximum
MTBF	1,732,619 hours at 25 °C; Bellcore Issue 2, Method 1, Case 3, Limited Part Stress Method

Power Requirements

Power consumption from chassis	
Active mode (at -40 °C)	500 mW maximum
Sleep mode	25 µW maximum
Thermal dissipation (at 70 °C)	
Active mode	750 mW maximum
Sleep mode	25 µW maximum

Physical Characteristics

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

Tip For two-dimensional drawings and three-dimensional models of the C Series module and connectors, visit *ni.com/dimensions* and search by module number.

Screw-terminal wiring	
Gauge	0.2 mm^2 to 2.5 mm^2 (26 AWG to 14 AWG) copper conductor wire
Wire strip length	13 mm (0.51 in.) of insulation stripped from the end
Temperature rating	90 °C minimum
Torque for screw terminals	0.5 N · m to 0.6 N · m (4.4 lb · in. to 5.3 lb · in.)
Wires per screw terminal	One wire per screw terminal; two wires per screw terminal using a 2-wire ferrule
Ferrules	0.25 mm^2 to 2.5 mm^2
Spring-terminal wiring	
Gauge	0.2 mm^2 to 2.5 mm^2 (30 AWG to 12 AWG) copper conductor wire
Wire strip length	10 mm (0.39 in.) of insulation stripped from the end
Temperature rating	90 °C minimum
Wires per spring terminal	One wire per spring terminal; two wires per spring terminal using a 2-wire ferrule
Ferrules	0.25 mm^2 to 2.5 mm^2
Connector securement	
Securement type	Screw flanges provided
Torque for screw flanges	0.2 N · m (1.80 lb · in.)
Weight	
NI 9263 with screw terminal	150 g (5.3 oz)
NI 9263 with spring terminal	139 g (4.9 oz)

Safety Voltages

Connect only voltages that are within the following limits:

Channel-to-channel	None
Channel-to-earth ground	
Continuous	250 Vrms, Measurement Category II
Withstand	2,300 Vrms, verified by a 5 s dielectric withstand test
Division 2 and Zone 2 hazardous locations applications (Channel-to-earth ground)	60 VDC, Measurement Category I

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 NI 9263 to signals or use for measurements within Measurement Categories II, III, or IV.

Note Measurement Categories CAT I and CAT O are equivalent. These test and measurement circuits are not intended for direct connection to the MAINS building installations of Measurement Categories CAT II, CAT III, or CAT IV.

Measurement Category II is for measurements performed on circuits directly connected to the electrical distribution system. This category refers to local-level electrical distribution, such as that provided by a standard wall outlet, for example, 115 V for U.S. or 230 V for Europe.

Caution Do not connect the NI 9263 to signals or use for measurements within Measurement Categories III or IV.

Hazardous Locations

U.S. (UL)	Class I, Division 2, Groups A, B, C, D, T4; Class I, Zone 2, AEx nA IIC T4
Canada (C-UL)	Class I, Division 2, Groups A, B, C, D, T4; Class I, Zone 2, Ex nA IIC T4
Europe (ATEX) and International (IECEx)	Ex nA IIC T4 Gc

Safety and Hazardous Locations Standards

This product is designed to meet the requirements of the following electrical equipment safety standards for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 61010-1, CSA 61010-1
- EN 60079-0:2012, EN 60079-15:2010
- IEC 60079-0: Ed 6, IEC 60079-15; Ed 4
- UL 60079-0; Ed 5, UL 60079-15; Ed 3
- CSA 60079-0:2011, CSA 60079-15:2012

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 sensitive electrical equipment for measurement, control, and laboratory use:

- EN 61326 (IEC 61326): Class A emissions; Industrial 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

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 CE

This product meets the essential requirements of applicable European Directives, as follows:

- 2014/35/EU; Low-Voltage Directive (safety)
- 2014/30/EU; Electromagnetic Compatibility Directive (EMC)
- 94/9/EC; Potentially Explosive Atmospheres (ATEX)

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 model number or product line, and click the appropriate link in the Certification column.

Shock and Vibration

To meet these specifications, you must panel mount the system.

Operating vibration	
Random (IEC 60068-2-64)	5 g_{rms}, 10 Hz to 500 Hz
Sinusoidal (IEC 60068-2-6)	5 g, 10 Hz to 500 Hz
Operating shock (IEC 60068-2-27)	30 g, 11 ms half sine; 50 g, 3 ms half sine; 18 shocks at 6 orientations

Environmental

Refer to the manual for the chassis you are using for more information about meeting these specifications.

Operating temperature (IEC 60068-2-1, IEC 60068-2-2)	-40 °C to 70 °C
Storage temperature (IEC 60068-2-1, IEC 60068-2-2)	-40 °C to 85 °C
Ingress protection	IP40
Operating humidity (IEC 60068-2-78)	10% RH to 90% RH, noncondensing
Storage humidity (IEC 60068-2-78)	5% RH to 95% RH, noncondensing
Pollution Degree	2
Maximum altitude	2,000 m

Indoor use only.

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 to the environment and to NI customers.

For additional environmental information, refer to the *Minimize Our Environmental Impact* 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 NI products must be disposed of according to local laws and regulations. For more information about how to recycle NI products in your region, visit *ni.com/environment/weee*.

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`.)

Calibration

You can obtain the calibration certificate and information about calibration services for the NI 9263 at *ni.com/calibration*.

Calibration interval	1 year

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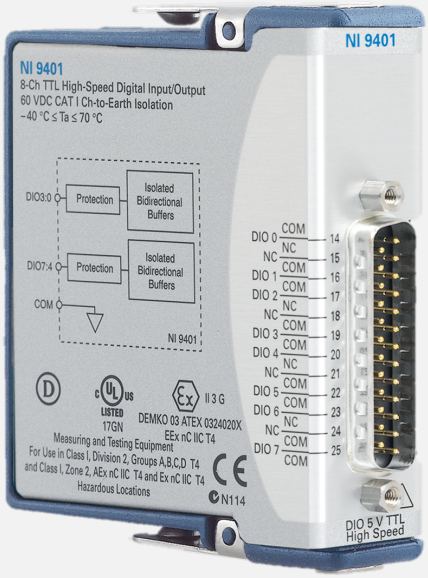
NI-9401 DataSheet



DATASHEET

NI 9401

8 DIO, 5 V/TTL, Bidirectional, 100 ns

- DSUB connectivity
- CompactDAQ counter compatibility
- 60 VDC, CAT I, channel-to-earth isolation

The NI 9401 is a bidirectional digital module for any NI CompactDAQ or CompactRIO chassis. The eight DIO channels are grouped in two ports that you can configure independently for input or output. You can use the NI 9401 to implement custom digital systems such as counters/timers, digital communication protocols, pulse generation, and beyond.

Kit Contents	• NI 9401 • NI 9401 Getting Started Guide
Accessories	**Front-Mount** • NI 9924 Screw-Terminal Block (781922-01)
	Cable • DSUB Cable, 1 m (192568-01) • DIN Rail Screw-Terminal Block (781081-01)
	EMC Compliance • EMI Noise-Suppression Ferrite (782803-01)

C SERIES DIGITAL INPUT/OUTPUT MODULE COMPARISON						
Product Name	Signal Levels	Channels	Update Rate	Direction	Connectivity	Isolation Continuous
NI 9381	LVTTL	4	1 µs	Bidirectional	DSUB	None
NI 9401	5 V/TTL	8	100 ns	Bidirectional	DSUB	60 VDC Ch-Earth
NI 9402	LVTTL	4	55 ns	Bidirectional	BNC	None
NI 9403	5 V/TTL	32	7 µs	Bidirectional	DSUB	60 VDC Ch-Earth

NI C Series Overview

NI provides more than 100 C Series modules for measurement, control, and communication applications. C Series modules can connect to any sensor or bus and allow for high-accuracy measurements that meet the demands of advanced data acquisition and control applications.

- Measurement-specific signal conditioning that connects to an array of sensors and signals
- Isolation options such as bank-to-bank, channel-to-channel, and channel-to-earth ground
- -40 °C to 70 °C temperature range to meet a variety of application and environmental needs
- Hot-swappable

The majority of C Series modules are supported in both CompactRIO and CompactDAQ platforms and you can move modules from one platform to the other with no modification.

CompactRIO

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Software

LabVIEW Professional Development System for Windows

- Use advanced software tools for large project development
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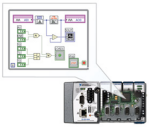
- Build DLLs, executables, and MSI installers

NI LabVIEW FPGA Module



- Design FPGA applications for NI RIO hardware
- Program with the same graphical environment used for desktop and real-time applications
- Execute control algorithms with loop rates up to 300 MHz
- Implement custom timing and triggering logic, digital protocols, and DSP algorithms
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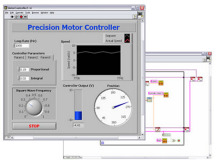
- Purchase as part of the LabVIEW Embedded Control and Monitoring Suite

NI LabVIEW Real-Time Module

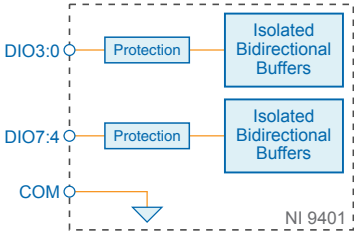


- Design deterministic real-time applications with LabVIEW graphical programming
- Download to dedicated NI or third-party hardware for reliable execution and a wide selection of I/O
- Take advantage of built-in PID control, signal processing, and analysis functions
- Automatically take advantage of multicore CPUs or set processor affinity manually
- Take advantage of real-time OS, development and debugging support, and board support
- Purchase individually or as part of a LabVIEW suite

Input/Output Circuitry

The eight DIO channels are internally referenced to COM, so you can use any of the nine COM lines as a reference for the external signal.

Figure 1. NI 9401 Input/Output Circuitry



NI 9401 Specifications

The following specifications are typical for the range -40 °C to 70 °C unless otherwise noted. All voltages are relative to COM unless otherwise noted.

Caution Do not operate the NI 9401 in a manner not specified in this document. Product misuse can result in a hazard. You can compromise the safety protection built into the product if the product is damaged in any way. If the product is damaged, return it to NI for repair.

Input/Output Characteristics

Number of channels	8 DIO channels
Default power-on line direction	Input

Input/output type	TTL, single-ended
Digital logic levels	
Input	
Voltage	5.25 V maximum
High, V_{IH}	2 V minimum
Low, V_{IL}	0.8 V maximum
Output High, V_{OH} (5.25 V maximum)	
Sourcing 100 µA	4.7 V minimum
Sourcing 2 mA	4.3 V minimum
Output Low, V_{OL}	
Sinking 100 µA	0.1 V maximum
Sinking 2 mA	0.4 V maximum
Maximum signal switching frequency, per channel	
Input	
8 input channels	9 MHz
4 input channels	16 MHz
2 input channels	30 MHz
Output[1]	
8 output channels	5 MHz
4 output channels	10 MHz
2 output channels	20 MHz
I/O propagation delay	100 ns maximum
I/O pulse width distortion	10 ns
Input current ($0 V \le V_{IN} \le 4.5 V$)	±250 µA
Input capacitance	30 pF
Input rise/fall time	500 ns maximum
Overvoltage protection, channel-to-COM[2]	±30 V maximum on one channel at a time
MTBF	1,244,763 hours at 25 °C; Bellcore Issue 2, Method 1, Case 3, Limited Part Stress Method

[1] By number of output channels with an output load of 1 mA, 50 pF

[2] Continued use at this level will degrade the life of the module.

Power Requirements

Power consumption from chassis	
Active mode	580 mW maximum
Sleep mode	1 mW maximum
Thermal dissipation (at 70 °C)	
Active mode	580 mW maximum
Sleep mode	1 mW maximum

Physical Characteristics

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

Tip For two-dimensional drawings and three-dimensional models of the C Series module and connectors, visit *ni.com/dimensions* and search by module number.

Weight	145 g (5.1 oz)

Safety Voltages

Connect only voltages that are within the following limits:

Maximum voltage[3]	
Channel-to-COM	±30 V maximum on one channel at a time, Measurement Category I
Isolation voltages	
Channel-to-channel	None
Channel-to-earth ground	
Continuous	60 VDC, Measurement Category I
Withstand	1,000 Vrms, verified by a 5 s dielectric withstand test

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.

[3] The maximum voltage that can be applied or output between any channel and COM without damaging the module or other devices.

Caution Do not connect the NI 9401 to signals or use for measurements within Measurement Categories II, III, or IV.

Note Measurement Categories CAT I and CAT O are equivalent. These test and measurement circuits are not intended for direct connection to the MAINS building installations of Measurement Categories CAT II, CAT III, or CAT IV.

Hazardous Locations

U.S. (UL)	Class I, Division 2, Groups A, B, C, D, T4; Class I, Zone 2, AEx nA IIC T4
Canada (C-UL)	Class I, Division 2, Groups A, B, C, D, T4; Class I, Zone 2, Ex nA IIC T4
Europe (ATEX) and International (IECEx)	Ex nA IIC T4 Gc

Safety and Hazardous Locations Standards

This product is designed to meet the requirements of the following electrical equipment safety standards for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 61010-1, CSA 61010-1
- EN 60079-0:2012, EN 60079-15:2010
- IEC 60079-0: Ed 6, IEC 60079-15; Ed 4
- UL 60079-0; Ed 5, UL 60079-15; Ed 3
- CSA 60079-0:2011, CSA 60079-15:2012

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 EMC requirements; Industrial Immunity
- EN 55011 (CISPR 11): Group 1, Class A emissions
- CE, C-Tick, ICES, and FCC Part 15 Emissions; Class A

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 CE

This product meets the essential requirements of applicable European Directives, as follows:

- 2014/35/EU; Low-Voltage Directive (safety)
- 2014/30/EU; Electromagnetic Compatibility Directive (EMC)
- 94/9/EC; Potentially Explosive Atmospheres (ATEX)

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 model number or product line, and click the appropriate link in the Certification column.

Shock and Vibration

To meet these specifications, you must panel mount the system.

Operating vibration	
Random (IEC 60068-2-64)	5 g_{rms}, 10 Hz to 500 Hz
Sinusoidal (IEC 60068-2-6)	5 g, 10 Hz to 500 Hz
Operating shock (IEC 60068-2-27)	30 g, 11 ms half sine; 50 g, 3 ms half sine; 18 shocks at 6 orientations

Environmental

Refer to the manual for the chassis you are using for more information about meeting these specifications.

Operating temperature (IEC 60068-2-1, IEC 60068-2-2)	-40 °C to 70 °C
Storage temperature (IEC 60068-2-1, IEC 60068-2-2)	-40 °C to 85 °C
Ingress protection	IP40
Operating humidity (IEC 60068-2-78)	10% RH to 90% RH, noncondensing
Storage humidity (IEC 60068-2-78)	5% RH to 95% RH, noncondensing
Pollution Degree	2
Maximum altitude	2,000 m

Indoor use only.

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 to the environment and to NI customers.

For additional environmental information, refer to the *Minimize Our Environmental Impact* 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 NI products must be disposed of according to local laws and regulations. For more information about how to recycle NI products in your region, visit *ni.com/environment/weee*.

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`.)

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