

## DATASHEET



# NI 9263

4 AO,  $\pm 10$  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  $\pm 30$  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.

	<b>Kit Contents</b> <ul style="list-style-type: none"><li>• NI 9263</li><li>• NI 9263 Getting Started Guide</li></ul>
	<b>Accessories</b> <ul style="list-style-type: none"><li>• NI 9927 backshell connector kit (screw terminal)</li><li>• NI 9981 backshell connector kit (spring terminal)</li></ul>

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

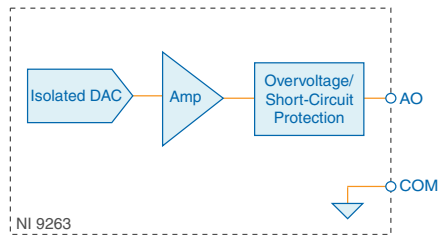


- Design deterministic real-time applications with LabVIEW graphical programming
- Download to dedicated NI or third-party hardware for reliable execution and a wide selection of I/O
- Take advantage of built-in PID control, signal processing, and analysis functions
- Automatically take advantage of 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  $-40^{\circ}\text{C}$  to  $70^{\circ}\text{C}$  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 <sup>1</sup>	0 V
Power-down voltage <sup>2</sup>	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 <sup>3</sup> (Offset Error)
Calibrated	Maximum (-40 °C to 70 °C)	0.35%	0.75%
	Typical (25 °C, ±5 °C)	0.03%	0.1%
Uncalibrated <sup>4</sup>	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

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

<sup>2</sup> 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.

<sup>3</sup> Range equals ±10.7 V

<sup>4</sup> 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 $\mu$ s min	3.5 $\mu$ s min
2	5 $\mu$ s min	6.5 $\mu$ s min
3	7.5 $\mu$ s min	9 $\mu$ s min
4	9.5 $\mu$ s min	12 $\mu$ s min

**Noise**

Updating at 100 kS/s	600 $\mu$ Vrms
Not updating	260 $\mu$ Vrms
Slew rate	4 V/ $\mu$ s
Crosstalk	76 dB
<b>Settling time (100 pF load, to 1 LSB)</b>	
Full-scale step	20 $\mu$ s
1 V step	13 $\mu$ s
0.1 V step	10 $\mu$ s
Capacitive drive	1,500 pF minimum
Monotonicity	16 bits
DNL	$\pm$ 1 LSB maximum
INL (endpoint)	$\pm$ 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 $\mu$ W maximum
<b>Thermal dissipation (at 70 °C)</b>	
Active mode	750 mW maximum
Sleep mode	25 $\mu$ W 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](https://ni.com/dimensions) and search by module number.

## Screw-terminal wiring

Gauge	0.2 mm <sup>2</sup> to 2.5 mm <sup>2</sup> (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 <sup>2</sup> to 2.5 mm <sup>2</sup>

## Spring-terminal wiring

Gauge	0.2 mm <sup>2</sup> to 2.5 mm <sup>2</sup> (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 <sup>2</sup> to 2.5 mm <sup>2</sup>

## 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

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](https://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 <sub>rms</sub> , 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](https://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](https://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](https://ni.com/environment/rohs_china)。(For information about China RoHS compliance, go to [ni.com/environment/rohs\\_china](https://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](https://ni.com/calibration).

Calibration interval	1 year
----------------------	--------

---

Refer to the *NI Trademarks and Logo Guidelines* at [ni.com/trademarks](http://ni.com/trademarks) for information on NI trademarks. Other product and company names mentioned herein are trademarks or trade names of their respective companies. For patents covering NI products/technology, refer to the appropriate location: **Help»Patents** in your software, the `patents.txt` file on your media, or the *National Instruments Patent Notice* at [ni.com/patents](http://ni.com/patents). You can find information about end-user license agreements (EULAs) and third-party legal notices in the readme file for your NI product. Refer to the *Export Compliance Information* at [ni.com/legal/export-compliance](http://ni.com/legal/export-compliance) for the NI global trade compliance policy and how to obtain relevant HTS codes, ECCNs, and other import/export data. NI MAKES NO EXPRESS OR IMPLIED WARRANTIES AS TO THE ACCURACY OF THE INFORMATION CONTAINED HEREIN AND SHALL NOT BE LIABLE FOR ANY ERRORS. U.S. Government Customers: The data contained in this manual was developed at private expense and is subject to the applicable limited rights and restricted data rights as set forth in FAR 52.227-14, DFAR 252.227-7014, and DFAR 252.227-7015.

© 2015—2016 National Instruments. All rights reserved.

373781B-02 Mar16