

# NI 9265 Datasheet

## 4-Channel, 0 mA to 20 mA, 16-Bit Analog Output Module



- 4 channels, 100 kS/s per channel simultaneously analog output
- 0 mA to 20 mA output range, 16-bit resolution
- Open-loop detection with interrupt, 0.0 mA power-on
- 250 Vrms, CAT II bank isolation
- 10-position screw-terminal or 10-position spring-terminal connectors available
- -40 °C to 70 °C operating range, 5 g vibration, 50 g shock

The NI 9265 is a 4-channel, 0 mA to 20 mA, 100 kS/s simultaneously updating C Series analog output module for any CompactDAQ or CompactRIO chassis. It is ideal for interfacing and controlling industrial current-driven actuators at high rates. The module has built-in open-loop detection, which generates an interrupt in software when an open loop is detected as well as zeroing outputs to ensure safety and avoid driving actuators at system power-on. The NI 9265 requires a 9 V to 36 V external power supply and includes a channel-to-earth ground double isolation barrier for safety and noise immunity.

## NI C Series Overview

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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



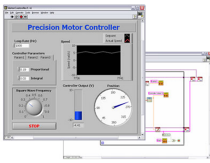
- Use advanced software tools for large project development
- Generate code automatically using DAQ Assistant and Instrument I/O Assistant
- Use advanced measurement analysis and digital signal processing
- Take advantage of open connectivity with DLLs, ActiveX, and .NET objects
- Build DLLs, executables,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

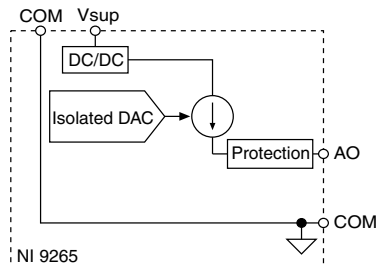


- Design deterministic real-time applications with LabVIEW graphical programming
- Download to dedicated NI or third-party hardware for reliable execution and a wide selection of I/O
- Take advantage of built-in PID control, signal processing, and analysis functions
- Automatically take advantage of 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 AO channel has a digital-to-analog converter (DAC) that produces a current signal. Each channel also has overvoltage and short-circuit protection.

**Figure 1.** NI 9265 Circuitry



# NI 9265 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** To ensure the specified EMC performance, operate this product only with shielded cables and accessories.



**Caution** Do not operate the NI 9265 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	0
Startup current	0.0 mA
Power-down current	0.0 mA
Full-scale output current	
Minimum	20.1 mA
Typical	20.6 mA
Maximum	21.0 mA
Output range	0 mA to 20 mA
Compliance voltage	12 VDC maximum
Maximum load	600 $\Omega$

**Table 1. Accuracy**

Measurement Conditions	Percent of Reading (Gain Error)	Percent of Range <sup>1</sup> (Offset Error)
Calibrated, typical (25 °C, $\pm 5$ °C)	0.11%	0.19%
Calibrated, maximum (-40 °C to 70 °C)	0.25%	0.4%

<sup>1</sup> Range equals 0 mA to 20.6 mA.

**Table 1. Accuracy (Continued)**

Measurement Conditions	Percent of Reading (Gain Error)	Percent of Range <sup>1</sup> (Offset Error)
Uncalibrated <sup>2</sup> , typical (25 °C, ±5 °C)	0.35%	1.4%
Uncalibrated, maximum (-40 °C to 70 °C)	0.85%	2.5%

## Stability

Gain drift 30 ppm/°C

Offset drift 45 ppm/°C

External power supply voltage range (Vsup) 9 VDC to 36 VDC

## Protection (AO, Vsup)

Overvoltage ±40 V

Short-circuit Indefinitely

**Table 2. Update Time**

Number of Channels	Update Time for R Series Expansion Chassis	Update Time for Any Other Chassis
One	3.5 µs	3 µs
Two	6.5 µs	5 µs
Three	9 µs	7.5 µs
Four	12 µs	9.5 µs

Noise 600 nArms

Crosstalk -90 dB

## Settling time (to 1 LSB)

Full-scale step 10 µs

1 mA step 5 µs

Glitch energy Unmeasurable

Monotonicity 16 bits

DNL 1 LSB maximum

<sup>1</sup> Range equals 0 mA to 20.6 mA.<sup>2</sup> Uncalibrated accuracy refers to the accuracy achieved when acquiring data in raw or unscaled modes and in which calibration constants that are stored in the module are not applied to the data.

INL	±16 LSB
MTBF	1,014,487 hours at 25 °C; Bellcore Issue 6, Method 1, Case 3, Limited Part Stress Method

## Power Requirements

Power consumption from chassis	
Active mode	230 mW maximum
Sleep mode	25 µW maximum
Thermal dissipation (at 70 °C)	
Active mode	1.5 W maximum
Sleep mode	10 mW maximum
Power consumption from external power supply	
Active mode	1.4 W maximum
Sleep mode	10 mW

## Physical Characteristics

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
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

## Connector securement

Securement type	Screw flanges provided
Torque for screw flanges	0.2 N · m (1.80 lb · in.)

## Safety Voltages

Connect only voltages that are within the following limits.

Channel-to-COM or Vsup-to-COM	±40 V maximum <sup>3</sup>
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## Isolation Voltages

Channel-to-channel	None
Channel-to-earth ground, Vsup-to-earth ground, or COM-to-earth ground	
Continuous	
up to 2,000 m altitude	250 Vrms, Measurement Category II
up to 5,000 m altitude	60 VDC, Measurement Category I
Withstand	
up to 2,000 m altitude	2,300 Vrms, verified by a 5 s dielectric withstand test
up to 5,000 m altitude	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.

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.



**Note** Do not connect the NI 9265 to signals or use for measurements within Measurement Categories III or IV.

<sup>3</sup> The maximum voltage that can be applied between any channel or Vsup terminal and a COM terminal without damaging the module or other devices.

## 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 61326-1 (IEC 61326-1): Class A emissions; Industrial immunity
- EN 55011 (CISPR 11): Group 1, Class A emissions
- CE, C-Tick, ICES, and FCC Part 15; Class A emissions



**Caution** To ensure the specified EMC performance, operate this product only with shielded cables and accessories.

## 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/](http://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](http://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](http://ni.com/environment/weee).

# 电子信息产品污染控制管理办法（中国 RoHS）



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