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# NI-9203

# Specifications

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# Contents

NI 9203.....	3
NI-9203 Specifications.....	5

# NI 9203



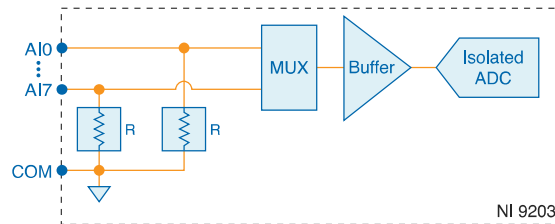
- 8 channels, 200 kS/s current input
- $\pm 20$  mA, 0 mA to 20 mA programmable input ranges; 16-bit resolution
- NIST-traceable calibration
- Screw-terminal or spring-terminal connectivity
- 250 V<sub>rms</sub>, CAT II bank isolation
- -40 °C to 70 °C operating range, 5 g vibration, 50 g shock

The NI 9203 is a C Series DAQ module with 8 analog current input channels for high-performance control and monitoring applications. It features programmable input ranges of  $\pm 20$  mA or 0 mA to 20 mA, 16-bit resolution, and a 200 kS/s maximum sampling rate. To protect against signal transients, the NI 9203 includes a channel-to-earth ground double-isolation barrier (250 V<sub>rms</sub> isolation) for safety and noise immunity.

## Input Circuitry

The input signals are buffered, conditioned, and sampled by a single 16-bit ADC. The module protects each channel from overvoltages. Refer to the Specifications section for information about overvoltage protection.

Figure 1. Input Circuitry on the NI 9203



# NI-9203 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-9203 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 Characteristics

Number of channels	8 analog input channels	
ADC resolution	16 bits	
Type of ADC	Successive approximation register (SAR)	
<b>Nominal input</b>		
Unipolar	0 mA to 20 mA	
Bipolar	±20 mA	
<b>Minimum overrange</b>		
Unipolar	6.5%	
Bipolar	5.5%	
Overvoltage protection, channel-to-COM	±30 V max on one channel at a time	

**Sample rate**

R Series Expansion chassis	192 kS/s max
All other chassis	200 kS/s max

**Conversion time**

R Series Expansion chassis	5.2 $\mu$ s min
All other chassis	5 $\mu$ s min

	Measurement Conditions	Percent of Reading (Gain Error)	Percent of Range <sup>[1]</sup> (Offset Error)
Calibrated	Maximum (-40 °C to 70 °C)	$\pm 0.18\%$	$\pm 0.06\%$
	Typical (25 °C, $\pm 5$ °C)	$\pm 0.04\%$	$\pm 0.02\%$
Uncalibrated	Maximum (-40 °C to 70 °C)	$\pm 0.66\%$	$\pm 0.54\%$
	Typical (25 °C, $\pm 5$ °C)	$\pm 0.49\%$	$\pm 0.46\%$

Table 1. Unipolar Accuracy

	Measurement Conditions	Percent of Reading (Gain Error)	Percent of Range <sup>[1]</sup> (Offset Error)
Calibrated	Maximum (-40 °C to 70 °C)	$\pm 0.20\%$	$\pm 0.09\%$
	Typical (25 °C, $\pm 5$ °C)	$\pm 0.05\%$	$\pm 0.02\%$
Uncalibrated	Maximum (-40 °C to 70 °C)	$\pm 0.74\%$	$\pm 0.66\%$
	Typical (25 °C, $\pm 5$ °C)	$\pm 0.54\%$	$\pm 0.55\%$

Table 2. Bipolar Accuracy

**Scaling coefficients**

Unipolar	330 nA/LSB typ
Bipolar	660 nA/LSB typ

<b>Unipolar stability</b>	
Offset drift	63 nA/°C
Gain drift	±14 ppm/°C
<b>Bipolar stability</b>	
Offset drift	286 nA/°C
Gain drift	±17 ppm/°C
Input bandwidth (-3 dB)	850 kHz
<b>Input impedance</b>	
Resistance	138 Ω
Capacitance	20 pF
<b>Input noise (code-centered)</b>	
RMS	1 LSB <sub>rms</sub>
Peak-to-peak	7 LSB
No missing codes	16 bits
INL	±3 LSB max
Crosstalk (at 1 kHz)	-100 dB
Settling time (to 2 LSB)	5 μs

MTBF	1,522,814 hours at 25 °C; Bellcore Issue 6, Method 1, Case 3, Limited Part Stress Method
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## Power Requirements

<b>Power consumption from chassis</b>	
Active mode	399 mW maximum
Sleep mode	5 mW maximum
<b>Thermal dissipation (at 70 °C)</b>	
Active mode	1.22 W maximum
Sleep mode	824 mW maximum

## Physical Characteristics

### Screw-terminal wiring

Gauge	copper conductor wire
Wire strip length	of insulation stripped from the end
Temperature rating	
Torque for screw terminals	
Wires per screw terminal	
<b>Connector securement</b>	



Securement type	Screw flanges provided
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Torque for screw flanges
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## Safety Voltages

Connect only voltages that are within the following limits.

Channel-to-COM	±30 V DC maximum
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## Isolation Voltages

Channel-to-channel	None
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### Channel-to-earth ground up to 2,000 m altitude

Continuous	250 V RMS, Measurement Category II
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Withstand	2,300 V RMS, verified by a 5 s withstand test
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### Channel-to-earth ground up to 5,000 m altitude

Continuous	60 V DC, Measurement Category I
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Withstand	1,000 V RMS, verified by a 5 s withstand test
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## Hazardous Locations

U.S. (UL)	;
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Canada (C-UL)	;
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Europe (ATEX) and International (IECEX)	DEMKO ATEX  IECEX
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## Safety Compliance 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, EN 60079-7
- IEC 60079-0, IEC 60079-7
- UL 60079-0, UL 60079-7
- CSA C22.2 No. 60079-0, CSA C22.2 No. 60079-7

**Note** For safety certifications, refer to the product label or the [Product Certifications and Declarations](#) section.

## Electromagnetic Compatibility

## CE Compliance

- 2014/34/EU; Potentially Explosive Atmospheres (ATEX)

## Product Certifications and Declarations

Refer to the product Declaration of Conformity (DoC) for additional regulatory compliance information. To obtain product certifications and the DoC for NI

products, visit [ni.com/product-certifications](https://ni.com/product-certifications), search by model number, and click the appropriate link.

## Shock and Vibration

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

<b>Operating vibration</b>	
Random	5 g RMS, 10 Hz to 500 Hz
Sinusoidal	5 g, 10 Hz to 500 Hz
Operating shock	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 (with power plug attached)	IP 40
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
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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 **Engineering a Healthy Planet** 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.

## EU and UK Customers

-  **Waste Electrical and Electronic Equipment (WEEE)**—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）

-  **中国 RoHS**— NI 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 NI 中国 RoHS 合规性信息，请登录 [ni.com/environment/rohs\\_china](http://ni.com/environment/rohs_china)。(For information about China RoHS compliance, go to [ni.com/environment/rohs\\_china](http://ni.com/environment/rohs_china).)

## Calibration

You can obtain the calibration certificate and information about calibration services for the NI-9203 at [ni.com/calibration](http://ni.com/calibration).

Calibration interval	1 year
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$\frac{1}{2}$  Range equals 21.5 mA.