NI-9203 Specifications

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Contents

NI 9203

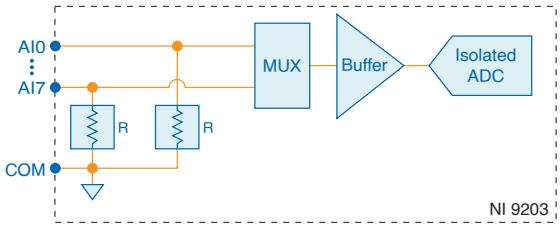
- 8 channels, 200 kS/s current input
- ±20 mA, 0 mA to 20 mA programmable input ranges; 16-bit resolution
- NIST-traceable calibration
- Screw-terminal or spring-terminal connectivity
- 250 V_{rms}, CAT II bank isolation
- -40 °C to 70 °C operating range, 5 g vibration, 50 g shock

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 ±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_{rms} 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)
Nominal input	
Unipolar	0 mA to 20 mA
Bipolar	±20 mA
Minimum overrange	
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 µs min
All other chassis	5 µs min

Table 1. Unipolar Accuracy

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

Table 2. Bipolar Accuracy

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

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

Unipolar stability

Offset drift	63 nA/°C
Gain drift	±14 ppm/°C

Bipolar stability

Offset drift	286 nA/°C
Gain drift	±17 ppm/°C

Input bandwidth (-3 dB)	850 kHz

Input impedance

Resistance	138 Ω
Capacitance	20 pF

Input noise (code-centered)

RMS	1 LSBrms
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

Power Requirements

Power consumption from chassis	
Active mode	399 mW maximum
Sleep mode	5 mW maximum
Thermal dissipation (at 70 °C)	
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	
Connector securement	
Securement type	Screw flanges provided

Torque for screw flanges

Safety Voltages

Connect only voltages that are within the following limits.

Channel-to-COM	±30 V DC maximum

Isolation Voltages

Channel-to-channel	None
Channel-to-earth ground up to 2,000 m altitude Continuous Withstand	 250 V RMS, Measurement Category II 2,300 V RMS, verified by a 5 s withstand test
Channel-to-earth ground up to 5,000 m altitude Continuous Withstand	 60 V DC, Measurement Category I 1,000 V RMS, verified by a 5 s withstand test

Hazardous Locations

U.S. (UL)	; ,
Canada (C-UL)	;
Europe (ATEX) and International (IECEx)	

	DEMKO ATEX IECEx

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 CE

- 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, search by model number, and click the appropriate link.

Shock and Vibration

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

Operating vibration	
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

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. 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.

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。(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-9203 at ni.com/calibration.

Calibration interval	1 year

[1] Range equals 21.5 mA.