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# NI-9207

# Specifications

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# NI-9207 Specifications

## Definitions

**Warranted** specifications describe the performance of a model under stated operating conditions and are covered by the model warranty.

**Characteristics** describe values that are relevant to the use of the model under stated operating conditions but are not covered by the model warranty.

- **Typical** specifications describe the performance met by a majority of models.
- **Nominal** specifications describe an attribute that is based on design, conformance testing, or supplemental testing.

Specifications are **Typical** unless otherwise noted.

## Conditions

Specifications are valid for the range -40 °C to 70 °C unless otherwise noted. All voltages are relative to COM unless otherwise noted.

### Related information:

- [Software Support for CompactRIO, CompactDAQ, Single-Board RIO, R Series, and EtherCAT](#)

## Connector Types

The NI-9207 has more than one connector type: NI-9207 with spring terminal and NI-9207 with DSUB. Unless the connector type is specified, NI-9207 refers to all connector types.

# Input Characteristics

Number of channels	16 analog input channels: 8 voltage and 8 current	
ADC resolution	24 bits	
Type of ADC	Delta-Sigma	
Sampling mode	Scanned	
<b>Input range</b>		
<b>Voltage channels</b>		
Minimum	$\pm 10.2$ V	
Typical	$\pm 10.4$ V	
<b>Current channels</b>		
Minimum	$\pm 21.5$ mA	
Typical	$\pm 22.0$ mA	
Maximum working voltage for analog inputs (signal voltage + common mode voltage), voltage channels only	Each channel must remain within $\pm 10.2$ V of common	
<b>Conversion time (per channel)</b>		
High-Resolution Mode	52 ms	

High-Speed Mode		2 ms
Overvoltage protection, channel-to-COM, all channels		±30 V maximum on one channel at a time
<b>Vsup pins, current channels only</b>		
Current	2 A maximum	
Voltage	0 to 30 V maximum	
<b>Input impedance</b>		
Voltage channels		>1 GΩ
Current channels		85 Ω

**Table 1.** Accuracy

Calibrated Measurement Conditions	Channels	Percent of Reading (Gain Error)	Percent of Range <sup>[1]</sup> (Offset Error)
Maximum (-40 °C to 70 °C)	Voltage channels	±0.52%	±0.04%
	Current channels	±0.87%	±0.05%

<b>Input noise</b>	
<b>Voltage channels</b>	
High-Resolution Mode	16 μV RMS

High-Speed Mode	80 $\mu$ V RMS
<b>Current channels</b>	
High-Resolution Mode	50 nA RMS
High-Speed Mode	200 nA RMS
<b>Stability</b>	
<b>Voltage channels</b>	
Gain drift	$\pm 21$ ppm/ $^{\circ}$ C
Offset drift	$\pm 14$ $\mu$ V/ $^{\circ}$ C
<b>Current channels</b>	
Gain drift	$\pm 43$ ppm/ $^{\circ}$ C
Offset drift	$\pm 30$ nA/ $^{\circ}$ C
CMRR ( $f_{in}$ = 0 Hz to 60 Hz), voltage channels only	86 dB
<b>CMRR, channel-to-earth ground (50/60 Hz)<sup>[2]</sup></b>	
High-Resolution Mode	160 dB
High-Speed Mode	120 dB
<b>NMRR (High-Resolution Mode only)</b>	

50 Hz	66 dB
60 Hz	68 dB

## NI-9207 with Spring Terminal Safety Voltages

Connect only voltages that are within the following limits:

<b>Isolation</b>	
Channel-to-channel	None
<b>Channel-to-earth ground</b>	
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

## NI-9207 with DSUB Safety Voltages

Connect only voltages that are within the following limits:

<b>Isolation</b>	
Channel-to-channel	None
<b>Channel-to-earth ground</b>	
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
Withstand, up to 5,000 m	500 V RMS, verified by a 5 s dielectric withstand test

## Measurement Category

### Measurement Category I



**Caution** Do not connect the NI-9207 with DSUB to signals or use for measurements within Measurement Categories II, III, or IV.



**Attention** Ne pas connecter le NI-9207 with DSUB à des signaux dans les catégories de mesure II, III ou IV et ne pas l'utiliser pour effectuer des mesures dans ces catégories.



**Warning** Do not connect the NI-9207 with DSUB to signals or use for measurements within Measurement Categories II, III, or IV, or for measurements on MAINS circuits or on circuits derived from Overvoltage Category II, III, or IV which may have transient overvoltages above what the product can withstand. The product must not be connected to circuits that have a maximum voltage above the continuous working voltage, relative to earth or to other channels, or this could damage and defeat the insulation. The product can only withstand transients up to the transient overvoltage rating without breakdown or damage to the insulation. An analysis of the working voltages, loop impedances, temporary overvoltages, and transient overvoltages in the system must be conducted prior to making measurements.



**Mise en garde** Ne pas connecter le NI-9207 with DSUB à des signaux dans les catégories de mesure II, III ou IV et ne pas l'utiliser pour des mesures dans ces catégories, ou des mesures sur secteur ou sur des circuits dérivés de surtensions de catégorie II, III ou IV pouvant présenter des surtensions



transitoires supérieures à ce que le produit peut supporter. Le NI-9207 with DSUB ne doit pas être raccordé à des circuits ayant une tension maximale supérieure à la tension de fonctionnement continu, par rapport à la terre ou à d'autres voies, sous peine d'endommager et de compromettre l'isolation. Le produit peut tomber en panne et son isolation risque d'être endommagée si les tensions transitoires dépassent la surtension transitoire nominale. Une analyse des tensions de fonctionnement, des impédances de boucle, des surtensions temporaires et des surtensions transitoires dans le système doit être effectuée avant de procéder à des mesures.

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.



**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.

## Measurement Category II



**Caution** Do not connect the NI-9207 with spring terminal to signals or use for measurements within Measurement Categories III or IV.



**Attention** Ne pas connecter le NI-9207 with spring terminal à des signaux dans les catégories de mesure III ou IV et ne pas l'utiliser pour effectuer des mesures dans ces catégories.

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.

## Environmental Characteristics

Temperature	
Operating	-40 °C to 70 °C
Storage	-40 °C to 85 °C
Humidity	
Operating	10% RH to 90% RH, noncondensing
Storage	5% RH to 95% RH, noncondensing
Ingress protection	IP40
Pollution Degree	2
Maximum altitude	5,000 m
Shock and Vibration	
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

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

## Power Requirements

Power consumption from chassis	
Active mode	295 mW maximum
Sleep mode	25 $\mu$ W maximum
Thermal dissipation (at -40 °C)	
Active mode	0.75 W maximum
Sleep mode	0.59 W maximum

## Physical Characteristics

Weight	
NI-9207 with spring terminal	161 g (5.7 oz)
NI-9207 with DSUB	144 g (5.1 oz)
Dimensions	Visit <a href="http://ni.com/dimensions">ni.com/dimensions</a> and search by module number.
Spring terminal wiring	
Gauge	0.14 mm <sup>2</sup> to 1.5 mm <sup>2</sup> (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 <sup>2</sup> to 1.5 mm <sup>2</sup>	
<b>Connector securement</b>		
Securement type	Screw flanges provided	
Torque for screw flanges	0.2 N · m (1.80 lb · in.)	

## Calibration

You can obtain the calibration certificate and information about calibration services for the NI-9207 at [ni.com/calibration](https://ni.com/calibration).

Calibration interval	2 years
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