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# sbRIO-9220 Specifications

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**Notice** The input terminals of this device are not protected from electromagnetic interference. As a result, this device may experience reduced measurement accuracy or other temporary performance degradation when connected cables are routed in an environment with radiated or conducted radio frequency electromagnetic interference. To limit radiated emissions and to ensure that this device functions within specifications in its operational electromagnetic environment, take precautions when designing, selecting, and installing measurement probes and cables.

## 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 the AI- signal on each channel unless otherwise noted.

## Input Characteristics

Number of channels	16 analog input channels
ADC resolution	16 bits
Type of ADC	Successive approximation register (SAR)
<b>Input voltage ranges</b>	
<b>Measurement Voltage (AI+ to AI-)</b>	
Minimum <sup>[1]</sup>	±10.4 V
Typical	±10.5 V
Maximum	±10.6 V
Maximum voltage (Signal + Common Mode)	Each channel must remain within ±10.4 V of common
Overvoltage protection	±30 V
Conversion time	10 µs minimum
Sample rate	100 kS/s maximum

**Table 1.** Accuracy

Measurement Conditions		Percent of Reading (Gain Error)	Percent of Range <sup>[2]</sup> (Offset Error)
Calibrated	Maximum (-40 °C to 70 °C)	0.142%	±0.070%
	Typical (23 °C ±5 °C)	0.010%	±0.001%
Uncalibrated <sup>[3]</sup>	Maximum (-40 °C to 70 °C)	0.350%	±0.360%
	Typical (23 °C ±5 °C)	0.060%	±0.070%

<b>Stability</b>	
Gain drift	5 ppm/°C
Offset drift	29 $\mu$ V/°C
CMRR ( $f_{in} = 60$ Hz)	70 dB
-3 dB bandwidth	>100 kHz
Input impedance	>1 G $\Omega$
Input noise	0.85 LSB <sub>rms</sub>
Crosstalk	-90 dB
<b>Settling time (to 2 LSBs)</b>	
10 V step	19 $\mu$ s
20 V step	26 $\mu$ s
No missing codes	15 bits
MTBF	1,522,250 at 25 °C; Bellcore Issue 6, Method 1, Case 3, Limited Part Stress Method

## Power Requirements

<b>Power consumption from chassis (full-scale input, 100 kS/s)</b>	
Active mode	1 W maximum
Sleep mode	4 mW maximum
<b>Thermal dissipation (at 70 °C)</b>	

Active mode	1.250 W maximum
Sleep mode	510 mW maximum

## Physical Characteristics

### Dimensions and Weight

Connector type	Spring terminal
Weight	64.4 g (2.27 oz)

### Spring-Terminal Wiring Specifications

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 terminal	One wire per spring terminal; two wires per spring terminal using a 2-wire ferrule
<b>Ferrules</b>	
Single ferrule, uninsulated	0.14 mm <sup>2</sup> to 1.5 mm <sup>2</sup> (26 AWG to 16 AWG) 10 mm barrel length
Single ferrule, insulated	0.14 mm <sup>2</sup> to 1.0 mm <sup>2</sup> (26 AWG to 18 AWG) 12 mm barrel length

Two-wire ferrule, insulated	2x 0.34 mm <sup>2</sup> (2x 22 AWG)12 mm barrel length
<b>Connector securement</b>	
Securement type	Screw flanges provided
Torque for screw flanges	0.2 N · m (1.80 lb · in.)

## Safety Voltages

### Isolation Voltages

**Temporary Overvoltage**—An overvoltage condition of a relatively long duration.

Channel-to-channel	None
<b>Channel-to-earth ground</b>	
Continuous	250 V RMS, Measurement Category II
Withstand up to 4,000 m	3,000 V RMS, verified by a 5 s dielectric withstand test
Temporary overvoltage protection	±30 V between any two pins

### Measurement Category



**Caution** Do not connect the product to signals or use for measurements within Measurement Categories III or IV.



**Attention** Ne pas connecter le produit 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

<b>Temperature</b>	
Operating	-40 °C to 70 °C
Storage	-40 °C to 85 °C
<b>Humidity</b>	
Operating	10% RH to 90% RH, noncondensing
Storage	5% RH to 95% RH, noncondensing
Pollution Degree	2
Maximum altitude	4,000 m

## Compliance Standards

### Environmental Standards

This product meets the requirements of the following environmental standards for electrical equipment.

- IEC 60068-2-1 Cold
- IEC 60068-2-2 Dry heat



## EMC Standards

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
- AS/NZS CISPR 11: Group 1, Class A emissions
- ICES-001: Class A emissions



**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** In Europe, Australia, and New Zealand (per CISPR 11) Class A equipment is intended for use in non-residential locations.

## Safety Compliance 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



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

## Calibration

You can obtain the calibration certificate and information about calibration services for the sbRIO-9220 at [ni.com/calibration](https://ni.com/calibration).


Calibration interval	1 year
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## 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).)

## 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.

## NI Services

Visit [ni.com/support](https://ni.com/support) to find support resources including documentation, downloads, and troubleshooting and application development self-help such as tutorials and examples.

Visit [ni.com/services](https://ni.com/services) to learn about NI service offerings such as calibration options, repair, and replacement.

Visit [ni.com/register](https://ni.com/register) to register your NI product. Product registration facilitates technical support and ensures that you receive important information updates from NI.

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