NI-9313 Specifications

2026-10-12

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These specifications apply to the NI-9313.

Revision History

Version	Date Changed	Description
379290A-01	September 2026	Initial release.

Looking For Something Else?

For information not found in the specifications for your product, such as operating instructions, browse *Related Information*.

Related information:

- NI-9313 User Manual
- NI-9313 Safety, Environmental, and Regulatory Information
- Specifications Explained: C Series Modules
- NI CompactRIO User Manual
- NI-DAQmx User Manual
- Software and Driver Downloads
- NI-9313 Dimensional Drawings
- Product Certifications
- Letter of Volatility
- Discussion Forums
- NI Learning Center

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 under the following conditions unless otherwise noted.

- Ambient temperature range -40 °C to 70 °C
- 15 minutes of warm-up time

NI-9313 Pinout

Use the pinout to identify the signals of the NI-9313 connector terminals.

Figure 1. NI-9313 Connector Pinout

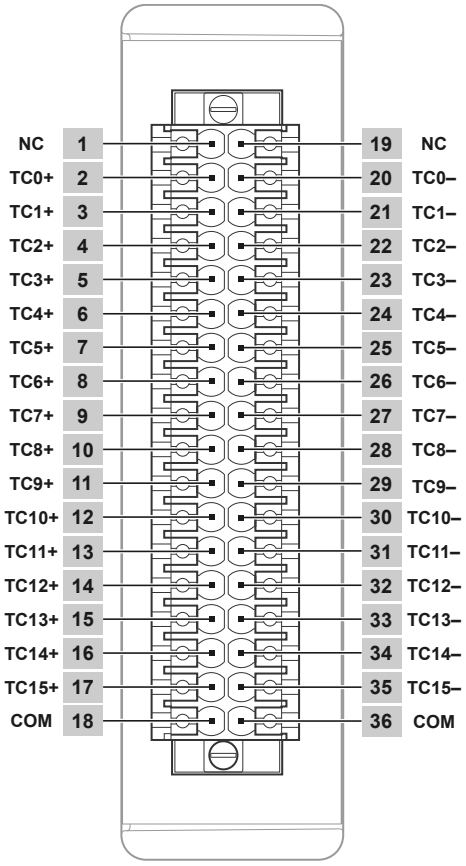


Table 1. Signal Descriptions

Signal	Description
COM	Common reference connection
NC	No connection
TC+	Positive thermocouple connection
TC-	Negative thermocouple connection

Input Characteristics

Table 2. Channels

Parameter	Value
Number of channels	16 thermocouple channels, 1 internal auto-zero channel, 1 internal cold-junction compensation channel

Table 3. ADC

Parameter	Value
ADC resolution	24 bits
Type of ADC	Delta-Sigma
Sampling mode	Scanned

Table 4. Input Measurement Ranges

Measurement Type	Range
Voltage measurement range	±78.125 mV
Temperature measurement ranges	Works over temperature ranges for J, K, T, E, N, B, R, S (defined by NIST) and C and A (defined by IEC 60584-1:2013) thermocouple types

Table 5. Timing Mode

Parameter	Value
Timing mode	High-resolution
Conversion time (per channel)	55 ms
Sample rate[1] (All Channels[2])	1 S/s

Table 6. Common-Mode Voltage Range

Connection	Common-Mode Voltage Range
Channel-to-COM	±1.2 V
COM-to-earth ground	±250 V

Table 7. Common-Mode Rejection Ratio (CMRR)

Measurement Conditions	Channel	CMRR
DC and 50 Hz to 60 Hz	Channel-to-COM	100 dB
DC and 50 Hz to 60 Hz	COM-to-earth ground	>170 dB

1. If you are using fewer than all channels, the sample rate might be faster. The maximum sample rate = 1/(*Conversion Time* x *Number of Channels*), or 18.18 S/s, whichever is smaller. Sampling faster than the maximum sample rate may degrade accuracy.
2. Including the auto-zero and cold-junction channels.

Table 8. Noise and Filtering

Parameter	Value
Noise rejection (at 50 Hz and 60 Hz)	60 dB
Input noise	200 nV RMS

Table 9. Input Impedance and Bandwidth

Parameter	Value
Differential input impedance	78 MΩ
Input bandwidth	14.4 Hz
Input current	50 nA

Table 10. Protection

Parameter	Value
Overvoltage protection	±30 V between any two inputs

Table 11. Gain Error

Measurement Conditions	Calibration	Typical	Maximum
25 °C	Within 1 year of calibration	0.03%	—
25 °C	Within 10 years of calibration	0.08%	—
-40 °C to 70 °C	Within 1 year of calibration	0.07%	0.15%
-40 °C to 70 °C	Within 10 years of calibration	0.13%	0.20%



Note NI recommends a calibration interval of 1 year. NI calibration services use the 1-year specification limits only. Choose an appropriate calibration interval based on your application requirements. If you choose to calibrate the device less often, the 10-year values estimate performance over this

> extended interval. The longer the calibration interval, the more likely the device is to exceed the 1-year specification limits when it is evaluated before adjustment during calibration, resulting in As-Found calibration failures.

Table 12. Offset Error

Calibration	Typical	Maximum
Within 1 year of calibration	4 µV	6 µV
Within 10 years of calibration	4 µV	6 µV

Table 13. Offset Error from Source Impedance

Parameter	Value
Offset error from source impedance	Add 0.05 µV per Ω when source impedance >50 Ω

Table 14. Cold-Junction Compensation Accuracy

Measurement Conditions	Calibration	Typical	Maximum
0 °C to 70 °C	Within 1 year of calibration	0.8 °C	1.7 °C
0 °C to 70 °C	Within 10 years of calibration	0.8 °C	1.7 °C
-40 °C to 70 °C	Within 1 year of calibration	1.1 °C	2.1 °C
-40 °C to 70 °C	Within 10 years of calibration	1.1 °C	2.1 °C

Temperature Measurement Accuracy

Table 15. Measurement Sensitivity

Thermocouple Types	Measurement Sensitivity
J, K, T, E, N	<0.02 °C
B, R, S	<0.15 °C
C, A	<0.05 °C

Measurement sensitivity represents the smallest temperature change that a sensor can detect. Sensor noise affects sensitivity. The values in the *Measurement Sensitivity* table assume the measurement is within the standard thermocouple sensor range. Values for thermocouple types J, K, T, E, N, B, R, and S follow the NIST Monolog 175 standard. Values for thermocouple types C and A are according to IEC 60584-1:2013.

The following figures show the errors for each thermocouple type when connected to the NI-9313 with the auto-zero channel on. The figures display the maximum errors over a full temperature range and typical errors at room temperature. The figures account for gain errors, offset errors, differential and integral non-linearity, quantization errors, noise errors, 50 Ω lead wire resistance, and cold-junction compensation errors. The figures do not account for the accuracy of the thermocouple itself.

Figure 2. Thermocouple Types J and N Errors

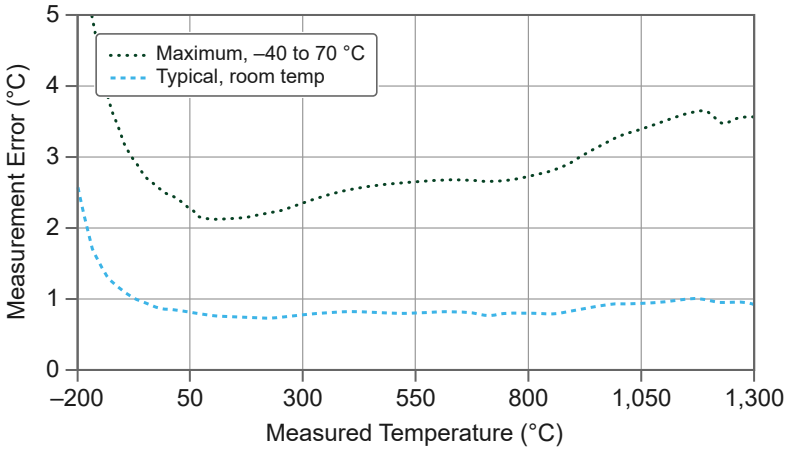


Figure 3. Thermocouple Type K Errors

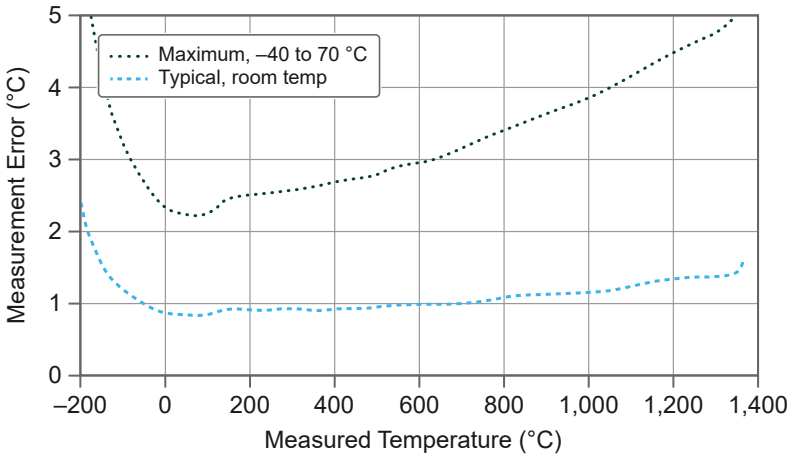


Figure 4. Thermocouple Types T and E Errors

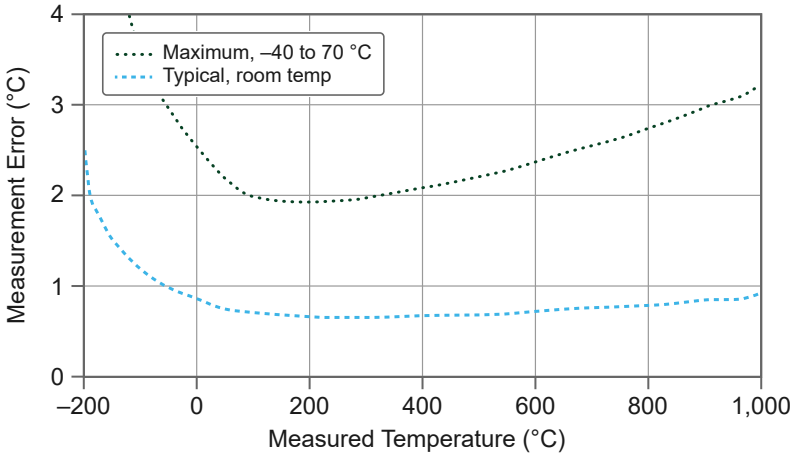


Figure 5. Thermocouple Type B Errors

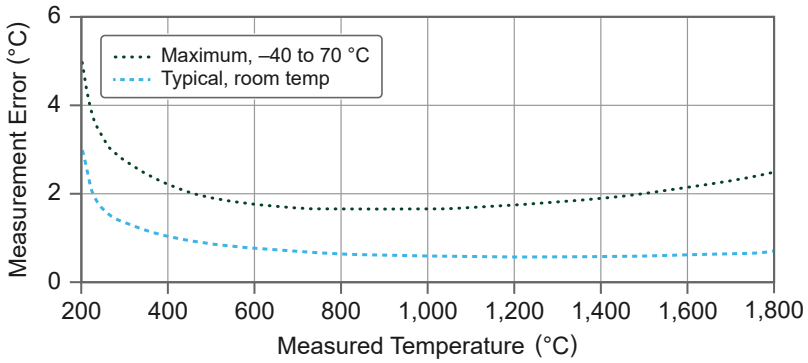


Figure 6. Thermocouple Types R and S Errors

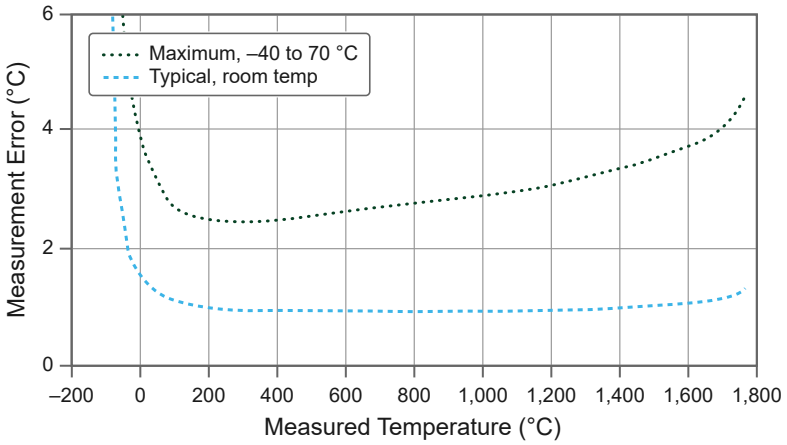
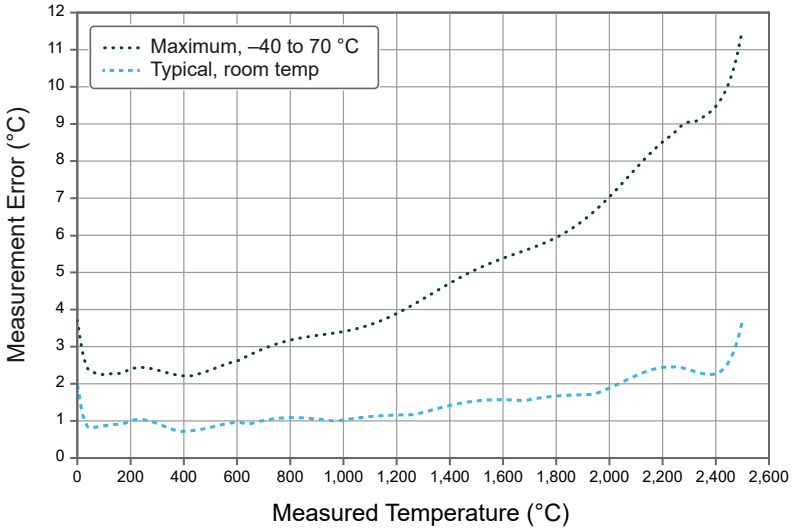


Figure 7. Thermocouple Types C and A Errors



Calibration

You can obtain the calibration certificate and information about calibration services for the NI-9313 at ni.com/calibration.

Table 16. Calibration Interval

Parameter	Value
Recommended calibration interval	1 year

Safety Guidelines for Hazardous Voltages

If you connect hazardous voltages to the product, take the following precautions. A *hazardous voltage* is a voltage greater than 30 V RMS, 42.4 V peak, or 60 V DC in DRY LOCATIONS. This product is not intended for WET LOCATIONS.

Hazardous Voltage Ensure that only qualified personnel perform wiring with hazardous voltages and that wiring adheres to your local electrical standards.

Tension dangereuse Assurez-vous que seul le personnel qualifié effectue le câblage avec des tensions dangereuses et que le câblage respecte vos

normes électriques locales.

Hazardous Voltage When product terminals are energized with hazardous voltages, ensure that you properly insulate devices and circuits connected to the product.

Tension dangereuse Lorsque les bornes du produit sont sous tension avec des tensions dangereuses, assurez-vous d'isoler correctement les appareils et circuits connectés au produit.

Hazardous Voltage Insulate all wiring for the highest voltage used.

Tension dangereuse Isolez tout le câblage pour la tension la plus élevée utilisée.

Hazardous Voltage Do not mix hazardous voltage circuits and human-accessible circuits on the same product. This product does not have reinforced isolation between channels. This product has functional or basic isolation only. If any channel has hazardous voltages, then other channels may become hazardous live if a fault occurs.

Tension dangereuse Ne pas combiner des circuits avec des tensions dangereuses et des circuits accessibles aux personnes sur le même produit. Ce produit ne dispose pas d'isolation renforcée entre les voies. Ce produit est uniquement équipé d'une isolation fonctionnelle ou de base. Si une voie présente des tensions dangereuses, d'autres voies peuvent devenir dangereuses en cas de défaillance.

Hazardous Voltage Install the NI-9940 connector backshell kit to insulate connected devices and circuits from human contact.

Tension dangereuse Installez le kit de capots de protection de connecteur NI-9940 pour isoler les périphériques et circuits connectés de

> tout contact humain.

Rated Voltages

Rated voltages are the voltage value or range at which the specified circuit's operation and performance characteristics have been evaluated and tested.

Table 17. Rated Voltages

Parameter	Value
Channel-to-COM	±1.2 V
TC+ to TC-	±78.125 mV

Temporary Overvoltage Protection

This product has been designed to withstand power frequency overvoltage of relatively long duration as specified below. Voltages beyond these levels may cause permanent damage.

Table 18. Temporary Overvoltage Protection

Parameter	Value
Between any two inputs	±30 V DC

Isolation Voltages

- **Working voltage**—The highest RMS value of the AC or DC voltage across the insulation that can continuously occur when the equipment is supplied at rated voltage.
- **Transient overvoltage (V peak)**—An overvoltage condition of a relatively short duration, a few milliseconds or less, oscillatory or non-oscillatory, usually highly damped. The transient overvoltage (U_m) stated here is the maximum peak value of the working voltage (U_w) plus the maximum additional transient overvoltage (U_t).
- **Withstand**—The highest RMS value of AC or DC voltage to which the isolation barrier has been tested in order to verify the insulation can handle the working voltage electrical and mechanical stresses in normal use, verified with a 1 min.

duration

Table 19. Isolation Voltages

Parameter	Value
Channel-to-channel	None
Channel-to-earth ground, continuous working voltage	250 V RMS, Measurement Category II
Channel-to-earth ground, withstand up to 4,000 m	3,000 V RMS, verified by a 5 s dielectric withstand test

Measurement Category II Guidelines

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.

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

Tension dangereuse 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.

Safety Guidelines for Hazardous Locations

Warning For installation in explosive atmospheres, you must house the product in an enclosure with a minimum rating of IP54, as specified by IEC/EN 60079-0.

Mise en garde En cas d’installation en atmosphère explosible, vous devez placer le produit dans un boîtier ayant un indice de conformité IP54 minimum, comme spécifié par la norme IEC/EN 60079-0.



Warning The enclosure must have a door or cover that can only be opened by using a tool.



Mise en garde Le boîtier doit être doté d’une porte ou d’un couvercle qui ne peut être ouvert qu’à l’aide d’un outil.



Warning Do not disconnect the power supply wires, I/O wires, or connectors from the product unless power has been switched off or the area is known to be nonhazardous.



Mise en garde Ne déconnectez les fils d'alimentation, les fils côté E/S et les connecteurs du produit que s'il est hors tension ou qu'il se trouve dans une zone non dangereuse.



Warning This product is intended for use only in environments with a Pollution Degree 2 or lower, as defined in IEC/EN 60664-1.



Mise en garde Ce produit est conçu pour être utilisé uniquement dans des environnements avec un degré de pollution 2 ou inférieur, tel que défini par la norme IEC/EN 60664-1.



Warning Provide transient protection that limits voltages at the supply terminals to no more than 140% of the product’s rated peak voltage.



Mise en garde Fournir une protection contre les phénomènes transitoires qui limite les tensions aux bornes d’alimentation à 140 % maximum de la tension de crête nominale du produit.



Warning Do not remove modules unless power has been switched off or the area is known to be nonhazardous.



Mise en garde Ne retirez les modules que s'ils sont hors tension ou que

vous savez que l'endroit n'est pas dangereux.



Warning Substituting components may make the product unsuitable for use in explosive atmospheres.



Mise en garde Le remplacement de composants peut rendre le produit impropre à l'utilisation en atmosphère explosible.

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 visit ni.com/product-certifications, search by model number, and click the appropriate link.

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 visit ni.com/product-certifications, search by model number, and click the appropriate

link.

Hazardous Locations Certifications

Region	Certification
U.S. (UL)	Class I, Division 2, Groups A, B, C, D, T4; Class I, Zone 2, AEx ec IIC T4 Gc
Canada (C-UL)	Class I, Division 2, Groups A, B, C, D, T4; Ex ec IIC T4 Gc
Europe (ATEX) and International (IECEx)	Ex ec IIC T4 Gc; ⟨Ex⟩ II 3 G UL 21 ATEX 2518X; IECEx UL 21.0013X

Environmental Guidelines

Notice Failure to follow the mounting instructions in the *NI-9313 User Manual* can cause temperature derating.

Notice Use this product indoors only.

Environmental Characteristics

Table 20. Temperature

Environment	Temperature Range
Operating	-40 °C to 70 °C
Storage	-40 °C to 85 °C

Table 21. Humidity

Environment	Humidity Range
Operating	10% relative to 90% relative, non-condensing
Storage	5% relative to 95% relative, non-condensing

Table 22. Ingress Protection

Parameter	Value
Ingress protection	IP40

Table 23. Pollution Degree

Parameter	Value
Pollution Degree	2

Table 24. Maximum Altitude

Parameter	Value
Maximum altitude	4,000 m

Table 25. Shock and Vibration

Parameter	Value
Operating vibration, random	10 Hz to 500 Hz, 5 g RMS
Operating vibration, sinusoidal	10 Hz to 500 Hz, 5 g
Operating shock	30 g, 11 ms half-sine 50 g, 3 ms half-sine 3 shocks at 6 orientations, 18 total

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

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
- IEC 60068-2-78 Damp heat (steady state)

- IEC 60068-2-64 Broadband random vibration
- IEC 60068-2-6 Sinusoidal vibration
- IEC 60068-2-27 Shock

EMC Guidelines

Follow these guidelines to ensure the specified electromagnetic compatibility (EMC) performance.

Notice Changes or modifications to the product not expressly approved by NI could void your authority to operate the product under your local regulatory rules.

Notice This product is not intended for use in residential environments, as it may cause interference to other electronic devices.

Notice Use 30 m (100 ft) or shorter cables.

Notice Operate this product only with shielded cables and accessories.

EMC Compliance for Industrial Use

This product was tested and complies with the regulatory requirements and limits for electromagnetic compatibility (EMC) stated in the product specifications. These requirements and limits provide reasonable protection against harmful interference when the product is operated in the intended operational electromagnetic environment.

This product is intended for use in industrial locations. However, harmful interference may occur in some installations, when the product is connected to a peripheral device or test object, or if the product is used in residential areas. To minimize interference with radio and television reception and prevent unacceptable performance degradation, install and use this product in strict accordance with the instructions in the product documentation.

Furthermore, any changes or modifications to the product not expressly approved by NI could void your authority to operate it under your local regulatory rules.

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
- KS C 9811 & KS C 9610-6-2

Note Group 1 equipment 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, New Zealand, and Canada (per CISPR 11) Class A equipment is intended for use in non-residential locations.

Power Requirements

Table 26. Power Consumption from Chassis

Mode	Power Consumption from Chassis
Active mode	490 mW maximum
Sleep mode	25 µW maximum

Table 27. Thermal Dissipation

Mode	Thermal Dissipation (at 70 °C)
Active mode	840 mW maximum
Sleep Mode	710 mW maximum

Physical Characteristics

Table 28. Dimensions and Weight

Parameter	Value
Dimensions	Visit ni.com/dimensions and search by module number.
Weight	164 g (5.8 oz)

Field Wiring Specifications

Use copper wiring for all connections unless documentation states otherwise.

Table 29. Conductor Specifications

Parameter	Value
Gauge	0.14 mm^2 to 1.5 mm^2 (26 AWG to 16 AWG)
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
Ferrules	0.14 mm^2 to 1.5 mm^2

Table 30. Connector Securement Specifications

Parameter	Value
Connector securement type	Screw flanges provided
Torque for screw flanges	0.2 N · m (1.80 lb · in.)

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