NI-9244 Specifications

2025-03-10

Contents

NI-9244 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.

Related information:

- Software Support for CompactRIO, CompactDAQ, Single-Board RIO, R Series, and EtherCAT

Conditions

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

NI-9244 Pinout

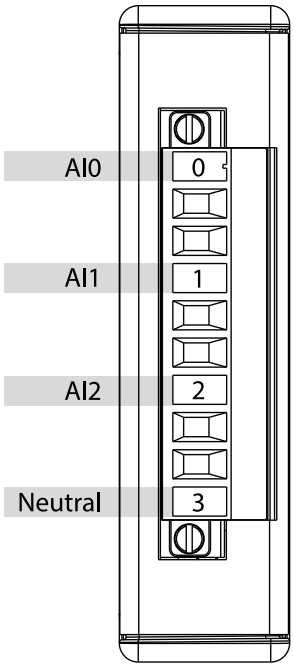

Table 1. Signal Descriptions

Signal	Description
AI	Analog input signal connection referenced to the Neutral signal
Neutral	Referenced, single-ended analog input connection

Input Characteristics

Scaling coefficient	118,911 nV/LSB
Number of channels	4 analog input channels
ADC resolution	24 bits
Type of ADC	Delta-Sigma (with analog prefiltering)

Sampling mode	Simultaneous
Internal master timebase (f_M)	
Frequency	12.8 MHz
Accuracy	±100 ppm maximum
Data rate range (f_S) using internal master timebase	
Minimum	1.613 kS/s
Maximum	50 kS/s
Data rate range (f_S) using external master timebase	
Minimum	390.625 S/s
Maximum	51.2 kS/s
Data rates (f_S)[1]	$\frac{f_M \div 256}{n}$ where n = 1, 2, …, 31
Input voltage range (AIx-to-Ground, Neutral-to-Ground, AIx-to-Neutral)	
Typical	997.5 V pk
Minimum	992 V pk

1. The data rate must remain within the appropriate data rate range.

Overvoltage withstand	800 Vrms continuous, 1000 Vrms for 1 s
Surge withstand	8 kV (1.2 µs/50 µs)
Input coupling	DC
Input impedance, AIx-to-Ground and Neutral-to-Ground	2 MΩ

Table 2. DC and AC Accuracy

Measurement Conditions		Percent of Reading (Gain Error)	Percent of Range (Offset Error)[2]
Calibrated	Maximum, (-40 °C to 70 °C)	0.17%	0.14%
	Typical, (23 °C±5 °C)	0.043%	0.012%

Note Accuracy specifications are valid for L-L, L-N and L-Earth measurements.

Input noise at 50 kS/s[3]	
N-Earth and L-Earth	4.22 mVrms
L-N and L-L	6 mVrms

2. Range equals 565.7 V (400 Vrms)
3. The module returns L-N and N-Earth values only.

Note When measuring the amplitude of the fundamental frequency over one or several power cycles, the noise of the measurement reduces significantly (theoretically with the square root of the number of samples in the acquisition window).

Nonlinearity (at 25 °C)	24 ppm
Stability	
Gain drift	5 ppm/°C
Offset drift	6 mV/°C
Post calibration gain match (channel-to-channel, maximum)	
Up to 20 kHz	109 mdB
Up to 10 kHz	39 mdB
Up to 3.8 kHz	19 mdB
Phase mismatch (channel-to-channel)	0.202°/ kHz maximum
Phase mismatch (module-to-module, maximum)	0.202°/kHz + 360° * f_{in}/ f_M
Phase nonlinearity (f_s = 50 kS/s)	
0 kHz to 10 kHz	0.02° maximum

0 kHz to 20 kHz	0.06° maximum
Input delay	40 $\frac{5}{512}$ $/f_s$ + 1.7 µs
Passband Frequency	0.453 * f_s
Flatness	
0 kHz to 20 kHz	±100 mdB maximum
0 kHz to 10 kHz	±20 mdB maximum
Negative phase sequence error at 50 Hz and 60 Hz	
At 5% unbalance	
Maximum	0.13%
Typical	0.05%
At 1% unbalance	
Maximum	0.13%
Typical	0.05%
Zero phase sequence error at 50 Hz and 60 Hz	
At 5% unbalance	

Maximum	0.13%
Typical	0.05%
At 1% unbalance	
Maximum	0.13%
Typical	0.05%
Stopband	
Frequency	0.547 * f_S
Rejection	-95 dB
Alias-free bandwidth	0.453 * f_S
Anti-alias rejection (f_S = 50 kS/s)	50 dB
-3 dB bandwidth (f_S = 50 kS/s)	0.49 * f_S
Crosstalk	
60 Hz	-100 dB
1 kHz	-74 dB

CMRR (f_{in} = 60 Hz)	-78 dB
SFDR (1 kHz, -60 dBFS)	-120 dB
Total Harmonic Distortion (THD), up to 1 kHz	-98 dB

Power Requirements

Power consumption from chassis	
Active mode	332 mW maximum
Sleep mode	50 µW maximum
Thermal dissipation	
Active mode	652 mW maximum
Sleep mode	320 µW maximum

Physical Characteristics

Screw-terminal wiring

Gauge	0.2 mm^2 to 3.0 mm^2 (24 AWG to 12 AWG) copper conductor wire
Wire strip length	7 mm (0.28 in.) of insulation stripped from the end

Temperature rating	90 °C minimum
Torque for screw terminals	0.5 N · m to 0.6 N · m (4.4 lb · in. to 5.3 lb · in.)
Wires per screw terminal	One wire per screw terminal
Ferrules	0.25 mm^2 to 2.5 mm^2
Weight	150 g (5.3 oz)
Connector securement	
Securement type	Screw flanges provided
Torque for screw flanges	0.5 N · m (4.42 lb · in.)

Safety Voltages

Connect only voltages that are within the following limits:

Maximum working voltage	400 V RMS L-N, 800 V RMS L-L
Input voltage range (AI*x*-to-Ground, Neutral-to-Ground, AI*x*-to-Neutral)	
Typical	997.5 V pk
Minimum	992 V pk

Overvoltage withstand	800 V RMS continuous, 1,000 V RMS for 1 s
Maximum working voltage, channel-to-earth ground	
Continuous, up to 2,000 m altitude	400 V RMS, Measurement Category III
Continuous, up to 5,000 m altitude	400 V RMS, Measurement Category II or 300 V RMS,Measurement Category III
Withstand	8,000 V pk
Zone 2 hazardous locations applications	
Channel-to-earth ground	300 V RMS, Measurement Category III

Measurement Categories

Measurement Category II

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.

Measurement Category III

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

Attention Ne pas connecter le produit à des signaux dans la catégorie de mesure IV et ne pas l'utiliser pour effectuer des mesures dans cette catégorie.

Measurement Category III is for measurements performed in the building installation at the distribution level. This category refers to measurements on hard-wired hardware such as hardware in fixed installations, distribution boards, and circuit breakers. Other examples are wiring, including cables, bus bars, junction boxes, switches, socket outlets in the fixed installation, and stationary motors with permanent connections to fixed installations.

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.

Calibration

You can obtain the calibration certificate and information about calibration services for the NI-9244 at ni.com/calibration.

Calibration interval	1 year