NI-9403 Specifications

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Contents

NI-9403 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. All voltages are relative to COM unless otherwise noted.

Input/Output Characteristics

Number of channels	32 digital input/output channels
Input/output type	TTL, single-ended

Default power-on line direction	Input
Input Current (0 V ≤ V_{in} ≤ 4.5 V)	±250 µA maximum
Module output current[1]	64 mA maximum
Input capacitance	30 pF
Timing	
Input	
Setup time[2]	10 ns minimum
Hold time[3]	60 ns minimum
Output	
Propagation delay[4]	330 ns maximum
Channel-to-channel skew[5]	265 ns maximum
Update/transfer time[6]	
cRIO-9151 R Series Expansion chassis	8 µS maximum
All other chassis	7 µS maximum

1. Module output current is the maximum guaranteed current that the module can drive from all the I/O lines without going into an overcurrent state.

Direction change time	18 µS maximum
Overvoltage protection Channel-to-COM	±30 V maximum on up to 8 channels at a time; however, continued use at this level will degrade the life of the module.
MTBF	763,325 hours at 25 °C; Bellcore Issue 2, Method 1, Case 3, Limited Part Stress Method

Digital Logic Levels

Input	
Voltage	-0.25 V to 5.25 V
High, V_{IH}	2.2 V minimum
Low, V_{IL}	0.8 V maximum
Hysteresis, V_H	0.2 V minimum
Output	
High, V_{OH} (5.2 V maximum)	

2. ***Setup time*** is the amount of time input signals must be stable before reading from the module.
3. ***Hold time*** is the amount of time input signals must be stable after initiating a read from the module.
4. ***Propagation delay*** is the amount of time after writing to the module that the output signals become valid.
5. ***Channel-to-channel skew*** is the amount of time between the first output signal updating and the last output signal updating.
6. The update/transfer and direction change times are valid when the module is used in a CompactRIO system. When used in other systems, driver software and system latencies impact these times.

Sourcing 100 µA	4.75 V minimum
Sourcing 2 mA	4.4 V minimum
Low, V_{OL}	
Sinking 100 µA	0.1 V maximum
Sinking 2 mA	0.26 V maximum

Power Requirements

Power consumption from chassis	
Active mode	1 W maximum
Sleep mode	25 µW maximum
Thermal dissipation (at 70 °C)	
Active mode	1 W maximum
Sleep mode	25 µW maximum

Physical Characteristics

Dimensions	Visit ni.com/dimensions and search by module number.

Weight	150 g (5.3 oz)

Safety Voltages

Connect only voltages that are within the following limits:

Channel-to-COM	±30 V maximum on up to 8 channels at a time, Measurement Category I	
Isolation		
Channel-to-channel		None
Channel-to-earth ground		
Continuous	60 V DC, Measurement Category I	
Withstand		
Up to 3,000 m altitude	1,000 V RMS, verified by a 5 s dielectric withstand test	
Up to 5,000 m altitude	860 V RMS, verified by a 5 s dielectric withstand test	

Measurement Category I

Warning Do not connect the product 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 produit 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 produit 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.

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.