NI-9375 and sbRIO-9375 Specifications

2025-03-10

Contents

NI-9375 and sbRIO-9375 Specifications 3

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Connector Types

The NI-9375 has more than one connector type: NI-9375 with spring terminal and NI-9375 with DSUB. Unless the connector type is specified, NI-9375 refers to all connector types.

The NI-9375 with spring terminal is available in two types: push-in spring terminal and spring terminal. The push-in type spring terminal connector is black and orange. The spring terminal connector is black. NI-9375 with spring terminal refers to both types unless the two types are specified. Differences between the two types of spring terminal connectors are noted by the connector color.

Related information:

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

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.

NI-9375 Pinout

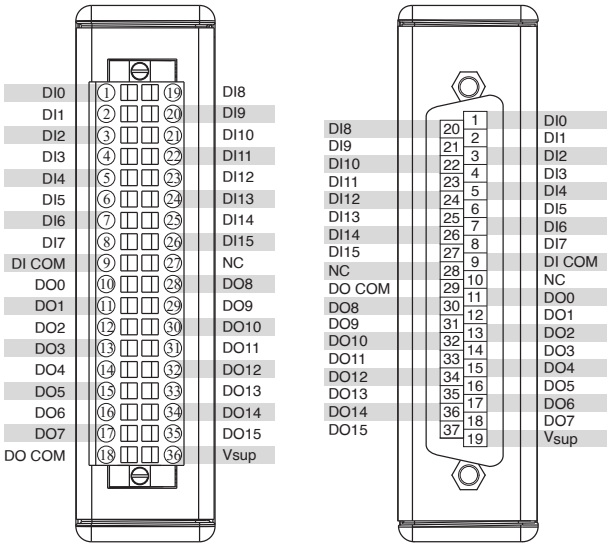

Table 1. Signal Descriptions

Signal	Description
DI	Digital input signal connection
DI COM	Common reference connection for the digital inputs
DO	Digital output signal connection
DO COM	Common reference connection for the digital outputs
NC	No connection
V_{sup}	Voltage supply connection

NI-9375 with Spring Terminal (Black Connector) Safety Voltages

Connect only voltages that are within the following limits.

Channel-to-COM or Vsup-to-COM	30 V DC maximum
Isolation	
DI bank-to-DO bank	60 V DC maximum
Channel-to-Channel	No isolation between channels
Channel-to-earth ground	
Continuous	60 V DC, Measurement Category I
Withstand	1,000 V RMS, verified by a 5 s dielectric withstand test

NI-9375 with Push-In Spring Terminal (Black/Orange Connector) Safety Voltages

Connect only voltages that are within the following limits.

Channel-to-COM or Vsup-to-COM	30 V DC maximum
Isolation	
DI bank-to-DO bank	60 V DC maximum

Channel-to-Channel	No isolation between channels
Channel-to-earth ground	
Continuous	60 V DC, Measurement Category I
Withstand up to 3,000 m	1,000 V RMS, verified by a 5 s dielectric withstand test
Withstand up to 5,000 m	860 V RMS

NI-9375 with DSUB Isolation Voltages

Connect only voltages that are within the following limits.

Channel-to-COM or Vsup-to-COM	30 V DC maximum
Isolation	
DI bank-to-DO bank	60 V DC maximum
Channel-to-Channel	No isolation between channels
Channel-to-earth ground	
Continuous	60 V DC, Measurement Category I
Withstand up to 3,000 m	1,000 V RMS, verified by a 5 s dielectric withstand test

Withstand up to 5,000 m	860 V RMS

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 and Humidity

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		
NI-9375 with spring terminal (black connector)		2,000 m

NI-9375 with push-in spring terminal (black/orange connector)	5,000 m
NI-9375 with DSUB	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

Power Requirements

Power consumption from chassis	
Active mode	450 mW maximum
Sleep mode	25 µW maximum
Thermal dissipation (at 70 °C)	
Active mode	1.5 W maximum
Sleep mode	0.6 W maximum

Physical Characteristics

Weight

NI-9375 with spring terminal (black connector)	159 g (5.6 oz)
NI-9375 with push-in spring terminal (black/orange connector)	164 g (5.8 oz)
NI-9375 with DSUB	148 g (5.3 oz)

NI-9375 with Spring Terminal (Black Connector)

Spring terminal wiring	
Gauge	0.08 mm^2 to 1.0 mm^2 (28 AWG to 18 AWG) copper conductor wire
Wire strip length	7 mm (0.28 in.) of insulation stripped from the end
Temperature rating	90 °C minimum
Wires per spring terminal	One wire per spring terminal
Connector securement	
Securement type	Screw flanges provided
Torque for screw flanges	0.2 N · m (1.80 lb · in.)

NI-9375 with Push-In Spring Terminal (Black/Orange Connector)

Spring terminal wiring	
Gauge	0.14 mm^2 to 1.5 mm^2 (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	
Single ferrule, uninsulated	0.13 mm^2 to 1.5 mm^2 (26 AWG to 16 AWG) 10 mm barrel length
Single ferrule, insulated	0.13 mm^2 to 1.0 mm^2 (26 AWG to 18 AWG) 12 mm barrel length
Two-wire ferrule, insulated	2x 0.34 mm^2 (2x 22 AWG) 12 mm barrel length
Connector securement	
Securement type	Screw flanges provided
Torque for screw flanges	0.2 N · m (1.80 lb · in.)

Input/Output Characteristics

Number of channels	32 channels: 16 digital input and 16 digital output

Digital Input

Input type	Sinking
Input voltage range	0 VDC to 30 VDC
Digital logic levels	
OFF state	
Input voltage	≤5 V
Input current	≤150 µA
ON state	
Input voltage	≥10 V
Input current	≥330 µA
Hysteresis	
Input voltage	1.7 V minimum
Input current	50 µA minimum

Input impedance	30 kΩ ±5%
Setup time[1]	1 µs maximum
Update/transfer time[2]	7 µs maximum

Digital Output

Output type		Sourcing
Power-on output state		Channels off
External power supply voltage range (Vsup)		6 VDC to 30 VDC
Continuous output current (I_O)		
NI-9375 with spring terminal		
All channels on	125 mA maximum (per channel)	
One channel on	500 mA maximum	
Per module	0.25 A[2]	
NI-9375 with DSUB		

1. ***Setup time*** is the amount of time input signals must be stable before reading from the module.
2. ***Update/transfer time*** is the maximum time the software takes to read data from the module. The update/transfer is valid when the module is used in a CompactRIO system. When used in other systems, driver software and system latencies impact this time.

All channels on	100 mA maximum (per channel)
One channel on	400 mA maximum
Per module	0.16 A^2 maximum

Output impedance (***R_O***)	0.3 Ω maximum
Output voltage (***V_O***)	Vsup - (***$I_O R_O$***)
Reversed-voltage protection	None
Current limiting	None
Vsup current consumption	18 mA
Update/transfer time[3]	7 µs maximum
Propagation delay[4]	500 µs maximum

3. ***Update/transfer time*** is the maximum time the software takes to write data to the module. The update/transfer is valid when the module is used in a CompactRIO system. When used in other systems, driver software and system latencies impact this time.
4. ***Propagation delay*** is the amount of time it takes the output signals to change state after being written to.