NI-9421 Specifications

2025-03-10

Contents

NI-9421 Specifications

Connector Types

The NI-9421 has more than one connector type: NI-9421 with screw terminal, NI-9421 with spring terminal, and NI-9421 with DSUB. Unless the connector type is specified, NI-9421 refers to all connector types.

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 9421 with DSUB Pinout

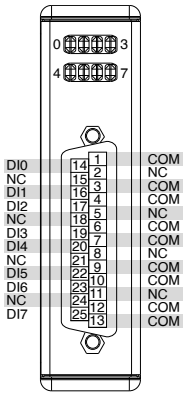

Table 3. Signal Descriptions

Signal	Description
COM	Common reference connection to isolated ground
DI	Digital input signal connection
NC	No connection

Table 2. LED Indicators

LED Pattern	Indication
Solid	The channel has been programmed to be in the ON state.
Off	The channel has been programmed to be in the OFF state.

NI 9421 with Screw Terminal or Spring Terminal Pinout

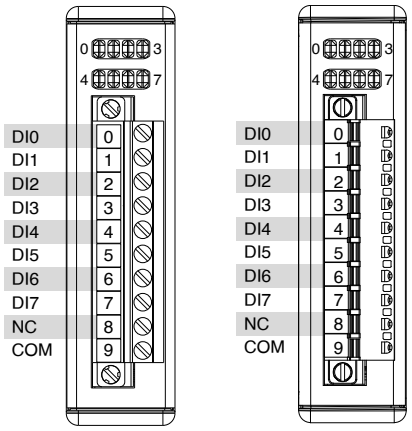

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Table 4. LED Indicators

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Off	The channel has been programmed to be in the OFF state.

Input Characteristics

Number of channels	8 digital input channels
Input type	Sinking
Digital logic levels	

OFF state	
Input voltage	≤5 V
Input current	≤300 µA
ON state	
Input voltage	11 V to 30 V
Input current	≥3 mA
I/O protection	
Input voltage	40 V maximum
Reverse-biased voltage	-30 V maximum
Input current	7 mA maximum, internally limited
Input delay time	100 µs maximum
MTBF	2,086,204 hours at 25 °C; Bellcore Issue 2, Method I, Case 3, Limited Part Stress Method

Power Requirements

Power consumption from chassis

Active mode	240 mW maximum
Sleep mode	7 mW maximum
Thermal dissipation (at 70 °C)	
Active mode	1.3 W maximum
Sleep mode	1.1 W maximum

Physical Characteristics

Weight

NI-9421 with screw terminal	166 g (5.9 oz)
NI-9421 with spring terminal	153 g (5.4 oz)
NI-9421 with DSUB	144 g (5.0 oz)

NI-9421 with Screw Terminal Wiring

Gauge	0.2 mm^2 to 2.5 mm^2 (26 AWG to 14 AWG) copper conductor wire
Wire strip length	13 mm (0.51 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; two wires per screw terminal using a 2-wire ferrule

NI-9421 with Spring Terminal Wiring

Gauge	0.2 mm^2 to 2.5 mm^2 (30 AWG to 12 AWG) copper conductor wire
Wire strip length	10 mm (0.39 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

NI-9421 with Screw Terminal and NI-9421 with Spring Terminal Connector Securement

Securement type	Screw flanges provided
Torque for screw flanges	0.2 N · m (1.80 lb · in.)

NI-9421 with Screw Terminal and NI-9421 with Spring Terminal Safety Voltages

Connect only voltages that are within the following limits:

Channel-to-COM	30 V maximum
Overvoltage protection	40 V maximum
Reverse-biased voltage	-30 V maximum
Isolation	
Channel-to-channel	None
Channel-to-earth ground	
Continuous	250 V RMS, Measurement Category II
Withstand	2,300 V RMS, verified by a 5 s dielectric withstand test

NI-9421 with DSUB Safety Voltages

Connect only voltages that are within the following limits:

Channel-to-COM	30 V maximum
Overvoltage protection	40 V maximum

Reverse-biased voltage	-30 V maximum
Isolation	
Channel-to-channel	None
Channel-to-earth ground	
Continuous	60 V DC, Measurement Category I
Withstand	1,000 V RMS, verified by a 5 s dielectric withstand test

Measurement Categories

Measurement Category I

Caution Do not connect the NI-9421 with DSUB to signals or use for measurements within Measurement Categories II, III, or IV.

Attention Ne pas connecter le NI-9421 with DSUB à des signaux dans les catégories de mesure II, III ou IV et ne pas l'utiliser pour effectuer des mesures dans ces catégories.

Warning Do not connect the NI-9421 with DSUB 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 NI-9421 with DSUB 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 NI-9421 with DSUB 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 NI-9421 with DSUB 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 NI-9421 with DSUB 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 NI-9421 with DSUB 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.

Measurement Category II

Caution Do not connect the NI-9421 with screw terminal or NI-9421 with spring terminal 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

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	2,000 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.