NI-9870 Specifications

2025-10-01

Contents

NI-9870 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

Specifications

The following specifications are typical for the range -40 °C to 70 °C unless otherwise noted.

Maximum baud rate	921.6 kbps
Maximum module throughput	1.28 Mbps
Maximum cable length	250 pF equivalent

Note Cable capacitance greater than 250 pF may adversely affect the maximum baud rate and thermal dissipation.

Maximum RS232 Receive signal (RXD, CTS, DSR, DCD, RI) continuous voltage	±8 V

Note Continuous RS232 input voltages in excess of ±8 V may cause excessive thermal dissipation.

Data line ESD protection (human body model)	±15 kV
MTBF	448,008 hours at 25 °C; Bellcore Issue 6, Method 1, Case 3, Limited Part Stress Method

Note Contact NI for Bellcore MTBF specifications at other temperatures or MIL-HDBK-217F specifications.

NI-9870 Pinout

The NI-9870 has four RJ-50 receptacles that provide connections for four RS232 devices.

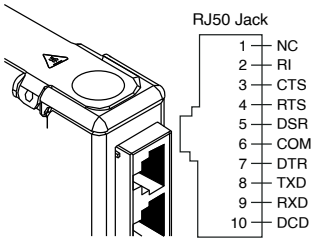


Table 1. RS232 Port Pinout

RJ-50 Pin	Signal Name*
1	No Connect
2	RI
3	CTS
4	RTS
5	DSR
6	GND
7	DTR
8	TXD
9	RXD
10	DCD

*These signals are shared by all four RJ-50 connectors on the NI-9870.

The cables included with your kit convert the RJ-50 pinout to the standard NI pinout on a DB-9 male connector, as shown in the following table.

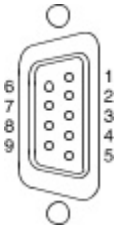


Table 2. Pin Assignments for RS232 DB-9 Male Connector

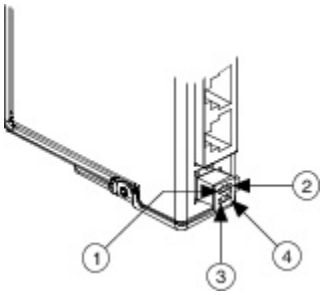
RJ-50 Pin	Signal Name
1	DCD
2	RXD
3	TXD
4	DTR

RJ-50 Pin	Signal Name
5	GND
6	DSR
7	RTS
8	CTS
9	RI

You must connect an external power supply to the NI-9870. This power supply provides the power for the RS232 transceivers on the module. You can use the included female four-position pigtail to connect to an external voltage source. The following figure lists the connections between an external voltage source (of +8 V to +28 V) and the NI-9870.

Caution To ensure the specified EMC performance, do not connect the power input to a DC mains supply or to any supply requiring a connecting cable longer than 30 m (100 ft). A DC mains supply is a local DC electricity supply network in the infrastructure of a certain site or building.

Figure 1. Four-Position External Power Connector



1. V sup
2. V sup
3. COM
4. COM

Figure 2 shows the method of power connection to the NI-9870 module. Attach an isolated power supply to the V_{SUP} and COM terminals using the included pigtail.

Figure 1. Powering the NI-9870 from an Isolated Power Source

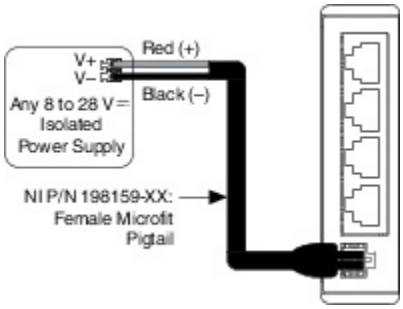
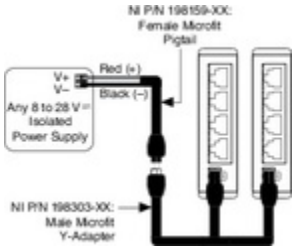


Figure 3 shows how to use the optional Y-adapter (available at ni.com/serial) to connect power to more than one module using the same power source. One Y-adapter is needed for each additional module. Ensure that the power supply can handle maximum power requirements for all modules connected.

Caution Make all connections before applying power.

Figure 1. Powering Multiple Modules from a Single Power Supply



Power Requirements

Power consumption from chassis	
Active mode	0.5 W maximum
Sleep mode	50 µW maximum
Thermal dissipation (at 70 °C)	
Active mode	1.5 W maximum

Sleep mode	0.5 W maximum
Required external supply voltage range (V_{SUP})	+8 to +28 V DC
Power supply consumption from external supply V_{SUP}	
Typical	0.5 W
Maximum	2 W

Physical Characteristics

If you need to clean the controller, wipe it with a dry towel.

Weight	Approx. 154 g (5.4 oz)

Safety Voltages

Maximum Measurement Voltages

Connect only voltages that are within these limits.

RS232 Receive Signal-to-COM (RXD, CTS, DSR, DCD, RI)	±25 V maximum, Measurement Category I
RS232 Transmit Signal-to-COM (TX, RTS, DTR)	±13.2 V maximum, Measurement Category I
V sup-to-COM	±28 V maximum, Measurement Category I

Isolation Voltages

Port-to-earth ground	
Continuous	60 V DC, Measurement Category I up to 5,000 m in altitude
Withstand	
up to 2,000 m in altitude	1000 V RMS verified by a 5s dielectric withstand test
up to 5,000 m in altitude	500 V RMS verified by a 5s 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 Guidelines

Notice Failure to follow the mounting instructions in the product documentation can cause temperature derating.

Notice This model is intended for use in indoor applications only.

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	IP30
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.

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