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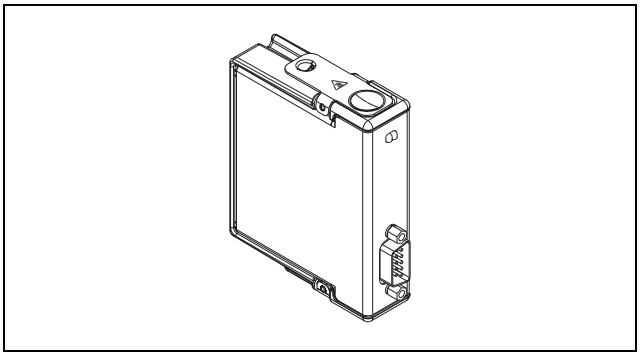
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Find the *National Instruments NI 9866* at our website: ***Click HERE***

OPERATING INSTRUCTIONS

NI 9866

1-Port, LIN Module



NATIONAL INSTRUMENTS

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These operating instructions describe how to use the National Instruments (NI) 9866 module. For information about installing, configuring, and programming your system, refer to your system documentation. The NI 9866 module requires the latest NI-XNET software to be installed. The latest version of the NI-XNET software is at `ni.com/downloads`.

Note The safety guidelines and specifications in this document are specific to the NI 9866. The other components in your system may not meet the same safety ratings and specifications. Refer to the documentation for each component in your system to determine the safety ratings and specifications for the entire system.

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Safety Guidelines

Caution Do *not* operate the NI 9866 in a manner not specified in the user manual or operating instructions. Product misuse can result in a hazard. You can compromise the safety protection built into the product if the product is damaged in any way. If the product is damaged, return it to National Instruments for repair.

Hot Surface This icon denotes that the component may be hot. Touching this component may result in bodily injury.

Safety Guidelines for Hazardous Locations

The NI 9866 is suitable for use in Class I, Division 2, Groups A, B, C, D, T4 hazardous locations; Class I, Zone 2, AEx nA IIC T4 and Ex nA IIC T4 hazardous locations; and nonhazardous locations only. Follow these guidelines if you are installing the NI 9866 in a potentially explosive environment. Not following these guidelines may result in serious injury or death.

Caution Do *not* disconnect I/O-side wires or connectors unless power has been switched off or the area is known to be nonhazardous.

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Caution Do *not* remove modules unless power has been switched off or the area is known to be nonhazardous.

Caution Substitution of components may impair suitability for Class I, Division 2.

Caution For Zone 2 applications, install the CompactRIO system in an enclosure rated to at least IP 54 as defined by IEC 60529 and EN 60529.

Caution For Zone 2 applications, install a protection device between the LIN signals and the NI 9866 LIN pins. The device must prevent the LIN Port-to-COM voltage from exceeding 55 V if there is a transient overvoltage condition.

Special Conditions for Safe Use in Europe

This equipment has been evaluated as Ex nA IIC T4 equipment under DEMKO Certificate No. 07 ATEX 0626664X. Each module is marked Ex II 3G and is suitable for use in Zone 2 hazardous locations.

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Wiring the NI 9866

The NI 9866 has one 9-pin male D-Sub connector that provides connections to a LIN bus.

The port has two common pins (COM) that are internally connected to the module's isolated reference and serve as the reference ground for LIN signal. You can connect the LIN bus reference ground to one or both COM pins. The port also has an optional shield pin, SHLD, that you can connect to a shielded LIN cable. Connecting SHLD may improve signal integrity and EMC performance in a noisy environment.

Caution You must use a UL listed ITE power supply marked LPS with the NI 9866.

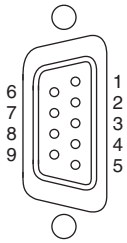
The NI 9866 requires an external power supply of +8 to +18 V to operate. Supply power to the NI 9866 V_{SUP} pin from the LIN bus.

Note Power on V_{SUP} is required for LIN operation.

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The NI 9866 pinout is listed in Table 1.

Table 1. Pin Assignments for the NI 9866

Connector	Pin	Signal
	1	No Connection (NC)
	2	NC
	3	COM
	4	NC
	5	SHLD
	6	COM
	7	LIN
	8	NC
	9	V_{SUP}

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Cabling Requirements for NI 9866

This section deals with cabling specifications, termination resistors, cable lengths, and the number of LIN nodes that can exist in a system.

Cable Specifications

LIN cables should meet the physical medium requirement of a bus RC time constant of 5 µs. For detailed formulas for calculating this value, refer to the *Line Characteristics* section of the LIN specification. Belden cable (3084A) and other unterminated CAN/Serial quality cables meet these requirements and should be suitable for most applications.

Cable Lengths

The maximum allowable cable length is 40 m, per the LIN specification.

Number of LIN Devices

The maximum number of devices on a LIN bus is 16, per the LIN specification.

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Termination Resistors

LIN cables require no termination, as nodes are terminated at the transceiver. Slave nodes typically are pulled up from the LIN bus to VBat with a 30 kΩ resistance and a serial diode. This termination usually is integrated into the transceiver package. The master node requires a 1 kΩ resistor and serial diode between the LIN bus and VBat. On NI-XNET LIN products, master termination is software selectable; you can enable it in the API with the NI-XNET Session Interface:LIN:Termination property.

NI 9866 Hardware Overview

The NI 9866 has one full-featured LIN port that is isolated from the other modules in the system. The port has a LIN controller that is fully compliant with the LIN 1.3/2.0/2.1/2.2 Specification. The port also has an NXP TJA1028 LIN transceiver that is fully compatible with the LIN 1.3/2.0/2.1/2.2 and SAE J2602 standard and supports baud rates up to 20 kbps.

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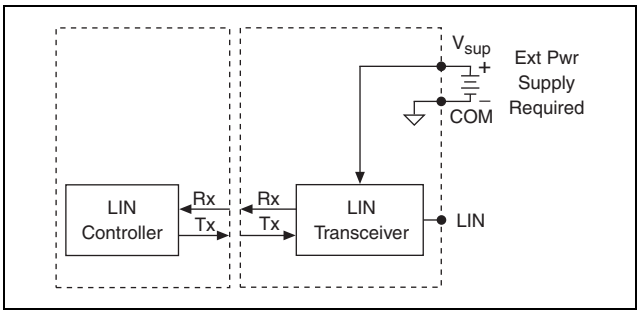


Figure 1. NI 9866 Hardware Overview

Specifications

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

LIN Characteristics

Transceiver.....NXP TJA1028

Max baud rate .....20 kbps

LIN bus lines voltage.....–40 to +40 VDC

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Supply voltage range (V_{SUP}) ..... +8 to +18 VDC normal operation, –0.3 to +40 V absolute limits

MTBF ..... Contact NI for Bellcore MTBF or MIL-HDBK-217F specifications

Power Requirements

Power consumption from chassis ..... 1 W max (active mode)

Thermal dissipation (at 70 °C)..... 1.25 W max (active mode)

Physical Characteristics

Caution If you need to clean your NI 9866, wipe it with a dry towel. The product must be completely dry and free from contaminants before you return it to service.

Weight..... Approx. 144 g (5.0 oz)

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Safety

Maximum Voltage[1]

Connect only voltages that are within these limits.

Port-to-COM.....–40 to +40 VDC max,
Measurement Category I

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.

Caution Do not connect to signals or use for measurements within Measurement Categories II, III, or IV.

[1] The maximum voltage that can be applied or output between any port or V_{SUP} terminal and a COM terminal without creating a safety hazard.

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Isolation Voltages

Port-to-earth ground

Withstand	1000 V_{rms}, verified by a 5 s dielectric withstand test
Continuous	60 VDC, Measurement Category I

Safety Standards

This product meets the requirements of the following standards of safety for electrical equipment for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 61010-1, CSA 61010-1

Note For UL and other safety certifications, refer to the product label or the *Online Product Certification* section.

Hazardous Locations

U.S. (UL)	Class I, Division 2, Groups A, B, C, D, T4; Class I, Zone 2, AEx nA IIC T4

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Canada (C-UL)	Class I, Division 2, Groups A, B, C, D, T4; Class I, Zone 2, Ex nA IIC T4
Europe (DEMKO)	Ex nA IIC T4

Environmental

Refer to the installation instructions for the chassis you are using for more information about meeting these specifications.

Operating temperature	–40 to 70 °C
Storage temperature	–40 to 85 °C
Ingress protection	IP 40
Operating humidity	10 to 90% RH, noncondensing
Storage humidity	5 to 95% RH, noncondensing
Pollution Degree (IEC 60664)	2
Maximum altitude	2,000 m

Indoor use only.

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Shock and Vibration

To meet these specifications, you must panel mount the CompactRIO system.

Operating vibration,
random (IEC 60068-2-64)..... 5 g_{rms}, 10 to 500 Hz

Operating shock
(IEC 60068-2-27)..... 30 g, 11 ms half sine,
50 g, 3 ms half sine,
18 shocks at 6 orientations

Operating vibration,
sinusoidal (IEC 60068-2-6) ..... 5 g, 10 to 500 Hz

Electromagnetic Compatibility

This product meets the requirements of the following EMC standards for electrical equipment for measurement, control, and laboratory use:

- EN 61326 (IEC 61326): Class A emissions; Basic immunity
- EN 55011 (CISPR 11): Group 1, Class A emissions
- AS/NZS CISPR 11: Group 1, Class A emissions
- FCC 47 CFR Part 15B: Class A emissions
- ICES-001: Class A emissions

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Note For the standards applied to assess the EMC of this product, refer to the *Online Product Certification* section.

Note For EMC compliance, operate this product according to the documentation.

CE Compliance CE

This product meets the essential requirements of applicable European Directives as follows:

- 2006/95/EC; Low-Voltage Directive (safety)
- 2004/108/EC; Electromagnetic Compatibility Directive (EMC)

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Online Product Certification

Refer to the product Declaration of Conformity (DoC) for additional regulatory compliance information. To obtain product certifications and the DoC for this product, visit `ni.com/certification`, search by model number or product line, and click the appropriate link in the Certification column.

Environmental Management

NI is committed to designing and manufacturing products in an environmentally responsible manner. NI recognizes that eliminating certain hazardous substances from our products is beneficial to the environment and to NI customers.

For additional environmental information, refer to the *NI and the Environment* Web page at `ni.com/environment`. This page contains the environmental regulations and directives with which NI complies, as well as other environmental information not included in this document.

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Waste Electrical and Electronic Equipment (WEEE)



EU Customers At the end of the product life cycle, all products *must* be sent to a WEEE recycling center. For more information about WEEE recycling centers, National Instruments WEEE initiatives, and compliance with WEEE Directive 2002/96/EC on Waste and Electronic Equipment, visit `ni.com/environment/weee`.

电子信息产品污染控制管理办法 （中国 RoHS）



中国客户 National Instruments 符合中国电子信息产品中限制使用某些有害物质指令 (RoHS)。关于 National Instruments 中国 RoHS 合规性信息，请登录 `ni.com/environment/rohs_china`。 (For information about China RoHS compliance, go to `ni.com/environment/rohs_china`.)

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Where to Go for Support

The National Instruments Web site is your complete resource for technical support. At `ni.com/support` you have access to everything from troubleshooting and application development self-help resources to email and phone assistance from NI Application Engineers.

National Instruments corporate headquarters is located at 11500 North Mopac Expressway, Austin, Texas, 78759-3504. National Instruments also has offices located around the world to help address your support needs. For telephone support in the United States, create your service request at `ni.com/support` and follow the calling instructions or dial 512 795 8248. For telephone support outside the United States, visit the Worldwide Offices section of `ni.com/niglobal` to access the branch office Web sites, which provide up-to-date contact information, support phone numbers, email addresses, and current events.

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