


SAFETY, ENVIRONMENTAL, AND REGULATORY INFORMATION


NI cDAQ™-9181

1-Slot, Ethernet CompactDAQ Chassis


This document includes compliance precautions and connection information for the NI cDAQ-9181.

 **Note** The guidelines in this document are specific to the NI cDAQ-9181. The other components in the system might not meet the same ratings. Refer to the documentation for each component in the system to determine the safety and EMC guidelines for the entire system.

Safety Guidelines

 **Caution** Do not operate the NI cDAQ-9181 in a manner not specified in this user manual. 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.

 **Note** Because some C Series modules may have more stringent certification standards than the NI cDAQ-9181, the combined system may be limited by individual component restrictions. Refer to the *NI cDAQ-9181 Specifications* for more details.

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


Safety Voltages


Connect only voltages that are within these limits.

V terminal to C terminal

30 V maximum, 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 the system to signals or use for measurements within Measurement Categories II, III, or IV.


 **Note** Measurement Categories CAT I and CAT O (Other) are equivalent. These test and measurement circuits are not intended for direct connection to the MAINS building installations of Measurement Categories CAT II, CAT III, or CAT IV.


Safety Guidelines for Hazardous Locations


The NI cDAQ-9181 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 Gc and Ex nA IIC T4 Gc hazardous locations; and nonhazardous locations only. Follow these guidelines if you are installing the NI cDAQ-9181 in a potentially explosive environment. Not following these guidelines may result in serious injury or death.


 **Caution** Do not disconnect the power supply wires and connectors from the controller unless power has been switched off.

 **Caution** When operating the cDAQ-9181 in hazardous locations, you must use the power connector with a power supply rated for hazardous locations. The power supply included in the cDAQ-9181 kit is not hazardous locations-certified. Visit ni.com to find hazardous locations-certified power supplies.


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


 **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 Division 2 and Zone 2 applications, install the system in an enclosure rated to at least IP54 as defined by IEC/EN 60079-15.


Special Conditions for Hazardous Locations Use in Europe and Internationally

The cDAQ-9181 has been evaluated as Ex nA IIC T4 Gc equipment under DEMKO 12 ATEX 1202658X and is IECEx UL 14.0089X certified. Each device is marked  II 3G and is suitable for use in Zone 2 hazardous locations, in ambient temperatures of $0\text{ }^{\circ}\text{C} \leq T_a \leq 55\text{ }^{\circ}\text{C}$.


 **Caution** You must make sure that transient disturbances do not exceed 140% of the rated voltage.


 **Caution** The system shall only be used in an area of not more than Pollution Degree 2, as defined in IEC/EN 60664-1.


 **Caution** The system shall be mounted in an ATEX/IECEx-certified enclosure with a minimum ingress protection rating of at least IP54 as defined in IEC/EN 60079-15.

 **Caution** The enclosure must have a door or cover accessible only by the use of a tool.


Power Requirements

 **Caution** The protection provided by the NI cDAQ-9181 chassis can be impaired if it is used in a manner not described in the *NI cDAQ-9181/9184/9188/9191 User Manual*.

 **Note** Some C Series modules have additional power requirements. For more information about C Series module power requirements, refer to the documentation for each C Series module.

 **Note** Sleep mode for C Series modules is not supported in the NI cDAQ-9181.

Voltage input range	9 V to 30 V
Maximum power consumption ¹	5 W

 **Note** The maximum power consumption specification is based on a fully populated system running a high-stress application at elevated ambient temperature and with all C Series modules consuming the maximum allowed power.

Physical Characteristics

Screw-terminal wiring


Gauge	0.5 mm ² to 2.1 mm ² (20 AWG to 14 AWG) copper conductor wire
Wire strip length	6 mm (0.24 in.) of insulation stripped from the end
Temperature rating	85 °C
Torque for screw terminals	0.20 N · m to 0.25 N · m (1.8 lb · in. to 2.2 lb · in.)
Wires per screw terminal	One wire per screw terminal

Connector securement

Securement type	Screw flanges provided
Torque for screw flanges	0.20 N · m to 0.25 N · m (1.8 lb · in. to 2.2 lb · in.)


Wiring Power to the NI cDAQ-9181

The NI cDAQ-9181 requires an external power source as described in the [Power Requirements](#) section. The NI cDAQ-9181 filters and regulates the supplied power and provides power to all of the modules. The POWER LED on the front panel identifies when the power input is in use.

 **Caution** To ensure the specified EMC performance, do not connect the power connector to a DC MAINS supply or to any supply requiring a connecting cable longer than 3 m (10 ft). A DC MAINS supply is a local DC electricity supply network in the infrastructure of a site or building.

Complete the following steps to connect a power source to the NI cDAQ-9181.

1. Make sure the power source is turned off.
2. If connected, loosen the connector screw flanges and remove the power screw terminal connector plug from the NI cDAQ-9181.

 **Note** Do not tighten or loosen the terminal screws on the power connector while the power is on.

3. Connect the positive lead of the primary power source to the V terminal of the power connector plug and tighten the terminal screw.
4. Connect the negative lead of the primary power source to the C terminal of the power screw terminal connector plug and tighten the terminal screw.
5. Install the power connector plug on the front panel of the NI cDAQ-9181 and tighten the connector screw flanges.
6. Turn on the external power source.

If the power source is connected to the power connector using long wiring with high DC resistance, the voltage at the power connector may be significantly lower than the specified voltage of the power source.


The C terminal is not connected to chassis ground. You can connect the C terminal to chassis ground externally. Refer to the [Power Requirements](#) section for information about the power supply input range. Refer to the [Safety Guidelines](#) section for information about the maximum voltage from terminal to chassis ground.

¹ Includes maximum 1 W module load per slot across rated temperature and product variations.

Preparing the Environment


Ensure that the environment you are using the NI cDAQ-9181 in meets the following specifications.

Operating temperature (IEC 60068-2-1 and IEC 60068-2-2)	0 °C to 55 °C
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 Caution	To maintain product performance and accuracy specifications when the ambient temperature is between 45 and 55 °C, you must mount the chassis horizontally to a metal panel or surface using the screw holes or the panel mount kit. Measure the ambient temperature at each side of the CompactDAQ system 63.5 mm (2.5 in.) from the side and 25.4 mm (1.0 in.) from the rear cover of the system. For further information about mounting configurations, go to ni.com/info and enter the Info Code <code>cdqamounting</code> .
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Pollution Degree (IEC 60664)	2
Maximum altitude	5,000 m

Indoor use only.


 **Note** Refer to the *NI cDAQ-9181 Specifications* for complete specifications.


Electromagnetic Compatibility Guidelines


This product was tested and complies with the regulatory requirements and limits for electromagnetic compatibility (EMC) stated in the product specifications. These requirements and limits provide reasonable protection against harmful interference when the product is operated in the intended operational electromagnetic environment.

This product is intended for use in industrial locations. However, harmful interference may occur in some installations, when the product is connected to a peripheral device or test object, or if the product is used in residential or commercial areas. To minimize interference with radio and television reception and prevent unacceptable performance degradation, install and use this product in strict accordance with the instructions in the product documentation.

Furthermore, any changes or modifications to the product not expressly approved by National Instruments could void your authority to operate it under your local regulatory rules.


 **Caution** To ensure the specified EMC performance, product installation requires either special considerations or user-installed add-on devices. Refer to the *NI cDAQ-9181/9184/9188/9191 User Manual* for further information.

 **Caution** To ensure the specified EMC performance, operate this product only with shielded cables and accessories. Note that the input DC power cables may be unshielded.

 **Caution** To ensure the specified EMC performance, do not connect the power connector to a DC MAINS supply or to any supply requiring a connecting cable longer than 3 m (10 ft). A DC MAINS supply is a local DC electricity supply network in the infrastructure of a site or building.

Special Conditions for Marine Applications

Some products are Lloyd's Register (LR) Type Approved for marine (shipboard) applications. To verify Lloyd's Register certification for a product, visit ni.com/certification and search for the LR certificate, or look for the Lloyd's Register mark on the product.

 **Caution** In order to meet the EMC requirements for marine applications, install the product in a shielded enclosure with shielded and/or filtered power and input/output ports. In addition, take precautions when designing, selecting, and installing measurement probes and cables to ensure that the desired EMC performance is attained.

Where to Go Next

The following documents contain information that you may find helpful as you use this document:

- *NI cDAQ-9181/9184/9188/9191 User Manual*
- *NI cDAQ-9181 Specifications*

Worldwide Support and Services

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