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# NI-9475 Getting Started

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## Before You Begin

Read the **NI-9475 Safety, Environmental, and Regulatory Information** and complete the software and hardware installation procedures in your chassis documentation.

### Safety Guidelines



**Caution** Observe all instructions and cautions in the user documentation. Using the product in a manner not specified can damage the product and compromise the built-in safety protection.



**Attention** Suivez toutes les instructions et respectez toutes les mises en garde de la documentation d'utilisation. L'utilisation du produit de toute autre façon que celle spécifiée risque de l'endommager et de compromettre la protection de sécurité intégrée.

### Safety Voltages

Connect only voltages that are within the following limits:

Vsup-to-COM	60 V DC maximum, Measurement Category I
<b>Isolation</b>	
Channel-to-channel	None
<b>Channel-to-earth ground</b>	
Continuous	60 V DC, Measurement Category I
Withstand	1,000 V RMS, verified by a 5 s dielectric withstand test

## Safety Guidelines for Hazardous Voltages



**Caution** Ensure that hazardous voltage wiring is performed only by qualified personnel adhering to local electrical standards.



**Caution** Do not mix hazardous voltage circuits and human-accessible circuits on the same module.



**Caution** Ensure that devices and circuits connected to the module are properly insulated from human contact.



**Caution** When module terminals are hazardous voltage LIVE ( $>42.4 V_{pk}/60 V$  DC), you must ensure that devices and circuits connected to the module are properly insulated from human contact.

## Safety Guidelines for Hazardous Locations

The NI-9475 is suitable for use in hazardous locations; , and hazardous locations; and nonhazardous locations only. Follow these guidelines if you are installing the NI-9475 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.



**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, or Zone 2.



**Caution** The system must be installed in an enclosure certified for the intended hazardous (classified) location, having a tool secured cover/door, where a minimum protection of at least IP54 is provided.

## Special Conditions for Hazardous Locations Use in Europe and Internationally

The NI-9475 has been evaluated as equipment under DEMKO ATEX and is IECEx certified. Each NI-9475 is marked and is suitable for use in Zone 2 hazardous locations, in ambient temperatures of  $-40\text{ °C} \leq T_a \leq 70\text{ °C}$ . If you are using the NI-9475 in Gas Group IIC hazardous locations, you must use the device in an NI chassis that has been evaluated as Ex nC IIC T4, Ex IIC T4, Ex nA IIC T4, or Ex nL IIC T4 equipment.



**Caution** Transient protection shall be provided that is set at a level not exceeding 140% of the peak rated voltage value of 85 V at the supply terminals to the equipment.



**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.

## 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.

## Special Conditions for Marine Applications

Some products are approved for marine (shipboard) applications. To verify marine approval certification for a product, visit [ni.com/product-certifications](https://ni.com/product-certifications), search by model number, and click the appropriate link.



**Notice** 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.

## Preparing the Environment

Ensure that the environment in which you are using the NI-9475 meets the following specifications.

Operating temperature (IEC 60068-2-1, IEC 60068-2-2)	-40 °C to 70 °C
Operating humidity (IEC 60068-2-78)	10% RH to 90% RH, noncondensing
Pollution Degree	2
Maximum altitude	2,000 m

Indoor use only.

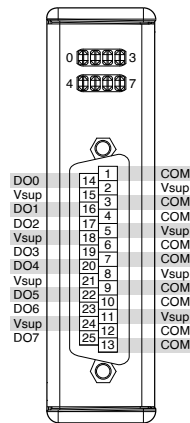


**Note** Refer to the device datasheet on [ni.com/manuals](http://ni.com/manuals) for complete specifications.

## Connecting the NI 9475

The NI 9475 provides connections for eight digital output channels.

Figure 1. NI 9475 Pinout



## Signals

Each channel of the NI 9475 has a DO pin to which you can connect a device. Each channel also has a COM pin and a Vsup pin. NI recommends you provide independent COM and Vsup wiring for each channel to minimize current flow in the COM and Vsup wiring. The COM pins are all connected together internally. Each channel has an LED that indicates the state of the channel. When a channel LED is lit, the channel is on. When the LED is dark, the channel is off.

## Connecting an External Power Supply

You must connect an external power supply to the NI 9475. This power supply provides the current for the devices you connect to the module. Connect the positive lead of the power supply to Vsup and the negative lead of the power supply to COM.



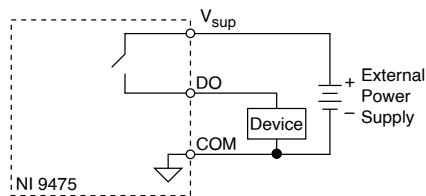
**Caution** Do not remove or insert modules if the external power supply connected to the Vsup and COM pins is powered on.

The NI 9475 has current sourcing outputs, which means the DO pin is driven to  $V_{sup}$  when the channel is turned on.

## Connecting a Device

You can directly connect the NI 9475 to a variety of industrial devices such as solenoids, motors, actuators, relays, and lamps. Make sure the devices you connect to the NI 9475 are compatible with the output specifications of the module. Connect the device to DO and connect the common of the device to COM.

Figure 2. Connecting a Device to the NI 9475

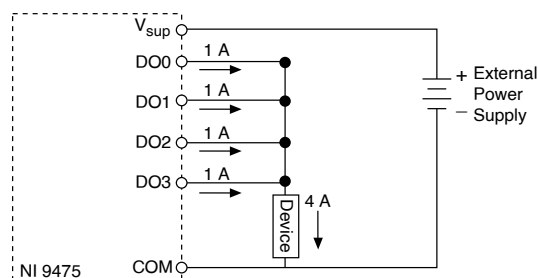


**Note** When the device is off, DO is not connected to COM. For large source impedances, you must use a pull-down resistor between DO and COM. Visit [ni.com/info](http://ni.com/info) and enter the Info Code CSeriesDOPulseGen for more information.

## Increasing Current Drive

Each channel has a continuous output current of 1 A. If you want to increase the output current to a device, you can connect any number of channels together in parallel. For example, if you want to drive 4 A of current, connect DO<0..3> in parallel as shown in the following figure. You must turn all parallel channels on and off simultaneously so that the current on any single channel cannot exceed the 1 A rating.

Figure 3. Increasing the Current to a Device Connected to the NI 9475





## I/O Protection

The NI-9475 provides short-circuit protection.

Each channel has circuitry that protects it from current surges resulting from short circuits over .



**Note** Refer to the device datasheet at [ni.com/manuals](https://ni.com/manuals) for maximum continuous output current, short-circuit behavior, and short-circuit trip time specifications and information about conditions that may damage the module.



**Note** Refer to the IEC 61131-2 standard for more information about short-circuit-proof devices.



**Note** Because the NI-9475 includes internal flyback diodes, you do not need to add external diodes when connecting to switching devices that store energy.

## Detecting an Overcurrent Condition

If a device connected to the module is not working while the channel is on, the module channel may be in an overcurrent state. Neither the software nor the module LEDs indicate if an overcurrent condition occurs. A channel LED may be on even if the channel is off because of an overcurrent condition.

To determine if the channel is in an overcurrent state, measure the voltage between DO and Vsup. If the voltage is equal to the voltage of the external power supply connected to the module, the channel is in an overcurrent state.

## Power Supplies and Overcurrent Conditions

If a short-circuit occurs, the current through DO can exceed the current rating for the power supply and the maximum continuous output current for the NI 9475.

If the power supply you are using with the NI 9475 cannot supply more than 13 A, the module may be damaged if a short-circuit condition occurs.

## Resetting Channels after an Overcurrent Condition

After you have determined and fixed the cause of an overcurrent condition, reset the channel by turning it off.

Alternatively, you can disconnect the external power supply from the chassis.

However, doing so disconnects power from all the module channels.

Normal operation can resume after you correct the overcurrent condition and reset the channel.

## Where to Go Next

### NI Services

Visit [ni.com/support](https://ni.com/support) to find support resources including documentation, downloads, and troubleshooting and application development self-help such as tutorials and examples.

Visit [ni.com/services](https://ni.com/services) to learn about NI service offerings such as calibration options, repair, and replacement.

Visit [ni.com/register](https://ni.com/register) to register your NI product. Product registration facilitates technical support and ensures that you receive important information updates from NI.

NI corporate headquarters is located at 11500 N Mopac Expwy, Austin, TX, 78759-3504, USA.