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# NI-9472

# Specifications

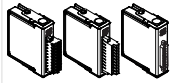
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# NI-9472 Datasheet



- DSUB, screw terminal, or spring terminal connectivity
- CompactDAQ counter compatibility
- 250 V RMS, CAT II, channel-to-earth isolation (screw and spring terminal); 60 V DC, CAT I, channel-to-earth isolation (DSUB)

The NI-9472 is a digital output module for CompactDAQ and CompactRIO systems. Each channel is compatible with 6 V to 30 V signals and features 2,300 Vrms of transient overvoltage protection between the output channels and the backplane. Each channel also has an LED that indicates the state of that channel. With the NI-9472, you can connect directly to a variety of industrial devices such as motors, actuators, and relays.

There are three connector options for the NI-9472—a 10-position screw-terminal connector, a 10-position spring-terminal connector, and a 25-position DSUB connector. This industry-standard 25-position DSUB connector provides for low-cost cabling to a wide variety of accessories available from NI or other vendors. A number of vendors with custom DSUB cable fabrication services can deliver cables with a pinout that matches your exact application needs.

 <p>Kit Contents</p>	<ul style="list-style-type: none"> <li>• NI 9472</li> <li>• NI 9472 Getting Started Guide</li> </ul>
 <p>Required Accessories</p>	<ul style="list-style-type: none"> <li>• NI 9927 Backshell Connector Kit (screw terminal)</li> <li>• NI 9981 Backshell Connector Kit (spring terminal)</li> <li>• NI 9924 Screw-Terminal Block (DSUB)</li> </ul>

C SERIES DIGITAL OUTPUT MODULE COMPARISON							
Name	Type	Output	Channels	Rate	Current	Connectivity	Isolation
NI 9375	Sourcing Output	30 V DC	16	7 $\mu$ s	100 mA/ch	Spring Terminal, 37-Pin DSUB	250 V RMS Ch-Earth (Spring) 60 V DC Ch-Earth (DSUB)
NI 9472	Sourcing Output	30 V	8	100 $\mu$ s	750 mA/ch	Screw Terminal, Spring Terminal, 25-Pin DSUB	250 V RMS Ch-Earth (Screw/Spring) 60 V DC Ch-Earth (DSUB)
NI 9474	Sourcing Output	30 V	8	1 $\mu$ s	1 A/ch	Screw Terminal, Spring Terminal	250 V RMS Ch-Earth
NI 9475	Sourcing Output	60 V	8	1 $\mu$ s	1 A/ch	25-Pin DSUB	60 V DC Ch-Earth
NI 9476	Sourcing Output	36 V	32	500 $\mu$ s	250 mA/ch	Spring Terminal, 37-Pin DSUB	250 V RMS Ch-Earth (Spring) 60 V DC Ch-Earth (DSUB)
NI 9477	Sinking Output	60 V	32	8 $\mu$ s	1 A/ch (20 A/module)	37-Pin DSUB	60 V DC Ch-Earth
NI 9478	Sinking Output	60 V	16	7 $\mu$ s	1.2 A/ch	37-Pin DSUB	60 V DC Ch-Earth

## NI C Series Overview



NI provides more than 100 C Series modules for measurement, control, and communication applications. C Series modules can connect to any sensor or bus and allow for high-accuracy measurements that meet the demands of advanced data acquisition and control applications.

- Measurement-specific signal conditioning that connects to an array of sensors and signals
- Isolation options such as bank-to-bank, channel-to-channel, and channel-to-earth ground
- -40 °C to 70 °C temperature range to meet a variety of application and environmental needs
- Hot-swappable

The majority of C Series modules are supported in both CompactRIO and CompactDAQ platforms and you can move modules from one platform to the other with no modification.

## CompactRIO



CompactRIO combines an open-embedded architecture with small size, extreme ruggedness, and C Series modules in a platform powered by the NI LabVIEW reconfigurable I/O (RIO) architecture. Each system contains an FPGA for custom timing, triggering, and processing with a wide array of available modular I/O to meet any embedded application requirement.

## CompactDAQ

CompactDAQ is a portable, rugged data acquisition platform that integrates connectivity, data acquisition, and signal conditioning into modular I/O for directly interfacing to any sensor or signal. Using CompactDAQ with LabVIEW, you can easily customize how you acquire, analyze, visualize, and manage your measurement data.



## Software

### LabVIEW Professional Development System for Windows



- Use advanced software tools for large project development
- Generate code automatically using DAQ Assistant and Instrument I/O Assistant
- Use advanced measurement analysis and digital signal processing

### LabVIEW Professional Development System for Windows

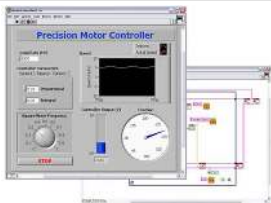
- Take advantage of open connectivity with DLLs, ActiveX, and .NET objects
- Build DLLs, executables, and MSI installers

### NI LabVIEW FPGA Module



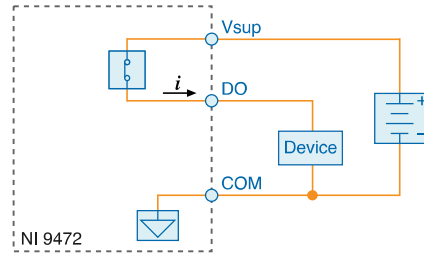
- Design FPGA applications for NI RIO hardware
- Program with the same graphical environment used for desktop and real-time applications
- Execute control algorithms with loop rates up to 300 MHz
- Implement custom timing and triggering logic, digital protocols, and DSP algorithms
- Incorporate existing HDL code and third-party IP including Xilinx IP generator functions
- Purchase as part of the LabVIEW Embedded Control and Monitoring Suite

### NI LabVIEW Real-Time Module



- Design deterministic real-time applications with LabVIEW graphical programming
- Download to dedicated NI or third-party hardware for reliable execution and a wide selection of I/O
- Take advantage of built-in PID control, signal processing, and analysis functions
- Automatically take advantage of multicore CPUs or set processor affinity manually
- Take advantage of real-time OS, development and debugging support, and board support
- Purchase individually or as part of a LabVIEW suite

## NI-9472 Circuitry



- The DO channels are internally referenced to COM.
- The NI-9472 has sourcing outputs. Sourcing outputs drive current from Vsup to DO when the channel is on.

**Tip** For more information about sourcing outputs, visit [ni.com/info](https://ni.com/info) and enter the Info Code sinksource.

## NI-9472 Specifications

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

**Caution** Do not operate the NI-9472 in a manner not specified in this document. 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 NI for repair.

## Output Characteristics

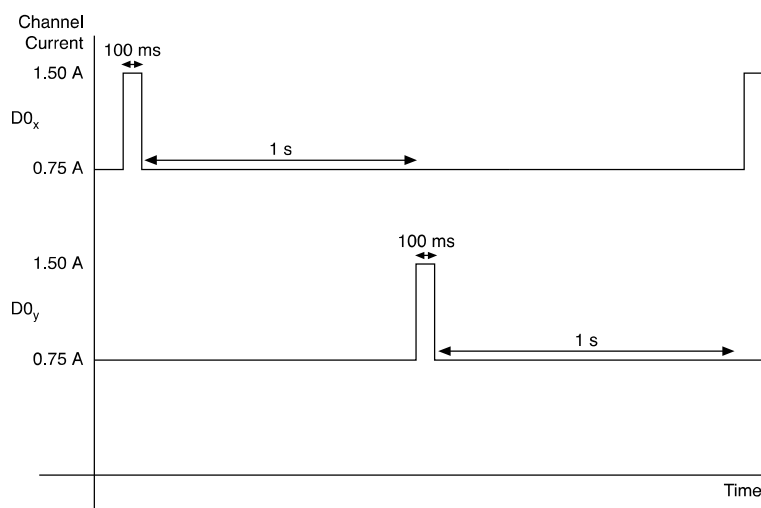
Number of channels	8 digital output channels
Output type	Sourcing
Power-on output state	Channels off
External power supply voltage range (Vsup)	6 VDC to 30 VDC
<b>Output impedance (R<sub>0</sub>)</b>	
Typical	0.07 Ω

Maximum	0.13 Ω
Continuous output current ( $I_0$ ), per channel	0.75 A maximum
Output voltage ( $V_0$ )	$V_{sup} - (I_0 \cdot R_0)$
<b>I/O protection</b>	
Voltage	30 VDC maximum
Reversed voltage	None
Short circuit trip time	10 μs at 14 A

Current	Channel Behavior	Module Protection
Less than .75 A	Channel does not trip	Module is not damaged
.75 A to 1.5 A for 100 ms maximum, repeatable after 1 s <sup>[1]</sup>	Channel does not trip	Module is not damaged
1.5 A to 4.4 A	Channel does not trip	Module may be damaged
4.4 A to 14 A	Channel may trip	Module may be damaged
Greater than 14 A	Channel trips	Module is not damaged

Table 1. Short-circuit Behavior

Figure 1. Short-circuit Behavior



Output delay time (full load)	100 μs maximum
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MTBF	1,113,301 hours at 25 °C; Bellcore Issue 2, Method 1, Case 3, Limited Part Stress Method
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## Power Requirements

<b>Power consumption from chassis</b>	
Active mode	230 mW maximum
Sleep mode	0.4 mW maximum
<b>Thermal dissipation (at 70 °C)</b>	
Active mode	1.5 W maximum
Sleep mode	55 mW maximum

## Physical Characteristics

<b>Spring-terminal wiring</b>	
Gauge	0.2 mm <sup>2</sup> to 2.5 mm <sup>2</sup> (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
<b>Connector securement</b>	
Securement type	Screw flanges provided
Torque for screw flanges	0.2 N · m (1.80 lb · in.)
<b>Weight</b>	
NI-9472 with screw terminal	150 g (5.3 oz)
NI-9472 with spring terminal	139 g (4.9 oz)

NI-9472 with DSUB

145 g (5.1 oz)

## NI-9472 with Screw Terminal and Spring Terminal Safety Voltages

Connect only voltages that are within the following limits.

Channel-to-COM	30 VDC maximum
<b>Isolation</b>	
Channel-to-channel	None
<b>Channel-to-earth ground</b>	
Continuous	250 Vrms, Measurement Category II
Withstand	2,300 Vrms, verified by a 5 s dielectric withstand test

**Caution** Do not connect the product 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.

## NI-9472 with DSUB Safety Voltages

Connect only voltages that are within the following limits.

Channel-to-COM	30 VDC maximum
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**Isolation**

Channel-to-channel	None
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**Channel-to-earth ground**

Continuous	60 VDC, Measurement Category I
Withstand	1,000 Vrms, verified by a 5 s dielectric withstand test

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

**Attention** Ne pas connecter le produit 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 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.

## Hazardous Locations

U.S. (UL)	Class I, Division 2, Groups A, B, C, D, T4; Class I, Zone 2, AEx nA IIC T4 Gc
Canada (C-UL)	Class I, Division 2, Groups A, B, C, D, T4; Ex nA IIC T4 Gc
Europe (ATEX) and International (IECEX)	Ex nA IIC T4 Gc DEMKO 03 ATEX 0324020X IECEX UL 14.0089X

## Safety Compliance and Hazardous Locations Standards

This product is designed to meet the requirements of the following electrical equipment safety standards for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 61010-1, CSA C22.2 No. 61010-1
- EN 60079-0, EN 60079-7
- IEC 60079-0, IEC 60079-7
- UL 60079-0, UL 60079-7
- CSA C22.2 No. 60079-0, CSA C22.2 No. 60079-7

**Note** For safety certifications, refer to the product label or the [Product Certifications and Declarations](#) section.

## Electromagnetic Compatibility

- EN 61326 EMC requirements; Minimum Immunity
- EN 55011 Emissions; Group 1, Class A
- CE, C-Tick, ICES, and FCC Part 15 Emissions; Class A

**Notice** To ensure the specified EMC performance, operate this product only with shielded cables and accessories.

## CE Compliance

- 2014/34/EU; Potentially Explosive Atmospheres (ATEX)

## Product Certifications and Declarations

Refer to the product Declaration of Conformity (DoC) for additional regulatory compliance information. To obtain product certifications and the DoC for NI

products, visit [ni.com/product-certifications](https://ni.com/product-certifications), search by model number, and click the appropriate link.

## Shock and Vibration

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

<b>Operating vibration</b>	
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

## Environmental

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

Operating temperature (IEC 60068-2-1, IEC 60068-2-2)	-40 °C to 70 °C
Storage temperature (IEC 60068-2-1, IEC 60068-2-2)	-40 °C to 85 °C
Ingress protection	IP40
Operating humidity (IEC 60068-2-30)	10% RH to 90% RH, noncondensing
Storage humidity (IEC 60068-2-30)	5% RH to 95% RH, noncondensing
Pollution Degree	2
Maximum altitude	2,000 m


Indoor use only.

## 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 **Engineering a Healthy Planet** web page at [ni.com/environment](https://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.

## EU and UK Customers

-  **Waste Electrical and Electronic Equipment (WEEE)**—At the end of the product life cycle, all NI products must be disposed of according to local laws and regulations. For more information about how to recycle NI products in your region, visit [ni.com/environment/weee](https://ni.com/environment/weee).

## 电子信息产品污染控制管理办法（中国 RoHS）

-  **中国 RoHS**— NI 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 NI 中国 RoHS 合规性信息，请登录 [ni.com/environment/rohs\\_china](https://ni.com/environment/rohs_china)。(For information about China RoHS compliance, go to [ni.com/environment/rohs\\_china](https://ni.com/environment/rohs_china).)

 One channel at a time.