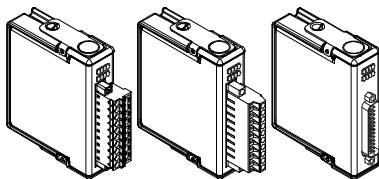


## DATASHEET

# NI 9472



8 DO, 6 V to 30 V, Sourcing, 100  $\mu$ s



- DSUB, screw-terminal, or spring-terminal connectivity
- CompactDAQ counter compatibility
- 250 Vrms, CAT II, channel-to-earth isolation (screw and spring terminal); 60 VDC, 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.

	Kit Contents	<ul style="list-style-type: none"><li>• NI 9472</li><li>• NI 9472 Getting Started Guide</li></ul>
	Required Accessories	<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						
Product Name	Module Type	Maximum Output	Channels	Update Rate	Continuous Current	Connectivity
NI 9375	Sourcing Output	30 VDC	16	7 $\mu$ s	100 mA/ch	Screw-Terminal, 37-Pin DSUB
NI 9472	Sourcing Output	30 V	8	100 $\mu$ s	750 mA/ch	Screw-Terminal, 25-Pin DSUB, Spring-Terminal
NI 9474	Sourcing Output	30 V	8	1 $\mu$ s	1 A/ch	Screw-Terminal, Spring-Terminal
NI 9475	Sourcing Output	60 V	8	1 $\mu$ s	1 A/ch	25-Pin DSUB
NI 9476	Sourcing Output	36 V	32	500 $\mu$ s	250 mA/ch	37-Pin DSUB
NI 9477	Sinking Output	60 V	32	8 $\mu$ s	1 A/ch (20 A/module)	37-Pin DSUB
NI 9478	Sinking Output	60 V	16	7 $\mu$ s	1.2 A/ch	37-Pin DSUB

## 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.



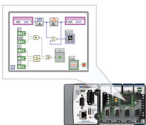
# Software

## LabVIEW Professional Development System for Windows



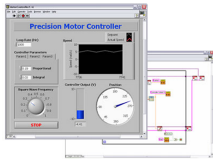
- Use advanced software tools for large project development
- Generate code automatically using DAQ Assistant and Instrument I/O Assistant
- Use advanced measurement analysis and digital signal processing
- Take advantage of open connectivity with DLLs, ActiveX, and .NET objects
- Build DLLs, executables, and MSI installers

## NI LabVIEW FPGA Module



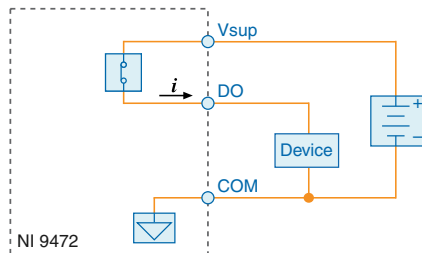
- Design FPGA applications for NI RIO hardware
- Program with the same graphical environment used for desktop and real-time applications
- Execute control algorithms with loop rates up to 300 MHz
- Implement custom timing and triggering logic, digital protocols, and DSP algorithms
- Incorporate existing 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 or 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  $V_{sup}$  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 `sinksources`.

## NI 9472 Specifications

The following specifications are typical for the range  $-40\text{ }^{\circ}\text{C}$  to  $70\text{ }^{\circ}\text{C}$  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

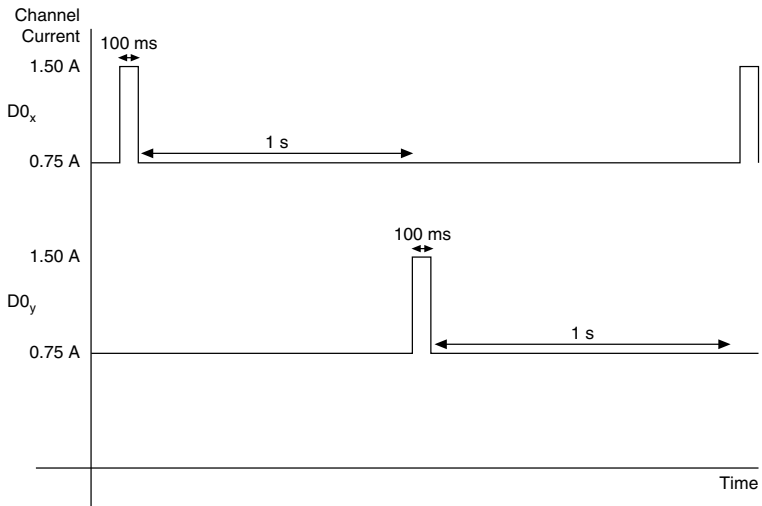
Number of channels	8 digital output channels
Output type	Sourcing
Power-on output state	Channels off
External power supply voltage range (V <sub>sup</sub> )	6 VDC to 30 VDC
Output impedance (R <sub>0</sub> )	
Typical	0.07 Ω
Maximum	0.13 Ω
Continuous output current (I <sub>0</sub> ), per channel	0.75 A maximum
Output voltage (V <sub>0</sub> )	V <sub>sup</sub> - (I <sub>0</sub> · R <sub>0</sub> )
I/O protection	
Voltage	30 VDC maximum
Reversed voltage	None
Short circuit trip time	10 μs at 14 A

**Table 1.** Short-circuit Behavior

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

<sup>1</sup> One channel at a time.

**Figure 1. Short-circuit Behavior**



Output delay time (full load)

100  $\mu$ s maximum

MTBF

1,113,301 hours at 25 °C; Bellcore Issue 2, Method 1, Case 3, Limited Part Stress Method

## Power Requirements

Power consumption from chassis

Active mode

230 mW maximum

Sleep mode

0.4 mW maximum

Thermal dissipation (at 70 °C)

Active mode

1.5 W maximum

Sleep mode

55 mW maximum

# Physical Characteristics

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



**Tip** For two-dimensional drawings and three-dimensional models of the C Series module and connectors, visit [ni.com/dimensions](https://ni.com/dimensions) and search by module number.

## Screw-terminal wiring

Gauge	0.2 mm <sup>2</sup> to 2.5 mm <sup>2</sup> (26 AWG to 14 AWG) copper conductor wire
Wire strip length	13 mm (0.51 in.) of insulation stripped from the end
Temperature rating	90 °C minimum
Torque for screw terminals	0.5 N · m to 0.6 N · m (4.4 lb · in. to 5.3 lb · in.)
Wires per screw terminal	One wire per screw terminal; two wires per screw terminal using a 2-wire ferrule
Ferrules	0.25 mm <sup>2</sup> to 2.5 mm <sup>2</sup>

## Spring-terminal wiring

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
Ferrules	0.25 mm <sup>2</sup> to 2.5 mm <sup>2</sup>

## Connector securement

Securement type	Screw flanges provided
Torque for screw flanges	0.2 N · m (1.80 lb · in.)

## Weight

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
Isolation	
Channel-to-channel	None
Channel-to-earth ground	
Continuous	250 Vrms, Measurement Category II
Withstand	2,300 Vrms, verified by a 5 s dielectric withstand test

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.



**Caution** Do not connect the NI 9472 to signals or use for measurements within Measurement Categories III or IV.

## NI 9472 with DSUB Safety Voltages

Connect only voltages that are within the following limits.

Channel-to-COM	30 VDC maximum
Isolation	
Channel-to-channel	None
Channel-to-earth ground	
Continuous	60 VDC, Measurement Category I
Withstand	1,000 Vrms, verified by a 5 s dielectric withstand test

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 NI 9472 to signals or use for measurements within Measurement Categories II, III, or IV.





**Note** Measurement Categories CAT I and CAT O 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.

## Hazardous Locations

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

## Safety 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 61010-1
- EN 60079-0:2012, EN 60079-15:2010
- IEC 60079-0: Ed 6, IEC 60079-15; Ed 4
- UL 60079-0; Ed 5, UL 60079-15; Ed 3
- CSA 60079-0:2011, CSA 60079-15:2012



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

## Electromagnetic Compatibility

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

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



**Note** For EMC declarations and certifications, and additional information, refer to the [Online Product Certification](#) section.



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

# CE Compliance

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

- 2014/35/EU; Low-Voltage Directive (safety)
- 2014/30/EU; Electromagnetic Compatibility Directive (EMC)
- 94/9/EC; Potentially Explosive Atmospheres (ATEX)

## 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](https://ni.com/certification), search by model number or product line, and click the appropriate link in the Certification column.

## Shock and Vibration

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

### Operating vibration

Random (IEC 60068-2-64)	5 g <sub>rms</sub> , 10 Hz to 500 Hz
Sinusoidal (IEC 60068-2-6)	5 g, 10 Hz 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

## 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 60068-2-78)	10% RH to 90% RH, noncondensing
Storage humidity (IEC 60068-2-78)	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 *Minimize Our Environmental Impact* web page at [ni.com/environment](http://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.

## Waste Electrical and Electronic Equipment (WEEE)



**EU Customers** 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](http://ni.com/environment/weee).

## 电子信息产品污染控制管理办法（中国 RoHS）



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