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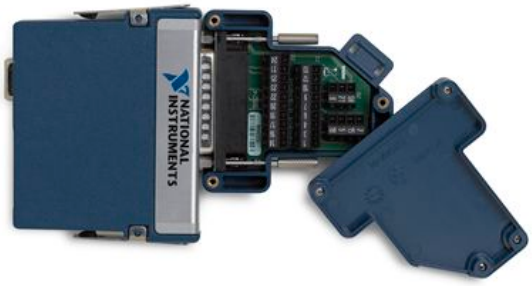
NI 9472

24 V, Sourcing Digital Output, 8 Ch Module



- 8 channels, 100 µs digital output
- 6 V to 30 V range (depends on external supply), sourcing digital outputs
- Compatibility with NI CompactDAQ counters
- 60 VDC, CAT I (D-SUB), or 250 Vrms, CAT II (screw-terminal) isolation
- 25-pin D-SUB or 10-position screw-terminal connector options
- -40 °C to 70 °C operating, 5 g vibration, 50 g shock

Overview

The NI 9472 is an 8-channel, 100 µs sourcing digital output module for any NI CompactDAQ or CompactRIO chassis. 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.

You can choose from two connector options for the NI 9472: a 10-position screw-terminal connector and a 25-position D-SUB connector. The industry-standard 25-position D-SUB connector provides for low-cost cabling to a wide variety of accessories from NI or other vendors. A number of vendors with custom D-SUB cable fabrication services can deliver cables with a pinout that matches your exact application needs.

Recommended Accessories
-NI 9924 front-mount 25-pin D-SUB to screw terminal (for D-SUB variant)
-NI 9927 strain relief and operator protection (for screw-terminal variant)

Optional Accessories
-NI 9936 extra screw-terminal block (quantity 10)
-NI 9980 extra spring-terminal block (quantity 10)
Note: The NI 9980 is not compatible with the NI 9927 and must be used with low or nonhazardous voltages or installed in a properly rated enclosure.

Box Contents
-1 NI 9472 C Series module
-1 NI 9472 Operating Instructions and Specifications manual
-1 NI 9936 10-position connector (for screw-terminal variant)

Back to Top

Comparison Tables

Product Name	Signal Levels	Direction	Channels	Update Rate	Continuous Current	Connectivity
NI 9375	12, 24 V	Sinking Input, Sourcing Output	16 In, 16 Out	7 µs In, 500 µs Out	100 mA/ch	Spring Terminal, 37-Pin D-SUB
NI 9472	12, 24 V	Sourcing Output	8	100 µs	750 mA/ch	Screw Terminal, 25-Pin D-SUB
NI 9474	5, 12, 24 V	Sourcing Output	8	1 µs	1 A/ch	Screw Terminal
NI 9475	5, 12, 24, 48, 60 V	Sourcing Output	8	1 µs	1 A/ch	25-Pin D-SUB
NI 9476	12, 24 V	Sourcing Output	32	500 µs	250 mA/ch	37-Pin D-SUB
NI 9477	5, 12, 24, 48, 60 V	Sinking Output	32	8 µs	1 A/ch (20 A per Module)	37-Pin D-SUB
NI 9478	5, 12, 24, 48 V	Sinking Output	16	7 µs	1.2 A/ch	37-Pin D-SUB

Back to Top

Application and Technology

NI C Series Overview

NI C Series modules are designed to provide high-accuracy measurements to meet the demands of advanced DAQ and control applications. Each module contains measurement-specific signal conditioning to connect to an array of sensors and signals, bank and channel-to-channel isolation options, and support for wide temperature ranges to meet a variety of application and environmental needs all in a single rugged package. You can choose from more than 100 C Series modules for measurement, control, and communication to connect your applications to any sensor on any bus.

Most C Series I/O modules work with both the NI CompactDAQ and NI CompactRIO platforms. The modules are identical, and you can move them from one platform to the other with no modification.

NI CompactRIO Platform

Powered by the NI LabVIEW reconfigurable I/O (RIO) architecture, NI CompactRIO combines an open embedded architecture with small size, extreme ruggedness, and hot-swappable industrial I/O modules. 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.

Configure Your Complete NI CompactRIO System

NI CompactDAQ Platform

NI CompactDAQ is a portable, rugged data acquisition platform that integrates connectivity and signal conditioning into modular I/O to directly interface with any sensor or signal. Using NI CompactDAQ with LabVIEW, you can easily customize how you acquire, analyze, present, and manage your measurement data. From research to development to validation, NI provides programmable software, high-accuracy measurements, and local technical support to help ensure you meet your exact measurement application requirements.

Back to Top

Ordering Information

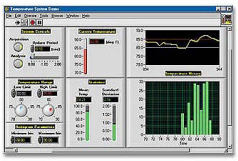
For a complete list of accessories, visit the product page on ni.com.

Products	Part Number	Recommended Accessories	Part Number
		No accessories required.	

Back to Top

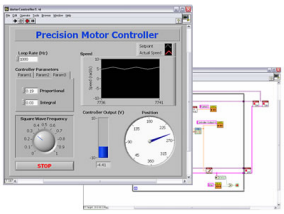
Software Recommendations

LabVIEW Professional Development System for Windows



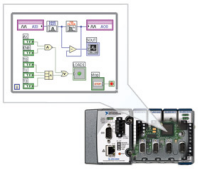
- Advanced software tools for large project development
- Automatic code generation using DAQ Assistant and Instrument I/O Assistant
- Tight integration with a wide range of hardware
- Advanced measurement analysis and digital signal processing
- Open connectivity with DLLs, ActiveX, and .NET objects
- Capability to build DLLs, executables, and MSI installers

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
- Includes real-time OS, development and debugging support, and board support
- Purchase individually or as part of a LabVIEW suite

NI LabVIEW FPGA Module



- Design FPGA applications for NI reconfigurable I/O (RIO) hardware targets
- 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 CORE Generator functions
- Included in the LabVIEW Embedded Control and Monitoring Suite

Back to Top

Support and Services

System Assurance Programs

NI system assurance programs are designed to make it even easier for you to own an NI system. These programs include configuration and deployment services for your NI PXI, CompactRIO, or Compact FieldPoint system. The NI Basic System Assurance Program provides a simple integration test and ensures that your system is delivered completely assembled in one box. When you configure your system with the NI Standard System Assurance Program, you can select from available NI system driver sets and application development environments to create customized, reorderable software configurations. Your system arrives fully assembled and tested in one box with your software preinstalled. When you order your system with the standard program, you also receive system-specific documentation including a bill of materials, an integration test report, a recommended maintenance plan, and frequently asked question documents. Finally, the standard program reduces the total cost of owning an NI system by providing three years of warranty coverage and calibration service. Use the online product advisors at ni.com/advisor to find a system assurance program to meet your needs.

Technical Support

Get answers to your technical questions using the following National Instruments resources.

- **Support** - Visit ni.com/support to access the NI KnowledgeBase, example programs, and tutorials or to contact our applications engineers who are located in NI sales offices around the world and speak the local language.
- **Discussion Forums** - Visit forums.ni.com for a diverse set of discussion boards on topics you care about.
- **Online Community** - Visit community.ni.com to find, contribute, or collaborate on customer-contributed technical content with users like you.

Repair

While you may never need your hardware repaired, NI understands that unexpected events may lead to necessary repairs. NI offers repair services performed by highly trained technicians who quickly return your device with the guarantee that it will perform to factory specifications. For more information, visit ni.com/repair.

Training and Certifications

The NI training and certification program delivers the fastest, most certain route to increased proficiency and productivity using NI software and hardware. Training builds the skills to more efficiently develop robust, maintainable applications, while certification validates your knowledge and ability.

- **Classroom training in cities worldwide** - the most comprehensive hands-on training taught by engineers.
- **On-site training at your facility** - an excellent option to train multiple employees at the same time.
- **Online instructor-led training** - lower-cost, remote training if classroom or on-site courses are not possible.
- **Course kits** - lowest-cost, self-paced training that you can use as reference guides.
- **Training memberships** and training credits - to buy now and schedule training later.

Visit ni.com/training for more information.

Extended Warranty

NI offers options for extending the standard product warranty to meet the life-cycle requirements of your project. In addition, because NI understands that your requirements may change, the extended warranty is flexible in length and easily renewed. For more information, visit ni.com/warranty.

OEM

NI offers design-in consulting and product integration assistance if you need NI products for OEM applications. For information about special pricing and services for OEM customers, visit ni.com/oem.

Alliance

Our Professional Services Team is comprised of NI applications engineers, NI Consulting Services, and a worldwide National Instruments Alliance Partner program of more than 700 independent consultants and integrators. Services range from start-up assistance to turnkey system integration. Visit ni.com/alliance.

Back to Top

Detailed Specifications

The following specifications are typical for the range –40 to 70 °C unless otherwise noted. All voltages are relative to COM unless otherwise noted. The specifications are the same for the NI 9472 and the NI 9474 unless otherwise noted.

Output Characteristics	
Number of channels	8 digital output channels
Output type	Sourcing
Power-on output state	Channels off
External power supply voltage range (V_{sup})	
NI 9472	6–30 VDC
NI 9474	5–30 VDC
Output impedance (R_0)	
Typical	0.07 Ω
Maximum	0.13 Ω
Continuous output current (I_0), per channel	
NI 9472	0.75 A max
NI 9474	1 A max
Output voltage (V_0)	$V_{sup} - (I_0 \cdot R_0)$
I/O protection	
Voltage	30 VDC max
Reversed voltage	None

Short-circuit behavior		
Current	**Channel Behavior**	**Module Protection**
0 to 1 A	Channel does not trip	Module is not damaged
1 to 6 A	Channel does not trip	Module may be damaged
6 to 13 A	Channel may trip	Module may be damaged
>13 A	Channel trips	Module is not damaged

Short-circuit trip time	10 µs at 13 A
Output delay time (full load)	
NI 9472	100 µs max
NI 9474	1 µs max
MTBF	
NI 9472	1,113,301 hours at 25 °C; Bellcore Issue 2, Method 1, Case 3, Limited Part Stress Method
NI 9474	479,889 hours at 25 °C; Bellcore Issue 2, Method 1, Case 3, Limited Part Stress Method

Note Contact NI for Bellcore MTBF specifications at other temperatures or for MIL-HDBK-217F specifications.

NI 9472 Power Requirements

Power consumption from chassis	
Active mode	230 mW max
Sleep mode	0.4 mW max
Thermal dissipation (at 70 °C)	
Active mode	1.5 W max
Sleep mode	55 mW max

NI 9474 Power Requirements

Power consumption from chassis	
Active mode	660 mW max
Sleep mode	0.6 mW max
Thermal dissipation (at 70 °C)	
Active mode	1.5 W max
Sleep mode	0.6 mW max

Physical Characteristics

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

Screw-terminal wiring	12 to 24 AWG copper conductor wire with 10 mm (0.39 in.) of insulation stripped from the end
Torque for screw terminals	0.5 to 0.6 N · m (4.4 to 5.3 lb · in.)
Ferrules	0.25 mm^2 to 2.5 mm^2
Weight	
NI 9472/9474 with screw terminal	150 g (5.3 oz)
NI 9472 with DSUB	145 g (5.1 oz)

Safety

NI 9472/9474 with Screw Terminal Safety Voltages

Connect only voltages that are within the following limits.

Channel-to-COM	30 VDC max
Isolation	
Channel-to-channel	None
Channel-to-earth ground	
Continuous	250 V_{rms}, Measurement Category II
Withstand	2,300 V_{rms}, 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 (e.g., 115 V for U.S. or 230 V for Europe). Examples of Measurement Category II are measurements performed on household appliances, portable tools, and similar products.

Caution Do *not* connect the NI 9472/9474 with screw terminal 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 max
Isolation	
Channel-to-channel	None
Channel-to-earth ground	
Continuous	60 VDC, Measurement Category I
Withstand	1,000 V_{rms}, 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 [1] voltage. 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 with DSUB to signals or use for measurements within Measurement Categories II, III, or IV.

Safety Standards

This product is designed to meet 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 nC IIC T4
Canada (C-UL)	Class I, Division 2, Groups A, B, C, D, T4; Class I, Zone 2, Ex nC IIC T4
Europe (DEMKO)	EEx nC IIC T4

Environmental

National Instruments C Series modules are intended for indoor use only but may be used outdoors if installed in a suitable enclosure. 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 to 70 °C
Storage temperature (IEC 60068-2-1, IEC 60068-2-2)	–40 to 85 °C
Ingress protection	IP 40
Operating humidity (IEC 60068-2-56)	10 to 90% RH, noncondensing
Storage humidity (IEC 60068-2-56)	5 to 95% RH, noncondensing
Maximum altitude	2,000 m
Pollution Degree (IEC 60664)	2

Shock and Vibration

To meet these specifications, you must panel mount the system. If you are using the NI 9472/9474 with screw terminal, you also must either affix ferrules to the ends of the terminal wires or use the NI 9932 backshell kit to protect the connections.

Operating vibration	
Random (IEC 60068-2-64)	5 g_{rms}, 10 to 500 Hz
Sinusoidal (IEC 60068-2-6)	5 g, 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

Electromagnetic Compatibility

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

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

Note For EMC compliance, operate this device with double-shielded cables.

CE Compliance

This product meets the essential requirements of applicable European Directives, as amended for CE marking, as follows:

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

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

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 module number or product line, and click the appropriate link in the Certification column.

Environmental Management

National Instruments is committed to designing and manufacturing products in an environmentally responsible manner. NI recognizes that eliminating certain hazardous substances from our products is beneficial not only to the environment but also 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.

Waste Electrical and Electronic Equipment (WEEE)

EU Customers At the end of their life cycle, all products *must* be sent to a WEEE recycling center. For more information about WEEE recycling centers and National Instruments WEEE initiatives, visit ni.com/environment/weee.htm.

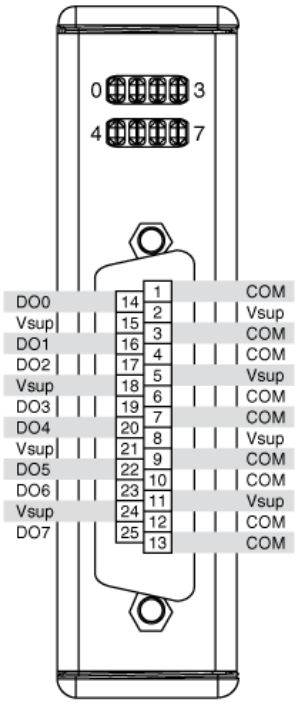
电子信息产品污染控制管理办法 （中国 RoHS）

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.)

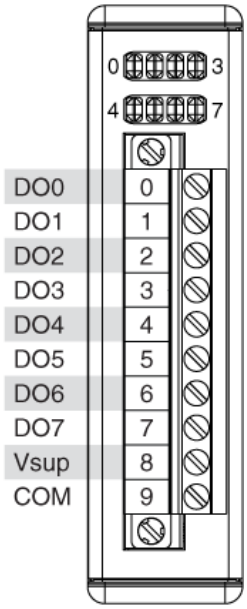
[1] MAINS is defined as the (hazardous live) electrical supply system to which equipment is designed to be connected for the purpose of powering the equipment. Suitably rated measuring circuits may be connected to the MAINS for measuring purposes.

Back to Top

Pinouts/Front Panel Connections



NI 9472/9474 with Screw Terminal



NI 9472 with DSUB

Back to Top