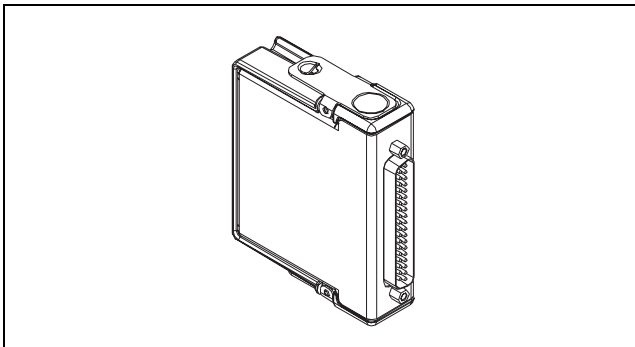


OPERATING INSTRUCTIONS

CompactRIO™ cRIO-9425

32-Channel, 24 V Sinking Digital Input Module



These operating instructions describe how to use the National Instruments cRIO-9425. For information about installing, configuring, and programming the CompactRIO system, refer to the *CompactRIO Bookshelf* at **Start»All Programs»National Instruments»CompactRIO»Search the CompactRIO Bookshelf**.

Safety Guidelines

Operate the cRIO-9425 only as described in these operating instructions.



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

Safety Guidelines for Hazardous Locations

The cRIO-9425 is suitable for use in Class I, Division 2, Groups A, B, C, and D hazardous locations; Class 1, Zone 2, AEx nC IIC T4 and Ex nC IIC T4 hazardous locations; and nonhazardous locations only. Follow these guidelines if you are installing the cRIO-9425 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.



Caution For Zone 2 applications, install the CompactRIO system in an enclosure rated to at least IP 54 as defined by IEC 60529 and EN 60529.

Special Conditions for Safe Use in Europe

This equipment has been evaluated as EEx nC IIC T4 equipment under DEMKO Certificate No. 03 ATEX 0324020X. Each module is marked  II 3G and is suitable for use in Zone 2 hazardous locations.

Connecting Signals to the cRIO-9425

The cRIO-9425 has a 37-pin DSUB connector that provides connections for 32 digital input channels. Each channel has one pin to which you can connect a digital input signal, DI. The cRIO-9425 has four common pins, COM, that are internally connected to the isolated reference of the module. Refer to Figure 1 for the pin assignments for each channel.

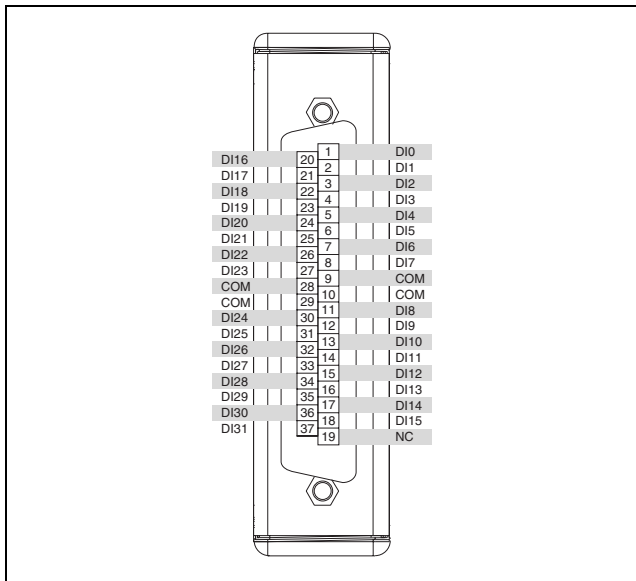


Figure 1. Pin Assignments

Connecting Devices to the cRIO-9425

The cRIO-9425 has *sinking inputs*, meaning that when current goes through or voltage is applied to the DI pin, the pin provides a path to common for the current or voltage. The cRIO-9425 internally limits current signals connected to DI. For more information about input current protection, refer to the [Specifications](#) section.

You can connect 2-, 3-, and 4-wire *sourcing-output* devices to the cRIO-9425. A sourcing-output device drives current or applies voltage to the DI pin. An example of a sourcing-output device is a PNP open collector.

Connect the sourcing-output device to the DI pin on the cRIO-9425. Connect the common of the external device to the COM pin. Figure 2 shows a possible configuration.

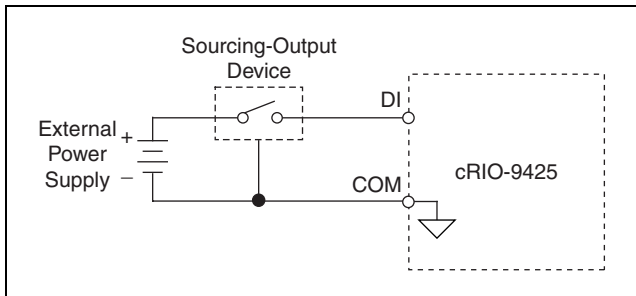


Figure 2. Connecting a Device to the cRIO-9425 (Three-Wire Device Shown)

The cRIO-9425 channel registers as ON when the sourcing-output device applies a voltage or drives a current to the DI pin that is in the input ON range. The channel registers as OFF when the device applies a voltage or drives a current to the DI pin that is in the input OFF range. If no device is connected to the DI pin, the channel registers as OFF. Refer to the [Specifications](#) section for more information about ON and OFF ranges.

Sleep Mode

You can enable sleep mode for the CompactRIO system in software. In sleep mode, the system consumes less power and may dissipate less heat. Typically, when a system is in sleep mode, you cannot communicate with the modules. Refer to the *Specifications* section for more information about power consumption and thermal dissipation. Refer to the *CompactRIO Bookshelf* for more information about enabling sleep mode in software.

NI-RIO Software

For information about determining which software you need for the modules you are using, go to ni.com/info and enter `rdniriosoftware`.

Specifications

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

Input Characteristics

Number of channels	32
Input type	Sinking

Digital logic levels

OFF state

Input voltage ≤ 5 V

Input current..... ≤ 150 μ A

ON state

Input voltage ≥ 10 V

Input current..... ≥ 330 μ A

Hysteresis

Input voltage 2 V min

Input current..... 60 μ A min

Input impedance..... 30 k $\Omega \pm 5\%$

I/O protection

Input voltage

Eight channels..... 60 VDC max

32 channels 30 VDC max

Reverse-biased voltage

Eight channels..... -60 VDC max

32 channels -30 VDC max

Setup time ¹	1 μ s max
Transfer time ²	7 μ s max
MTBF	1,256,699 hours at 25 °C; Bellcore Issue 6, Method 1, Case 3, Limited Part Stress Method



Note Contact NI for Bellcore MTBF specifications at other temperatures or for MIL-HDBK-217F specifications. Go to ni.com/certification and search by model number or product line for more information about MTBF and other product certifications.

¹ *Setup time* is the amount of time input signals must be stable before you can read from the module.

² *Transfer time* is the maximum time FPGA Device I/O functions take to read data from the module.

Power Requirements

Power consumption from chassis

Active mode 410 mW max

Sleep mode 0.5 mW max

Thermal dissipation (at 70 °C)

Active mode 1.45 W max

Sleep mode 1 W max

Physical Characteristics

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

Weight..... Approx. 147 g (5.2 oz)

Safety

Safety Voltages

Connect only voltages that are within these limits.

Channel-to-COM 60 VDC max

Isolation

Channel-to-channel No isolation between channels

Channel-to-earth ground

Withstand 1,000 V_{rms}, 1 minute max

Continuous 60 VDC,
Installation Category I

Installation 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.

Safety Standards

The cRIO-9425 is designed to meet the requirements of the following standards of safety for electrical equipment for measurement, control, and laboratory use:

- EN 61010-1, IEC 61010-1
- UL 61010-1
- CAN/CSA 22.2 No. 61010-1



Note For UL and other safety certifications, refer to the product label, or visit ni.com/certification, search by model number or product line, and click the appropriate link in the Certification column.

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

CompactRIO modules are intended for indoor use only. For outdoor use, mount the CompactRIO system in a suitably rated enclosure. Refer to the installation instructions for the chassis you are using for more information about meeting these specifications.

Operating temperature
(IEC60068-2-1, IEC 60068-2-2) -40 to 70 °C

Storage temperature
(IEC60068-2-1, 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 CompactRIO system.

Operating vibration,
random (IEC 60068-2-64) 5 g_{rms}, 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

Operating vibration,
sinusoidal (IEC 60068-2-6) 5 g, 10 to 500 Hz

Electromagnetic Compatibility

Emissions.....	EN 55011 Class A at 10 m FCC Part 15A above 1 GHz
Immunity.....	Industrial levels per EN 61326-1:1997 + A2:2001, Table A.1
EMC/EMI	CE, C-Tick, and FCC Part 15 (Class A) Compliant



Note For EMC compliance, operate this device with shielded cabling.

FCC Compliance

Go to ni.com/info and enter `rdcriofcc` for information about using this product in compliance with FCC regulations.

CE Compliance

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

Low-Voltage Directive (safety)..... 73/23/EEC

Electromagnetic Compatibility

Directive (EMC) 89/336/EEC



Note Refer to the Declaration of Conformity (DoC) for this product for any additional regulatory compliance information. To obtain the DoC for this product, visit ni.com/certification, search by model number or product line, and click the appropriate link in the Certification column.

National Instruments Contact Information

National Instruments corporate headquarters is located at 11500 North Mopac Expressway, Austin, Texas, 78759-3504. National Instruments also has offices located around the world to help address your support needs. For telephone support in the United States, create your service request at ni.com/support and follow the calling instructions or dial 512 795 8248. For telephone support outside the United States, contact your local branch office:

Australia 1800 300 800, Austria 43 0 662 45 79 90 0,
Belgium 32 0 2 757 00 20, Brazil 55 11 3262 3599,
Canada (Calgary) 403 274 9391, Canada (Ottawa) 613 233 5949,
Canada (Québec) 450 510 3055, Canada (Toronto) 905 785 0085,
Canada (Vancouver) 604 685 7530, China 86 21 6555 7838,
Czech Republic 420 224 235 774, Denmark 45 45 76 26 00,
Finland 385 0 9 725 725 11, France 33 0 1 48 14 24 24,
Germany 49 0 89 741 31 30, India 91 80 51190000,
Israel 972 0 3 6393737, Italy 39 02 413091,
Japan 81 3 5472 2970, Korea 82 02 3451 3400,
Malaysia 603 9131 0918, Mexico 01 800 010 0793,
Netherlands 31 0 348 433 466, New Zealand 0800 553 322,
Norway 47 0 66 90 76 60, Poland 48 22 3390150,
Portugal 351 210 311 210, Russia 7 095 783 68 51,

Singapore 65 6226 5886, Slovenia 386 3 425 4200,
South Africa 27 0 11 805 8197, Spain 34 91 640 0085,
Sweden 46 0 8 587 895 00, Switzerland 41 56 200 51 51,
Taiwan 886 2 2528 7227, Thailand 662 992 7519,
United Kingdom 44 0 1635 523545

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