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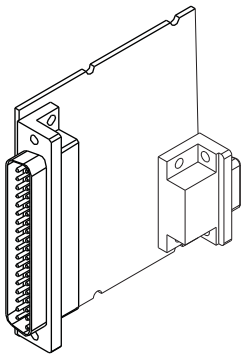
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Find the *National Instruments sbRIO-9425* at our website: *Click HERE*

OPERATING INSTRUCTIONS AND SPECIFICATIONS

NI 9425E

32-Channel, 24 V Sinking Digital Input Module



NATIONAL INSTRUMENTS™

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This document describes how to use the National Instruments 9425E and includes dimensions, connector assignments, and specifications for the NI 9425E. Visit `ni.com/info` and enter `rdsoftwareversion` to determine which software you need for the modules you are using. For information about installing, configuring, and programming the system, refer to the system documentation. Visit `ni.com/info` and enter `cseriesdoc` for information about C Series documentation.

Caution National Instruments makes no electromagnetic compatibility (EMC) or CE marking compliance claims for the NI 9425E. The end-product supplier is responsible for conformity to any and all compliance requirements.

Caution The NI 9425E must be installed inside a suitable enclosure prior to use. Hazardous voltages may be present.

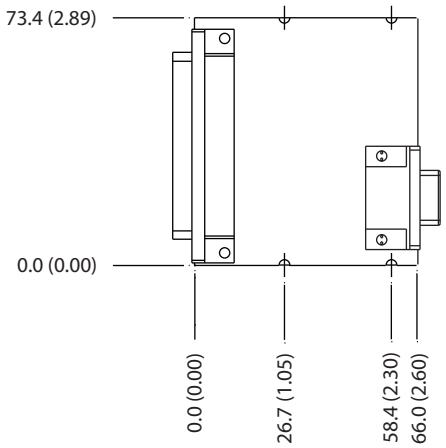
Caution Do not operate the NI 9425E in a manner not specified in these operating instructions. Product misuse can result in a hazard. You can compromise the safety protection built into the product if the product is damaged in any way. If the product is damaged, return it to National Instruments for repair.

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NI 9425E Dimensions

The following figure shows the dimensions of the NI 9425E.

Figure 1. NI 9425E Dimensions in Millimeters (Inches)

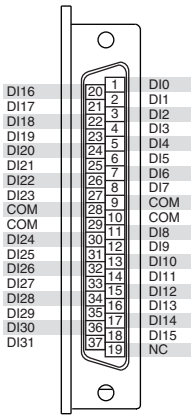


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Connecting the NI 9425E

The NI 9425E has a 37-pin DSUB connector that provides connections for 32 simultaneously-sampled digital input channels.

Figure 2. NI 9425E Pin Assignments



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Each channel has a DI pin to which you can connect a digital input signal. The NI 9425E has four common pins, COM, that are internally connected to the isolated reference of the module.

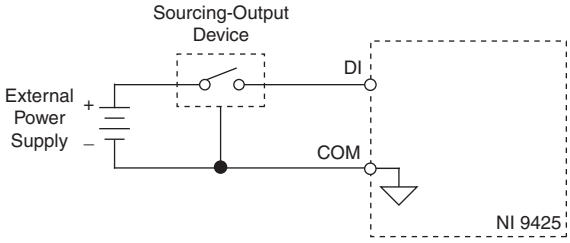
The NI 9425E has sinking inputs, meaning that when the device drives a current or applies a voltage to the DI pin, the pin provides a path to COM for the current or voltage. The NI 9425E internally limits current signals connected to DI. For more information about input current levels, refer to the *Specifications* section.

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

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Connect the sourcing-output device to the DI pin on the NI 9425E. Connect the common of the external device to the COM pin. Refer to Figure 3 for an illustration of connecting a device to the NI 9425E.

Figure 3. Connecting a Device to the NI 9425E (Three-Wire Device Shown)



The NI 9425E channel registers as ON when the sourcing-output device applies a voltage or drives a current that is in the input ON range to the DI pin. The channel registers as OFF when the device applies a voltage or drives a current that is in the input OFF range to the DI pin. If no device is connected to the DI pin, the channel

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registers as OFF. Refer to the *Specifications* section for more information about the ON and OFF states.

Caution To ensure a grounded connection, use shielded I/O cables and tie the shield to the chassis ground.

Sleep Mode

This module supports a low-power sleep mode. Support for sleep mode at the system level depends on the chassis that the module is plugged into. Refer to the chassis manual for information about support for sleep mode. If the chassis supports sleep mode, refer to the software help for information about enabling sleep mode. Visit `ni.com/info` and enter `cseriesdoc` for information about C Series documentation.

Typically, when a system is in sleep mode, you cannot communicate with the modules. In sleep mode, the system consumes minimal power and may dissipate less heat than it does in normal mode. Refer to the *Specifications* section for more information about power consumption and thermal dissipation.

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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.

Input Characteristics

Number of channels ..... 32 digital input channels

Input type ..... Sinking

Digital logic levels

- OFF state
  - Input voltage ..... ≤5 V
  - Input current ..... ≤150 µA
- ON state
  - Input voltage ..... ≥10 V
  - Input current ..... ≥330 µA
- Hysteresis
  - Input voltage ..... 2 V min
  - Input current ..... 60 µA min

Input impedance ..... 30 kΩ ± 5%

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I/O protection

- Input voltage
  - 8 channels ..... 60 VDC max
  - 32 channels ..... 30 VDC max
- Reverse-biased voltage
  - 8 channels ..... -60 VDC max
  - 32 channels ..... -30 VDC max

Hold time[1] ..... 0 µs min

Setup time[2] ..... 1 µs min

Update/transfer time ..... 7 µs max

MTBF ..... 1,256,699 hours at 25 °C; Bellcore Issue 2, Method 1, Case 3, Limited Part Stress Method

[1] *Hold time* is the amount of time input signals must be stable after initiating a read from the module.

[2] *Setup time* is the amount of time input signals must be stable before reading from the module.

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

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 ..... 43 g (1.5 oz)

Safety

Safety Voltages

Connect only voltages that are within the following limits.

Channel-to-COM ..... 60 VDC max

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Isolation Voltages

Channel-to-channel ..... None

Channel-to-earth ground

- Continuous ..... 60 VDC, Measurement Category I up to 5,000 m altitude
- Withstand
  - up to 2,000 m altitude ..... 1,000 V_{rms}, verified by a 5 s dielectric withstand test
  - up to 5,000 m altitude ..... 500 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* 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.

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Caution Do *not* connect the NI 9425E to signals or use for measurements within Measurement Categories II, III, or IV.

Caution Measurement Categories CAT I and CAT O (Other) 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.

Safety Standards

This product meets 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.

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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.

Shock and Vibration

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

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

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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 to 85°C

Note Measure the local ambient temperature by placing thermocouples on both sides of the PCB, 0.2 in. (5 mm) from the board surface. Avoid placing thermocouples next to hot components such as the FPGA, processor, or near board edges, which can cause inaccurate temperature measurements.

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

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Storage humidity
(IEC 60068-2-56)..... 5 to 95% RH, noncondensing

Pollution Degree 2

Maximum altitude..... 5,000 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`. This page contains the environmental regulations and directives with which NI complies, as well as other environmental information not included in this document.

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EU Customers At the end of the product life cycle, all products *must* be sent to a WEEE recycling center. For more information about WEEE recycling centers, National Instruments WEEE initiatives, and compliance with WEEE Directive 2002/96/EC on Waste and Electronic Equipment, visit `ni.com/environment/weee`.

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