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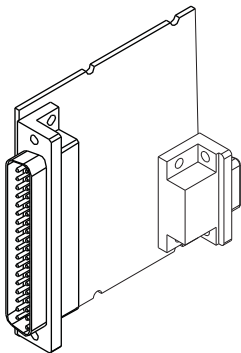
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NI-9425

OPERATING INSTRUCTIONS AND SPECIFICATIONS
NI 9425E
32-Channel, 24 V Sinking Digital Input Module

NATIONAL INSTRUMENTS™

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.

NI 9425E Dimensions

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

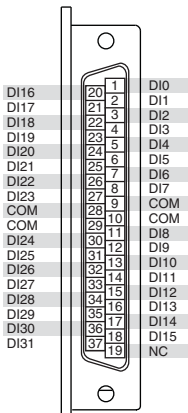**Figure 1.** NI 9425E Dimensions in Millimeters (Inches)

73.4 (2.89)

0.0 (0.00)

0.0 (0.00)

26.7 (1.05)

58.4 (2.30)

66.0 (2.60)
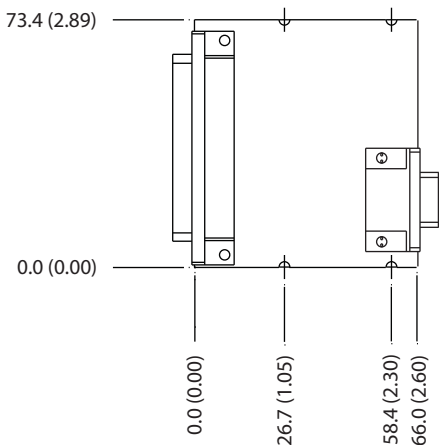
Connecting the NI 9425E

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

| DI16 | 20 | 1 | DI0 |
DI17	21	2	DI1
DI18	22	3	DI2
DI19	23	4	DI3
DI20	24	5	DI4
DI21	25	6	DI5
DI22	26	7	DI6
DI23	27	8	DI7
COM	28	9	COM
COM	29	10	COM
DI24	30	11	DI8
DI25	31	12	DI9
DI26	32	13	DI10
DI27	33	14	DI11
DI28	34	15	DI12
DI29	35	16	DI13
DI30	36	17	DI14
DI31	37	18	DI15
		19	NC

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.

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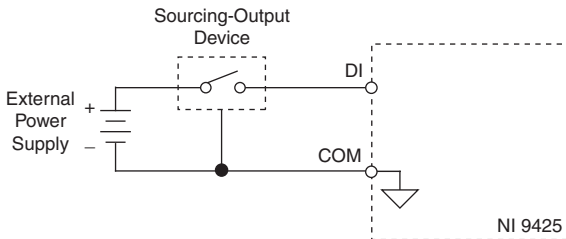
The NI 9425E channel registers as ON when the sourcing-output device applies a voltage or drives a current that is in the input ON range to the DI pin. The channel registers as OFF when the device applies a voltage or drives a current that is in the input OFF range to the DI pin. If no device is connected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

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.

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%

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

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[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.

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

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.

⚠️ **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.

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

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

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.

Waste Electrical and Electronic Equipment (WEEE)

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.

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.)

Worldwide Support and Services

The National Instruments website is your complete resource for technical support. At ni.com/support you have access to everything from troubleshooting and application development self-help resources to email and phone assistance from NI Application Engineers.

Visit ni.com/services for NI Factory Installation Services, repairs, extended warranty, and other services.

Visit ni.com/register to register your National Instruments product. Product registration facilitates technical support and ensures that you receive important information updates from NI.

A Declaration of Conformity (DoC) is our claim of compliance with the Council of the European Communities using the manufacturer's declaration of conformity. This system affords the user protection for electromagnetic compatibility (EMC) and product safety. You can obtain the DoC for your product by visiting ni.com/certification. If your product supports calibration, you can obtain the calibration certificate for your product at ni.com/calibration.

National Instruments corporate headquarters is located at 11500 North Mopac Expressway, Austin, Texas, 78759-3504. National Instruments also has offices located around the world. For telephone support in the United States, create your service request at ni.com/support or dial 1 866 ASK MYNI (275 6964). For telephone support outside the United States, visit the Worldwide Offices section of ni.com/niglobal to access the branch office websites, which provide up-to-date contact information, support phone numbers, email addresses, and current events.