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Find the *National Instruments PXIe-4300* at our website: ***Click HERE***

DEVICE SPECIFICATIONS

# NI PXIe-4300

This document lists specifications for the NI PXIe-4300 module. These specifications are typical for the range of 0 °C to 55 °C unless otherwise stated. The system must be allowed to warm up for 15 minutes to achieve the rated accuracy. All specifications are subject to change without notice. Visit `ni.com/manuals` for the most current specifications and product documentation.

**Note** Keep the filler panels on all unused slots in your chassis to maintain forced air cooling.

**Caution** Maximum voltage for all analog inputs is ±11 V for all ranges.

## Analog Input

Number of channels ..... 8 differential

ADC resolution ..... 16 bits

DNL ..... No missing codes guaranteed

INL ..... Refer to the *AI Absolute Accuracy (Specification)* section.

Sampling rate

- Maximum ..... 250 kS/s per channel
- Minimum ..... No minimum
- Timing accuracy ..... 50 ppm of sample rate
- Timing resolution ..... 10 ns

Input coupling ..... DC

Voltage measurement range (software-selectable per channel) ..... ±10 V, ±5 V, ±2 V, ±1 V

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Maximum working voltage (signal + common mode)

| Maximum Working Voltage (Signal + Common Mode) | |
|---|---|
| **Range** | **Working Voltage** |
| 10 V | ±11 V |
| 5 V | ±10.5 V |
| 2 V | ±9 V |
| 1 V | ±8.5 V |

CMRR from COM (to 60 Hz)

- 10 V ..... 95 dB
- 5 V ..... 100 dB
- 2 V, 1 V ..... 105 dB

Bandwidth ..... 520 kHz

Filtering

- Lowpass (software-selectable per channel) ..... 10 kHz, 100 kHz, disable
- Cut-off frequency tolerance ..... ±5%
- Filter type ..... 2nd order Butterworth

Input impedance

- Device on[1]
  - AI- to AI COM ..... >1 GΩ in parallel with 10 pF
  - AI+ to AI COM ..... >1 GΩ in parallel with 10 pF
- Device off
  - AI+ to AI COM ..... 10 kΩ
  - AI- to AI COM ..... 10 kΩ

Input bias current ..... ±6 nA

Input FIFO size ..... 2,046 samples shared among channels used

Data transfers ..... DMA (scatter-gather), programmed I/O

Fault protection (powered on)

- Between AI+ and AI- ..... ±60 V
- Between any AI and COM ..... ±60 V
- Between PFI or RSVD lines and COM .... ±24 V

Input current during fault conditions ..... ±5 mA max/AI pin

[1] The impedance given is for the NI PXIe-4300. Refer to the *NI PXIe-4300 and TB-4300/B/C User Guide and Terminal Block Specifications* for terminal block impedance information.



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## AI Absolute Accuracy (Specification)

INL error ..... 76 ppm of range

| Nominal Range | | Residual Gain Error (ppm of Reading) | Residual Offset Error (ppm of Range) | Offset Tempco (ppm of Range/°C) | Random Noise, σ (µVrms) | Absolute Accuracy at Full Scale (µV) |
|---|---|---|---|---|---|---|
| Positive Full Scale | Negative Full Scale | | | | | |
| 10 | -10 | 65 | 33 | 10 | 208 | 2,460 |
| 5 | -5 | 69 | 68 | 10 | 107 | 1,430 |
| 2 | -2 | 75 | 168 | 11 | 58 | 785 |
| 1 | -1 | 88 | 337 | 11 | 50 | 575 |

**Note** Accuracies listed are valid for up to one year from the module external calibration.

### Stability

Gain drift ..... 11.5 ppm/°C

Reference drift ..... 5 ppm/°C

### AI Absolute Accuracy Equation

$$AbsoluteAccuracy = Reading \cdot (GainError) + Range \cdot (OffsetError) + NoiseUncertainty$$

$$GainError = ResidualAIGainError + GainTempco \cdot (TempChangeFromLastInternalCal) + ReferenceTempco \cdot (TempChangeFromLastExternalCal)$$

$$OffsetError = ResidualAIOffsetError + OffsetTempco \cdot (TempChangeFromLastInternalCal) + INL_Error$$

$$\text{NoiseUncertainty} = \frac{\text{RandomNoise} \cdot 3}{\sqrt{10000}}$$

For a coverage factor of 3 sigma and averaging 10000 points.



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### AI Absolute Accuracy Example

Absolute accuracy at full scale on the analog input channels is determined using the following assumptions:

- *TempChangeFromLastExternalCal* = 10 °C
- *TempChangeFromLastInternalCal* = 1 °C
- *number_of_readings* = 10000
- *CoverageFactor* = 3 σ

For example, on the 10 V range, the absolute accuracy at full scale is as follows:

*GainError* = 65 ppm + 11.5 ppm · 1 °C + 5 ppm · 10 °C = 126.5 ppm

*OffsetError* = 33 ppm + 10 ppm · 1 °C + 76 ppm = 119 ppm

$$\text{NoiseUncertainty} = \frac{208\ \mu\text{V} \cdot 3}{\sqrt{10000}} = 6.2\ \mu\text{V}$$

*AbsoluteAccuracy* = 10 V · (*GainError*) + 10 V · (*OffsetError*) + *NoiseUncertainty* = 2,460 µV

# Digital PFI Input

## Electrical Characteristics

| Level | Min | Max |
|---|---|---|
| Input high voltage (VIH) | 1.87 V | 5.5 V |
| Input low voltage (VIL) | 0 V | 0.84 V |
| Hysteresis | 0.56 V | 0.87 V |

# Triggers

Analog Trigger

Source ..... AI<0..7>

Purpose..... Reference Trigger

Level ..... Full Scale (depending on AiRange), Programmable

Resolution ..... 16-bit

Mode ..... Rising-edge, Rising-edge with Hysteresis, Falling-edge, Falling-edge with Hysteresis, Entering Window, Leaving Window



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Digital Trigger

Source ..... PXI_TRIG<0..7>, PXI_STAR, PXIe_DSTAR<A..B> PFI<0..1>

Purpose ..... Start Trigger, Reference Trigger, Pause Trigger

Polarity..... Software-selectable

Debounce Filter Settings ..... Disable, 90 ns, 5.12 µs, 2.56 ms, Custom interval

# Clocking

Source ..... Onboard Clock, PXI_TRIG<0..7>, PXI_STAR, PXIe_DSTAR<A..B>, PFI<0..1>, PXIe_Clk100 (RefClk Only)

Destination..... Sample Clock, Sample Clock Timebase, Reference Clock

Polarity..... Software-selectable (except Reference Clock)

Debounce filter settings
(Sample Clock Only) ..... Disable, 90 ns, 5.12 µs, 2.56 ms, Custom interval

Reference clock locking frequencies

| Reference Signal | Locking Input Frequency (MHz) | | |
|---|---|---|---|
| | 10 | 20 | 100 |
| PXIe_DSTAR<A.. B> | ✓ | ✓ | ✓ |
| PXI_STAR | ✓ | ✓ | — |
| PXIe_Clk100 | — | — | ✓ |
| PXI_TRIG<0..7> | ✓ | ✓ | — |
| PFI<0..1> | ✓ | ✓ | — |

**Note** National Instruments does not recommend locking to non-selected frequencies.



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## Output Timing Signals

| | |
|---|---|
| Source | Start Trigger, Reference Trigger,<br>Pause Trigger,<br>PFI<0..1>,<br>Sample Clock,<br>Various Derived Timebases and Clocks |
| Destination | PXI_TRIG<0..7> PXIe_DSTAR C |
| Polarity | Software-selectable |

## Bus Interface

| | |
|---|---|
| Form factor | x1 PXI Express peripheral module, specification rev 1.0 compliant |
| Slot compatibility | PXI Express or PXI Express hybrid slots |
| DMA channels | 1 analog input |

## Calibration

| | |
|---|---|
| Recommended warm-up time | 15 minutes |
| Calibration interval | 1 year |

## Power Requirements

| | |
|---|---|
| +3.3 V | 2.0 W |
| +12 V | 8.8 W |

## Physical Requirements

| | |
|---|---|
| Dimensions | Standard 3U PXIe,<br>16 cm by 10 cm<br>(6.3 in. by 3.9 in.) |
| Weight | 148 g (5.2 oz) |
| I/O connector | 96-pin male DIN 41612/IEC 60603-2 connector. |



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# Environmental Specifications

Maximum altitude..... 2,000 m (800 mbar),
at 25 °C ambient temperature

Pollution Degree..... 2

Indoor use only

## Operating Environment

Ambient temperature range ..... 0 °C to 55 °C
(Tested in accordance with IEC-60068-2-1 and IEC-60068-2-2. Meets MIL-PRF-28800F Class 3 low temperature limit and MIL-PRF-28800F Class 2 high temperature limit.)

Relative humidity range..... 10% to 90%, noncondensing
(Tested in accordance with IEC-60068-2-56.)

## Storage Environment

Ambient temperature range ..... -40 °C to 71 °C
(Tested in accordance with IEC-60068-2-1 and IEC-60068-2-2. Meets MIL-PRF-28800F Class 3 limits.)

Relative humidity range..... 5% to 95% noncondensing
(Tested in accordance with IEC-60068-2-56.)

# Shock and Vibration

Operating shock ..... 30 g peak, half-sine,11 ms pulse
(Tested in accordance with IEC-60068-2-27. Meets MIL-PRF-28800F Class 2 limits.)

Random vibration

- Operating ..... 5 Hz to 500 Hz, 0.3 $g_{rms}$
- Non-operating..... 5 Hz to 500 Hz, 2.4 $g_{rms}$
  (Tested in accordance with IEC-60068-2-64. Nonoperating test profile exceeds the requirements of MIL-PRF-28800F, Class 3.)



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## Safety Voltage

Connect only voltages that are within the following limits:

Between any AI+ and AI- ..... ±11 V

Between any AI terminal and COM ..... ±11 V

Isolation

Channel to channel

Continuous ..... 300 Vrms, Measurement Category II (Basic)

Withstand ..... 1,400 Vrms

Channel to earth ground

Continuous ..... 300 Vrms, Measurement Category II

Withstand ..... 2,300 Vrms, verified by a 5 s dielectric withstand test

**Caution** Do *not* use for measurements within Measurement Categories III or IV.

**Caution** The protection provided by the NI PXIe-4300 can be impaired if it is used in a manner not described in this document.

## Safety

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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## Electromagnetic Compatibility

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

- EN 61326-1 (IEC 61326-1): Class A emissions; Basic immunity
- EN 55011 (CISPR 11): Group 1, Class A emissions
- AS/NZS CISPR 11: Group 1, Class A emissions
- FCC 47 CFR Part 15B: Class A emissions
- ICES-001: Class A emissions



**Note** In the United States (per FCC 47 CFR), Class A equipment is intended for use in commercial, light-industrial, and heavy-industrial locations. In Europe, Canada, Australia and New Zealand (per CISPR 11) Class A equipment is intended for use only in heavy-industrial locations.



**Note** Group 1 equipment (per CISPR 11) is any industrial, scientific, or medical equipment that does not intentionally generate radio frequency energy for the treatment of material or inspection/analysis purposes.



**Note** For EMC declarations and certifications, and additional information, refer to the *Online Product Certification* section.

## CE Compliance CE

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)

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



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# 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`.

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