

# Analog Input Module for Compact FieldPoint

## NI cFP-AI-118

- 8 analog voltage differential input channels
- 8 voltage input ranges  $-\pm 1$ ,  $\pm 5$ ,  $\pm 10$ ,  $\pm 15$ , 0 to 1, 0 to 5, 0 to 10, and 0 to 15 V
- 16-bit resolution
- Simultaneous sampling on all channels
- 10 Hz digital sync filter configurable per channel
- 100 V<sub>rms</sub> Category I continuous channel-to-channel isolation, verified by 750 V<sub>rms</sub>, 5 s dielectric withstand test
- 250 V<sub>rms</sub> Category II continuous channel-to-ground isolation, verified by a 2,300 V<sub>rms</sub>, 5 s dielectric withstand test
- Hot-swappable
- -40 to 70 °C operation



## Overview

The National Instruments cFP-AI-118 Compact FieldPoint module can measure eight analog inputs at 16-bit resolution at a 10 kS/s per-channel sampling rate with multiple voltage ranges. In addition to high resolution and simultaneous sampling, the NI cFP-AI-118 features 750 V<sub>rms</sub> channel-to-channel isolation and 2,300 V<sub>rms</sub> channel-to-backplane isolation, verified by a 5 s dielectric withstand test. This module also was designed using a new architecture in which the controller obtains access to the module memory immediately, significantly reducing jitter. This feature makes this module ideal for industrial environments where sensors and actuators work at different voltage levels, and ground loops are common.

## Ordering Information

NI cFP-AI-118 .....777318-118

### Recommended Compact FieldPoint System Products

NI cFP-2120 .....777317-2120

NI cFP-BP-4 .....778617-04

NI cFP-CB-1 .....778618-01

NI PS-5 power supply .....778805-90

NI Developer Suite Professional Control Edition .....777906-03

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For complete product specifications, pricing, and accessory information, call 800 813 3693 (U.S.) or go to [ni.com/compactfieldpoint](http://ni.com/compactfieldpoint).



# Analog Input Module for Compact FieldPoint

## Specifications

Typical for -40 to 70 °C temperature range and for operation with the 10 Hz filter enabled unless otherwise noted.

### Input Characteristics

Number of channels.....	8 differential
Maximum signal input range.....	±15 V (±15.75 V with overranging)
Maximum voltage (V+ or V- to earth) .....	250 V <sub>rms</sub> , Measurement Category II
ADC resolution.....	16 bits (refer to table)
Type of ADC .....	Delta-sigma

### Effective Resolution by Input Range and Filter Setting

Nominal Input Range (V)	With Overranging (V)	Effective Resolution <sup>1</sup> (No Filtering) (µV)	Effective Resolution <sup>1</sup> with 10 Hz Filter (µV)
±1	±1.05	100	32
±5	±5.25	160	160
±10	±10.5	320	320
±15	±15.75	480	480
0 to 1	0 to 1.05	100	16
0 to 5	0 to 5.25	100	80
0 to 10	0 to 10.5	160	160
0 to 15	0 to 15.75	240	240

<sup>1</sup>Includes quantization errors and typical RMS noise.

All-channel sample rate	
With 10 Hz filter .....	3.45 kHz <sup>1</sup>
Without filtering .....	10.42 kHz <sup>1</sup>
Input bandwidth (-3 dB) .....	3 kHz minimum
Common-mode rejection at 60 Hz, with 50 Ω source impedance and no filtering	
Channel to channel.....	110 db
Channel to ground .....	110 db
Crosstalk attenuation.....	>100 dB
RMS noise.....	100 µV
Peak-to-peak noise .....	700 µV
Settling time to 1 LSB	
Full-scale step (-15 to 15 V) .....	2.1 ms
1% step.....	1.6 ms
Semaphore acquisition jitter .....	None
Monotonicity .....	Warranted over the operating temperature range
Input resistance .....	1 MΩ
Input capacitance.....	<50 pF
Overvoltage protection .....	±250 V

<sup>1</sup>The all-channel update rate refers to the time the module takes to sample all channels. The overall system update rate is affected by other factors, such as the aggregate module update rate and software loop rate. To calculate the system update rate, visit [ni.com/info](http://ni.com/info) and enter "systemrate."

### Accuracy by Input Range and Temperature Range

Nominal Input Range (V)	Typical Accuracy at 15 to 35 °C (% of Reading; % of Full Scale)	Warranted Accuracy at 15 to 35 °C (% of Reading; % of Full Scale)
±1	±0.037; ±0.006	±0.086; ±0.036
±5	±0.037; ±0.003	±0.066; ±0.009
±10	±0.037; ±0.003	±0.064; ±0.005
±15	±0.037; ±0.003	±0.063; ±0.004
0 to 1	±0.037; ±0.006	±0.111; ±0.036
0 to 5	±0.037; ±0.003	±0.071; ±0.009
0 to 10	±0.037; ±0.003	±0.066; ±0.005
0 to 15	±0.037; ±0.003	±0.065; ±0.004

Gain error drift .....	7.4 ppm/°C
Offset error drift.....	3 µV/°C

### Isolation Voltage

Isolation voltage is verified by a dielectric withstand test.

Channel-to-channel isolation	
Continuous .....	100 V <sub>rms</sub>
Withstand .....	750 V <sub>rms</sub> , 5 s max
Channel-to-backplane isolation	
Continuous .....	250 V <sub>rms</sub>
Withstand .....	2,300 V <sub>rms</sub> , 5 s max
Channel-to-ground isolation	
Continuous .....	250 V <sub>rms</sub>
Withstand .....	2,300 V <sub>rms</sub> , 5 s max

### Physical Characteristics

LED indicators	
Power (green)	
Ready (green)	
Dimensions.....	127.1 by 73.3 by 23.9 mm (5.00 by 2.89 by 0.94 in.)
Weight.....	117 g (4.1 oz)
Warm-up time .....	30 minutes

### Power Requirements

Power from network module .....	1.125 W
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### Environment

Operating temperature .....	-40 to 70 °C
Storage temperature.....	-40 to 85 °C
Relative humidity .....	10 to 90%, noncondensing
Maximum altitude.....	2,000 m; at higher altitudes the isolation voltage ratings must be lowered
Pollution degree .....	2

### Shock and Vibration

Operating vibration, random (IEC 60068-2-64) .....	10 to 500 Hz, 5 g <sub>rms</sub>
Operating vibration, sinusoidal (IEC 60068-2-6) .....	10 to 500 Hz, 5 g
Operating shock (IEC 60068-2-27) .....	50 g, 3 ms half sine, 18 shocks at 6 orientations; 30 g, 11 ms half sine, 18 shocks at 6 orientations

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### Safety and Compliance

#### Safety

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 visit [ni.com/certification](https://ni.com/certification), search by model number or product line, and click the appropriate link in the Certification column.

#### 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; Minimum 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 according to product documentation.

#### 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:** 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](https://ni.com/certification), search by model number or product line, and click the appropriate link in the Certification column.

#### Waste Electrical and Electronic Equipment (WEEE)

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