

Analog Input Module for Compact FieldPoint

NI cFP-AI-118

- 8 analog voltage differential input channels
- 8 voltage input ranges $-\pm 1$, ± 5 , ± 10 , ± 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_{rms} Category I continuous channel-to-channel isolation, verified by 750 V_{rms}, 5 s dielectric withstand test
- 250 V_{rms} Category II continuous channel-to-ground isolation, verified by a 2,300 V_{rms}, 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_{rms} channel-to-channel isolation and 2,300 V_{rms} 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-118777318-118

Recommended Compact FieldPoint System Products

NI cFP-2120777317-2120

NI cFP-BP-4778617-04

NI cFP-CB-1778618-01

NI PS-5 power supply778805-90

NI Developer Suite Professional Control Edition777906-03

BUY NOW!

For complete product specifications, pricing, and accessory information, call 800 813 3693 (U.S.) or go to 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 _{rms} , 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 ¹ (No Filtering) (µV)	Effective Resolution ¹ 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

¹Includes quantization errors and typical RMS noise.

All-channel sample rate	
With 10 Hz filter	3.45 kHz ¹
Without filtering	10.42 kHz ¹
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

¹The 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 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 _{rms}
Withstand	750 V _{rms} , 5 s max
Channel-to-backplane isolation	
Continuous	250 V _{rms}
Withstand	2,300 V _{rms} , 5 s max
Channel-to-ground isolation	
Continuous	250 V _{rms}
Withstand	2,300 V _{rms} , 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
---------------------------------	---------

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 _{rms}
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

Analog Input Module for Compact FieldPoint

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

Waste Electrical and Electronic Equipment (WEEE)

EU Customers: At the end of their life cycle, all products must be sent to a WEEE recycling center. For more information about WEEE recycling centers and National Instruments WEEE initiatives, visit ni.com/environment/weee.htm.

NI Services and Support



NI has the services and support to meet your needs around the globe and through the application life cycle – from planning and development through deployment and ongoing maintenance. We offer services and service levels to meet customer requirements in research, design, validation, and manufacturing. Visit ni.com/services.

Training and Certification

NI training is the fastest, most certain route to productivity with our products. NI training can shorten your learning curve, save development time, and reduce maintenance costs over the application life cycle. We schedule instructor-led courses in cities worldwide, or we can hold a course at your facility. We also offer a professional certification program that identifies individuals who have high levels of skill and knowledge on using NI products. Visit ni.com/training.

Professional Services

Our NI Professional Services team is composed of NI applications and systems engineers and a worldwide National Instruments Alliance Partner program of more than 600 independent consultants and

integrators. Services range from start-up assistance to turnkey system integration. Visit ni.com/alliance.



OEM Support

We offer design-in consulting and product integration assistance if you want to use our products for OEM applications. For information about special pricing and services for OEM customers, visit ni.com/oem.

Local Sales and Technical Support

In offices worldwide, our staff is local to the country, giving you access to engineers who speak your language. NI delivers industry-leading technical support through online knowledge bases, our applications engineers, and access to 14,000 measurement and automation professionals within NI Developer Exchange forums. Find immediate answers to your questions at ni.com/support.

We also offer service programs that provide automatic upgrades to your application development environment and higher levels of technical support. Visit ni.com/ssp.

Hardware Services

NI Factory Installation Services

NI Factory Installation Services (FIS) is the fastest and easiest way to use your PXI or PXI/SCXI combination systems right out of the box. Trained NI technicians install the software and hardware and configure the system to your specifications. NI extends the standard warranty by one year on hardware components (controllers, chassis, modules) purchased with FIS. To use FIS, simply configure your system online with ni.com/pxiadvisor.

Calibration Services

NI recognizes the need to maintain properly calibrated devices for high-accuracy measurements. We provide manual calibration procedures, services to recalibrate your products, and automated calibration software specifically designed for use by metrology laboratories. Visit ni.com/calibration.

Repair and Extended Warranty

NI provides complete repair services for our products. Express repair and advance replacement services are also available. We offer extended warranties to help you meet project life-cycle requirements. Visit ni.com/services.



ni.com • 800 813 3693

National Instruments • info@ni.com

