



NATIONAL INSTRUMENTS FP-AI-110 Eight-Channel 16-Bit Analog Input Modules Instruction Manual

[Home](#) » [NATIONAL INSTRUMENTS](#) » NATIONAL INSTRUMENTS FP-AI-110 Eight-Channel 16-Bit Analog Input Modules Instruction Manual 

Contents

- 1 NATIONAL INSTRUMENTS FP-AI-110 Eight-Channel 16-Bit Analog Input Modules
- 2 Product Information
- 3 Product Usage Instructions
- 4 Features
- 5 Installing the FP-AI-110
- 6 Installing the cFP-AI-110
- 7 Wiring the [c]FP-AI-110
- 8 Taking Measurements with the [c]FP-AI-110
- 9 Status Indicators
- 10 Isolation and Safety Guidelines
- 11 Safety Guidelines for Hazardous Locations
- 12 Specifications
 - 12.1 Safety Isolation Voltage
- 13 Where to Go for Support
- 14 Documents / Resources
 - 14.1 References
- 15 Related Posts



NATIONAL INSTRUMENTS FP-AI-110 Eight-Channel 16-Bit Analog Input Modules



Product Information

The FP-AI-110 and cFP-AI-110 are eight-channel, 16-bit analog input modules designed for use with the FieldPoint system. These modules provide accurate and reliable analog input measurements for a variety of applications.

Features

- Eight analog input channels
- 16-bit resolution
- Compatible with FieldPoint terminal bases and Compact FieldPoint backplanes
- Easy installation and configuration

Product Usage Instructions

Installing the FP-AI-110

1. Slide the terminal base key to either position X or position 1.
2. Align the FP-AI-110 alignment slots with the guide rails on the terminal base.
3. Press firmly to seat the FP-AI-110 on the terminal base.

Installing the cFP-AI-110

1. Align the captive screws on the cFP-AI-110 with the holes on the backplane.
2. Press firmly to seat the cFP-AI-110 on the backplane.
3. Tighten the captive screws using a number 2 Phillips screwdriver with a shank of at least 64 mm (2.5 in.) length to a torque of 1.1 Nm (10 lb in.).

Wiring the [c]FP-AI-110

When wiring the FP-AI-110 or cFP-AI-110, it is important to follow these guidelines:

- Install a 2 A maximum, fast-acting fuse between the external power supply and the V terminal on each channel.

- Do not connect both current and voltage inputs to the same channel.
- Cascading power between two modules defeats isolation between those modules. Cascading power from the network module defeats all isolation between modules in the FieldPoint bank.

Refer to Table 1 for the terminal assignments associated with each channel.

Terminal Assignments

Terminal Numbers	Channel	VIN	IIN	VSUP	COM
0	1	2	17	18	
1	3	4	19	20	
2	5	6	21	22	
3	7	8	23	24	
4	9	10	25	26	
5	11	12	27	28	
6	13	14	29	30	
7	15	16	31	32	

Note: Install a 2 A, fast-acting fuse on each VIN terminal, each IIN terminal, and a 2 A maximum, fast-acting fuse on each VSUP terminal.

These operating instructions describe how to install and use the FP-AI-110 and cFP-AI-110 analog input modules (referred to inclusively as the [c]FP-AI-110). For information about configuring and accessing the [c]FP-AI-110 over a network, refer to the user manual for the FieldPoint network module you are using.

Features

The [c]FP-AI-110 is a FieldPoint analog input module with the following features:

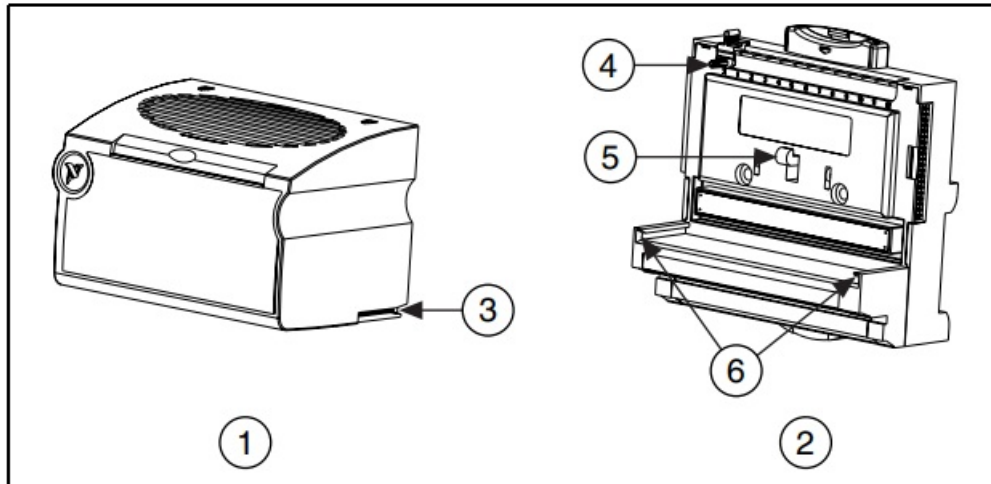
- Eight analog voltage or current input channels
- Eight voltage input ranges: 0–1 V, 0–5 V, 0–10 V, ± 60 mV, ± 300 mV, ± 1 V, ± 5 V, and ± 10 V
- Three current input ranges: 0–20, 4–20, and ± 20 mA
- 16-bit resolution
- Three filter settings: 50, 60, and 500 Hz
- 250 Vrms CAT II continuous channel-to-ground isolation, verified by 2,300 Vrms dielectric withstand test
- –40 to 70 °C operation
- Hot-swappable

Installing the FP-AI-110

The FP-AI-110 mounts on a FieldPoint terminal base (FP-TB-x), which provides operating power to the module. Installing the FP-AI-110 onto a powered terminal base does not disrupt the operation of the FieldPoint bank.

To install the FP-AI-110, refer to Figure 1 and complete the following steps:

1. Slide the terminal base key to either position X (used for any module) or position 1 (used for the FP-AI-110).
2. Align the FP-AI-110 alignment slots with the guide rails on the terminal base.
3. Press firmly to seat the FP-AI-110 on the terminal base. When the FP-AI-110 is firmly seated, the latch on the terminal base locks it into place.



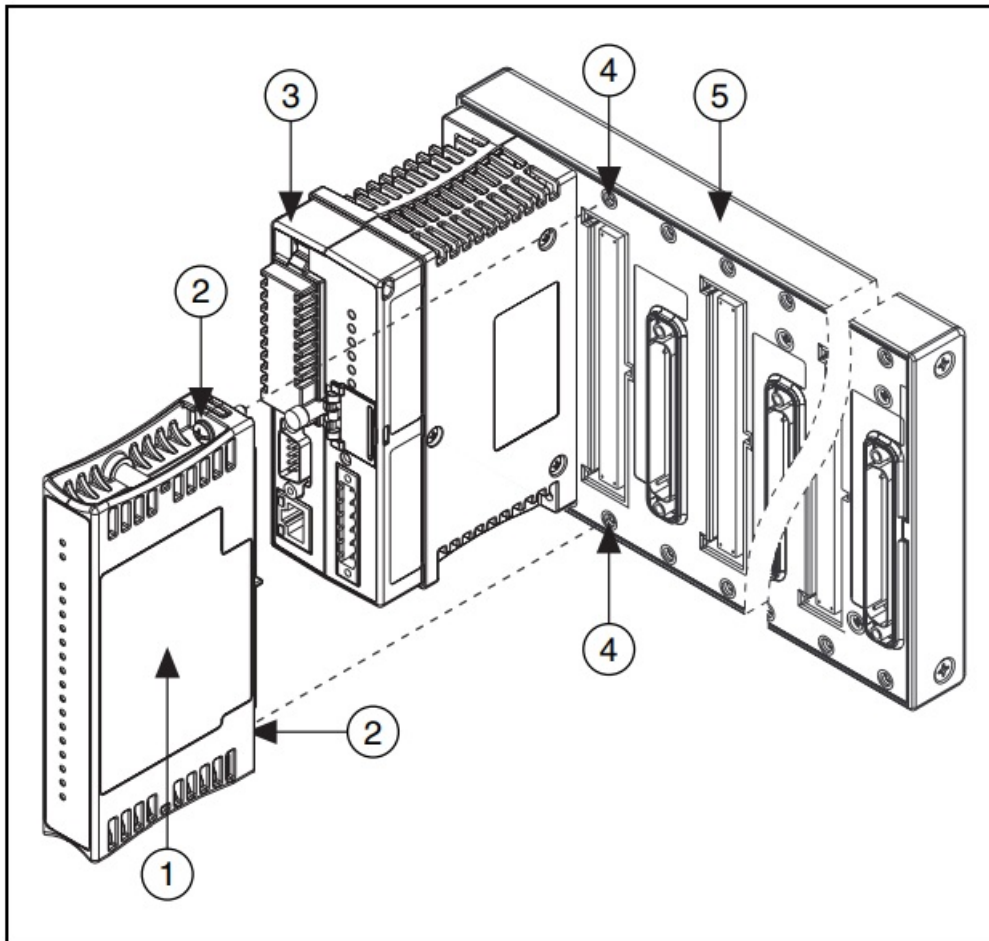
1. I/O Module
2. Terminal Base
3. Alignment Slot
4. Key
5. Latch
6. Guide Rails

Installing the cFP-AI-110

The cFP-AI-110 mounts on a Compact FieldPoint backplane (cFP-BP-x), which provides operating power to the module. Installing the cFP-AI-110 onto a powered backplane does not disrupt the operation of the FieldPoint bank.

To install the cFP-AI-110, refer to Figure 2 and complete the following steps:

1. Align the captive screws on the cFP-AI-110 with the holes on the backplane. The alignment keys on the cFP-AI-110 prevent backward insertion.
2. Press firmly to seat the cFP-AI-110 on the backplane.
3. Using a number 2 Phillips screwdriver with a shank of at least 64 mm (2.5 in.) length, tighten the captive screws to 1.1 N · m (10 lb · in.) of torque. The nylon coating on the screws prevents them from loosening.



1. cFP-DI-300
2. Captive Screws
3. cFP Controller Module
4. Screw Holes
5. cFP Backplane

Wiring the [c]FP-AI-110

The FP-TB-x terminal base has connections for each of the eight input channels and for an external power supply to power field devices. The cFP-CB-x connector block provides the same connections. Each channel has separate input terminals for voltage (VIN) and current (IIN) input. Voltage and current inputs are referenced to the COM terminals, which are internally connected to each other and to the C terminals. All eight VSUP terminals are internally connected to each other and to the V terminals.

You can use a 10–30 VDC external supply to power field devices.

Connect the external power supply to multiple V and VSUP terminals so that the maximum current through any V terminal is 2 A or less and the maximum current through any VSUP terminal is 1 A or less.

Install a 2 A maximum, fast-acting fuse between the external power supply and the V terminal on each channel.

The wiring diagrams in this document show fuses where appropriate.

Table 1 lists the terminal assignments for the signals associated with each channel. The terminal assignments are the same for the FP-TB-x terminal bases and the cFP-CB-x connector blocks.

Table 1. Terminal Assignments

Channel	Terminal Numbers			
	VIN1	IIN2	3 VSUP	COM
0	1	2	17	18
1	3	4	19	20
2	5	6	21	22
3	7	8	23	24
4	9	10	25	26
5	11	12	27	28
6	13	14	29	30
7	15	16	31	32
<p>1 Install a 2 A, fast-acting fuse on each V_{IN} terminal.</p> <p>2 Install a 2 A, fast-acting fuse on each I_{IN} terminal.</p> <p>3 Install a 2 A maximum, fast-acting fuse on each V_{SUP} terminal.</p>				

- **Caution** Do not connect both current and voltage inputs to the same channel.
- **Caution** Cascading power between two modules defeats isolation between those modules. Cascading power from the network module defeats all isolation between modules in the FieldPoint bank.

Taking Measurements with the [c]FP-AI-110

The [c]FP-AI-110 has eight single-ended input channels. All eight channels share a common ground reference that is isolated from other modules in the FieldPoint system. Figure 3 shows the analog input circuitry on one channel.

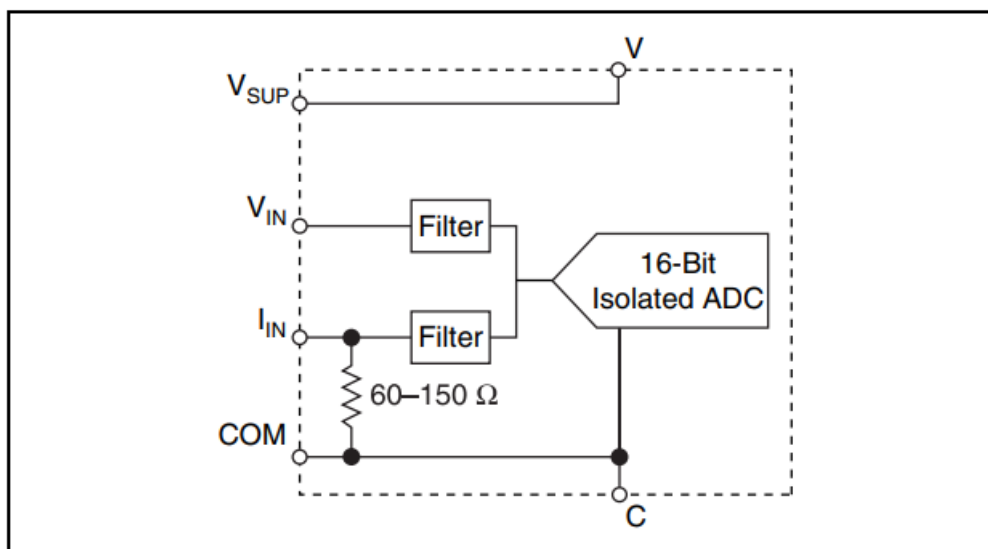


Figure 3. FP-AI-110 Analog Input Circuit

Measuring Voltage with the [c]FP-AI-110

The input ranges for voltage signals are 0–1 V, 0–5 V, 0–10 V, 60 mV, ± 300 mV, ± 1 V, ± 5 V, and ± 10 V.

Figure 4 shows how to connect a voltage source without an external power supply to one channel of the [c]FP-AI-110.

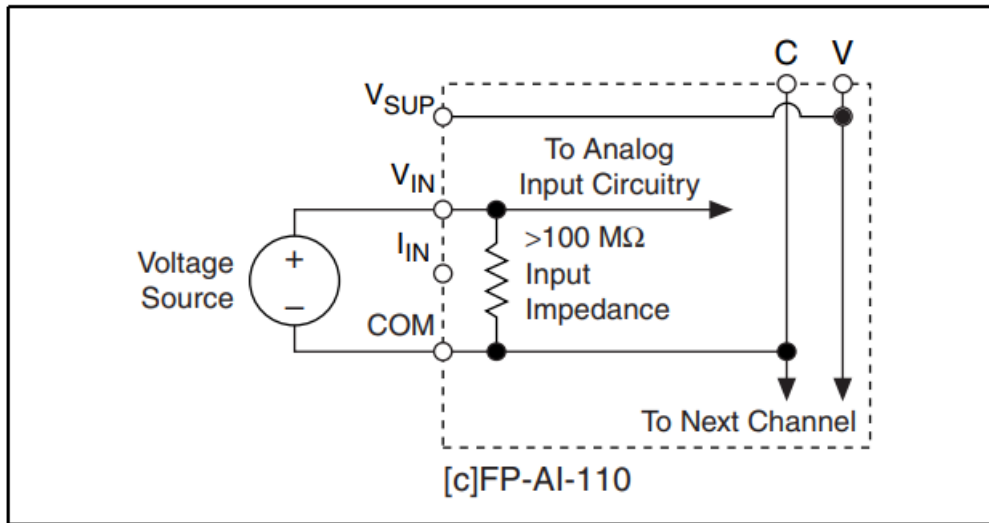


Figure 4. Voltage Source without External Power Supply

Figure 5 shows how to connect a voltage source with an external power supply to one channel of the [c]FP-AI-110.

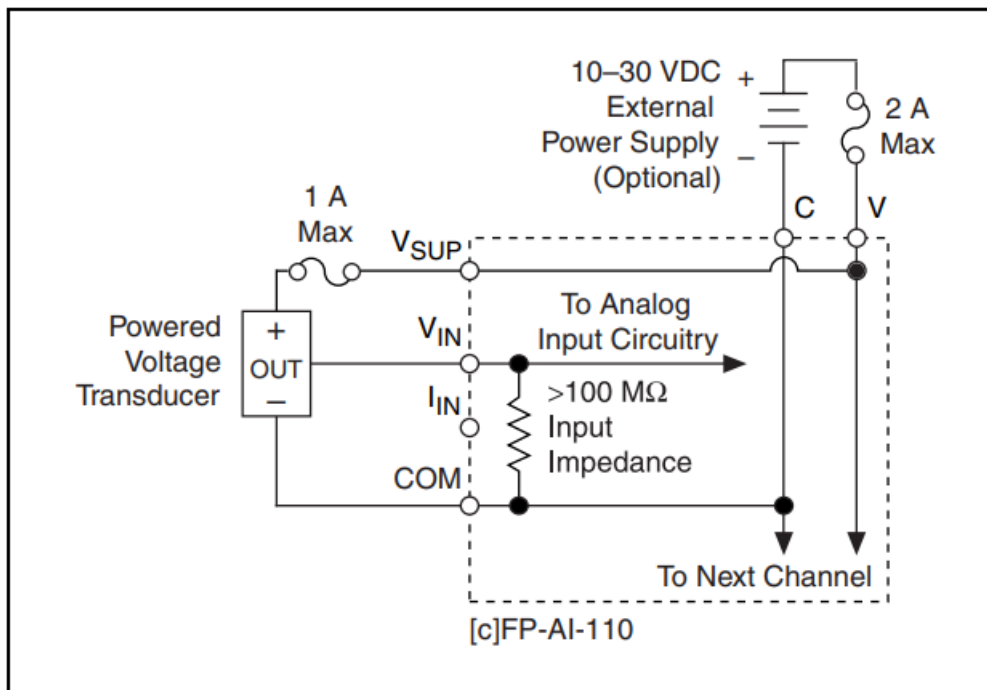


Figure 5. Voltage Source with External Power Supply

Measuring Current with the [c]FP-AI-110

- The input ranges for current sources are 0–20, 4–20, and ± 20 mA.
- The module reads current flowing into the IIN terminal as positive and current flowing out of the terminal as negative. Current flows into the IIN terminal, goes through a 100 Ω resistor, and flows out from the COM or C terminal.
- Figure 6 shows how to connect a current source without an external power supply to one channel of the [c]FP-

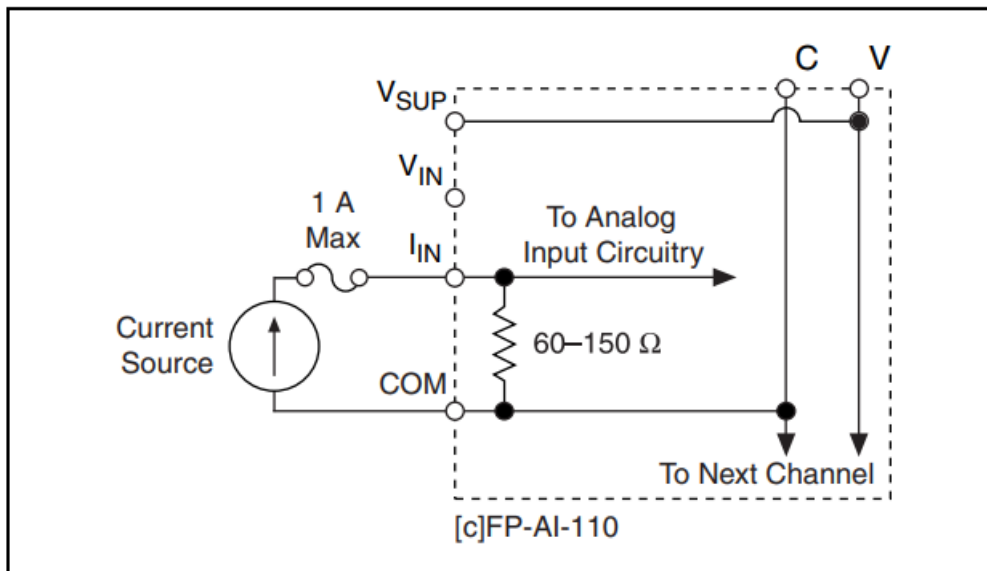


Figure 6. Current Source without External Power Supply

Figure 7 shows how to connect a current source with an external power supply to one channel of the [c]FP-AI-110.

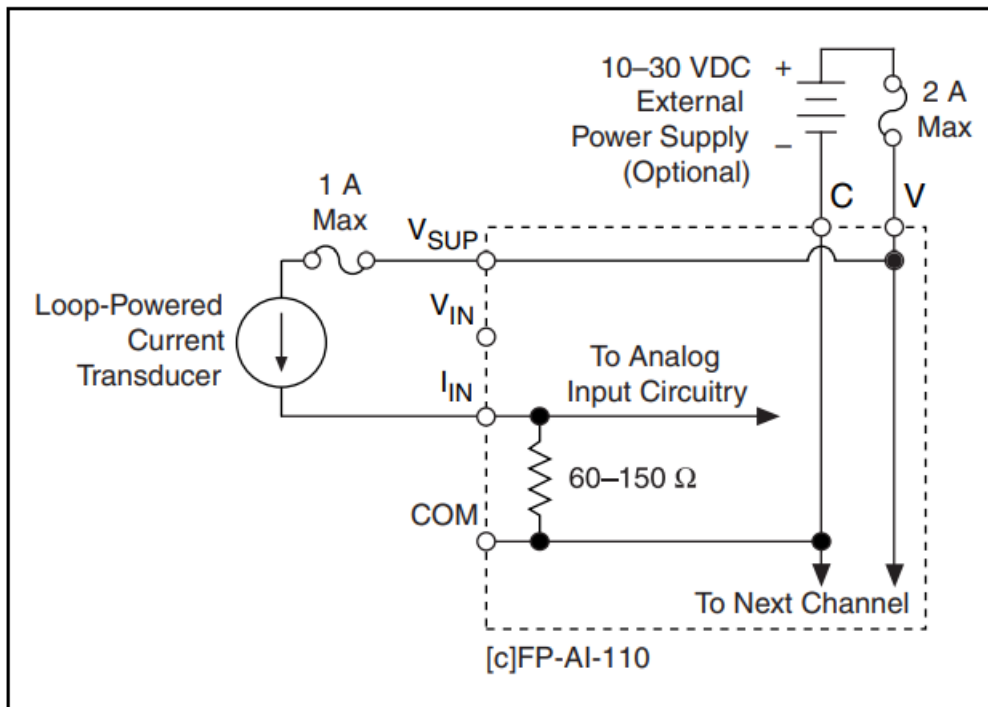


Figure 7. Current Source with External Power Supply

Input Ranges

To prevent inaccurate readings, choose an input range such that the signal you are measuring does not exceed either end of the range.

Overhanging

The [c]FP-AI-110 has an overhanging feature that measures a little beyond the nominal values of each range. For example, the actual measurement limit of the ± 10 V range is ± 10.4 V. The overhanging feature enables the [c]FP-AI-110 to compensate for field devices with span errors of up to +4% of full scale. Also, with the overhanging feature, a noisy signal near full scale does not create rectification errors.

Filter Settings

Three filter settings are available for each channel. The filters on the [c]FP-AI-110 input channels are comb filters

that provide notches of rejection at multiples, or harmonics, of a fundamental frequency. You can select a fundamental frequency of 50, 60, or 500 Hz. The [c]FP-AI-110 applies 95 dB of rejection at the fundamental frequency and at least 60 dB of rejection at each of the harmonics. In many cases, most of the noise components of input signals are related to the local AC power line frequency, so a filter setting of either 50 or 60 Hz is best.

The filter setting determines the rate at which the [c]FP-AI-110 samples the inputs. The [c]FP-AI-110 resamples all of the channels at the same rate. If you set all of the channels to the 50 or 60 Hz filter, the [c]FP-AI-110 samples each channel every 1.470 s or every 1.230 s, respectively. If you set all of the channels to 500 Hz filters, the module samples each channel every 0.173 s. When you select different filter settings for different channels, use the following formula to determine the sampling rate.

- (number of channels with 50 Hz filter) × 184 ms +
- (number of channels with 60 Hz filter) × 154 ms +
- (number of channels with 500 Hz filter) × 21.6 ms = Update Rate

If you are not using some of the [c]FP-AI-110 channels, set them to the 500 Hz filter setting to improve the response time of the module. For example, if one channel is set for a 60 Hz filter, and the other seven channels are set to 500 Hz, the module samples each channel every 0.3 s (four times faster than the case in which all eight channels are set to the 60 Hz setting).

The sampling rate does not affect the rate at which the network module reads the data. The [c]FP-AI-110 always has data available for the network module to read; the sampling rate is the rate at which this data is updated. Set up your application so that the sampling rate is faster than the rate at which the network module polls the [c]FP-AI-110 for data.

Status Indicators

The [c]FP-AI-110 has two green status LEDs, POWER and READY. After you insert the [c]FP-AI-110 into a terminal base or backplane and apply power to the connected network module, the green POWER LED lights and the [c]FP-AI-110 informs the network module of its presence. When the network module recognizes the [c]FP-AI-110, it sends initial configuration information to the [c]FP-AI-110. After the [c]FP-AI-110 receives this initial information, the green READY LED lights and the module is in normal operating mode. A blinking or unlit READY LED indicates an error condition.

Upgrading the FieldPoint Firmware

You may need to upgrade the FieldPoint firmware when you add new I/O modules to the FieldPoint system. For information on determining which firmware you need and how to upgrade your firmware, go to ni.com/info and enter fpmatrix.

Isolation and Safety Guidelines

Caution Read the following information before attempting to connect the [c]FP-AI-110 to any circuits that may contain hazardous voltages.¹

This section describes the isolation of the [c]FP-AI-110 and its compliance with international safety standards. The field wiring connections are isolated from the backplane and the inter-module communication bus. The isolation barriers in the module provide 250 Vrms Measurement Category II continuous channel-to-backplane and channel-to-ground isolation, verified by 2,300 Vrms, 5 s dielectric withstand test.² The [c]FP-AI-110 provides double insulation (compliant with IEC 61010-1) for

1. A hazardous voltage is a voltage greater than 42.4 V_{peak} or 60 VDC. When a hazardous voltage is present on any channel, all of the channels must be considered to be carrying hazardous voltages. Ensure that all circuits

connected to the module are inaccessible to human touch.

2. Refer to the Safety Isolation Voltage section for more information about isolation on the [c]FP-AI-110.

Working voltages of 250 Vrms

Safety standards (such as those published by UL and IEC) require the use of double insulation between hazardous voltages and any human-accessible parts or circuits.

Never try to use any isolation product between human-accessible parts (such as DIN rails or monitoring stations) and circuits that can be at hazardous potentials under normal conditions, unless the product is specifically designed for such an application, as is the [c]FP-AI-110.

Even though the [c]FP-AI-110 is designed to handle applications with hazardous potentials, follow these guidelines to ensure a safe total system:

- There is no isolation between channels on the [c]FP-AI-110. If a hazardous voltage is present on any channel, all channels are considered hazardous. Make sure that all other devices and circuits connected to the module are properly insulated from human contact.
- Do not share the external supply voltages (the V and C terminals) with other devices (including other FieldPoint devices), unless those devices are isolated from human contact.
- For Compact FieldPoint, you must connect the protective earth (PE) ground terminal on the cFP-BP-x backplane to the system safety ground. The backplane PE ground terminal has the following symbol stamped beside it: . Connect the backplane PE ground terminal to the system safety ground using 14 AWG (1.6 mm) wire with a ring lug. Use the 5/16 in. panhead screw shipped with the backplane to secure the ring lug to the backplane PE ground terminal.
- As with any hazardous voltage wiring, make sure that all wiring and connections meet applicable electrical codes and commonsense practices. Mount terminal bases and backplanes in an area, position, or cabinet that prevents accidental or unauthorized access to wiring that carries hazardous voltages.
- Do not use the [c]FP-AI-110 as the only isolating barrier between human contact and working voltages higher than 250 Vrms .
- Operate the [c]FP-AI-110 only at or below Pollution Degree 2. Pollution Degree 2 means that only nonconductive pollution occurs in most cases. Occasionally, however, a temporary conductivity caused by condensation must be expected
- Operate the [c]FP-AI-110 at or below Measurement Category II. Measurement Category II is for measurements performed on circuits directly connected to the low-voltage installation. This category refers to local-level distribution, such as that provided by a standard wall outlet

Safety Guidelines for Hazardous Locations

The [c]FP-AI-110 is suitable for use in Class I, Division 2, Groups A, B, C, and D hazardous locations; Class 1, Zone 2, AEx nC IIC T4 and Ex nC IIC T4 hazardous locations; and nonhazardous locations only. Follow these guidelines if you are installing the [c]FP-AI-110 in a potentially explosive environment. Failing to follow these guidelines may result in serious injury or death.

- **Caution** Do not disconnect I/O-side wires or connectors unless power has been switched off or the area is known to be nonhazardous.
- **Caution** Do not remove modules unless power has been switched off or the area is known to be nonhazardous.
- **Caution** Substitution of components may impair suitability for Class I, Division 2.

- **Caution** For Zone 2 applications, install the Compact FieldPoint system in an enclosure rated to at least IP 54 as defined by IEC 60529 and EN 60529.

Special Conditions for Safe Use in Europe

This equipment has been evaluated as EEx nC IIC T4 equipment under DEMKO Certificate No. 03 ATEX 0251502X. Each module is marked II 3G and is suitable for use in Zone 2 hazardous locations.

Caution For Zone 2 applications, connected signals must be within the following limits

- **Capacitance**..... 20 µF max
- **Inductance**.....0.2 H max

Safety Guidelines for Hazardous Voltages

If hazardous voltages are connected to the module, take the following precautions. A hazardous voltage is a voltage greater than 42.4 Vpeak or 60 VDC to earth ground

- **Caution** Ensure that hazardous voltage wiring is performed only by qualified personnel adhering to local electrical standards.
- **Caution** Do not mix hazardous voltage circuits and human-accessible circuits on the same module.
- **Caution** Make sure that devices and circuits connected to the module are properly insulated from human contact.
- **Caution** When terminals on the connector block are live with hazardous voltages, make sure that the terminals are not accessible.

Specifications

The following specifications are typical for the range –40 to 70 °C unless otherwise noted. Gain errors are given as a percentage of input signal value. Specifications are subject to change without notice.

Input Characteristics

- **Number of channels**8
- **ADC resolution**..... 16 bits at 50 or 60 Hz; 10 bits at 500 Hz
- **Type of ADC**.....Delta-sigma

Effective resolution by input signal range and filter set

Nominal Input Range		With Overranging	Effective Resolution with 50 or 60 Hz Filter Enabled*	Effective Resolution with 500 Hz or No Filter Enabled*
Voltage	±60 mV	±65 mV	3 mV	25 mV
	±300 mV	±325 mV	16 mV	100 mV
	±1 V	±1.04 V	40 mV	300 mV
	±5 V	±5.2 V	190 mV	1,500 mV
	±10 V 0–1 V	±10.4 V 0–1.04 V	380 mV	3,000 mV
	0–5 V	0–5.2 V	20 mV	300 mV
	0–10 V	0–10.4 V	95 mV	1,500 mV
			190 mV	3,000 mV
Current	0–20 mA	0–21 mA	0.5 mA	15 mA
	4–20 mA	3.5–21 mA	0.5 mA	15 mA
	±20 mA	±21 mA	0.7 mA	16 mA
* Includes quantization errors and rms noise.				

Input characteristics by filter setting

Characteristic	Filter Settings		
	50 Hz	60 Hz	500 Hz
Update rate*	1.470 s	1.230 s	0.173 s
Effective resolution	16 bits	16 bits	10 bits
Input bandwidth (–3 dB)	13 Hz	16 Hz	130 Hz
* Applies when all eight channels are set to the same filter setting.			

- **Normal-mode rejection** 95 dB (with 50/60 Hz filter)
- **Nonlinearity** 0.0015% (monotonicity1 guaranteed over the operating temperature range)

Voltage Inputs

- **Input impedance** >100 MΩ

- **Overvoltage protection**±40 V

A characteristic of an ADC in which the digital code output always increases as the value of the analog input to it increases.

Input current

- **25 °C**..... 400 pA typ, 1 nA max
- **70 °C**.....3 nA typ, 15 nA max

Input noise (with 50 or 60 Hz filter enabled)

- **±60 mV range**.....±3 LSB1 peak-to-peak
- **±300 mV range**.....±2 LSB peak-to-peak
- **Other ranges**±1 LSB peak-to-peak

Typical and warranted accuracy by input range and temperature range

Nominal Input Range	Typical Accuracy at 15 to 35 °C (% of Reading; % of Full Scale)	Warranted Accuracy at 15 to 35 °C (% of Reading; % of Full Scale)
±60 mV	±0.04%; ±0.05%	±0.05%; ±0.3%
±300 mV	±0.04%; ±0.015%	±0.06%; ±0.1%
±1 V	±0.04%; ±0.008%	±0.05%; ±0.04%
±5 V	±0.04%; ±0.005%	±0.06%; ±0.02%
±10 V	±0.04%; ±0.005%	±0.06%; ±0.02%
0–1 V	±0.04%; ±0.005%	±0.05%; ±0.03%
0–5 V	±0.04%; ±0.003%	±0.06%; ±0.01%
0–10 V	±0.04%; ±0.003%	±0.06%; ±0.01%

Nominal Input Range	Typical Accuracy at – 40 to 70 °C (% of Reading; % of Full Scale)	Warranted Accuracy at – 40 to 70 °C (% of Reading; % of Full Scale)
±60 mV	±0.06%; ±0.35%	±0.10%; ±1.5%
±300 mV	±0.07%; ±0.08%	±0.11%; ±0.40%
±1 V	±0.06%; ±0.03%	±0.10%; ±0.13%
±5 V	±0.07%; ±0.01%	±0.11%; ±0.04%
±10 V	±0.07%; ±0.01%	±0.11%; ±0.03%

Nominal Input Range	Typical Accuracy at – 40 to 70 °C (% of Reading; % of Full Scale)	Warranted Accuracy at – 40 to 70 °C (% of Reading; % of Full Scale)
0–1 V	±0.06%; ±0.025%	±0.10%; ±0.12%
0–5 V	±0.07%; ±0.007%	±0.11%; ±0.03%
0–10 V	±0.07%; ±0.005%	±0.11%; ±0.02%

Note Full scale is the maximum value of the nominal input range. For example, for the ±10 V input range, full scale is 10 V and ±0.01% of full scale is 1 mV

- **Gain error drift**±20 ppm/°C
- **Offset error drift With 50 or 60 Hz filter enabled**.....±6 µV/°C
- **With 500 Hz filter enabled**±15 µV/°C

Current Inputs

- **Input impedance**60–150 Ω
- **Overvoltage protection**±25 V
- **Input noise (50 or 60 Hz filter)**0.3 µA rms

Typical and warranted accuracy by temperature range

Typical Accuracy at 15 to 35 °C (% of Reading; % of Full Scale)	Warranted Accuracy at 15 to 35 °C (% of Reading; % of Full Scale)
±0.08%; ±0.010%	±0.11%; ±0.012%

Typical Accuracy at – 40 to 70 °C (% of Reading; % of Full Scale)	Warranted Accuracy at – 40 to 70 °C (% of Reading; % of Full Scale)
±0.16%; ±0.016%	±0.3%; ±0.048%

- **Offset error drift**.....±100 nA/°C
- **Gain error drift**±40 ppm/°C

Physical Characteristics

IndicatorsGreen POWER and READY indicators

Weight

- **FP-AI-110**.....140 g (4.8 oz)
- **cFP-AI-110**..... 110 g (3.7 oz)

Power Requirements

- **Power from network module**350 mW

Safety Isolation Voltage

Channel-to-ground isolation

Continuous250 Vrms, Measurement Category II

Dielectric withstand.....2,300 Vrms (test duration is 5 s)

Channel-to-channel isolationNo isolation between channels

Environmental

FieldPoint modules are intended for indoor use only. For outdoor use, they must be mounted inside a sealed enclosure.

- **Operating temperature**–40 to 70 °C
- **Storage temperature**–55 to 85 °C
- **Humidity** 10 to 90% RH, noncondensing
- **Maximum altitude**.....2,000 m; at higher altitudes the isolation voltage ratings must be lowered.
- **Pollution Degree**2

Shock and Vibration

These specifications apply only to the cFP-AI-110. NI recommends Compact FieldPoint if your application is subject to shock and vibration. Operating vibration, random

- **(IEC 60068-2-64)**.....10–500 Hz, 5 grms Operating vibration, sinusoidal
- **(IEC 60068-2-6)**.....10–500 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

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
- CAN/CSA-C22.2 No. 61010-1

For UL, hazardous location, 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

Emissions.....EN 55011 Class A at 10 m FCC Part 15A above 1 GHz
Immunity.....EN 61326:1997 + A2:2001,

CE, C-Tick, and FCC Part 15 (Class A) Compliant

Note For EMC compliance, you must operate this device with shielded cabling

CE Compliance

- This product meets the essential requirements of applicable
- European Directives, as amended for CE marking, as follows:
- **Low-Voltage Directive (safety)**.....73/23/EEC

Electromagnetic Compatibility

- **Directive (EMC)**89/336/EEC

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.

Mechanical Dimensions

Figure 8 shows the mechanical dimensions of the FP-AI-110 installed on a terminal base. If you are using the cFP-AI-110, refer to the Compact FieldPoint controller user manual for the dimensions and cabling clearance requirements of the Compact FieldPoint system.

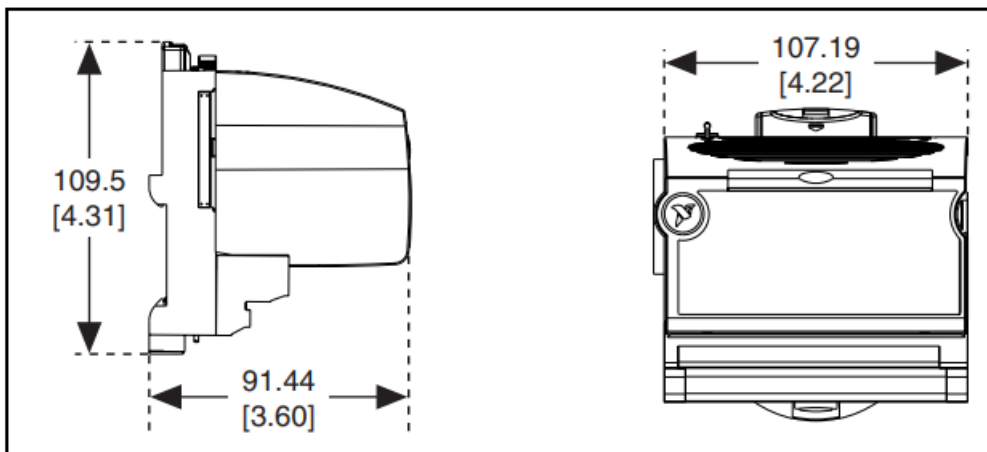


Figure 8. FP-AI-110 Mechanical Dimensions

Where to Go for Support

For more information about setting up the FieldPoint system, refer to these National Instruments documents:

- FieldPoint network module user manual
- Other FieldPoint I/O module operating instructions
- FieldPoint terminal base and connector block operating instructions

Go to ni.com/support for the most current manuals, examples, and troubleshooting information

National Instruments corporate headquarters is located at 11500 North Mopac Expressway, Austin, Texas, 78759-3504. National Instruments also has offices located around the world to help address your support needs. For telephone support in the United States, create your service request at ni.com/support and follow the calling instructions or dial 512 795 8248. For telephone support outside the United States, contact your local branch office:

- Australia 1800 300 800, Austria 43 0 662 45 79 90 0,
- Belgium 32 0 2 757 00 20, Brazil 55 11 3262 3599,
- Canada 800 433 3488, China 86 21 6555 7838,
- Czech Republic 420 224 235 774, Denmark 45 45 76 26 00,
- Finland 385 0 9 725 725 11, France 33 0 1 48 14 24 24,
- Germany 49 0 89 741 31 30, India 91 80 51190000,
- Israel 972 0 3 6393737, Italy 39 02 413091,
- Japan 81 3 5472 2970, Korea 82 02 3451 3400,
- Lebanon 961 0 1 33 28 28, Malaysia 1800 887710,
- Mexico 01 800 010 0793, Netherlands 31 0 348 433 466,
- New Zealand 0800 553 322, Norway 47 0 66 90 76 60,
- Poland 48 22 3390150, Portugal 351 210 311 210,
- Russia 7 095 783 68 51, Singapore 1800 226 5886,
- Slovenia 386 3 425 4200, South Africa 27 0 11 805 8197,
- Spain 34 91 640 0085, Sweden 46 0 8 587 895 00,
- Switzerland 41 56 200 51 51, Taiwan 886 02 2377 2222,
- Thailand 662 278 6777, United Kingdom 44 0 1635 523545

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	<p>NATIONAL INSTRUMENTS FP-AI-110 Eight-Channel 16-Bit Analog Input Modules [pdf] Instructions Manual</p> <p>FP-AI-110, cFP-AI-110, Eight-Channel 16-Bit Analog Input Modules, FP-AI-110 Eight-Channel 16-Bit Analog Input Modules, 16-Bit Analog Input Modules, Analog Input Modules, Input Modules, Modules</p>
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- [NI Product Certifications - NI](#)
- [NI Using Info Codes - NI](#)
- [NI Legal Information - NI](#)
- [NI National Instruments Patents - NI](#)

-  [Support - NI](#)
-  [FP-AI-110 National Instruments Analog Input Module | Apex Waves](#)

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