FieldPoint™ Operating Instructions
FP-DI-300 and cFP-DI-300

Eight-Channel, 24 V Digital Input Module

These operating instructions describe how to install and use the National Instruments FP-DI-300 and cFP-DI-300 digital input modules (referred to inclusively as the [c]FP-DI-300). For information about configuring and accessing the [c]FP-DI-300 over a network, refer to the user manual for the FieldPoint network module you are using.

Features

The [c]FP-DI-300 is a FieldPoint digital input module with the following features:

- Eight digital input channels
- Sinking inputs compatible with 24 VDC sourcing outputs
- On/Off LED indicators
- 2,300 V_{rms} transient overvoltage protection
- –40 to 70 °C operation
- Hot swappable

Installing the FP-DI-300

The FP-DI-300 mounts on a FieldPoint terminal base (FP-TB-*x*), which provides operating power to the module. Installing the FP-DI-300 onto a powered terminal base does not disrupt the operation of the FieldPoint bank.

To install the FP-DI-300, 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 5 (used for the FP-DI-300 module).
2. Align the FP-DI-300 alignment slots with the guide rails on the terminal base.

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3. Press firmly to seat the FP-DI-300 on the terminal base. When the module is firmly seated, the terminal base latch locks it into place.

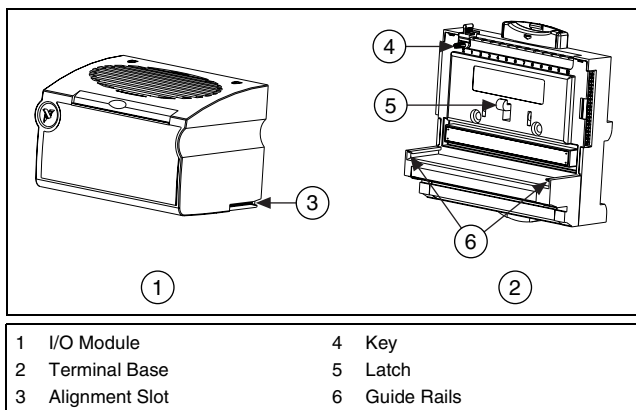| 1	I/O Module	4	Key
2	Terminal Base	5	Latch
3	Alignment Slot	6	Guide Rails

Figure 1. Installing the FP-DI-300

Installing the cFP-DI-300

The cFP-DI-300 mounts on a Compact FieldPoint backplane (cFP-BP-*x*), which provides operating power to the module. Installing the cFP-DI-300 onto a powered backplane does not disrupt the operation of the FieldPoint bank.

To install the cFP-DI-300, refer to Figure 2 and complete the following steps:

1. Align the captive screws on the cFP-DI-300 with the holes on the backplane. The alignment keys on the cFP-DI-300 prevent backward insertion.

2. Press firmly to seat the cFP-DI-300 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.
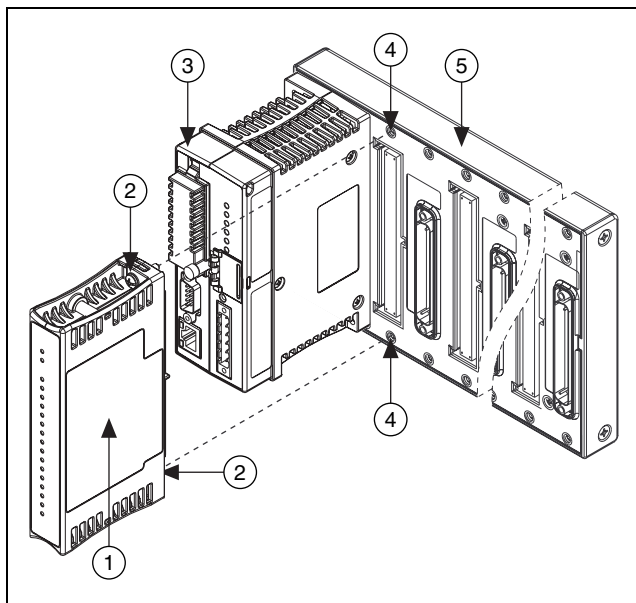
1	cFP-DI-300	4	Screw Holes
2	Captive Screws	5	cFP Backplane
3	cFP Controller Module		

Figure 2. Installing the cFP-DI-300

Wiring the [c]FP-DI-300

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 one input terminal, V_{IN}. All eight inputs are referenced to the COM terminals, which are internally connected to each other and to the C terminals. All eight V_{SUP} terminals are internally connected to each other and to the V terminals.

Use a 15–30 VDC external power supply to power field devices. Connect the external power supply to multiple V and V_{SUP} terminals so that the maximum current through any V terminal is 2 A or less and the maximum current through any V_{SUP} 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		
	V_{IN}	V_{SUP}[1]	COM
0	1	17	18
1	3	19	20
2	5	21	22
3	7	23	24
4	9	25	26
5	11	27	28
6	13	29	30
7	15	31	32

[1] Install a 1 A maximum, fast-acting fuse on each connected V_{SUP} terminal. Install a 2 A maximum, fast-acting fuse on each connected V terminal.

⚠ **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.

You can wire each channel for use with a *sourcing-output* device. A sourcing-output device provides a path to a voltage source.

Figure 3 shows how to connect a three-wire sourcing-output device to one channel of the [c]FP-DI-300. In this wiring configuration, the external power supply is connected to the V and C terminals. The output device sources power to the V_{IN} terminal.
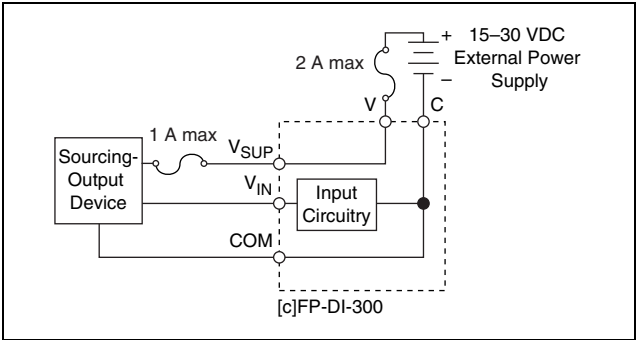
Figure 3. Connection to Sourcing-Output Device

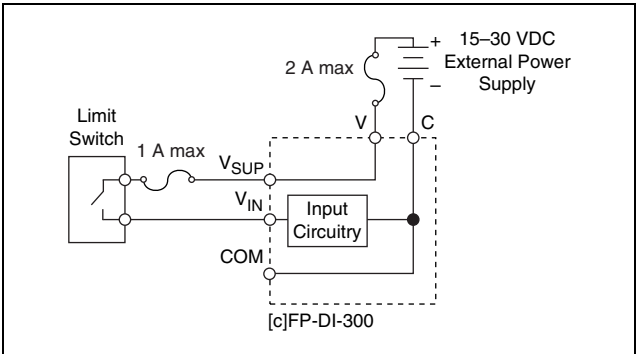Figure 4 shows how to connect a limit switch to one channel of the [c]FP-DI-300.

Figure 4. Connection to Limit Switch

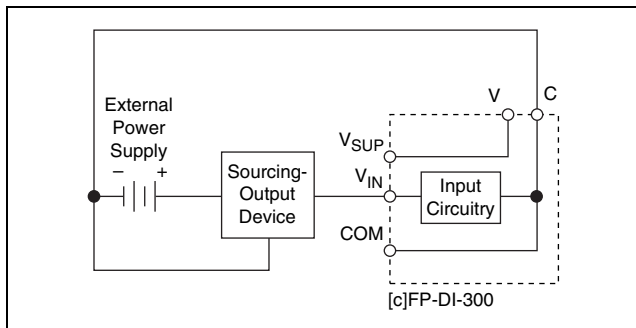Alternatively, you can connect an external power supply as shown in Figure 5.

Figure 5. Connection to Externally Powered Sourcing-Output Device

> **Note** You *must* use the same ground for all of the channels on the [c]FP-DI-300.

Digital Input Circuit

The [c]FP-DI-300 has eight current-limited input channels. You can connect a voltage signal to each channel. All eight input channels share a common ground reference that is isolated from other modules in the FieldPoint system.

When you apply a voltage above 15 V to a V_{IN} terminal, current flows through that terminal and turns on the optical isolator, registering as an ON condition for the channel. When you apply a voltage below 5 V to a V_{IN} terminal, the channel registers an OFF condition. When you apply a voltage between 5 and 15 V, the channel may or may not register an ON condition.

The [c]FP-DI-300 has *sinking* inputs, which means that current flows through the V_{IN} terminal to the COM terminal. The inputs are compatible with sourcing-output devices capable of sourcing or driving current from a positive supply voltage to common. A sensor is an example of a sourcing-output device.

Figure 3 shows connections to sourcing-output devices. These devices should have OFF state leakage currents of less than 1 mA to ensure that they do not provide false ON state readings to the [c]FP-DI-300.

Status Indicators

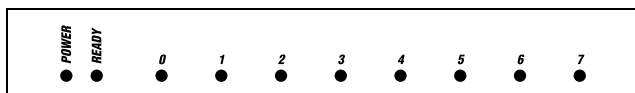Figure 6 shows the status indicator LEDs on the [c]FP-DI-300.

Figure 6. Status Indicators

The [c]FP-DI-300 has two green status LEDs, **POWER** and
READY. After you install the [c]FP-DI-300 onto a terminal base
or backplane and apply power to the connected network module,
the green **POWER** indicator lights and the [c]FP-DI-300 informs
the network module of its presence. When the network module
recognizes the [c]FP-DI-300, it sends initial configuration
information to the [c]FP-DI-300. After the [c]FP-DI-300 receives
this initial information, the green **READY** indicator lights and the
module is in normal operating mode.

In addition to the green **POWER** and **READY** indicators, each
channel has a numbered green status indicator that lights when the
channel is in the ON state.

Isolation and Safety Guidelines

⚠ **Caution** Read the following information before
attempting to connect the [c]FP-DI-300 to any
circuits that may contain hazardous voltages.

This section describes the isolation of the [c]FP-DI-300 and its
compliance with international safety standards. The field wiring
connections are isolated from the backplane and the inter-module
communication bus. The isolation is provided by the module,
which has optical and galvanic isolation barriers designed and
tested to protect against transient fault voltages of up to 2,300 V_{rms}.

Follow these guidelines to ensure a safe total system:

- The [c]FP-DI-300 has a safety isolation barrier between the
  I/O channels and the inter-module communication bus. There
  is no isolation between channels unless otherwise noted. If any
  of the channels on a module are wired at a hazardous potential,
  make sure that all other devices or circuits connected to that
  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.

- Operate the [c]FP-DI-300 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.

- Refer to the FieldPoint product label for regulatory certification under hazardous location standards. If the FieldPoint product is not certified for operation in hazardous locations, do not operate it in an explosive atmosphere or where there may be flammable gases or fumes.

Specifications

These specifications are typical for the range –40 to 70 °C unless otherwise noted. Specifications are subject to change without notice.

Input Characteristics

Number of channels	8
Input type	24 VDC sinking inputs
Reverse voltage protection	–30 VDC
Input OFF range	<5 VDC
Input ON range	15 to 30 VDC
Input impedance	5 kΩ

Current sink

Logic Level	Minimum	Maximum
ON state	3 mA	6 mA
OFF state	−6 mA	1 mA

Physical Characteristics

Indicators .... Green **POWER** and
READY indicators,
8 green input state indicators

Weight

FP-DI-300 .... 140 g (4.93 oz)

cFP-DI-300 .... 110 g (3.88 oz)

Power Requirements

Power from network module .... 225 mW

Isolation Voltage

Channel-to-channel isolation .... No isolation between
channels

Transient overvoltage .... 2,300 V_{rms}

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-DI-300. NI recommends Compact FieldPoint if your application is subject to shock and vibration.

Operating vibration, random
(IEC 60068-2-64)............................. 10–500 Hz, 5 g_{rms}

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 3121-1, UL 61010C-1
- CAN/CSA C22.2 No. 1010.1

For UL, hazardous location, and other safety certifications, refer to the product label or visit ni.com/hardref.nsf, 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,
Table 1

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

Mechanical Dimensions

Figure 7 shows the mechanical dimensions of the FP-DI-300 installed on a terminal base. If you are using the cFP-DI-300, refer to the Compact FieldPoint controller user manual for the dimensions and cabling clearance requirements of the Compact FieldPoint system.
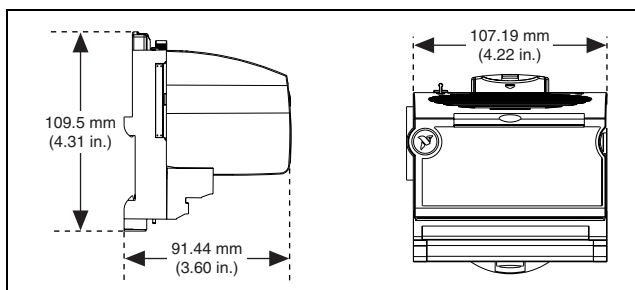

Figure 7. FP-DI-300 Mechanical Dimensions

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:

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Canada (Vancouver) 514 685 7530, 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, Greece 30 2 10 42 96 427,
India 91 80 51190000, Israel 972 0 3 6393737,
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Korea 82 02 3451 3400, Malaysia 603 9131 0918,
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