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Find the *National Instruments cFP-1808* at our website: *Click HERE*

Quick Start Guide

Compact FieldPoint™ cFP-180*x*

What You Need to Get Set Up

- cFP-180*x* Network Interface
- Mounting hardware (panel-mount or rack-mount accessory)
- I/O module(s)
- Connector blocks and/or cables
- Ethernet or serial cable
- 11–30 VDC power supply
- Number 2 Phillips screwdriver
- PC running Windows
- FieldPoint software 4.1.2 or later

1. Mount the cFP-180*x*

You can mount the cFP-180*x* on a panel or in a standard 19 in. rack. Before using either of these mounting methods, record the serial number from the back of the cFP-180*x*.

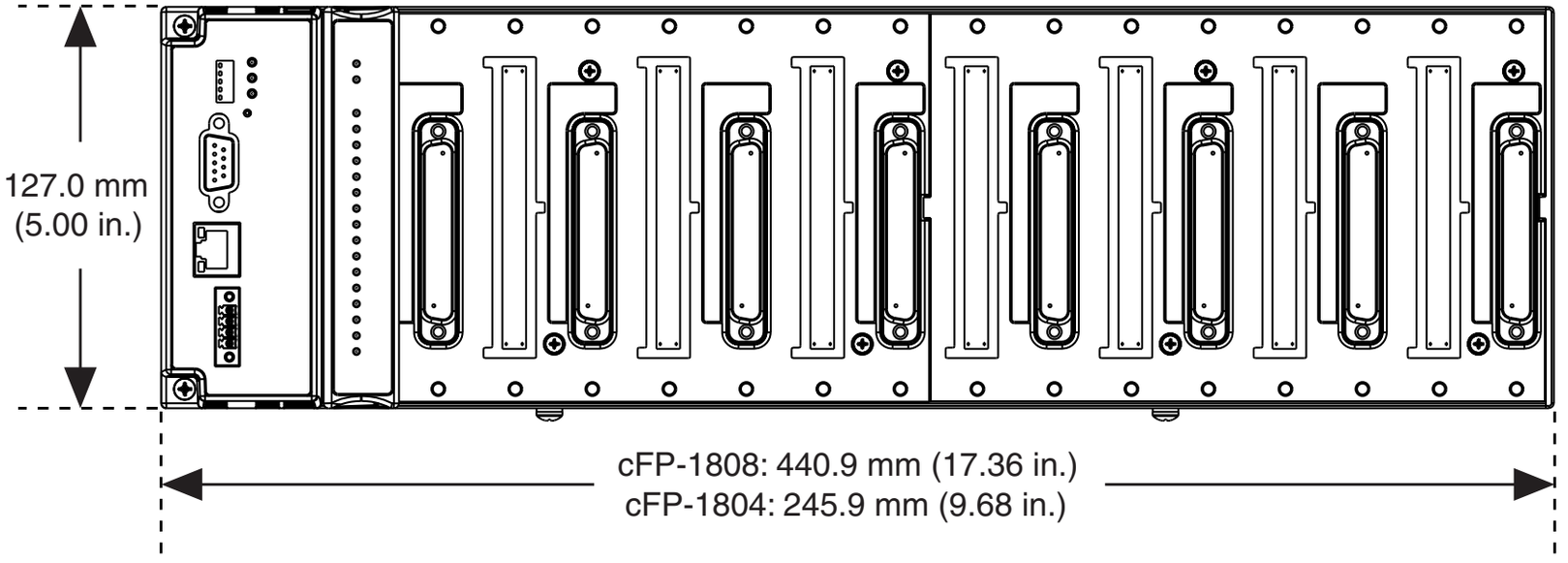
Each set of mounting instructions in this document includes an instruction to connect the protective earth (PE) ground terminal on the cFP-180*x* to the system safety ground. The PE ground terminal has the following symbol stamped beside it: ⏚. Connect the PE ground terminal to the system safety ground using

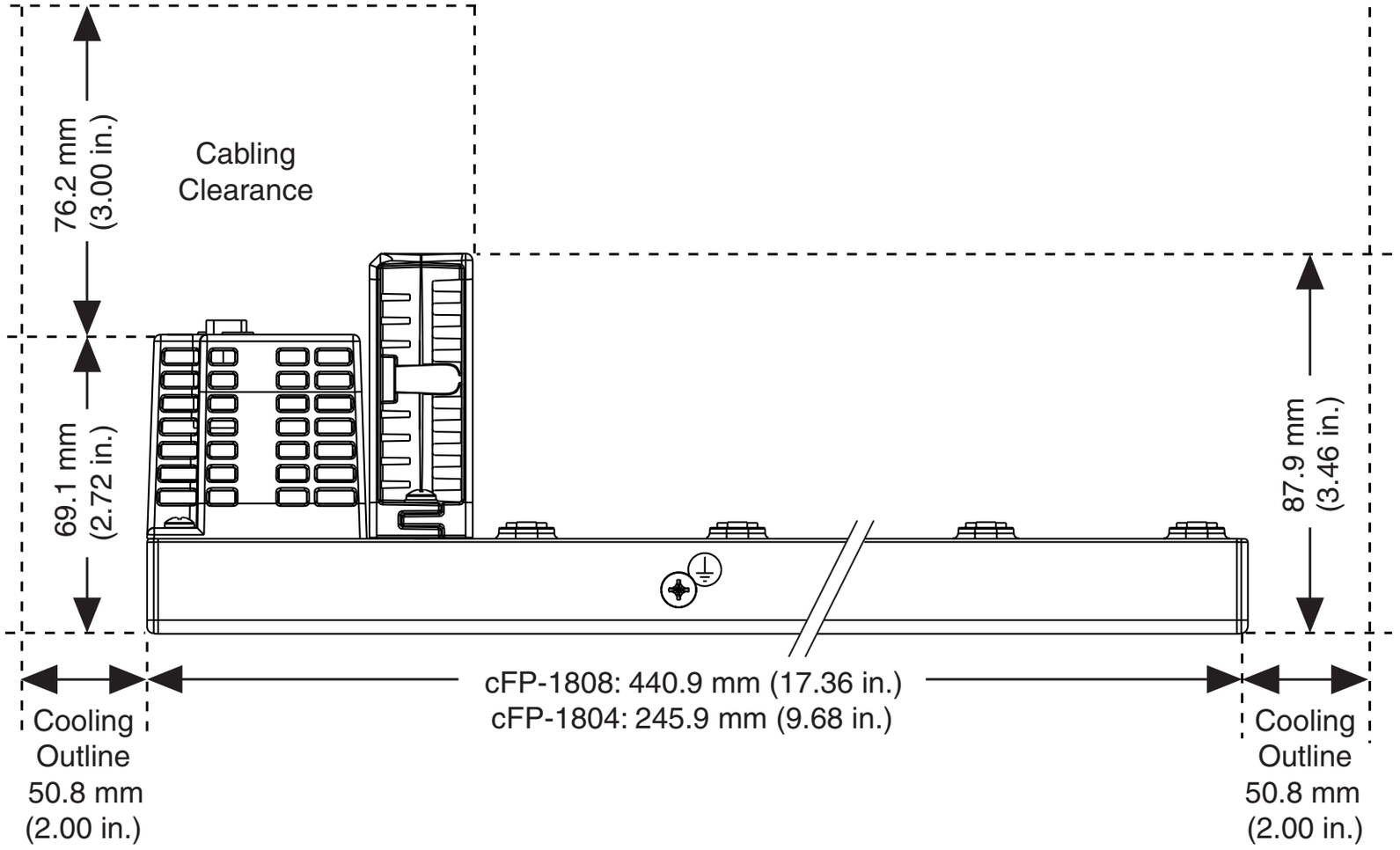
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14 AWG (1.6 mm) wire with a ring lug. Use the 5/16 in. panhead screw shipped with the cFP-180*x* to secure the ring lug to the PE ground terminal.

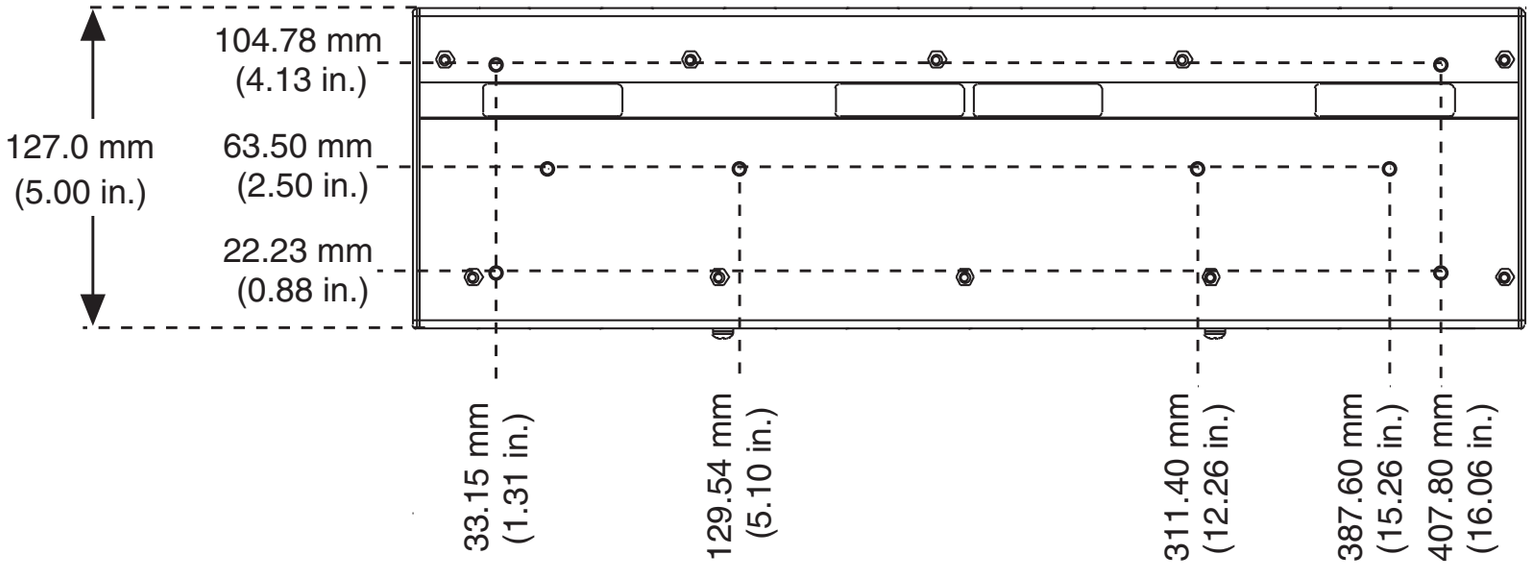
Caution Keep in mind these requirements for space and cabling clearance:

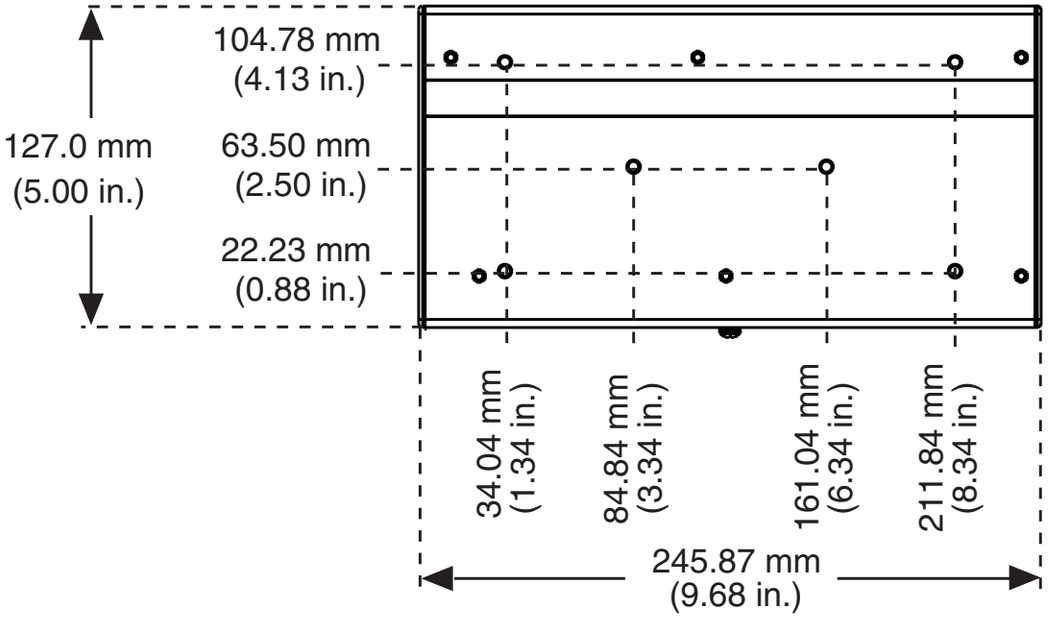
- Allow at least 51 mm (2 in.) all around the cFP-180*x* for air circulation.
- Allow 38 mm (1.5 in.) below and 51 mm (2 in.) above the I/O modules.





Caution If you are using UL Recognized I/O modules with the Compact FieldPoint system, you must install the entire system in a suitably rated, UL Listed NEMA or IP enclosure. Refer to the *Compact FieldPoint Safety Information* section for more information.



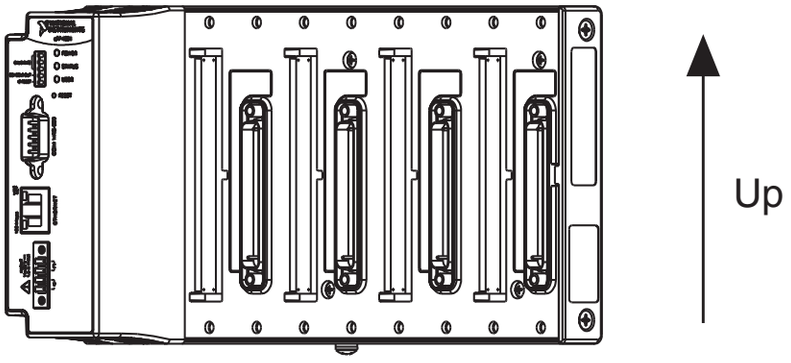


Caution NI recommends that you use one of the mounting systems described in this document. If you decide to use a custom mounting

solution, make sure that the screws you use are short enough to fit in the holes in the backplane. The screw holes are 5 mm (0.2 in.) deep.

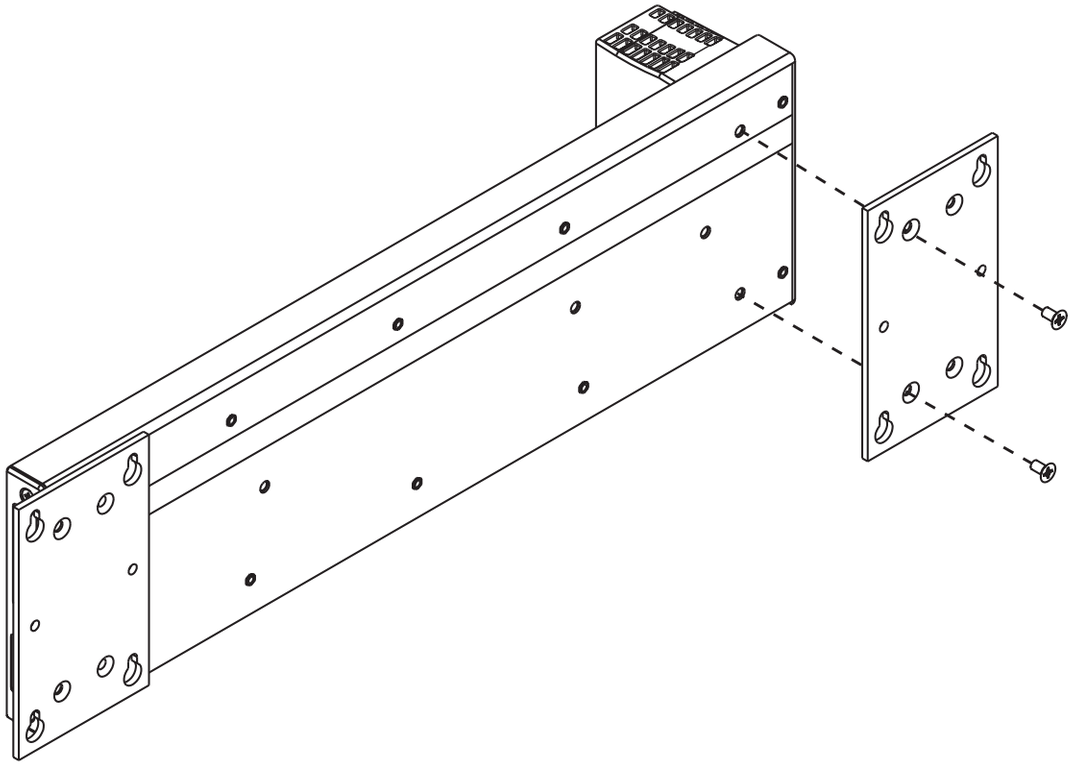
Mounting the System Upright

To ensure maximum cooling efficiency, mount the Compact FieldPoint system so that the I/O module vents are at the top and bottom.

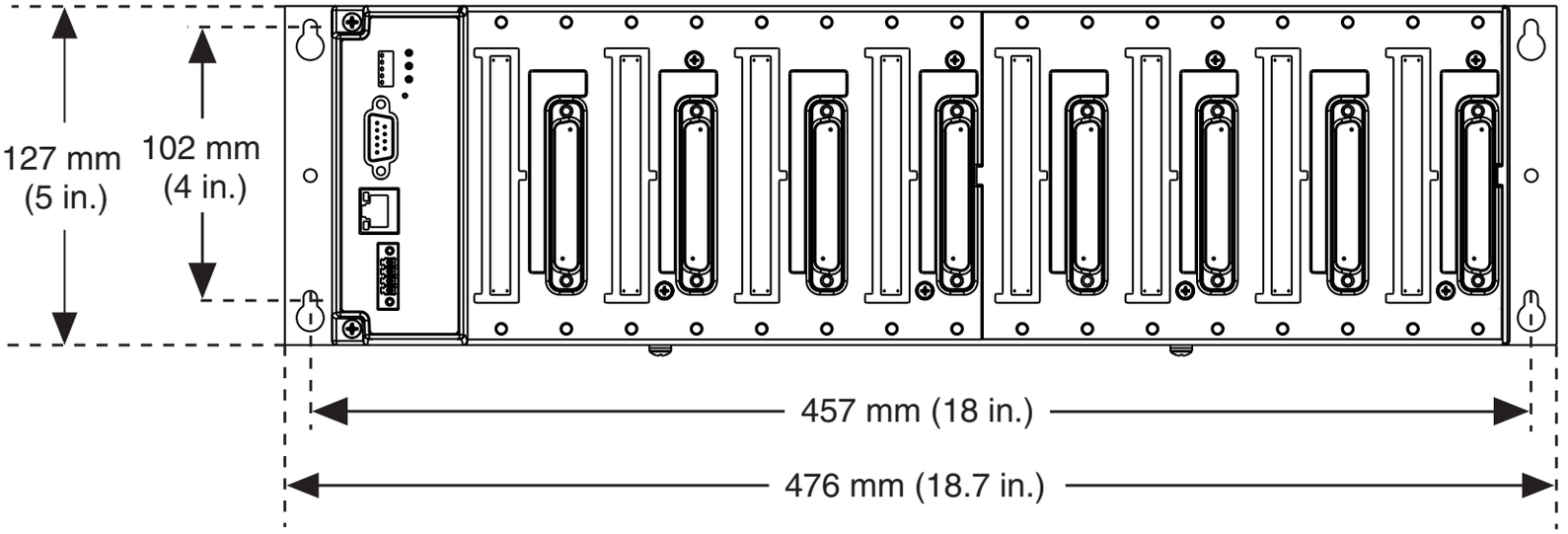


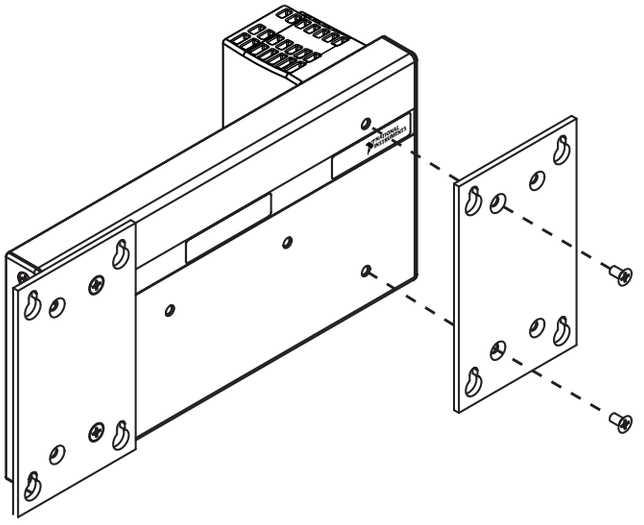
Mounting the Backplane on a Panel

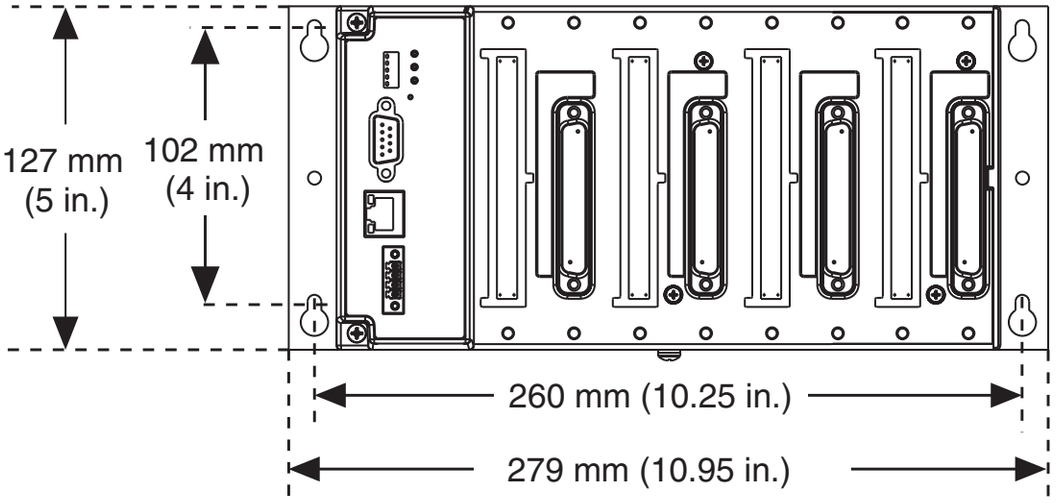
1. Fasten the panel-mount plates to the back of the cFP-180*x* using a number 2 Phillips screwdriver and the 8-32 × 5/16 in. countersunk screws shipped with the kit.



Caution Do not use screws longer than 5/16 in. to fasten the panel-mount plates to the backplane.


127 mm
(5 in.)
102 mm
(4 in.)
457 mm (18 in.)
476 mm (18.7 in.)



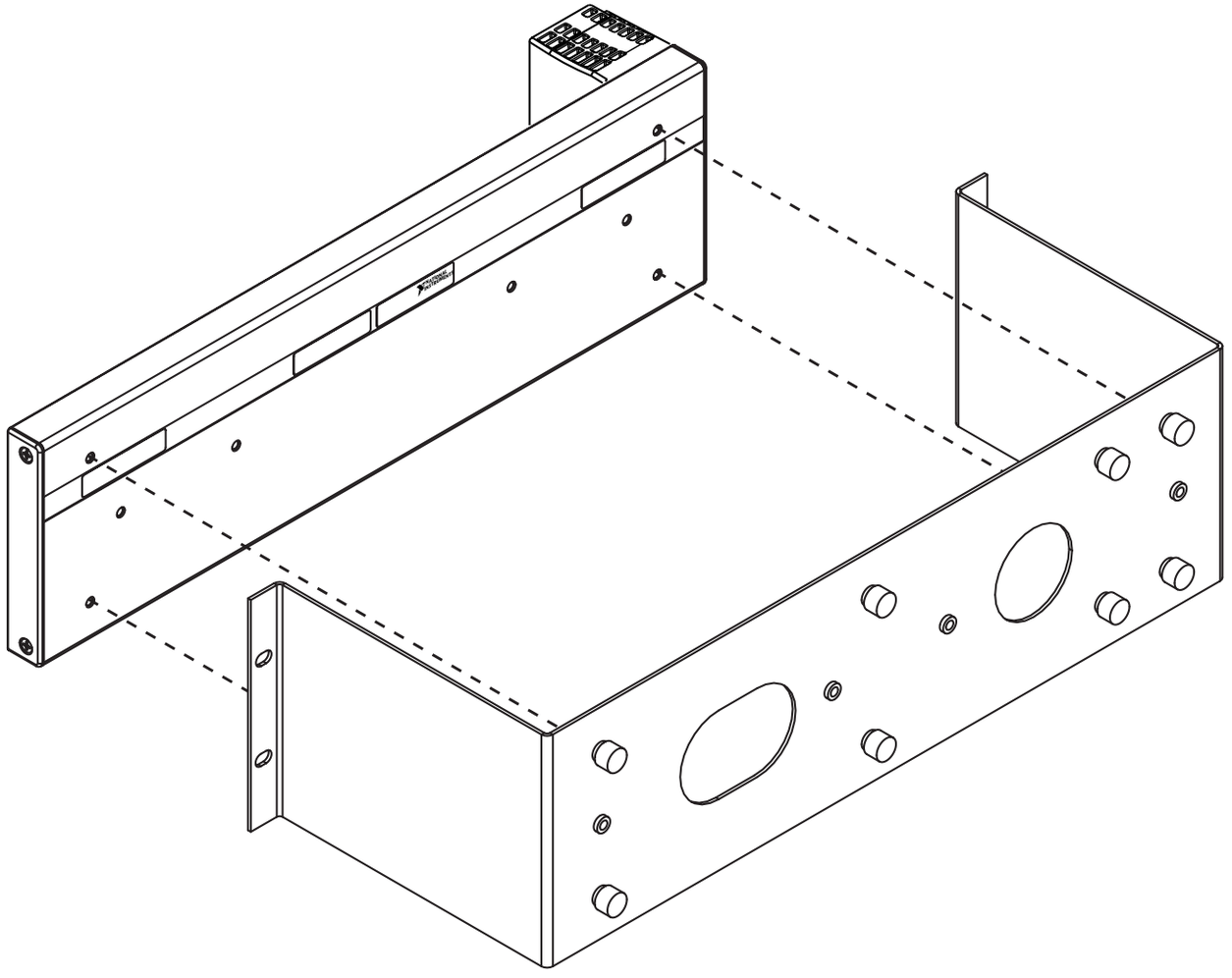


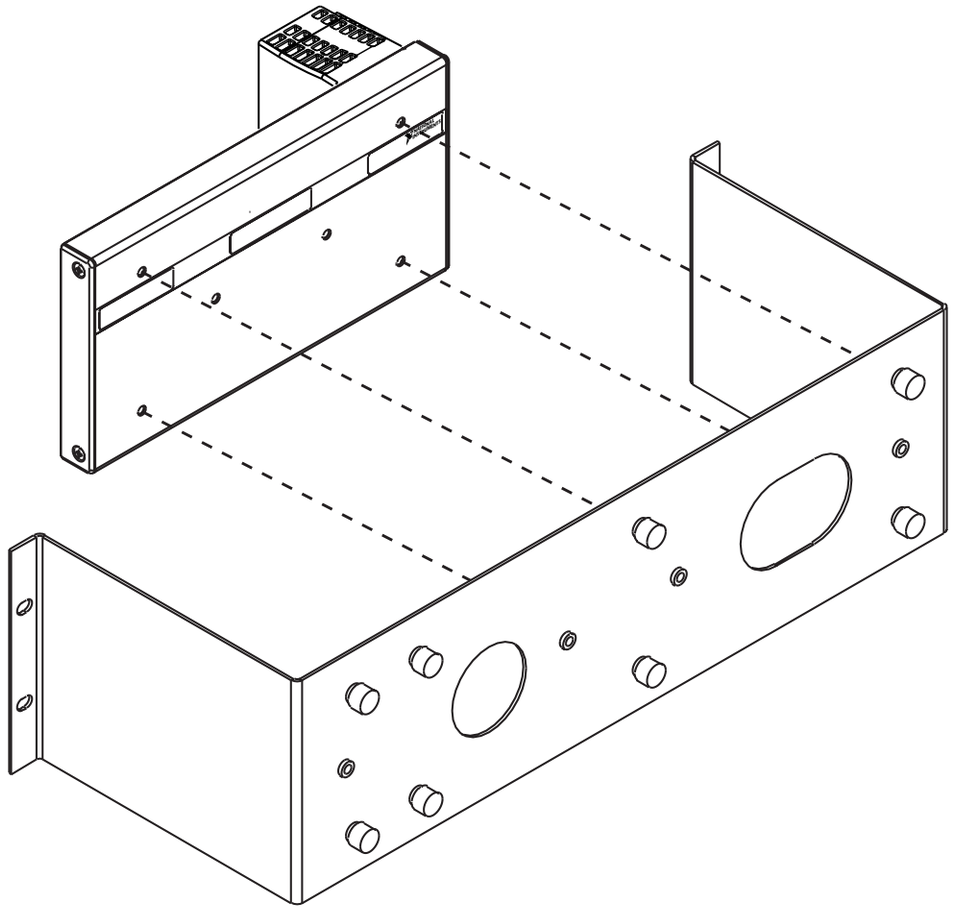
2. Bolt or screw the panel-mount accessory to a panel.
3. Connect the PE ground terminal on the cFP-180*x* to safety ground.

Caution Disconnect power before removing the backplane from the panel.

Mounting the cFP-180*x* in a Standard 19 in. Rack

1. Fasten the rack-mount bracket to the back of the cFP-180*x* using the captive screws on the bracket.



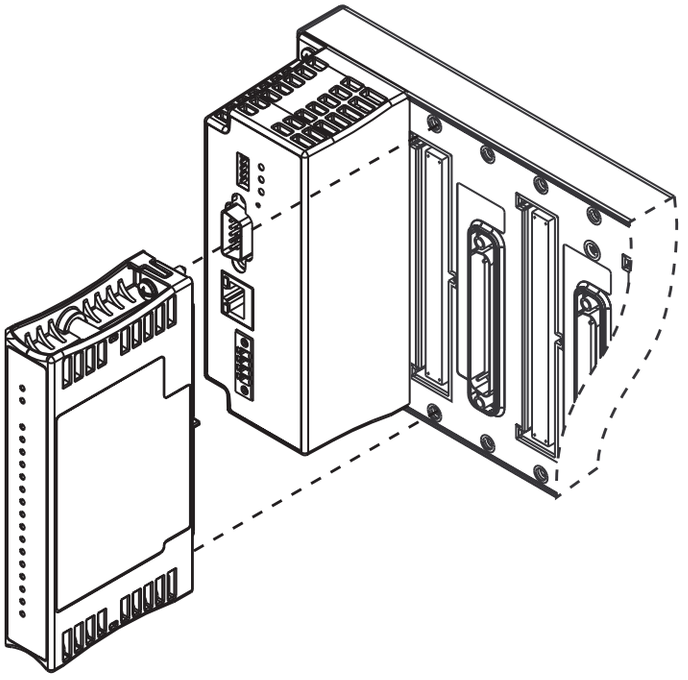


2. Bolt the rack-mount accessory to a standard 19 in. rack.
3. Connect the PE ground terminal on the cFP-180*x* to safety ground.

Caution Disconnect power before removing the cFP-180*x* from the rack.

2. Install I/O Modules on the Backplane

1. Align the captive screws on the I/O module with the holes on the backplane.
2. Press firmly to seat the I/O module 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.
4. Repeat this procedure to install additional I/O modules on the backplane.

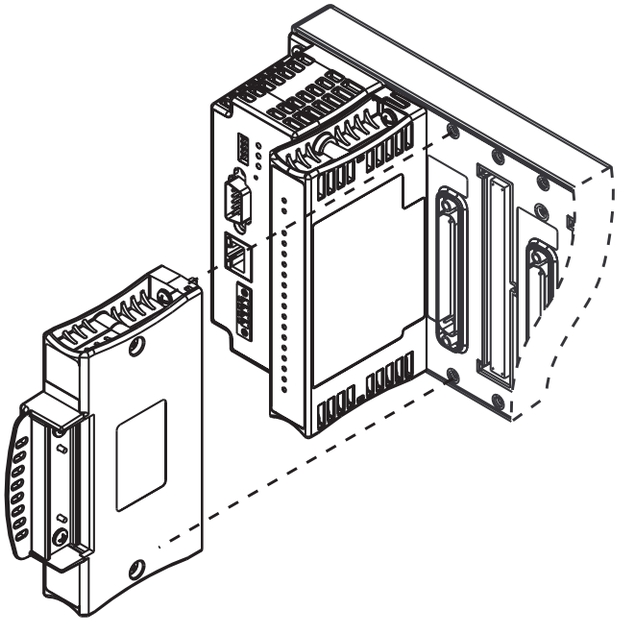


3. Install Connector Blocks on the Backplane

To connect I/O modules to input signals or to external loads, you need to install a cFP-CB-*x* connector block or other connectivity accessory for each I/O module on the backplane. Use the connector socket to the right of each I/O module socket.

Caution Do not insert or remove connector blocks or other connectivity accessories while power is applied to them.

1. Wire field devices as described in the I/O module and connector block operating instructions.



Caution Hazardous voltage wiring should be performed by qualified personnel and in accordance with local electrical standards.

2. Align the captive screws on the connector block with the holes on the backplane.
3. Press firmly to seat the connector block on the backplane.
4. 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.
5. Repeat this procedure to install additional connector blocks on the backplane.

4. Connect the cFP-180*x* to Your Network

You can connect the cFP-180*x* to an Ethernet network, an RS-232 network, or both.

Connecting the cFP-180*x* to an Ethernet Network

To use the cFP-180*x* on an Ethernet network, you must first configure the cFP-180*x* using MAX.

Connect the cFP-180*x* to an Ethernet network using the RJ-45 Ethernet port on the controller. Use a standard Category 5 Ethernet cable to connect the cFP-180*x* to an

Ethernet hub, or use an Ethernet crossover cable to connect the controller directly to a computer. Refer to *Cabling* in the *Specifications* section for pinouts of the two types of Ethernet cable.

If the host PC is already configured on a network, you must configure the cFP-180*x* on the same network. If neither is connected to a network, you can connect the two directly using a crossover cable.

In order for you to configure the cFP-180*x*, it must reside on the same subnet as the host PC.

Caution To prevent data loss and to maintain the integrity of your Ethernet installation, do not use a cable longer than 100 m. If you are using a 100 Mbps Ethernet, National Instruments recommends using a Category 5 shielded twisted-pair Ethernet cable.

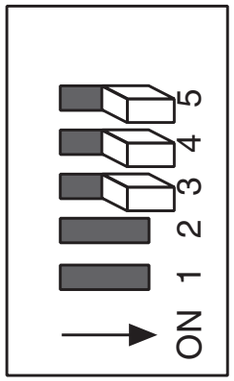
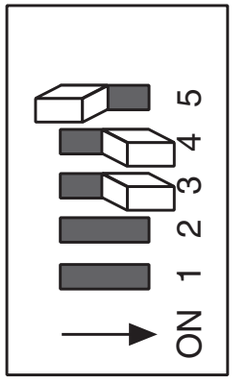
Connecting the cFP-180*x* to an RS-232 Serial Network

To use the cFP-180*x* on a serial network, you must first connect it to a host computer and configure it using MAX. Connect the RS-232 port of the cFP-180*x* to the RS-232 port of the host computer. Use a 9-pin D-SUB male-to-female straight-through cable. Do not use a null modem cable (usually female-to-female).

DIP switches 3, 4, and 5 set the baud rate. Table 1 shows the switch positions and the corresponding network baud rates.

Note The preconfigured setting of 115.2 kbps provides the fastest performance, and you do not need to change this setting unless you experience communication problems.

Table 1. DIP Switch Positions and Corresponding Serial Baud Rates

DIP Switches 3–5	Serial Baud Rate
	300
	1,200

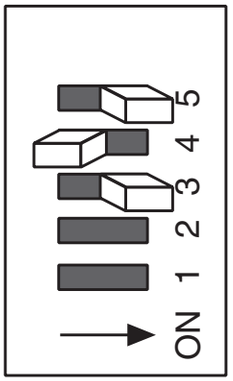
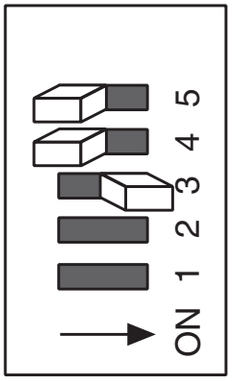
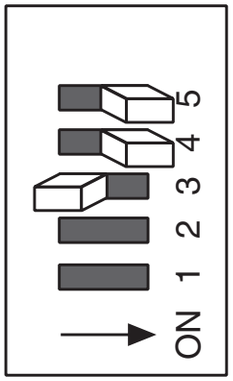
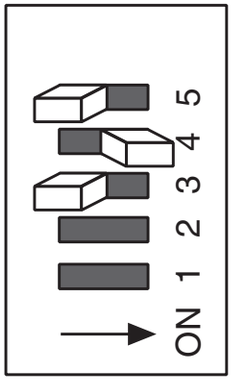
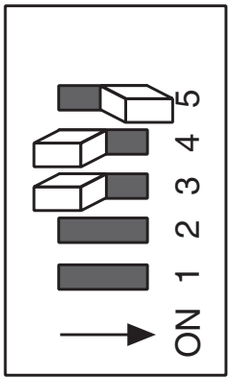
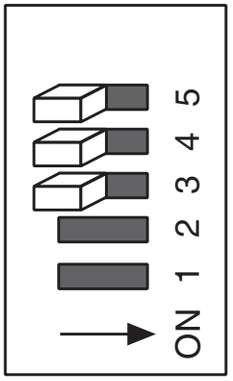
DIP Switches 3–5	Serial Baud Rate
	2,400
	9,600

Table 1. DIP Switch Positions and Corresponding Serial Baud Rates (Continued)

DIP Switches 3–5	Serial Baud Rate
	19,200
	38,400

DIP Switches 3–5	Serial Baud Rate
	57,600
	115,200

The switch settings determine the baud rate when the cFP-180*x* is powered on. If you change the switch settings while the cFP-180*x* is on, you must turn it off, then on again, to apply the new settings and change the baud rate.

The serial interface on the cFP-180*x* always uses the following parameters: 1 start bit, 8 data bits, 1 stop bit, and no parity.

RS-232 specifies a maximum cabling distance of 50 ft, but improvements in line drivers and cabling technology often allow you to design your network beyond the recommendations of the specification.

The RS-232 connector is a 9-pin female D-SUB connector. Figure 1 shows the pinout.

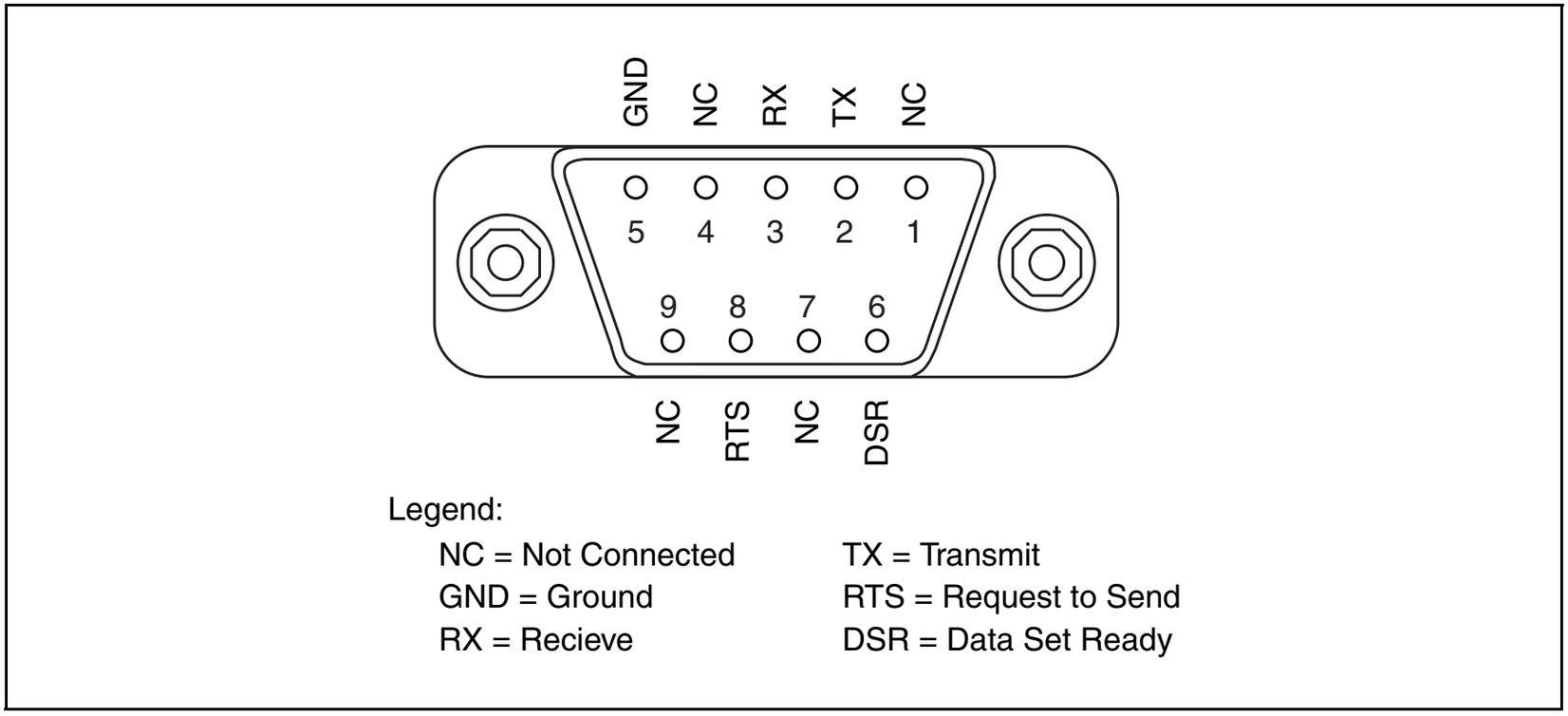


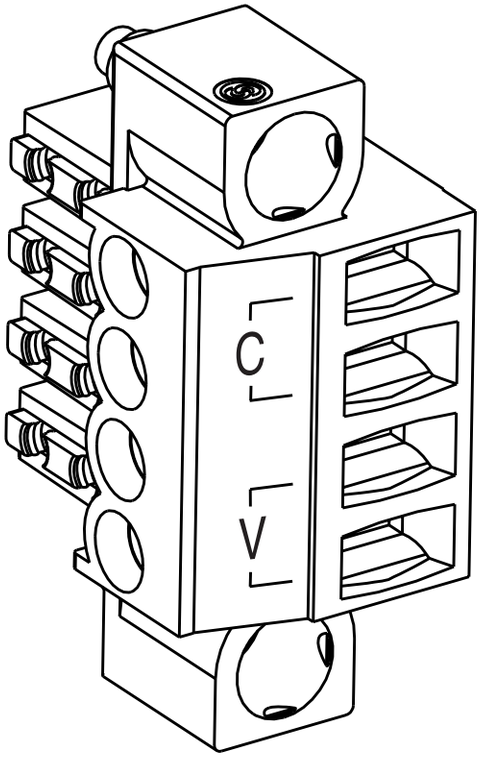
Figure 1. RS-232 Connector Pinout for the cFP-180*x*

The cFP-180*x* does not use RS-232 hardware handshaking, but it asserts the RTS and DSR signals for host computers or software that may require these signals. A host computer that does not use these signals does not need to connect to them.

5. Wire Power to the cFP-180*x*

Each cFP-180*x* on your network requires an 11 to 30 VDC power supply. Refer to the *Compact FieldPoint Safety Information* section before powering up the cFP-180*x*.

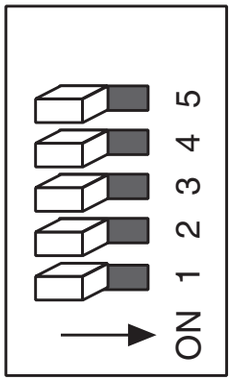
1. Connect the positive lead of the power supply to one of the V terminals and the negative lead to one of the C terminals.
   a. Use 14 to 22 AWG power wires.
   b. Strip 5 to 6 mm (0.2 to 0.24 in.) of insulation from the ends of the power wires.
   c. Tighten the terminal screws to 0.25 N · m (2.2 lb · in.) of torque.
   d. Refer to the operating instructions for the power requirements of each I/O module.
2. Use a separate power supply for each module that needs external power.



Caution Cascading power defeats isolation between the cascaded modules.

6. Power Up the cFP-180*x*

Check the DIP switches on the controller, making sure that the RESET IP switch and CONSOLE OUT switches are in the OFF position. Plug in each power supply to the Compact FieldPoint system. The cFP-180*x* runs a power-on self test (POST), during which the POWER and STATUS LEDs are steadily lit. After about three seconds, the STATUS LED begins flashing steadily if there is an Ethernet cable connected to the Ethernet port. The cFP-180*x* is ready to be configured.



DIP Switches	Functions
1	IP RESET
2	CONSOLE OUT
3, 4, 5	BAUD RATE

If you have already assigned an IP address to the cFP-180*x*, the STATUS LED turns off. The total boot time for a configured system is 10–15 seconds.

If the CONSOLE OUT switch is in the ON position, the cFP-180*x* sends status information to the host PC through the serial port. This status information includes the version number of the firmware installed on the cFP-180*x* and the network configuration of the cFP-180*x*. To see this information, turn on the CONSOLE OUT switch and reboot the cFP-180*x*. If you are using Windows XP, select **Start»Programs»Accessories»Communications»Hyper Terminal** to launch the Windows terminal program. Make sure that the serial settings in Hyper Terminal match the settings configured on the cFP-180*x*.

When the CONSOLE OUT switch is in the ON position, the cFP-180*x* does not use the serial communication protocol and you cannot communicate with FieldPoint I/O over the serial port.

7. Install Software on the Host PC

1. Install the software packages you plan to use, such as LabVIEW, the LabVIEW Real-Time Module, Measurement Studio, VI Logger, or LabWindows™/CVI™, before you install the FieldPoint software. The FieldPoint software installation installs the LabVIEW VIs and examples and the LabWindows/CVI instrument driver only if it finds the corresponding development software installed.
2. Close all other applications.
3. Insert the National Instruments FieldPoint Software CD into the CD-ROM drive on your computer.
4. Follow the onscreen instructions to complete the installation.



Note If the setup does not launch automatically, select **Start»Run** from Windows, enter `d:\setup`, where *d* is the letter of your CD-ROM drive, and select **OK**.

8. Configure the cFP-180*x*

Launch Measurement & Automation Explorer (MAX) to configure the cFP-180*x*. For information about configuring the cFP-180*x* in software, refer to the *Measurement & Automation Explorer Help for FieldPoint* (**Start»Programs» National Instruments»FieldPoint»FieldPoint Help**).

Using the cFP-180*x* as a Modbus Device

The cFP-180*x* is shipped with NI protocols for serial and Ethernet communication. FieldPoint software uses these communication protocols to configure the system and communicate with I/O modules.

If the cFP-180*x* has firmware version 6.03 or later installed, it can function as a Modbus slave device. You can communicate with I/O modules using Modbus ASCII and RTU for serial and Modbus TCP for Ethernet.

To download the latest firmware for the cFP-180*x*, go to `ni.com/support` and select **Drivers and Updates»Current Versions»Distributed I/O - FieldPoint**, then find the cFP-180*x* firmware under the Firmware heading. Install the new firmware using MAX. Refer to the *Using the cFP-180x as a Modbus Device* help file for more information.

Compact FieldPoint Safety Information

The following section contains important safety information that you *must* follow when installing and using Compact FieldPoint products.

Do *not* operate Compact FieldPoint products in a manner not specified in the user manual or operating instructions. Misuse of the product can result in a hazard. You can compromise the safety protection built into the product if the product is damaged in any way. If the product is damaged, return it to National Instruments for repair.

Do *not* substitute parts or modify Compact FieldPoint products. Use the products only with the modules, accessories, and cables specified in the installation instructions.

You *must* connect the PE ground terminal on the cFP-180*x* 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.

Do *not* operate Compact FieldPoint products in an explosive atmosphere or where there may be flammable gases or fumes. If you need to operate Compact FieldPoint products in such an environment, the Compact FieldPoint products *must* be in a suitably rated enclosure.

If you need to clean a Compact FieldPoint product, use a soft nonmetallic brush. The product *must* be completely dry and free from contaminants before you return it to service.

Operate the product only at or below Pollution Degree 2. Pollution is foreign matter in a solid, liquid, or gaseous state that can reduce dielectric strength or surface resistivity. The following is a description of pollution degrees:

- Pollution Degree 1 means no pollution or only dry, nonconductive pollution occurs. The pollution has no influence.
- Pollution Degree 2 means that only nonconductive pollution occurs in most cases. Occasionally, however, condensation can cause temporary conductivity.
- Pollution Degree 3 means that conductive pollution occurs, or dry, nonconductive pollution occurs which becomes conductive due to condensation.



Caution You *must* insulate signal connections for the maximum voltage for which the Compact FieldPoint product is rated. Do *not* exceed the

maximum ratings for the product. Do *not* install wiring while the product is live with electrical signals. Do *not* remove or add connector blocks when power is connected to the Compact FieldPoint system. Avoid contact between your body and the connector block signal wiring when hot-swapping modules.

Operate Compact FieldPoint products at or below the *measurement category*[1] marked on the hardware label. Measurement circuits are subjected to *working voltages*[2] and transient stresses (overvoltage) from the circuit to which they are connected during measurement or test. Measurement categories establish standard impulse withstand voltage levels that commonly occur in electrical distribution systems. The following is a description of measurement categories:

- Measurement Category I is for measurements performed on circuits not directly connected to the electrical distribution system referred to as MAINS[3] voltage. This category is for measurements of voltages from specially protected secondary circuits. Such voltage measurements include signal levels, special equipment, limited-energy parts of equipment, circuits powered by regulated low-voltage sources, and electronics.
- Measurement Category II is for measurements performed on circuits directly connected to the electrical distribution system. This category refers to local-level electrical distribution, such as that provided by a standard wall

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[1] Measurement categories are defined in electrical safety standard IEC 61010-1.

[2] Working voltage is the highest rms value of an AC or DC voltage that can occur across any particular insulation.

[3] MAINS is defined as a hazardous live electrical supply system that powers equipment. Suitably rated measuring circuits may be connected to the MAINS for measuring purposes.

outlet (for example, 115 V for U.S. or 230 V for Europe). Examples of Measurement Category II are measurements performed on household appliances, portable tools, and similar products.

- Measurement Category III is for measurements performed in the building installation at the distribution level. This category refers to measurements on hard-wired equipment such as equipment in fixed installations, distribution boards, and circuit breakers. Other examples are wiring, including cables, bus-bars, junction boxes, switches, socket-outlets in the fixed installation, and stationary motors with permanent connections to fixed installations.
- Measurement Category IV is for measurements performed at the primary electrical supply installation (<1,000 V). Examples include electricity meters and measurements on primary overcurrent protection devices and on ripple control units.

Using This Product Safely in Hazardous Locations

This product is suitable for use in U.S. and Canada: Class I, Division 2, Groups A, B, C, D, T4 hazardous locations; AEx nC IIC T4 hazardous locations; Ex nC IIC T4 hazardous locations; EEx nC IIC T4 hazardous locations; and nonhazardous locations.



Caution Explosion hazard—Substitution of components may impair suitability for Class I, Division 2.

Explosion hazard—Do not disconnect equipment unless power has been switched off or the area is known to be nonhazardous.

Equipment must be used within its electrical and environmental ratings. Refer to the *Specifications* section. Refer to the product label for manufacturing location.

This product must be installed in an enclosure rated at least IP 54.

Specifications

Network

Network interface ..... 10BaseT and 100BaseTX Ethernet

Compatibility IEEE802.3

Communication rates ..... 10 Mbps, 100 Mbps, auto-negotiated

Maximum cabling distance ..... 100 m/segment

Maximum power to I/O modules ..... 9 W

Maximum number of banks ..... Determined by network topology

Serial Port

One RS-232 (DCE) serial port

- Baud rate ..... 300 to 115,200 bps
- Data bits 8
- Stop bits 1
- Parity ..... None
- Flow control ..... None

Power Requirement

Power supply range..... 11 to 30 VDC

Recommended power supply..... 20 W

Power consumption ..... 6.1 W + 1.1 (*I/O module power requirements*)

Safety Isolation Voltage

Isolation voltage is verified by a dielectric withstand test.

Module to backplane

- Continuous ..... 250 V_{rms}, Measurement Category II
- Withstand..... 2,300 V_{rms}, 5 s max

Physical Characteristics

Screw-terminal wiring ..... 14 to 22 AWG copper conductor wire with 7 mm (0.28 in.) of insulation stripped from the end

Torque for screw terminals ..... 0.5 to 0.6 N · m (4.4 to 5.3 lb · in.)

Weight

- cFP-1804 ..... 935 g (2 lbs 1 oz)
- cFP-1808 ..... 1,595 g (3 lbs 8 oz)

Environmental

FieldPoint modules are intended for indoor use only. For outdoor use, they must be installed in a suitable 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

Operating vibration

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

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



Note 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 + A2:2002, Table 1

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



Note For EMC compliance, 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:

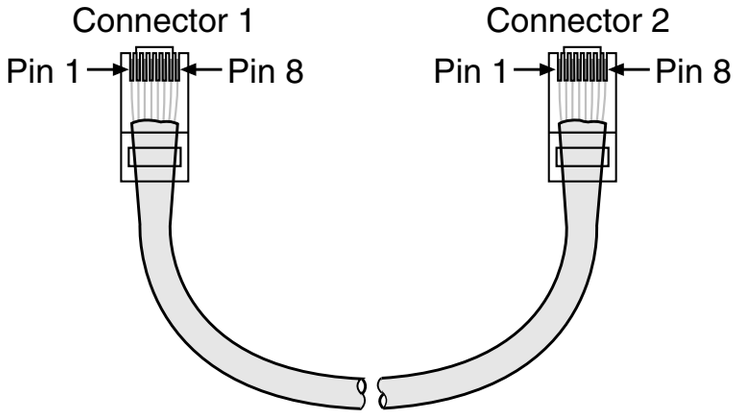
Low-Voltage Directive (safety)..... 73/23/EEC

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.

Cabling

The table below shows the standard Ethernet cable wiring connections.

Ethernet Cable Connector Pinouts	Pin	Connector 1	Connector 2 (Normal)	Connector 2 (Crossover)
	1	white/orange	white/orange	white/green
	2	orange	orange	green
	3	white/green	white/green	white/orange
	4	blue	blue	blue
	5	white/blue	white/blue	white/blue
	6	green	green	green
	7	white/brown	white/brown	white/brown
	8	brown	brown	brown

Where to Go for Support

The National Instruments Web site is your complete resource for technical support. At `ni.com/support` you have access to everything from troubleshooting and application development self-help resources to email and phone assistance from NI Application Engineers.

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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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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324176B-01 Dec05

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