FieldPoint™ FP-20*xx*

What You Need to Get Set Up

- FP-20*xx* LabVIEW RT controller
- 35 mm DIN rail
- Two DIN rail locks (included)
- Terminal base(s)
- I/O module(s)
- 11–30 VDC power supply

- Accessories: Ethernet cable, flathead screwdriver
- Ferrite clip for Ethernet cable, NI part number 711856-01
- PC running Windows
- National Instruments FieldPoint Software CD
- LabVIEW RT

1 **Selecting an Environment for the FieldPoint System**

NI FieldPoint is designed for static installations. Static installations are installations that do not move and are not subject to shock and vibration. NI recommends Compact FieldPoint for mobile systems and for locations that are subject to shock and vibration.

The FieldPoint system should be mounted inside an instrumentation cabinet such as the FP-ENC1. NI offers two versions of the FP-ENC1, one with a solid metal door and one with a polycarbonate window. Both versions include a DIN rail for mounting the FieldPoint system inside the cabinet.

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The best way to mount a FieldPoint system is on a single 35 mm DIN rail inside an instrumentation cabinet. Do not mount the FieldPoint system on a door or panel. Doors can contort and bend DIN rails, causing disconnections. Panel mounting can cause FieldPoint modules not to make solid contact with each other.

2 Mounting the FieldPoint System on a DIN Rail

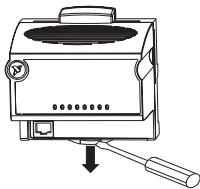### *Mounting the DIN Rail on a Solid Support*

Use screws to mount the DIN rail securely to a solid support such as the inside of an instrumentation cabinet. Place the screws 100 mm (4 in.) apart.
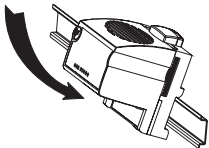
Note Do not use spliced DIN rails. Use only a single DIN rail.
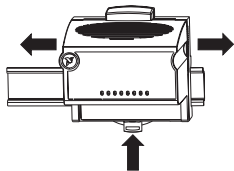
Installing the Network Module

A. Unlock rail clip.

B. Hook lip on back of module onto top of DIN rail, press down, and snap into place.

C. Slide module into position and lock rail clip.

Installing the Terminal Bases

⚠ **Caution**   Connect terminal bases to the network module before applying power to the module. Do *not* connect or disconnect terminal bases while power is applied to the network module.
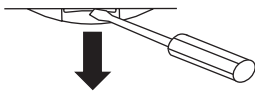
A. Unlock rail clip.

B. Press base onto rail.
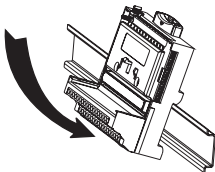
C. Slide base into position and lock rail clip. Be careful not to bend any pins.
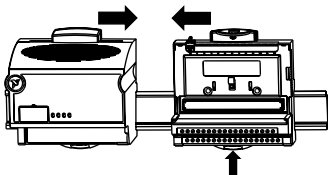
D. Repeat for each terminal base, up to nine for each network module in most cases. Make sure there are no gaps between terminal bases.

Note If you need more than one length of DIN rail, use up to two FieldPoint Bus Extender cables instead of splicing DIN rails together. You can order FieldPoint Bus Extender cables from NI.

E. You *must* install DIN rail locks at each end of the bank to ensure reliable connections between terminal bases and network module. Two rail locks are included with each network module. Place protective cover on the bus connector of the last terminal base.
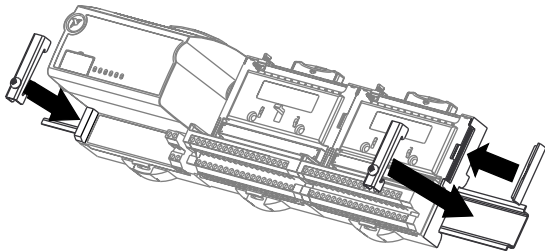
Installing the I/O Modules

It does not matter where you install each I/O module, except in the following cases:

- If you plan to cascade power between any I/O modules using the V and C terminals, group those modules together. Refer to the *FP-2000/2010/2015 User Manual* for more information about cascading power.

⚠️ **Caution** Cascading power defeats isolation.

- For more accurate measurements, place thermocouple modules away from heat sources, including network modules and relay modules, and mount thermocouple modules on FP-TB-3 terminal bases.

A. Align slots on module with guide rails on base, and press module onto base until terminal base latch locks module in place.
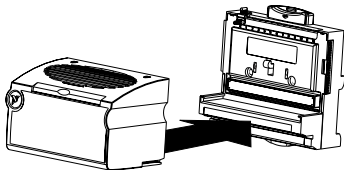
B. Repeat for each I/O module.

3 Grounding and Shielding the FieldPoint System

Protecting the FieldPoint System from Damage

In order to comply with EMC specifications, the FieldPoint system must be mounted inside a metal enclosure such as the FP-ENC1. For maximum protection from electromagnetic interference and electrostatic discharge, ground the enclosure as shown.

1 Ground braid
2 Grounding bolts on enclosure
3 DIN rail inside enclosure

Protecting Signals from Interference

There are three main types of interference that affect measurements: electrostatic induction, magnetic induction, and transients. The area in which your signal wires are located as well as the types of wires used to connect device to the FieldPoint system determine how much these types of interference affect signals.

Electrostatic induction comes from electrical fields radiated by voltage sources such as power lines. Electrical fields near signal wires can add noise to signals. You can reduce this type of interference by using signal wire with a foil shield and grounding the shield at the signal source end of the wire. Be sure not to
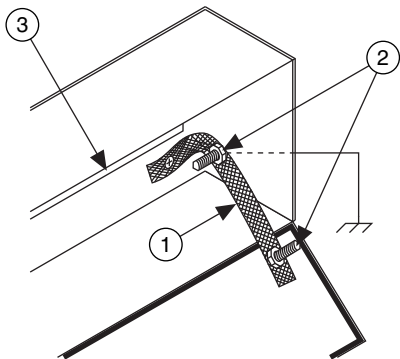
ground the shield at any other point because it is not thick enough to withstand current running through it.

Magnetic induction comes from magnetic fields surrounding the flow of current. The fields produce current in the signal wires which generates noise. You can reduce the amount of magnetic induction by using twisted-pair wire. The more twists per length of wire, the more the magnetic interference is reduced.

Transients, also called voltage spikes, can be induced on signal wires by sources such as lightning strikes. If your signal wires are in an environment susceptible to lightning strikes or other sources of transients, run the wires through a metal conduit grounded in several places or through a thick shield grounded in several places.

Note A foil shield is not thick enough to protect against transients and should be grounded only at one end.

1 Twisted pair
2 Foil shield
3 Conduit
4 Grounded in several locations
5 Grounded at one end
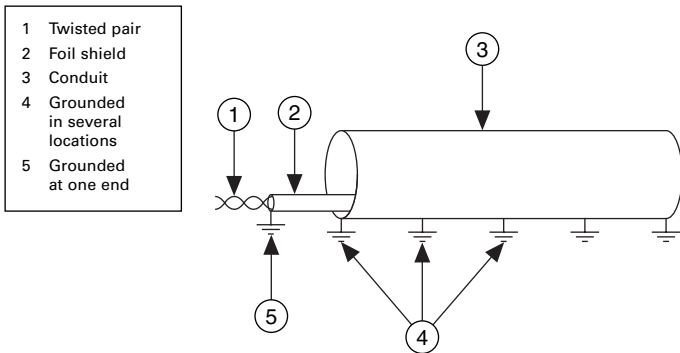
4 **Connecting the FP-20xx to the Network**

Connect the FP-20xx to an Ethernet network by connecting the RJ-45 Ethernet port of the FP-20xx to an Ethernet hub using a standard Category 5 Ethernet cable.

Straight-Through
UTP Cable

Straight-Through
UTP Cable
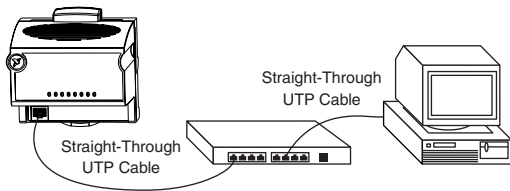
Optionally, you can connect an FP-20xx directly to a computer using an Ethernet crossover cable.

Crossover Cable
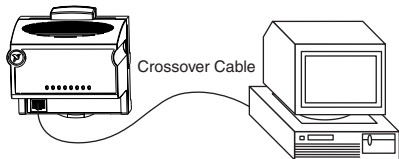
Do not use a cable longer than 100 m. If you are using a 100 Mbps Ethernet, National Instruments recommends using a Category 5 shielded twisted-pair cable. If you need to build your own cable, refer to the *FP-20xx User Manual* specifications section for cabling details.

Install a ferrite clip, NI part number 711856-01, on the Ethernet cable, 10 in. or less from the FP-20*xx*.
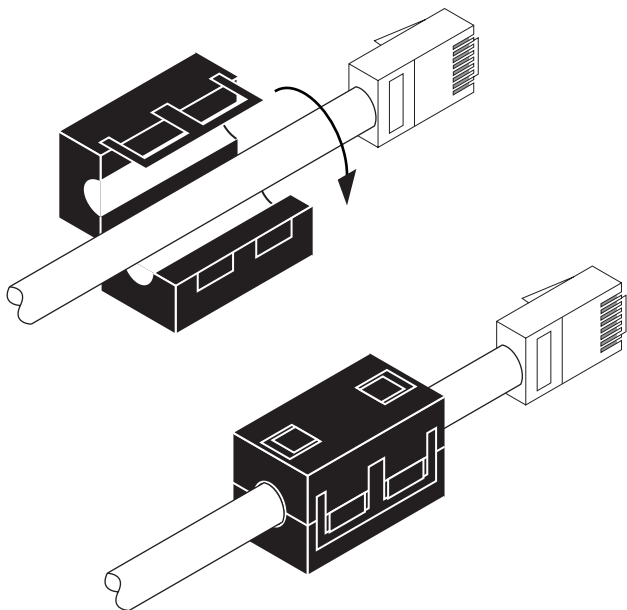
5. Wiring Power to the FieldPoint System

A. Use an 11–30 VDC, 15 W minimum power supply such as the NI PS-4 or PS-5.

B. Install a ferrite on the power supply leads, less than 10 in. from the ends of the leads, as shown.
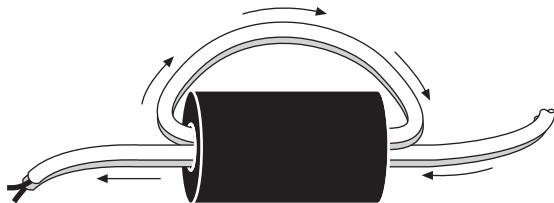
C. Install a tie wrap to secure the ferrite.
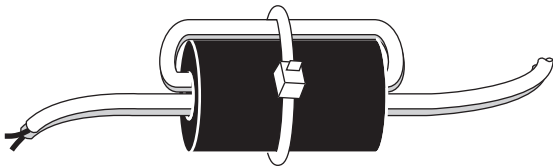
D. Put a heat-shrink wrapper over the ferrite and shrink it to fit using a heat gun or blow dryer.

E. Connect power supply leads to the V and C terminals of the network module. Connect the negative lead to the C terminal on the left side of the terminal block, then connect the positive lead to the V terminal on the left side of the block. The terminal block has three pairs of V and C terminals. Refer to the I/O module operating instructions for the power requirements of each module.

11–30 VDC Primary Power Supply

11–30 VDC Backup Power Supply (optional)

V

C

To Adjacent Device (optional connection)
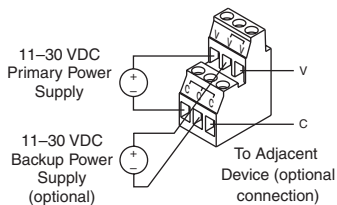
F. Connect power to the I/O modules that require external power for outputs (examples include output, counter, relay, PWM, PG, and QUAD modules). It is generally best to power each such module by connecting an external power supply to the V_{SUP} and COM terminals. Refer to the I/O module operating instructions for power requirements, detailed wiring diagrams, and safe wiring practices.

⚠ Caution Cascading power from neighboring bases or network modules defeats isolation between cascaded modules.

Separate Power Supply (Recommended)

Cascaded Power (Defeats Isolation)

No External Power Required

FP-20*xx*   FP-AI-100   FP-AO-200   FP-RLY-420   FP-TC-120

Power supply connected to V_{SUP} and COM terminals

Shades of gray indicate different voltage potentials.

15 16 V   V 1 2 3
31 32 C   C 17 18
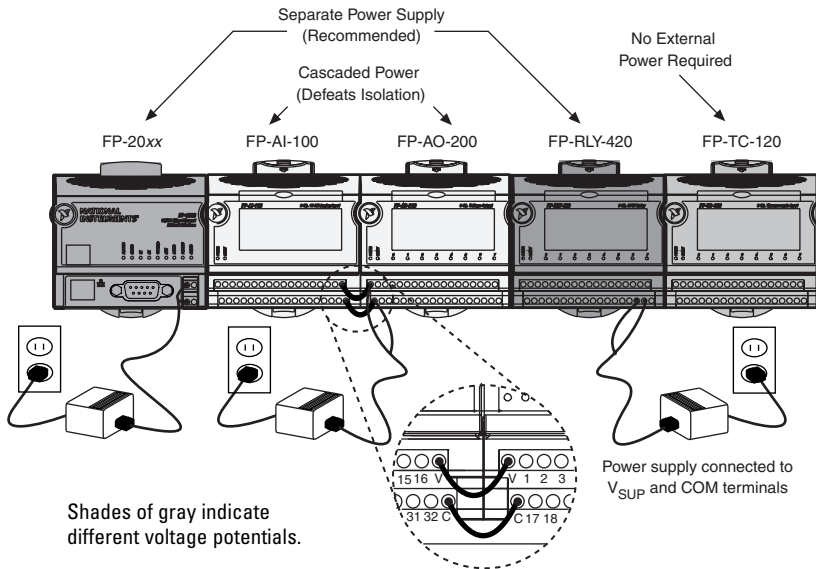
⚠ Caution Cascading power defeats isolation.

6 **Connecting to Field Devices**

Use the operating instructions for each I/O module to help you connect field devices.

7 **Powering Up the FieldPoint System**

⚠️ **Caution** Terminal bases must be connected to the FP-20*xx* before power is applied to the FP-20*xx*.

Make sure the RESET DIP switch is not on. Plug in each power supply to the FieldPoint bank. You should see the POWER and STATUS LEDs come on. After about 5 seconds, the **STATUS** LED begins flashing. This indicates that the FP-20*xx* is ready to be configured. (If the **STATUS** LED turns off, the FP-20*xx* has been configured.) If the LEDs do not follow this sequence, refer to the *FP-20xx User Manual* troubleshooting appendix.
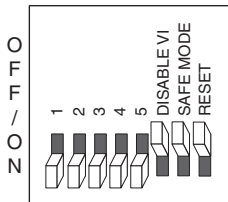
8 **Installing Software on the Host PC**

A. Install the software packages you plan to use, such as LabVIEW, LabVIEW RT, 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 and examples, only if it finds the corresponding development software installed.

B. Close all other applications.

C. Insert the National Instruments FieldPoint Software CD into the CD-ROM drive of your computer.

D. 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 the CD-ROM drive, and select **OK**.
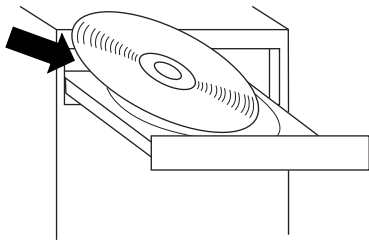
9 **Configuring the FP-20*xx***

Launch NI Measurement & Automation Explorer (MAX) to configure the FP-20*xx*. For information about configuring the FP-20*xx* in software, refer to the *Measurement & Automation Explorer Help for FieldPoint* (**Start»Programs»National Instruments»FieldPoint»FieldPoint Help**).

Specifications

Specifications are typical for the −25 to 55 °C temperature range unless otherwise noted. Specifications are subject to change without notice.

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 supplied to
terminal bases . . . . 9 W
Maximum number of banks . . . . Determined by network topology

Memory

FP-2000 . . . . 32 MB nonvolatile
                                            16 MB DRAM
FP-2010 . . . . 64 MB nonvolatile
                                            32 MB DRAM
FP-2015 . . . . 512 MB nonvolatile
                                            32 MB DRAM

For information about the memory used by the LabVIEW RT module and the operating system, go to ni.com/info and enter rdfpec.

Power Requirements

Power supply range . . . . 11–30 VDC
Recommended power supply
    FP-20xx with up to 5 modules . 15 W (FP-PS-4 or equivalent)
    FP-20xx with 6 to 9 modules . . 20 W
Power consumption . . . . 4.5 W + 1.1(*I/O module power requirements*)

Physical Characteristics

Screw-terminal wiring . . . . 16–26 AWG copper conductor wire with 7 mm
    (0.28 in.) of insulation stripped from the end
Torque for screw terminals . . . . 0.5–0.6 N · m (4.4–5.3 lb · in.)
Weight . . . . 278 g (9.8 oz)

Environmental

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

Operating temperature . . . . −25 to 55 °C
Storage temperature . . . . −55 to 85 °C
Humidity . . . . 10 to 90% RH, noncondensing
Maximum altitude . . . . 2,000 m
Pollution Degree 2

Safety

The FP-20*xx* is designed to meet the requirements of the following standards for safety and electrical equipment for measurement, control, and laboratory use:

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

Note 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

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

Emissions . . . . EN 55011 Class A at 10 m FCC Part 15A above 1 GHz

Immunity . . . . EN 61326: 1997+A2: 2001, Table 1

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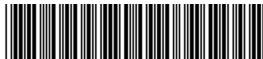
Mechanical Dimensions

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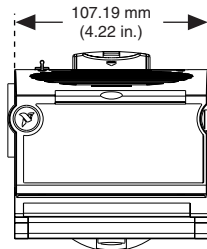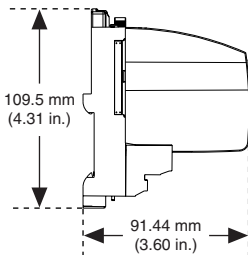
Go to `ni.com/support` for the most current manuals, examples, and troubleshooting information. National Instruments corporate headquarters is located at 11500 North Mopac Expressway, Austin, Texas, 78759-3504. National Instruments also has offices located around the world to help address your support 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 (Calgary) 403 274 9391, Canada (Ottawa) 613 233 5949, Canada (Québec) 450 510 3055, Canada (Toronto) 905 785 0085, 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, Italy 39 02 413091, Japan 81 3 5472 2970, Korea 82 02 3451 3400, Malaysia 603 9131 0918, Mexico 001 800 010 0793, Netherlands 31 0 348 433 466, New Zealand 0800 558 322, Norway 47 0 66 90 76 60, Poland 48 22 3390150, Portugal 351 210 311 210, Russia 7 095 783 6851, Singapore 65 6226 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 2 2528 7227, Thailand 662 992 7519, United Kingdom 44 0 1635 523545

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