Ethernet Network Interface for FieldPoint

NI FP-1601

- PC-based distributed I/O Ethernet network interface
- High-performance networking
  - 10BaseT/100BaseTX
  - Event-driven communications and configurable deadbanding
- Secure Ethernet access with IP filtering and password protection
- Industrial-grade reliability
  - Automatic self-diagnostics
  - Redundant power supply inputs
  - Isolated communication bus to I/O modules
  - Network watchdog timer
  - Configurable I/O powerup states

Operating Systems
- Windows 2000/NT/XP

Recommended Software
- LabVIEW
- LabVIEW Datalogging and Supervisory Control Module

Other Compatible Software
- LabWindows/CVI
- Measurement Studio
- Lookout
- VI Logger

Driver Software (included)
- Measurement & Automation Explorer
- OPC server (2.0 compliant)

Module	Ethernet Ports	Event Driven Protocol	10/100 BaseTX
FP-1601	1	✓	✓

Overview and Applications

The National Instruments FP-1601 network interface connects up to nine FieldPoint I/O modules to a high-speed Ethernet network. With up to 100 Mb/s data communication rates and event-driven communications, the NI FP-1601 delivers a high-performance network connection for FieldPoint that is easy to interface with a PC and easy to use.

The FP-1601 manages communications between the host PC and the I/O modules over a local high-speed bus formed by FieldPoint terminal bases. The network interface module also provides diagnostic and autoconfiguration features to simplify installation, use, and maintenance.

Applications can easily communicate with the FP-1601 interface to exchange data. The FP-1601 interface can communicate with a [c]FP-20xx embedded controller or with a Windows computer running LabVIEW, LabWindows/CVI, Measurement Studio, Lookout, or your choice of OPC client application software. Using the FP-1601, you can rapidly build flexible, modular distributed measurement and automation systems.

Network Communications Interface

The NI FP-1601 connects directly to Ethernet networks, autonegotiating on the network for 10 Mb/s or 100 Mb/s communication rates. It includes an RJ-45 connector for connection to 10BaseT and 100BaseTX networks and uses a protocol based on standard TCP/IP to maintain full compatibility with existing networks.

FieldPoint builds on standard TCP/IP network protocols and adds a number of key enhancements, including event-driven communications and publisher-subscriber networking. In a publisher-subscriber architecture one or more client PCs subscribe to I/O data from FieldPoint banks. The network interface monitors connected I/O modules and publishes I/O data only when the value changes. Analog signals can change value within selectable ranges, called dead bands, without causing the system to report data. This event-driven method, along with data compression, helps you avoid unnecessary Ethernet traffic and maximizes communications efficiency.

Ethernet Network Interface for FieldPoint

System Configurations

A single FP-1601 interface manages a bank of up to nine FieldPoint bases and attached I/O modules. The network interface module and terminal bases snap together and mount as a unit on a DIN rail. The network interface module and terminal bases form a high-speed data bus for communication between the network module and the I/O modules. With modular terminal bases, it is easy to expand your FieldPoint system to meet changing application needs.

For more details on configuring a FieldPoint system, see page 532.

Decrease Network Traffic with Event-Driven Communication

Using an event-driven communication protocol, the FieldPoint Ethernet network interface transmits data via Ethernet only when data values change. This eliminates unnecessary network traffic, resulting in more efficient communication. The data values can consist of individual I/O module channels or user-defined variables in the embedded LabVIEW program.

Network Watchdog Timers

The FP-1601 can detect and respond to network failures. If you enable the watchdog timer and the Ethernet link becomes inactive or is lost, the FP-1601 can automatically set the output channels to configured output states.

Power Supply Backup and Regulation

An 11 to 30 VDC supply powers the FP-1601. An extra set of screw terminals is available for a backup UPS or battery. The network interface filters and regulates the power input, redistributing power to all I/O modules in the node through the backplane bus in the terminal bases.

For external power supply options, see FieldPoint Accessories on page 550.

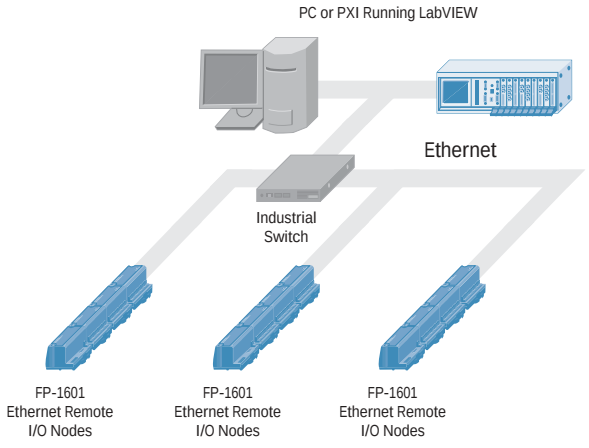

Figure 1. Ethernet provides an open, high-performance network for FieldPoint Distributed I/O

Configurable Output States with Snapshot

With the Snapshot feature, you can easily define the default output states and I/O configurations for the entire FieldPoint node after system power-up. The SnapShot command instructs the Ethernet network interface to memorize the current settings of the I/O modules in the node, storing the information in nonvolatile storage on the FP-1601. After power-up, the FP-1601 will initialize the I/O modules to the configurable output states you defined with Snapshot.

Security

The FP-1601 offers advanced security features so that only authorized clients can access the FieldPoint system. Authorized clients are Ethernet nodes with IP addresses that match user-defined patterns. You can also further qualify the list of clients by their access rights – none, read only, and read/write (with access to configuration). Initially, the network module grants all clients full access. The user then can select an IP pattern that corresponds to the required list of clients. In addition, you can set a password that any user can enter for full access rights to the FieldPoint System.

Ethernet Network Interface for FieldPoint

Easy Configuration Software

National Instruments Measurement & Automation Explorer (MAX) configuration software, included with your FieldPoint hardware, simplifies the use and integration of FieldPoint systems. With MAX, you configure the entire system, including network parameters, module and I/O settings, and named-channel items. MAX will search your Ethernet network and return configuration settings on all your FieldPoint nodes. MAX will also automatically detect the I/O modules on each bank so you can easily configure I/O parameters, such as input ranges, power-up output states, and watchdog states, using intuitive dialog windows. To get your system up and running quickly, from MAX you can also interactively test I/O modules and channels, viewing input data values and setting output values,without writing any software code.

In addition to configuring hardware parameters, MAX also configures and manages named-channel items used in your higher-level programming software. From your application software package, such as LabVIEW, LabWindows/CVI, Measurement Studio, or Lookout, you simply address a named-channel item to access the I/O values.

For more details on configuring a FieldPoint system, see page 532.

Ordering Information

NI FP-1601 777792-01

Recommended Compact FieldPoint System Products

NI FP-TB-1 777519-01
NI PS-4 Power Supply 778586-90
NI Developer Suite Standard Control Edition 777905-03

BUY ONLINE!

Visit ni.com/info and enter fp1601.

Specifications

Network

Network interface	10BaseT and 100BaseTX Ethernet
Compatibility	IEEE 802.3
Communications rate	10 Mb/s, 100 Mb/s, autonegotiated
Maximum cabling distance	100 m/segment
Maximum number of I/O modules per bank	9 terminal bases
Maximum power supplied to terminal bases	9 W
Maximum number of banks	Determined by network topology

Power Requirements

Power supply range	11-30 VDC
Recommended power supply	
FP-1601 with up to 5 modules	15 W (FP-PS-4 or equivalent)
FP-1601 with 6 to 9 modules	20 W
Power consumption	4.5 W + 1.1 (I/O module power requirements)

Physical Characteristics

LED indicators	
POWER (green)	Valid power to module
STATUS (red)	Failure condition
LINK (green)	Valid network connection
SPEED (yellow)	100 Mb/s (10 Mb/s when unlit)
ACTIVE (green)	Ethernet activity
Tx (green)	Transmit activity
Rx (green)	Receive activity
User-defined	3 bi-color, 1 green
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	235 g (8.3 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
Relative Humidity	10 to 90%, noncondensing
Maximum altitude	2,000 m
Pollution Degree	2

Safety

The FP-1601 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

For UL and other safety certifications, refer to the product label or to ***ni.com***

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

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

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/*** and search by model number or product line.