

ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Find the *National Instruments cFP-2020* at our website: *Click HERE*

LabVIEW Real-Time Controller Interfaces with Ethernet

NI cFP-2020, NI cFP-2010, NI cFP-2000

NEW

Controller Overview

- Real-time LabVIEW embedded controllers for intelligent industrial I/O
- Stand-alone embedded real-time controller or PC-based distributed I/O Ethernet interface
- Industrial-grade reliability
  - Automatic self-diagnostics
  - Redundant power supply inputs
  - Isolated communication bus to I/O modules
- RS-232 and RS-485 serial ports for local device control
- Removable CompactFlash for data logging
- Class I Div 2 Rated for Hazardous Environments

Operating Systems

- Windows 2000/NT/XP
- Real-time performance with LabVIEW (page 134)

Recommended Software

- LabVIEW
- LabVIEW Real-Time Module
- 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	DRAM Memory	Internal Nonvolite Storage	Removable Compact Flash	Ethernet Ports	RS-232 Serial Ports	RS-485 Serial Ports
cFP-2020	32 MB	64 MB	✓	1	3	1
cFP-2010	32 MB	64 MB	–	1	2	0
cFP-2000	16 MB	32 MB	–	1	1	0

Overview and Applications

Compact FieldPoint is a programmable automation controller (PAC) designed for industrial control applications performing advanced embedded control, data logging, headless operation, and Ethernet connectivity. It combines the packaging, specifications, and reliability of a PLC with the software, flexibility, connectivity, and functionality of a PC. Compact FieldPoint is our most rugged and reliable platform and is designed for industrial and mobile environments with high shock, vibration, and temperature extremes. Compact FieldPoint banks run LabVIEW Real-Time, providing the functionality, connectivity, and flexibility of LabVIEW on a small, rugged, industrial platform. The modular I/O architecture with built-in signal conditioning and isolation provides direct connectivity to industrial sensors such as analog voltage, 4 to 20 mA current, thermocouple, RTD, pressure, strain, flow, pulse width modulation (PWM), and 24 V digital I/O.

Engineers and scientists use the National Instruments cFP-20xx controllers in intelligent distributed applications requiring industrial-grade reliability, such as process and discrete control systems, to open and close valves, run control loops, log data, perform real-time simulation and analysis, and communicate over serial, phone, and Ethernet.

System Configurations

A single NI cFP-20xx controller manages a bank of up to eight Compact FieldPoint analog and digital I/O modules, which constitutes a node. The network module securely mounts on a metal backplane that provides a solid mounting surface for the Compact FieldPoint bank and forms the communication bus between the controller module and the I/O modules. You choose the I/O modules and connector block or cabling option that is best suited for your application.

For more details on configuring a Compact FieldPoint system, see page 517.

Highly Productive Software

When your application requires powerful functionality and rapid development, the key is flexible software that integrates seamlessly with hardware. LabVIEW is an industry-standard graphical development environment that provides all the tools necessary to create advanced and full-featured measurement and control applications. LabVIEW makes it easy to construct simple or complex applications using an extensive palette of functions and tools – from simple analog PID process control loops to high-channel-count hybrid control systems that combine both analog and digital components.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

LabVIEW Real-Time Controller Interfaces with Ethernet

Embedded Control Made Easy

LabVIEW Real-Time enables you to perform digital and analog control on the FieldPoint platform. With LabVIEW Real-Time embedded and running on a cFP-20xx controller, you can perform simple digital control with Boolean logic, as well as more advanced analog control, such as PID and fuzzy logic. The PID Control Toolset for LabVIEW has drop-down blocks for basic and advanced PID, feed forward, and fuzzy control. You can also use it for linear and nonlinear testing, modeling, and simulation. When developing a control system, you can take advantage of LabVIEW to implement basic control or easily incorporate advanced control techniques, such as disturbance decoupling, gain scheduling, and fuzzy logic control. For beginner users, powerful tools such as Autotuning PID make life easier and more productive. For embedded systems, you can effortlessly deploy your LabVIEW application on the real-time Compact FieldPoint hardware target.

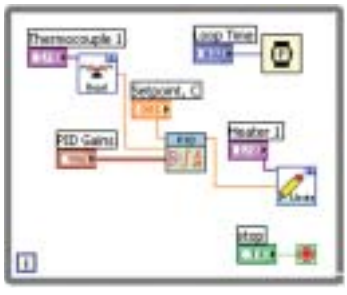


Figure 1. Take control quickly with Compact FieldPoint and LabVIEW Real-Time.

Reliable Embedded Operation

Using cFP-20xx industrial controllers, powered by real-time LabVIEW, you can create flexible control and measurement systems to meet your unique application requirements. Because these controllers contain an onboard processor and nonvolatile storage, you can perform embedded monitoring, logging, and machine control. Using the LabVIEW Real-Time module, you can download your application onto the controller and run the application disconnected from the host PC. Compact FieldPoint I/O banks include a number of features for industrial operation, including 2,300 V transient overvoltage protection where dangerous voltage levels are present, a wide temperature range for operation in hostile environments, backup power supply connections to protect against primary power failure, and hot-swappable modules to simplify maintenance and minimize downtime.

Web-Enabled Hardware

With remote panels, you can use a Web browser to connect to the front panel user interface for your LabVIEW application. Several Web browser clients can simultaneously view the front panel, while a single browser can both view and control the application. cFP-20xx real-time controllers feature an embedded Web server that handles up to 20 simultaneous remote panel connections. The cFP-20xx controllers also offer static Web pages to display system information and automatically run an FTP server to make it easy to update the embedded control program or to share logged data.

Embedded Intelligent Data Logging

Compact FieldPoint 20xx controllers all feature built-in nonvolatile memory for data logging, and with the cFP-2020 you can expand your storage capacity by using the removable CompactFlash drive. You can store the data in any DOS-compatible format, including CSV and XML. Once the data is stored, you can easily transfer it to a PC using the embedded FTP server on the cFP-20xx. LabVIEW Real-Time expands the functionality beyond the typical data logger because you can make additional calculations and decisions to eliminate logging unneeded data and to perform onboard real-time processing and control. Compact FieldPoint combines data logging, data reduction, control algorithms, HMI, and the ability to communicate with other nodes on the network.

Communication

cFP-20xx controllers connect directly to Ethernet and autonegotiate on the network for 10 Mb/s or 100 Mb/s communication rates. The Ethernet port serves as a high-speed link for downloading application code, performing run-time debugging and probing, and transmitting control and indicator values with a graphical user interface (GUI) running on a networked PC. You can also use the Ethernet port for programmatic network communication using protocols such as TCP, UDP, FTP, HTTP, and DataSocket.

Once deployed, the controllers can communicate peer to peer with other [c]FP-20xx intelligent FieldPoint controllers, or with passive network interfaces such as the FP-1601 and FP-1000. In addition, cFP-20xx controllers can communicate to a Windows computer running LabVIEW, Measurement Studio, Lookout, or your choice of National Instruments or third-party OLE for process control (OPC) client application software. Using industry-standard OPC technology, the Compact FieldPoint controller automatically communicates with the FieldPoint OPC server over the network to read and write I/O remotely without programming. This feature makes it easy to communicate with Compact FieldPoint using any OPC-enabled HMI/SCADA supervisory control software and to add Compact FieldPoint to installations with existing hardware.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

LabVIEW Real-Time Controller Interfaces with Ethernet

Decrease Network Traffic with Event-Driven Ethernet Communication

Using an event-driven communication protocol, the cFP-20xx 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.

Serial Connectivity

cFP-20xx controllers also include up to three RS-232 serial ports and one RS-485 serial port to programmatically communicate with other serial devices such as remote FieldPoint banks, LCD display/keypad units, bar code readers, or phone and radio modems.

Security

With the advanced security features enabled, only authorized clients can access the Compact 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 Compact FieldPoint System.

Power Supply Backup and Regulation

An 11 to 30 VDC supply powers the cFP-20xx. An extra set of screw terminals is available on the network controllers for a backup UPS or battery. The controllers filter and regulate the power input, redistributing power to all the I/O modules in the node via the backplane bus. For external power supply options, see Compact FieldPoint Accessories on page 526.

Easy Configuration Software

National Instruments Measurement & Automation Explorer (MAX) configuration software, included with your Compact FieldPoint hardware, simplifies the use and integration of Compact 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 Compact FieldPoint nodes. MAX will also automatically detect the I/O modules on each bank, and 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 Compact FieldPoint system, see page 517.

Ordering Information

NI cFP-2020	777317-2020
NI cFP-2010	777317-2010
NI cFP-2000	777317-2000

Recommended Compact FieldPoint System Products

NI cFP-BP-4	777617-04
NI cFP-BP-8	777617-08
NI cFP-CB-1	777618-01
NI cFP-CB-3	777618-03
NI PS-5 Power Supply	778805-90
NI Developer Suite Professional Control Edition	777906-03

BUY ONLINE!

Visit ni.com/info and enter cfp2000, cfp2010, and/or cfp2020.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

LabVIEW Real-Time Controller Interfaces with Ethernet

Specifications

Network

Network interface	10BaseT and 100BaseTX Ethernet
Compatibility	IEEE 802.3
Communication rates	10 Mb/s, 100 Mb/s, autonegotiated
Maximum cabling distance	100 m/segment
Maximum power to connected I/O modules	9 W
Maximum number of banks	Determined by network topology

Memory

cFP-2000	32 MB nonvolatile; 16 MB DRAM
cFP-2010	64 MB nonvolatile; 32 MB DRAM
cFP-2020	64 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.**

Serial Ports

cFP-2000	One RS-232, DTE
cFP-2010	Two RS-232, DTE
cFP-2020	Three RS-232, DTE; one RS-485, DTE

RS-485 Isolation Voltage

Maximum isolation voltage	100 V_{rms}
Transient overvoltage	740 V_{rms}

Power Requirement

Power supply range	11 to 30 VDC
Recommended power supply	PS-5
cFP-BP-4 system	15 W
cFP-BP-8 system	20 W
Power consumption	
cFP-2000	4.8 W + 1.1 (I/O module power requirements)
cFP-2010	5.0 W + 1.1 (I/O module power requirements)
cFP-2020	6.1 W + 1.1 (I/O module power requirements)

Physical Characteristics

LED indicators	
POWER (green)	Valid power to module
STATUS (red)	Failure condition
LINK/ACTIVE (green)	Valid network connection when lit; Ethernet activity when blinking
100 Mbps (yellow)	Ethernet speed (10 Mb/s if unlit)
User-defined	3 bicolor, 1 green
DIP switches	
cFP-2000, cFP-2010	3 user-defined, 3 predefined
cFP-2020	3 user-defined, 5 predefined
External digital I/O (cFP-2020)	2 switch inputs, 2 (5 V) digital outputs
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	
Dimensions	
cFP-2000	286 g (10.1 oz)
cFP-2010	293 g (10.3 oz)
cFP-2020	326 g (11.5 oz)
cFP-20xx on cFP-BP-4 backplane	127 by 246 by 106 mm (5.0 by 9.7 by 4.2 in.)
cFP-20xx on cFP-BP-8 backplane	127 by 441 by 106 mm (5.0 by 17.4 by 4.2 in.)

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 60 °C
Storage temperature	-55 to 85 °C
Relative humidity	10 to 90%, 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 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 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 + A2:2002, 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, click Declarations of Conformity visit ***ni.com/hardref.nsf/*** and search by model number or product line.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP