PROFIBUS Interfaces for NI LabVIEW, LabVIEW Real-Time

NI CompactRIO PROFIBUS Interface, NI PCI PROFIBUS Interface, NI PXI PROFIBUS Interface

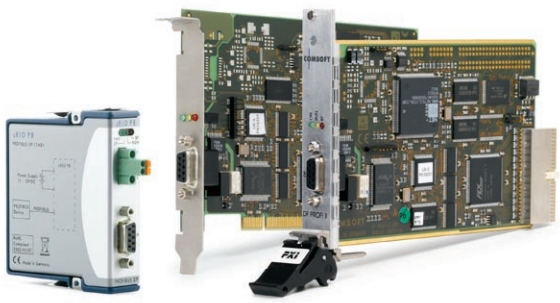
- CompactRIO, PXI, and PCI 1-port interfaces for PROFIBUS DP industrial networks
- PROFIBUS DP RS485 baud rates from 9.6 kbits/s to 12,000 kbits/s
- Graphical Configurator software
  - Configure network timing, masters, and slaves
  - Load .GS* files for configuring slaves
  - Diagnostic utility for in-application troubleshooting
- Supported PROFIBUS DP protocols
  - DPV0 Master Class 1/2, DPV0 Slave, DPV1 Master Class 2
- PROFIBUS master functionality
  - Single-master and multimaster modes
  - Onboard processor that downloads and stores PROFIBUS configurations for reliable network master operation
  - Advanced bus parameter customization
- PROFIBUS slave functionality
  - Add CompactRIO, PC, PXI, and industrial controllers as powerful PROFIBUS slaves to existing networks

Operating Systems

- Windows 7/Vista/XP/2000
- LabVIEW Real-Time ETS

Recommended Software

- LabVIEW



Overview

PROFIBUS PCI and PXI one-port interfaces connect PC-based controllers to PROFIBUS DP (decentralized peripheral) industrial networks as powerful masters or slaves. The PROFIBUS NI C Series module provides master and slave connectivity to embedded real-time programmable automation controllers (PACs) such as NI Single-Board RIO and CompactRIO. You can perform PROFIBUS device automated test using these interfaces, which include an NI LabVIEW driver for human machine interface (HMI) and SCADA applications. Featuring more than 20 million installed nodes, PROFIBUS is one of the leading industrial networks for reliably connecting programmable logic controllers (PLCs), I/O, sensors, and drives over long distances in industrial environments.

These PROFIBUS interfaces include a configuration utility to simplify the process of setting up a PROFIBUS network. With the configuration utility and the LabVIEW driver, you can write applications using easy-to-understand tags and avoid programming the low-level details of the PROFIBUS network. With the NI interfaces, you have easy access to both process and diagnostic data to cover a wide breadth of applications.

Hardware

NI PROFIBUS interfaces are available in the CompactRIO, PCI, and PXI form factors. They are designed to work on the PROFIBUS DP layer, the core communications layer of PROFIBUS. PROFIBUS provides multiple transmission technologies to fit location requirements for industrial networks. These are assigned to PROFIBUS in IEC 61158 and IEC 61784 and include RS485, Manchester Bus Powered (MBP), intrinsically safe RS485 and MBP, and fiber-optic connections. These PROFIBUS interfaces work with RS485-based networks, the most common transmission technology.

An onboard processor, memory, and flash storage enable the interfaces to reliably communicate with the PROFIBUS network independently of PC performance and jitter. If the host machine has a software failure, the rest of the PROFIBUS network continues to operate normally.

CompactRIO PROFIBUS modules require 2.5 W of power, so you must use the module in Slot 1 while leaving Slot 2 empty. Also, these modules work with only CompactRIO reconfigurable chassis, such as an NI cRIO-911x, and NI Single-Board RIO devices. They are not supported in the NI 9151 R Series expansion chassis. Only the CompactRIO PROFIBUS slave module is supported in NI 9144 real-time Ethernet expansion chassis for programming in FPGA Mode.

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Baud Rate (kb/s)	Max Cable Length (m)
9.6	1200
19.2	1200
45.45	1200
93.75	1200
187.5	1000
500	400
1500	200
3000	100
6000	100
12000	100

Table 1. Supported PROFIBUS Baud Rates

Software

The PROFIBUS interfaces are shipped with a LabVIEW driver and a powerful configuration utility. The LabVIEW driver is a VI-based API for operating the PROFIBUS interfaces in either master or slave mode. The software for the CompactRIO PROFIBUS module is a LabVIEW FPGA VI-based API for operating PROFIBUS interfaces in either master or slave mode and must be installed separately. In master mode, a LabVIEW system can control a PROFIBUS DP network of devices such as sensors, drives, and PLCs. In slave mode, the LabVIEW system can operate as a powerful node on an existing PROFIBUS network with another master controlling the node.

PROFIBUS Master

In master mode, these PROFIBUS interfaces control the timing and arbitration of the network. After the interface configures the network with the included Configurator utility, the API allows the host application to send and receive process data to the interfaces. The host application then sends the data to the network according to the timing parameters. Process data flowing to the host application (process image) is hardware-timestamped by the PROFIBUS interfaces for reliable timing and control. With average-sized PROFIBUS configurations (approximately 3 KB of I/O data), you can achieve 1 ms control resolution. When you use these interfaces with the LabVIEW Real-Time operating system, you can achieve deterministic control of devices over a PROFIBUS network and maximum reliability.

PROFIBUS Slave

When using one of these PROFIBUS interfaces as a slave on a PROFIBUS network, you can turn a CompactRIO, PC, or PXI system into a powerful PROFIBUS device. As a slave, the interface helps you integrate NI high-performance data acquisition, motion, vision, and modular instruments into PROFIBUS-enabled machines and processes.

Configurator Software

Using the Configurator software included with these PROFIBUS interfaces, you can quickly and easily set up a PROFIBUS configuration. By working with device manufacturer-supplied .GS* files, you can select and configure the I/O you access with the master application. You also can use the Configurator to monitor the values of device I/O to quickly identify the correct I/O addresses for an application. With the graphical interface of the Configurator, you can maintain larger networks with ease. The Configurator uses an XML-based configuration storage format for easy integration with third-party applications.

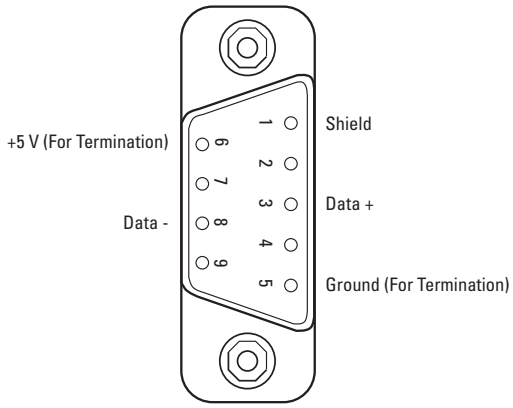

Figure 1. 9-Pin D-Sub Connector

Ordering Information

NI CompactRIO PROFIBUS master/slave interface 781352-01
NI CompactRIO PROFIBUS slave interface 781351-01
NI PCI PROFIBUS master/slave interface 780160-01
NI PXI PROFIBUS master/slave interface 780161-01

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For complete product specifications, pricing, and accessory information, call 800 813 3693 (U.S.) or go to **ni.com/profibus**.

Specifications

Host CPU	
CompactRIO	ARM 9 @ 150 MHz
PCI, PXI	NetSilicon NET+ARM 40 @ 33 MHz
PROFIBUS chip	Siemens ASPC 2 @ 48 MHz
RAM	
CompactRIO	32 MB
PCI, PXI	2 MB
Flash memory	
CompactRIO	4 MB
PCI, PXI	1 MB
PCI interface	5 and 3.3 V compatible
Internal power requirements	
CompactRIO	2.5 W
PCI, PXI	5.5 W
PROFIBUS isolation voltage	500 VDC
Physical layer	RS485
PROFIBUS connector	D-Sub 9-pin
Number of ports	1
DP services	DPV0 Master Class 1/2, DPV0 Slave, DPV1 Master Class 2
DP/DPV1 services	DPV1 Class 2 Master-Slave MSAC2_initiate, MSAC2_read, MSAC2_write, MSAC2_data_transport, MSAC2_abort
Process image data size	Maximum 8 KB
Operating temperature	0 to 55 °C
Storage temperature range	-25 to 70 °C
Certifications	
CompactRIO	CE, EN 50082-1, EN 50082-2, EN 50081-1, EU 89/336/EWG and 92/31/EWG, RoHS compliant 2002/95/EC
PCI, PXI	EU 2004/108/EG, DIN EN 55024, DIN EN 55022, RoHS compliant 2002/95/EC
Dimensions	
CompactRIO	7.1 by 2.3 by 8.8 cm (2.8 by 0.9 by 3.5 in.)
PXI	3U, 1-slot, PXI/CompactPCI module; 16 by 10 cm (6.3 by 3.9 in.)
PCI	17.4 by 9.8 cm (6.8 by 3.85 in.)

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