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Serial Interfaces for PXI, PCI, PCMCIA, Ethernet, USB, and ISA

NI Serial Interfaces

- Flexible baud rates from 57 b/s to 2 Mb/s (NI 843x)
- Up to 128 B transmit/receive FIFOs (NI 843x, USB, ENET)
- Full multiprocessor and hyperthreading compatibility (NI 843x)
- Memory-mapped to prevent I/O resource conflicts (NI 843x)
- 3.3 and 5 V PCI slot-compatible (NI 843x)
- NI-Serial device driver works with NI-VISA for easy development
- LabVIEW Real-Time compatibility for deterministic control (Plug-In, ENET)
- Optical isolation up to 2000 V (plug-in)

Operating Systems

- Windows 2000/XP (NI 843x, USB)
- Windows 2000/NT/XP/Me/9x (PXI, PCI, PCMCIA, ISA)
- Windows 2000/NT/XP (ENET)

Recommended Software

- LabVIEW
- LabWindows/CVI
- Measurement Studio

Other Compatible Software

- C/C++
- Visual Basic
- Any package that uses the Microsoft Win32 Serial API

Driver Software (included)

- NI-Serial

NEW



Overview

National Instruments offers serial interfaces for PCI, PXI, PCMCIA, ISA, USB, and Ethernet. They are asynchronous interfaces for communicating with instruments via serial ports. Depending on the platform, interfaces are available with up to 16 ports and full Windows 2000/NT/XP/Me/9x plug-and-play compatibility, which gives you the benefit of automatic configuration for easier installation and maintenance. You can install and use these devices as standard serial ports from your existing applications or with applications written with NI-VISA. Development environments such as Visual Basic, Visual C++, and Excel, as well as NI LabVIEW, LabWindows/CVI, Measurement Studio, and Lookout application software products, can access the add-in serial ports using standard serial I/O functions. All interface devices include an enhanced serial driver for improved performance, easy configuration, and access to the advanced transceiver control modes of the RS485 interfaces.

Isolation

Ground loops – current flowing through the ground line when ground voltage levels differ between connected devices – are a common problem in many industrial applications. On RS485, this problem results in a common-mode voltage produced by the difference in ground levels or by noise induced on both lines. Isolating serial ports eliminates this problem and protects the computer system in harsh industrial environments. The National Instruments PCI, PXI, and AT serial interfaces are available with optical isolation up to 2,000 V for such applications.

Cabling

NI 2-port serial interfaces have DB-9 male connectors with standard pin assignments for RS485 and RS232 connectors (see Figure 1). The 4-port interfaces use 10-position modular phone jacks, so all four connectors can exist on a single back panel (see Figure 2). When purchasing a 4-port serial interface, you can order cables that convert the phone jacks to either DB-9 or DB-25 male connectors with standard pin assignments. In general, you should order four converter cables per 4-port serial device. Note that a converter cable is not designed to go the full distance from a 4-port serial interface directly to your instruments. Our most popular converter cables convert the 10-pin phone jack on a 4-port device to the same DB-9 male connector found on a typical PC serial port. The connection from this converter to your serial device uses the standard cables used with the PC serial port.

National Instruments ships cables with all isolated ISA and PCI 4-channel serial boards to ensure isolation. NI 4-channel PXI serial modules, which do not require special isolated cables to ensure isolation, come without cables.

All 8-port serial interfaces include an adapter cable that connects to the SCSI 68-pin connector on the device and terminates in eight standard DB-9 male connectors (see Figure 3).

All 16-port RS232 serial interfaces include a breakout box that connects to the SCSI 100-pin connector on the device and terminates in 16 standard DB-9 male connectors (see Figure 4).

NI ships PCMCIA serial cards with interface cables that provide one, two, or four DB-9 male connectors. These DB-9 male connectors provide standard pin assignments for RS485 and RS232 connections. Note that these cables are not designed to go the full distance from a PCMCIA serial card to your instrument. The cables provide the same DB-9 male connectors found on a typical PC serial port.

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Serial Interfaces for PXI, PCI, PCMCIA, Ethernet, USB, and ISA

High-Performance Interfaces

NI 843x high-performance serial interfaces deliver advanced features such as flexible baud rates up to 2 Mb/s and universal PCI, and hyperthreading and multiprocessor compatibility. With the flexible baud rate capabilities of the NI 843x interfaces, you can communicate with devices that operate with nonstandard baud rates ranging from 57 b/s up to 2 Mb/s within 1 percent and standard baud rates within 0.01 percent. With multiprocessor and hyperthreading compatibility, you also can take advantage of the latest PC technology for higher speeds and improved efficiency. The new driver software included with the devices offers better resource allocation as well as DMA access for higher throughput with minimal CPU usage. In addition, NI 843x interfaces include new memory-mapping features that you can use to connect to more serial devices without resource conflicts. PCI-843x interfaces are universal PCI boards, fully compatible with both 5 and 3.3 V signaling environments so the board can work in a wide range of PCs.

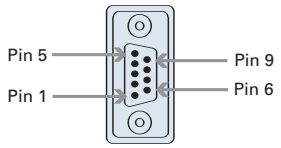


Figure 1. DB-9 Connector Pin Locations

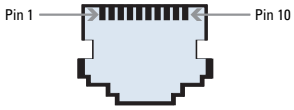


Figure 2. 10-Position Modular Jack Pin Locations

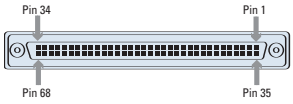


Figure 3. SCSI 68-Pin Connector Locations

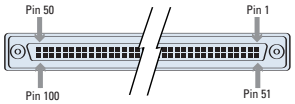


Figure 4. SCSI 100-Pin Connector Locations

USB Interfaces

The National Instruments USB-232 and USB-485 transform your USB port into asynchronous serial ports for communication with serial devices. The NI USB-232 and USB-485 are available in either 1, 2, or 4-port versions, using standard RS232, RS422, or RS485 communications. You can install and use the USB-232 and USB-485 as standard serial ports from your existing applications or with applications written with NI-VISA.

Additionally, the USB-232 2 and 4-port versions feature software-selectable DTE or DCE transceiver modes, as well as an automatic transceiver detection mode, or Auto232. The USB-485 features software-selectable biasing, with which you can turn biasing on and off for each port.

Ethernet Interfaces

The National Instruments ENET-232 and ENET-485 serial device servers connect either 100BaseTX (100 Mb/s) or 10BaseT (10 Mb/s) Ethernet networks to asynchronous serial ports for communication with serial devices. They come with either 2 or 4-port options and use standard RS232, RS422, or RS485 communications. All products are shipped with driver software for Windows 2000/NT/XP. You can install and use these serial device servers as standard serial ports from your existing applications or with applications written with NI-VISA.

The TCP/IP communication protocol, which handles all communication between the serial device server and the host PC, runs on embedded firmware in the serial device server. A configuration utility configures the IP address of the serial device server and exposes all additional serial ports to the OS for immediate use by any application software package using a standard Microsoft Windows Serial (COM) port interface.

Specifications

Interface Hardware Dimensions

High-Performance PCI	10.7 by 14.2 cm (4.2 by 5.6 in)
PCI	
2-port boards (isolated and unisolated)	10.7 by 14.2 cm (4.2 by 5.6 in.)
4-port boards (isolated and unisolated)	10.7 by 17.3 cm (4.2 by 6.8 in.)
8-port boards	10.7 by 14.5 cm (4.2 by 5.7 in.)
16-port boards	10.7 by 17.5 cm (4.2 by 6.9 in.)
PXI (excluding connectors)	10.0 by 16.0 cm (3.9 by 6.3 in.)
PCMCIA	Type II PC Card
ENET	21.0 by 12.4 by 3.7 cm (8.25 by 4.89 by 1.44 in.)
USB-232/2, USB-232/4	21.0 by 12.4 by 3.7 cm (8.3 by 4.9 by 1.4 in.)
USB-232	3.8 by 3.7 by 1.6 cm or (1.5 by 1.4 by 0.6 in.)
ISA	
Unisolated 2-port boards	10.7 by 16.5 cm (4.2 by 6.5 in.)
Isolated 2-port boards	10.7 by 18.7 cm (4.2 by 7.4 in.)
Unisolated 4-port boards	10.7 by 16.5 cm (4.2 by 6.5 in.)
Isolated 4-port boards	10.7 by 25.4 cm (4.2 by 10.0 in.)

Environmental Specifications

	Operating Environment		Storage Environment	
	Ambient Temperature (°C)	Relative Humidity	Ambient Temperature (°C)	Relative Humidity
PCI	0 to 55	10 to 90%	-20 to 70	5 to 95%
PXI	0 to 55	10 to 90%	-20 to 70	5 to 95%
PCMCIA	0 to 55	10 to 90%	-40 to 125	5 to 95%
ISA	0 to 70	10 to 90%	-20 to 70	5 to 95%
USB	0 to 70	10 to 90%	-40 to 80	5 to 95%
Ethernet	0 to 70	10 to 90%	-40 to 85	5 to 95%

Safety

These products are designed to meet the requirements of the following standards of safety for information technology equipment:
IEC 60950-1, EN 60950-1
UL 60950-1
CAN/CSA C22.2 No. 60950-1

Electromagnetic Compatibility

Emissions: EN 55011 Class A at 10 m. FCC Part 15A above 1 GHz
Immunity: EN 61326:1997 + A2:2001, Table 1
CE, C-Tick, and FCC Part 15 (Class A) Compliant
NOTE: For EMC compliance, operate this device with shielded cabling.

CE Compliance CE

These products meet 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: For more information on certifications, marks, and DoCs, visit ***ni.com/certification***.

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Serial Interfaces for PXI, PCI, PCMCIA, Ethernet, USB, and ISA

Ordering Information

	Model	Power Requirements (from PCI, PXI, PCMCIA, or ISA Channel) +5 VDC Typical Current (mA)	+5 VDC Maximum Current (mA)	+12 VDC Typical Current (mA)	+12 VDC Maximum Current (mA)	Signal Compatibility I/O Connectors	Optical Isolation	All Signals	Only RXD, TXD, GND, RTS, and CTS	Data Line ESD Protection[1] (HBM) (kV)	Max Transfer Rate (kb/s)	FIFO Size (B)	DB-9 Adapter(s) Included	Part Number
High-Performance Plug-In	**PCI**													
	PCI-8430/2 (RS232)	325	500	–	–	DB-9 male	–	✓	–	15	1000	128	–	778978-01
	PCI-8430/4 (RS232)	400	600	–	–	10-position jack	–	✓	–	15	1000	128	–	778979-01
	PCI-8430/8 (RS232)	600	900	–	–	SCSI 68-pin interface	–	✓	–	15	1000	128	–	779147-01
	PCI-8431/2 (RS485)	500	750	–	–	DB-9 male	–	–	✓	15	2000	128	–	778980-01
	PCI-8431/4 (RS485)	725	1100	–	–	10-position jack	–	–	✓	15	2000	128	–	778981-01
	PCI-8431/8 (RS485)	1300	1900	–	–	SCSI 68-pin interface	–	–	✓	15	2000	128	–	779148-01
	PXI													
	PXI-8430/2 (RS232)	325	500	–	–	DB-9 male	–	✓	–	15	1000	128	–	778982-01
	PXI-8430/4 (RS232)	400	600	–	–	10-position jack	–	✓	–	15	1000	128	–	778983-01
	PXI-8431/2 (RS485)	500	750	–	–	DB-9 male	–	–	✓	15	2000	128	–	778984-01
	PXI-8431/4 (RS485)	725	1100	–	–	10-position jack	–	–	✓	15	2000	128	–	778985-01
Plug-In	**PCI**													
	PCI-232/2	50	100	20	200	DB-9 male	–	✓	–	15	115.2	64	–	777642-02
	PCI-232/4	70	150	40	400	10-position jack	–	✓	–	15	115.2	64	–	777642-04
	PCI-232/8	100	180	80	800	SCSI 68-pin interface	–	✓	–	15	115.2	64	✓	777642-08
	PCI-232/16	500	1000	–	–	SCSI 100-pin female	–	Ports 1 to 8	Ports 9 to 16	15	115.2	64	✓	777642-16
	PCI-232I/2	400	650	–	–	DB-9 male	✓	–	✓	15	115.2	64	–	777854-02
	PCI-232I/4	500	750	–	–	10-position jack	✓	–	✓	15	115.2	64	✓	777854-04
	PCI-485/2	350	750	–	–	DB-9 male	–	–	✓	2	460.8	64	–	777641-02
	PCI-485/4	700	1300	–	–	10-position jack	–	–	✓	2	460.8	64	–	777641-04
	PCI-485/8	1100	2000	–	–	SCSI 68-pin interface	–	–	✓	2	460.8	64	✓	777641-08
	PCI-485I/2	800	1300	–	–	DB-9 male	✓	–	✓	15	460.8	64	–	777853-02
	PCI-485I/4	1000	1500	–	–	10-position jack	✓	–	✓	15	460.8	64	✓	777853-04
	PXI													
	PXI-8420/2	100	150	20	200	DB-9 male	–	✓	–	15	115.2	64	–	777733-02
	PXI-8420/4	125	200	40	400	10-position jack	–	✓	–	15	115.2	64	–	777733-04
	PXI-8420/8	150	250	80	800	SCSI 68-pin male	–	✓	–	15	115.2	64	✓	777733-08
	PXI-8420/16	500	1000	–	–	SCSI 100-pin female	–	Ports 1 to 8	Ports 9 to 16	15	115.2	64	✓	777733-16
	PXI-8421/2	350	750	–	–	DB-9 male	–	–	✓	2	460.8	64	–	777735-02
	PXI-8421/4	700	1300	–	–	10-position jack	–	–	✓	2	460.8	64	–	777735-04
	PXI-8421/8	1100	2000	–	–	SCSI 68-pin female	–	–	✓	2	460.8	64	✓	777735-08
	PXI-8422/2	400	650	–	–	DB-9 male	✓	–	✓	15	115.2	64	–	777736-02
	PXI-8422/4	500	750	–	–	10-position jack	✓	–	✓	15	115.2	64	–	777736-04
	PXI-8423/2	800	1300	–	–	DB-9 male	✓	–	✓	15	460.8	64	–	777737-02
	PXI-8423/4	1000	1500	–	–	10-position jack	✓	–	✓	15	460.8	64	–	777737-04
	PCMCIA													
	PCMCIA-232	40	150	–	–	DB-9 male	–	✓	–	2	921.6	16	✓	777379-01
	PCMCIA-232/2	60	250	–	–	DB-9 male	–	✓	–	2	921.6	16	✓	777379-02
	PCMCIA-232/4	60	200	–	–	DB-9 male	–	✓	–	15	115.2	64	✓	777379-04
	PCMCIA-485	110	225	–	–	DB-9 male	–	–	✓	2	921.6	16	✓	777378-01
	PCMCIA-485/2	150	400	–	–	DB-9 male	–	–	✓	2	921.6	16	✓	777378-02
	ISA													
	AT-232/2	260	340	–	–	DB-9 male	–	✓	–	2	115.2	16	–	777312-02
	AT-232/4	340	450	–	–	10-position jack	–	✓	–	2	115.2	16	–	777312-04
	AT-232I/2	160	200	–	–	DB-9 male	✓	–	✓	15	115.2	16	–	777500-02
	AT-232I/4	280	320	–	–	10-position jack	✓	–	✓	15	115.2	16	✓	777500-04
	AT-485/2	390	510	–	–	DB-9 male	–	–	✓	2	115.2	16	–	777311-02
	AT-485/4	600	780	–	–	10-position jack	–	–	✓	2	115.2	16	–	777311-04
	AT-485I/2	220	260	–	–	DB-9 male	✓	–	✓	15	115.2	16	–	777501-02
	AT-485I/4	300	360	–	–	10-position jack	✓	–	✓	15	115.2	16	✓	777501-04

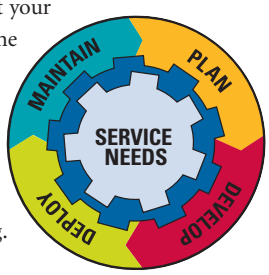
	Model	Power Requirements (from PCI, PXI, PCMCIA, or ISA Channel) +5 VDC Typical Current (mA)	+5 VDC Maximum Current (mA)	+9 to +30 VDC Typical Current (mA)	+9 to +30 VDC Maximum Current (mA)	Signal Compatibility I/O Connectors	Optical Isolation	All Signals	Only RXD, TXD, GND, RTS, and CTS	Data Line ESD Protection[1] (HBM) (kV)	Max Transfer Rate (kb/s)	FIFO Size (B)	DB-9 Adapter(s) Included	Part Number
External	**USB**													
	USB-232	100	500	–	–	DB-9 male	–	–	–	15	230.4	128	–	778472-01
	USB-232/2	200	500	–	–	DB-9 male	–	–	–	15	230.4	128	–	778473-02
	USB-232/4	300	500	–	–	DB-9 male	–	–	–	15	230.4	128	–	778473-04
	USB-485	175	500	–	–	DB-9 male	–	–	–	15	460.8	128	–	778475-01
	USB-485/2	300	500	–	–	DB-9 male	–	–	–	15	460.8	128	–	77876-02
	USB-485/4	–	–	225	500	DB-9 male	–	–	–	15	460.8	128	–	778476-P4
	Ethernet													
	ENET-232/2	–	–	600	1000	DB-9 male	–	–	–	15	230.4	128	–	778064-P2
	ENET-232/4	–	–	600	1000	DB-9 male	–	–	–	15	230.4	128	–	778064-P4
	ENET-485/2	–	–	600	1000	DB-9 male	–	–	–	15	460.8	128	–	778065-P2
	ENET-485/4	–	–	600	1000	DB-9 male	–	–	–	15	460.8	128	–	778065-P4

[1]ESD Protection rating determined by transceiver component design.

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Calibration Services

NI recognizes the need to maintain properly calibrated devices for high-accuracy measurements. We provide manual calibration procedures, services to recalibrate your products, and automated calibration software specifically designed for use by metrology laboratories. Visit ni.com/calibration.

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