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SPECIFICATIONS AND FEATURES GUIDE

This document lists safety and compliance information for NI Serial hardware, as well as physical specifications, software features, and recommended operating conditions.

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NI-Serial Supported Interfaces

The PCI interfaces listed in Table 1 are universal cards which accept either 3.3 or 5 volts.

PCI Interfaces	Standard	# Ports	Isolated	Max Baud (kbaud) [*]	Connector Type [†]	FIFO Size (Bytes)
PCI-8430/2	RS-232	2	No	1000.0	DB-9 male	128
PCI-8430/4	RS-232	4	No	1000.0	10P10C	128
PCI-8430/8	RS-232	8	No	1000.0	68-pin SCSI	128
PCI-8430/16	RS-232	16	No	1000.0	68-pin VHDCI	128
PCI-8431/2	RS-485/ RS-422	2	No	3000.0‡	DB-9 male	128
PCI-8431/4	RS-485/ RS-422	4	No	3000.0‡	10P10C	128
PCI-8431/8	RS-485/ RS-422	8	No	3000.0‡	68-pin SCSI	128
PCI-8432/2	RS-232	2	Yes	1000.0	DB-9 male	128
PCI-8432/4	RS-232	4	Yes	1000.0	10P10C	128
PCI-8433/2	RS-485/ RS-422	2	Yes	3000.0‡	3000.0 [‡] DB-9 male	
PCI-8433/4	RS-485/ RS-422	4	Yes	3000.0*	10P10C	128

Table 1. PCI Interfaces

* All NI serial hardware supports standard baud rates. In addition, the PCI/NI PCIe/PXI-843x family of hardware supports any baud rate from 2 baud up to the maximum supported baud rate for that interface. All baud rates are supported because the UART can get within 1.3 percent of all baud rates in that range.

[†] Serial connector cables end in DB-9 male serial connectors.

 ‡ The two-wire auto control mode for RS-485 transceiver control has a maximum baud rate of 2000 kbaud.

PCI Express Interfaces	Standard	# Ports	Isolated	Max Baud (kbaud) [*]	Connector Type [†]	FIFO Size (Bytes)
NI PCIe-8430/8	RS-232	8	No	1000.0	68-pin VHDCI	128
NI PCIe-8430/16	RS-232	16	No	1000.0	68-pin VHDCI	128
NI PCIe-8431/8	RS-485/ RS-422	8	No	3000.0‡	68-pin VHDCI	128
NI PCIe-8431/16	RS-485/ RS-422	16	No	3000.0‡	68-pin VHDCI	128

Table 2. PCI Express Interfaces

* All NI serial hardware supports standard baud rates. In addition, the PCI/NI PCIe/PXI-843*x* family of hardware supports any baud rate from 2 baud up to the maximum supported baud rate for that interface. All baud rates are supported because the UART can get within 1.3 percent of all baud rates in that range.

[†] Serial connector cables end in DB-9 male serial connectors.

 ‡ The two-wire auto control mode for RS-485 transceiver control has a maximum baud rate of 2000 kbaud.

PXI Interfaces	Standard	# Ports	Isolated	Max Baud (kbaud) [*]	Connector Type [†]	FIFO Size (Bytes)
PXI-8430/2	RS-232	2	No	1000.0	DB-9 male	128
PXI-8430/4	RS-232	4	No	1000.0	10P10C	128
PXI-8430/8	RS-232	8	No	1000.0	68-pin SCSI	128
PXI-8430/16	RS-232	16	No	1000.0	68-pin VHDCI	128
PXI-8431/2	RS-485/ RS-422	2	No	3000.0‡	DB-9 male	128
PXI-8431/4	RS-485/ RS-422	4	No	3000.0‡	10P10C	128
PXI-8431/8	RS-485/ RS-422	8	No	3000.0‡	68-pin SCSI	128
PXI-8432/2	RS-232	2	Yes	1000.0	DB-9 male	128
PXI-8432/4	RS-232	4	Yes	1000.0	10P10C	128

Table 3. PXI Interfaces

Table 3. PXI Interfaces (Continued)

PXI Interfaces	Standard	# Ports	Isolated	Max Baud (kbaud) [*]	Connector Type [†]	FIFO Size (Bytes)
PXI-8433/2	RS-485/ RS-422	2	Yes	3000.0*	DB-9 male	128
PXI-8433/4	RS-485/ RS-422	4	Yes	3000.0‡	10P10C	128

* All NI serial hardware supports standard baud rates. In addition, the PCI/NI PCIe/PXI-843x family of hardware supports any baud rate from 2 baud up to the maximum supported baud rate for that interface. All baud rates are supported because the UART can get within 1.3 percent of all baud rates in that range.

[†] Serial connector cables end in DB-9 male serial connectors.

[‡] The two-wire auto control mode for RS-485 transceiver control has a maximum baud rate of 2000 kbaud.

PXI Express Interfaces	Standard	# Ports	Isolated	Max Baud (kbaud)*	Connector Type [†]	FIFO Size (Bytes)
NI PXIe-8430/8	RS-232	8	No	1000.0	68-pin VHDCI	128
NI PXIe-8430/16	RS-232	16	No	1000.0	68-pin VHDCI	128
NI PXIe-8431/8	RS-485/ RS-422	8	No	3000.0 ^{‡, **}	68-pin VHDCI	128
NI PXIe-8431/16	RS-485/ RS-422	16	No	3000.0 ^{‡, **}	68-pin VHDCI	128

Table 4. PXI Express Interfaces

* All NI serial hardware supports standard baud rates. In addition, the PXI/NI PXIe-843*x* family of hardware supports any baud rate from 2 baud up to the maximum supported baud rate for that interface. All baud rates are supported because the UART can get within 1.3 percent of all baud rates in that range.

[†] Serial connector cables end in DB-9 male serial connectors.

[‡] The two-wire auto control mode for RS-485 transceiver control has a maximum baud rate of 2000 kbaud.

** For possible use with higher baud rates, refer to ni.com/kb and search for KnowledgeBase 58KE182F.

USB Interfaces	Standard	# Ports	Isolated	Max Baud (kbaud) [*]	Connector Type	FIFO Size (Bytes)		
USB-232	RS-232	1	No	230.4	DB-9 male	128		
USB-232/2	RS-232	2	No	230.4	DB-9 male	128		
USB-232/4	RS-232	4	No	230.4	DB-9 male	128		
USB-485	RS-485/ RS-422	1	No	460.8	DB-9 male	128		
USB-485/2	RS-485/ RS-422	2	No	460.8	DB-9 male	128		
USB-485/4								
* All NI serial hardware supports standard baud rates. In addition, the PCI/NI PCIe/PXI-843x family of hardware supports any baud rate from 2 baud up to the maximum supported baud rate for that interface. All baud rates are supported because the UART can get within 1.3 percent of all baud rates in that range.								

Table 5. USB Interfaces

Table 6. ExpressCard Interfaces

ExpressCard Interfaces	Standard	# Ports	Isolated	Max Baud (kbaud)*	Connector Type	FIFOSize (Bytes)			
NI ExpressCard- 8420/2	RS-232	2	No	230.4	DB-9 male	128			
NI ExpressCard- 8421/2	RS-485/ RS-422	2	No	460.8	DB-9 male	128			
* All NI serial hard	* All NI serial hardware supports standard baud rates. In addition, the PCI/NI PCIe/PXI-843x family of								

hardware supports any baud rate from 2 baud up to the maximum supported baud rates for that interface. All baud rates are supported because the UART can get within 1.3 percent of all baud rates in that range.

National Instruments considers the following baud rates to be standard. NI serial hardware supports these rates up to the maximum rate specified. Your device may also support additional baud rates not listed below:

300	2400	14400	57600	460800
600	4800	19200	115200	
1200	9600	38400	230400	

To set the baud rate, set the VISA Baud attribute or use the Windows SetCommState function and pass the actual value of the baud rate in the **BaudRate** field of the **DCB** structure.

Refer to *Hardware Specifications* for supported baud rates on each board.

Serial Hardware Features

To determine which features your product supports, refer to the following table.

Table 7. Se	ial Hardware Features
-------------	-----------------------

Hardware				RS-485	RS-485 Program- matically Controlled	RS-232	RS-232 DTE/DCE Transceiver Control	Hardware Implemented Flow Control		
	Adjustable FIFO Settings	Get Interface Type	RS-485 Transceiver Control	Socketed Bias Resistors	Controlled Bias Resistors	RS-232 Transceiver State		RTS/ CTS	DTR/ DSR	Xon/ Xoff
PCI/NI PCIe/PXI/ NIPXIe-8430, PCI/PXI-8432	~	~				~		~	~	~
PCI/NI PCIe/PXI/ NI PXIe-8431 eight port and NI PXIe/ NI PCIe-8431 16 port	~	~	~					~		~
All other PCI/PXI-8431 and PCI/PXI-8433	~	~	~	~				~		~
USB-232 one port		~				~		~	~	~
USB-232 two and four port		~				~	\checkmark	~	~	~
USB-485 one port		~	~		~			~		~

				RS-485 Program- RS-485 matically		RS-232	Hardware Implemented Flow Control			
Hardware	Adjustable FIFO Settings	Get Interface Type	RS-485 Transceiver Control	Socketed Bias Resistors	Controlled Bias Resistors	RS-232 Transceiver State	DTE/DCE Transceiver Control	RTS/ CTS	DTR/ DSR	Xon/ Xoff
USB-485 two and four port		~	\checkmark	~	~			~		~
NI ExpressCard -8420		~				~		~	~	~
NI ExpressCard -8421		~	~		~			~		~

Table 7. Serial Hardware Features (Continued)

7

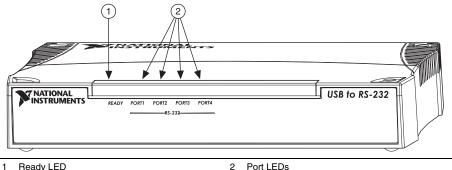
USB LED Descriptions

The USB serial two and four-port hardware uses bicolor LEDs to indicate device and port status. Table 8 describes these LEDs; Figure 1 shows their location.

LED	Description				
Ready	Dim Red—Powered, but not connected to USB (self-powered USB only)				
	Red—Powered and connected to USB, but not fully configured				
	Yellow—Device is ready (normal operation)				
	Blinking Red or Red-Yellow—Device error. Contact NI.				
Port <i>x</i>	Solid Red—Port is open, but no valid signals detected (USB-232 only)				
	Solid Green—Port is open				
	Blinking Yellow—Port is transmitting				
	Blinking Green—Port is receiving				
	Alternated Blinking Green/Yellow—Port is transmitting and receiving				
	Blinking Red—Port error (framing error, FIFO overrun, or parity error)				

Table 8. USB LEDs

Figure 1. USB-Serial Hardware LEDs



Ready LED 1

Port LEDs

Connectors and Pinouts

DB-9 Male





Pin	232 DTE	232 DCE	422/485
1	DCD*	DCD	GND
2	RXD	TXD	CTS+ (HSI+)
3	TXD	RXD	RTS+ (HSO+)
4	DTR*	DSR	RXD+
5	GND	GND	RXD-
6	DSR*	DTR	CTS- (HSI-)
7	RTS	CTS	RTS- (HSO-)
8	CTS	RTS	TXD+
9	RI*	RI	TXD-

Table 9. DB-9 Male Pin Descriptions

* These signals are "No Connect" on the PCI-232I and PXI-8422 ports and ports 9-16 on legacy 16-port boards.

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Note DCE mode supported on USB-232/2 and USB-232/4 only.

10-Position Modular Jack (10P10C)

Figure 3.	10-Position Modular Jack Pin Locations

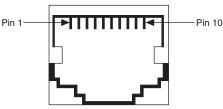


 Table 10.
 10-Position Modular Jack Pin Descriptions

Pin	232 422/485	
1	No Connect	No Connect
2	RI*	TXD-
3	CTS	TXD+
4	RTS	RTS- (HSO-)
5	DSR*	CTS- (HSI-)

Pin	232	422/485		
6	GND	RXD-		
7	DTR*	RXD+		
8	TXD	RTS+ (HSO+)		
9	RXD	CTS+ (HSI+)		
10	DCD*	GND		
* These signals are "No Connect" on the PCI-232I and PXI-8422 ports.				

Table 10. 10-Position Modular Jack Pin Descriptions (Continued)

68-Pin Connector

The following figures and table give the 68-pin connector pin locations and descriptions. The SCSI 68-pin connector and VHDCI 68-pin connector have the same pinout.

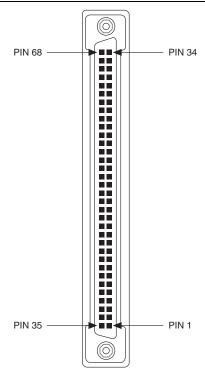
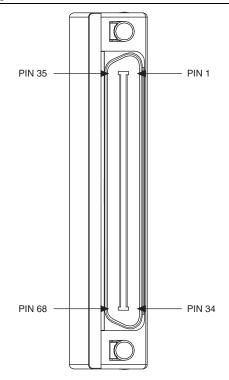


Figure 4. 68-Pin SCSI Connector Pin Locations



	68-Pin Connector Port							485	485 D-Sub 9	232	232 D-Sub 9
1	2	3	4	5	6	7	8	Signal	Connector	Signal	Connector
66	57	49	40	32	23	15	6	RXD-	5	DCD	1
68	59	51	42	34	25	17	8	CTS+	2	RXD	2
65	56	48	39	31	22	14	5	RTS+	3	TXD	3
64	55	47	38	30	21	13	4	RXD+	4	DTR	4
60	60	43	43	26	26	9	9	GND	1	GND	5
63	54	46	37	29	20	12	3	CTS-	6	DSR	6
62	53	45	36	28	19	11	2	RTS-	7	RTS	7
61	52	44	35	27	18	10	1	TXD+	8	CTS	8
67	58	50	41	33	24	16	7	TXD-	9	RI	9

Table 11. 68-Pin Connector Pin Descriptions

Cables and Accessories

The following serial cables and accessories are available from National Instruments. Refer to ni.com for more information.

Part Number	Description			
Adapter Cables (DB-9 and DB-25 connectors have jacksockets unless otherwise specified.)				
182844-01	DB-9 RS485 terminating pass-through connector 120 Ω			
182845-01	Serial cable, 10P10C modular plug to DB-9 male, 1 m			
182845-02	Serial cable, 10P10C modular plug to DB-9 male, 2 m			
182845-03	Serial cable, 10P10C modular plug to DB-9 male, 3 m			
182846-01	Serial cable, 10P10C modular plug to DB-25 male, 1 m			
184428-01	Serial cable, 10P10C modular plug to DB-9 male, 1 m, isolated			
199022-02	Serial cable, 10P10C to DB-9 male, jackscrews, 2 m			
197545-01	Serial cable, 68-pin VHDCI to eight DB-9 male, RS-232, 1 m			
197546-01	Serial cable, 68-pin VHDCI to eight DB-9 male, RS-485, 1 m			
Extension and	Extension and Null-Modem Cables (All cables have jackscrews.)			
182238-01	Serial cable, RS232 null modem, DB-9 female to DB-9 female, 1 m			
182238-02	Serial cable, RS232 null modem, DB-9 female to DB-9 female, 2 m			

Table 12. Serial Cables and Accessories

Table 12. Seria	Cables and	Accessories	(Continued)
-----------------	------------	-------------	-------------

Part Number	Description
182238-04	Serial cable, RS232 null modem, DB-9 female to DB-9 female, 4 m
183045-01	Serial cable, RS232 straight through, DB-9 female to DB-9 female, 1 m
183045-02	Serial cable, RS232 straight through, DB-9 female to DB-9 female, 2 m
183045-04	Serial cable, RS232 straight through, DB-9 female to DB-9 female, 4 m
183283-01	Serial cable, RS485/RS422 null modem, DB-9 female to DB-9 female, 1 m
183283-02	Serial cable, RS485/RS422 null modem, DB-9 female to DB-9 female, 2 m
183283-04	Serial cable, RS485/RS422 null modem, DB-9 female to DB-9 female, 4 m

RS-232, RS-422, and RS-485

RS-232, RS-422, and RS-485 Features

Feature	RS-232	RS-422	RS-485				
Type of transmission lines	Single ended	Differential	Differential				
Maximum number of drivers	1	1	32				
Maximum number of receivers	1	10	32				
Maximum cable length	2.5 nF equivalent	4,000 ft	4,000 ft				
Maximum CMV	±25 V	±7 V	+12 to -7 V				
Driver output*	5 to 25 V	2 to 6 V	1.5 to 6 V				
Driver load	<3 kΩ	100 Ω	60 Ω				
* Actual driver output varies depending	ng on cable length and loa	ıd.	* Actual driver output varies depending on cable length and load.				

Table 13. RS-232, RS-422, and RS-485 Features

RS-232 Loopback

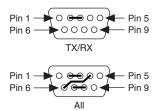
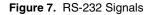
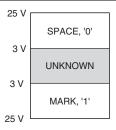


Figure 6. RS-232 Loopback

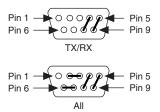
RS-232 Signals





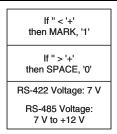
RS-485/422 Loopback





RS-485/422 Signals

Figure 9.	RS-485/422	Signals
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RS-485 Topologies

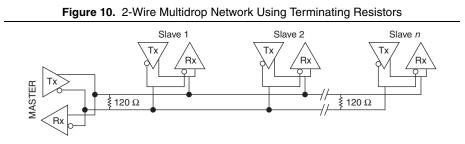
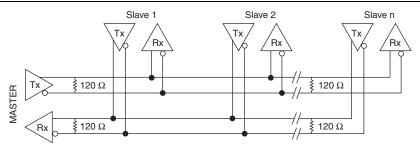


Figure 11. 4-Wire Full-Duplex Multidrop Network Using Terminating Resistors



The driver directly supports 4-wire full-duplex operation on peer-to-peer RS-485 networks. Multidrop RS-485 networks require additional software development.

RS-485 terminators are available at ni.com/serial.

RS-485 Transceiver Control

		2-Wire		
Enable	4-Wire	DTR/Echo	DTR/No Echo	Auto
TX	ON	DTR	DTR	TX
RX	ON	ON	DTR	TX

Table 14. RS-485 Tranceiver Control

The available modes might vary with the controller or interface used. For further information refer to ni.com/kb and search for KnowledgeBase **67KEP64G**.

UART Data Frame Example

0xD9-8 Data Bits, Odd Parity, 1 Stop Bit

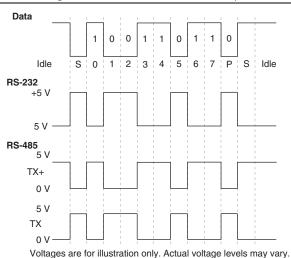


Figure 12. UART Data Frame Example

Hardware Specifications

NI 9870 RS-232 C-Series Module

C-Series modules are for use with the NI CompactRIO platform. For complete module and system specifications, refer to the *NI 9870 Operating Instructions and Specifications*.

Specifications

The following specifications are typical for the range -40 to 70 °C unless otherwise noted.

The NI 9870 supports arbitrary baud rates according to the following equation:

BaudRate = 3.6864 Mbps / (Prescaler * Divider)

Prescaler can be (4..65535).

Divider can be 1 or 4.

As long as the actual baud rate is within 2% of the desired baud rate, communication errors should not happen.



Note Cable capacitance greater than 250 pF may adversely affect the maximum baud rate and thermal dissipation.

Maximum RS232 Receive signal (RXD, CTS, DSR, DCD, RI) Continuous Voltage......±8 V



Note Continuous RS232 input voltages in excess of ± 8 V may cause excessive thermal dissipation.

Data line ESD protection (human body model).....±15 kV



Note Contact NI for Bellcore MTBF specifications at other temperatures or for MIL-HDBK-217F specifications.

Power Requirements

Power consumption from chassis

Active mode	0.5 W max
Sleep mode	$50 \ \mu W \ max$

Thermal dissipation (at 70 °C)	
Active mode	1.5 W max
Sleep mode	0.5 W max
Required external supply voltage range (V _{SUP})	+8 to +28 VDC
Power supply consumption from e	external supply V _{SUP}
Typical	0.5 W

JF		
Ma	num2	W

Physical Characteristics

If you need to clean the module, wipe it with a dry towel.

Weight	Approx.	154 g (5.4	oz)
--------	---------	------------	-----

Safety

Maximum Voltage¹

Connect only voltages that are within these limits.

RS232 Receive Signal-to-COM	
(RXD, CTS, DSR, DCD, RI)	±25 V max,
	Measurement Category I
RS232 Transmit Signal-to-COM	
(TX, RTS, DTR)	±13.2 V max,

	Measurement Category I
V _{SUP} -to-COM	±28 V max,
	Measurement Category I

Measurement Category I is for measurements performed on circuits not directly connected to the electrical distribution system referred to as *MAINS* voltage. MAINS is a hazardous live electrical supply system that powers equipment. This category is for measurements of voltages from specially protected secondary circuits. Such voltage measurements include signal levels, special equipment, limited-energy parts of equipment, circuits powered by regulated low-voltage sources, and electronics.



Caution Do *not* connect to signals or use for measurements within Measurement Categories II, III, or IV.

¹ The maximum voltage that can be applied or output without creating a safety hazard.

Isolation Voltages

Port-to-earth ground

Shock and Vibration

To meet these specifications, you must panel mount the CompactRIO system.

Operating vibration, sinusoidal (IEC 60068-2-6)5 g, 10 to 500 Hz

Environmental

CompactRIO modules are intended for indoor use only. For outdoor use, mount the CompactRIO system in a suitably rated enclosure. Refer to the installation instructions for the chassis you are using for more information about meeting these specifications.

Operating temperature	40 to 70 °C
Storage temperature	40 to 85 °C
Ingress protection	. IP 40
Operating humidity	. 10 to 90% RH, noncondensing
Storage humidity	. 5 to 95% RH, noncondensing
Maximum altitude	. 2,000 m
Pollution Degree (IEC 60664)	.2

NI 9871 RS-485 C-Series Module

C-Series modules are for use with the NI CompactRIO platform. For complete module and system specifications, refer to the *NI 9871 Operating Instructions and Specifications*.

Specifications

The following specifications are typical for the range -40 to 70 °C unless otherwise noted.

The NI 9871 supports arbitrary baud rates according to the following equation:

BaudRate = 3.6864 Mbps / (Prescaler * Divider)

Prescaler can be (4..65535).

Divider can be 1 or 4.

As long as the actual baud rate is within 2% of the desired baud rate, communication errors should not happen.

Maximum cable length 1.2 km (4,000 ft)

Data line ESD protection (human body model)...... ±15 kV

Note Contact NI for Bellcore MTBF specifications at other temperatures or for MIL-HDBK-217F specifications.

Power Requirements

Power consumption from chassis	
Active mode	0.5 W max
Sleep mode	50 µW max
Thermal dissipation (at 70 °C)	
Active mode	1.5 W max
Sleep mode	55 mW max
Required external supply	
voltage range (V _{SUP})	+8 to +28 VDC
Power supply consumption from exter	mal supply V _{SUP}
Typical	1 W
Maximum	3.5 W

Physical Characteristics

If you need to clean the module, wipe it with a dry towel.

Weight...... Approx. 153 g (5.4 oz)

Safety

Maximum Voltage¹

Connect only voltages that are within these limits.

RS485/RS422 Port-to-COM	
	Measurement Category I

V _{SUP} -to-COM	±28 V max,
	Measurement Category I

Measurement Category I is for measurements performed on circuits not directly connected to the electrical distribution system referred to as *MAINS* voltage. MAINS is a hazardous live electrical supply system that powers equipment. This category is for measurements of voltages from specially protected secondary circuits. Such voltage measurements include signal levels, special equipment, limited-energy parts of equipment, circuits powered by regulated low-voltage sources, and electronics.



Caution Do *not* connect to signals or use for measurements within Measurement Categories II, III, or IV.

Isolation Voltages

Port-to-earth ground

Withstand	$1000 V_{rms}$, verified by a 5 s dielectric
	withstand test
Continuous	. 60 VDC,
	Measurement Category I

Shock and Vibration

To meet these specifications, you must panel mount the CompactRIO system.

Operating vibration, random (IEC 60068-2-64)	5 g _{rms} , 10 to 500 Hz
Operating shock (IEC 60068-2-27)	. 30 g, 11 ms half sine, 50 g, 3 ms half sine, 18 shocks at 6 orientations
Operating vibration,	

sinusoidal (IEC 60068-2-6) 5 g, 10 to 500 Hz

¹ The maximum voltage that can be applied or output without creating a safety hazard.

Environmental

CompactRIO modules are intended for indoor use only. For outdoor use, mount the CompactRIO system in a suitably rated enclosure. Refer to the installation instructions for the chassis you are using for more information about meeting these specifications.

Operating temperature	40 to 70 °C
Storage temperature	40 to 85 °C
Ingress protection	IP 40
Operating humidity	10 to 90% RH, noncondensing
Storage humidity	5 to 95% RH, noncondensing
Maximum altitude	2,000 m
Pollution Degree (IEC 60664)	2

PCI Serial Hardware

This section describes the characteristics of the PCI serial hardware and the recommended operating conditions.

PCI-843x Series Hardware

PCI-8430/2 (RS-232) and PCI-8431/2 (RS-485/422)		
Dimensions	10.67 × 14.22 cm	
	(4.2 × 5.6 in.)	
I/O connector	.DB-9 male connector	
Power requirement (from PCI channel)		
PCI-8430/2		
+5 VDC	.325 mA typical	
	500 mA maximum	
PCI-8431/2		
+5 VDC	• •	
	700 mA maximum	
Weight		
PCI-8430/2	. 88 g	
PCI-8431/2	92 g	
Maximum baud rate		
PCI-8430/2	.1 Mbps	
PCI-8431/2	.3 Mbps	
Decide a second on the direct Court Other disc	4 - 41	

Boards support any baud rate from 2 baud up to the maximum.

PCI-8430/4 (RS-232) and PCI-8431/ Dimensions	, ,
I/O connector ¹	10-position modular jack (10P10C)
Power requirement (from PCI channel) PCI-8430/4	
+5 VDC	400 mA typical 600 mA maximum
PCI-8431/4	
+5 VDC	725 mA typical 1.1 A maximum
Weight	
PCI-8430/4	99 g
PCI-8431/4	102 g
Maximum baud rate	
PCI-8430/4	1 Mbps
PCI-8431/4	3 Mbps
Boards support any baud rate from 2 baud up	to the maximum.
PCI-8430/8 (RS-232) and PCI-8431/	8 (RS-485/422)
Dimensions	10.67 × 14.48 cm
	(4.2 × 5.7 in.)
I/O connector ²	68-pin, SCSI type connector
Power requirement (from PCI channel) PCI-8430/8	
+5 VDC	600 mA typical 900 mA maximum
PCI-8431/8	
+5 VDC	1.3 A typical 1.9 A maximum

¹ The four-port PCI serial boards require cables, included in your kit, to convert the 10-position modular jacks (10P10C) to DB-9 male connectors.

² The eight-port PCI serial boards require a cable, included in your kit, to convert the 68-pin connector to eight DB-9 connectors.

Weight Maximum baud rate PCI-8430/8.....1 Mbps Boards support any baud rate from 2 baud up to the maximum. PCI-8430/16 (RS-232) $(4.2 \times 6.9 \text{ in.})$ Power requirement (from PCI channel) PCI-8430/16 +5 VDC......935 mA typical 1.4 A maximum Maximum baud rate1 Mbps Boards support any baud rate from 2 baud up to the maximum. PCI-8432/2 (RS-232) and PCI-8433/2 (RS-485/422) $(4.2 \times 6.9 \text{ in.})$ Operating rated voltage (continuous) RS-232-25 V to +25 V RS-485-7 V to + 12 V Isolation voltages Port-to-port test Port-to-host

test

¹ The 16-port PCI serial boards require two cables, included in your kit, to convert the two 68-pin connectors to the 16 (2 × 8) DB-9 male connectors.

Power requirement (from PCI channel) PCI-8432/2	
+5 VDC	380 mA typical 570 mA maximum
PCI-8433/2	
+5 VDC	380 mA typical 570 mA maximum
Weight	
PCI-8432/2	102 g
PCI-8433/2	104 g
Maximum baud rate	
PCI-8432/2	1 Mbps
PCI-8433/2	3 Mbps
Boards support any baud rate from 2 baud up	to the maximum.
PCI-8432/4 (RS-232) and PCI-8433/4	4 (RS-485/422)
Dimensions	10.67 × 17.44 cm
	$(4.2 \times 6.9 \text{ in.})$
I/O connector ¹	10-position modular jack (10P10C)
Operating rated voltage (continuous)	
RS-232	25 V to +25 V
RS-485	7 V to + 12 V
Isolation voltages	
Port-to-port	
Continuous	
Withstand	$1.2000 V_{rms}$, verified by a 5 s dielectric withstand test
Port-to-host	
Continuous	
Withstand	2000 V_{rms} , verified by a 5 s dielectric withstand test
Power requirement (from PCI channel)	
PCI-8432/4	
+5 VDC	550 mA typical 815 mA maximum
PCI-8433/4	
+5 VDC	785 mA typical 1.2 A maximum

¹ The four-port PCI serial boards require cables, included in your kit, to convert the 10-position modular (10P10C) jacks to DB-9 male connectors.

Weight

PCI-8432/4	105 g
PCI-8433/4	106 g

Maximum baud rate

PCI-8432/4	.1 Mbps
PCI-8433/4	.3 Mbps

Boards support any baud rate from 2 baud up to the maximum.

Environmental Characteristics (for All PCI Interfaces)

Operating Environment

Ambient temperature	0 to 55 °C (Tested in accordance with IEC-60068-2-1 and IEC-60068-2-2.)
Relative humidity	10 to 90%, noncondensing (Tested in accordance with IEC-60068-2-56.)
Altitude (maximum)	2,000 m
Pollution Degree	2
Indoor use only.	
Storage Environment	
Ambient temperature	20 to 70 °C (Tested in accordance with IEC-60068-2-1 and IEC-60068-2-2.)
Relative humidity	5 to 95%, noncondensing (Tested in accordance with IEC-60068-2-56.)
Other Specifications (for All DC	(Intorfacea)

Other Specifications (for All PCI Interfaces)

Maximum cable length

RS-485 ¹	
RS-232	
Data line ESD protection (l	numan body model)
RS-485	±15 kV
RS-232	±15 kV
_	



Note This equipment is intended for indoor use only.

¹ RS-485 is capable of 1.2 km (4,000 ft) without surge limitation.

Safety

This product meets the requirements of the following standards of safety for electrical equipment for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 61010-1, CSA 61010-1



Note For UL and other safety certifications, refer to the product label or the *Online Product Certification* section.

Electromagnetic Compatibility

This product meets the requirements of the following EMC standards for electrical equipment for measurement, control, and laboratory use:

- EN 61326 (IEC 61326): Class A emissions; Basic immunity
- EN 55011 (CISPR 11): Group 1, Class A emissions
- AS/NZS CISPR 11: Group 1, Class A emissions
- FCC 47 CFR Part 15B: Class A emissions
- ICES-001: Class A emissions



Note For the standards applied to assess the EMC of this product, refer to the *Online Product Certification* section.



Note For EMC compliance, operate this device with shielded cabling.

CE Compliance $\mathbf{C} \in \mathbf{C}$

This product meets the essential requirements of applicable European Directives as follows:

- 2006/95/EC; Low-Voltage Directive (safety)
- 2004/108/EC; Electromagnetic Compatibility Directive (EMC)

Online Product Certification

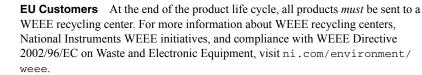
Refer to the product Declaration of Conformity (DoC) for additional regulatory compliance information. To obtain product certifications and the DoC for this product, visit ni.com/certification, search by model number or product line, and click the appropriate link in the Certification column.

Environmental Management

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For additional environmental information, refer to the *Minimize Our Environmental Impact* web page at ni.com/environment. This page contains the environmental regulations and directives with which NI complies, as well as other environmental information not included in this document.

Waste Electrical and Electronic Equipment (WEEE)



电子信息产品污染控制管理办法 (中国 RoHS)

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PCI Express Serial Hardware

(e) (40)

This section describes the characteristics of the PCI Express serial hardware and the recommended operating conditions.

NI PCIe-843x Series Hardware

NI PCIe-8430/8 (RS-232) and NI PCI	e-8431/8 (RS-485/422)
Dimensions	11.12 × 17.53 cm (4.38 × 6.9 in.)
I/O connectors	
NI PCIe-8430/8	
RS-232 ¹	68-pin VHDCI
PCI Express	x1
NI PCIe-8431/8	
RS-485 ¹	68-pin VHDCI
PCI Express	x1
Power requirement (from PCI Express channel	el)
NI PCIe-8430/8	
+3.3 VDC	200 mA typical
	750 mA maximum
+3.3 VDC +12 VDC	750 mA maximum 190 mA typical
	750 mA maximum
	750 mA maximum 190 mA typical
+12 VDC NI PCIe-8431/8 +3.3 VDC ²	750 mA maximum 190 mA typical 220 mA maximum 700 mA typical, 1.5 A maximum
+12 VDC NI PCIe-8431/8	750 mA maximum 190 mA typical 220 mA maximum 700 mA typical, 1.5 A maximum

¹ The 8-port PCI Express serial boards require a cable, included in your kit, to convert the 68-pin connector to eight DB-9 male connectors.

 $^{^2}$ These values are based on the assumption that all 16 ports (for the NI PCIe-8431/16) or 8 ports (for the NI PCIe-8431/8) are using a 620 Ω bias resistor and NI-offered terminators installed on both ends of the cable.

Weight

NI PCIe-8430/8	. 88	g
NI PCIe-8431/8	. 90	g

Maximum baud rate

NI PCIe-8430/8	1	Mbps
NI PCIe-8431/8	3	Mbps

Boards support any baud rate from 2 baud up to the maximum.

NI PCIe-8430/16 (RS-232) and NI PCIe-8431/16 (RS-485/422)

	(, , , , , , , , , , , , , , , , , , ,
Dimensions	
I/O connectors	
NI PCIe-8430/16	
RS-232 ¹	
PCI Express	x1
NI PCIe-8431/16	
RS-485 ¹	
PCI Express	x1
Power requirement (from PCI Expr	ess channel)
NI PCIe-8430/16	
+3.3 VDC	
+12 VDC	
	250 mA maximum
NI PCIe-8431/16	
	1.4 A typical, 3 A maximum
+12 VDC	
	250 mA maximum
Weight	
NI PCIe-8430/16	
NI PCIe-8431/16	101 g
Maximum baud rate	
NI PCIe-8430/16	
NI PCIe-8431/16	3 Mbps

Boards support any baud from 2 baud up to the maximum.

¹ The 16-port PCI Express serial boards require two cables, included in your kit, to convert the two 68-pin connectors to the 16 (2×8) DB-9 male connectors.

 $^{^2}$ These values are based on the assumption that all 16 ports (for the NI PCIe-8431/16) or 8 ports (for the NI PCIe-8431/8) are using a 620 Ω bias resistor and NI-offered terminators installed on both ends of the cable.

NI PCIe-8432/2 (RS-232) and NI PCIe-8433/2 (RS-485/422)		
Dimensions	11.12 × 16.67 cm (4.38 × 6.6 in.)	
I/O connectors		
NI PCIe-8432/2	DB-9 male connector	
NI PCIe-8433/2	DB-9 male connector	
Operating rated voltage (continuous)		
RS-232	25 V to +25 V	
RS-485	7 V to +12 V	
Isolation voltages		
Port-to-port		
Continuous	60 VDC (CAT I)	
Withstand	$\dots 2000 V_{rms}$, verified by a 5 s dielectric withstand test	
Port-to-host		
Continuous		
Withstand	$\dots 2000 V_{rms}$, verified by a 5 s dielectric withstand test	
Power requirement (from PCI Express channel)	nel)	
NI PCIe-8432/2		
+12 VDC		
	160 mA maximum	
+3.3 VDC	650 mA typical 650 mA maximum	
NI PCIe-8433/2		
+12 VDC	140 mA typical	
	240 mA maximum	
+3.3 VDC	21	
	660 mA maximum	
Weight		
NI PCIe-8432/2	U	
NI PCIe-8433/2	90.7 g	
Maximum serial transfer rate		
RS-232		
RS-485		

Environmental Characteristics (for All PCI Express Interfaces)

Operating Environment	
Ambient temperature	0 to 55 °C (Tested in accordance with IEC-60068-2-1 and IEC-60068-2-2.)
Relative humidity	10 to 90%, noncondensing (Tested in accordance with IEC-60068-2-56.)
Altitude (maximum)	2,000 m
Indoor use only.	
Storage Environment	
Ambient temperature	20 to 70 °C
·	(Tested in accordance with IEC-60068-2-1 and IEC-60068-2-2.)
Relative humidity	5 to 95%, noncondensing (Tested in accordance with IEC-60068-2-56.)

Other Specifications (for All PCI Express Interfaces)

	•
Maximum cable length	
RS-485 ¹	30 m (limited by EMC/surge)
RS-232	2,500 pF equivalent (TIA-EIA-232-F 2.1.4)
Data line ESD protection (human body mode	l)
RS-485	±15 kV
RS-232	±15 kV
Baud rate accuracy	
RS-232	Within 0.015% for standard baud rate
	Within 0.5% for nonstandard baud rate
RS-485	Within 0.015% for standard baud rate
	Within 0.5% for nonstandard baud rate below
	1 Mbps
	Within 1.3% for nonstandard baud rate between
	1 Mbps and 3 Mbps



Note This equipment is intended for indoor use only.

Safety

This product meets the requirements of the following standards of safety for electrical equipment for measurement, control, and laboratory use:

• IEC 61010-1, EN 61010-1

¹ RS-485 is capable of 1.2 km (4,000 ft) without surge limitation.

• UL 61010-1, CSA 61010-1



Note For UL and other safety certifications, refer to the product label or the *Online Product Certification* section.

Electromagnetic Compatibility

This product meets the requirements of the following EMC standards for electrical equipment for measurement, control, and laboratory use:

- EN 61326 (IEC 61326): Class A emissions; Basic immunity
- EN 55011 (CISPR 11): Group 1, Class A emissions
- AS/NZS CISPR 11: Group 1, Class A emissions
- FCC 47 CFR Part 15B: Class A emissions
- ICES-001: Class A emissions



Note For the standards applied to assess the EMC of this product, refer to the *Online Product Certification* section.



Note For EMC compliance, operate this device with shielded cabling.

CE Compliance $\mathbf{C} \in \mathbf{C}$

This product meets the essential requirements of applicable European Directives as follows:

- 2006/95/EC; Low-Voltage Directive (safety)
- 2004/108/EC; Electromagnetic Compatibility Directive (EMC)

Online Product Certification

Refer to the product Declaration of Conformity (DoC) for additional regulatory compliance information. To obtain product certifications and the DoC for this product, visit ni.com/certification, search by model number or product line, and click the appropriate link in the Certification column.

Environmental Management

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Waste Electrical and Electronic Equipment (WEEE)



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电子信息产品污染控制管理办法 (中国 RoHS)

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PXI Serial Hardware

This section describes the characteristics of the PXI serial hardware and the recommended operating conditions.

PXI-843x Serial Hardware

PXI-8430/2 (RS-232) and PXI-8431/2	(RS-485/422)
Dimensions	. 100 × 160 mm (3.94 × 6.37 in.)
I/O connector	. DB-9 male connector
Power requirement (from PXI channel) PXI-8430/2	
+5 VDC	. 325 mA typical 500 mA maximum
PXI-8431/2	
+5 VDC	. 500 mA typical 750 mA maximum
Weight	
PXI-8430/2	. 134 g
PXI-8431/2	. 134 g
Maximum baud rate	
PXI-8430/2	. 1 Mbps
PXI-8431/2	. 3 Mbps
Development of the local Grand Street	

Boards support any baud rate from 2 baud up to the maximum.

PXI-8430/4 (RS-232) and PXI-8431/4 Dimensions	100 × 160 mm
	(3.94 × 6.37 in.)
I/O connector ¹	10-position modular jack (10P10C)
Power requirement (from PXI channel)	
PXI-8430/4	
+5 VDC	400 mA typical 600 mA maximum
PXI-8431/4	
+5 VDC	725 mA typical
	1.1 A maximum
Weight	
PXI-8430/4	137 g
PXI-8431/4	140 g
Maximum baud rate	
PXI-8430/4	1 Mbps
PXI-8431/4	3 Mbps
Boards support any baud rate from 2 baud up	to the maximum.
PXI-8430/8 (RS-232) and PXI-8431/8	3 (RS-485/422)
Dimensions	100 × 160 mm
	(3.94 × 6.37 in.), 3U
I/O connector ²	68-pin SCSI (68-pin SCSI to eight DB-9 male connector adapter cable included)
Power requirement (from PXI channel)	
PXI-8430/8	
+5 VDC	1 A typical 1.5 A maximum
PXI-8431/8	1.5 T maximum
+5 VDC	
	1.4 A maximum
Weight	
PXI-8430/8	135 g
PXI-8431/8	137 g

¹ The four-port PXI serial boards require cables, included in your kit, to convert the 10-position modular jacks (10P10C) to DB-9 male connectors.

² The eight-port PXI serial boards require a cable, included in your kit, to convert the 68-pin connector to eight DB-9 connectors.

Shock and vibration		
Operational shock	. 30 g peak, half-sine, 11 ms pulse (Tested in accordance with IEC-60068-2-27. Test profile developed in accordance with	
	MIL-PRF-28800F.)	
Maximum baud rate		
PXI-8430/8	. 1 Mbps	
PXI-8431/8	. 3 Mbps	
Boards support any baud rate from 2 baud up to the maximum.		
PXI-8430/16 (RS-232)		
Dimensions	. 100 × 160 mm	
	(3.94 × 6.37 in.), 3U	
I/O connector ¹	. 68-pin VHDCI × 2	
Power requirement (from PXI channel)		
PXI-8430/16		
+5 VDC	51	
	1.4 A maximum	
Weight	. 157 g	
Maximum baud rate	. 1 Mbps	
Boards support any baud rate from 2 baud up	to the maximum.	
PXI-8432/2 (RS-232) and PXI-8433/2	(RS-485/422)	
Dimensions	. 100 × 160 mm	
	(3.94 × 6.37 in.), 3U	
I/O connector	. DB-9 male connector × 2	
Operating rated voltage (continuous)		
RS-232		
RS-485	7 V to + 12 V	
Isolation voltages		
Port-to-port		
Continuous		
Withstand	. 2000 V_{rms} , verified by a 5 s dielectric withstand test	

¹ The 16-port PXI serial boards require two cables, included in your kit, to convert the two 68-pin connectors to the 16 (2 × 8) DB-9 male connectors.

Port-to-host		
Continuous		
Withstand	$2000 V_{rms}$, verified by a 5 s dielectric withstand test	
Power requirement (from PXI channel) PXI-8432/2		
+5 VDC	725 mA typical 1 A maximum	
PXI-8433/2		
+5 VDC	725 mA typical 1 A maximum	
Weight		
PXI-8432/2	125 g	
PXI-8433/2	125 g	
Shock and vibration		
Operational shock	30 g peak, half-sine, 11 ms pulse (Tested in accordance with IEC-60068-2-27. Test profile developed in accordance with MIL-PRF-28800F.)	
Random vibration		
Operating	5 to 500 Hz, 0.3 g _{rms}	
Nonoperating	5 to 500 Hz, 2.4 g _{rms} (Tested in accordance with IEC-60068-2-64. Nonoperating test profile exceeds the requirements of MIL-PRF-28800F, Class 3.)	
Maximum baud rate		
PXI-8432/2	1	
PXI-8433/2	3 Mbps	
Boards support any baud rate from 2 baud up to the maximum.		
PXI-8432/4 (RS-232) and PXI-8433/4	4 (RS-485/422)	
Dimensions		
	(3.94 × 6.37 in.), 3U	
I/O connector ¹	10-position modular jack (10P10C)	
Operating rated voltage (continuous)		
RS-232	25 V to +25 V	
RS-485	-7 V to + 12 V	

¹ The four-port PXI serial boards require cables, included in your kit, to convert the 10-position modular jacks (10P10C) to DB-9 male connectors.

Isolation voltages		
Port-to-port		
Continuous	60 VDC (CAT I)	
Withstand	2000 V _{rms} , verified by a 5 s dielectric withstand test	
Port-to-host		
Continuous	60 VDC (CAT I)	
Withstand	2000 V_{rms} , verified by a 5 s dielectric withstand test	
Power requirement (from PXI channel)		
PXI-8432/4		
+5 VDC	925 mA typical	
	2 A maximum	
PXI-8433/4		
+5 VDC		
	2 A maximum	
Weight		
PXI-8432/4	147 g	
PXI-8433/4	147 g	
Maximum baud rate		
PXI-8432/4	1 Mbps	
PXI-8433/4	3 Mbps	
Boards support any baud rate from 2 baud up to the maximum.		
Environmental Characteristics	(for All PXI Interfaces)	

Operating Environment

Ambient temperature	0 to 55 °C (Tested in accordance with IEC-60068-2-1 and IEC-60068-2-2.)
Relative humidity	10 to 90%, noncondensing (Tested in accordance with IEC-60068-2-56.)
Altitude (maximum)	2,000 m
Pollution Degree	2
Indoor use only.	
Storage Environment	
Ambient temperature	20 to 70 °C (Tested in accordance with IEC-60068-2-1 and IEC-60068-2-2.)

Other Specifications (for All PXI Interfaces)

Maximum cable length

RS-485 ¹	30 m (limited by EMC/surge)
RS-232	2,500 pF equivalent (TIA-EIA-232-F 2.1.4)

Data line ESD protection (human body model)

RS-485	$\pm 15 \text{ kV}$
RS-232	±15 kV

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Note This equipment is intended for indoor use only.

Safety

This product meets the requirements of the following standards of safety for electrical equipment for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 61010-1, CSA 61010-1



Note For UL and other safety certifications, refer to the product label or the *Online Product Certification* section.

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This product meets the requirements of the following EMC standards for electrical equipment for measurement, control, and laboratory use:

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- AS/NZS CISPR 11: Group 1, Class A emissions
- FCC 47 CFR Part 15B: Class A emissions
- ICES-001: Class A emissions



Note For the standards applied to assess the EMC of this product, refer to the *Online Product Certification* section.



Note For EMC compliance, operate this device with shielded cabling.

CE Compliance

This product meets the essential requirements of applicable European Directives as follows:

- 2006/95/EC; Low-Voltage Directive (safety)
- 2004/108/EC; Electromagnetic Compatibility Directive (EMC)

 $^{^{1}}$ RS-485 is capable of 1.2 km (4,000 ft) without surge limitation.

Online Product Certification

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PXI Express Serial Hardware

This section describes the characteristics of the PXI Express serial hardware and the recommended operating conditions.

NI PXIe-843x Serial Hardware

NI PXIe-8430/8 (RS-232) and NI PXIe-8431/8 (RS-485/422)

Power requirement (from PXI Express channel)

NI PXIe-8430/8

¹ The eight-port PXI Express serial boards require a cable, included in your kit, to convert the 68-pin connector to eight DB-9 connectors.

	250 mA maximum
+3.3 VDC	200 mA typical
	750 mA maximum
NI PXIe-8431/8	
+12 VDC	
	240 mA maximum
+3.3 VDC ¹	
	1.5 A maximum
Weight	
NI PXIe-8430/8	- 0
NI PXIe-8431/8	143 g
Maximum baud rate	
NI PXIe-8430/8	1 Mbps
NI PXIe-8431/8	3 Mbps ²
Boards support any baud rate from 2 baud up	to the maximum.
Baud rate accuracy	
NI PXIe-8430/8	Within 0.015% for standard baud rate
	Within 0.5% for nonstandard baud rate
NI PXIe-8431/8	
	Within 0.5% for nonstandard baud rate below
	1 Mbps Within 1.3% for nonstandard baud rate between
	1 Mbps and 3 Mbps
NI PXIe-8430/16 (RS-232) and NI PX	(le-8431/16 (RS-485/422)
Dimensions	100 × 160 mm
	(3.94 × 6.37 in.), 3U
I/O connector ³	68-pin VHDCI × 2
Power requirement (from PXI Express channel	el)
NI PXIe-8430/16	·
+12 VDC	250 mA typical
	270 mA maximum

² For possible use with higher baud rates, refer to ni.com/kb and search for KnowledgeBase's KB58KE182F.

¹ These values are based on the assumption that all 16 ports (for the NI PXIe-8431/16) or 8 ports (for the NI PXIe-8431/8) are using a 620 Ω bias resistor and NI-offered terminators installed on both ends of the cable.

³ The 16-port PXI Express serial boards require two cables, included in your kit, to convert the two 68-pin connectors to the 16 (2 × 8) DB-9 male connectors.

NI PXIe-8431/16	
+12 VDC	250 mA typical
	280 mA maximum
+3.3 VDC ¹	1.4 A typical
	3 A maximum
Weight	
NI PXIe-8430/16	152 g
NI PXIe-8431/16	155 g
Maximum baud rate	
NI PXIe-8430/16	1 Mbps
NI PXIe-8431/16	3 Mbps ²
Boards support any baud rate from 2 baud up	to the maximum.
Baud rate accuracy	
NI PXIe-8430/16	Within 0.015% for standard baud rate
	Within 0.5% for nonstandard baud rate
NI PXIe-8431/16	Within 0.015% for standard baud rate
	Within 0.5% for nonstandard baud rate below
	1 M
	Within 1.3% for nonstandard baud rate between
	1 M and 3 M

Environmental Characteristics (for All PXI Express Interfaces)

Operating Environment

Ambient temperature	0 to 55 °C (Tested in accordance with IEC-60068-2-1 and IEC-60068-2-2. Meets MIL-PRF-28800F Class 3 low temperature limit and MIL-PRF-28800F Class 2 high temperature limit.)
Relative humidity	10 to 90%, noncondensing (Tested in accordance with IEC-60068-2-56.)
Altitude (maximum)	2,000 m
Pollution degree	2
Indoor use only.	

 $^{^1}$ These values are based on the assumption that all 16 ports (for the NI PXIe-8431/16) or 8 ports (for the NI PXIe-8431/8) are using a 620 Ω bias resistor and NI-offered terminators installed on both ends of the cable.

² For possible use with higher baud rates, refer to ni.com/kb and search for KnowledgeBase **KB58KE182F**.

Storage Environment

Ambient temperature	40 to 71 °C
	(Tested in accordance with IEC-60068-2-1 and IEC-60068-2-2. Meets MIL-PRF-28800F
	Class 3 limits.)
Relative humidity	.5 to 95%, noncondensing (Tested in accordance with IEC-60068-2-56.)

Other Specifications (for All PXI Express Interfaces)

Maximum cable length	
RS-485 ¹	30 m (limited by EMC/surge)
RS-232	2,500 pF equivalent (TIA-EIA-232-F 2.1.4)
Data line ESD protection (human body model	l)
RS-485	±15 kV
RS-232	±15 kV
Shock and vibration	
Operational shock	30 g peak, half-sine, 11 ms pulse (Tested in accordance with IEC-60068-2-27. Meets MIL-PRF-28800F Class 2 limits.)
Random vibration	
Operating	5 to 500 Hz, 0.3 g _{rms}
Nonoperating	5 to 500 Hz, 2.4 g _{rms} (Tested in accordance with IEC-60068-2-64. Nonoperating test profile exceeds the requirements of MIL-PRF-28800F, Class 3.)



Note This equipment is intended for indoor use only.

Safety

This product meets the requirements of the following standards of safety for electrical equipment for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 61010-1, CSA 61010-1



Note For UL and other safety certifications, refer to the product label or the *Online Product Certification* section.

Electromagnetic Compatibility

This product meets the requirements of the following EMC standards for electrical equipment for measurement, control, and laboratory use:

¹ RS-485 is capable of 1.2 km (4,000 ft) without surge limitation.

- EN 61326 (IEC 61326): Class A emissions; Basic immunity
- EN 55011 (CISPR 11): Group 1, Class A emissions
- AS/NZS CISPR 11: Group 1, Class A emissions
- FCC 47 CFR Part 15B: Class A emissions
- ICES-001: Class A emissions



Note For the standards applied to assess the EMC of this product, refer to the *Online Product Certification* section.



Note For EMC compliance, operate this device with shielded cabling.

CE Compliance (E

This product meets the essential requirements of applicable European Directives as follows:

- 2006/95/EC; Low-Voltage Directive (safety)
- 2004/108/EC; Electromagnetic Compatibility Directive (EMC)

Online Product Certification

Refer to the product Declaration of Conformity (DoC) for additional regulatory compliance information. To obtain product certifications and the DoC for this product, visit ni.com/certification, search by model number or product line, and click the appropriate link in the Certification column.

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Waste Electrical and Electronic Equipment (WEEE)



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USB Serial Hardware

This section describes the characteristics of the USB serial hardware and the recommended operating conditions.

USB-232 (RS-232) and USB-485 (RS-485/422)

· · · · · ·	. ,
Dimensions	$3.81 \times 3.56 \times 1.52$ cm
	$(1.5 \times 1.4 \times 0.6 \text{ in.})$
Case material	PVC
Weight	
USB-232	121 g (0.27 lb)
USB-485	118 g (0.26 lb)
I/O connector	DB-9 male connector
USB connector	Captive cable with USB series A plug
Power requirement (from USB channel) USB-485	
+5 VDC	175 mA typical 500 mA maximum
USB-232	
+5 VDC	80 mA typical 100 mA maximum
Maximum baud rate	
USB-232	230.4 kbps
USB-485	460.8 kbps
Boards support standard baud rates below the	maximum.
USB-232/2, USB-232/4 (USB-2 (RS-485/422)	232), USB-485/2, and USB-485/4
Dimensions	21.08 × 12.45 × 3.56 cm
	(8.3 × 4.9 × 1.4 in.)
Case material	Hard plastic with metal baseplate
Weight	375 g (0.83 lb)
I/O connector	DB-9 male connector
USB connector	USB series B
Power requirement (from USB channel) USB-485/2	
+5 VDC	300 mA typical
	500 mA maximum
LISB-232/2	

USB-232/2

+5 VDC	200 mA typical
	500 mA maximum
USB-232/4	
+5 VDC	300 mA typical
	500 mA maximum
Power requirement (from external supply)	
USB-485/4 (9 V-30 V)	
+12 VDC (typical)	225 mA typical
	500 mA maximum
Maximum baud rate	
USB-232/2 and USB-232/4	230.4 kbps
USB-485/2 and USB-485/4	460.8 kbps
Boards support standard baud rates below the	naximum.

Environmental Characteristics (for All USB Interfaces)

Operating Environment

Ambient temperature	0 to 70 °C (Tested in accordance with IEC-60068-2-1 and IEC-60068-2-2.)
Relative humidity	10 to 90%, noncondensing (Tested in accordance with IEC-60068-2-56.)
Altitude (maximum)	2,000 m
Pollution Degree	2
Indoor use only.	
Storage Environment Ambient temperature	
One port	40 to 80 °C (Tested in accordance with IEC-60068-2-1 and IEC-60068-2-2.)
Two and four port	40 to 85 °C (Tested in accordance with IEC-60068-2-1 and IEC-60068-2-2.)
Relative humidity	5 to 95%, noncondensing (Tested in accordance with IEC-60068-2-56.)

Other Specifications (for All USB Interfaces)

Maximum cable length

RS-485 ¹	. 30 m (limited by EMC/surge)
RS-232	.2,500 pF equivalent (TIA-EIA-232-F 2.1.4)

Data line ESD protection (human body model)

RS-485	±15 kV
RS-232	±15 kV



Note This equipment is intended for indoor use only.

Safety

This product meets the requirements of the following standards of safety for electrical equipment for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 61010-1, CSA 61010-1



Note For UL and other safety certifications, refer to the product label or the *Online Product Certification* section.

Electromagnetic Compatibility

This product meets the requirements of the following EMC standards for electrical equipment for measurement, control, and laboratory use:

- EN 61326 (IEC 61326): Class A emissions; Basic immunity
- EN 55011 (CISPR 11): Group 1, Class A emissions
- AS/NZS CISPR 11: Group 1, Class A emissions
- FCC 47 CFR Part 15B: Class A emissions
- ICES-001: Class A emissions



Note For the standards applied to assess the EMC of this product, refer to the *Online Product Certification* section.



Note For EMC compliance, operate this device with shielded cabling.

CE Compliance $\zeta \in$

This product meets the essential requirements of applicable European Directives as follows:

- 2006/95/EC; Low-Voltage Directive (safety)
- 2004/108/EC; Electromagnetic Compatibility Directive (EMC)

Online Product Certification

Refer to the product Declaration of Conformity (DoC) for additional regulatory compliance information. To obtain product certifications and the DoC for this product, visit ni.com/certification, search by model number or product line, and click the appropriate link in the Certification column.

¹ RS-485 is capable of 1.2 km (4,000 ft) without surge limitation.

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Waste Electrical and Electronic Equipment (WEEE)



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ExpressCard Serial Hardware

This section describes the characteristics of the ExpressCard serial hardware, along with the recommended operating conditions.

NI ExpressCard-8420/2 (RS-232) and NI ExpressCard-8421/2 (RS-485/422)

Dimensions	$.34 \times 75 \times 5 \text{ mm}$ (1.34 × 2.95 × 0.2 in.)
Weight	(1.51 2.55 0.2 11.)
NI ExpressCard-8420/2	. 16 g (0.5 oz)
NI ExpressCard-8421/2	. 17 g (0.6 oz)
Connectors	
I/O connector	. 26-position latching connector with 20 cm breakout cable to two DB-9 male connectors
ExpressCard	. ExpressCard/34 standard connector interface
Power requirements (from ExpressCard USB interface)	
Voltage	.+3.3 VDC ± 10%
NI ExpressCard-8420/2	
+3.3 VDC	. 100 mA typical

	250 mA maximum	
NI ExpressCard-8421/2 +3.3 VDC	160 mA typical 260 mA maximum	
Shock and Vibration		
Nonoperating shock	50 g, 11 ms (Tested in accordance with IEC-60068-2-27.)	
Nonoperating vibration, sinusoidal Nonoperating drop test	(Tested in accordance with IEC-60068-2-6.) 2 drops in 3 mutually exclusive axes from 75 cm	
	onto no-cushioning vinyl tile surface	
Environmental Characteristics		
Altitude (maximum)	2,000 m (at 25 °C ambient temperature)	
Pollution Degree	2	
Indoor use only.		
-		
Operating Environment		
Ambient temperature	0 to 65 °C (Tested in accordance with IEC-60068-2-1 and IEC-60068-2-2.)	
Relative humidity	5 to 95%, noncondensing (Tested in accordance with IEC-60068-2-56.)	
Hot Surface Be careful when removing ExpressCards. Recently used ExpressCards may exceed safe handling temperatures.		
Storage Environment		
Ambient temperature	20 to 65 °C (Tested in accordance with IEC-60068-2-1 and IEC-60068-2-2.)	
Nonoperating thermal shock	20 to 65 °C, 5 shocks	
Other Specifications Maximum cable length		
RS-485 ¹	30 m (limited by EMC/surge) 2,500 pF equivalent (TIA-EIA-232-F 2.1.4)	
Data line ESD protection (human body model		
RS-485±15 kV		
¹ RS-485 is capable of 1.2 km (4,000 ft) without surge limitation.		

RS-232.....±15 kV

Maximum baud rate

NI ExpressCard-8420/2	230.4 kbps
NI ExpressCard-8421/2	

Boards support standard baud rates below the maximum.



Note This equipment is intended for indoor use only.

Safety

This product meets the requirements of the following standards of safety for electrical equipment for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 61010-1, CSA 61010-1



Note For UL and other safety certifications, refer to the product label or the *Online Product Certification* section.

Electromagnetic Compatibility

This product meets the requirements of the following EMC standards for electrical equipment for measurement, control, and laboratory use:

- EN 61326 (IEC 61326): Class A emissions; Basic immunity
- EN 55011 (CISPR 11): Group 1, Class A emissions
- AS/NZS CISPR 11: Group 1, Class A emissions
- FCC 47 CFR Part 15B: Class A emissions
- ICES-001: Class A emissions



Note For the standards applied to assess the EMC of this product, refer to the *Online Product Certification* section.



Note For EMC compliance, operate this device with shielded cabling.

CE Compliance $\mathbf{C} \in \mathbf{C}$

This product meets the essential requirements of applicable European Directives as follows:

- 2006/95/EC; Low-Voltage Directive (safety)
- 2004/108/EC; Electromagnetic Compatibility Directive (EMC)

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