

High-Performance Real-Time Embedded Controllers for PXI

NI PXI-8195 RT, NI PXI-8196 RT *NEW!*

- Execution target for NI LabVIEW Real-Time applications
- Reliable and deterministic operation
- Ethernet control of PXI
- 57 kHz single PID loop rate, maximum

Development System Requirements

- LabVIEW for Windows
- LabVIEW Real-Time Module for Windows

Deployment Software (included)

- LabVIEW Real-Time embedded software



Overview

National Instruments RT Series PXI embedded controllers deliver a flexible, rugged platform for your deterministic, real-time measurement and control applications. The NI PXI-8196 RT and NI PXI-8195 RT controllers offer a high-performance platform, ideal for real-time test and control applications. You develop your LabVIEW application with the National Instruments LabVIEW Real-Time Module on Windows and download the program to your RT Series PXI embedded controller via Ethernet. The embedded code executes on a real-time OS. Thus, you use the powerful and flexible development tools of LabVIEW to build reliable, real-time solutions.

LabVIEW Real-Time applications running on PXI systems achieve microsecond loop rates with only 3 to 4 ns of system jitter. These real-time measurement and control systems capitalize on Intel processors coupled with the advanced timing, triggering, and I/O synchronization benefits of PXI. Furthermore, NI measurement services software extends the timing capabilities of PXI to deliver tight integration with LabVIEW Real-Time applications through operations such as hardware-timed software loops.

Connect to Any I/O

The modularity of PXI and open development environment of LabVIEW make it easy to integrate a variety of I/O within your application. Create a custom real-time embedded solution using an RT Series PXI embedded controller with any number and combination of PXI/CompactPCI plug-in modules.

Built-in LabVIEW libraries help you create applications with data acquisition, dynamic signal acquisition, motion control, image acquisition, and reconfigurable I/O. Communicate with peripheral devices through CAN, GPIB, Ethernet, or serial protocols. Use NI-VISA to integrate third-party PXI/CompactPCI modules in your application.

In addition, the RT Series PXI embedded controllers include an external SMB connection for use as a trigger input, output, or watchdog timer. Use the external SMB to pass trigger and timing signals into and out of the PXI trigger bus in your PXI system.

Create Reliable Stand-Alone Systems

To ensure reliable operation, embedded LabVIEW applications continue to run even if the host PC is interrupted or rebooted. Because RT Series PXI embedded controllers run in a separate chassis with a dedicated power supply, the operator can shut down the host computer entirely without disrupting the real-time program.

For stand-alone operation, you can permanently embed code in the system so it starts automatically when the system boots, requiring no human interaction. Use the LabVIEW Professional Development System and LabVIEW Real-Time Module to compile your LabVIEW application to an executable and download it to your RT Series PXI embedded controller.

Model	PXI-8196 RT	PXI-8195 RT
Processor	2.0 GHz Pentium M 760	1.5 GHz Celeron M 370
RAM, standard	512 MB	256 MB
RAM, maximum	2 GB	2 GB
Storage, hard drive	40 GB ¹	40 GB
Storage, solid-state	— ²	— ²
GPIB interface	✓	—
Ethernet port	10/100/1000BaseTX	10/100/1000BaseTX
Serial port	✓	✓
Built-in μ s hardware timing	✓	✓
Watchdog/trigger SMB	✓	✓

¹30 GB for PXI-8196 RT Extended Temperature version. ²Optional 128 or 512 MB solid-state drive can replace the hard drive.

Table 1. PXI RT Series Controller Selection Guide

High-Performance Real-Time Embedded Controllers for PXI

Dual-Boot Option

You can configure NI PXI embedded controllers to boot into Windows or the real-time OS. NI Measurement & Automation Explorer includes features for installing and configuring PXI embedded controllers as LabVIEW Real-Time targets. The controllers use a hardware switch or BIOS setting to boot into the desired OS.

The result is a PXI controller that can run embedded LabVIEW Real-Time or Windows applications. When the controller is in real-time mode, you need another Windows computer to develop and debug the LabVIEW Real-Time code for the PXI controller. To enable a Windows PXI embedded controller to dual-boot with the real-time OS, you must purchase the LabVIEW Real-Time embedded software for the controller.

Extended Temperature Option

The PXI-8196 RT controller is available in two versions to address different environmental conditions. The standard version has an operating temperature of 5 to 50 °C with a storage temperature of -40 to 65 °C. The extended temperature version has an operating temperature of 0 to 55 °C with a storage temperature of -40 to 85 °C.

The extended temperature option uses a hard drive designed for reliability in the low and high-temperature extremes. This extended temperature hard drive has a capacity of 30 GB (minimum), versus 40 GB (minimum) on the standard controller. Refer to the specifications section for additional details.

NI Hardware	Benchmark	Processing	Channels	File Write	Network Transfer	Maximum Loop Rate (kHz)	
						PXI-8196 RT	PXI-8195 RT
E Series DAQ	Analog Input and Output	PID	1	–	–	57 k	48 k
	Analog Input and Output	PID	8	–	–	9 k	9 k
	Analog Input and Output	PID	1	✓ ¹	–	36 k	34 k
	Analog Input and Output	PID	1	–	✓ ²	48 k	40 k
PXI-6533	Digital Input and Output ³	–	8	–	–	216 k	199 k
	Digital Input and Output ³	–	16	–	–	132 k	125 k
	Digital Output ⁴	–	16	–	–	613 k	453 k
PXI-6602	Counter Read ⁵	–	1	–	–	154 k	145 k
	Counter Read ⁵	–	4	–	–	38 k	36 k
None	Data Analysis	FFT ⁶	1 array	–	–	6.0 k	4.4 k

¹One data value per iteration written to an open file. ²TCP transfers of 512 bytes per transfer. ³Static (nonbuffered, unstrobed) digital read and write. ⁴Static (nonbuffered, unstrobed) digital write. ⁵Read current value of counter register. ⁶FFTs per second based on test of 1000 FFTs using one array of 2048 double-precision data points with Hanning windowing and no averaging.

Table 2. Maximum Loop Rates for LabVIEW Real-Time PXI Systems (All benchmarks use LabVIEW 7.1 Real-Time Module and traditional NI-DAQ 7.4, polling mode Ethernet, and adhere to the NI recommended architecture for LabVIEW Real-Time applications. Contact National Instruments for additional details regarding these and other benchmarks.)

Ordering Information

To order a complete PXI system based on a LabVIEW Real-Time embedded controller, visit ni.com/pxiadvisor.

Step 1. Select Controller

NI PXI-8195 RT	779910-33
NI PXI-8196 RT	779911-33
NI PXI-8196 RT, Extended Temperature.....	779912-33

Step 2. Select Your Memory Upgrade

To take advantage of the increased bandwidth of dual-channel memory, you must configure the RAM DIMMs in matched pairs. For this reason, National Instruments recommends using matched pairs when upgrading memory.

PXI-8195 RT

Standard

256 MB (1 x 256 MB DIMM)

Recommended upgraded memory configurations:

512 MB (2 x 256 MB DIMMs; 1 must be purchased)

1 GB (2 x 512 MB DIMMs must be purchased)

2 GB (2 x 1 GB DIMMs must be purchased)

PXI-8196 RT

Standard

512 MB (2 x 256 MB DIMMs)

Recommended upgraded memory configurations:

1 GB (2 x 512 MB DIMMs must be purchased)

2 GB (2 x 1 GB DIMMs must be purchased)

256 MB DDR2 RAM DIMM.....	779301-256
512 MB DDR2 RAM DIMM.....	779301-512
1 GB DDR2 RAM DIMM.....	779301-1024

Step 3. Select Solid-State Storage Options

128 MB Solid-State HDD	779175-128
512 MB Solid-State HDD	779175-512

Step 4. Select Accessories

Micro-GPIB to GPIB cable (0.2 m).....	183285-0R2
Micro-GPIB to GPIB cable (1 m)	183285-01
Micro-GPIB to GPIB cable (2 m)	183285-02
NI PXI-8252 IEEE 1394 (FireWire) interface module	778925-01

BUY NOW!

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

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Specifications

Specifications subject to change without notice.

Features

Processor	
PXI-8195 RT	1.5 GHz Celeron M 370
PXI-8196 RT	2.0 GHz Pentium M 760
Ethernet	10/100/1000 BaseTX, RJ-45 connector
Video	Intel Graphics Media Accelerator 900
Serial	1 (RS232)
Parallel Port	
	IEEE 1284
	Type C connector (miniature) (adapter cable not included)
GPIOB	
	PCI-GPIB/TNT, micro D25 connector
	IEEE 488 and HS488 transfers (adapter cable not included)
RAM	
	2 SO-DIMM sockets, DDR2 SDRAM, PC2 4200
PXI-8195 RT	256 MB standard, 2 GB maximum
PXI-8196 RT	512 MB standard, 2 GB maximum
Hard Drive	
PXI-8195 RT	40 GB minimum, internal 2.5 in., 9.5 mm Fast Ultra ATA100 interface
PXI-8196 RT	
Base	40 GB minimum, internal 2.5 in., 9.5 mm Fast Ultra ATA100 interface
Extended Temp. Option	30 GB minimum, internal 2.5 in., 9.5 mm Fast Ultra ATA100 interface

V (I/O) Keying

The PXI-8196 RT requires chassis V (I/O) = +5 VDC (blue key).

Power Requirements

PXI-8195 RT

Voltage	Current (A)	
	Typical	Maximum
+3.3	2.8	3.2
+5	4.8	6.5
+12	0	0
-12	0	0

PXI-8196 RT

Voltage	Current (A)	
	Typical	Maximum
+3.3	2.8	3.2
+5	5	7
+12	0	0
-12	0	0

Physical

Board Dimensions	4-slot 3U PXI module
Slot Requirements	1 system slot plus 3 controller expansion slots
MTBF	
PXI-8195 RT	TBD
PXI-8196 RT	124,400 hours
Weight	0.7 kg (1.7 lb) typical

Operating Environment

Ambient temperature ¹	
PXI-8195 RT	5 to 50 °C (IEC-60068-2-1 and IEC 60068-2-2) ²
PXI-8196 RT	
Base	5 to 50 °C (IEC-60068-2-1 and IEC 60068-2-2) ²
Extended temp. option	0 to 55 °C (IEC-60068-2-1 and IEC 60068-2-2) ²
Relative humidity	10 to 90% noncondensing (tested in accordance with IEC-60068-2-56)
Altitude	2000 m (at 25 °C ambient temperature)

¹ For chassis that are not available in the online catalog at ni.com, please contact National Instruments for supported operating temperatures.

² 5 to 40 °C for the PXI-1000B DC. National Instruments does not recommend using the PXI-1010 chassis with the PXI-8195 RT or the base version of the PXI-8196 RT.

³ 0 to 35 °C for the PXI-1010.

Storage Environment

Ambient temperature	
PXI-8195 RT	-40 to 65 °C (IEC-60068-2-1 and IEC-60068-2-2)
PXI-8196 RT	
Base	-40 to 65 °C (IEC-60068-2-1 and IEC-60068-2-2)
Extended Temp. Option	-40 to 85 °C (IEC-60068-2-1 and IEC-60068-2-2)
Relative humidity	5 to 95% noncondensing (IEC-60068-2-56)

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} (with solid-state hard drive)
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.)

Safety Compliance

EN 61010-1, IEC 61010-1, UL 61010-01, CAN/CSA-C22.2 No. 61010-1

Electromagnetic Compatibility

Refer to the Declaration of Conformity (DoC) for regulatory compliance information.

To obtain the DoC for this product, click Declaration of Conformity at ni.com/hardref.nsf.

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Hardware Services

NI Factory Installation Services

NI Factory Installation Services (FIS) is the fastest and easiest way to use your PXI or PXI/SCXI combination systems right out of the box. Trained NI technicians install the software and hardware and configure the system to your specifications. NI extends the standard warranty by one year on hardware components (controllers, chassis, modules) purchased with FIS. To use FIS, simply configure your system online with ni.com/pxiadvisor.

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.

Repair and Extended Warranty

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