

High-Value Real-Time Embedded Controllers for PXI

NI PXI-8101 RT, NI PXI-8102 RT **NEW!**

- 2.0 GHz single-core for PXI-8101 RT, 1.9 GHz dual-core for PXI-8102 RT
- 1 GB (1 x 1 GB DIMM) RAM (standard)
- 2 GB (1 x 2 GB DIMM) RAM (maximum)
- Execution target for NI LabVIEW Real-Time or LabWindows™/CVI Real-Time applications
- Reliable and deterministic operation
- Ethernet control of PXI
- Watchdog timer
- 115 kHz single-point loop rate for the PXI-8102 RT, 112 kHz single-point loop rate for the PXI-8101 RT

Development System Requirements (Windows)

- LabVIEW 8.6.1 or later
- LabVIEW Real-Time Module 8.6.1 or later

Or

- LabWindows™/CVI
- LabWindows/CVI Real-Time Module

Deployment Software (included)

- OS and drivers already installed
- Hard-drive-based image recovery

PXI System Configuration

- Complete PXI system configuration at ni.com/pxiadvisor



Overview

National Instruments RT Series PXI embedded controllers deliver a flexible, rugged platform for your deterministic, real-time measurement and control applications. NI PXI-8101 RT and PXI-8102 RT controllers, featuring the latest Intel single-core and dual-core processors, 1 GB standard RAM, and 800 MHz DDR2 memory, offer an ideal balance of performance and value for real-time test and control applications. You develop your LabVIEW application with the LabVIEW Real-Time Module on Windows OS and download the program to your PXI real-time controller via Ethernet.

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 combined 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 a PXI-8101 RT or PXI-8102 RT 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, reconfigurable I/O, and instrumentation. 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, PXI-8101 RT and PXI-8102 RT 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 system.

CPU	PXI-8101 RT	PXI-8102 RT
CPU	Intel Celeron 575	Intel Celeron T3100
CPU frequency	2.0 GHz	1.9 GHz
CPU cores	1	2
Front-side bus	667 MHz	800 MHz
L2 cache		1 MB
Dual-channel 800 MHz DDR2 RAM, standard	1 GB (1 x 1 GB)	
Dual-channel 800 MHz DDR2 RAM, maximum	2 GB (1 x 2 GB)	
Hard drive (standard option), minimum	80 GB SATA (5400 rpm) ¹	
10/100/1000BASE-TX (Gigabit) Ethernet		✓
Serial port (RS232)		✓
Parallel port		✓
Hi-Speed USB ports		2
Watchdog/trigger SMB		✓

¹Optional 32 GB solid-state drive can replace the hard drive.

Table 1. NI PXI-8101 RT and PXI-8102 RT Features

Create Reliable Stand-Alone Systems

To ensure reliable operation, embedded LabVIEW Real-Time applications continue to run even if the host PC is interrupted or rebooted. Because these real-time 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.

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For stand-alone operation, you can embed code in the system so that 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 into an executable and download it to your PXI real-time controller.

Dual-Boot Option

You can configure NI PXI embedded controllers to boot into Windows or the real-time OS. NI Measurement & Automation Explorer (MAX) 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 embedded 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 deployment software for the controller.

Benchmark	Processing	Channels	DAQ I/O Mode	Loop Rates (kHz)			
				PXI-8104 RT	PXI-8101 RT	PXI-8102 RT	PXI-8108 RT
Analog Input and Output	PID	1	Polling	93	112	115	137
		1	Interrupt	37	39	38	43
		4	Polling	55	66	71	83
		4	Interrupt	26	28	23	26
		16	Polling	27	30	31	33
		16	Interrupt	22	24	19	22

Table 1. Maximum loop rates for LabVIEW Real-Time PXI systems are shown. All benchmarks use the LabVIEW Real-Time Module Version 8.6.1 with NI-DAQmx Version 8.9. Benchmarks that do not test network performance run on a headless target without a direct Ethernet connection for maximum performance. Benchmarks that do test network performance use interrupt-mode Ethernet via a direct connection between the host PC and real-time target with a crossover cable. Visit ni.com or contact National Instruments for additional benchmarks.

Ordering Information

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

Controller Model

NI PXI-8101 RT	780955-33
NI PXI-8102 RT	781149-33

Step 1. Select Memory Upgrade

Standard

1 GB (1 x 1 GB DIMM)

Recommended upgraded memory configurations

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

2 GB DDR2 RAM	780446-2048
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Step 2. Select Storage Options

250 GB standard temperature HDD	779175-06
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32 GB solid-state HDD	779175-08
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Step 3. Select Accessories

IEEE 1284 parallel port cable adapter (6 in.)	777169-01
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NI PXI-8252 IEEE 1394 interface module	778925-01
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BUY NOW

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

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Specifications

Specifications subject to change without notice.

Features

Processor

PXI-8101 RT	Intel Celeron 575 2.0 GHz
PXI-8102 RT	Intel Celeron T3100 Dual Core 1.9 GHz

Chipset Mobile Intel GM45 Express Chipset

Front-side bus

PXI-8101 RT	667 MHz
PXI-8102 RT	800 MHz

System memory (RAM)

Standard	1 GB 800 MHz DDR2 RAM PC2 6400
Maximum	2 GB 800 MHz DDR2 RAM PC2 6400

Ethernet..... 10/100/1000BASE-TX, RJ45 connector

Hard drive..... 80 GB minimum, 5400 rpm, internal
2.5 in., 9.5 mm Serial ATA 1.0 interface

Video Integrated Graphics (Mobile Intel
GM45 Express Chipset)

Serial 1 (RS232)

Parallel IEEE 1284 Type C miniature connector
(adapter cable not included)

Hi-Speed USB..... 2

Power Requirements

Voltage (V)	Current (A)			
	Typical		Maximum	
	PXI-8101 RT	PXI-8102 RT	PXI-8101 RT	PXI-8102 RT
+3.3	2.25	2.50	3.6	4.80
+5	3.50	4.00	6.6	7.80
+12	0.001	0.001	0.075	0.075
-12	0.0	0.0	0.0	0.0

Physical

Board dimensions..... 2-slot 3U PXI module
2 by 13 by 21.6 cm
(1.59 by 5.1 by 8.5 in.)

Slot requirements..... One system slot plus one
controller expansion slot

Compatibility Fully compatible with PXI Specification

Weight..... 0.983 kg (2.17 lb) typical

Environment

Maximum altitude..... 2,000 m (800 mbar)
(at 25 °C ambient temperature)

Pollution degree..... 2

Indoor use only.

Operating Environment

Ambient temperature range¹ 5 to 50 °C^{2,3}
(tested in accordance with
IEC-60068-2-1 and IEC-60068-2-2)

Relative humidity range 10 to 90% noncondensing
(tested in accordance with
IEC-60068-2-56)

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

²5 to 40 °C for the NI PXI-1000B DC.

³Processor should not throttle CPU frequency under reasonable,
worst case processor workloads in high operating temperature.

Storage Environment

Ambient temperature range..... -40 to 65 °C
(tested in accordance with
IEC-60068-2-1 and IEC-60068-2-2)

Relative humidity range 5 to 95% noncondensing
(tested in accordance
with IEC-60068-2-56)

Shock and Vibration

Operating 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)

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Safety Compliance

- IEC 61010-1, EN 61010-1
- UL 61010-01, CSA 61010-1

Electromagnetic Compatibility

- 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

CE Compliance

This product meets the essential requirements of applicable European Directives, as amended for CE marking, as follows:

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

Refer to the Declaration of Conformity (DoC) for this product for any additional regulatory compliance information. To obtain 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.

Waste Electrical and Electronic Equipment (WEEE)

EU Customers: At the end of their life cycle, all products must be sent to a WEEE recycling center. For more information about WEEE recycling centers and National Instruments WEEE initiatives, visit ni.com/environment/weee.htm.

NI Services and Support



NI has the services and support to meet your needs around the globe and through the application life cycle – from planning and development through deployment and ongoing maintenance. We offer services and service levels to meet customer requirements in research, design, validation, and manufacturing.

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Professional Services

Our NI Professional Services team is composed of NI applications and systems engineers and a worldwide National Instruments Alliance Partner program of more than 600 independent consultants and integrators. Services range from



start-up assistance to turnkey system integration. Visit ni.com/alliance.

OEM Support

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In offices worldwide, our staff is local to the country, giving you access to engineers who speak your language. NI delivers industry-leading technical support through online knowledge bases, our applications engineers, and access to 14,000 measurement and automation professionals within NI Developer Exchange forums. Find immediate answers to your questions at ni.com/support.

We also offer service programs that provide automatic upgrades to your application development environment and higher levels of technical support. Visit ni.com/ssp.

Hardware Services

System Assurance Programs

NI system assurance programs are designed to make it even easier for you to own an NI system. These programs include configuration and deployment services for your NI PXI, CompactRIO, or Compact FieldPoint system. The NI Basic System Assurance Program provides a simple integration test and ensures that your system is delivered completely assembled in one box. When you configure your system with the NI Standard System Assurance Program, you can select from available NI system driver sets and application development environments to create customized, reorderable software configurations. Your system arrives fully assembled and tested in one box with your software preinstalled. When you order your system with the standard program, you also receive system-specific documentation including a bill of materials, an integration test report, a recommended maintenance plan, and frequently asked question documents. Finally, the standard program reduces the total cost of owning an NI system by providing three years of warranty coverage and calibration service. Use the online product advisors at ni.com/advisor to find a system assurance program to meet your needs.

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

NI provides complete repair services for our products. Express repair and advance replacement services are also available. We offer extended warranties to help you meet project life-cycle requirements. Visit ni.com/services.