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Requirements and Compatibility | Ordering Information | Detailed Specifications
For user manuals and dimensional drawings, visit the product page resources tab on ni.com.

Last Revised: 2014-11-06 07:14:07.0

High-Value Real-Time Embedded Controllers for PXI

NI PXI-8101 RT, NI PXI-8102 RT

- 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 8.6.1 or later or LabWindows™/CVI Real-Time 9.0 or later applications
- 115 kHz single-point loop rate for the PXI-8102 RT, 112 kHz single-point loop rate for the PXI-8101 RT
- 4 GB (or greater) SSD option
- Reliable and deterministic operation and Ethernet control of PXI
- 10/100/1000BASE-TX (Gigabit) Ethernet and 2 Hi-Speed USB ports
- 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 millisecond loop rates with only 3 to 4 µs 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.

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Requirements and Compatibility

OS Information

- Real-Time OS

Software Compatibility

- LabVIEW Real-Time Module
- LabWindows/CVI Real-Time Module

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Application and Technology

PXI-8101 RT and PXI-8102 RT Features

	PXI-8101 RT	PXI-8102 RT
CPU	Intel Celeron 575 (2.0 GHz)	Intel Celeron T3100 (1.9 GHz)
CPU cores	1	2
Dual-channel 800 MHz DDR2 RAM, standard	1 GB (1 x 1 GB)	
Dual-channel 800 MHz DDR2 RAM, maximum	4 GB (1 x 4 GB)	
Hard drive (standard option), minimum	80 GB SATA (5400 rpm)	
Storage, solid state		

	4 GB (or greater) Flash HD
10/100/1000BASE-TX (Gigabit) Ethernet ports	1
Hi-Speed USB ports	2
Serial port (RS232)	
Parallel port	
Watchdog/trigger SMB	

Connect to Any I/O
The modularity of PXI and open development environment of NI 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.

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.

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.

Real-Time Performance Benchmarks
Table 2 contains the PID loop rate benchmark numbers for the PXI-8101 RT and PXI-8102 RT.

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

Table 2. 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.

Memory
The PXI-8101 RT and PXI-8102 RT use 800 MHz DDR2 SDRAM, which makes the controllers ideal for data-intensive applications requiring significant analysis. They have a single SO-DIMM socket for the DDR2 SDRAM. 1 GB (1 x 1 GB DIMM) of RAM is standard with upgrade options to 4 GB.

Memory Options	Configuration	Part Number
Standard - 1 GB	1 x 1 GB DIMM	N/A
2 GB	1 x 2 GB DIMM	780446-2048
Recommended - 4 GB	1 x 4 GB DIMM	780446-4096

Table 2. Memory Upgrade Options

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Ordering Information

For a complete list of accessories, visit the product page on ni.com.

Products	Part Number	Recommended Accessories	Part Number
NI PXI-8101 RT			
NI PXI-8101 Celeron 575 2.0 GHz Real-Time Embedded SW	780955-33	No accessories required.	
NI PXI-8101 Celeron 575, 4 GB (or Greater) Flash HD, RT SW	780956-33	No accessories required.	
Other Accessories			

Micro-GPIB to GPIB cable (1 m)	183285-01	No accessories required.
USB English keyboard and optical mouse	779660-01	No accessories required.
ExpressCard strain-relief accessory for embedded controllers	192524-01	No accessories required.
Micro-GPIB to GPIB adapter cable (0.2 m)	183285-0R2	No accessories required.
Parallel port adapter cable (6 in.)	777169-01	No accessories required.
NI PXI-GPIB, with NI-488.2 Software for Windows 7/Vista/XP/2000	778039-01	No accessories required.
Micro-GPIB to GPIB cable (2 m)	183285-02	No accessories required.
Hard-Drive Spare/Replacement and Upgrades		
60 GB (or Greater) 2.5 in SATA Blank HDD Spare/Replacement	779175-03	No accessories required.
250 GB 2.5 in MLC SATA Solid State Hard Drive Upgrade	781945-01	No accessories required.
32 GB 2.5 in SATA Solid State Hard Drive Upgrade	779175-08	No accessories required.
500 GB 2.5 in SATA Hard Drive Upgrade	781946-01	No accessories required.
NI PXI-8102 RT		
NI PXI-8102 1.9 GHz Dual Core Real-Time Embedded SW	781149-33	No accessories required.

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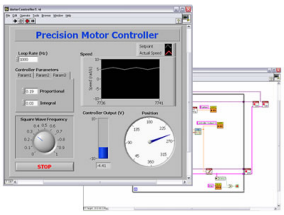
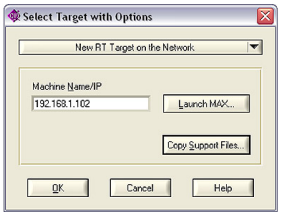
Software Recommendations

NI LabVIEW Real-Time Module



- Design deterministic real-time applications with LabVIEW graphical programming
- Download to dedicated NI or third-party hardware for reliable execution and a wide selection of I/O
- Take advantage of built-in PID control, signal processing, and analysis functions
- Automatically take advantage of multicore CPUs or set processor affinity manually
- Includes real-time OS, development and debugging support, and board support
- Purchase individually or as part of a LabVIEW suite

NI LabWindows™/CVI Real-Time Module



- Develop real-time applications in the LabWindows/CVI integrated development environment
- Deploy to dedicated real-time hardware for reliable, deterministic performance
- Use built-in PID control functions or create your own control algorithms
- Remotely debug real-time applications
- Use commercial off-the-shelf I/O, including data acquisition, modular instruments, and CAN

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Support and 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.

Technical Support

Get answers to your technical questions using the following National Instruments resources.

- **Support** - Visit ni.com/support to access the NI KnowledgeBase, example programs, and tutorials or to contact our applications engineers who are located in NI sales offices around the world and speak the local language.
- **Discussion Forums** - Visit forums.ni.com for a diverse set of discussion boards on topics you care about.
- **Online Community** - Visit community.ni.com to find, contribute, or collaborate on customer-contributed technical content with users like you.

Repair

While you may never need your hardware repaired, NI understands that unexpected events may lead to necessary repairs. NI offers repair services performed by highly trained technicians who quickly return your device with the guarantee that it will perform to factory specifications. For more information, visit ni.com/repair.

Training and Certifications

The NI training and certification program delivers the fastest, most certain route to increased proficiency and productivity using NI software and hardware. Training builds the skills to more efficiently develop robust, maintainable applications, while certification validates your knowledge and ability.

- **Classroom training in cities worldwide** - the most comprehensive hands-on training taught by engineers.
- **On-site training at your facility** - an excellent option to train multiple employees at the same time.
- **Online instructor-led training** - lower-cost, remote training if classroom or on-site courses are not possible.
-

Course kits - lowest-cost, self-paced training that you can use as reference guides.

- **Training memberships** and training credits - to buy now and schedule training later.

Visit ni.com/training for more information.

Extended Warranty

NI offers options for extending the standard product warranty to meet the life-cycle requirements of your project. In addition, because NI understands that your requirements may change, the extended warranty is flexible in length and easily renewed. For more information, visit ni.com/warranty.

OEM

NI offers design-in consulting and product integration assistance if you need NI products for OEM applications. For information about special pricing and services for OEM customers, visit ni.com/oem.

Alliance

Our Professional Services Team is comprised of NI applications engineers, NI Consulting Services, and a worldwide National Instruments Alliance Partner program of more than 700 independent consultants and integrators. Services range from start-up assistance to turnkey system integration. Visit ni.com/alliance.

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Detailed Specifications

This topic lists the electrical, mechanical, and environmental specifications of the NI PXI-8101/8102 embedded computer.

Features

NI PXI-8101/8102	
CPU—NI PXI-8101	Intel® Celeron® Processor 575 (2.00 GHz single core processor), 667 MHz FSB
CPU—NI PXI-8102	Intel® Dual-Core Celeron® T3100 (1.9 GHz dual core processor), 800 MHz FSB
On-die L2 cache	1 MB
DDR2 RAM, PC2 6400	1 GB Standard, 4 GB Maximum
Hard Drive	80 GB Serial ATA, minimum
Ethernet	10/100/1000 BaseTX
Serial Ports (RS-232)	Yes (1)
Parallel Port	Yes (1)
Hi-Speed USB (2.0) Ports	Yes (2)
PS/2 Keyboard/Mouse Connector	No
PXI Trigger Bus Input/Output	Yes
Installed Operating System	Windows Vista Business, Windows Vista Business downgraded to Windows XP Professional

Electrical

NI PXI-8101		
Voltage (V)	**Current (Amps)**	
	Typical	**Maximum**
+3.3 V	2.25 A	3.60 A
+5 V	3.50 A	6.60 A
+12 V	0.001 A	0.075 A
–12 V	0 A	0 A
Note Does not include any attached USB devices.		

NI PXI-8102		
Voltage (V)	**Current (Amps)**	
	Typical	**Maximum**
+3.3 V	2.50 A	4.80 A
+5 V	4.00 A	7.80 A
+12 V	0.001 A	0.075 A
–12 V	0 A	0 A
Note Does not include any attached USB devices.		

Physical	
Board dimensions	2-slot 3U PXI module 4.0 cm × 13.0 cm × 21.6 cm (1.59 in. × 5.14 in. × 8.51 in.)
Slot requirements	One system slot plus one controller expansion slot
Compatibility	Fully compatible with PXI specification
Weight	0.645 kg (1.42 lb) typical
Environment	
Maximum altitude	2,000 m (at 25 °C ambient temperature)
Pollution Degree	2
Indoor use only.	
Operating Environment	
Ambient temperature [1]	5 to 50 °C [2], [3] (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.)

Caution Clean the NI PXI-8101/8102 with a soft nonmetallic brush. Make sure that the device is completely dry and free from contaminants before powering-on the controller again.

Storage Environment	
Ambient temperature	–40 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.)
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.)

Note Specifications are subject to change without notice.

Safety Standards

This product is designed to meet 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 cables.

CE Compliance CE

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)

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 module number or product line, and click the appropriate link in the Certification column.

Environmental Management

National Instruments is committed to designing and manufacturing products in an environmentally responsible manner. NI recognizes that eliminating certain hazardous substances from our products is beneficial not only to the environment but also to NI customers.

For additional environmental information, refer to the *NI and the Environment* 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)

EU Customers At the end of the product life cycle, all products *must* be sent to a WEEE recycling center. For more information about WEEE recycling centers, National Instruments WEEE initiatives, and compliance with WEEE Directive 2002/96/EC on Waste Electrical and Electronic Equipment, visit ni.com/environment/weee.htm.

电子信息产品污染控制管理办法 （中国 RoHS）

中国客户 National Instruments 符合中国电子信息产品中限制使用某些有害物质指令 (RoHS)。
关于 National Instruments 中国 RoHS 合规性信息，请登录 ni.com/environment/rohs_china。
(For information about China RoHS compliance, go to ni.com/environment/rohs_china.)

Battery Replacement and Disposal

Battery Directive This device contains a long-life coin cell battery. If you need to replace it, use the Return Material Authorization (RMA) process or contact an authorized National Instruments service representative. For more information about compliance with the EU Battery Directive 2006/66/EC about Batteries and Accumulators and Waste Batteries and Accumulators, visit ni.com/environment/batterydirective.

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

[2] 5 to 40 °C for the PXI-1000B DC.

[3] Processor should not throttle CPU frequency under reasonable, worst case processor work loads in high operating temperatures.

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