# Embedded Single-Slot VXIbus Controllers

NEW

## NI VXIpc-77x

- VXI*plug&play*-compliant
- VXIpc-770 – 566 MHz Celeron processor
- VXIpc-771 – 1.26 GHz Pentium III Processor
- Intel 815E chipset
- High-performance PCI-based peripherals
  - 10/100BaseT Ethernet
  - GPIB
- NI MITE-based VXIbus interface
  - DMA
  - VME64
- Storage and memory
  - 256 MB, upgradeable to 512 MB
  - Internal hard drive, 30 GB minimum[1]
- Programmable NI watchdog timer
- Complete VXI Slot 0 resource manager
- Jumperless configuration

### NI-VXI/NI-VISA Software

- Windows 2000/XP
- VxWorks
- Linux 2.2/2.4 kernel

[1]Minimum drive size does not apply to solid-state flash drive options. Because of rapidly changing hard drive technology, please contact National Instruments for the latest hard drive options.

## Overview

The National Instruments VXIpc-77x embedded controllers are flexible, high-performance controllers in a small, rugged package ideal for VXI systems. These controllers give you direct control of VXI registers, memory, interrupts, and triggers while maintaining compatibility with the scores of software packages and tools available for general-market desktop PC computers.

NI VXIpc-77x controllers provide the most cost-effective single-slot VXI embedded control solution available. Table 1 details the standard VXIpc-77x features.

NI VXIpc-77x controllers use industry-standard VXI*plug&play* software, including NI-VXI/NI-VISA and NI-488.2 software. The NI-VXI/NI-VISA bus interface software is a comprehensive software package for configuring, programming, and troubleshooting your VXI system. With NI-VXI/NI-VISA, you can be confident that your software development will not become obsolete as your needs change and VXI technology evolves. If you require solid-state storage media for operation in harsh environments, you can use NI VXIpc-77x controllers with an internal solid-state flash drive in place of the internal hard drive.

| Feature | Description |
|---|---|
| Processor | 566 MHz or 1.26 GHz |
| IDE Controller | Ultra ATA 100/66/33, BMIDE and PIO modes |
| Ethernet | 10/100BaseT (RJ45) |
| Video | Integrated Intel 82815 graphics controller |
| Memory | 256 MB PC133 SDRAM, (2 SO-DIMM slots upgradeable to a total of 512 MB) |
| GPIB | IEEE 488.2 (26-pin miniature connector) |
| Serial Ports | 2 RS232 (9-pin miniature connector) |
| Parallel Port | IEEE 1284-compatible |
| PS/2 | 2 ports (keyboard[1]/mouse[1]) |
| USB | 2 ports, USB 1.1-compliant |

[1]Not included.

*Table 1. VXIpc-770 Features*

## Options

- Windows 2000 installed, internal hard drive
- Windows XP installed, internal hard drive
- No OS installed, internal hard drive
- VxWorks software available
- Linux software available
- Internal flash drive available

## Hardware

The hardware for a VXIpc-77x controller consists of a single-width module that fits directly in a C-size VXI mainframe. You can use the controller in Slot 0 or in non-Slot 0 operation, so you can use several VXIpc-77x controllers in a system together. VXIpc-77x controllers use the Intel 815E chipset and a Pentium processor to deliver the maximum performance and flexibility for your VXI system. Figure 1 shows the block diagram for VXIpc-77x controllers.

### Hardware Architecture

State-of-the-art packaging technology gives VXIpc-77x controllers the full functionality of a desktop PC in a VXI module. The controllers required a number of technological advances before NI could manufacture it, including MITE and MANTIS custom ASICs for high-performance VXI control, as well as the PCI MITE and TNT4882 ASIC for GPIB control.

VXIpc-77x controllers have 10/100BaseT Ethernet capability, so you can quickly and easily integrate the controller into a LAN or WAN.

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## Processors

The VXIpc-77x controllers feature the 566 MHz Intel Celeron processor in the FC-PGA2 package. The VXIpc-771 features the 1.26 GHz Intel Pentium III processor. The processor comes with 128 KB of level 2 cache and interfaces to the chipset through the AGTL+ system bus.

## Memory

VXIpc-77x controllers come with two SO-DIMM sockets for memory. 256 MB of SDRAM is installed in one socket, leaving the other socket available for expansion. The system handles a maximum of 512 MB of memory. You can purchase additional 256 MB memory modules and upgrade your system memory.

## Intel 82815 Graphics Controller

VXIpc-77x controllers use the integrated Intel 82815 graphics controller and dynamic memory video technology (DMVT). Using DMVT, the integrated graphics controller achieves optimum graphics and memory performance by dynamically sharing the high-speed PC133 system memory. With this video memory management, the controllers can handle a wide range of video resolutions and colors, a few of which are listed in Table 2.

| Resolution | Colors |
|---|---|
| 640 x 480 | 16 M colors |
| 800 x 600 | 16 M colors |
| 1024 x 768 | 16 M colors |
| 1280 x 1024 | 16 M colors |
| 1600 x 1200 | 256 colors |

*Table 2. VXIpc-770 Graphics Compatibility*

## 10/100BaseT Ethernet

VXIpc-77x controllers use the Intel integrated LAN controller and the 82562 Platform LAN Connect Fast Ethernet controller. The controller automatically negotiates connections for 10BaseT and 100BaseTX.

## IEEE 488.2/HS488 Interface

VXIpc-77x controllers use the NI PCI mini-MITE and NI TNT4882 ASIC (PCI-GPIB-compatible), giving full GPIB control of external instruments via a front panel connector. GPIB control capability is fully IEEE 488.2-compatible. The GPIB interface is fully compatible with the NI industry-standard NI-488.2 driver software for a variety of operating systems. Any software using NI-488.2 runs on a VXIpc-770 controller. Using the HS488 protocol, the controller can handle speeds up to 8 MB/s.

## NI Watchdog

The NI watchdog is a counter/timer for monitoring an application program. Your software automatically checks in with NI watchdog. Please call National Instruments technical support for more information on this feature.

## Real-Time Clock

VXIpc-77x controllers use the integrated real-time clock along with a user-replaceable battery for CMOS setting backup. The battery is a hermetically sealed lithium battery, making it suitable for use in industrial applications.

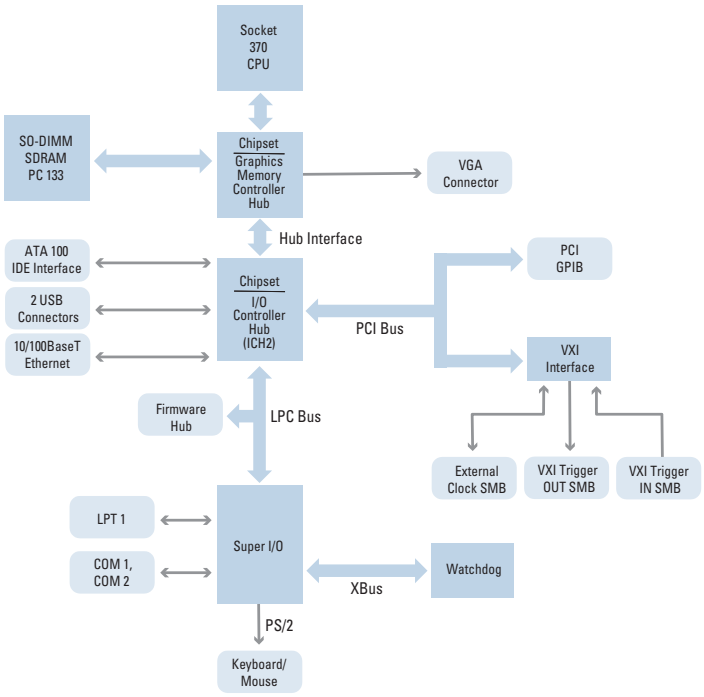


*Figure 1. VXIpc-77x Block Diagram*

## BIOS

The Phoenix BIOS was developed specifically for the VXIpc-77x controllers. The BIOS incorporates a PXE network boot ROM so you have the option of adding network booting.

## USB CD-ROM Drive

National Instruments offers an optional external USB CD-ROM drive for use with VXIpc-77x embedded controllers. Using the USB interface, you can connect this CD-ROM drive to your embedded controller for easy system software recovery, installation, and upgrades. The USB port completely powers this CD-ROM drive, so no external power connections are required.

## USB Floppy Drive

National Instruments also offers an optional external USB floppy drive for use with the VXIpc-77x embedded controllers (see Figure 2). The floppy drive connects directly through USB and requires no external power. This USB floppy drive is an excellent option for easy software installation or read/write data storage access on a floppy diskette.

*Figure 2. USB Floppy Drive*

# Embedded Single-Slot VXIbus Controllers

## VXIbus

**VXI Addressing** – The VXIpc-77x controllers feature the MITE and MANTIS custom ASICs for access to the VXI backplane resources. To access VXI memory or VXI devices, the controllers use the multiple windowing scheme of the MITE, so you can access all of the VXI address space. The MITE exports independent VXI address windows, providing the user with three completely user-configurable windows. You can use one or all three windows; you can also set each window size and location. This multiple windowing scheme alleviates the performance penalty related to the context switching of one window that you must constantly move between the different address spaces.

**DMA Transfers to and from VXI** – A VXIpc-77x controller can perform block-mode transfers using one of the two on-chip DMA controllers on the MITE. Controlling external VXI devices often takes valuable CPU time because the microprocessor typically shoulders the burden of transferring data to and from devices. MITE-based VXI controllers, such as those of the VXIpc-77x, move the burden of block data transfers to one of the DMA controllers integrated in the MITE and free CPU processing time. Instead of the computer microprocessor transferring the data and/or commands, the NI-VXI/NI-VISA software executes the block data transfers with the MITE ASIC. While the MITE transfers the data, the processor can perform application-specific tasks, such as data presentation and analysis.

**VXI Slot 0 Functionality** – VXIpc-77x controllers have full VXI Slot 0 capability, including a MODID register and a CLK10 source, as required by the VXIbus specification. You can also install a VXIpc-77x controller in another slot and use it in the non-Slot 0 mode. No matter what your configuration needs, VXIpc-77x controllers can automatically detect whether they are inserted into Slot 0 and automatically enable or disable the Slot 0 onboard circuitry without switches and jumpers.

**External VXI CLK10 Synchronization** – VXIpc-77x controllers have SMB connectors on the front panel for an external clock. Onboard programmable logic can configure the controller and its 10 MHz VXI CLK10 signal to this connector as an output, or use this connector as an input for the 10 MHz VXI CLK10 signal. With a VXIpc-77x controller, you can configure multiple mainframes to operate off a single 10 MHz system clock.

**Advanced Trigger/Timing** – With a VXIpc-77x controller, you have full software and hardware control of the VXI trigger lines. The VXIpc-77x controllers have two SMB trigger I/O connectors on their front panel for routing any TTL trigger line between the backplane and external devices. VXIpc-77 controllers can respond to all VXI-defined protocols on all P2 TTL and ECL trigger lines simultaneously. The hardware also includes an internal counter, which gives sophisticated counting of events and interrupting on trigger edges and pulses, as well as generating pulse trains, variable length pulses, and pulse stretching.

**VXI Interrupts** – A VXIpc-77x controller can function as an interrupter and an interrupt handler for any or all of the VXIbus interrupt lines in a VXI mainframe. The NI-VXI/NI-VISA software can notify your application when any interrupt is asserted, and can assert any interrupt level with a programmable status. You can assign which interrupt levels should be handled by each device in the system with the NI-VXI configuration software.

## Software

VXIpc-77x controllers include NI-VXI/NI-VISA software, making them completely compliant with VXI*plug&play* Systems Alliance specifications. NI-VXI/NI-VISA is the combination of our popular NI-VXI VXI bus interface software and our new-generation virtual instrumentation software architecture VISA I/O software, also standardized by the VXI*plug&play* Systems Alliance. Because VXIpc-77x controllers are completely VXI*plug&play*-compliant, you can run all the latest VXI*plug&play* software, including executable soft front panels. With these panels, you can operate the instrument immediately, and standardized LabVIEW, LabWindows/CVI, and Measurement Studio instrument drivers simplify your programming task.

NI-VXI/NI-VISA comes with a VXI bus interface library that you can use with a number of popular programming environments and compilers, including LabVIEW, LabWindows/CVI, Measurement Studio, Microsoft Visual C++, Borland C++, and Microsoft Visual Basic. NI also offers industry-standard NI-488.2 software for controlling external GPIB instruments through the front-panel GPIB port. Application software developed using the VXIpc-77x controllers and the NI-VXI/NI-VISA bus interface software is compatible with many other VXI controller platforms, including computers equipped with a MXI-2- or MXI-3-based interface. NI-VXI and NI-VISA I/O software compatibility across platforms protects your software investment in the future. Because the software for all these configurations is compatible, you can program both general-purpose external PCs and embedded VXIpc controllers using the same programming tools and concepts. You can easily port VXI software to other platforms as your controller requirements change or expand in the future. The NI-VXI and NI-DAQ software for the VXIpc-77x controllers is not compatible with National Instruments legacy VXI data acquisition and signal conditioning devices. Please see technical support at ***ni.com*** for additional information.

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## Ordering Information

### NI VXIpc-770

No OS installed on internal hard drive .....778299-00
Windows 2000 installed on internal hard drive.....778299-01

### NI VXIpc-771

No OS installed on internal hard drive .....779525-00
Windows XP installed on internal hard drive.....779525-01
Windows 2000 installed on internal hard drive.....779525-02

### Additional Software Options

NI-VXI/NI-VISA for Linux[1] .....778130-01

[1]For Linux, order a VXIpc-77x controller with no OS and the NI-VXI/NI-VISA for Linux.

NI-VXI/NI-VISA for VxWorks[2].....778597-01

[2]For VxWorks, order a VXIpc-77x controller with no OS and the NI-VXI/NI-VISA for VxWorks.

### Memory Upgrade Options

A VXIpc-77x controller comes with two SO-DIMM sockets, one with 256 MB of PC133 SDRAM, and another available for expansion. The system handles a maximum of 512 MB of PC133 memory. You can purchase the following SDRAM modules to add to your controller. For maximum memory, you can purchase 256 MB SDRAM modules for installation.

256 MB SDRAM .....778469-256

### Flash Drive Options

Internal IDE flash drive[3].....778600-01

[3]Please contact National Instruments for the latest flash drive options.

### Additional Accessories

USB CD-ROM drive.....778492-01
USB floppy drive.....778492-02
Parallel port adapter cable (6 in.)[4].....777169-01
GPIB adapter cable (2 m)[4].....183285-02
Serial adapter cable (8 in.)[4].....183286-08

[4]Every VXIpc-77x controller comes with one parallel port adapter cable, one GPIB adapter cable, and one serial adapter cable.

## Specifications

Complies with VXI Specification 2.0
Complies with IEEE 488.2

### Physical

Size..... Fully enclosed, shielded VXI C-size board
Dimensions..... 233.35 by 340 by 30.48 mm (9.187 by 13.386 by 1.2 in.)
Number of VXI slots..... 1
Weight..... 1.5 kg (3.2 lb)

### Power Requirements

| | Current 771 | | Current 770 | |
|---|---|---|---|---|
| VDC | DC (Typical) | Dynamic (Typical) | DC (Typical) | Dynamic (Typical) |
| +5 | 9.75 A | 4.25 A | 7.75 A | 4.25 A |
| +12 | 150 mA | 150 mA | 150 mA | 150 mA |
| -12 | 50 mA | 150 mA | 50 mA | 150 mA |
| -2 | 100 mA | 125 mA | 100 mA | 125 mA |
| -5.2 | 200 mA | 125 mA | 200 mA | 125 mA |

Total power (typical)..... 42.4 W

### Operating Environment

Ambient temperature range..... 5 to 50 °C (0 to 50 °C with solid-state HDD)
Relative humidity range..... 10 to 90%, noncondensing

### Storage Environment

Ambient temperature range..... -20 to 70 °C
Relative humidity range..... 5 to 95%, noncondensing

### Mean Time Between Failures (MTBF)

VXIpc-770/VXIpc-771 ..... 112,000 hours
(Predictions performed in accordance with Bellcore Reliability Methods.)

### Shock and Vibration

Functional shock..... 30 g peak, half-sine, 11 ms pulse (Meets IEC 60068-2-27. Test profile developed in accordance with MIL-T-28800E Class 3.)

Random vibration
Operational..... 5 to 500 Hz, 0.3 $_{grms}$
Nonoperational..... 5 to 500 Hz, 2.4 $_{grms}$ (Meets IEC 60068-2-64. Nonoperating test profile developed in accordance with MIL-T-28800E and MIL-STD-810E Method 514.)

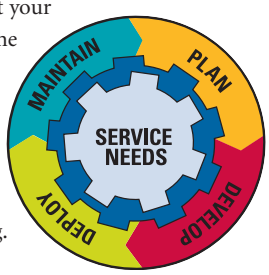
### Safety Compliance

EN 61010-1, IEC 61010-1

**Specifications subject to change without notice.**

# 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. Visit ni.com/services.




## Training and Certification

NI training is the fastest, most certain route to productivity with our products. NI training can shorten your learning curve, save development time, and reduce maintenance costs over the application life cycle. We schedule instructor-led courses in cities worldwide, or we can hold a course at your facility. We also offer a professional certification program that identifies individuals who have high levels of skill and knowledge on using NI products. Visit ni.com/training.

## Professional Services

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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

### 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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