ATE Core Configurations

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FIGURE 1

15U, 38U, and 44U ATE Core Configuration with Multiple PXI Chassis in a Lab Environment

NI's ATE Core Configurations streamline the design, procurement, assembly, and deployment of rack-based automated test systems through standardized mechanical, power, and safety system infrastructure. Designed and built by NI, ATE Core Configurations serve as a foundation for custom, scalable, and easily replicated test systems. From cutting-edge instrumentation to scalable rack-based test systems, NI provides complete solutions for flexible, high-performance testing.

- Standardized mechanical, power, and safety system infrastructure
- Flexible size options including:

  - 15U for DUT-on-top or lower power systems
  - 38U less than 2 m tall
  - 44U supports up to seven PXI chassis

- Integrated power distribution supporting AC/DC power, three-phase distribution, and up to 36 kW of power
- Monitor test system health and control with integrated rack control unit

- Integrate various NI hardware including PXI, CompactDAQ, CompactRIO, and other instrumentation with preinstalled drivers
- Designed and built by NI, you can rely on a single vendor for all components from rack to instrumentation
- Engineered for safety and convenience with emergency shutoff, thermal shutdown, and power and Ethernet routing
- IEC/EN 61010-1 compliant system that can be shipped anywhere in the world

Streamlined Design, Procurement, Assembly, and Deployment of Rack-Based Automated Test Systems

Test engineers and directors, no matter the field, are under immense pressure to deliver complex test systems under increasingly shrinking schedules while optimizing for budget. ATE Core Configurations streamline the procurement of high-quality automated test systems by keeping costs and timelines in control with preassembled, configured systems from a single vendor. Reduce the time and cost of multiple purchase orders (POs) by acquiring a full tester from one vendor who can repeatably deliver IEC/EN 61010-1 compliant systems anywhere in the world.

Used in applications for aerospace, transportation production test, electronic device validation, and more, ATE Core Configurations provide the option to configure and customize your automated test solution. With power, mechanical, safety, and instrumentation options, ATE Core Configurations are truly a custom test solution for your application that you can order and reorder based on your production needs.

FIGURE 2
15U ATE Core Configuration with multiple PXI Chassis in a lab Environment

FIGURE 3

ATE Core Configurations come in three different sizes. The 44U provides maximum space, the 38U option is just under two meters tall and can fit through common door heights, and the 15U rack is designed for DUT on top configurations.

Selection Guide	Power	Phase	Current Rating	Branch Rating	Voltage Rating	Input Connection	Name	Compatible Rack Sizes
Low Power	3.8 kW	1φ	16 A	20 A	100–240 V	IEC 60309	RMX-10140-16S2	15U only
Mid Power	5.7 kW	1φ	24 A	30 A	100–240 V	IEC 60309	RMX-10140-24S2	15U, 38U, and 44U
High Power Wye	11.5 kW	3φ Y	16 A	20 A	100–240 V	IEC 60309	RMX-10140-16Y2	38U and 44U
High Power Delta	13.3 kW	3φ Δ	32 A	40 A	200–240 V	Hardwire	RMX-10140-32D2	38U and 44U
Ultra High-Power (3Ø output)	21 kW	3φ Δ	50 A	63 A	200–240 V	Hardwire	RMX-10140-50D2P	38U only
Ultra High-Power (3Ø output)	36 kW	3φ Y	50 A	63 A	200–240 V	Hardwire	RMX-10140-50Y2P	38U only

TABLE 1

ATE Core Configuration Rack Sizes and Power Options

Detailed View of ATE Core Configurations

Front Door Options

Rear Door

Detailed Diagram of ATE Core Configurations

1 Removable Side Panels	2 Start/Stop/ Emergency Power Off (EPO) Panel	3 Mouse, Monitor, Keyboard Mounting Accessories	4 Industrial Casters	5 Cable Management	6 Power Entry Panel (top or bottom)
7 Mounting Rails	8 AC Power Distribution Unit	9 Fan Kit (Programmable RPM Options)	10 Rack Control Unit (RCU)	11 DC Power Distribution Unit	

FIGURE 4

Detailed Diagram of ATE Core Configurations

Key Features

Procure a Complete System From a Single Source

Reducing test system procurement to one vendor mitigates schedule risk and saves time and money by decreasing the number of POs. Designed by NI, ATE Core Configurations enable each test engineer or director to significantly reduce the hassle of procuring the elements of a tester from multiple vendors.

With ATE Core Configurations, you can specify and purchase automated test equipment and infrastructure including rack, uninterruptible power supply, emergency power off, power distribution unit, and other rack-mountable components all from a single source.

A single source of purchase also means a single source of repair. You can replace or repair nearly all components in the rack through NI support. Trust that even in the worst circumstances, your production line test system can be brought back to working condition quickly because you use only one vendor for repairs and replacements.

Proactively Manage Systems Through Software

Every ATE Core Configurations rack contains a rack control unit (RCU), which comes with a C# API supported on Windows 10. The RCU can be used for uptime, monitoring, and reporting activities. It also enables critical control features such as startup and shutdown sequences. The RCU can control rack infrastructure components such as fans and power distribution. It can monitor and report on those components, as well as collect other data such as temperature, power input, ITA pin status, and more.

Simplify Test with Standardized Equipment

Test managers often must coordinate tests across multiple facilities with a variety of test equipment. ATE Core Configurations provide a standardized platform on which to build tests that can be translated easily from one site to another to optimize developer time. With IEC/EN 61010-1 compliant testers and various power and size options, NI can save any build or custom configuration for your future purchases.

Reduce Hardware Assembly Burden

Every time they receive a test rack, test engineers must spend time assembling, wiring, and installing software before performing any tests. But their time is most efficiently spent on other tasks such as ensuring the test sequence is performing as expected. With ATE Core Configurations, all standard rack assembly, connections, and software installation are performed before shipment by NI engineers. This saves integration time and frees up engineers to perform more critical tasks that are necessary to reduce schedule risk.

Configure a Rack to Meet Your Needs

ATE Core Configurations are designed to be configurable, and to ship with the options you need and want. This includes I/O, power entry and distribution, accessories, and more. We will also mount the instruments you want in the rack and can make a single part number that you can reorder and reference. ATE Core Configurations can also be bought as one of a few common, pre-configured racks, where I/O, power entry panels, power distribution, accessories, and more are already chosen for you. To learn more, **contact NI**.

FIGURE 5

Get to your solution from requirements to deployment faster with NI's ATE Core Configurations.

Rack Infrastructure Details

Rack Control Unit

Every ATE Core Configurations rack contains a rack control unit (RCU) which comes with a C# API supported on Windows 10. The RCU can be used for uptime, monitoring, and reporting activities. It also enables critical control features such as startup and shutdown sequences.

Key Features and Capabilities

- Monitor system state and health
- Control startup and shutdown sequence, including soft shutdown report
- Aware of system population and power set
- Monitor input power and power distribution
- Control and monitor fan speed and PWM (predict aging)
- Monitor safety thermal shutdown
- Monitor and report ITA pin status
- Communication path for interface devices (DUT fixture, calibration device, continuity checker)
- Local system storage
- Enables test cell features (tower light, pneumatics)
- Built-in four-port USB hub
- Reporting of information/data collected by RCU

Power Entry Panel

The Power Entry Panel (PEP) routes power, Ethernet, and USB from the external facility into the ATE Core Configurations rack. It also acts as the main power breaker for circuit and thermal protection as well as emergency shutoff.

ATE Core Configurations offer six distinct power configurations:

- Lower power
- Mid power
- High power (delta)
- High power (wye)
- Ultra-high power (delta)
- Ultra-high power (wye)

Each PEP contains the IEC or hardwire connector, circuit protection, line filters, kill-switch relays for emergency shutoff, a 3.3 V I2C connector, pre-wired RCU, pre-wired fans, I/O for UPS or loopback, one to three C19 outlets pre-wired to power distribution units, and an external grounding lug.

Power Distribution Unit

The Power Distribution Unit (PDU) distributes input power to outlets used to power components in the system.

Each single-phase PDU contains eight IEC C13 outlets which can be controlled by the RCU in pairs, and hardwired AUX DC 600 and 1200 outlets (12 V, 24 V, 48 V), optional connection to facility GND, circuit protection, remote inhibit, and emergency power off.

The three-phase PDUs support either delta or wye power configurations and have two channels. They each contain a contactor with DC coil control, three-phase filter, circuit protection , and remote inhibit and emergency power off.

Power Levels	Phase	Wattage	Number of Single-Phase PDUs
Low	Single	3.8 kW	1
Mid	Single	5.7 kW	2
High Power Wye	Three	11.5 kW	3
High Power Delta	Three	13.3 kW	3
Ultra-High Power Wye	Three	21 kW	3 (and one 3-phase)
Ultra-High Power Delta	Three	36 kW	3 (and one 3-phase)

TABLE 2
ATE Core Configurations Power Entry and Distribution Options

Uninterruptible Power Supply

The Uninterruptible Power Supply (UPS) powers critical components in a system during power loss, brownouts, and normal operation. The UPS option provided in ATE Core Configurations is an APC-branded UPS.

FIGURE 6
Side Profile View of ATE Core Configurations Including Power Entry Panel, Power Distribution Unit, Rack Control Unit

Emergency Power-Off

When a test system encounters a serious issue or an emergency occurs in the facility, operators need the ability to quickly power off the test system. Emergency power off (EMO) mechanisms are included in the ATE Core Configurations to simplify connectivity and inhibit power switching. When the EMO is pressed, switches within the PEP disconnect power to the AC and DC PDUs. The rack also features a temperature controller that shuts off the rack if the internal temperature reaches a certain user-programmable level, enabled through the RCU.

Monitors, Mouse, and Keyboard

Using ATE Core Configurations as a test station traditionally requires a monitor or other user interface mounted on the rack. You can choose from three main options to integrate a mouse, monitor, or keyboard (MMK) in the rack: mounted in an MMK drawer, mounted on an adjustable mounting arm, or flush-mounted in the rack.

FIGURE 7
Mounting options include mounted in an MMK drawer, mounted on an adjustable mounting arm, or flush-mounted in the rack.

Configurable I/O

All racks have configurable front and rear I/O panels. At a minimum, this includes an emergency power-off (EMO) button, rack power button, and status indicator on the front panel with an Ethernet port on the rear panel. The I/O panels can also contain rear system circuit breaker, rear EMO, front Ethernet, IEC 60309 power input connector, hardwired connection for high-current systems, integrated four-port USB 2.0 hub, and external C13 power with GFCI. This can also include upgrades for standard test needs such as GPIB, RS232, pneumatics, and other upgrades.

- Options for standard controller I/O on the rack
- Power button and status LED
- Rear system circuit breaker
- Front EMO with rear upgrade option
- Rear Ethernet with front upgrade option
- Integrated four-port USB 2.0 hub

- External C13 power with GFCI (front, rear, or none)
- Additional aux panels for flexibility
- IEC 60309 power input connector
  - Hardwired connection for high-current systems
- Upgrades for standard test needs
  - GPIB, RS232, pneumatics

Mechanical infrastructure

ATE Core Configurations come in varying sizes with different abilities. The 15U rack is designed for DUT on top configurations, keeping the DUT at a reasonable working height. The 38U rack, with a height just under two meters, can fit through common door heights, and the 44U gives you more room for equipment you need in the same floor space.

Model	Height (including casters)	Width	Depth	Max. Static Load	Caster Support
15U	31.148 in. (892.76 mm)	26.5 in. (673.1 mm)	33.46 in. (850 mm)	1,200 lb. (544 kg)	(4) Swivel-locking Anti-ESD
38U	75.398 in. (1915.1 mm)	26.5 in. (673.1 mm)	33.46 in. (850 mm)	1,200 lb. (544 kg)	(4) Swivel-locking Anti-ESD
44U	85.922 in. (2,182.4 mm)	26.5 in. (673.1 mm)	33.46 in. (850 mm)	1,200 lb. (544 kg)	(4) Swivel-locking Anti-ESD

TABLE 3
ATE Core Configurations Mechanical Overview

With power distribution equipment already integrated into the space to the side of the rack, you get the entire advertised U-height to use for your instruments and other components you would use in a standard 19-inch rack.

Mounting Rails

Each ATE Core Configurations contain three sets of mounting rails (m6 or 10–32 threads) to easily mount equipment of different sizes and provide flexibility for thermal management. The total mounting depth is 31.5 in. (800 mm), the middle-mounting rail is optional, and location is reconfigurable.

Side Panels and Rear Door

The racks have all power entry and distribution components mounted in a 2U-wide vertical space to the left when viewing the front of the rack. All equipment mounted in the side space is mounted on swinging panels for added serviceability. Doors and side panels are removable for easier access, with side panels having a trip to prevent them from being opened during use.

Configuring Your Own ATE Core Configurations System

Start configuring your own ATE Core Configurations system today by **contacting NI**. Figure 8 displays the different rack sizes, 15U, 38U, and 44U with their corresponding power configurations options. Start from one of these standard configurations.
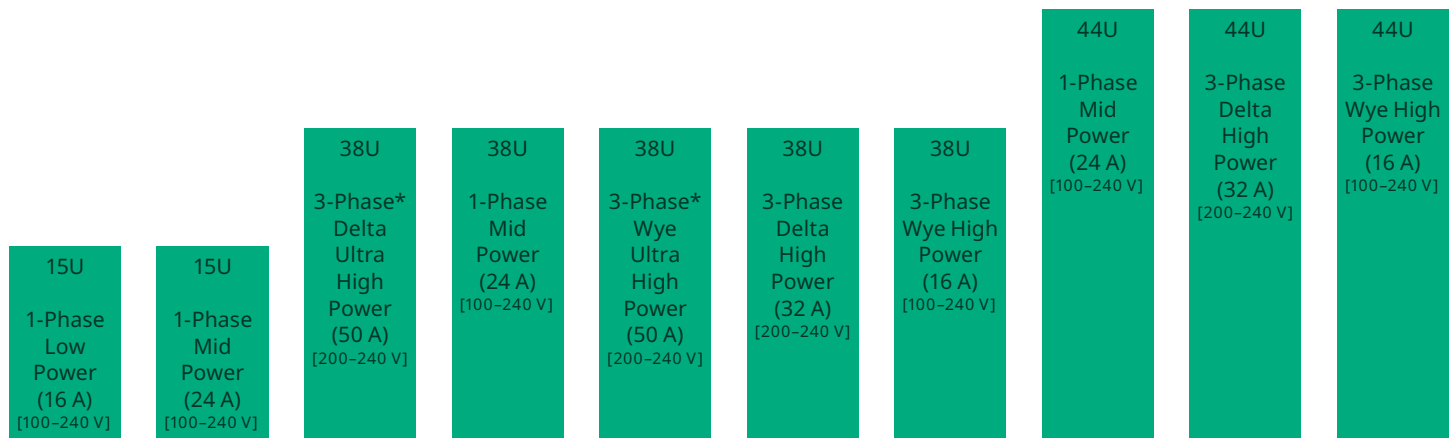
*3-phase power CAN be distributed within the system

Visual Representation of Rack Sizes and Power Options

Software

Every ATE Core Configurations rack contains a rack control unit (RCU), which comes with a C# API supported on Windows 10. The RCU can be used for uptime, monitoring, and reporting activities. It also enables critical control features such as startup and shutdown sequences. The RCU can control rack infrastructure components such as fans and power distribution. It can monitor and report on those components, as well as collect other data such as temperature, power input, ITA pin status, and more. The RCU also has an option for interaction through the Hardware Configuration Utility (HWCU).

NI Software: The Right Tools for the Job

NI has a variety of software for engineers working on research, validation, and production test applications. Learn about our software that helps engineers perform quick ad-hoc tests, build an automated test system, automate data analysis and reporting, develop test sequences, and more.
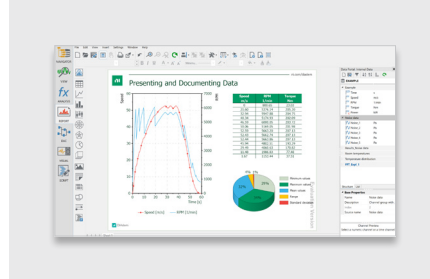
LabVIEW
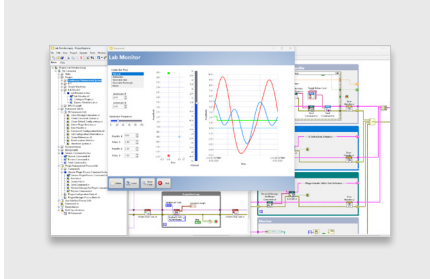
Graphical programming environment that engineers use to develop automated research, validation, and production test systems.

• Acquire data from NI and third-party hardware and communicate using industry protocols
• Use configurable, interactive display elements
• Take advantage of available analysis functions

DIAdem

Data analytics software for measurement data search, inspection, analysis, and automated reporting.

• Display data in multiple 2D-axis systems
• Perform calculations with a simple point-and-click interface
• Automate your measurement data analysis workflow, from import to analysis
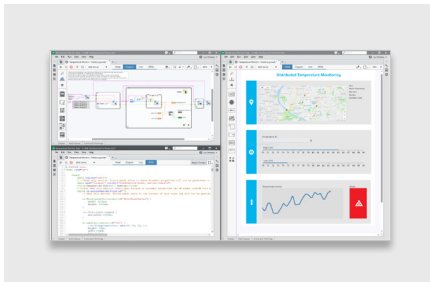
TestStand
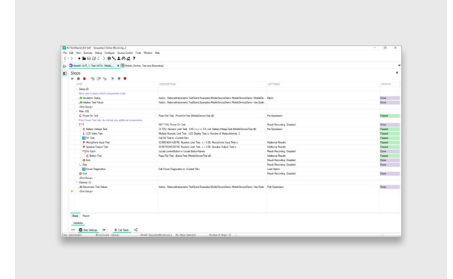
Test executive software that accelerates system development for engineers in validation and production.

• Call and execute tests in LabVIEW, Python, C/C++, or .NET
• Conduct complex tasks, such as parallel testing
• Create customer operator interfaces and robust tools for deployment and debugging

G Web

Development software that helps engineers create web-based user interfaces wihtout the need for traditional web development skills.

• Data transfer APIs for connecting to systems written in LabVIEW, Python, or C#
• Pre-built objects for data display and user input
• Included hosting on SystemLink™ Cloud

FlexLogger™
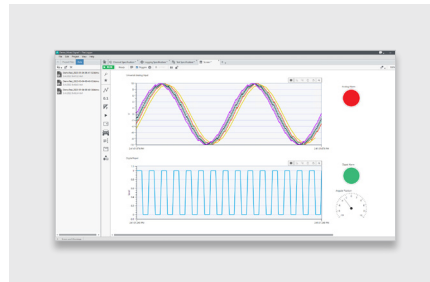
No-code data acquisition software engineers use to build validation and verification test applications.

• Interactive visualization tools for monitoring tests with drag-and-drop charts, graphs, and controls
• Ability to set alarms that monitor single channels or groups for unexpected behavior

InstrumentStudio™
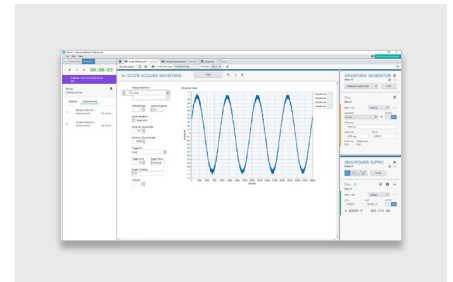
Application software that simplifies setup and configuration of NI PXI hardware.

• Customizable layouts for monitoring multiple instruments at once
• Interactively debug in tandem with code
• TDMS file export containing instrument settings, measurements, and raw data

Supporting Documentation

Document Type	Model
User Manual	**ATE Core Configurations Generation 2**

TABLE 4
ATE Core Configurations Documentation

Platform-Based Approach to Test and Measurement

What Is PXI?

Powered by software, PXI is a rugged PC-based platform for measurement and automation systems. It combines PCI electrical-bus features with the modular, Eurocard packaging of CompactPCI and then adds specialized synchronization buses and key software features. PXI is both a high-performance and low-cost deployment platform for applications such as manufacturing test, military and aerospace, machine monitoring, automotive, and industrial test.

Developed in 1997 and launched in 1998, PXI is an open industry standard governed by the PXI Systems Alliance (PXISA), a group of more than 70 companies chartered to promote the PXI standard, ensure interoperability, and maintain the PXI specification.
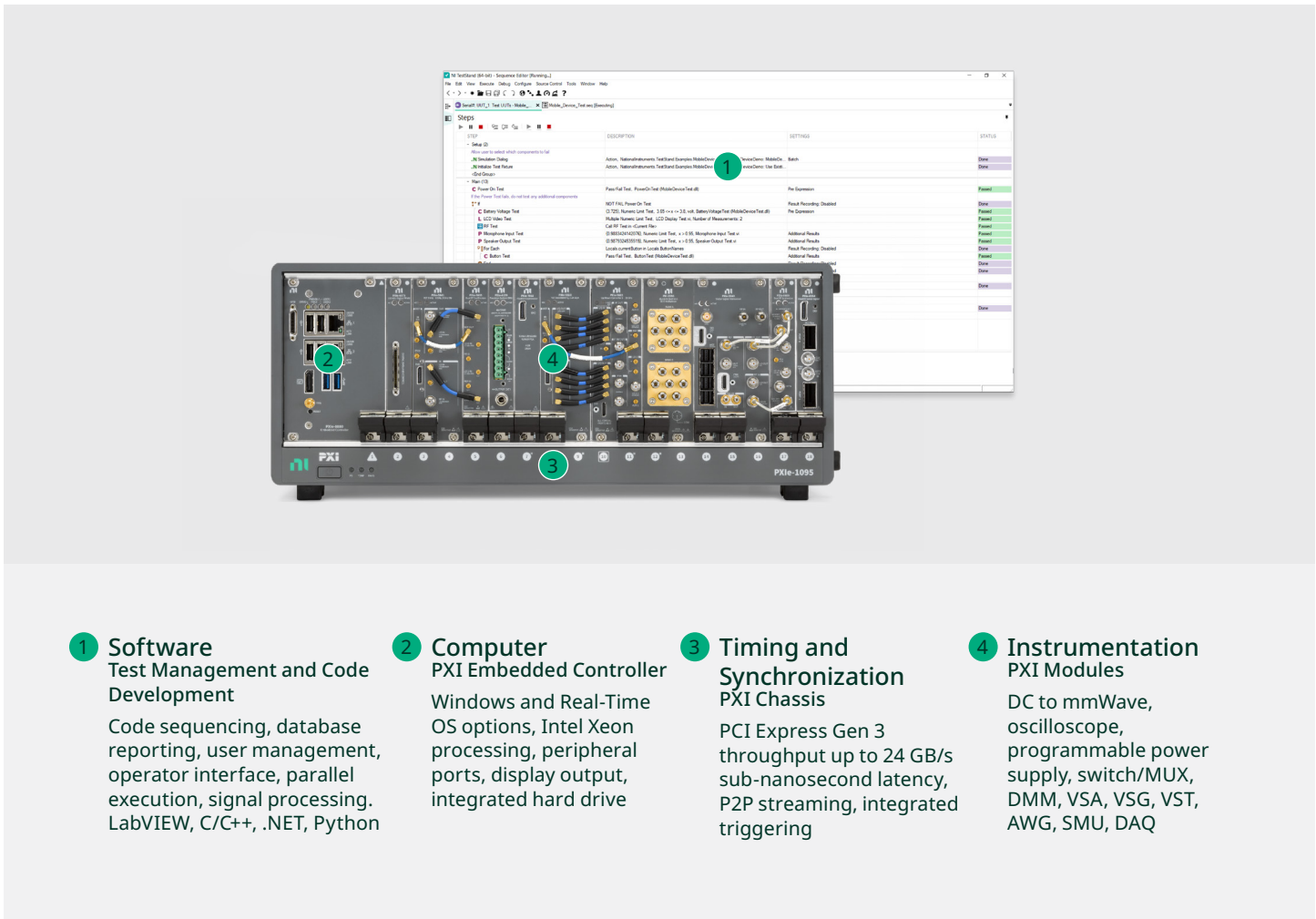
FIGURE 9

A PXI system includes a chassis, controller, instrumentation, and software.

1 Software
Test Management and Code Development

Code sequencing, database reporting, user management, operator interface, parallel execution, signal processing. LabVIEW, C/C++, .NET, Python

2 Computer
PXI Embedded Controller

Windows and Real-Time OS options, Intel Xeon processing, peripheral ports, display output, integrated hard drive

3 Timing and Synchronization
PXI Chassis

PCI Express Gen 3 throughput up to 24 GB/s sub-nanosecond latency, P2P streaming, integrated triggering

4 Instrumentation
PXI Modules

DC to mmWave, oscilloscope, programmable power supply, switch/MUX, DMM, VSA, VSG, VST, AWG, SMU, DAQ

Integrating the Latest Commercial Technology

By leveraging the latest commercial technology for its products, NI can continually deliver high-performance and high-quality products to its users at a competitive price. The latest PCI Express Gen 3 switches deliver higher data throughput, the latest Intel multicore processors facilitate faster and more efficient parallel (multisite) test, the latest FPGAs from Xilinx help to push signal processing algorithms to the edge to accelerate measurements, and the latest data converters from TI and ADI continually increase the measurement range and performance of NI instrumentation.

Higher Data Throughput	Parallel Test Execution	Measurement Acceleration	Increased Measurement Range
PCI Express Gen 3	Multicore Processors	FPGAs	Data Converters

FIGURE 10

Integrating the Latest Commercial Technology

PXI Instrumentation

NI offers more than 600 different PXI modules ranging from DC to mmWave. Because PXI is an open industry standard, nearly 1,500 products are available from more than 70 different instrument vendors. With standard processing and control functions designated to a controller, PXI instruments need to contain only the actual instrumentation circuitry, which provides effective performance in a small footprint. Combined with a chassis and controller, PXI systems feature high-throughput data movement using PCI Express bus interfaces and subnanosecond synchronization with integrated timing and triggering.
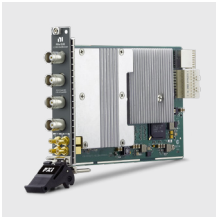
Oscilloscopes
Sample at speeds up to 12.5 GS/s with 5 GHz of analog bandwidth; feature numerous triggering modes and deep onboard memory

Digital Multimeters
Perform voltage (up to 1,000 V), current (up to 3 A), resistance, inductance, capacitance, and frequency/period measurements as well as diode tests

Digital Instruments
Perform characterization and production test of semiconductor devices with timing sets and per channel pin parametric measurement units (PPMUs)

Waveform Generators
Generate standard functions including sine, square, triangle, and ramp as well as user-defined, arbitrary waveforms

Frequency Counters
Perform counter/timer tasks such as event counting and encoder position, period, pulse, and frequency measurements
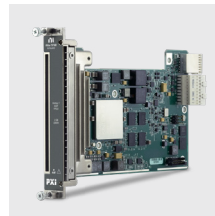
Source Measure Units
Combine high-precision source and measure capability with high-channel density, deterministic hardware sequencing, and NI SourceAdapt transient optimization
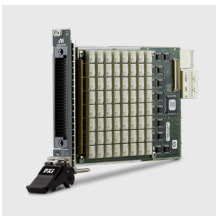
Power Supplies and Loads
Supply programmable DC power; some modules include isolated channels, output disconnect functionality, and remote sense

NI FlexRIO Custom Instruments and Processing
Provide high-performance I/O and powerful FPGAs for applications that require more than standard instruments can offer

Switches (Matrix and MUX)
Feature a variety of relay types and row/column configurations to simplify wiring in automated test systems

Vector Signal Transceivers
Combine a vector signal generator and vector signal analyzer with FPGA-based, real-time signal processing and control

GPIB, Serial, and Ethernet
Integrate non-PXI instruments into a PXI system through various instrument control interfaces
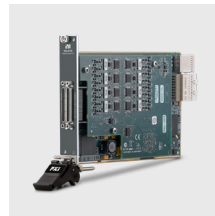
Data Acquisition Modules
Provide a mix of analog I/O, digital I/O, counter/timer, and trigger functionality for measuring electrical or physical phenomena

Hardware Services

All NI hardware features a one-year warranty for basic repair coverage and includes calibration in adherence to NI specifications prior to shipment. PXI systems also include basic assembly and a functional test. NI offers additional entitlements to improve uptime and lower maintenance costs with service programs for hardware. Learn more at **ni.com/services/hardware**.

Additionally, you can repair and replace ATE Core Configurations all through a single source. For detailed information on component options within your ATE Core Configuration, contact NI at **ni.com/contact-us**.

	Standard	Premium	Description
Program Duration	1, 3, or 5 years	1, 3, or 5 years	Length of service program
Extended Repair Coverage	✓	✓	NI restores your device's functionality; coverage includes firmware updates and factory calibration.
System Configuration, Assembly, and Test[1]	✓	✓	NI technicians assemble, install software in, and test your system per your custom configuration prior to shipment.
Advanced Replacement[2]	—	✓	NI stocks replacement hardware that can be shipped immediately if a repair is needed.
System Return Material Authorization (RMA)[1]	—	✓	NI accepts the delivery of fully assembled systems when performing repair services.
Calibration Plan (Optional)	Standard	Expedited[3]	NI performs the requested level of calibration at the specified calibration interval for the duration of the service program.

[1] This option is available only for PXI, CompactRIO, and CompactDAQ systems.
[2] This option is not available for all products in all countries. Contact your local NI sales representative to confirm availability.
[3] Expedited calibration includes only traceable levels.

TABLE 5
NI Hardware Services

PremiumPlus Service Program

NI can customize the previously listed offerings or provide additional entitlements such as on-site calibration, custom sparing, and lifecycle services through a PremiumPlus Service Program. Contact your NI sales representative to learn more.

Technical Support

Every NI system includes a 30-day trial for phone and email support from NI engineers that can be extended through a **Standard Service Program (SSP)** membership. NI has more than 400 support engineers available around the globe to provide local support in more than 30 languages. You also can take advantage of NI's award-winning **online resources** and **communities**.
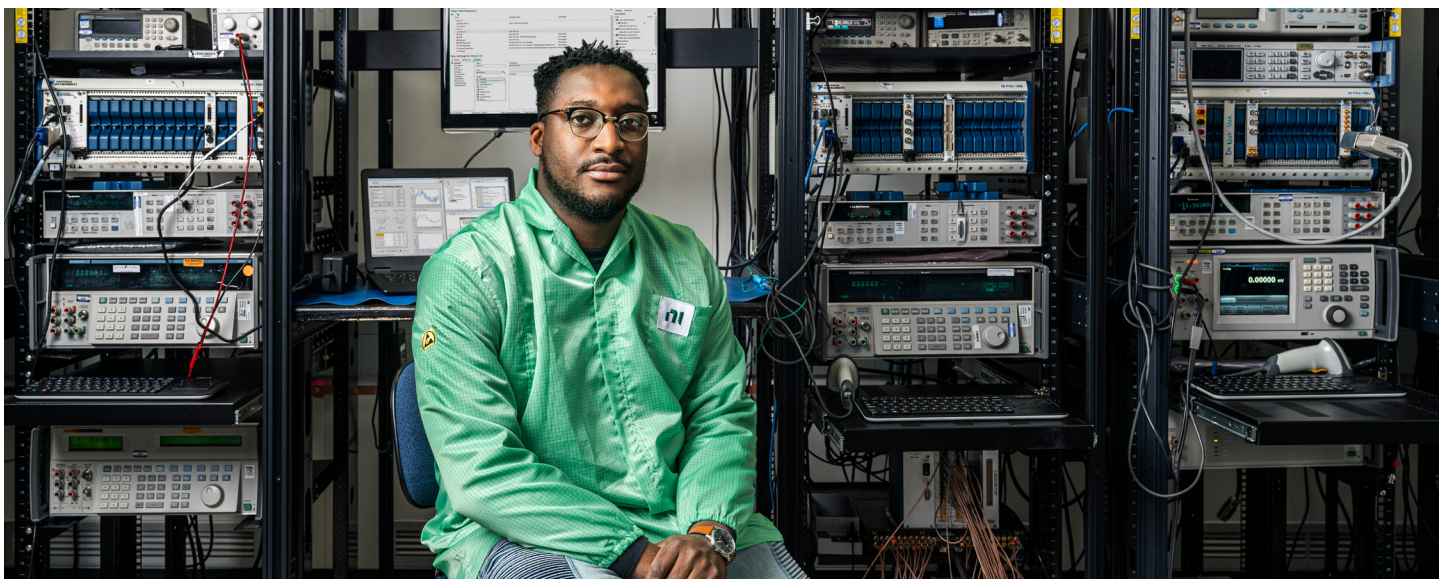
System Integration on Your Terms

NI offers a variety of solution integration options customized to your application-specific requirements. You can use your own internal integration teams for full system control or leverage the expertise of our worldwide network of NI Partners to obtain a turnkey system.

Contact your account manager or call or email us to learn more about how NI can help you increase product quality and accelerate test timelines at (888) 280-7645 or **info@ni.com**.

NI Services and Support

Consulting and Integration

Global Support

Turnkey Solution Delivery and Support

Prototyping and Feasibility Analysis

Repair and Calibration

Training and Certification