



## MTS FlexTest® Controller Family

A versatile, modular controller platform for all your testing needs

be certain.

**MTS FLEXTTEST CONTROLLERS** ARE THE RELIABLE, COST-EFFECTIVE SOLUTION FOR YOUR CURRENT AND FUTURE TESTING NEEDS. THESE MODULAR CONTROLLERS ALLOW YOU TO SHARE HARDWARE BETWEEN CONTROL SYSTEMS AND LABS, ARE EASILY RECONFIGURED FOR A WIDE VARIETY OF TEST APPLICATIONS, AND CAN BE EXPANDED TO ACCOMMODATE NEW TEST NEEDS IN THE FUTURE.



## MTS FlexTest Controller Family

The latest generation of modular digital controllers



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The scalable family of FlexTest controllers all use the same Series 494 hardware.

### Experience the Expertise

MTS Systems Corporation offers unrivaled expertise in the field of precise force and motion control. Engineers in dozens of industries throughout the world rely on MTS' testing equipment and state-of-the-art software to validate designs and to test the durability and performance of products and structures. From automobiles to aircraft, from bridges to buildings, from medical devices to manufactured goods, MTS delivers the necessary technology and know-how to help you accurately test your materials, designs and products.

The latest innovation in MTS control technology is the new FlexTest controller family, which is a set of controllers that all use the same Series 494 hardware

modules. This modular hardware platform allows you to save time and effort in training and in test setup, and enables an easy, cost-effective way to expand your testing capabilities.

The design of FlexTest controllers is based on decades of MTS expertise in providing solutions for structural, system, component and material testing as well as MTS' vast experience in delivering and supporting many thousands of digital controllers across the globe. This new family of controllers provides high-speed closed-loop control, function generation, transducer conditioning and data acquisition to address the full spectrum of testing needs.



## Innovative Hardware



The new Series 494 hardware is the result of more than forty years of controller development experience at MTS. This hardware platform is our 4th generation of digital, and the 3rd generation of modular digital controllers; and is an extension of the technology leadership and innovation that have created MTS' reputation for superior controls. These controllers all share a common set of conditioners, valve drivers and I/O modules.

**FLEXTEST 200 CONTROLLER** – up to forty control channels, and up to eight test stations



**FLEXTEST 100 CONTROLLER** – up to sixteen control channels, and up to eight test stations



**FLEXTEST 60 CONTROLLER** – up to eight control channels, and up to six test stations



**FLEXTEST 40 CONTROLLER** – up to four control channels on one or two test stations

### TEDS CAPABILITIES

Transducer Electronic Data Sheets (TEDS) capabilities comply with the IEEE 1451.4 standard and help ensure that appropriate calibration information is used.

### MTS FlexTest Controller Advantages

MTS provides reliable, easy-to-use, and cost-effective controllers which can be enhanced to meet new test requirements in the future.

MTS controllers have distinct advantages in:

- » Test design and automation
- » Test control
- » Controller versatility
- » Controller longevity

**ADVANTAGES IN TEST DESIGN AND AUTOMATION** are realized through the use of MultiPurpose TestWare (MPT™) software. MPT is a powerful and flexible software application which enables you to design and automate virtually any test procedure.

**ADVANTAGES IN TEST CONTROL** are realized by various adaptive compensation techniques which provide tools for controlling complex tests on difficult specimens.

**ADVANTAGES IN CONTROLLER VERSATILITY** are realized by enabling any hardware resource such as valve drivers or conditioners to be used for any test station. You can easily reallocate hardware resources to reconfigure your controller for different test arrangements.

**ADVANTAGES IN EXPANDING CONTROLLER CAPACITY AND LONGEVITY** are realized by use of modular architecture including centralized processors which can be easily upgraded in the field. Additional test resource boards can be added. These capabilities help you to cost-effectively expand your controller capacity and/or extend the productive life of your controller investment.

### Model 494.05 Handset

The new handset provides an easy, convenient, and compact means to install and replace specimens, and to setup and initiate tests at the load frame or test rig. It is available for all the FlexTest controllers that use Series 494 hardware.



#### HANDSET FEATURES INCLUDE:

- » Exclusive control – to prevent control of actuator movement from any other source
- » Speed-sensitive thumbwheel – for precise control of the actuator
- » Multi-line text display – for easy viewing of system information
- » Display Pages – for Manual Command, Auto Offset and Program Run operation

#### HANDSET FUNCTIONS INCLUDE:

- » Temporarily override and reset interlock
- » Energize and de-energize hydraulic pump and hydraulic manifold
- » Easily view multiple signals for one or more control channels
- » Conveniently move actuators to install and replace test specimens
- » Auto-offset selected transducer signals
- » Start, pause and stop the test application program

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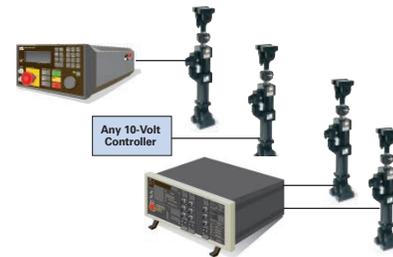
### Multi-Step Lab Migration

In addition to being an ideal solution for new installations, the FlexTest controller provides the ability to migrate existing labs from older analog controls in multiple cost-effective steps.

*You can migrate your lab one channel at a time, or all at once — whatever is best for you.*

#### LAB BEFORE FLEXTEST CONTROLLER

- » Existing servo-controllers, typically analog and often single-channel
- » No automation
- » No data acquisition
- » No ability to observe signal traces
- » No support for RPC® software



#### AUTOMATE EXISTING ANALOG CONTROLLERS WITH FLEXTEST SUPERVISOR TO REALIZE NEW CAPABILITIES

- » Automated tests
- » Customized tests
- » Block-cycle tests
- » Multi-channel tests
- » Data acquisition
- » RPC time history drives and responses
- » Specimen protection while loading (CLC)
- » Various control compensation techniques
- » Multi-station tests (on one or multiple PCs)



#### CHANNELS CONVERTED TO FULL FLEXTEST CONTROL SUPPORT, EVEN MORE NEW CAPABILITIES

- » Mode-switch
- » Bumpless start
- » Auto-zero
- » Tuning (or auto-tuning) for all channels
- » Save and restore PID settings
- » Save and restore test files
- » Simpler re-configurations
- » Simpler setups (limits, etc.)



## Increase Productivity with Proven Software

### Sophisticated Information Management

FlexTest software has an intuitive graphical interface that makes it easy to quickly configure your controller for a wide range of testing applications.

#### DEFINE YOUR WORKSPACE

Choose the information you want displayed during a test. FlexTest software allows you to position and size system status information, including digital meters and scope displays, on your PC monitor.

### Multiple Stations

#### DEFINE SEPARATE VIEWS

You can define separate views for each test station. Your stations will open to automatically show the views you have selected. You can open and close all the windows you wish, and then easily revert to your favorite view at the click of a button.

#### FOCUS ON ONE STATION

With Station Desktop Organizer, you can focus on one station at a time. Most of the PC monitor is dedicated to your station of choice, while a small area is used to keep you informed of the status of other open stations.

#### SWITCH VIEWS

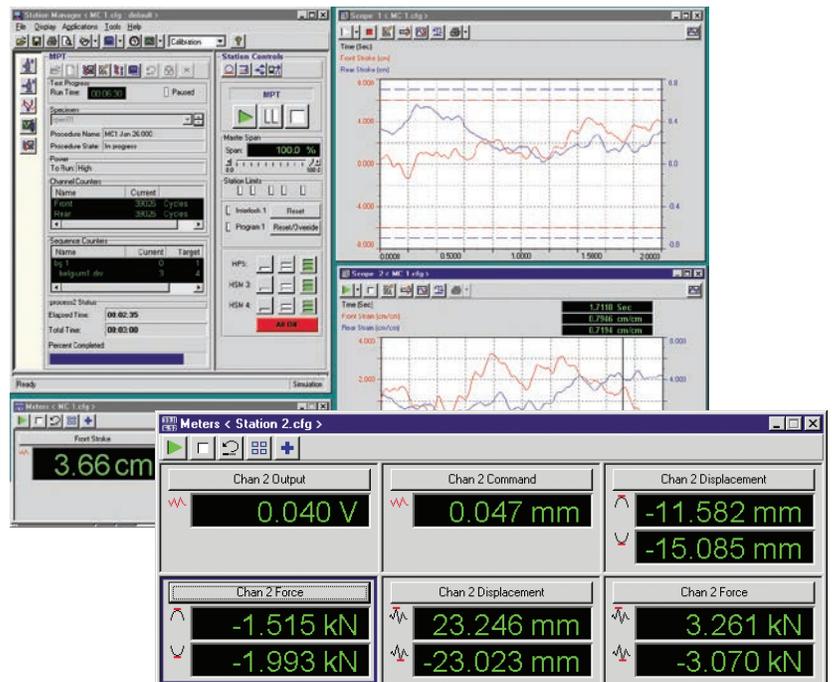
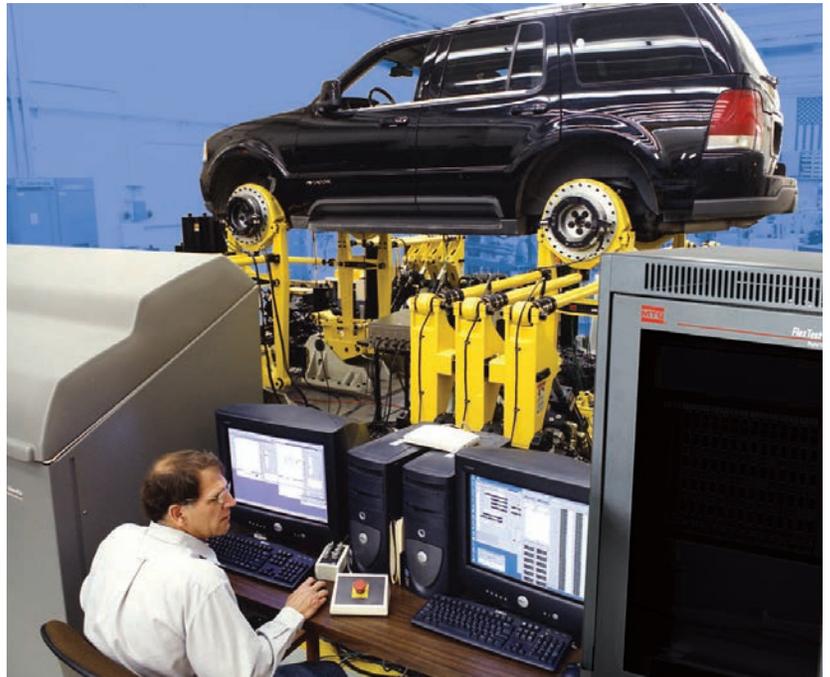
Just click your mouse to switch views from one station to another.

#### MULTIPLE OPERATORS

FlexTest software allows multiple operators to simultaneously run separate tests on one controller, without having to share a PC. The PC-per-Station option allows each operator to have their own PC, and is very useful in multi-station applications where the test rigs are located in different areas.

### Project Management

The Project Manager feature allows you to better organize your files. This feature is particularly helpful when using multiple stations or when multiple operators are accessing common systems.



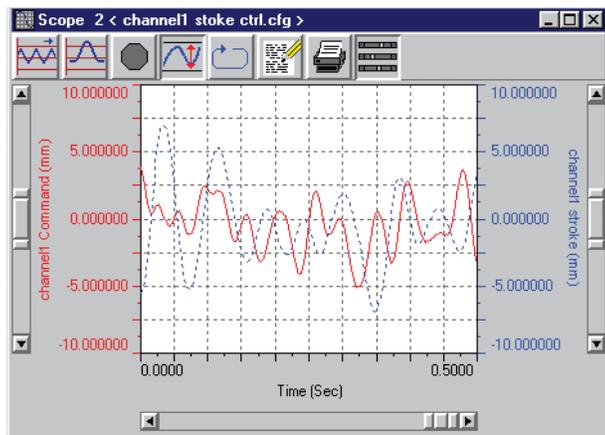
## Accurate Test Control

FlexTest controllers support adaptive control compensation techniques, calculated channels, cascade control, and interoperability with RPC software to adapt actuator controls to meet test requirements for your specimen and achieve accurate results.

## Compensation Techniques

Each compensation technique is optimized to meet specific application needs. These techniques enable you to more accurately control your tests. You can realize desired end levels even while specimen characteristics change.

- » **NULL PACING** ensures desired levels are reached on initial cycle without over-programming.
- » **PEAK VALLEY CONTROL (PVC)** adapts as specimen compliance changes to ensure peaks and valleys are maintained for any constant amplitude periodic waveform.
- » **PEAK VALLEY PHASE (PVP) CONTROL** adapts for phase as well as amplitude for multi-channel cyclic tests. PVC can correct for phase even with distorted waveforms.
- » **ARBITRARY END LEVEL CONTROL (ALC)** can adapt for linear or non-linear specimens with periodic or random waveforms.
- » **ADAPTIVE INVERSE CONTROL (AIC)** can be applied to any waveform, including random profiles or RPC time history files in linear systems. An example of how AIC can greatly improve tracking to desired command is illustrated in the two charts below.



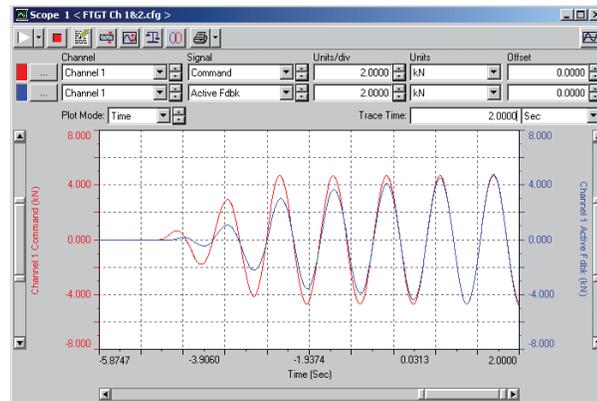
Without AIC

With Adaptive Compensation, the command is adjusted in real time so the achieved response matches a target signal.

All of these compensation techniques are useful in certain test applications. They work for any control mode, including dual-mode control.

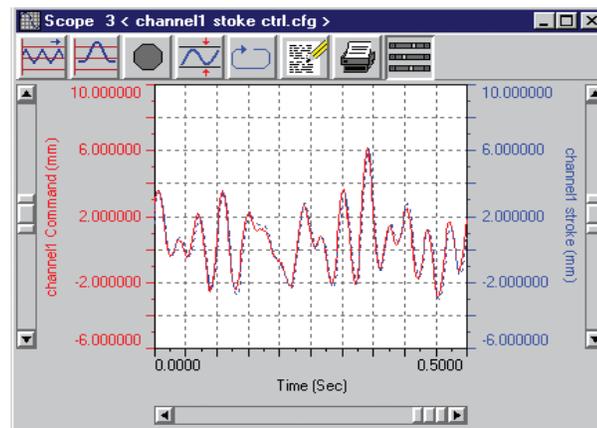
## Calculated Channels

The FlexTest control system enables you to easily define calculations from input signals. Available mathematical functions include: +, -, x, /, cos, exp, ln, log, power, sin, tan, and time. It is possible to use one defined calculation in another calculation.



## Cascade Control

With optional Cascade Control you define feedback signals for each of two control loops on one actuator. The command to the outer loop uses one signal (e.g. load) while most of the actual control is performed by the inner loop with the other signal (e.g. stroke). This enables better tuning and system response in cases where the specimen stiffness varies significantly as a function of temperature or wear.



With AIC

## Interoperability with RPC

FlexTest control systems can also interoperate with RPC software – either through networking or by having the RPC software reside on and run from the FlexTest control system PC.

# MTS Series 793 Application Software

## MultiPurpose TestWare (MPT) Software

MPT is powerful application software that enables you to easily automate test procedures. You can quickly create your own test sequences, including any sequence of command generation and data acquisition. New test requirements can be satisfied in a few minutes by designing a new test and saving it for future use. You are not limited as you might be with a fixed-function application.

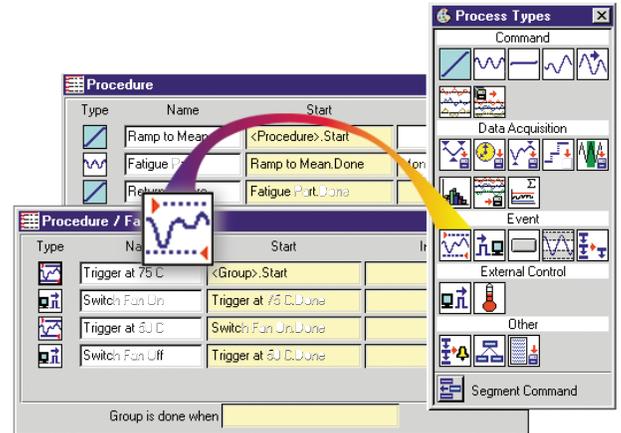
This flexibility extends to data analysis. The software saves data from your tests in a standard format, allowing you to use your favorite spreadsheet program or analysis package. This gives you total flexibility in analyzing, plotting, or reporting your data.

### INTUITIVE OPERATION

The mouse-driven graphical user interface makes MPT software easy to learn and use, especially with its drag-and-drop means for defining tests. You'll spend more time testing and less time learning and setting up the system.

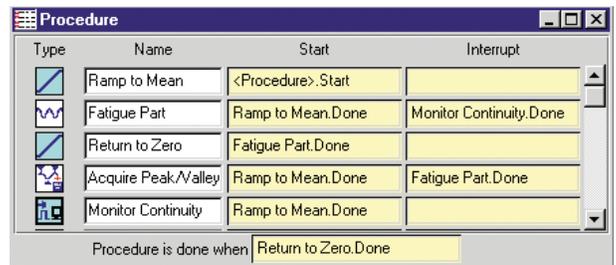
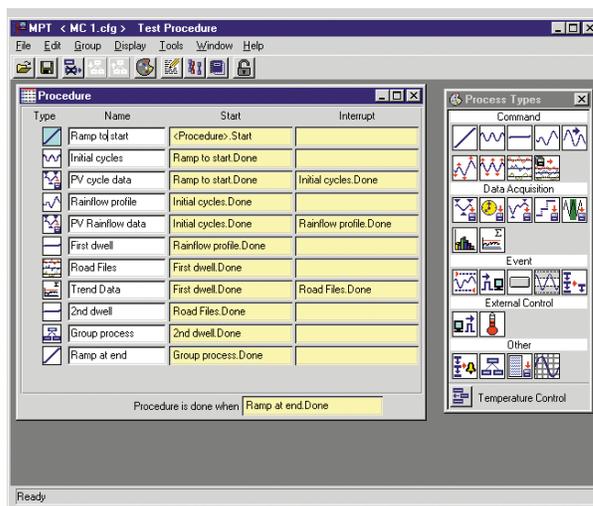
*For more information about MPT software, see the MTS MultiPurpose TestWare brochure, part number 100-213-363.*

## Powerful Test Design made Fast, Flexible and Easy



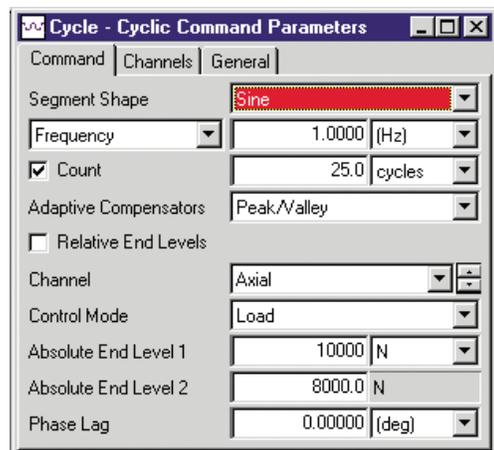
### SELECT THE PROCESSES

Available processes are displayed as icons on the Process palette. Select the icon, drag it to the table, and drop it in place.



### CONNECT THE PROCESSES

Establish the order in which processes execute by connecting them with other processes.



### DEFINE THE PROCESS PARAMETERS

Define the specific test parameters for each process, such as ramp time, end-levels, and frequencies.

### Faster Test Design with MPT Variables

**MPT VARIABLES** allow test developers to easily create and edit automated test procedures, significantly increasing test flexibility and productivity.

Imagine that you would like to run various cyclic blocks at several different end levels but at a common frequency, and at the end of the test, you want to review results and reset the common frequency based on prior test results. Without MPT Variables, you would need to open every cyclic process to change the frequency for each cyclic process. With end levels set as a MPT Variable, the Variables Editor can be used to simply change the frequency value in one location for all cyclic processes that reference that particular variable.

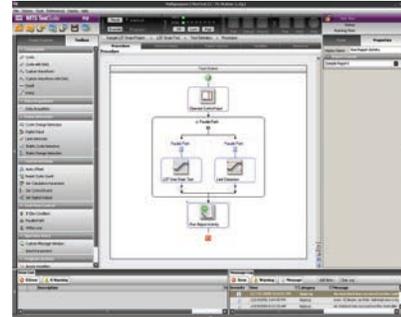
MPT Variables also make it easier to adjust the frequency while the test procedure is running. The Operator Information Process is used to enable variable change without stopping and unlocking the test, making changes fast and easy to implement.

#### MPT VARIABLES (793.23)

- » Test designers can define, view, and change MPT process variables without having to access individual processes
- » Creating and editing test procedures is faster and more reliable, particularly for procedures involving large numbers of processes.
- » Test designers can create tests with loops that use different values for each pass, making tests more compact and quicker and easier to define.
- » For added convenience, the Operator Information Process enables test designers to designate variable values that can be changed while the test is running.

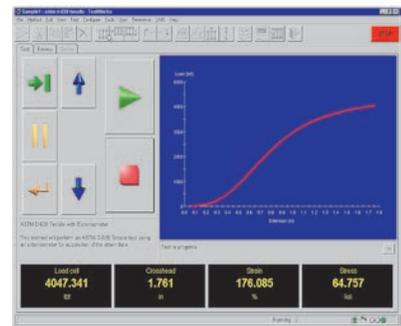
### MTS TestSuite Software Platform

- » **MTS TESTSUITE™ SOFTWARE** provides new tools for creating and running tests, generating reports and analyzing test data for material and component tests. It gives you more control over your testing operations than ever before. Calculations are transparent and modifiable, so that you can use the testing templates provided by MTS, modify those templates or develop your own. Test design is done through a graphical workflow interface that allows designers to see the tests they are creating in a flow chart format. Creating tests, even those with complex and parallel workflows, is simple and fun.



### Other Application Software

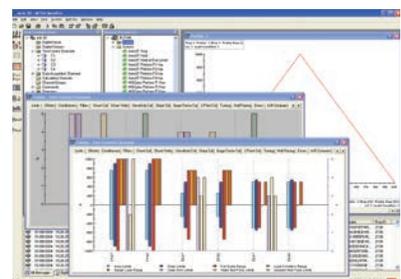
- » **TESTWORKS® 4 SOFTWARE** runs test methods for tensile, compression, flexure, and other simple monotonic tests. It allows you to acquire and manipulate data from displacement, time, load, and up to six strain channels, as well as store test setup data along with test results, so you can easily determine how a test was run and repeat it as desired.



- » **RPC PRO SOFTWARE** minimizes testing time through advanced editing, analysis, and simulation capabilities. RPC Pro software can complement existing test systems or provide a powerful application for new test simulation that can be customized and automated to meet your specific needs.



- » **AEROPRO™ SOFTWARE** is designed specifically to manage the large-channel-count static and fatigue structural tests required in aerospace structural testing. Allows users to view test status, scan data or continuous run-time data with multiple data types in a single display.



# Materials Testing

For decades, MTS has been creating material testing solutions for several industries. Our superior software and controls, combined with our state-of-the-art load frames, provide the utmost reliability and repeatability of material test results.

## Innovative Hardware

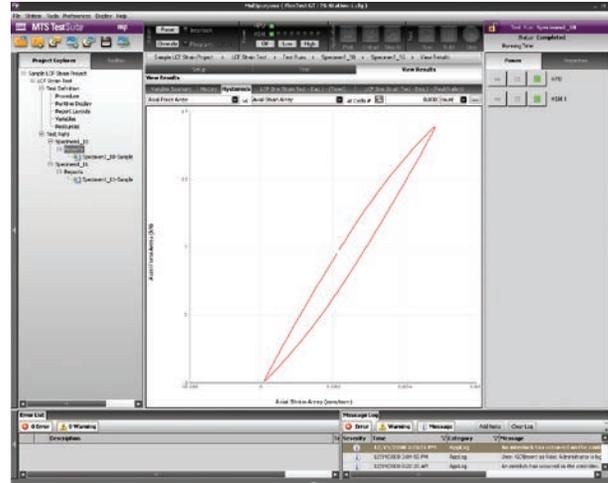
- » **NEW HANDSET** – allows you to easily install and replace test specimens at the load frame.
- » **TEDS SUPPORT** – complies with IEEE 1451.4 standard, to recognize the connected TEDS transducer and help ensure that appropriate calibration information is used.
- » **MULTI-STATION SUPPORT** – maximizes productivity and minimizes your expense. Each test operator can use their own PC and simultaneously run separate tests on one controller.

For a wide variety of tests, on a vast array of materials, MTS has the complete testing solution.

**TESTS:** Tensile. Compression. Shear. Tear. Fatigue. Fracture. *And more.*

**MATERIALS:** Plastics. Metals. Adhesives. Ceramics. Elastomers. Resins. Propellants. Carbon Fiber Composites. *And more.*

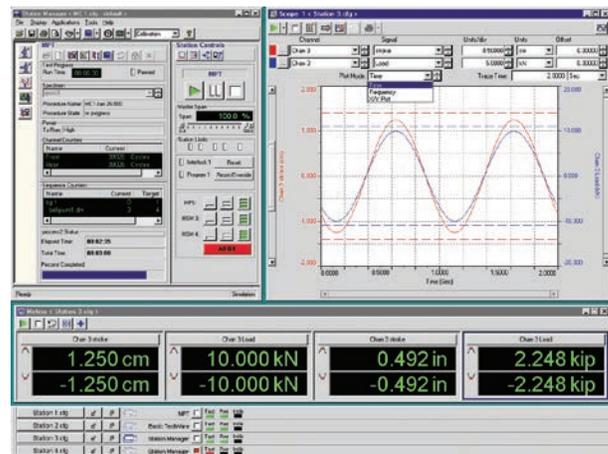
## Proven Software



MTS TestSuite Fatigue Analyzer



TestWorks software



MultiPurpose TestWare (MPT) software

### Flexible, precise control

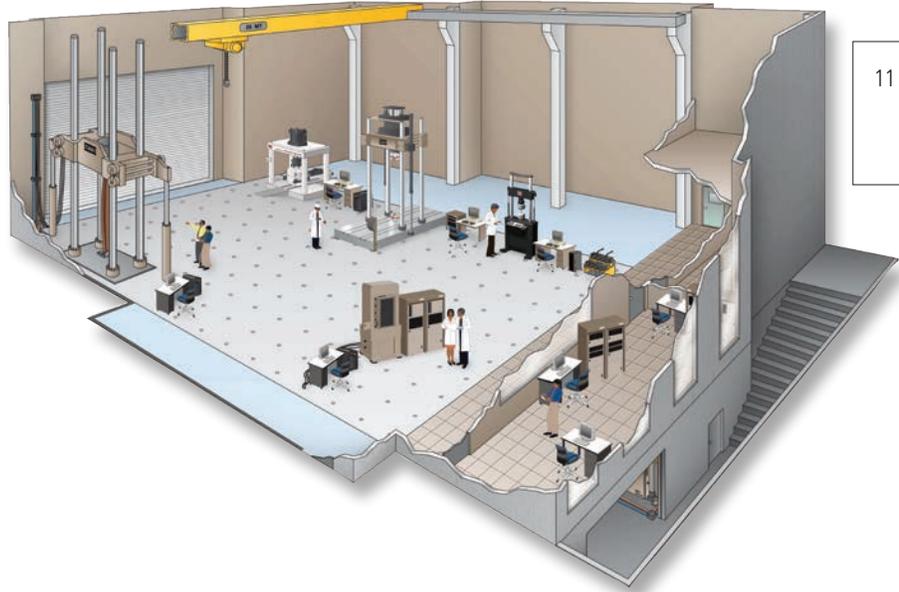
MTS material testing systems are ideal for not only standard dynamic testing requirements, but also for tougher challenges including high-frequency, multi-axial and axial-torsional applications. These servohydraulic systems:

- » Perform reliably during long-duration fatigue tests
- » Resist side loads and deflections to maintain precise alignment
- » Can be configured with a broad range of extensometers, force transducers, grips, fixture and environmental chambers
- » Provide the ultimate in testing flexibility.

The biomedical industry is just one of the many industries that benefit from MTS testing expertise. Product development scientists use MTS Bionix® products to accurately and cost-effectively conduct tests that allow them to shorten time-to-market and meet regulatory requirements. They rely upon MTS Bionix solutions to perform quality control and verification tests, to assure the highest quality and reliability of their medical products.

With MTS FlexTest controllers and Series 793 application software, biomedical product developers can:

- » Evaluate materials and product designs early in the development cycle
- » Simulate biological forces and displacements
- » Characterize biomaterial properties
- » Measure quality control and quality assurance.



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## Component Testing

MTS understands the importance of gaining high quality component and subassembly test data; so we provide a broad set of testing solutions, including: powerful control and data acquisition software, test application software, versatile controllers, and reliable hydromechanical products to address a full range of component testing needs.

Test seats, radiators, instrument panels, HVAC subsystems, engine mounts, fuel tanks and more with MTS controllers. The FlexTest controllers integrate several key algorithms to speed testing, including: Adaptive Inverse Control (AIC), Amplitude Phase Controller (APC) and Three Variable Control (TVC).

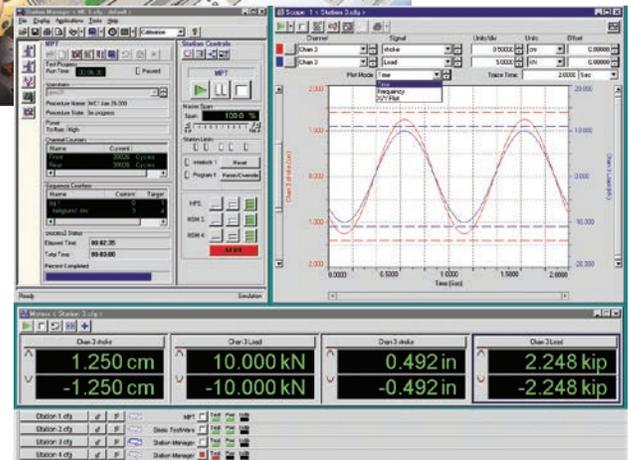
### Innovative Hardware

- » **SMALLER AND LIGHTER** – the new controllers are smaller and much lighter than other controllers for most system and component test applications.
- » **GREATER CONFIGURABILITY** – safely re-configure a test while other tests are running on the same controller.
- » **GREATER FLEXIBILITY** – the modular platform makes it easy to match your channel requirements with the most cost-effective solution.

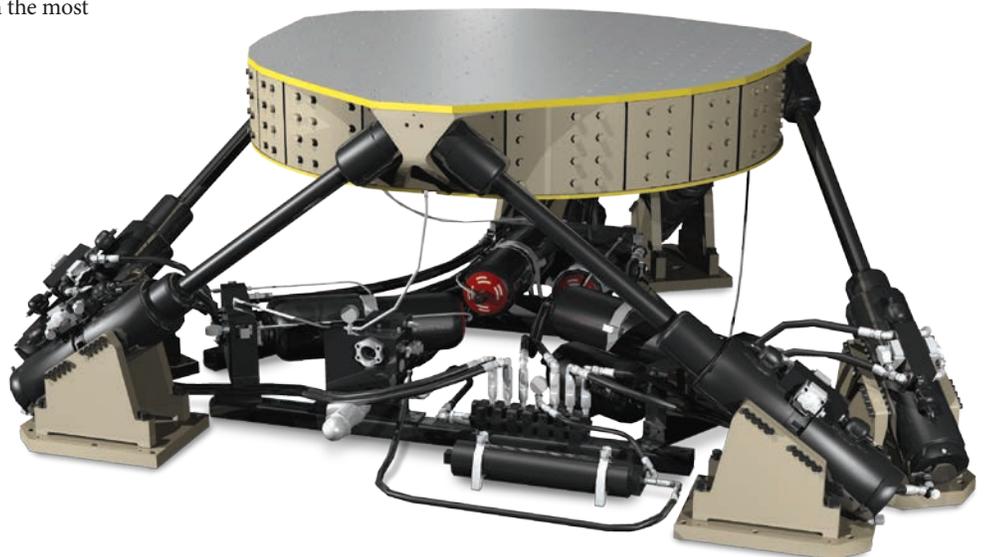
### Proven Software



Component RPC Pro (cRPC Pro) software



MultiPurpose TestWare software



## Systems Testing

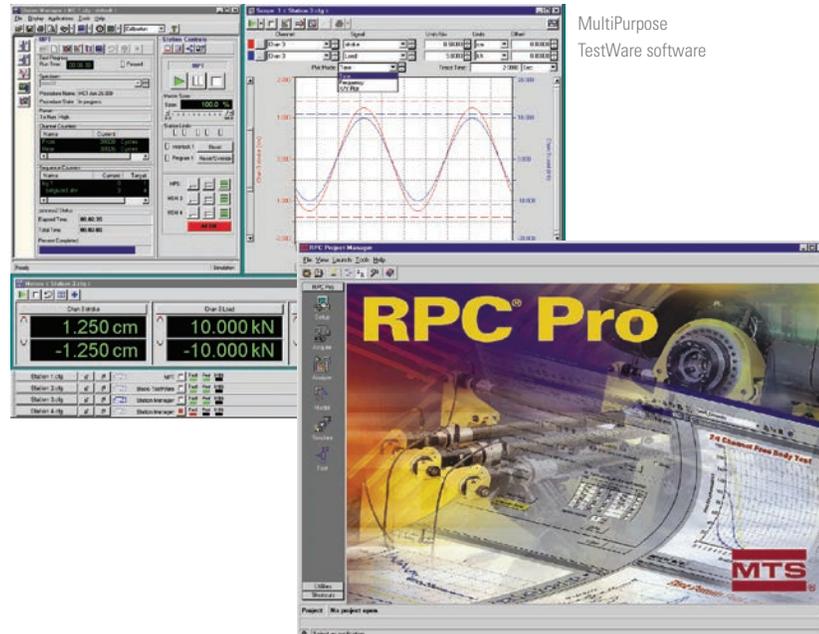
For full-vehicle testing, the reliability and repeatability of results is critical to success. For more than forty years, manufacturers have trusted MTS to provide testing solutions that can efficiently and accurately validate vehicle design. And over the years, MTS has continued to offer innovative hardware and software solutions for vehicle testing. The scalability of the new controller hardware is one of the latest improvements in testing technology. Now you can easily expand to larger channel counts, and can accommodate more test rigs, stations, and test operators while maintaining the accuracy you require.

Additionally, you gain several advantages when using the new MTS controller hardware with industry-standard RPC Pro software:

- » Native support for data formats
- » Anti-aliasing filters
- » Real time calculations (matrix control)
- » Mode switching.

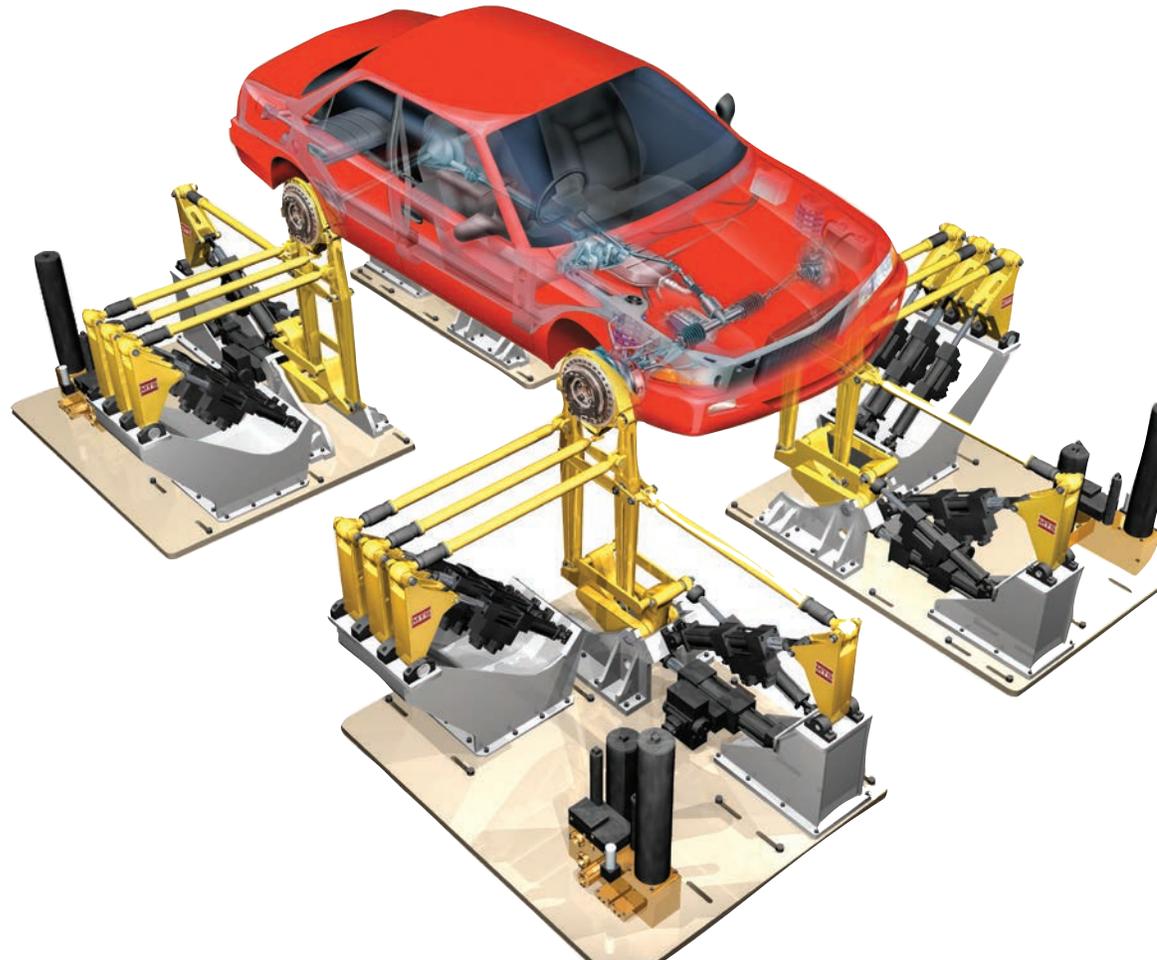
Superior controls and software help ensure reliable, repeatable results.

### Proven Software



MultiPurpose  
TestWare software

RPC Pro software



# Structural Testing

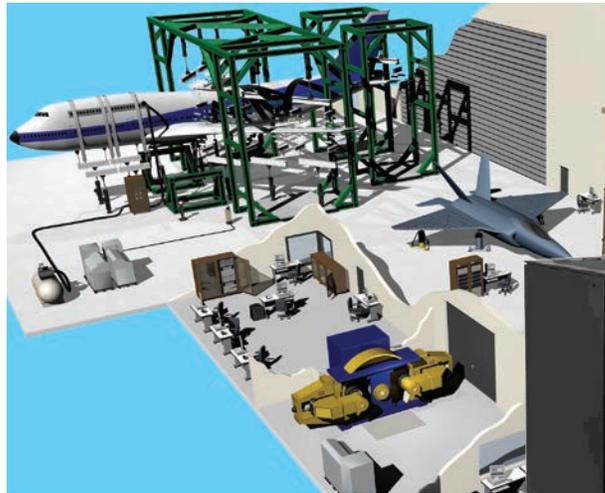
MTS controllers have been integral to aerospace structural testing for decades. The new controller family includes the FlexTest 200, which brings additional capacity to aerospace test labs. The FlexTest 200 controller can manage up to 40 channels and 8 stations in single chassis. Multiple chassis can be connected in a system to support tests with over 300 control channels. Multiple operators and remote rig locations can be easily accommodated in multi-station applications.



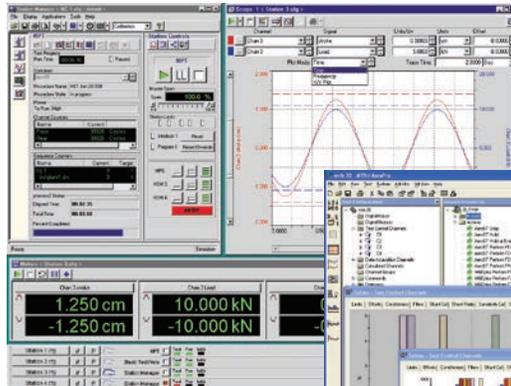
## Aero Control System Advantages

### Innovative Hardware

- » **COMMON HARDWARE PLATFORM** – the new FlexTest 200 controller uses the same hardware platform found in all other MTS Series 494 control systems. The resulting compatibility allows you to leverage your controller investment across both your structural testing and material testing departments.
- » **EXPANDABILITY** – address changing requirements with affordable upgrades and add-on capabilities instead of new control system purchases.
- » **INTEGRATED CHASSIS ARCHITECTURE** – minimal internal cabling means fewer problems and easier serviceability.
- » **TEDS SUPPORT** – complies with IEEE 1451.4 standard, to recognize the connected TEDS transducer and ensure that appropriate calibration information is used.
- » **MULTIPLE CONTROLLERS** – connect multiple controllers together for Aero structural tests with larger numbers of control channels.



### Proven Software



Series 793 system software

AeroPro software

## MTS Reliability

It is what you would expect from the leader in servohydraulic testing solutions: a controller family that uses a common set of versatile modules to meet any testing need. MTS will continue to support you with innovative, modular hardware solutions, and time-tested software to help meet all your testing requirements. With the newest controllers, you now can experience even higher channel densities and capacities, greater configurability, more setup options, support for TEDS, and other improvements to make your testing more reliable. You can count on MTS to continue to provide versatile, reliable, usable control solutions that bring value to your testing operations.



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## Unparalleled MTS Service and Support

For more than forty years MTS Systems Corporation has been the world-leading supplier of test systems to manufacturers in the automotive, aerospace and other industries. A key component of our success over the decades has been our worldwide service organization. Regardless of your size or location, MTS is committed to optimizing your return on your FlexTest controller investment. To help you maximize the productivity of your testing system we offer planned professional maintenance, responsive local support, hands-on training programs, accurate and up-to-date technical documentation, and accredited calibration services. To resolve more complex engineering or process challenges, we field an experienced global consulting team. MTS is ISO 9001 certified, and our controller and application software packages are designed and manufactured in accordance with ISO 9001 practices.



## Series 494 Hardware

The Series 494 DUCs (Digital Universal Conditioners) can work with most AC transducers and DC transducers. You can use the same DUC to condition an LVDT for one test, and then to condition a load-cell for the next test. These are full-range conditioners, meaning they accurately cover the full scale of the transducer while providing the resolution and repeatability needed when measuring small percentages of

that range. There is no need to select between ranges for a transducer. FlexTest controller settings and test setups are easily repeatable because you can save and retrieve configurations.

Full-Range conditioning is available in three mezzanine cards:

- » 494.16 Valve Driver/DUC card
- » 494.25 Single DUC card
- » 494.26 Dual DUC card:



### SERIES 494 HARDWARE INCLUDES:

- » 494.96 MVME Processors
- » Mezzanine Cards: **←1**
  - 494.16 Valve Driver/DUC card
  - 494.21 Multi-Range DUC & Accelerometer Adapter
  - 494.25 Single DUC card
  - 494.26 Dual DUC card
  - 494.45 8-Input A/D card
  - 494.46 8-Output D/A card
  - 494.47 Dual UART/Encoder interface
- » 494.40 I/O Carrier holds mezzanine cards **←2**

### FLEXTEST 40 CONTROLLER

- » 494.41 or 494.42 System board
- » 494.44 Two-Station System board, with optional 494.32 DIO breakout box & 494.33 DIO power supply

### FLEXTEST 60, FLEXTEST 100, FLEXTEST 200 CONTROLLERS

- » 493.73 HPU interface board
- » 494.74 Dual HSM interface (On/Off or Off/Lo/Hi) **←3**
- » 494.75 8-Input BNC board
- » 494.76 8-Output BNC board
- » 494.31 High-Power DIO breakout box with 494.33 DIO power supply
- » 493.72 Digital I/O interface board
- » 493.74 Dual HSM interface board
- » 494.49 Quad Encoder interface

### FOR AERO STRUCTURAL TESTING

- » 494.43 Multi Chassis interface board
- » 494.79 8-Channel valve driver board

### FlexTest 40 Controller



Back (4 slots)



Front (no slots)



One-station version with 494.41 or 494.42 system board

Two-station version with 494.44 system board

### FlexTest 60 Controller

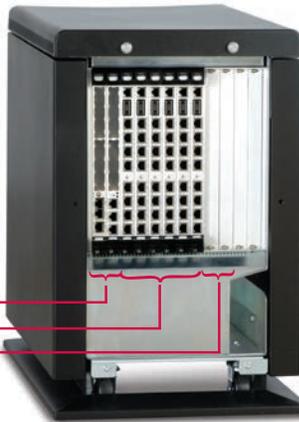


Front (6 slots)

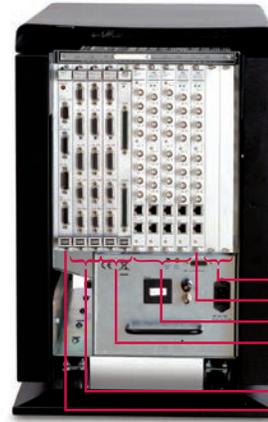


Back (8 slots)

### FlexTest 100 Controller



Front (10 slots)



Back (12 slots)

494.96 MVME Processors  
494.40 I/O Carrier boards  
Room for expansion

Room for expansion  
494.76 8-Output BNC board  
494.75 8-Input BNC boards  
493.72 Digital I/O Interface board  
(connects to screw-terminal break-out box)  
494.74 HSM Interface boards  
493.73 HPU Interface board

### FlexTest 200 Controller



Front (20 slots)



Back (20 slots)

## Specifications

	FlexTest 40	FlexTest 60	FlexTest 100	FlexTest 200
<b>Configurability</b>	No configuration constraints. Any input can be assigned to any control channel. Control channels can be assigned to any station without changing circuit boards or cables.			
<b>Test Stations*</b>	1	or 2	Up to 4 (6 if on/off HSMs)	Up to 8
<b>Control Channels*</b>	Up to 4	Up to 4	Up to 8	Up to 16
<b>Conditioned Transducer Inputs*</b>	Up to 12	Up to 12	Up to 24	Up to 40
<b>Auxiliary Data Inputs*</b>	Up to 16	Up to 16	Up to 32	Up to 64
<i>*Limitations may apply to realize capacities shown</i>				
<b>User Definable Digital I/O</b>	3/3 included	8/8 available	16/16 available	32/32 available
Input on voltage	2.7-26 VDC @ 0.5 mA minimum			
Input resistance	2 K ohm			
Output	30V, 1A maximum		30 VDC, 2A maximum	
<b>Maximum System Update rate**</b>				
1-2 control channels	6144 Hz		6144 Hz	6144 Hz
3-4 control channels	4096 Hz		4096 Hz	4096 Hz
5-8 control channels	NA		2048 Hz	2048 Hz
9-16 control channels	NA		2048 Hz	2048 Hz
17-32 control channels	NA		NA	2048 Hz
> 32 control channels	NA		NA	1024 Hz
<i>**Limitations may apply to realize rates shown</i>				
<b>Dimensions (including enclosure)</b>				
Height	14 cm (5.5 in)		44.2 cm (17.4 in)	56 cm (22 in)
Width	43 cm (17 in)		21.6 cm (8.5 in)	37 cm (14.5 in)
Depth	44.5 cm (17.5 in)		64.8 cm (25.5 in)	66 cm (26 in)
Weight	8.6 kg (19 lb)		14 kg (31 lb)	45.4 kg (100 lb)
<b>Power Input</b>				
Voltage	Universal input: 100-240 VAC single-phase; 50-60 Hz			
Surge current (for 1/2 cycle)	< 40A		< 40A	< 80A
Static current at 115 VAC	~ 4A		~ 8A	~ 12A
Static current at 230 VAC	~ 2A		~ 4A	~ 6A
Leakage current	< 3.5 mA		< 3.5 mA	< 3.5 mA
Circuit protection	Short circuit protection by duty cycle fold-back with auto recovery			
<b>Hydraulic Service Manifold I/F</b>				
HSM contact outputs	1.0 A @ 24 VDC			
HSM proportional output	20 - 800 mA; 2 or 4 sec. ramp on; 0, 2, or 4 sec. ramp off (selectable)	Only available with 493.74 board: 20 - 800 mA; 2 or 4 second ramp on; 0, 2, or 4 second ramp off (selectable)		
<b>Servo Control</b>				
Control modes	Any connected input (load, strain, stroke, etc) or calculated variable Dual-Mode, Channel-Limited-Channel (such as load-limited displacement for specimen loading). Cascade Control and Three-Variable Control available as options.			
Tuning	PIDF with forward loop filter. Control loops can be tuned manually or automatically.			
Command optimization	PVC (Peak Valley Control), and Null Pacing are standard. ALC (Arbitrary Level Control), PVP (Peak Valley Phase), AIC (Adaptive Inverse Control), and AICX (Enhanced AIC), are optional.			
<b>Program Generation</b>				
Frequency range	0.001 Hz to 600 Hz Recommend frequency not exceed 10% of system update rate			
Resolution	32 bit			
Waveforms	Haversine, square, triangle, ramp, true sine, random, and sine-sweep			
Other	Broad band, frequency-weighted random signal generation Soft start-stop available on all functions			

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	FlexTest 40	FlexTest 60	FlexTest 100	FlexTest 200
<b>Valve Drive - 2 Stage</b>		Dual-balance differential current source		
Output range		Adjustable full scale up to 100 mA. Compliance voltage = 20 V		
Output dither		Amplitude adjustable: 0-50% FS current. Frequency adjustable: 1-4915 Hz		
<b>Valve Drive - 3 Stage</b>		Dual-balance differential current source		
Output range		Adjustable full scale up to 100 mA. Compliance voltage = 20 V		
Output dither		Amplitude adjustable: 0-50% FS current. Frequency adjustable: 1-4915 Hz		
Excitation		Balanced output 100 mA maximum +/- 20 VAC, frequency set to 10 kHz		
Input		Differential AC-coupled with adjustable gain and zero		
Input-loop controller		Proportional and differential		
<b>Digital Universal Conditioner</b>		Primarily for resistive-type or reactive-type transducers		
Excitation		Balanced constant-voltage or constant-current, supports 4-wire or 8-wire connections		
DC excitation amplitude		1 - 20 V		
AC excitation amplitude		1 -10 V peak-peak		
Excitation frequency		Selectable: 10, 5, 2.5, 2, or 1 kHz		
Gain accuracy		< 0.1% at 10 VDC excitation and 20 deg C (DC mode)		
Temperature drift		< 30 ppm/degC (DC mode)		
Interlocks		Excitation failure in hardware, conditioner saturation in software		
TEDS support		Compatible with IEEE 1451.4 Class 2		
<b>Analog Inputs (optional)</b>				
Input voltage		+/- 12.5 V		
<b>Signal Processing</b>				
Input resolution		19 bit with over-sampling		
Internal data sample rate		122.88 kHz (simultaneous sample and hold on all analog inputs)		
Sample update rate		Simultaneous sample and hold, sampled at update rate: 1024 - 6144 Hz		
Signal processing		32 bit floating point		
Types		Timed sample, peak / valley, max / min, level-crossing, cyclic / logarithmic, and with ability to tie data channels to a master signal		
Digital filters		Bessel, Butterworth, Elliptical		
RPC		Time History data acquisition for RPC analysis is available		
Format		Data transfer to ASCII, and optionally to MTS RPC format		
Digital Transducers		Quadrature (e.g. incremental encoder), SSI (e.g. Temposonics R, absolute encoder, PWM (e.g. Temposonics G)		
<b>Analog Outputs (optional)</b>				
Output voltage		+/- 10 V		
Maximum load		2000 ohm minimum, 1000 pf maximum		
Output resolution		16 bit		
<b>Environment</b>		Temp: 5-40 deg C; RH: 5-85%		

System transducers can be calibrated to meet or exceed standards such as ASTM E4 and E83, ISO 9513 and 7500, BS 3846 and 1610, and DIN 51 301 and 51 307 to provide needed traceability.

**FOR MORE INFORMATION OR TO ORDER**  
 Contact your local MTS sales engineer  
 or call MTS at 1-800-328-2255, or  
 1-952-937-4000.

Regional Business Centers

THE AMERICAS

**MTS Systems Corporation**

14000 Technology Drive  
Eden Prairie, MN 55344-2290  
USA

Telephone: 952-937-4000  
Toll Free: 800-328-2255  
Fax: 952-937-4515  
E-mail: [info@mts.com](mailto:info@mts.com)  
Internet: [www.mts.com](http://www.mts.com)

EUROPE

**MTS Systems France**

BAT EXA 16  
16/18 rue Eugène Dupuis  
94046 Créteil Cedex

**France**  
Telephone: +33-(0)1-58 43 90 00  
Fax: +33-(0)1-58 43 90 01  
E-mail: [contact.france@mts.com](mailto:contact.france@mts.com)

**MTS Systems GmbH**

Hohentwielsteig 3  
14163 Berlin

**Germany**  
Telephone: +49-(0)30 81002-0  
Fax: +49-(0)30 81002-100  
E-mail: [euroinfo@mts.com](mailto:euroinfo@mts.com)

**MTS Systems S.R.L. a socio unico**

Strada Pianezza 289  
10151 Torino

**Italy**  
Telephone: +39-(0)11 45175 11 sel. pass.  
Fax: +39-(0)11 45175 00-01  
E-mail: [mtstorino@mts.com](mailto:mtstorino@mts.com)

**MTS Systems Norden AB**

Datavägen 37  
SE-436 32 Askim

**Sweden**  
Telephone: +46-(0)31-68 69 99  
Fax: +46-(0)31-68 69 80  
E-mail: [norden@mts.com](mailto:norden@mts.com)

**MTS Systems Ltd. UK**

Unit 9, Cirencester Office Park  
Tetbury Road  
Cirencester  
Gloucestershire

**GL7 6JJ**  
**United Kingdom**  
Telephone: +44-(0)1285-648800  
Fax: +44-(0)1285-658052  
E-mail: [mtsuksales@mts.com](mailto:mtsuksales@mts.com)

ASIA/PACIFIC

**MTS Japan Ltd.**

ArcaCentral Bldg. 8F  
1-2-1 Kinshi, Sumida-ku  
Tokyo 130-0013

**Japan**  
Telephone: 81-3-6658-0901  
Fax: 81-3-6658-0904  
E-mail: [mts-j-info@mts.com](mailto:mts-j-info@mts.com)

**MTS Korea, Inc.**

4<sup>th</sup> F., ATEC Tower, 289,  
Pankyo-ro, Bundang-gu  
Seongnam-si  
Gyeonggi-do 463-400,

**Korea**  
Telephone: 82-31-728-1600  
Fax: 82-31-728-1699  
E-mail: [mtsk-info@mts.com](mailto:mtsk-info@mts.com)

**MTS China Hechuan Office**

Room 703 Building #B,  
Venture International Park,  
No. 2679 Hechuan Road,  
Minhang District,  
Shanghai 201103,

**P.R.China**  
Telephone: +86-21-5427 1122  
Fax: +86-21-6495 6330  
E-mail: [info@mtschina.com](mailto:info@mtschina.com)



**MTS Systems Corporation**

14000 Technology Drive  
Eden Prairie, MN 55344-2290 USA

ISO 9001 Certified QMS  
<http://www.mts.com>

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