

ElectroForce® 3200 Series III Test Instrument

ElectroForce® test instruments incorporate proprietary linear motion technologies and WinTest® controls to provide a revolutionary approach to dynamic mechanical testing. The ElectroForce 3200 Series III family of tests instruments offers improved features, providing unparalleled performance and versatility for challenging applications requiring low amplitude testing accuracy.

The 3200 Series III test instrument may be configured for 225 N or optionally, 450 N maximum force capacity. The system has a wide bandwidth, capable of performing tests from static conditions to cyclic tests up to 300 Hz and 200 Hz for DMA.

Innovation in the Material Testing Industry



The High Accuracy Displacement Sensor is the first use in the

material testing industry of a new technology that provides displacement resolution of a nanometer and accuracies in the range of microns.

Accuracy – Exceeds ASTM E-2309's toughest standard, Class A

Resolution – Unparalleled 1 nm resolution

Responsiveness – Reduced signal latency results in significantly improved controls responsiveness

Absolute displacement measurement – High resolution and absolute measurement with a single sensor



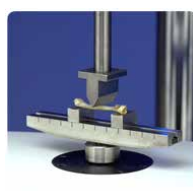
ElectroForce® 3200 Series III Axial Configuration



Applications

Low amplitude testing accuracy is a growing need for research and product development applications such as:

- Biomaterials
- Biological tissues
- Medical devices and components
- Small components
- Microelectronics
- Polymers and elastomers
- Films, foils and fibers
- Foods and fluids (rheology)



Test Types

The design of new materials and products requires a thorough assessment of material properties and complete performance evaluation within the intended end-use service environment. A variety of basic and advanced testing techniques are available in the 3200 to meet this need.

- Tension/Compression
- Bending
- Stress Relaxation
- Torsion
- Creep
- Shear
- Pulsatile

HIGHLIGHTS

of the Series III Test Instrument

Ease of Use – Electronic lift mechanism, lever-action crosshead locks and new amplifier with status/diagnostic read-out

Accuracy – Compensation of acceleration induced force errors

Performance – Increased testing frequency for fatigue (300 Hz) and DMA (200 Hz)

Laboratory awareness – Highly visible test status indicator lights

Important Features and Benefits

- Proprietary linear motor operates without friction, an important feature for high resolution, low-force testing
- Efficient, direct electromagnetic conversion to force, resulting in greater acceleration, high frequencies and high velocities
- Intuitive software design to simplify test setup and a flexible hardware platform for changing test needs
- Powered from a standard electrical outlet, requiring no additional infrastructure, air conditioning or water cooling
- Air-cooled, clean-room compatible and whisper-quiet operation in compact, space-saving packages
- Energy efficient and environmentally friendly by using pollution-free and non-toxic technologies
- Lifetime Customer Support with free Technical Support and satisfaction guaranteed.



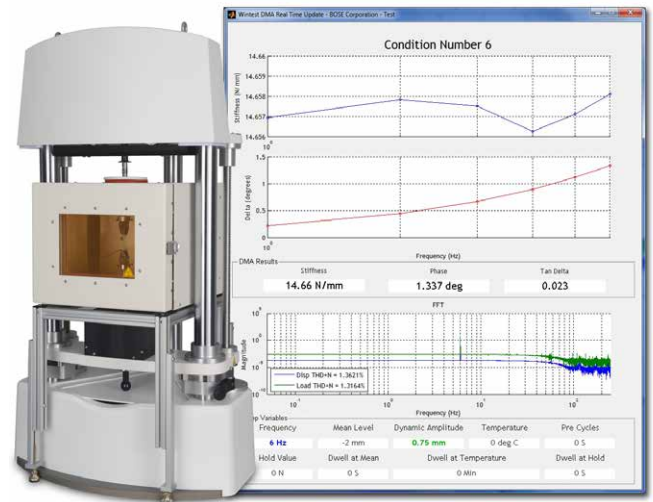
Engineered Materials

ElectroForce® test instruments perform a broad range of materials testing tasks. These requirements range from simple static tests used to acquire **tensile, compressive or bending data**, to more **complex fatigue and fracture mechanics** testing applications often found in the following industries and application areas;

- **Electronics and Microelectronics**
- **Smart Materials**
- **Automotive**
- **Aerospace**
- **Universities and National Labs**
- **Polymers, Plastics, and Composites**
- **Tire and Rubber**

ElectroForce testing systems provide a multi-purpose, high performance, clean and reliable product platform that's well-suited for use in research activities where mechanical testing is required.

Optional **DMA software** provides the capability for a ElectroForce materials testing system to do double duty as a DMA/DMTA instrument with much higher force and displacement capability than what traditional DMA instruments offer, allowing larger specimens to be tested for DMA properties.



3200 Series III DMA System with Hot/Cold Chamber



DMA of Elastomers



Electronics Fatigue



Flex Fatigue



Testing of Tire Cord



Thin Film or Filament

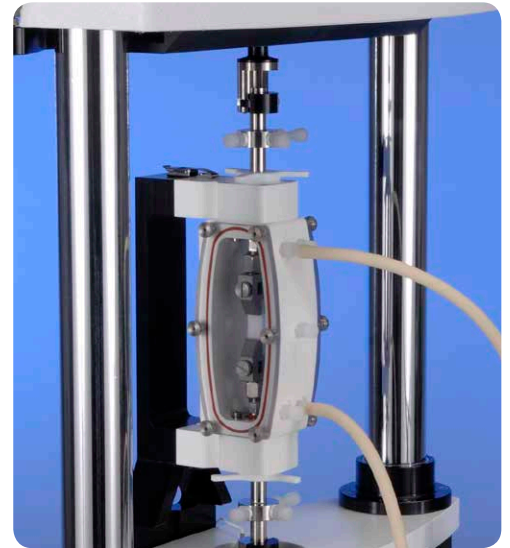
Biologics

The majority of the biomaterials testing applications of our customers have some unique feature. It may be the type of loading that needs to be applied, the measurements taken, the test setup in the software, the fixtures required for sample attachment, or the environmental conditions provided during the test. These challenges coupled with the ElectroForce team's application expertise have led to the design and development of a wide breadth of biomedical materials testing solutions.

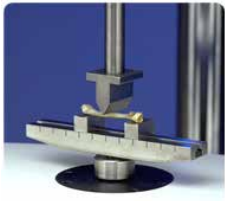
Examples include:

- **Bone and Cartilage**
- **Tendon and Ligament**
- **Spine**
- **Dental**
- **Blood Vessels and Heart Valves**
- **Pericardium and Heart Muscle**
- **Hydrogels and Scaffolds**
- **Skin and other Native Tissues and Organs**
- **Tissue-engineered Construct Stimulation and Characterization**
- **Ophthalmic Characterization**

Whether your test specifications require replication of physiological or pathological conditions or other regulatory inputs, TA ElectroForce strives to offer complete materials testing solutions either through our large selection of existing capabilities or through the development of customized products and services.



3200 with BioDynamic® Option



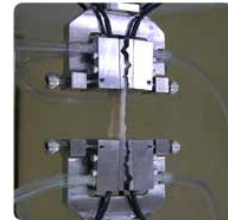
3 Point Bend of Bone



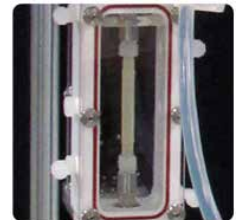
Orally Disintegrating Tablet



Heated Saline Environment



Electronically Cooled Tissue Grips



BioDynamic Environment

Medical Devices



ElectroForce® multi-specimen fatigue testing systems can be used for high cycle fatigue life characterization of coronary and vascular device structures, and evaluation of device materials for s/n curve development. In addition, the test systems can provide controlled loading for small soft structures and devices such as:

- **Septal Occluders**
- **Stents and Grafts**
- **Nitinol Structures**
- **Aneurysm Clips**
- **Percutaneous Heart Valves**
- **Annuloplasty Devices**
- **Vena Cava Filters and Structures**
- **Dental Implants**
- **Small Joint Implants**
- **Sutures**
- **Contact Lenses**
- **Biosensors**

TA ElectroForce has configured a multi-specimen test system utilizing the versatility of the ElectroForce 3200 test instrument. These uniaxial dynamic systems, configured with multi-specimen fixtures, employ dynamic linear motors that achieve high frequency load or displacement control to simulate stress levels of specific materials or specific geometries or design areas of the medical devices.

3200 with MSF Option

ElectroForce® 3200 Series III Test Instrument Configurations

This table-top test instrument is readily adaptable for a variety of testing applications.

3220 Base System	3230 Base System	Torsion Option	Extended Stroke (ES) Option	BioDynamic® Option
<p>Force Capacity Peak/max sine : ± 225 N Static or RMS: ± 160 N (continuous)</p> <p>Frequency 0.00001 - 300 Hz DMA max: 200 Hz</p> <p>Displacement +/- 6.5 mm</p> <p>Motor Velocity Static to 3.2 m/s</p> <p>Min Ramp Rate 0.0065 micron/s</p> <p>Test Space Size Vertical = 0 - 43.1 cm Horizontal = 35.5 cm</p>	<p>Force Capacity Peak/max sine : ± 450 N Static or RMS: ± 320 N (continuous)</p> <p>Frequency 0.00001 - 300 Hz DMA max: 200 Hz</p> <p>Displacement +/- 6.5 mm</p> <p>Motor Velocity Static to 3.2 m/s</p> <p>Min Ramp Rate 0.0065 micron/s</p> <p>Test Space Size Vertical = 0 - 43.1 cm Horizontal = 35.5 cm</p>	<p>Torque Capacity Peak/max sine : ± 5.6 N-m</p> <p>Frequency 0.00001 - 100 Hz DMA: NA</p> <p>Rotation +/- 10 revolutions</p> <p>Motor Velocity Static to 6000 deg/s</p> <p>Min Ramp Rate 0.0036 deg/s</p> <p>Test Space Size Vertical = 0 - 34.7 cm Horizontal = 35.5 cm</p>	<p>Force Capacity Equals base system</p> <p>Frequency 0.00001 - 5 Hz DMA max: 80 Hz</p> <p>Displacement 150 mm</p> <p>Motor Velocity Static to 60 mm/s</p> <p>Min Ramp Rate 0.0065 micron/s</p> <p>Test Space Size Vertical = 0 - 31 cm Horizontal = 35.5 cm</p>	<p>Force Capacity Peak/max sine : ± 200 N</p> <p>Frequency 0.00001 - 20 Hz DMA max: 10 Hz</p> <p>PULSATILE LOADING</p> <p>Pulse Volume 8.8 mL/pulse</p> <p>Pressure 0-500 mmHg</p> <p>Mean Flow 17 - 1760 mL/min</p>

Facility Information

Height=105 cm, Width=57.9 cm, Depth=51.8 cm. MSF option adds 7.6 cm to the frame height.

Weight=98 kg. 3230 adds 7 kg to the base system. Torsion and ES option adds 6 kg to the base. MSF option adds 31 kg to base (including water filled bath)

*Specifications are subject to change

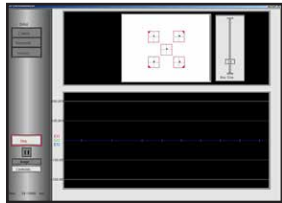
Software and Accessory Options

TA ElectroForce carries an extensive line of test equipment accessories. ElectroForce® test instruments can be integrated with a variety of specimen fixtures, measurement transducers, environmental chambers, saline baths and optional software. Contact the TA ElectroForce for test frame options and accessory packages to meet your specific testing needs.



Grips/platens

Tension/Torsion Grips
Wedge Grips
DMA Grips
Tissue Grips - Thermal-Electrically Cooled
BioDynamic® Tensile Grips
Compression Platens
BioDynamic Compression Platens
3 and 4 Point Bend



Digital Video Extensometer

Software Options

Advanced Security Suite
Dynamic Mechanical Analysis
Dynamic Link Libraries
Advanced Function Generation

Sensors

Force/Torque
Displacement/Rotation
Strain
Pressure
Chemical
Acceleration Compensation

Fixtures and Chambers

Multispecimen Fixture
Saline Baths
BioDynamic Chamber
Hot/Cold Chambers



3200 Series III System with Torsion Option and Saline Bath

Lifetime Customer Support

We're committed to your testing success, and TA ElectroForce has taken this commitment to a new level by offering free technical phone and E-mail support so you can keep your testing program moving forward. Timely and effective technical support can be critical to reach your testing goals. When you need help, we want to to make it easy to get answers.

- Commitment to on-time instrument delivery
- Timely installation provided by our qualified field engineer team
- Thorough training during installation to assure your testing productivity
- Ongoing live web training classes for new users without charge



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