Bose® test instruments incorporate proprietary linear motion technologies and WinTest® controls to provide a revolutionary approach to dynamic mechanical testing. The Bose 3200 Series III family of test instruments offers new and 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**

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

**Resolution** – Unparalleled 1 nm resolution

**Noise** – Over 10x improvements in noise

**Responsiveness** – Reduced signal latency results in significantly improved controls responsiveness

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

**Applications**

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

- Biomaterials
- Medical devices and components
- Compliant biological tissues
- 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
Bose® 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 Bose DMA software provides the capability for a Bose 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.
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 Bose 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, Bose strives to offer complete materials testing solutions either through our large selection of existing capabilities or through the development of customized products and services.

Bose® 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

Bose 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.
ElectroForce® 3200 Series III Test Instrument Configurations

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

<table>
<thead>
<tr>
<th>3220 Base System</th>
<th>3230 Base System</th>
<th>Torsion Option</th>
<th>Extended Stroke (ES) Option</th>
<th>BioDynamic® Option</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Force Capacity</strong></td>
<td><strong>Force Capacity</strong></td>
<td><strong>Torque Capacity</strong></td>
<td><strong>Force Capacity</strong></td>
<td><strong>Force Capacity</strong></td>
</tr>
<tr>
<td>Peak/max sine : ± 225 N</td>
<td>Peak/max sine : ± 450 N</td>
<td>Peak/max sine : ± 5.6 N-m</td>
<td>Equals base system</td>
<td>Peak/max sine : ± 200 N</td>
</tr>
<tr>
<td>Static or RMS: ± 160 N</td>
<td>Static or RMS: ± 320 N</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(continuous)</td>
<td>(continuous)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Frequency</strong></td>
<td><strong>Frequency</strong></td>
<td><strong>Frequency</strong></td>
<td><strong>Frequency</strong></td>
<td><strong>Frequency</strong></td>
</tr>
<tr>
<td>0.00001 - 300 Hz</td>
<td>0.00001 - 100 Hz</td>
<td>0.00001 - 100 Hz</td>
<td>0.00001 - 5 Hz</td>
<td>0.00001 - 20 Hz</td>
</tr>
<tr>
<td>DMA max: 200 Hz</td>
<td>DMA max: 80 Hz</td>
<td>DMA max: 80 Hz</td>
<td>DMA max: 10 Hz</td>
<td>DMA max: 60 Hz</td>
</tr>
<tr>
<td><strong>Displacement</strong></td>
<td><strong>Displacement</strong></td>
<td><strong>Rotation</strong></td>
<td><strong>Displacement</strong></td>
<td><strong>Displacement</strong></td>
</tr>
<tr>
<td>+/- 6.5 mm</td>
<td>+/- 6.5 mm</td>
<td>+/-10 revolutions</td>
<td>+/- 100 mm</td>
<td>+/- 150 mm</td>
</tr>
<tr>
<td><strong>Motor Velocity</strong></td>
<td><strong>Motor Velocity</strong></td>
<td><strong>Motor Velocity</strong></td>
<td><strong>Motor Velocity</strong></td>
<td><strong>Motor Velocity</strong></td>
</tr>
<tr>
<td>Static to 3.2 m/s</td>
<td>Static to 3.2 m/s</td>
<td>Static to 6000 deg/s</td>
<td>Static to 8000 deg/s</td>
<td>Static to 6000 deg/s</td>
</tr>
<tr>
<td><strong>Min Ramp Rate</strong></td>
<td><strong>Min Ramp Rate</strong></td>
<td><strong>Min Ramp Rate</strong></td>
<td><strong>Min Ramp Rate</strong></td>
<td><strong>Min Ramp Rate</strong></td>
</tr>
<tr>
<td>0.00065 micron/s</td>
<td>0.00065 micron/s</td>
<td>0.00065 micron/s</td>
<td>0.00065 micron/s</td>
<td>0.00065 micron/s</td>
</tr>
<tr>
<td><strong>Test Space Size</strong></td>
<td><strong>Test Space Size</strong></td>
<td><strong>Test Space Size</strong></td>
<td><strong>Test Space Size</strong></td>
<td><strong>Test Space Size</strong></td>
</tr>
<tr>
<td>Vertical = 0 - 43.1 cm</td>
<td>Vertical = 0 - 43.1 cm</td>
<td>Vertical = 0 - 34.7 cm</td>
<td>Vertical = 0 - 31 cm</td>
<td>Vertical = 0 - 20 cm</td>
</tr>
<tr>
<td>Horizontal = 35.5 cm</td>
<td>Horizontal = 35.5 cm</td>
<td>Horizontal = 35.5 cm</td>
<td>Horizontal = 35.5 cm</td>
<td>Horizontal = 35.5 cm</td>
</tr>
</tbody>
</table>

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

Bose 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 ElectroForce Systems Group 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

Sensors
- Force/Torque
- Displacement/Rotation
- Strain
- Pressure
- Chemical
- Acceleration Compensation

Software Options
- Advanced Security Suite
- Dynamic Mechanical Analysis
- Dynamic Link Libraries
- Advanced Function Generation

Fixtures and Chambers
- 3 and 4 Point Bend
- Multispecimen Fixture
- Saline Baths
- BioDynamic Chamber
- Hot/Cold Chambers

Lifetime Customer Support

We’re committed to your testing success, and Bose 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 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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