

# ElectroForce® Multi-specimen Fatigue Test Instruments

## Fatigue Testing of Nitinol Materials and Structures

To reduce time and costs for developing fatigue life (s/n) curves for NiTi, CoCr, and SS stent materials and structures, Bose has configured multi-specimen test systems utilizing the versatility of the ElectroForce® 3200 Series III and 3330 Series II test instruments. Both systems include the enhanced measurement capability of the Bose® High Accuracy Displacement Sensor. This enables an even wider range of testing by improving low-amplitude displacement measurements, all through a single, easy-to-use displacement channel. The sensor is calibrated to the highest accuracy class, Class A, of ASTM E-2309.

ElectroForce multi-specimen fatigue test systems are designed to provide tension-tension, or compression-compression displacement controlled loading for small soft structures and devices, such as stents, stent structures, stented grafts, vena cava filters, septal patch structures or other similar devices.

The multi-specimen loading sites and a temperature controlled saline bath are integrated into the 3200 or 3330 loading system to provide computer controlled axial displacement for all loading stations. Each loading site has an independent load cell that may be used to monitor the load on each test specimen, or for failure detection. Standard ElectroForce 3200 Series III or 3330 Series II multi-specimen systems are available with 12 loading sites, and optional 20 site configurations or higher force 6 site configurations are available with longer delivery. ElectroForce 3200 and 3330 multi-specimen fatigue testing systems can be used for high cycle fatigue life characterization of:

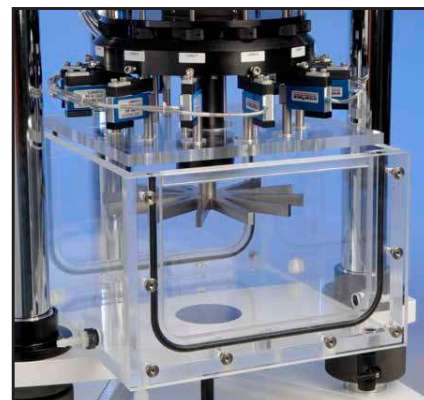
- Coronary and vascular device materials for s/n curve development:
  - Diamond material samples
  - V-shaped material samples
- Coronary and vascular device structures:
  - Stents (vascular and heart valve)
  - Stent segments
  - Vascular graft structures/hooks/wear
  - Vena cava filter structures
  - Septal closure devices
  - Annuloplasty devices

### ElectroForce Test Instrument Overview:

By incorporating proprietary Bose motor technologies and WinTest® controls, ElectroForce instruments provide exceptional fidelity, precision and versatility for a variety of test applications. The ElectroForce linear motor utilizes a simple and durable moving-magnet design that provides excellent dynamic displacement at accelerated test frequencies, and years of reliable operation. As a result, ElectroForce test instruments have set a new standard for performance, simplicity and elegance in a single test system.



**ElectroForce® 3330 Series II  
Multi-specimen Fatigue Test Instrument**



**37°C Circulating Saline Bath  
with 12 Loading Sites**

**BOSE®**

# ElectroForce® 3330 Series II and 3200 Series III Multi-specimen Fatigue Test Instruments



## Performance:

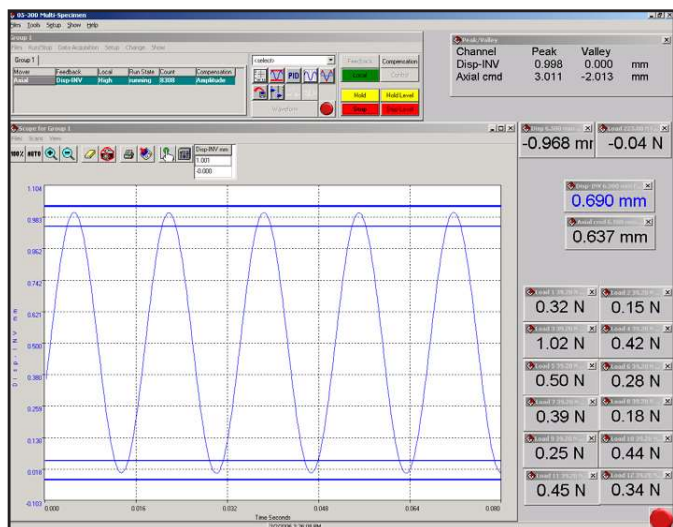
### ElectroForce 3330 Series II test instrument:

- 3.0 kN capacity
- 25 mm dynamic displacement
- High Accuracy Displacement Sensor<sup>5</sup>
- 0.01 to 100 Hz

### ElectroForce® 3200 Series III test instrument:

- 225 N capacity<sup>1</sup>
- 12.5 mm dynamic displacement
- High Accuracy Displacement Sensor<sup>5</sup>
- 0.01 to >100 Hz

### ElectroForce® 3200 Series III Multi-specimen Fatigue Test Instrument



### WinTest® Control Software Monitors Each Loading Site

<sup>1</sup> Represents the overall capacity of the test instrument.  
Typically each loading site is less than 5 N load.

<sup>2</sup> Twelve (12) sites are standard. Twenty (20) sites are available as an option.

<sup>3</sup> Distance between upper pullrod and lower mounting surface.

<sup>4</sup> This is a pre-test 'tare' adjustment to ensure that all samples are at the same level of stress.

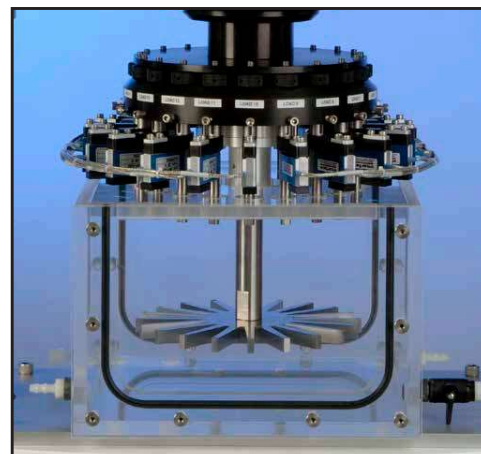
<sup>5</sup> Series II systems include the Bose® High Accuracy Displacement Sensor and are calibrated to ASTM E-2309, Class A.

Specifications are subject to change

## Dimensions:

### Loading Site Dimensions<sup>2</sup>:

- 100 mm vertical space<sup>3</sup>
- 20 mm vertical adjustment at each site<sup>4</sup>
- Sites are spaced evenly around a 200 mm specimen loading circle
- 50 mm diameter clearance space (12 sites)
- 30 mm diameter clearance space (20 sites)
- Load cells are mounted above the bath



37°C Circulating Saline Bath  
with 20 Loading Sites

### Bath Specifications:

- 280 mm x 280 mm x 200 mm high (inside dimensions)
- Designed for 37°C saline
- Circulation and heating
- Flat sides for video-graphic validation
- Removable front and rear panels for easy access