ElectroForce® 3330 Series II Test Instrument

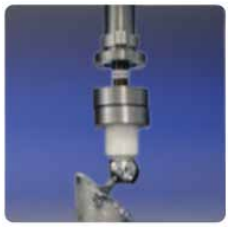
ElectroForce® test instruments incorporate proprietary linear motion technologies and WinTest® controls to provide a revolutionary approach to mechanical fatigue and dynamic characterization. The ElectroForce family of test instruments provides a full range of force and performance capabilities for a variety of test applications.

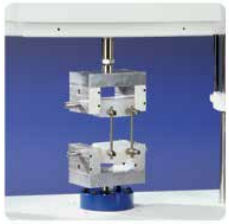
The 3330 system provides static to 100 Hz performance with a load envelope of ±3000 N, allowing versatile performance for a variety of test applications such as durability testing of orthopaedic implant devices and dynamic characterization of engineered materials and components.

First in the Material Testing Industry

The ElectroForce 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. This allows for reliable tests of 10x smaller displacement amplitudes over the full range of motion of the system with no additional sensors required.

ElectroForce® 3330 Series II Table Top and Floor Standing Configurations

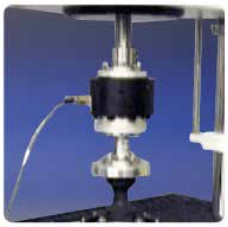




Applications

The ElectroForce Series II 3330 test instrument is well-suited for a variety of tests that include ASTM and ISO standards tests for:

- Automotive components
- Fracture mechanics
- Component durability
- Orthopaedic implants
- Consumer products
- Prosthetics
- Cyclic fatigue studies



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

TA ElectroForce®

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.

HIGHLIGHTS of the Series II Test Instrument

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

Resolution – Unparalleled 1 nm resolution

Noise – Over 10x improvement in noise

Responsiveness – Reduced signal latency results in significantly improved controls responsiveness

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

ElectroForce® Linear Motor

TunelQ® Software

7 WinTest® Control System

Intelligent Test Control

High Accuracy Displacement

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**

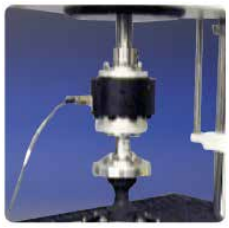
ElectroForce testing systems provide a multi-purpose, high performance, clean and reliable product platform that's well-suited for use in research activities that require mechanical testing.

Optional **ElectroForce 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.

Fracture Mechanics of Composites

Tensile Test of Metals or Polymers

Axial/Torsion of Composites



Vibration Isolation Device

3330 DMA System with Hot/Cold Chamber

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.

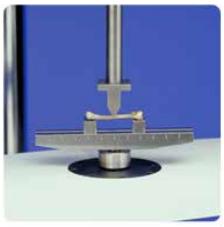
Examples include:

- **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**

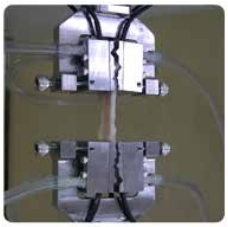
Whether your test specifications require replication of physiological or pathological conditions or other regulatory inputs, TA ElectroForce strives to offer complete materials testing solutions either through our large selection of existing capabilities or through the development of customized products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

3330 with Dental Wear Fixture

Compression of Hydrogel



Bend Fixture



Electronically-cooled Tissue Grips

Medical Devices

3330 with Multi-Specimen Fixture

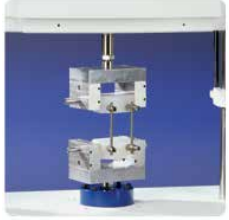
ElectroForce multi-specimen fatigue testing systems can be used for high cycle fatigue life characterization of coronary and vascular device structures, and evaluation of device materials for s/n curve development. In addition, the test systems can provide controlled loading for small soft structures 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 3330 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.

Joint Implant

Dental Implant



Spine Fixation

ElectroForce® 3330 Series II Test Instrument Configurations

3330 Base System (table top)	3330 Torsion Option (floor standing)	3330 High Torque Option (floor standing)
Force Capacity Peak/max sine: ± 3000 N Static or RMS: ± 2100 N (continuous) **Frequency** 0.00001 - 100 Hz DMA max: 75 Hz **Displacement** 25 mm **Motor Velocity** Static to 2.0 m/s **Min Ramp Rate** 0.013 micron/s **Test Space Size** Vertical = 0 - 52.5 cm (with load cell)	**Torque Capacity** Peak/max sine: ± 24 N-m Static or RMS: ± 24 N-m (continuous) **Frequency** 0.00001 - 100 Hz DMA max: NA **Rotation** +/- 10 revolutions **Motor Velocity** Static to 6000 deg/s **Min Ramp Rate** 0.0036 deg/s **Test Space Size** Vertical = 0 - 43 cm (with load cell)	**Torque Capacity** Peak/max sine: ± 49 N-m Static or RMS: ± 42 N-m (continuous) **Frequency** 0.00001 - 100 Hz DMA: NA **Rotation** +/- 10 revolutions **Motor Velocity** Static to 6000 deg/s **Min Ramp Rate** 0.0036 deg/s **Test Space Size** Vertical = 0 - 43 cm (with load cell)

Facility Information

Table top dimensions: Height = 123 cm, Width = 62 cm, Depth = 44 cm.
Floor standing option: Height = 185 cm, Width = 70 .5 cm, Depth = 56 cm.
Extended column option: adds 30 cm to the test space and frame height.
Weight = 118 kg. Extended column adds 6 kg to the base system. Floor standing torsion options add approximately 130 kg to the base.
**Specifications are subject to change*

3330 System with Torsion Option and T-slot

Software and Accessory Options

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 ElectroForce Systems Group for test frame options and accessory packages to meet your specific testing needs.

Digital Video Extensometer

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

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

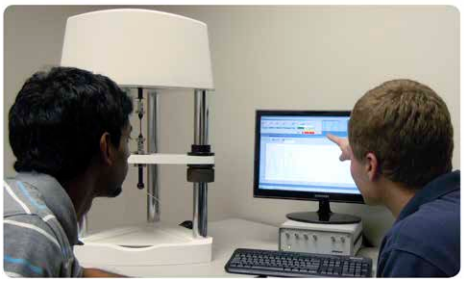
Sensors
Force/Torque
Displacement/Rotation
Strain
Pressure
Chemical

Fixtures and Chambers
Multispecimen Fixture
Saline Baths
BioDynamic Chamber
Hot/Cold Chambers

Lifetime Customer Support

We're committed to your testing success, and 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 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



TA Instruments – ElectroForce Systems Group
Email: electroforce@tainstruments.com – Website: electroforce.tainstruments.com
Phone: 952-278-3070 – Fax: 952-278-3071

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