

# ElectroForce® Test Instruments

## Industry Leading Performance, Versatility and Energy Efficiency

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

ElectroForce test instruments are controlled by the WinTest digital control system. WinTest software features an intuitive design that enables the user to quickly set up tests with little training. ElectroForce test instruments are also very lab-friendly thanks to their practically maintenance-free operation. As a result, they have set a new standard for performance, simplicity and versatility in a single test system.

### Features and Benefits:

- Patented moving-magnet linear motor that provides excellent dynamic performance
- Efficient, direct electromagnetic conversion to force, resulting in unmatched acceleration, high frequencies and high velocities
- 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
- Friction-free linear motor, an important feature for high resolution, low-force testing
- Intuitive software to simplify test setup
- A wide range of instruments, from gram level to 15 kN force to provide the proper choice for a wide variety of test applications.



# ElectroForce® Table-Top Test Instruments

## ElectroForce® 3200 Series III Configurations

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 test conditions to cyclic tests up to 300 Hz. It includes the enhanced measurement capability of the ElectroForce® 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 table-top configuration is readily adaptable for a variety of testing applications from biomedical research to the characterization of engineered materials. The system may be configured with an optional torsion capability for biaxial applications, an extended stroke option, and a wide range of system options including hot/cold chambers and saline baths.

### Typical test applications:

- Biomaterials
- Medical devices
- Microelectronics
- Elastomers
- Fibers, foils, and films
- Small components
- Compliant bio-tissues
- Foods and fluids (rheology)



3200 Series III Axial/Torsion

## ElectroForce 3100 Test Instrument for the Laboratory, Office or Classroom

Measuring less than 51.8 cm tall, the ElectroForce 3100 test instrument is the smallest in the ElectroForce product family. The 3100 will fit on a desk or table-top, and it is extremely lab friendly thanks to its practically maintenance-free operation. The 3100 instrument is well-suited for micro-characterization of materials and devices because of its exceptional control resolution up to 22 N maximum static force.



ElectroForce 3100

## ElectroForce 3330 Series II Table-top Configuration

The ElectroForce 3330 Series II test instrument is well-suited for long term durability studies. It provides static to 100 Hz performance with a load envelope of  $\pm 3000$  N and versatility for a variety of fatigue and durability applications. The system also includes the enhanced measurement capability of the ElectroForce 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.

### Typical test applications:

- Durability testing of orthopaedic implant device
- Dynamic characterization of engineered materials and components.
- Integrated with a variety of environmental chambers and specimen fixtures to meet specific test applications.

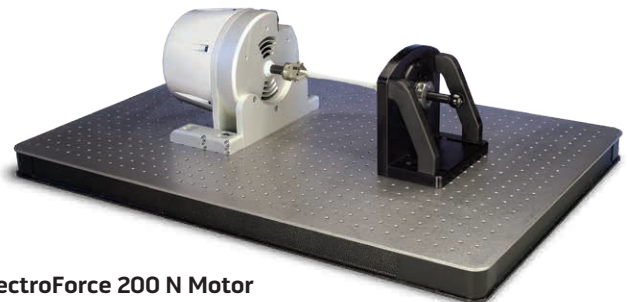
The ElectroForce 3330 table-top configuration is a clean stand-alone package that can be integrated with a variety of chambers and fixtures to meet specific test applications



Table-top 3330 Series II

## ElectroForce TestBench Instruments

TestBench configurations were designed with component testing in mind. Thanks to their modular approach, a wide array of configurations and performance capabilities are possible.



### ElectroForce 200 N Motor with Reaction Bracket

- TestBench systems can be multi-channel and multi-axis.
- The WinTest® PCI controller can provide control for up to eight channels at a time.
- Reaction brackets are pre-designed to allow attachment of components or the test specimen to the mounting baseplate.
- A saline bath can be added as an environmental option.

# ElectroForce® Floor-Standing Test Instruments

## ElectroForce® 3330 Series II Floor-standing Configuration

The ElectroForce® 3330 Series II test instrument is available as a table-top configuration or a floor-standing model. The floor-standing model provides additional versatility, such as the ability to incorporate a torsional motor for multiaxial test applications, or an extended stroke option to provide up to 150 mm of additional displacement. It provides 100 Hz performance with a dynamic load envelope of  $\pm 3000$  N, and the capability to add an optional  $\pm 24$  N-m or  $\pm 49$  N-m torsional package. The system includes the enhanced measurement capability of the ElectroForce 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 robust load frame was designed with versatility in mind. The spacious 40.6 cm wide by 50.0 cm high test space is easily adjusted using an integrated lift. In addition, the axial/torsion test instrument can be integrated with a hot/cold environmental chamber, thereby providing advanced test capabilities for a variety of engineered materials under realistic service conditions.

### Typical test applications:

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

Floor-standing Axial/Torsion 3330 Series II with Hot/Cold Chamber



## ElectroForce 3500 Configurations



ElectroForce 3510

ElectroForce 3500 test instruments are available in three basic system configurations. The 3510 instrument, rated at 7.5 kN, is configured with the linear motor installed in the upper crosshead, making it well-suited for applications requiring a temperature-controlled bath. The 3520 instrument is rated at 7.5 kN, and the linear motor is installed in the lower baseplate. The 3550 instrument is a higher-force configuration rated at 15 kN.

These systems can perform tests over a wide frequency range, providing versatility for a range of mechanical tests. Dynamic performance is dependent upon test specimen characteristics, fixtures, and test parameters. Torsion motor options are also available for all of the 3500 configurations.

### Typical test applications:

- Fatigue and general durability
- Engineered materials property determination for elastomers, polymers and composites
- Automotive and aerospace materials and components
- Orthopaedic materials and implants
- Consumer products, including sports equipment, household items and electronics



ElectroForce 3550

# ElectroForce® Test Instruments Specifications

Instrument Model:	3100	3200 Series III	3330 Series II	3510	3520/3550
<b>Electromagnetic Load Capacity:</b>					
Peak/max sine	± 22 N	± 225 N	± 3000 N	± 7500 N	± 7500 N - Model 3520
High force option	NA	± 450 N	NA	N/A	± 15000 N - Model 3550
Static or RMS (continuous)	± 22 N	± 160 N	± 2100 N	± 5300 N	± 5300 N - Model 3520
High force option	NA	± 320 N	NA	N/A	± 10600 N - Model 3550
<b>Displacement<sup>1</sup>:</b>	5 mm	13 mm	25 mm	50 mm	50 mm
<b>Extended Stroke Option:</b>	NA	150 mm	150 mm	NA	N/A

Note: Extended stroke actuator provides static test capability, slack/creep compensation and ease of test setup.

## Linear Velocity:

Minimum:	0.0025 µm/s	0.0065 µm/s	0.013 µm/s	0.025 µm/s	0.025 µm/s
Maximum <sup>2</sup> :	1.0 m/s	3.2 m/s	2.0 m/s	1.5 m/s	1.5 m/s

## Frequency:

Minimum:	0.00001 Hz	0.00001 Hz	0.00001 Hz	0.00001 Hz	0.00001 Hz
Maximum <sup>2</sup> :	100 Hz	300 Hz	100 Hz	100 Hz	50 Hz
DMA <sup>2,3,4</sup> :	75 Hz	200 Hz	75 Hz	40 Hz	35 Hz

Note: Performance curves are available upon request.

## Dimensions (H/W/D)<sup>5</sup>:

Height	51.8 cm	105 cm	122 cm	270 cm	250 cm
Width	29.2 cm	57.9 cm	61 cm	99 cm	85 cm
Depth	17.2 cm	51.8 cm	56 cm	82 cm	82 cm
Weight:	18 kg	98 kg	118 kg	1050 kg	750 kg

<b>Test Space Size<sup>6</sup>:</b>	0 to 165 mm	0 to 431 mm	0 to 525 mm 0 to 830 mm optional	0 to 1000 mm	0 to 1000 mm
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## Torsional Motor Option:

<b>Standard</b>					
Peak/max	NA	± 5.6 N-m	± 24 N-m	± 49 N-m	± 49 N-m
Static or RMS (continuous)	NA	± 5.6 N-m	± 24 N-m	± 42 N-m	± 42 N-m
<b>High Torque Option</b>					
Peak/max	NA	NA	± 49 N-m	N/A	± 70 N-m
Static or RMS (continuous)	NA	NA	± 42 N-m	N/A	± 50 N-m
Rotation	NA	Multi-turn (± 10 revolutions max)	Multi-turn (± 10 revolutions max)	Multi-turn (± 10 revolutions max)	Multi-turn (± 10 revolutions max)

<sup>1</sup> Series II and Series III systems include the ElectroForce® High Accuracy Displacement Sensor and are calibrated to ASTM E-2309.

<sup>2</sup> Varies depending on test protocol, fixture mass and specimen stiffness.

<sup>3</sup> Optional Dynamic Mechanical Analysis (DMA) software.

<sup>4</sup> DMA performance specification applies to base system.

<sup>5</sup> Dimensions can vary with optional features.

<sup>6</sup> Space between load cell and motor shaft for axial configurations. Test space may be reduced with other options.

Specifications are subject to change

## Applications and Fixtures

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

