ElectroForce® test instruments featuring patented linear motion technologies and WinTest® controls, provide a revolutionary approach to mechanical fatigue and dynamic characterization. The ElectroForce family of test instruments includes a full range of force and performance capabilities for a wide variety of test applications based on the most unique motor design in the industry. The end result to the customer is billions of cycles of unmatched reliable performance in a dynamic test instrument with precision, accuracy and ease of use for a wide range of applications.
ElectroForce Load Frames

- 22 N
- 200 N
- 225 N or 450 N
- 1000 N or 3000 N

Models:
- 3100
- 5500
- 3200
- 3300
3300
Floor Standing

1000 N
or
3000 N

7500 N

7500 N
or
15000 N

3510

3520/3550

ElectroForce Test Instruments
ElectroForce System Features

Successfully utilized in a variety of testing and motion control applications for over 20 years.

- Patented 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 a compact, space-saving package

- Energy efficient and environmentally friendly by using pollution-free, non-toxic technologies and oil-free design
Frequency to 300 Hz…
Forces to 15 kN
Reliability that won’t let you down
The flexural suspension is engineered to guide the magnet assembly without contact or lubrication. The magnet, coil and stators are designed to control temperatures to eliminate performance degradation over decades of use and deliver maintenance-free operation that you can count on for your longest running tests.

Unmatched waveform control and fidelity
Without the friction of rolling or sliding bearings, the ElectroForce motor design provides the control required for the most sensitive of tests. The motor converts even the smallest of increments of waveform change precisely to specimen force, displacement or pressure. This means applied forces can be controlled to gram force ranges and displacements can be controlled to a micron.

Testing in a variety of environmental conditions
With its efficient, quiet and bearing-free design, the ElectroForce motor is engineered for use in a variety of diverse and challenging environments, including clean rooms, humidity chambers and even hot cells.

Sized to meet your requirements
The architecture of the ElectroForce motor can be scaled to accommodate a wide range of forces and displacements:

- Maximum forces ranging from 22 N up to 15 kN
- Maximum displacements ranging from 5 mm up to 50 mm.

Design simplicity provides unmatched performance & billions of maintenance-free cycles
The **Most Dynamic & Controllable Linear Motor in the Industry**

**Bandwidth for any Test: Fast or Slow**

ElectroForce motors excel at the full spectrum of testing speeds, due to the low mass of the rare earth moving magnet and stationary coil design. Testing speeds can range from static tests, to one cycle per day, and up to frequencies of 300 Hz.
The **Widest Array of TestBench Configurations**

200N TestBench with **Extended Stroke**

200N TestBench with **Torsion**

200N TestBench
200N TestBench with Torsion

Dual 3kN TestBench

3000 N TestBench Dual

Vertical TestBench

200 N

Planar Biaxial TestBench with Video Extensometer

200 N

3000 N TestBench

200 N

Dual 200N TestBench
Software

The Most Flexible Control System Available

Single comprehensive package that provides data acquisition, waveform controls and user interface in an easy to use package:

- Advanced controls including multi-channel synchronization of phase and amplitude, and cross-channel compensation
- Calculated channels to provide real-time mathematical calculations for measurement channels
- Powerful waveform generation tools to quickly create periodic waveforms for fatigue tests and block grouping to create more complex tests
- Integrated data acquisition algorithms so a variety of data collection techniques can be utilized, including timed data acquisition, peak/valley capture, level-crossing and additional techniques
- Additional options include:
  - Dynamic Mechanical Analysis
  - External Waveform Input
  - Dynamic Link Libraries
**WinTest® 7 Tune IQ**

The Most Accurate Closed Loop Control Algorithms

Tune IQ software uses advanced proprietary algorithms to simplify the tuning process:

- Provides excellent re-creation of system program waveforms, allowing for improved test control and ultimately better test results.
- Advanced methods that analyze the dynamic response of the system, sensor and sample for optimal control, superior to a single-point measurement that doesn’t factor in sample dynamics.

**WinTest 7 DMA (Dynamic Mechanical Analysis)**

A flexible platform for advanced viscoelastic property measurements, including:

- $E'$
- $E''$
- Tan Delta
- Glass Transition

**TRIOS**

The Most Versatile Analysis Package available for Mechanical Testing:

- Time Temperature Superposition (TTS)
- Peak analysis
- Onset point analysis
- Peak integration
- Continuous and discrete relaxation spectrum

**HADS (High Accuracy Displacement Sensor)**

The Most Accurate and Precise Displacement Sensor on the Market

- Up to 1nm resolution and micron level of accuracy
- Class A, ASTM E2309 calibrated accuracy
- Extremely low noise to eliminate the need to filter data
- High responsiveness extends the dynamic performance of system
- Single displacement channel to provide both absolute and high resolution measurements
Applications
FATIGUE, DURABILITY & MATERIAL CHARACTERIZATION

Medical Devices
Electronics
Elastomers
Aerospace
Biomaterials
Composites
Polymers
Automotive
Tissue Engineering
The design of new materials and products requires a thorough assessment of material properties and complete performance evaluation within the customer’s intended end-use. A variety of basic and advanced testing techniques are available to meet this need.

- Tension/Compression
- Bending
- Torsion
- Shear
- Pulsatile
- Multi-axial
- Failure Testing
- Fatigue
- Dynamic Characterization
- Creep
- Stress Relaxation
- Accelerated Life Testing

Your Success our Mission™
ElectroForce® test instruments can be integrated with a variety of specimen fixtures, measurement transducers, environmental chambers, saline baths and optional software.

**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

**Fixtures and Chambers**
- Multi-specimen Fixture
- Saline Baths
- BioDynamic Chambers
- Hot/Cold Chambers
- Furnaces
- 24-well Plate Fixture
- T-Slot

**Sensors**
- Force/Torque
- Displacement/Rotation
- Strain
- Pressure
- Chemical
- Accelerometer
- Submersible Load Cells

**Upgrade Options**
- Axial
- Axial/Torsion
- Extended Stroke
- Pulsatile
- Table top
- Vertical Mount
- System Status Indicator (SSI) Lights
- Battery Backup
TA Instruments’ leadership position results from the fact that we offer the best overall product in terms of technology, performance, quality, and customer support. While each is important, our demonstrated commitment to after-sales support is a primary reason for the continued loyalty of our customers. To provide this level of support, TA Instruments has assembled the largest worldwide team of field technical and service professionals in the industry. Others promise good service. Talk to our customers and learn how TA Instruments consistently delivers on our promise to provide exceptional service.

With direct support staff in 23 countries and 5 continents, TA Instruments can extend its exceptional support to you, wherever you are.
## Specifications

<table>
<thead>
<tr>
<th></th>
<th>3100</th>
<th>5500</th>
<th>3200</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Linear Motor</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Standard</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peak/Max Sine</td>
<td>± 22 N</td>
<td>± 200 N</td>
<td>± 225 N</td>
</tr>
<tr>
<td>Static or RMS (continuous)</td>
<td>± 22 N</td>
<td>± 140 N</td>
<td>± 160 N</td>
</tr>
<tr>
<td><strong>High Force Option</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peak/Max Sine</td>
<td>—</td>
<td>—</td>
<td>± 450 N</td>
</tr>
<tr>
<td>Static or RMS (continuous)</td>
<td>—</td>
<td>—</td>
<td>± 320 N</td>
</tr>
<tr>
<td><strong>Displacement</strong></td>
<td>5 mm</td>
<td>13 mm</td>
<td>13 mm</td>
</tr>
<tr>
<td><strong>Extended Stroke Option</strong></td>
<td>—</td>
<td>—</td>
<td>150 mm</td>
</tr>
<tr>
<td><strong>Linear Velocity</strong></td>
<td>0.0025 μm/s – 1.0 m/s</td>
<td>0.0065 μm/s – 0.80m/s</td>
<td>0.0065 μm/s – 3.2 m/s</td>
</tr>
<tr>
<td><strong>Frequency</strong></td>
<td>0.00001 Hz – 100 Hz</td>
<td>0.00001 Hz – 20 Hz</td>
<td>0.00001 Hz – 300 Hz</td>
</tr>
<tr>
<td><strong>Torsional Motor Option</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Standard</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peak/Max</td>
<td>—</td>
<td>—</td>
<td>± 5.6 N-m</td>
</tr>
<tr>
<td>Static or RMS (continuous)</td>
<td>—</td>
<td>—</td>
<td>± 5.6 N-m</td>
</tr>
<tr>
<td><strong>High Torque Option</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peak/Max</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Static or RMS (continuous)</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td><strong>Rotation</strong></td>
<td>—</td>
<td>—</td>
<td>Multi-turn (± 10 revolutions Standard)</td>
</tr>
</tbody>
</table>

— Not Available
### Linear Motor

<table>
<thead>
<tr>
<th></th>
<th>3300</th>
<th>3510</th>
<th>3520/3550</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standard</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peak/Max Sine</td>
<td>± 1000 N</td>
<td>± 7500 N</td>
<td>± 7500 N - Model 3520</td>
</tr>
<tr>
<td>Static or RMS (continuous)</td>
<td>± 700 N</td>
<td>± 5300 N</td>
<td>± 5300 N - Model 3520</td>
</tr>
<tr>
<td><strong>High Force Option</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peak/Max Sine</td>
<td>± 3000 N</td>
<td></td>
<td>± 15000 N - Model 3550</td>
</tr>
<tr>
<td>Static or RMS (continuous)</td>
<td>± 2100 N</td>
<td></td>
<td>± 10600 N - Model 3550</td>
</tr>
<tr>
<td><strong>Displacement</strong></td>
<td>25 mm</td>
<td>50 mm</td>
<td>50 mm</td>
</tr>
<tr>
<td><strong>Extended Stroke Option</strong></td>
<td>150 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Linear Velocity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.013 μm/s – 1.5 m/s[1]</td>
<td>0.025 μm/s – 1.5 m/s</td>
<td>0.025 μm/s – 1.5 m/s</td>
</tr>
<tr>
<td></td>
<td>0.013 μm/s – 2.0 m/s[2]</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Frequency</strong></td>
<td>0.00001 Hz – 100 Hz</td>
<td>0.00001 Hz – 100 Hz</td>
<td>0.00001 Hz – 50 Hz</td>
</tr>
</tbody>
</table>

### Torsional Motor Option

<table>
<thead>
<tr>
<th></th>
<th>3300</th>
<th>3510</th>
<th>3520/3550</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standard</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peak/Max</td>
<td>± 14 N-m[3] / ± 24 N-m[4]</td>
<td>± 49 N-m</td>
<td>± 49 N-m</td>
</tr>
<tr>
<td>Static or RMS (continuous)</td>
<td>± 14 N-m[3] / ± 24 N-m[4]</td>
<td>± 42 N-m</td>
<td>± 42 N-m</td>
</tr>
<tr>
<td><strong>High Torque Option</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peak/Max</td>
<td>± 49 N-m[3]</td>
<td></td>
<td>± 70 N-m</td>
</tr>
<tr>
<td>Static or RMS (continuous)</td>
<td>± 42 N-m[3]</td>
<td></td>
<td>± 50 N-m</td>
</tr>
<tr>
<td><strong>Rotation</strong></td>
<td>Multi-turn (± 10 revolutions Standard)</td>
<td>Multi-turn (± 10 revolutions Standard)</td>
<td>Multi-turn (± 10 revolutions Standard)</td>
</tr>
</tbody>
</table>

Notes:

[1] Linear Velocity on ElectroForce 3310
[2] Linear Velocity on ElectroForce 3330
[5] High torque option only available on ElectroForce 3330

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

Specifications are subject to change