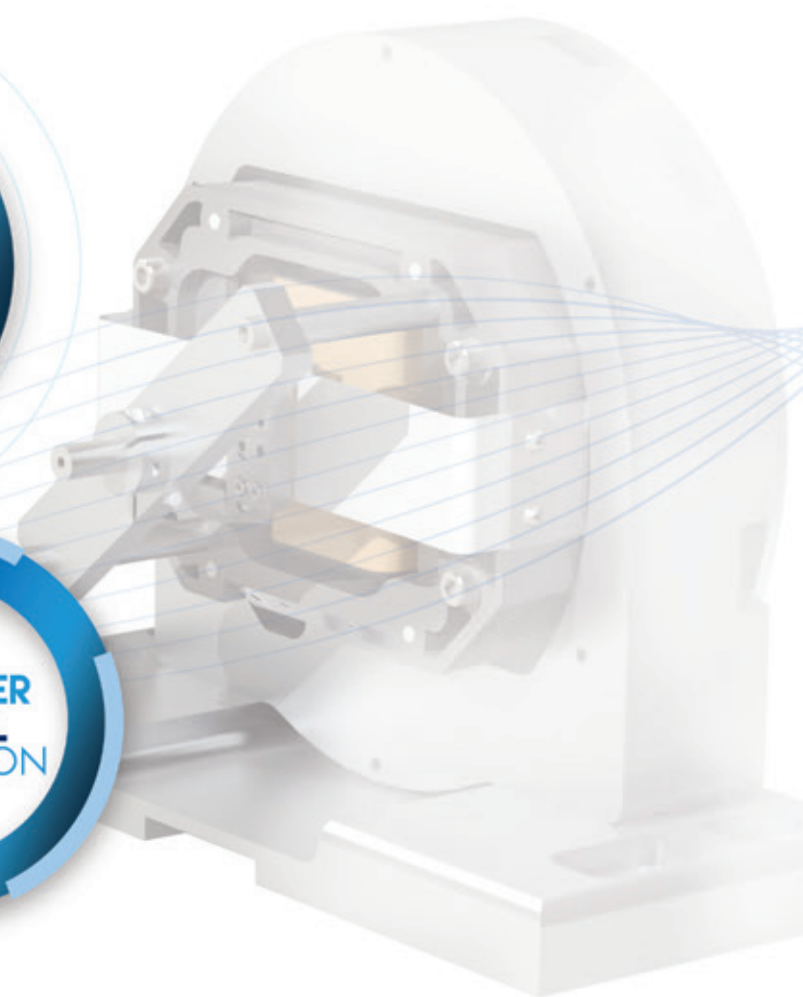




ELECTROFORCE[®]
TEST SYSTEMS



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 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.

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ElectroForce® Load Frames



3100

5500

3200

3300

3300
Floor Standing

3510

3520/3550

ElectroForce® System Features

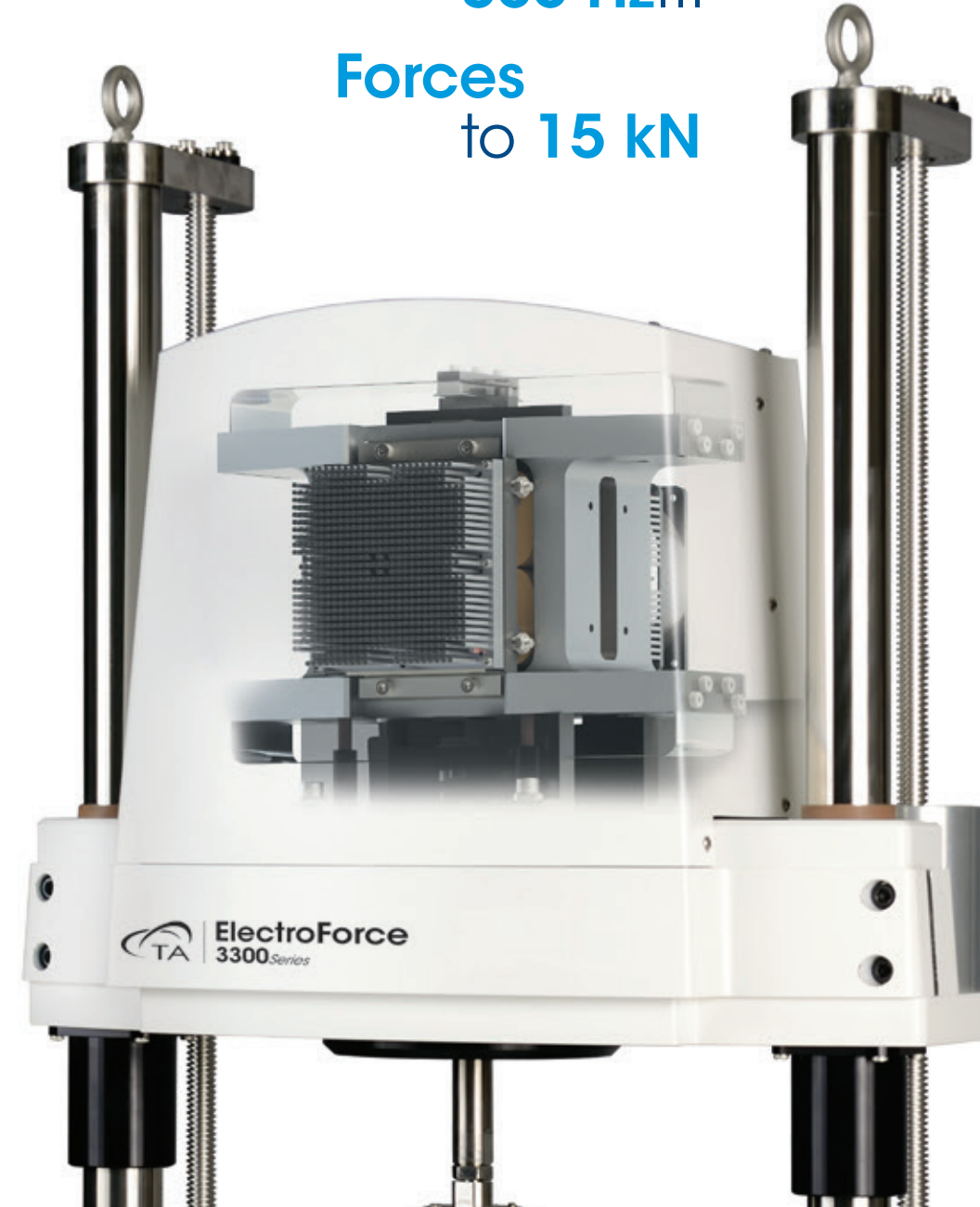
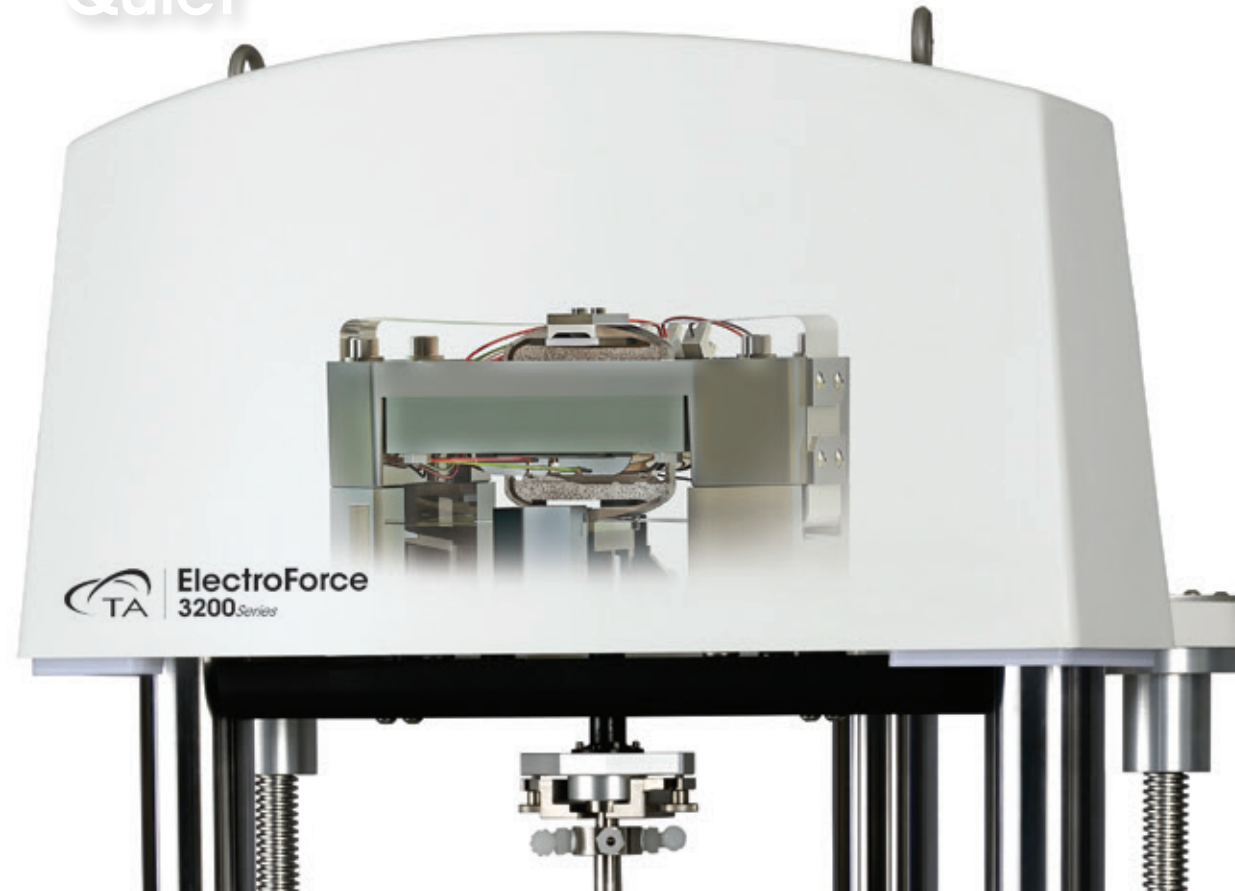
Dynamic
Reliable
Energy Efficient
Frictionless
Clean
Environmentally Friendly
Maintenance-Free
Quiet

Frequency to
300 Hz...

Forces
to **15 kN**

For more than 20 years, ElectroForce test instruments have been successfully utilized in a variety of material characterization, mechanical testing, and motion control applications.

- Patented linear motor operates without friction, an important feature for high-resolution, low-force testing
- Efficient, direct electromagnetic conversion to force results 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



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.

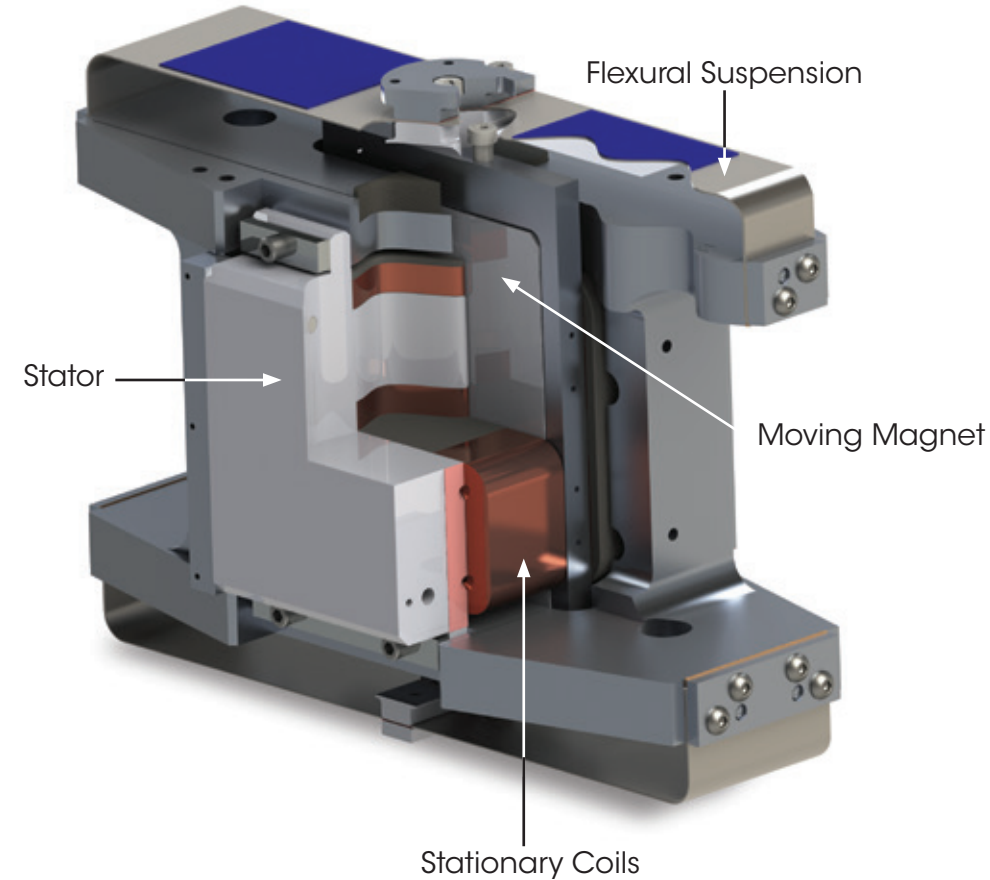
Testing in a variety of environmental conditions

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 from 22 N up to 15 kN
- Maximum displacements from 5 mm up to 50 mm.
- Extended Stroke Options add 150mm displacement.

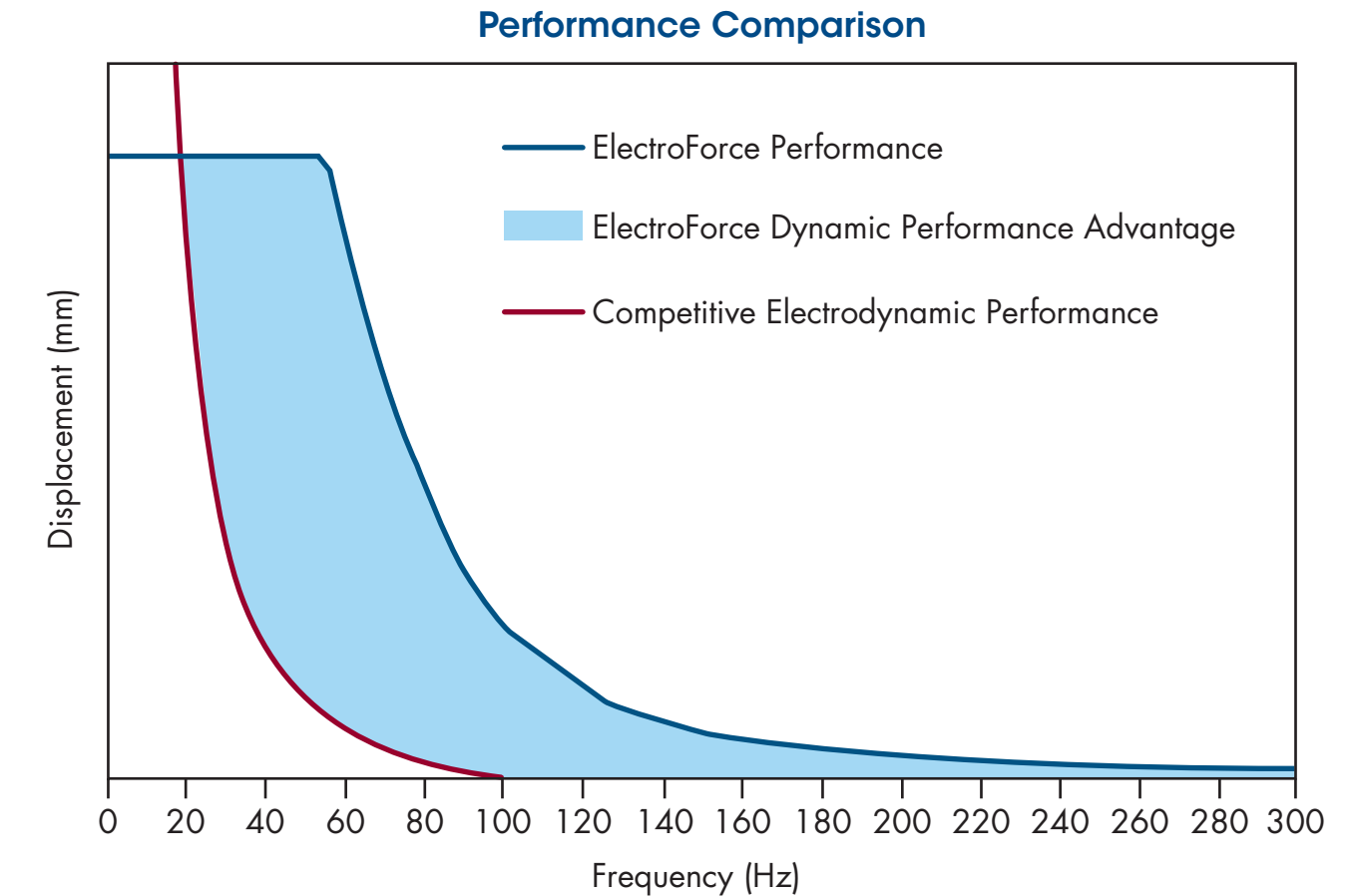


Design simplicity provides unmatched performance & billions of maintenance-free cycles

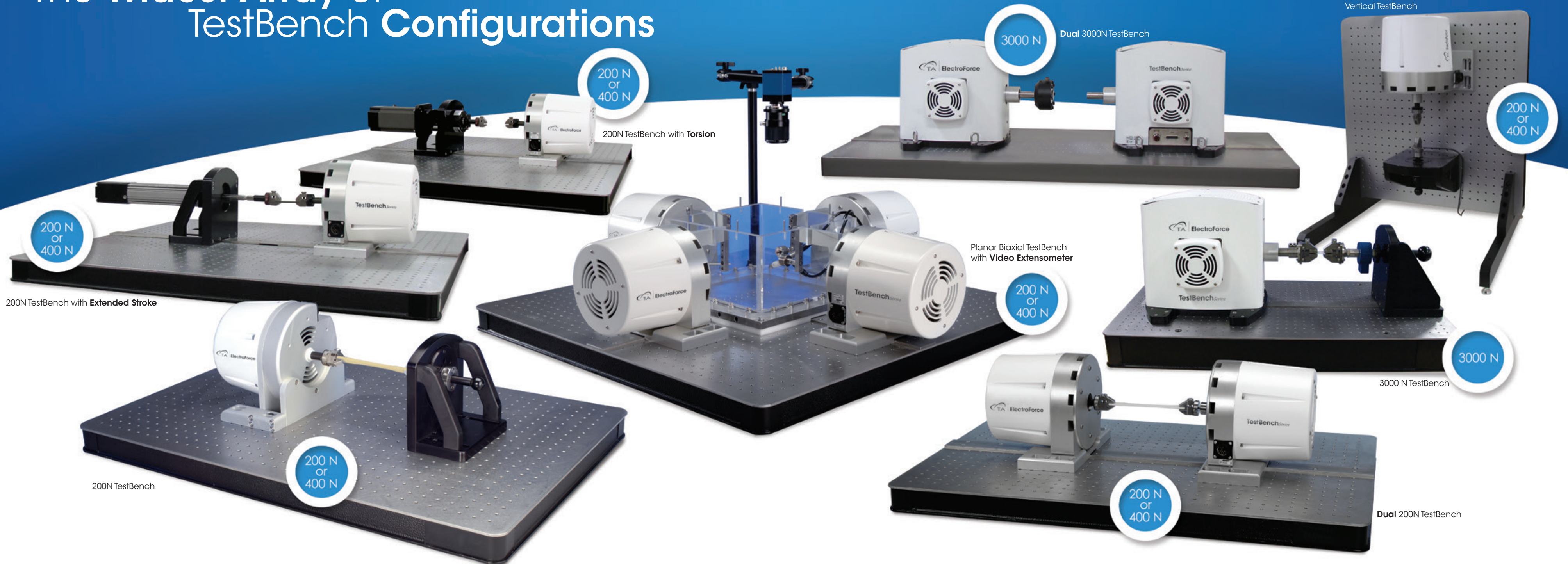
The Most Dynamic & Controllable Linear Motor in the Industry

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



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® 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 DMA (Dynamic Mechanical Analysis)

A flexible application for advanced viscoelastic property measurements, including:

- E'
- E''
- Tan Delta
- Glass Transition
- Hysteresis Energy

TRIOS

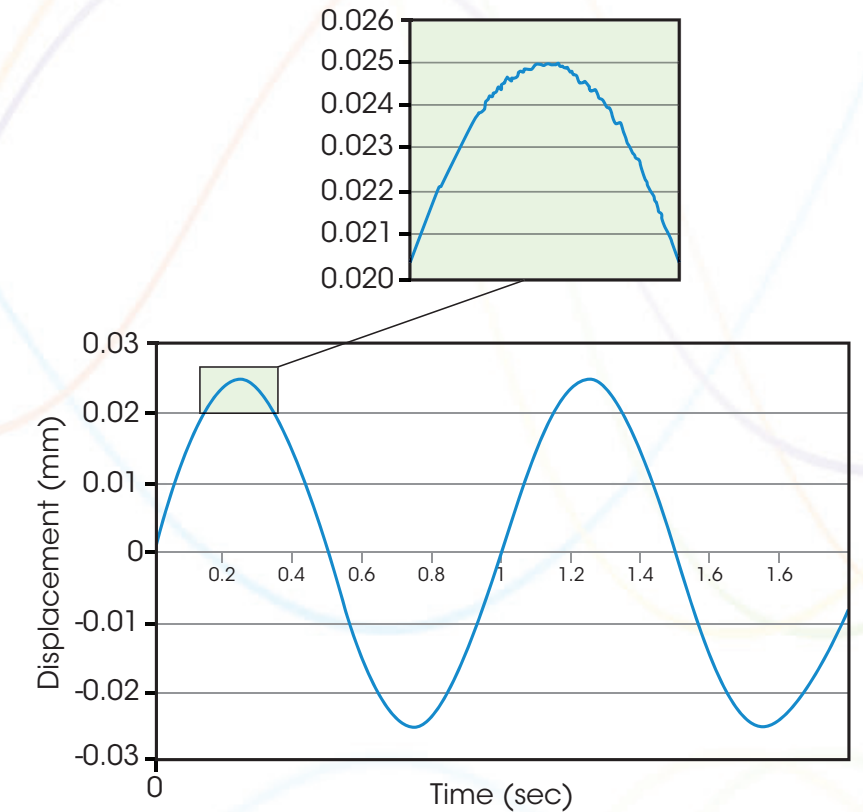
Most Versatile Analysis and Plotting Package for DMA:

- Time Temperature Superposition (TTS)
- Peak analysis
- Onset point analysis
- Peak integration
- User-defined Variables

HADS (High Accuracy Displacement Sensor)

The Most Accurate and Precise Displacement Sensor on the Market

- Up to 1 nanometer 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
- HADS is standard on 3200 and 3300 and is an available option on 3510 instruments



Applications

FATIGUE, DURABILITY & MATERIAL CHARACTERIZATION

Medical
Devices

Electronics

Elastomers

Aerospace

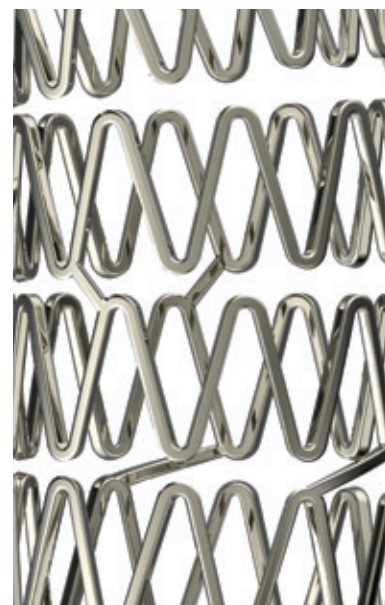
Biomaterials

Composites

Polymers

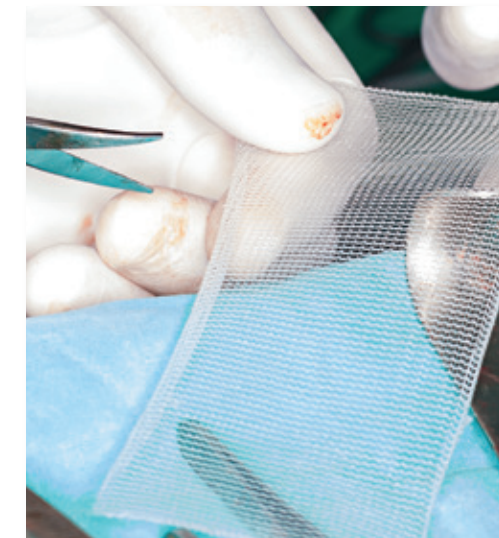
Automotive

Tissue Engineering

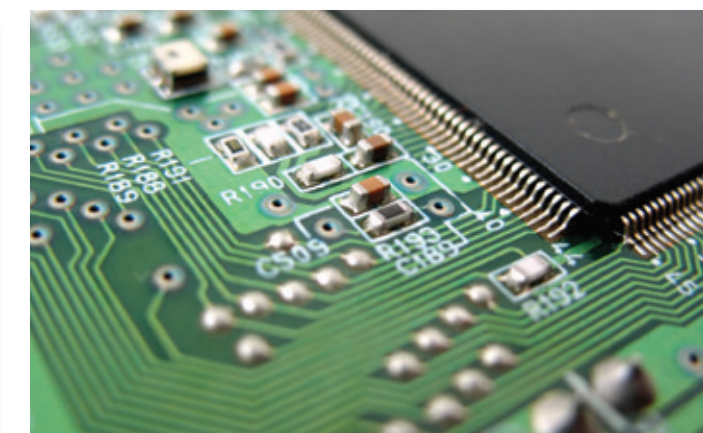


The design of new materials and products requires a thorough assessment of material properties and complete performance evaluation within the customer's intended end-use. A variety of basic and advanced testing techniques are available to meet this need.

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



Your **Success**
our **Mission™**



Accessories

TA ElectroForce
3200 Series

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

Sensors

Force/Torque

Displacement/Rotation

Strain

Pressure

Chemical

Accelerometer

Submersible Force Sensors

Fixtures and Chambers

Multi-specimen Fixture

Saline Baths

BioDynamic Chambers

Hot/Cold Chambers

Furnaces

24-well Plate Fixture

T-Slot

Upgrade Options

Axial

Axial/Torsion

Extended Stroke

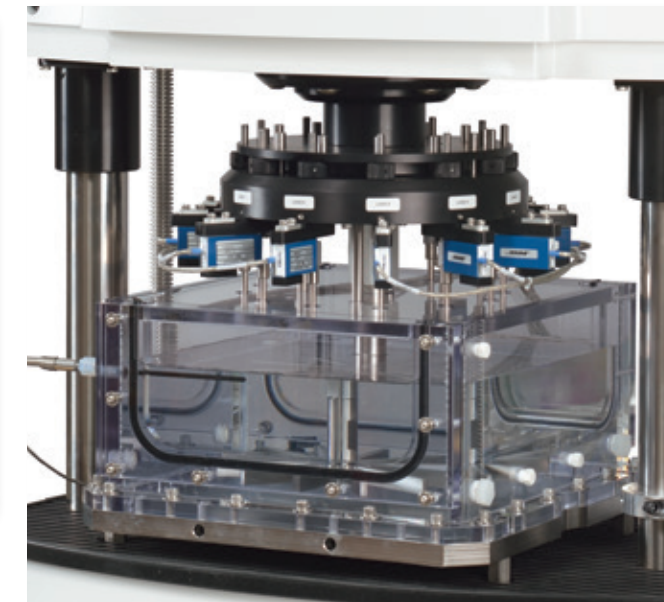
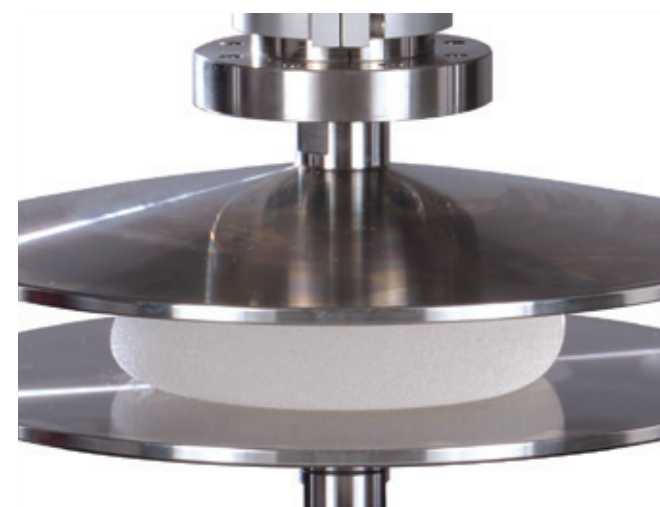
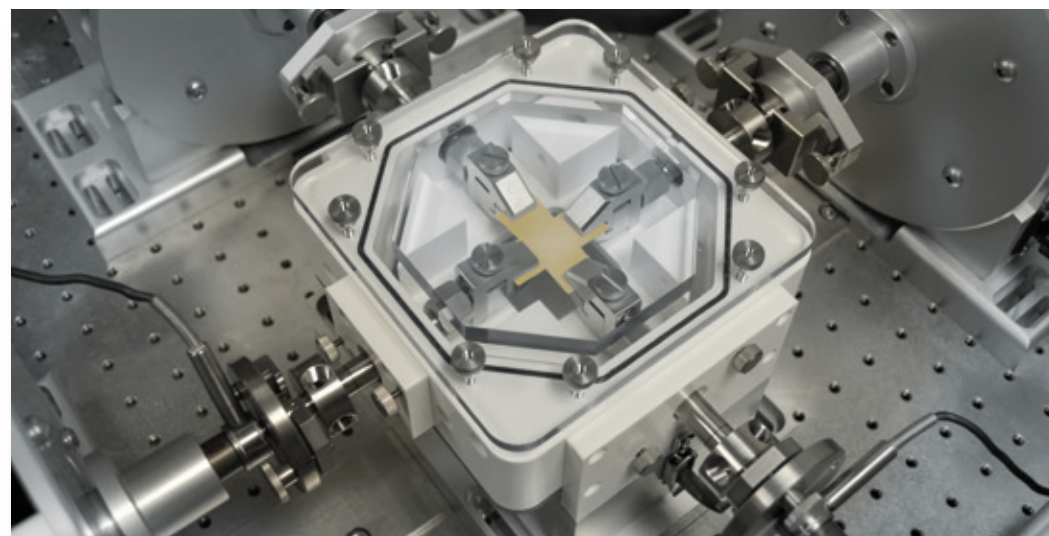
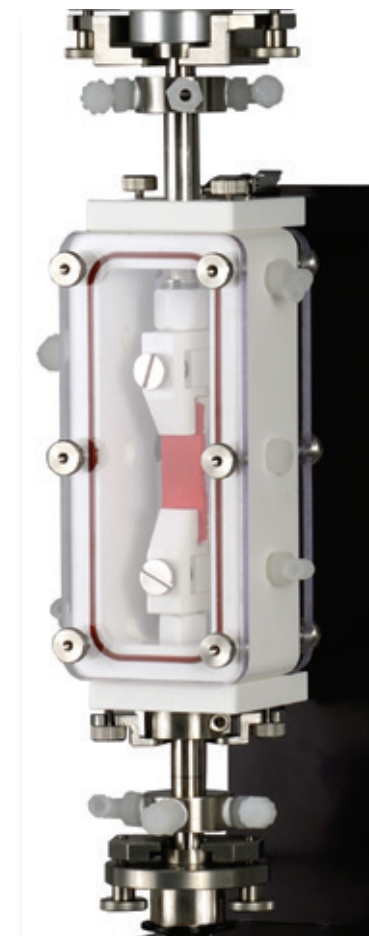
Pulsatile

Table top

Verical Mount

System Status Indicator (SSI) Lights

Battery Backup



Industry-Leading Sales & Support

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 **24 countries** and **5 continents**, TA Instruments can extend its exceptional support to you, wherever you are.



Specifications

	3100	5500	3200	3300	3510
Linear Motor					
Standard					
Peak/Max Sine	± 22 N	± 200 N	± 225 N	± 1000 N	± 7500 N
Static or RMS (continuous)	± 22 N	± 140 N	± 160 N	± 700 N	± 5300 N
High Force Option					
Peak/Max Sine	—	—	± 450 N	± 3000 N	—
Static or RMS (continuous)	—	—	± 320 N	± 2100 N	—
Displacement					
Standard	5 mm	13 mm	13 mm	25 mm	50 mm
Extended Stroke Option	—	—	150 mm	150 mm	—
Linear Velocity					
	0.0025 µm/s – 1.0 m/s	0.0065 µm/s – 0.80m/s	0.0065 µm/s – 3.2 m/s	0.013 µm/s – 1.5 m/s ^[1] 0.013 µm/s – 2.0 m/s ^[2]	0.025 µm/s – 1.5 m/s
Frequency					
	0.00001 Hz – 100 Hz	0.00001 Hz – 20 Hz	0.00001 Hz – 300 Hz	0.00001 Hz – 100 Hz	0.00001 Hz – 100 Hz
Torsional Motor Option					
Standard					
Peak/Max	—	—	± 5.6 N-m	± 14 N-m ^[3] / ± 24 N-m ^[4]	± 49 N-m
Static or RMS (continuous)	—	—	± 5.6 N-m	± 14 N-m ^[3] / ± 24 N-m ^[4]	± 42 N-m
High Torque Option					
Peak/Max	—	—	—	± 49 N-m ^[5]	± 70 N-m
Static or RMS (continuous)	—	—	—	± 42 N-m ^[5]	± 50 N-m
Rotation					
	—	—	Multi-turn (± 20 revolutions Standard)	Multi-turn (± 20 revolutions Standard)	Multi-turn (± 20 revolutions Standard)
Thermal Chamber Option					
	—	—	-150 to 315°C	-150 to 350°C	-150 to 350°C
Fluid/Saline Bath Option					
	Ambient to 40°C	Ambient to 40°C	Ambient to 40°C	Ambient to 40°C	Ambient to 40°C

— Not Available

Notes:

^[1] Linear Velocity on ElectroForce® 3310

^[2] Linear Velocity on ElectroForce 3330

^[3] Standard torque capacity on ElectroForce 3310

^[4] Standard torque capacity on ElectroForce 3330

^[5] High torque option only available on ElectroForce 3330

Specifications are subject to change

	3520/3550	200N/400N TestBench	3000N TestBench
Linear Motor			
Standard			
Peak/Max Sine	± 7500 N	± 200 N	± 3000 N
Static or RMS (continuous)	± 5300 N	± 140 N	± 2100 N
High Force Option			
Peak/Max Sine	± 15000 N	± 400 N	—
Static or RMS (continuous)	± 10600 N	± 280 N	—
Displacement			
Standard	50 mm	13 mm	25 mm
Extended Stroke Option	—	150 mm	—
Linear Velocity			
	0.025 µm/s – 1.5 m/s	0.0065 µm/s – 3.2 m/s	0.013 µm/s – 2.0 m/s
Frequency			
	0.00001 Hz – 50 Hz	0.00001 Hz – 100 Hz	0.00001 Hz – 100 Hz
Torsional Motor Option			
Standard			
Peak/Max	± 49 N-m	± 5.6 N-m	—
Static or RMS (continuous)	± 42 N-m	± 5.6 N-m	—
High Torque Option			
Peak/Max	± 70 N-m	—	—
Static or RMS (continuous)	± 50 N-m	—	—
Rotation			
	Multi-turn (± 20 revolutions Standard)	Multi-turn (± 20 revolutions Standard)	Multi-turn (± 20 revolutions Standard)
Thermal Chamber Option			
	-150 to 350°C	—	—
Fluid/Saline Bath Option			
	—	Ambient to 40°C	—



AMERICAS

New Castle, DE USA

Lindon, UT USA

Wakefield, MA USA

Eden Prairie, MN USA

Chicago, IL USA

Irvine, CA USA

Montreal, Canada

Toronto, Canada

Mexico City, Mexico

São Paulo, Brazil

EUROPE

Hüllhorst, Germany

Bochum, Germany

Eschborn, Germany

Wetzlar, Germany

Elstree, United Kingdom

Brussels, Belgium

Etten-Leur, Netherlands

Paris, France

Barcelona, Spain

Milano, Italy

Warsaw, Poland

Prague, Czech Republic

Sollentuna, Sweden

Copenhagen, Denmark

ASIA & AUSTRALIA

Shanghai, China

Beijing, China

Tokyo, Japan

Seoul, South Korea

Taipei, Taiwan

Guangzhou, China

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