NG-EML Series D – Floor Standing Universal Testing Machine

Standards: ASTM D412, ASTM E8, ISO 7500-1, ASTM E4, ISO 527, ISO 604, ISO 1184, ISO 37, ASTM D638, ISO 6892-1, ASTM E21

- ULTIMATE USER-FRIENDLINESS
- LEADING DEPENDABILITY AND RELIABILITY
- STRICT COMPLIANCE WITH INDUSTRY STANDARDS
- STOCKED CONSUMABLES AND SPARES
- TRUSTED AFTER SALES TECHNICAL SUPPORT
- LIFETIME PRODUCT SUPPORT ADVANTAGE

Description

The NG-EML Series D – Floor Standing Universal Testing Machine (50 kN – 1000 kN) is a heavy-duty electromechanical system developed to meet the increasing demands of testing high-strength steels, advanced composites, high-temperature alloys, and other challenging materials. This system is optimized for both standardized testing and complex research environments requiring maximum stiffness, accuracy, and test stability.

The system features a dual-column floor-standing frame, optimized by finite element analysis (FEA), with reinforced guidance columns and preloaded precision assemblies that ensure exceptional mechanical rigidity and alignment. The high-rigidity synchronous belt drive and servo direct-drive architecture allow for low-noise, high-speed, and backlash-free performance during tensile, compression, and flexural testing.

High precision is maintained even under extreme test conditions, with a minimum testing speed of 0.00005 mm/min and a sampling frequency of up to 1200 Hz. The system supports intelligent waveform generation, strain rates down to 0.00007/s, and provides collision protection, overload safety, and adaptive closed-loop control.

- **Force Capacity Options:** 50 kN, 100 kN, 200 kN, 300 kN, 500 kN, 600 kN, 1000 kN (11240 – 224800 lbf)
- **Frame Configuration:** Dual-column, floor-standing electromechanical frame with servo

direct-drive and synchronous belt transmission

- **Test Space:** Available in single-space and dual-space configurations; extended-travel models offered for long specimens or specialized fixtures

- **Typical Applications:** Suited for high-strength metal testing, composite development, material fatigue studies, thermal testing, and advanced quality control in aerospace, automotive, manufacturing, and research laboratories

Typical Test Specimens

Designed for high-precision testing of advanced and high-strength materials, the NG-EML Series D system supports a broad range of specimen types, including:

- Rubber, elastomers, and soft polymers (ASTM D412, ISO 37)
- Engineering plastics and reinforced composites (ASTM D638, ISO 527, ISO 604)
- Metal sheets, rods, and wires including high-strength steels (ASTM E8, ISO 6892-1, GB/T 228)
- High-temperature alloys and prepregs (ASTM E21, ISO 7500)
- Biodegradable plastics and flexible polymers (ISO 1184)
- Flexible electronics and printed substrates
- Structural materials and components tested at elevated loads and temperatures
- Samples requiring advanced strain-rate control or waveform-driven testing procedures

Key Features of the NG-EML Series D Universal Testing Machine

The NG-EML Series D is designed to address the high-performance requirements of contemporary materials testing. Its main features include:

- **Floor-standing dual-column configuration**: Engineered for high stiffness and stability, optimized through FEM analysis. Equipped with robust guidance columns and additional linear guides to ensure accurate crosshead alignment and minimize vibration.
- **Direct-drive servo system with synchronous belt transmission**: Replaces traditional gear reducers to deliver high-speed motion, minimal vibration, and enhanced energy efficiency. Offers fast acceleration response and higher test stability across a broad range of materials.
- **Pre-loaded precision ball screws**: Enhances load transmission consistency and reduces mechanical backlash, ensuring reliable results during cyclic or high-force testing.
- **Photoelectric encoder-based position measurement**: Integrated within the servo system, supports precise displacement tracking with micro-resolution (as low as 0.0095 μm depending on model), ensuring high fidelity in measurement and strain-rate control (as low as 0.00007 s^{-1}).

- **Closed-loop control and high-speed data acquisition**: 1200 Hz sampling and control frequency, 6-channel 24-bit AD acquisition, and 3-channel digital acquisition (up to 4 MHz). Supports waveform generation including sine and trapezoidal forms.
- **Built-in intelligent safety features**: Includes overload protection (103% of rated force), mechanical stroke limiters, software-defined safety thresholds, and real-time collision mitigation based on force change detection.
- **GenTest™ software platform**: Preloaded with ASTM, ISO, GB/T, and EN standard methods. Offers step-by-step workflows, recalculation features, customizable reports, multi-language support, voice broadcasting, and smart accessory control integration.
- **Flexible system integration**: Compatible with extensometers, video extensometers, high/low temperature chambers, pneumatic grip modules, strain gauges, and more. Analog signal output and Ethernet/USB interfaces support external DAQ systems.
- **Handset with 3.5" touchscreen**: Provides magnetic mounting, real-time data display, crosshead jog, fine-tuning, grip control, and return-to-origin functionality. Dual communication modes with both controller and PC.

Control System

The NG-EML Series D Universal Testing Machine integrates a high-performance digital control architecture designed to deliver precision test execution, high-speed communication, and system-wide integration.

- **Alternative Connectivity – Ethernet & USB:** In addition to USB connectivity, the system supports Ethernet (TCP/IP) communication via a dedicated high-speed chip with integrated hardware logic for complex protocol handling. This provides stable, low-latency data transmission for remote control, lab networking, or distributed acquisition environments.
- **Sampling and Signal Acquisition:** The controller supports up to 1200 Hz closed-loop control frequency and 1200 Hz real-time sampling, ensuring accurate synchronization of force, position, and extensometer signals. It features a 6-channel 24-bit AD analog measurement system, plus 3-channel high-speed digital input capable of acquiring orthogonal pulse signals (e.g., encoder, grating ruler) at up to 4 MHz.
- **Integrated Hardware Safeguards:** Embedded firmware constantly monitors voltage, current, overload, motor temperature, and displacement limits. Both hardware- and software-level emergency stop logic are in place to safeguard the system during abnormal conditions.
- **Handheld Remote Console (Standard):** The system includes a 3.5-inch color touchscreen handset with tactile silicone buttons and a precision rotary control wheel. It supports:
    - Crosshead movement (up/down)
    - Test start/stop
    - Return-to-origin with memory function
    - Grip open/close (if equipped)
    - Specimen protection logic (to avoid overloading during setup)

Optimized Structural Rigidity

The NG-EML Series D – Floor Standing Universal Testing Machine is built around a dual-column frame architecture that delivers outstanding stiffness, alignment stability, and mechanical durability. Its structure is optimized using finite element analysis (FEA) to minimize frame deflection and mechanical backlash under full load conditions.

The system features:

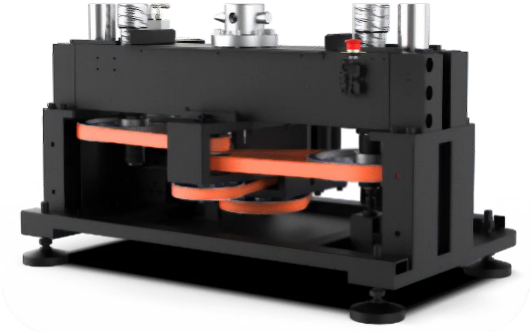
- **Robust guidance columns with self-lubricating design**, ensuring high lateral stiffness and straight crosshead travel.

- **Preloaded precision ball screws** for consistent axial force transmission and minimal mechanical clearance.
- **Integrated servo motor encoder system** with high-resolution position tracking.

All mechanical contact points — including load cell mounts, actuator couplings, and crosshead interfaces — are engineered for high rigidity and zero-clearance fit, ensuring excellent reproducibility for critical measurements such as modulus, yield strength, and tensile failure points.

Advanced Direct-Drive Servo Actuation

The NG-EML Series D – Floor Standing machine features a servo direct-drive transmission system that replaces traditional gear reducers with a high-rigidity synchronous belt mechanism. This architecture improves mechanical efficiency, reduces transmission backlash, and enhances energy efficiency across all test conditions.



Key performance benefits include:

- **High-speed crosshead movement:** Up to 850 mm/min (for 50–100 kN models) and up to 300 mm/min (for 1000 kN model) depending on frame capacity.
- **Fast return speeds:** Up to 1200 mm/min, minimizing idle time between tests.
- **Ultra-low minimum test speed:** Down to 0.00005 mm/min, enabling precise control for tests requiring low strain rates, including high-temperature tensile strain rates as low as 0.00007 s^{-1}.
- **Smooth acceleration profiles:** Enhanced for dynamic responsiveness during ramp, hold, and waveform-based testing.

Intelligent Safety and Control Architecture

The NG-EML Series D UTM integrates a multi-layered safety and intelligence framework designed to safeguard equipment, test specimens, and operators during all stages of material testing.

- **Real-Time Collision Detection:** The system monitors abnormal force changes in real time. If force exceeds a preset threshold (e.g., specimen break or obstruction), crosshead movement is automatically stopped, preventing damage to the load cell and specimen.
- **103% Overload Protection:** The machine features built-in software-configurable overload limits that stop the test once the applied load exceeds 103% of rated capacity.

- **Dual Position Limit Safeguards:** Both mechanical limit switches and software-defined stroke boundaries are included to prevent overtravel during operation.
- **Emergency Stop System:** The control unit is equipped with emergency stop circuitry, allowing operators to immediately halt all motion in critical situations.
- **Sensor Range Protection:** Force, displacement, and extensometer channels are governed by protective logic that halts test execution if inputs exceed calibrated operating ranges.
- **Handheld Console Safety:** The Handset V3.0 includes safeguards such as grip lockout, overload prevention, and a return-to-initial-position feature to avoid misalignment or misoperation during setup.

Optional Protection Shield

The optional protection shield features a fully enclosed structural design with an aluminum alloy reinforcement frame and high-impact polycarbonate panels. This safety enclosure is engineered in accordance with international mechanical safety standards to ensure maximum protection during critical testing operations.

Equipped with an integrated door locking mechanism and software-linked interlock system, the shield restricts system movement when the door is open. This design minimizes the risk of injury and enhances occupational safety in high-throughput or high-force test scenarios.

Streamlined Operation and Maintenance

The NG-EML Series D Universal Testing Machine is engineered for ease of operation and maintenance, optimizing daily workflows while minimizing training requirements and service downtime.

- **User-Centered Software Workflow:** The system runs on an intuitive, icon-driven interface. It includes preloaded test templates compliant with ASTM, ISO, GB/T, and EN standards. Users benefit from drag-and-drop test configuration and real-time graphical feedback.
- **Guided Test Configuration:** Operators can define test sequences through a step-by-step instructional interface, reducing the chance of setup errors and promoting repeatable testing across teams.
- **Automated Reporting:** Post-test processing includes automatic result calculation (e.g., modulus, yield strength, peak force) and one-click export of raw data and formatted reports. Batch operations are supported for high-throughput labs.
- **Accessible Maintenance Architecture:** The control unit features a pull-out controller, and redesigned outer covers provide easy tool-free access for inspecting belts, motors, or sensors.

This simplifies service routines and minimizes machine downtime.

- **Dual Operation Modes:** The system can be operated via the 3.5" handheld touch-screen controller or an optional industrial-grade touchscreen PC, allowing flexibility for both standalone operation and synchronized PC-driven workflows.

Mechanical and Electronic Architecture

The Series D UTM is built with a highly rigid dual-column structure and advanced control electronics to guarantee stability, repeatability, and accuracy across various test conditions and material types.

Precision Load Frame

The structural integrity of the NG-EML Series D is supported by a reinforced load frame engineered for high-precision, low-friction operation. Key features include:

- **High-Stiffness Linear Guide System:** Dual linear guide rails with integrated self-lubrication significantly enhance lateral stiffness and ensure straight, low-friction crosshead travel. This design minimizes off-axis motion and maintains precise axial alignment, which is essential for reducing measurement error in displacement- and strain-sensitive tests.
- **Low-Noise Synchronous Belt Drive:** The direct-drive system employs a high-performance synchronous belt optimized for high speed and low vibration. It operates maintenance-free and ensures smooth power transmission between the servo motor and the actuator assembly.
- **Integrated Optical Encoder:** A high-resolution photoelectric encoder is embedded within the servo system to capture real-time position feedback of the crosshead, supporting micro-displacement measurements with 0.0133 μm resolution.

Load Cell Assembly

The system includes the following load cell features:

- **High-Precision Load Cells:** Each system includes a factory-calibrated load cell with high stiffness, minimal signal drift, and linearity across the entire rated force range.

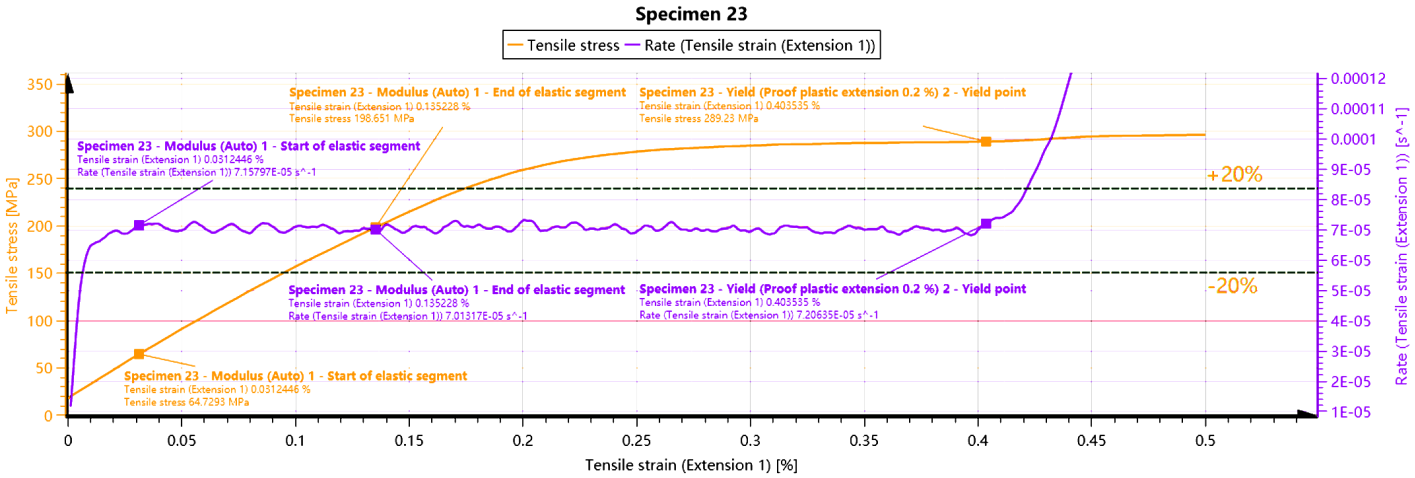
- **Overload and Lateral Force Protection:** Built-in safety logic and structural reinforcement protect the sensor against shock loading, side forces, and improper specimen failure.
- **Bidirectional Testing:** The load cells support both tensile and compression tests without requiring reconfiguration.
- **TEDS Auto-Recognition:** All load cells are equipped with IEEE 1451.4-compliant TEDS chips, enabling plug-and-play recognition and eliminating manual setup.
- **Self-Calibration Ready:** The system supports internal load cell verification procedures to maintain measurement accuracy over time.
- **Wide Operating Temperature Range:** Rated from -55°C to +90°C, suitable for standard and environmental chamber-based testing.

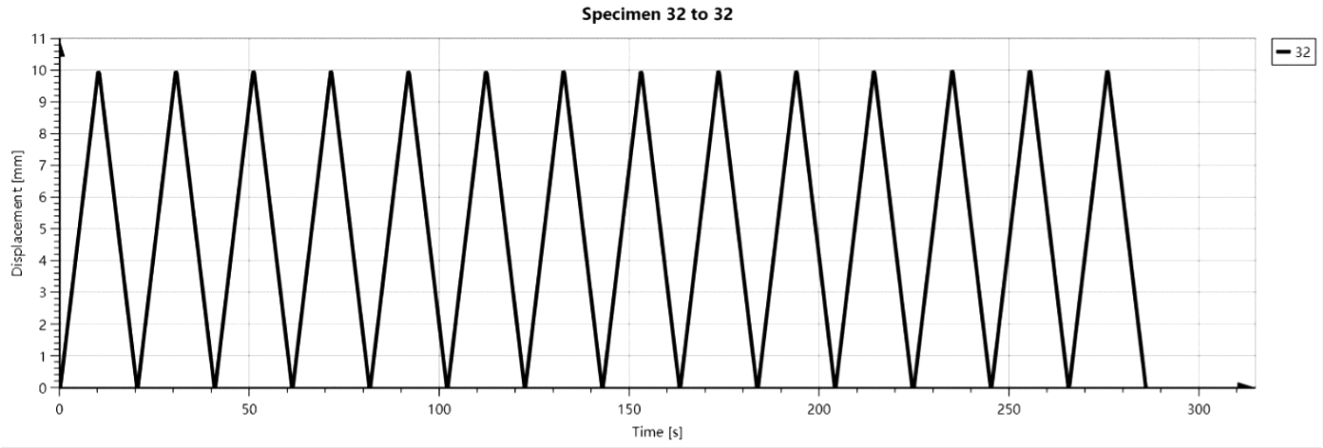
Closed-Loop Controller

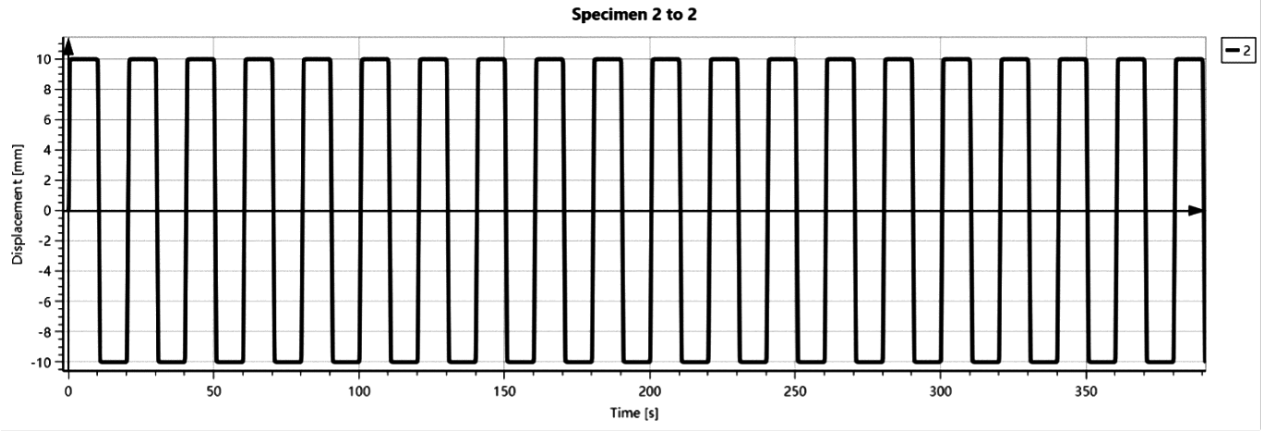
The system incorporates a responsive closed-loop controller designed for test control under dynamic load conditions:

- **Adaptive Feedback Control:** The controller features a next-generation closed-loop PID algorithm, optimized for the upgraded direct-drive mechanics. This enables rapid system response under varying material behavior and loading profiles.
- **Smooth Transition Profiles:** Intelligent speed ramps and control smoothing algorithms ensure consistent performance across high-speed and low-speed regimes. This is critical for metal testing at both ambient and elevated temperatures.
- **Multi-Channel Acquisition:** Six synchronized analog channels and multiple digital inputs allow simultaneous integration of extensometers, temperature sensors, strain gauges, and load signals with millisecond-level accuracy.
- **Real-Time Monitoring and Safety:** Continuous monitoring of voltage, temperature, and sensor integrity ensures safe test execution even during long-duration or high-cycle protocols.

Live Data Visualization and Graphing







NORTH AMERICA (CORPORATE HEADQUARTERS): 170-422 Richards St., Vancouver, BC, V6B 2Z4 Canada
CALIFORNIA: 3503 Jack Northrop Ave., Suite # AF937, Hawthorne, CA 90250
Toll Free:+1 (888) 332-3582 | Fax: +1 905 247-0555 | www.nextgentest.com

- **Real-Time Graphing:** During each test, the system displays synchronized force-displacement, stress-strain, and time-based curves in real time. Graphs are updated dynamically with every acquisition cycle (1200 Hz).
- **Customizable Chart Layouts:** Operators can define custom chart views, zoom windows, axis scaling, and data overlays for advanced comparative analysis.
- **Result Markers and Zoom-In Tools:** Breakpoints, yield offsets, modulus zones, and extensometer triggers are automatically marked and labeled during or after testing.
- **Multiple Curve Overlays:** Batch testing and comparison of multiple sample curves on a single graph allow performance consistency analysis and outlier detection.
- **Export Formats:** Charts and raw data can be exported in multiple formats including CSV, Excel, PDF, and graphical image (PNG, SVG).

Integrated Control Interfaces

The Series D UTM is engineered to support multiple control and interaction modes, providing operators with ergonomic, efficient, and flexible access to all machine functions. Whether in production, R&D, or training environments, these interfaces streamline test execution, setup, and safety control.

Handheld Remote Controller – Included as Standard

This compact, magnetically mountable remote handset includes a fully integrated 3.5-inch full-color touchscreen display for direct user interaction with test status and parameter control.

- **Ergonomic Interface:** Features silicone-coated buttons and a fine-resolution rotary wheel, which allows precise manual positioning of the crosshead. Operators can jog the crosshead, issue return-to-origin commands, or fine-tune alignment prior to clamping specimens.
- **Real-Time Feedback:** Live force, displacement, and system state are displayed on-screen. The user receives continuous updates, reducing the need to shift attention between the handset and PC.
- **Core Control Functions:**
  - Start / Stop test
  - Return to home position
  - Manual jog of crosshead (up/down)
  - Grip open/close control (if pneumatic system installed)
  - Specimen protection logic – prevents excessive preload during setup
- **Flexible Communication Modes:** Can function either:
  - **In direct mode**, communicating with the controller via embedded logic
  - **In PC-synchronized mode**, acting as a secondary user input device for software-guided workflows

Optional Industrial Touchscreen PC

An optional all-in-one touchscreen computer can be mounted directly on the load frame, enabling standalone test execution without requiring an external desktop or laptop.

- **GenTest™ Software Ready:** The integrated industrial PC is preloaded with the full version of GenTest™ software. It provides access to all standard test method libraries, custom sequence creation, live graphing, real-time analytics, and report generation tools.
- **Intuitive Touch Interface:** Multi-touch screen supports tap, drag, pinch-to-zoom, and gesture control. Graphs, test results, and settings are interactively accessible on-screen, minimizing the learning curve for new users.
- **Industrial-Grade Build:** The PC unit features:
  - Shock-absorbing housing
  - Sealed surface for dust and moisture resistance
  - Vibration isolation mounts (optional)
- **Port Expansion:** Offers multiple USB ports for data export, printer connection, barcode scanning, or peripheral automation.

GenTest™ Software

The newly updated testing software features a streamlined and intuitive layout, offering a logical arrangement of functions, consistent interface design, and clearly structured navigation. It supports both horizontal and vertical screen orientations, with automatic resolution scaling based on the display settings of the host computer.

A broad set of preloaded testing protocols is included, covering widely used standards such as GB/T, ASTM, ISO, and EN. These methods are organized into modular test groups based on application type, allowing users to efficiently select appropriate configurations for different industries and materials. In addition to standard methods, the software enables full customization of test procedures and standards to accommodate unique testing scenarios.

An integrated modular accessory management system links accessory configurations directly with the test workflow, allowing seamless interaction between the software and connected components. The platform supports a wide range of external devices, including video extensometers, temperature controllers, analog gauges, fully automatic extensometers, thermal chambers, pneumatic grip controllers, and strain measurement sensors, ensuring maximum adaptability across complex test setups.

- **Modern Interface & Layout:** Flat, user-friendly UI with touch optimization, numeric keypad, and real-time language switching.
- **Flexible Test Methods:** Preloaded GB/T, ASTM, ISO, EN standards with quick test options, templates, and customizable expressions.
- **Real-Time Monitoring:** Live display of up to 12 data channels, interactive graphs, and full test progress visualization.

- **Data Handling & Reports:** One-click raw data export, customizable reports, built-in analysis tools, and recalculation features.
- **Automation & Protection:** Automatic fixture pressure, clamping control, pre-test validation, and sample protection mechanisms.
- **Advanced Control:** Step-based sequencing, voice prompts, and programmable peripheral integration.
- **Security & Maintenance:** Tiered user permissions, test logs, and smart maintenance reminders.
- **Safety Compliance:** Covers overload, electrical, and thermal protections with real-time monitoring.

Technical Specifications

Model	NG-EML 50–100	NG-EML 200–300	NG-EML 500–600	NG-EML 1000
Force Capacity	11,240 / 22,480 lbf (50 / 100 kN)	44,960 / 67,440 lbf (200 / 300 kN)	112,400 / 134,880 lbf (500 / 600 kN)	224,810 lbf (1000 kN)
Frame Type	Floor-standing			
Test Space	Single-space / Dual-space			
Max Speed	850 mm/min	600 mm/min	330 mm/min	300 mm/min
Min Speed	0.00005 mm/min			
Return Speed	1200 mm/min		500 mm/min	400 mm/min
Position Resolution	0.0095 µm	0.0067 µm	0.011 µm	0.011 µm
Frame Stiffness	270 kN/mm	380 kN/mm	900 kN/mm	1300 kN/mm
Weight	2205 / 2690 lbs (1000 / 1220 kg)	2701 / 3307 lbs (1225 / 1500 kg)	6528 / 7654 lbs (2960 / 3470 kg)	12,082 / 13,621 lbs (5480 / 6180 kg)
Power Supply	2 kW		7 kW	11 kW
Voltage	3-phase AC 380V ±10 %, 50Hz / 60Hz			

Common Parameters	
Accuracy	Class 0.5
Force Range	500 N – 1000 kN (0.2% – 100% FS) 10 N – 250 N (0.4% – 100% FS)
Calibration Standard	GB/T 16825.1, ISO 7500 (Class 0.5), ASTM E4
Speed Accuracy	±0.2% of set speed
Position Accuracy	±0.2% of set position
Force Resolution	1 / 600000 FS
Extension Resolution	1 / 600000 FS
Strain Accuracy	Better than GB/T 228, ISO 6892-1, ASTM E8, ASTM E21
Safety Protection	Overload protection (103% of rated force), position limit, over-voltage protection
Single-Channel Data Sampling Rate	1200 Hz
Control Frequency	1200 Hz

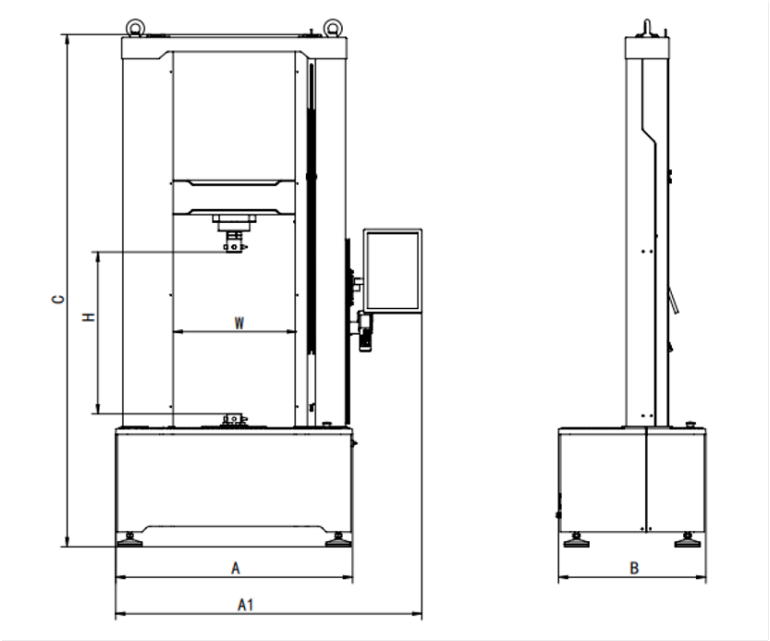
Environmental and Operational Conditions	
Working Temperature	+5 °C to +40 °C
Storage Temperature	-25 °C to +55 °C
Relative Humidity	At 20 °C, +10% to 90%, non-condensing
Maximum Operating Altitude	2000 meters
Motor Type	AC servo motor
Ball Screw	Pre-loaded
Position Measurement	Optical encoder

Dimensional Specifications and Drawing References

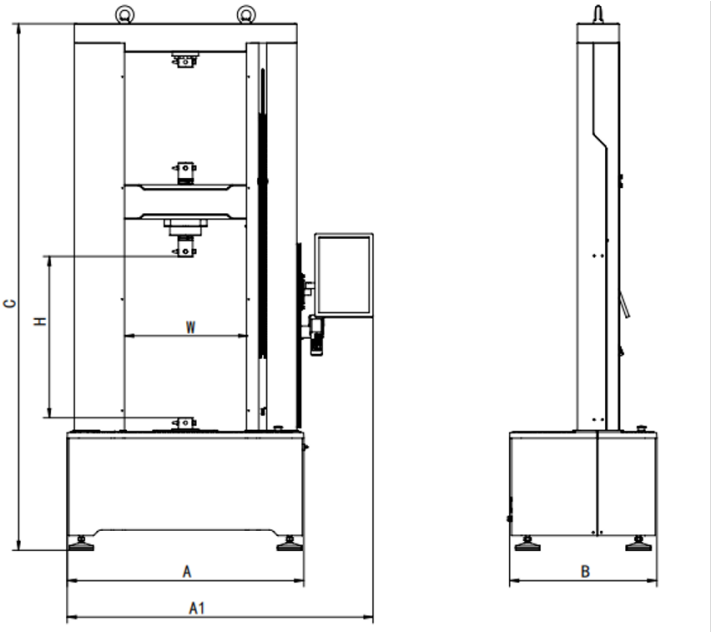
Machine dimensions depend on the selected kN capacity. Please refer to the tables below for the corresponding values.

NG-EML 50–100 & NG-EML 200–300 Models

Frame Type	Dimensions (W × D × H)	Crosshead Travel (H)	Test Width (W)	Touchscreen Height (A1)
Standard (single-space)	46.3 × 28.0 × 100.4 in (1175 × 710 × 2550 mm)	53.1 in (1350 mm)	23.6 in (600 mm)	65.2 in (1655 mm)
Standard (dual-space)	46.3 × 28.0 × 103.1 in (1175 × 710 × 2620 mm)	49.2 in (1250 mm)		
Extended 300 mm (single-space)	46.3 × 28.0 × 112.2 in (1175 × 710 × 2850 mm)	65.0 in (1650 mm)		
Extended 300 mm (dual-space)	46.3 × 28.0 × 115.0 in (1175 × 710 × 2920 mm)	61.0 in (1550 mm)		
Extended 600 mm (single-space)	46.3 × 28.0 × 124.0 in (1175 × 710 × 3150 mm)	76.8 in (1950 mm)		
Extended 600 mm (dual-space)	46.3 × 28.0 × 126.8 in (1175 × 710 × 3220 mm)	72.8 in (1850 mm)		



Single-Space Frame Configuration



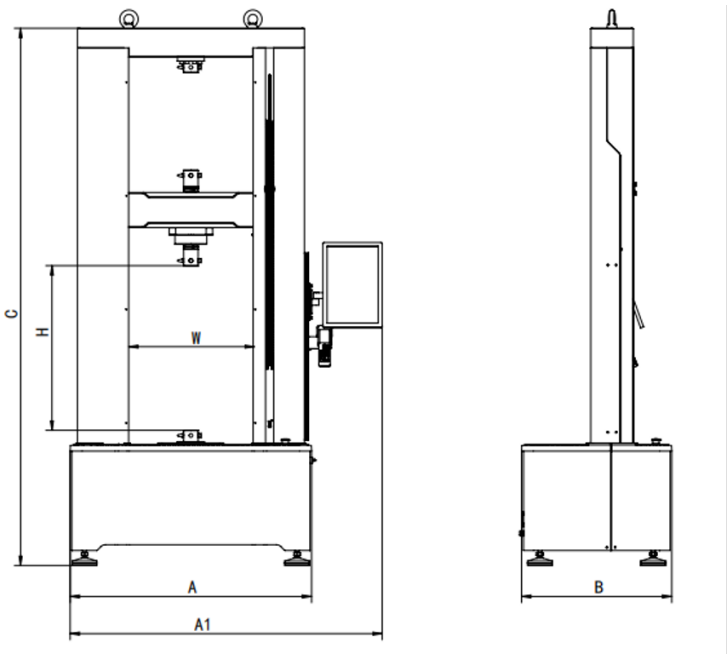
Dual-Space Frame Configuration

NG-EML 500–600 Models

Frame Type	Dimensions (W × D × H)	Crosshead Travel (H)	Test Width (W)	Touchscreen Height (A1)
Standard (single-space)	56.3 × 33.5 × 108.7 in (1430 × 850 × 2760 mm)	29.5 in (750 mm)	29.5 in (750 mm)	90.6 in (2300 mm)
Standard (dual-space)	56.3 × 33.5 × 111.8 in (1430 × 850 × 2840 mm)	25.6 in (650 mm)	29.5 in (750 mm)	90.6 in (2300 mm)
Extended 300 mm (single-space)	56.3 × 33.5 × 120.5 in (1430 × 850 × 3060 mm)	41.3 in (1050 mm)	29.5 in (750 mm)	90.6 in (2300 mm)
Extended 300 mm (dual-space)	56.3 × 33.5 × 123.6 in (1430 × 850 × 3140 mm)	37.4 in (950 mm)	29.5 in (750 mm)	90.6 in (2300 mm)

NG-EML 1000 Model

Frame Type	Dimensions (W × D × H)	Crosshead Travel (H)	Test Width (W)	Touchscreen Height (A1)
Standard (single-space)	61.8 × 39.4 × 122.0 in (1570 × 1000 × 3100 mm)	19.7 in (500 mm)	35.0 in (890 mm)	96.5 in (2450 mm)
Standard (dual-space)	61.8 × 39.4 × 128.0 in (1570 × 1000 × 3250 mm)	35.4 in (900 mm)	35.0 in (890 mm)	96.5 in (2450 mm)
Extended 300 mm (single-space)	61.8 × 39.4 × 133.9 in (1570 × 1000 × 3400 mm)	31.5 in (800 mm)	35.0 in (890 mm)	96.5 in (2450 mm)
Extended 300 mm (dual-space)	61.8 × 39.4 × 139.8 in (1570 × 1000 × 3550 mm)	23.6 in (600 mm)	35.0 in (890 mm)	96.5 in (2450 mm)



Single-Space Frame Configuration

*** Request a formal quotation or send an e-mail to sales@nextgentest.com for the most up-to-date pricing and applicable discounts and incentives.**