NG-EML Series B – Dual Column Bench Top Universal Testing Machine

Standards: ASTM E4, ISO 6892, ASTM D790, ASTM D638, ISO 37, ISO 1184, ISO 604, ISO 178, ISO 527, ISO 7500-1, ISO 2439, ISO 7500, ASTM E8, ASTM D412

- 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 B – Dual Column Bench Top Universal Testing Machine (100 N – 10 kN) is a high-performance electromechanical system engineered for precision testing in both research and industrial environments. Designed to meet the increasing demands of composite, high-strength metal, and high-temperature material testing, this system combines stiffness, speed, and advanced control accuracy in a compact benchtop format.

Equipped with a direct-drive servo architecture, dual guidance columns, and FEM-optimized components, the system ensures minimal vibration, high structural rigidity, and consistent axial alignment under full load. These features support accurate tensile, compression, and flexural testing.

- **Force Capacity Options:** 100 N, 200 N, 500 N, 1 kN, 2 kN, 5 kN, 10 kN (22.48 – 2248.09 lbf)
- **Frame Configuration:** Dual-column, bench-top electromechanical frame with servo direct-drive transmission
- **Test Space:** Single-zone vertical layout with reinforced guidance columns for precise displacement control
- **Typical Applications:** Ideal for QC, R&D, certification, and academic testing of elastomers, plastics, composites, and metals requiring high-accuracy, repeatable results.

Typical Test Specimens

Designed for high-precision testing of modern materials, the system supports a wide variety of specimen types, including:

- Rubber, elastomers, and flexible polymer films (ASTM D412, ISO 37, ISO 1184)
- Engineering plastics and reinforced composites (ASTM D638, ISO 527, ISO 604)
- Thin metal sheets, soft metals, and wire (ASTM E8, ISO 6892-1, GB/T 228)
- High-strength alloys and prepregs (ASTM E21, ISO 7500)
- Flexible electronic substrates and small components
- Adhesives, foam, paper-based and wood products (ASTM D790, ISO 178)
- Textiles, biomaterials, and consumer goods

Key Features of the NG-EML Series B UTM

The NG-EML Series B incorporates advanced structural and control technologies, offering the following key features:

- **Dual-column electromechanical bench-top configuration:** Designed for high precision and stability, optimized for both standard and advanced materials testing.
- **FEM-optimized crosshead and frame structure:** Rigid guidance columns with self-lubrication and preload assembly ensure high stiffness and accurate axial alignment throughout the test stroke.
- **Direct-drive servo system with synchronous belt transmission:** Offers high speed (up to 2400 mm/min), fast return, low vibration, and maintenance-free operation. Enhances energy efficiency and minimizes backlash.
- **Pre-loaded precision ball screws:** Improve force transmission consistency and reduce mechanical clearance, maintaining accuracy under cyclic loading.
- **Photoelectrical encoder-based position measurement:** Integrated into the servo motor system, enabling 0.011 µm position resolution and smooth speed transitions, including high-temperature strain rate testing as low as 0.00007 s^{-1}.
- **Closed-loop control with 1200 Hz frequency:** Digital 24-bit acquisition with high-speed 6-channel AD conversion and up to 4 MHz pulse signal input. Ensures precise control of force, displacement, and strain in real time.
- **Built-in overload and collision protection:** Includes automatic stop on force spike detection, 103% overload protection, mechanical limit switches, and programmable safety logic to protect the load cell and specimen.
- **GenTest™ Software:** Intuitive interface with preloaded test methods (ASTM, ISO, GB/T, EN), real-time graphing, quick test setup, recalculation, voice prompts, and multi-language

switching.

- **Flexible accessory integration:** Supports connection with extensometers, temperature chambers, pneumatic controllers, and other devices. Features TEDS recognition and dual communication modes (PC/software and controller).
- **Handset with 3.5" color touchscreen:** Allows direct crosshead control, test initiation, grip actuation, and fine-tuning for sensitive adjustments. Features magnetic base and ergonomic wheel.
- **Optional modular components:** Include ergonomic workbench (793×658×675 mm), full-protection safety shield with interlock logic, touchscreen PC, and pneumatic grip control unit with integrated pressure regulation.

Control System

The NG-EML Series B system incorporates a high-performance digital control unit designed for precise test execution, seamless communication, and enhanced system integration.

- **Alternative Connectivity – Ethernet (TCP/IP):** In addition to USB, the controller supports Ethernet-based communication using a dedicated high-speed logic chip with full TCP/IP protocol stack support. This allows for high-throughput, low-latency data transmission in distributed testing environments or where remote control and network integration are required.
- **Sampling and Acquisition Performance:** The control system offers 1200 Hz closed-loop sampling, enabling precise synchronization of force, displacement, and extensometer inputs. Six-channel analog acquisition with 24-bit resolution allows highly accurate signal capture for real-time feedback and test control.

- **Integrated Hardware Protection:** Embedded firmware ensures autonomous monitoring of voltage, current, overload, motor temperature, and crosshead limits. Emergency stop logic is implemented both in software and hardware layers.
- **Handheld Remote Console (Standard):** Includes a 3.5-inch full-color touch screen, ergonomic silicone keypad, and fine-adjustment rotary dial. Features include test start/stop, grip control, crosshead positioning, return-to-origin function, and overload prevention. It can operate in dual mode—connected directly to the controller or through the PC interface—offering full control redundancy for lab flexibility.

Optimized Structural Rigidity

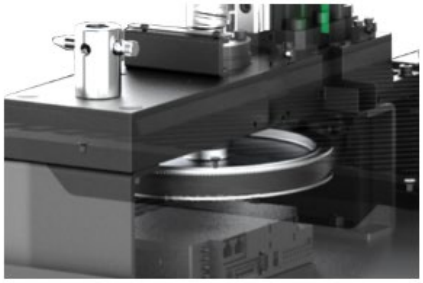
The NG-EML Series B – Dual Column Bench Top Universal Testing Machine features a frame engineered for superior mechanical stiffness and durability. Utilizing a high-rigidity dual-rail structure and an FEA-optimized crosshead design, the system minimizes deflection and backlash, ensuring exceptional accuracy during critical measurements such as modulus determination, yield strength, and failure loads.

- The testing frame integrates preloaded precision ball screws, dual linear motion guide rails, and reinforced column supports to significantly reduce mechanical play.
- All interfaces — load cell, ball screw, motor couplings, and crosshead contact points — are engineered for zero-clearance under load, enhancing measurement consistency in both static and dynamic tests.
- The rigid design ensures long-term alignment stability, even during high-cycle or repetitive test applications.

Advanced Direct-Drive Servo Actuation

The NG-EML Series B UTM is equipped with a next-generation direct-drive servo transmission system that delivers exceptional speed, acceleration, and responsiveness.

- The system eliminates traditional gear reducers by employing a high-rigidity synchronous belt and servo motor assembly, which significantly improves mechanical efficiency and reduces transmission backlash.
- Maximum crosshead movement speed reaches 2400 mm/min, significantly reducing testing cycle durations and increasing throughput.
- High-speed drive enables better responsiveness for low-speed creep, stress relaxation, and modulus ramp tests, while still allowing ultra-slow control for precision measurement scenarios.
- Enhanced acceleration profiles improve system adaptability in multi-stage or high-speed ramp testing procedures



Intelligent Safety and Control Architecture

The NG-EML Series B incorporates an advanced safety and intelligence layer that protects both operator and equipment while optimizing system responsiveness and usability.

- **Real-Time Collision Prevention:** The system constantly monitors real-time force feedback and movement data. If an abnormal force spike is detected (e.g., specimen fracture or obstruction), crosshead motion is automatically halted to prevent load cell overload or mechanical damage.
- **Overload Protection Logic:** The system enforces an immediate stop at 103% of rated capacity. This hardware-level safeguard ensures long-term integrity of sensitive components.
- **Dual-Layer Position Limit Protection:** Built-in software and mechanical end-stop switches ensure safe operation boundaries. Both user-defined digital limits and physical stroke protectors are implemented.
- **Emergency Stop Circuitry:** Integrated emergency stop buttons allow the operator to immediately interrupt any movement.
- **Sensor Range Enforcement:** All input channels (force, displacement, extensometer) include range-checking logic to prevent overrange conditions and maintain data validity.
- **Handheld Controller Safety:** The remote control unit includes grip lockout, overload

prevention, and a return-to-origin function that prevents accidental mispositioning.

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 Series B UTM is designed for intuitive use and efficient daily operation, reducing setup time, operator training, and maintenance complexity.

- **User-Centered Software Workflow:** GenTest software presents a clean, icon-driven interface. Built-in templates for ASTM, ISO, GB/T, and EN standards allow rapid setup, while drag-and-drop test design and real-time graphical outputs simplify routine and advanced testing alike.
- **Step-by-Step Configuration:** Operators can build test sequences with guided steps, reducing the risk of errors and ensuring repeatability across users and labs.
- **Instant Report Generation:** One-click data export, automatic calculation of results (modulus, yield, tensile strength, etc.), and batch processing functions streamline documentation and compliance.
- **Accessible Maintenance Architecture:** The controller module is slide-mounted and accessible for service without disassembling the frame. Protective covers can be quickly opened for belt, motor, or sensor inspection.
- **Dual Control Modes:** The handheld remote console and optional touch-screen PC interface allow local or PC-based operation with full synchronization, offering flexibility for both training and production use.

Mechanical and Electronic Architecture

The NG-EML Series B UTM is engineered with a precision mechanical structure and high-performance control electronics to ensure stability, repeatability, and accuracy across all test scenarios.

- **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.

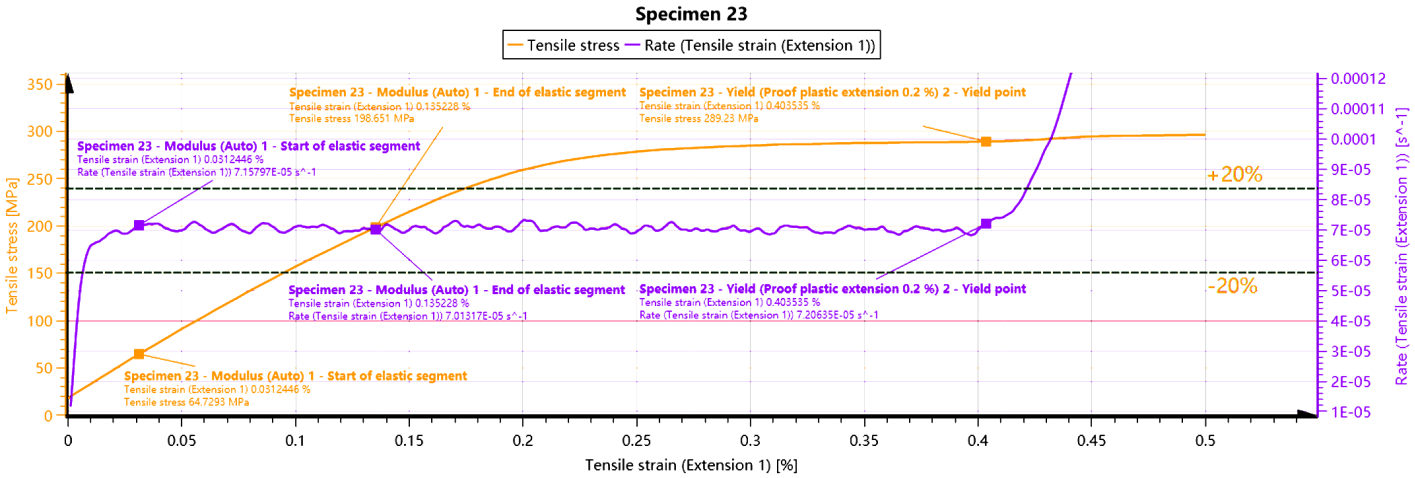
- **Wide Operating Temperature Range:** Rated from -55°C to +90°C, suitable for standard and environmental chamber-based testing.

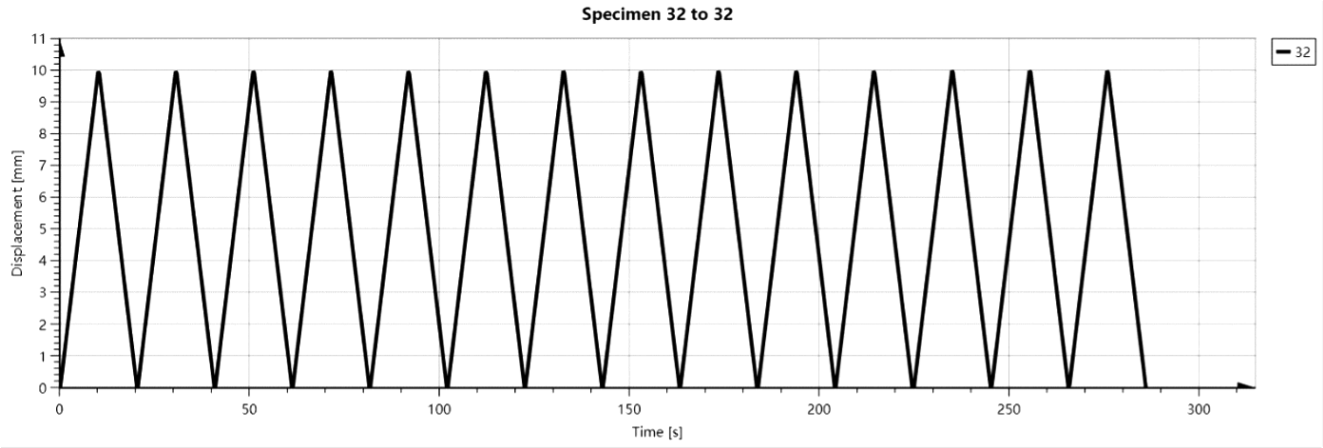
Closed-Loop Controller

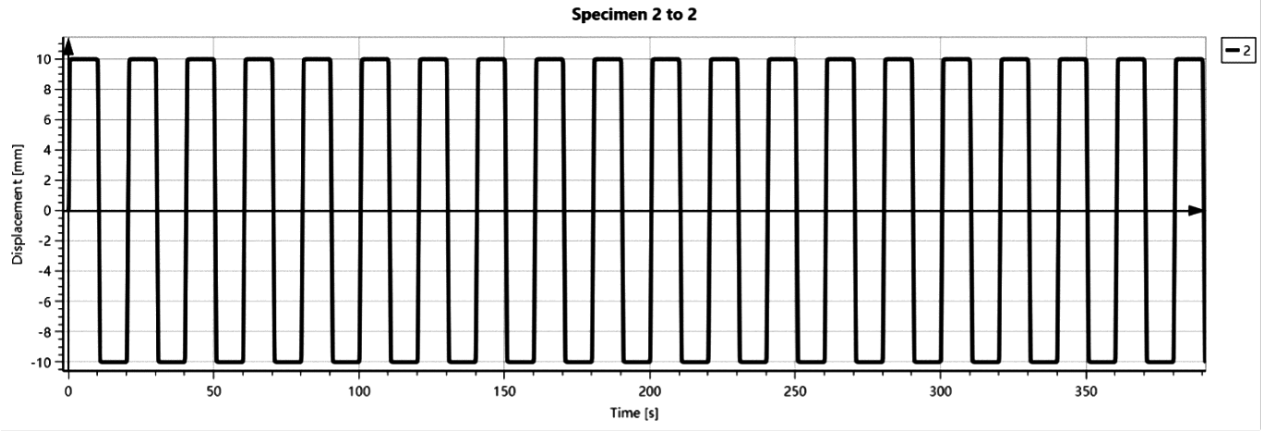
The system incorporates a responsive closed-loop controller designed for test control under dynamic load conditions:

- **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







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- **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 NG-EML B Series 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.

Optional Workbench

The optional ergonomic workbench is designed to enhance operator convenience during test preparation and execution. It provides a stable surface for instrument handling and organized storage of accessories such as grips and fixtures. With compact dimensions of 793 × 658 × 675 mm (L × D × H), it integrates seamlessly into laboratory environments and supports efficient workflow.

Optional Pneumatic Grip Control Module

For applications requiring pneumatic grips, the system supports an optional digital pneumatic grip pressure control unit.

- **Pressure Control and Regulation:** Users can set and adjust air pressure via a digital interface to match the material's clamping requirements. Accurate pressure prevents both under-clamping (slippage) and over-clamping (material deformation).
- **Dual Gripping Channels:** Independently control opening and closing of upper and lower pneumatic grips for high-precision clamping sequences.
- **Integrated Safety Mechanism:**
  - Grip actuation is disabled unless the test space is clear and the system is in a safe state
  - Pre-pressure locking and relief mechanisms help maintain grip force during test start

- **Compact Design:** The module can be rack-mounted near the testing system or installed directly on the machine frame for easy access. Quick-connect fittings allow fast changeover of grip types.
- **Visual Display:** Real-time pressure feedback and grip status indicators support operator awareness and reduce the risk of setup error.

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.

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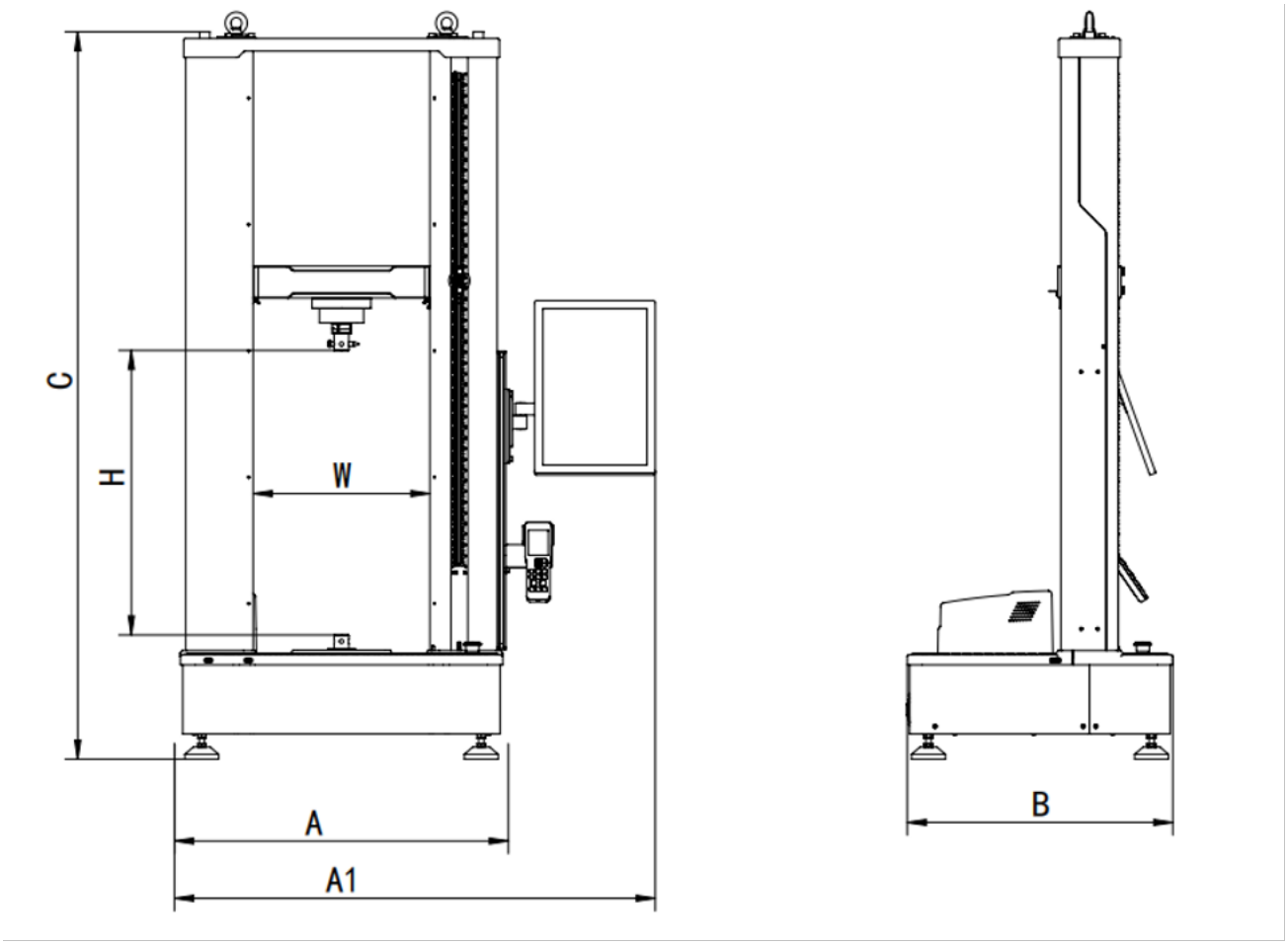
Technical Specifications

Model	NG-EML Series B – Dual Column Bench Top Universal Testing Machine
Force Capacity	0.1 kN (22.5 lbf) / 0.2 kN (45 lbf) / 0.5 kN (112 lbf) / 1 kN (225 lbf) / 2 kN (450 lbf) / 5 kN (1124 lbf) / 10 kN (2248 lbf)
Frame Type	Desktop
Test Space	Single-zone configuration
Maximum Crosshead Speed	2000 mm/min
Minimum Crosshead Speed	0.00005 mm/min
Return Speed (Max)	2400 mm/min
Position Resolution	0.011 µm
Vertical Crosshead Travel (H)	1090 mm (42.9 in)
Test Width (W)	420 mm (16.5 in)
Dimensions (W × D × H)	30.3 × 25.2 × 66.9 in (770 × 640 × 1700 mm)
Frame Stiffness, kN/mm	50 kN/mm
Weight	595 lbs (270 kg)
Power Supply	1 kW
Voltage	Single-phase AC 220 V ±10 %, 50 Hz / 60 Hz
Voltage	Single-phase AC220V±10%, 50Hz/60Hz

Common Parameters	
Accuracy	Class 0.5
Force Range	500 N – 10 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

Overall Dimensions and Working Area Diagram



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