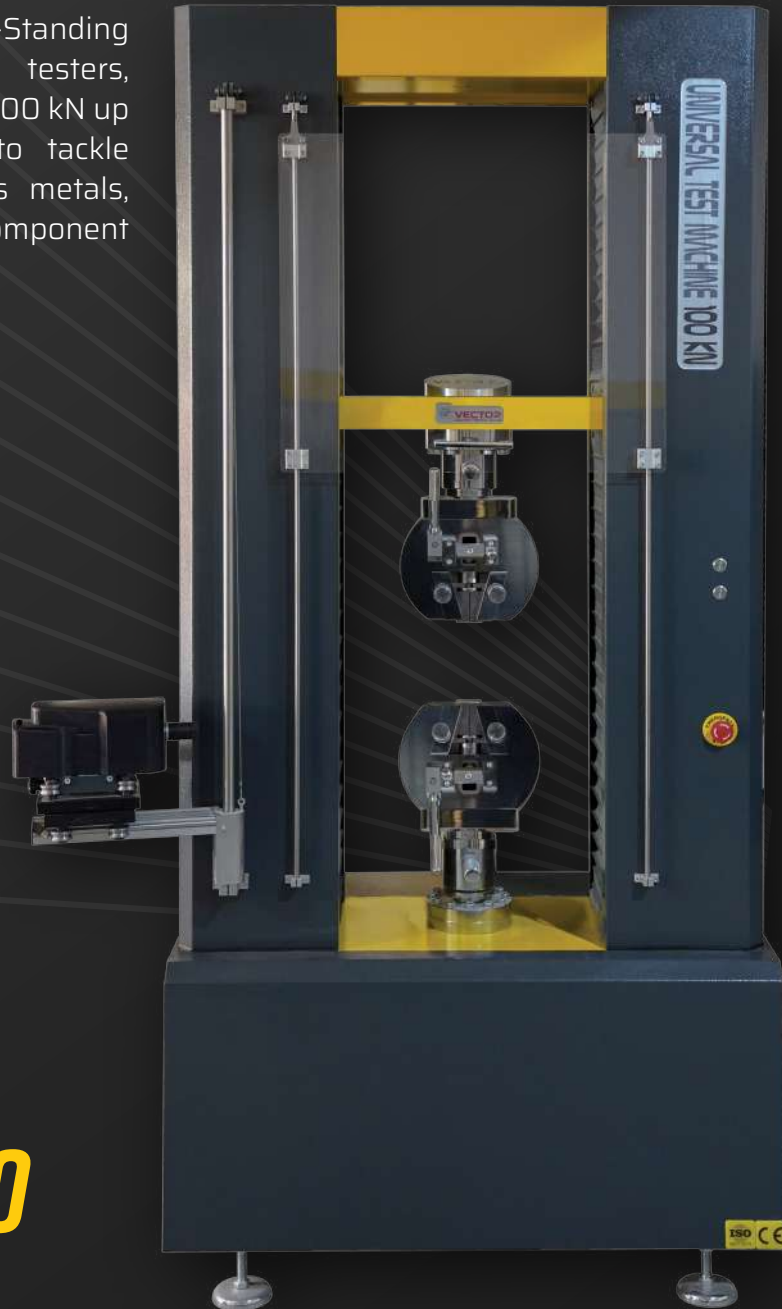


UNIVERSAL TEST MACHINE

Tesla Series (100–300 kN)

For the most demanding materials testing requirements, Vector offers the Tesla Series Double-Column Floor-Standing systems. These heavy-duty testers, available in load capacities from 100 kN up to 300 kN, are engineered to tackle high-force applications such as metals, alloys, composites, and large component testing.



VTR-40-10000



Tesla Series

Double-Column (100–300 kN)

Key Features & Benefits

Heavy-Duty Load Frame: Each floor-standing Tesla machine utilizes a robust dual-column load frame constructed from thick, high-grade steel. The columns are precision-aligned and bolted to a solid base, forming a rigid 2-column structure that can withstand high loads without bending. Finite element analysis was used in the design to ensure uniform stress distribution; as a result, frame deflection at maximum load 300 kN is extremely low (virtually eliminating any influence on measurement). This is crucial for high-force testing – the frame will not “give” under load, preserving the accuracy of extension measurements and preventing energy loss. In contrast, some competitor floor models or older four-column designs may exhibit slight compliance under peak loads, which can affect results; Tesla’s optimized two-column design provides superior stiffness and consistent results at full capacity.

Long Stroke & Spacious Test Area: Accommodating large specimens is a priority. The vertical test space (daylight opening between the base and moving crosshead) is generous to fit long specimens or fixtures. The crosshead travel is likewise extensive, allowing testing of materials with significant elongation (for example, pulling long steel rebar samples to break is possible in a single stroke). The distance between columns (horizontal test width) is wide enough to test bulky samples or assemblies. This spacious test area often exceeds that of competitor machines in the same class, providing more flexibility in types of specimens that can be tested. Whether you’re testing a large metal coupon, a composite panel, or multiple rebar rods in a bend fixture, the Tesla floor model’s geometry offers the room needed.

Exceptional Force and Strain Measurement: The Tesla high-capacity series delivers laboratory-grade measurement accuracy on an industrial scale. Load accuracy is maintained at $\pm 0.5\%$ of reading or better across the full range, verified per standards up to the machine’s maximum capacity. Each system supports the use of multiple load cells (for instance, a 300 kN machine might use a 50 kN load cell for lower-force tests to achieve higher resolution). The control electronics seamlessly handle these swaps, auto-recognizing each sensor and protecting them from overload by intelligently limiting force when a lower-capacity cell is in use. Strain measurement can be done via clip-on extensometers, large gauge length extensometers, or non-contact video extensometers; the controller’s high-speed data capture (5 kHz) ensures even rapid failure events of high-strength metals are captured in detail. Competing high-capacity frames often still operate at 1 kHz data rates, which can miss critical drop-offs at break. Tesla’s 5 kHz capability means you get five times more data through the sharp yield points and sudden breaks typical in metal testing, giving more insight into material behavior.

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Powerful Drive System: Unlike older hydraulic-only systems, the Tesla floor-standing machines use a modern electromechanical drive (ball-screw driven by a servo motor) to apply loads, optionally supplemented by hydraulic grips or fixtures if needed. The servo motor and gearbox are high-torque units designed specifically for low-speed, high-force operation – ensuring smooth application of force even at very slow test speeds. The drive system delivers excellent control from as low as 0.0005 mm/min up to ~500 mm/min, depending on frame size. This means you can perform a slow, precise creep test at 0.5 microns per minute or a faster tensile test at several hundred mm/min on a 100 kN+ sample with equal control fidelity. The electromechanical design offers advantages in energy efficiency and quiet operation (no continuously running hydraulic pump). It also enables ****position holding**** without drift – the crosshead can hold a given position or force for extended periods (useful for stress-relaxation or creep tests) with minimal noise or vibration. Some competitor high-capacity systems rely on hydraulics which may require oil maintenance and generate more noise; the Tesla provides a cleaner, low-maintenance solution while matching the force capacity and control quality of hydraulic counterparts.

Superior Long-Term Reliability: Heavy-duty testing demands equipment that can last. The Tesla floor-standing series is built with an emphasis on durability: oversized ball screws, heavy-duty bearings, and robust motor drives that are all designed for continuous operation at high loads. The entire system is protected with overload sensors – if a specimen abruptly fails and the crosshead accelerates, the controller reacts in milliseconds to prevent a hard stop impact. The drive is also safeguarded by automatic torque limiting to avoid any damage if the load limit is exceeded or if fixtures collide. These protections, along with a proven mechanical design, contribute to the machine's longevity. Many competitor machines in this class are adaptations of lower-capacity models or use older technology that may require frequent service; in contrast, Tesla testers are engineered from the ground up for high-capacity use, resulting in a system that will maintain calibration and performance over many years of heavy use. Vector backs these machines with long-term service agreements and support, reflecting our confidence in their durability and our commitment to your uptime.

Competitive Edge: When comparing high-capacity testers, consider the Tesla series' unique combination of features. For example, competitor frames might offer either high speed or high precision, but Tesla provides both, thanks to its advanced servo control and data acquisition system. The inclusion of modern conveniences – such as an operator panel at eye level, integrated pneumatic grip supply, and modular extensometer options – sets Tesla apart from many legacy heavy testers that can be cumbersome to operate. Furthermore, Tesla's emphasis on safety (with full protective enclosures and interlocks available) ensures that even at high forces, operators are protected, which is not always the case with older heavy-duty machines that lacked comprehensive guarding. By choosing Tesla floor-standing testers, laboratories and test facilities gain a state-of-the-art system that not only meets the force capacity needs but does so with greater accuracy, ease-of-use, and peace of mind compared to the competition.

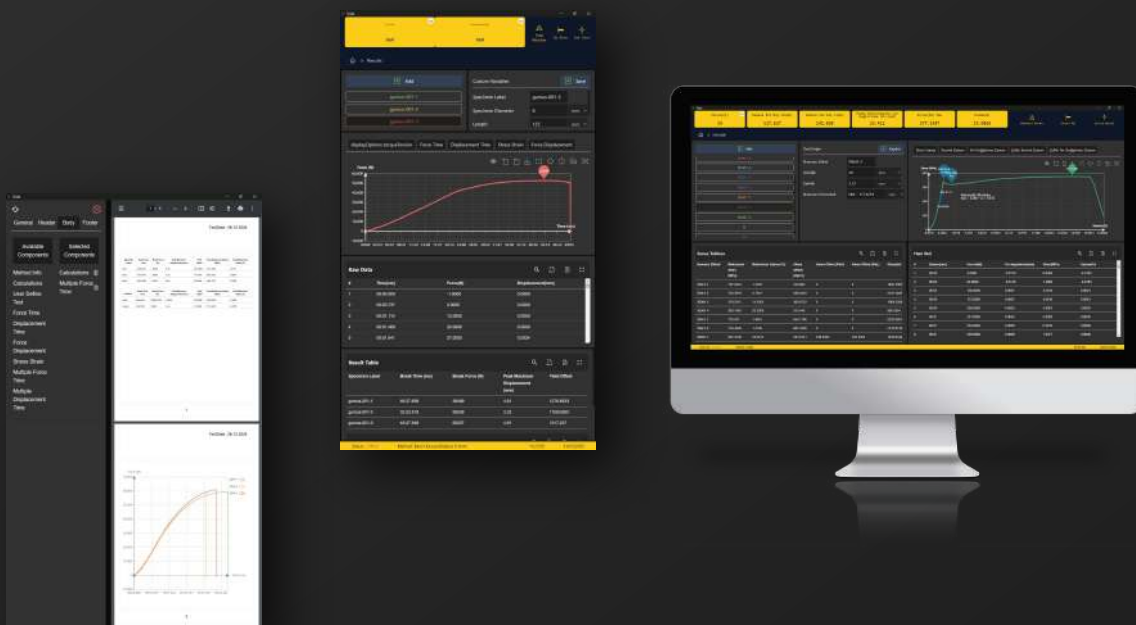
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Double-Column (100–300 kN)

Advanced Software & Control

High-Capacity Test Software: The same powerful Vector software platform drives the floor-standing series, but with additional features tailored for high-force testing scenarios. The software includes methods for metals and building materials testing (for example, methods conforming to ASTM E8 for metals tension, ASTM A370 for steel rebar, etc.) with pre-configured settings like specified loading rates or hold times at yield. It also supports multi-stage test profiles – critical for composite and advanced material testing – where you might preload a specimen, hold, then continue to break. The interface allows operators to easily adjust these test profiles or create their own, using a graphical sequence editor to string together ramps, holds, cycling, etc. Even with complex test requirements, the software ensures the machine follows the sequence precisely, thanks to the adaptive control and high-resolution feedback.

Real-Time Monitoring & Adaptive Control: At such high forces, real-time feedback is essential. The Tesla’s control system monitors load and strain channels in real time at 5 kHz and can adjust drive output on-the-fly to maintain target rates. For example, if a metal specimen yields and its stiffness drops suddenly, the controller will detect the load drop and modulate the crosshead movement to avoid a rapid uncontrolled drop. This maintains stable testing conditions even through abrupt specimen transitions. The software provides real-time plots of stress vs. strain or force vs. elongation on-screen, updating smoothly due to the high data rate. Operators can watch critical points (yield, ultimate load) as they happen, and the system can be configured to automatically stop at a specified load or strain (useful for proof tests where you don’t want to break the specimen). These controls are easily accessible and can be fine-tuned, but the default settings are intelligently chosen so even less experienced users can run tests safely on high-strength materials.



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Compliance with International Standards

Integrated Device Control: Floor-standing tests often involve additional devices – like hydraulic grips, furnaces, or extensometers – that require control. The Tesla system’s controller has multiple I/O ports and supports integration with these devices. For instance, the software can send a command to close hydraulic grips (via an optional grip control module) before a test begins, and open them after completion, automating grip operation. Temperature chamber integration allows the software to read and record temperature or even ramp the temperature as part of a test sequence. All such integration is managed through the user-friendly software interface, where pre-test checklists can ensure, say, “temperature at setpoint” before proceeding. This tight integration reduces manual steps and potential errors when performing complex tests (e.g., high-temperature tensile tests on alloys). Competing systems might require manual control of such peripherals, whereas Tesla provides an all-in-one control solution.

Data Analysis and Reporting: The software doesn’t stop at just controlling the test – it also offers powerful analysis tools needed for high-force tests. It can automatically calculate yield strength (with offset methods), tensile strength, elastic modulus (by selecting the linear portion of the stress-strain curve), elongation at break, reduction of area (if diameter/area inputs are provided), and other relevant metrics. For fracture tests, it can mark energy absorption or other custom criteria. All calculations can be reviewed and adjusted post-test if needed. Reporting is flexible: a standard test report template includes all key results and a graph of the stress-strain curve, but this can be customized to include company logos, specimen details, statistical summaries (if multiple tests), etc. The software supports saving the raw data and analysis such that you can re-load a test later to re-analyze with different parameters – a critical feature for research labs working with new materials. Ultimately, the control and software suite with the Tesla floor models gives operators full command over the testing process and data, from setup to final report, with a level of precision and convenience that stands out in the high-capacity arena.



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Double-Column (100–300 kN)

Safety & Ergonomics

Operator Safety Systems: Safety is paramount when dealing with 100+ kN forces. The Tesla floor-standing machines come equipped with comprehensive safety features. A full-height safety enclosure with interlocked doors is available to surround the test area; this is strongly recommended for brittle or high-energy tests (for example, testing high-strength bolts that can fracture explosively). Emergency stop button is located on the frame, giving anyone nearby the ability to stop the machine instantly if required. The emergency stop and control system meet Category 4 safety requirements with redundant relays (similar to European CE two-channel safety circuits). Additionally, software safety limits are in place: the operator can set a maximum force (for instance, slightly above the expected peak) so the machine will automatically stop if that force is exceeded, preventing overload of the specimen or load cell. Over-travel limits are also automatically set based on fixture geometry to prevent the crosshead from colliding with the base or top. These layered safety measures ensure that even in worst-case scenarios, both the user and the equipment are protected.

Ergonomic Considerations: Floor-standing testers are large, but Tesla's design includes features to make operation as ergonomic as possible. The crosshead positioning is motorized and controlled via the interface or from button on the columns, so operators do not need to manually crank the crosshead – a task that can be arduous on large frames. The loading area is designed at a reasonable height so that for many tests (e.g., tensile of a metal rod), the gripping section is around chest level for an operator, reducing the need for bending or working on a ladder. For very long specimens or specific setups, the crosshead can be lowered or raised accordingly, and there are locking pins to secure the crosshead during fixture changes (for safety, similar to a car jack stand concept). The machine base is open-front, meaning operators can approach the test area with a specimen or tool cart. If needed, a crane or hoist can be used from above (the frame has attachment points to facilitate lifting heavy specimens or load fixtures into place). We provide optional accessories like specimen loading tables or alignment tools to aid in setting up heavy samples. In sum, despite the size of these machines, operator convenience is addressed at every step – from powered crosshead movement to thoughtful placement of controls – to make high-force testing as straightforward and safe as possible.



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Minimal Maintenance & Diagnostics: Large machines can be intimidating to maintain, but Tesla simplifies this through smart design and monitoring. The drive system has lifetime-lubricated ball screws and gearboxes, and the software includes a system monitoring feature that tracks runtime, number of cycles, and load histograms, alerting the user when preventive maintenance or inspection is advisable. The electronics perform self-diagnostics at startup, checking sensor connections and calibration status – any issues are clearly reported to the user. If an overload or error condition occurs, the system logs it for later review. Components like motors and electronics are modular, allowing quick replacement if necessary by a service engineer. We also offer remote support: with the user's permission, Vector engineers can help troubleshoot or update firmware. These features reduce downtime and make it easier to keep the system running optimally. Competitor high-capacity systems often lack such modern diagnostics, leaving users to discover issues only after a failure or calibration drift. Tesla's proactive approach to maintenance means your investment is protected and the machine's uptime is maximized.

Technical Specifications (Model Example)

Load Capacity: 100 kN - 300 kN (maximum force capacity for tension/compression)

Frame Construction: Dual-column floor-standing, steel frame with reinforcement

Test Space: 1300 mm (User configurable)

Crosshead Speed Range: 0.0005 mm/min to ~500 mm/min (varies with model and load)

Power Requirements: 230 V 1-Phase

Data Acquisition & Control: Up to 5000 Hz sampling; closed-loop servo control (PIDF) up to 1000 Hz update rate

Accuracy: $\pm 0.5\%$ - meets ISO 7500-1 Class 0.5 (Note: All models are delivered with a full calibration and compliance documentation.)

Versatility & Applications

The Tesla Double-Column Floor-Standing series is designed to tackle heavy-duty testing across multiple industries and applications. In the metals industry, these machines can perform tensile tests on high-strength steel, aluminum alloys, fasteners, cables, and rebars – providing crucial data for material certification and quality control. For construction materials, they can test concrete reinforcement bars, structural connectors, or anchor bolts in tension and compression. In aerospace and automotive R&D, the 100–300 kN range covers testing of composite panels, large polymer components, and structural elements for failure loads. The testers are equally adept at compression applications: e.g., compressive crush tests of foam or honeycomb structures, or even stacking strength tests for packaging and containers. With appropriate fixtures, the Tesla floor models can do bend tests on large beams or plates, shear tests on bolted joints, and many other custom setups. Their high precision makes them suitable not only for brute force tests but also for delicate high-force measurements – such as measuring the modulus of a metal or the stress-strain curve of a composite throughout the elastic and plastic regions with laboratory accuracy.

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Industries

Materials Science & R&D: Characterization of polymers, films, composites, and biomedical materials.

Metals & Alloys: Tensile, compression, and fatigue testing of steel, aluminum, and reinforced materials.

Construction & Infrastructure: Testing rebar, structural fasteners, anchor bolts, and concrete reinforcement elements.

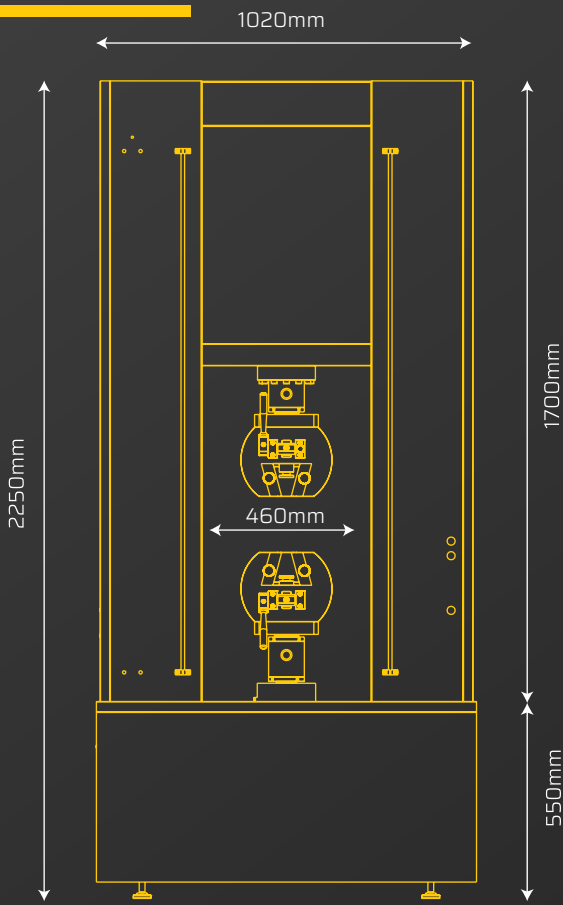
Aerospace & Automotive: Evaluation of composites, polymer structures, and large mechanical assemblies for failure analysis.

Industrial & Heavy Machinery: Certification and quality control of high-strength components and welded structures.

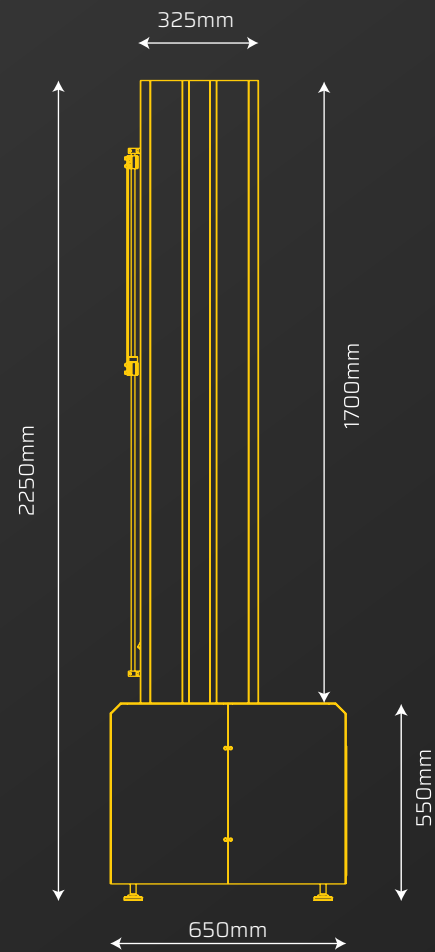
Research & Material Science: Advanced testing of new materials, composite laminates, and high-strength polymers.

Tesla Series

Double-Column (100–300 kN)



High-Capacity and Durable Testing Solutions: Tesla Series



High-Capacity and Durable Testing Solutions: Tesla Series

TECHNICAL SPECIFICATION

Specification	VTR-40-0100
Max Capacity	300 kN
Frame Design	Dual-column, steel construction
Overall Dimensions (H×W×D)	2250mm X 1050mm X 650mm
Test Space Height	1100 mm (configurable)
Speed Range	0.0001 – 500 mm/min
Data Acquisition	5 kHz; 24-bit resolution
Accuracy Class	±0.5% per ISO 7500-1 (Class 0.5)
Power Requirements	120/240 V, 50/60 Hz
Operator Interface	PC software
Connectivity	USB
Safety Features	Emergency stop, dual limit switches, enclosure
Weight	~300 kg
Optional Accessories	Pneumatic grips, advanced extensometers, custom fixtures