

50KN UTM - UNIVERSAL TESTING MACHINE TTM-50



50kN UTM - Universal Testing Machine TTM-50 is designed for analyzing the static properties of materials through tensile, compression, bending, shearing, peeling, tearing, loading, relaxation, and reciprocating tests. It supports both metal and non-metal materials, including composites.

The system automatically calculates parameters such as R_{eH} , R_{eL} , $R_{p0.2}$, F_m , $R_{t0.5}$, $R_{t0.6}$, $R_{t0.65}$, $R_{t0.7}$, R_m , E . It performs tests and generates data in compliance with ISO, ASTM, and DIN standards.

APPLICATIONS

1. Calibration of load measurement instruments for uniaxial testing machines
2. Verification and calibration of force-measuring systems in tension/compression testing machines
3. Tensile testing of metallic materials at room temperature
4. Determination of tensile properties of plastics
5. Test methods for ceramic tile adhesives

FEATURES

Mechanical Framework and Design

The main frame consists of a base, two fixed beam, one movable crosshead, four columns, and two screws, forming a strong door-frame structure.

The transmission loading system features an AC servo motor and a synchronous cog belt speed reducer, driving a high-precision ball screw to control crosshead movement with accuracy.

Key Features:

- 1. Sleek design with exceptional stability
- 2. High rigidity and precise control
- 3. Efficient performance with low noise
- 4. Energy-saving and eco-friendly operation

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Mark	A	B	C	D	E	F	G	H	I
Value (mm)	1822	790	594	248	576	445	1237	410	190

Control and Measurement System

This machine features the advanced DSC-10TT full-digital closed-loop control system for precise measurement and control. A computer oversees the testing process, providing real-time curve visualization and data processing.

After testing, users can enlarge curves for detailed reanalysis and edit data using the built-in graphical processing module. Designed for accuracy and efficiency, the machine meets international standards.

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1. Advanced Closed-Loop Control

- 1. Supports displacement, deformation, and speed closed-loop control.
- 2. Allows real-time adjustments to testing speed and methods, providing greater flexibility and versatility.

2. Comprehensive Multi-Layer Protection

1. Includes both software and hardware protections.
2. Safeguards against overload, overcurrent, overpressure, under voltage, overspeed, and limit breaches.
3. **High-Resolution Data Acquisition**
 1. Features three high-speed 24-bit A/D conversion channels.
 2. Achieves an effective resolution of $\pm 1/300,000$ with consistent precision throughout the testing process.
4. **Reliable Data Transmission**
 1. Utilizes USB or serial communication for stable and interference-resistant data transfer.
5. **Advanced Signal Processing**
 1. Equipped with three pulse signal capture channels (one for displacement, two for deformation).
 2. It uses state-of-the-art quadruple frequency technology to enhance pulse count accuracy, with a maximum capture frequency of 5 MHz.
6. **High-Precision Servo Motor Control**
 1. Digital-driven servo motor with a PWM output frequency range of 0.01 Hz to 5 MHz, ensuring precise and stable performance.

Key Benefits of the Control and Measurement System

1. Advanced Control System

The DSC-10TT full-digital closed-loop control system is our latest-generation specialized control technology for testing machines. It incorporates state-of-the-art servo motor control chips and a multi-channel data acquisition and processing module, ensuring high-speed sampling consistency, effective control, and system stability. The system design primarily relies on hardware modules, enhancing reliability and long-term performance.

2. High-Efficiency, Professional Control Platform

The DSC-TT system integrates DSP + MCU technology, combining the high-speed processing of DSP with the I/O control strength of MCU. This approach delivers superior performance compared to single DSP or 32-bit microcontrollers. The system

includes built-in motor control modules like PWM (Pulse Width Modulation) and QEI (Quadrature Encoder Interface) to enhance precision and ensure safe and stable operation.

3. Parallel Sampling with Synchronous Data Acquisition

A key feature of the DSC-10TT system is its use of a dedicated ASIC chip, enabling synchronous sampling of load cells signals. This hardware-based parallel sampling method prevents asynchronous errors between load and deformation data, improving accuracy and reliability.

4. High-Precision Position Signal Filtering

The optical encoder position capture module features a 24-stage hardware filtering system that processes pulse signals, eliminating errors caused by signal interference. This ensures precise position tracking and maintains the stability and accuracy of the position pulse capture system.

5. Optimized Control Function Execution

By offloading peripheral tasks like sampling and condition monitoring to specialized ASIC chips, the DSC-TT system dedicates its core processing power to PID (Proportional-Integral-Derivative) control calculations. This results in:

1. Faster response times
2. More reliable closed-loop control
3. Real-time adjustments and optimized system performance

This bottom-up approach to control function execution ensures precision, stability, and efficiency, making the DSC-10TT system a cutting-edge solution for material testing applications.

Performance Characteristics of DSC-10TT

The user interface supports the Windows operating system, providing real-time curve display and processing with graphical visualization. The software features a modular structure, ensuring flexibility and ease of use. Data storage and processing are based on an MS-ACCESS database, making it convenient to integrate with Microsoft Office applications for seamless data management and reporting.

The system features a graded user authority management mode, where user access is determined upon login. A super administrator holds the highest level of control, managing user permissions and assigning different operational modules to various users.

The software offers a comprehensive testing management function, allowing users to configure testing units as needed. Custom testing programs can be created based on different standards, ensuring tests meet specified requirements. The system provides real-time visualization of the testing process, including equipment status, control program steps, and extensometer switching.

With advanced curve analysis capabilities, the system supports multiple curve types such as load-deformation and load-time graphs. Real-time curve comparison is possible, with different colors distinguishing test samples. Users can zoom in on any section for detailed analysis, label feature points, and manually or automatically select points for comparison. Curves with labeled points can be printed in test reports.

The system automatically stores test data, preventing data loss due to unexpected interruptions. A fuzzy query function enables quick retrieval of test results based on different criteria, allowing users to review, compare, and analyze data across different test periods and batches. A data backup function ensures previously stored data remains accessible.

Built on an MS-ACCESS database, the DSC-10TT software integrates seamlessly with Microsoft Office, allowing test reports to be saved in Word or Excel formats. Users can also access original test data for material research, maximizing the efficiency of measurement data analysis.

The system supports automatic test result calculations, where an extensometer can capture key test parameters such as ReH, ReL, Rp0.2, Fm, Rt0.5, Rt0.6, Rt0.65, Rt0.7, Rm, and E. These parameters can be freely configured and visualized in printed reports.

An automatic extensometer removal function is included, where the software detects the yield point and switches from deformation to displacement collection. The system then notifies users via an information bar when the switch is complete, allowing for extensometer removal.

The machine includes an automatic return feature, where the moving crosshead resets to its initial position after testing. An automatic calibration function enables load and elongation calibration based on predefined standards.

The measurement range operates in full range mode without classification, ensuring flexibility and ease of use. The system also supports a modular electrical hardware design, allowing easy accessory exchange, functionality extension, and maintenance. Additionally, the automatic switch mode dynamically adjusts the displayed curve based on test force and deformation, optimizing real-time monitoring.

TECHNICAL SPECIFICATIONS

Measurement Parameters	
Maximum test force	50 kN / 11,250 lb.f (can add load cells to extend the force range)
Accuracy class	0.5
Measuring range of test force	0.2%~ 100%FS (full scale)
Indicating error of test force	Within ±0.5% of indicating value
Resolution of test force	±1/300000 of maximum test force, grade unchanged and resolution unchanged in whole process
Measuring range of deformation	0.2%~ 100%FS
Indicating error of deformation	Within ±0.5% of indicating value
Resolution of deformation	1/300000 of maximum deformation
Indicating error of displacement	Within ±0.5% of indicating value

Measurement Parameters	
Resolution of displacement	0.025μm
Control Parameters	
Adjustable range of force control rate	0.005□ 5%FS/s
Control accuracy of force control rate	When rate is less than 0.05%FS/s, within ±2% of setting value; When rate is no less than 0.05%FS/s, within ±0.5% of setting value.
Adjustable range of deformation rate	0.005□ 5%FS/s
Control accuracy of deformation rate	When rate is less than 0.05%FS/s, within ±2% of setting value; When rate is no less than 0.05%FS/s, within ±0.5% of setting value.
Adjustable range of displacement rate	0.001□ 500mm/min
Control accuracy of displacement rate	When rate < 0.5mm/min, within ±1% of setting value; When rate ≥ 0.5mm/min, within ±0.2% of setting value
Other Parameters	
Effective testing width	440mm
Effective distance of tension	610mm (including wedge tensile fixture and can be custom-made according to user's requirements)
Removable distance of crosshead	970mm
Size of Main Unit (length x width x height)	(820 × 620 × 1880) mm
Weight of Main Unit	350Kg
Power supply	220V, 50Hz, 1kW (110V is also available)

Configuration

1. Main Unit: 50kN Door Structure

- (1) Machine Frame: TTM series frame – one set
- (2) Ball Screws: High-precision, zero-clearance – two pieces

2. Control System and Measuring System

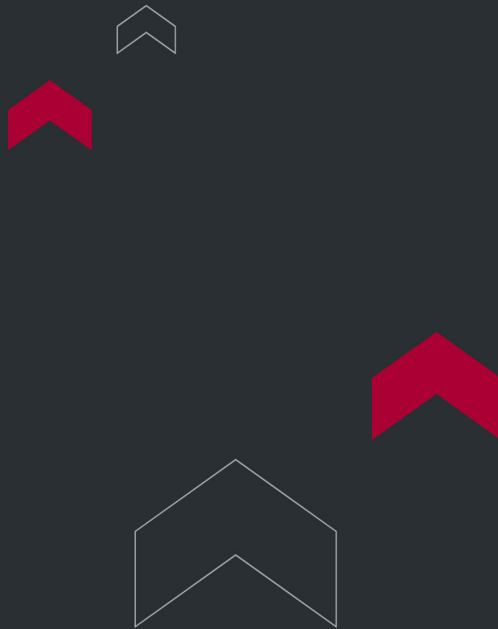
- (1) Servo Motor, Speed Regulation & Control System – one set
- (2) Synchronous Belt – one set
- (3) Load cells: 50kN load cells– one piece
- (4) DSC-10TT Full Digital Closed-Loop Measuring & Control System – one set
 - 1. Load Measuring System
 - 2. Displacement Measuring System
 - 3. Deformation Measuring System
- (5) DSC-10TT Software (English Version)
- (6) Remote Control Unit: Features an LCD screen for real-time display of equipment status, testing force, and displacement. It is magnetic and can be attached to any position on the frame – one piece
- (7) PC (1 piece)
- (8) Printer (HP Color Inkjet, A4) – one piece

3. Grips (Customizable to Customer Requirements)

- (1) Wedge Tensile Grips (Jaw size: Flat 0-7mm, 7-14mm; V Φ 4- Φ 9mm, Φ 9-14mm) – one set per size
- (2) Compression Plates (Plate Diameter Φ 100mm) – one set

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Remote Control Unit



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