

600KN UTM - UNIVERSAL TESTING MACHINE TTM-600



600kN UTM - Universal Testing Machine TTM-600 is designed for comprehensive material testing, including tensile, compression, bending, shearing, peeling, tearing, load testing, relaxation, and cyclic testing. It supports both metal and non-metal materials, including composites.

This machine automatically calculates parameters such as ReH, ReL, Rp0.2, Fm, Rt0.5, Rt0.6, Rt0.65, Rt0.7, Rm, and E. It conducts tests and generates data in compliance with ISO, ASTM, DIN, and other international standards.

APPLICATIONS

- **Metals & Metallurgy Industry** - Tensile, compression, and bending tests for steel, aluminum, and alloys to ensure mechanical performance and compliance with international standards.
- **Construction & Civil Engineering** - Strength and ductility evaluation of concrete, rebar, composites, and other structural materials for safety and durability.
- **Automotive Industry** - Testing of metals, plastics, elastomers, and composites for fatigue resistance, crash safety, and component reliability.
- **Aerospace & Defense** - Precision testing of advanced composites, lightweight alloys, and structural materials under critical load conditions.
- **Plastics & Polymers Industry** - Tensile, tear, peel, and shear testing of polymers, films, and composites for quality control and product development.

- **Energy & Power Industry** - Assessment of materials used in pipelines, turbines, pressure vessels, and structural components exposed to extreme stress.
- **Research & Academia** - Comprehensive material testing and characterization in universities, laboratories, and R&D institutions.
- **Independent Testing & Certification Labs** - Standardized mechanical testing to provide compliance reports and certification services across industries.

FEATURES

Mechanical Framework and Design

The main frame includes a base, two fixed beam, a movable crosshead, four columns, and two screws, creating a robust door-frame structure.

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

This design ensures a sleek appearance, exceptional stability, high rigidity, precise control, and efficient performance. It also operates with low noise, conserves energy, and meets environmental standards.

Control and Measurement System

This machine is equipped with the advanced DSC-10TT full-digital closed-loop control system for precise measurement and control. A computer manages the testing process, offering real-time curve visualization and data processing.

After testing, the curve can be enlarged for detailed reanalysis and data editing using the built-in figure processing module. Its performance aligns with international standards.

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1. **Advanced Control Flexibility** – Enables precise displacement, deformation, and speed closed-loop control. The testing speed and method can be adjusted in real time, allowing for greater flexibility and a wider range of testing applications.
2. **Comprehensive Protection System** – Incorporates multiple layers of software and hardware protection, including safeguards against overload, overcurrent, overpressure, undervoltage, overspeed, and limit breaches, ensuring safe operation.
3. **High-Resolution Data Processing** – Utilizes three high-speed 24-bit A/D switching channels with an effective resolution of $\pm 1/300,000$, maintaining consistent accuracy throughout the testing process.
4. **Reliable Data Transmission** – Supports USB or serial communication for stable and interference-resistant data transfer.
5. **Enhanced Signal Capture** – Features three pulse signal capture channels—one for displacement and two for large deformation—leveraging advanced quadruple frequency technology to increase pulse count accuracy fourfold. The maximum capture frequency reaches 5MHz.
6. **Precision Servo Motor Control** – Includes a digital-driven servo motor with a PWM output frequency ranging from 0.01Hz to 5MHz for precise performance control.

Key Benefits of the Control and Measurement System

1. DSC-10TT Full-Digital Closed-Loop Control System

The DSC-10TT is our latest-generation control system, specifically developed for testing machines. It utilizes advanced servo motor control chips and a multi-channel data acquisition module to ensure synchronized sampling, high-speed operation, and precise control. The system's design primarily relies on hardware modules, enhancing stability and reliability.

2. High-Efficiency, Professional Control Platform

The DSC-TT system combines DSP and MCU technologies, offering both the high-speed processing power of DSP and the robust I/O control capabilities of MCU. This hybrid approach significantly outperforms single DSP or 32-bit microcontrollers. Integrated hardware modules for motor control, such as PWM and QEI, ensure optimal system performance and reliable operation.

3. Parallel Sampling for Improved Accuracy

A key innovation of this system is the use of a specialized ASIC chip, enabling synchronized sampling of all load cells signals. This hardware-based parallel sampling method eliminates asynchronous errors in load and deformation measurements, ensuring highly accurate test results.

4. Advanced Signal Filtering for Precision

The optical encoder position capture module features a dedicated hardware module with a built-in 24-stage filter. This effectively eliminates pulse interference, preventing miscounts and ensuring precise position tracking for stable and reliable performance.

5. Optimized Control Function Processing

By leveraging ASIC chips for tasks like sampling and condition monitoring, the system offloads communication and peripheral functions to dedicated hardware modules. This allows the DSC-TT system to focus on PID calculations, improving response speed and control precision. The result is a fully integrated closed-loop control system that operates at the core hardware level for unmatched performance and stability.

Performance Characteristics of DSC-10TT

The user interface is designed for Windows systems, featuring real-time curve display and processing with a visually intuitive graphical layout. The software is built with a modular structure, ensuring flexibility and ease of use. Data storage and processing are based on an MS-ACCESS database, allowing seamless integration with OFFICE applications for efficient data management and reporting.

1. **User Access Management**

The system operates on a graded user access model. After logging in, users are granted access to specific operation modules based on their permissions. The super administrator has full control and can assign different modules to various operators.

2. **Advanced Testing Management**

Testing units can be configured as needed, allowing users to create customized testing programs based on different standards. The system ensures compliance with selected standards and generates corresponding test reports. It also provides real-time equipment status updates, including program control steps and extensometer switching.

3. **Comprehensive Curve Analysis**

The system supports multiple curve types, such as load-deformation and load-time, with real-time display capabilities. Users can compare curves from the same sample group using different colors, zoom into specific sections for detailed analysis, and label feature points automatically or manually. These labeled curves can be printed in test reports.

4. **Automatic Data Storage & Recovery**

Test data is saved automatically to prevent loss due to system crashes. A fuzzy search function allows quick retrieval of results based on various conditions. Data from multiple test sessions can be combined for comparison and analysis. Backup functionality ensures stored data remains accessible.

5. **Flexible Data Management & Software Integration**

Built on an MS-ACCESS database, the DSC-10TT software seamlessly integrates with OFFICE applications. Reports can be saved in WORD or EXCEL formats, and raw data can be accessed for further analysis, supporting in-depth material research.

6. **Automatic Test Result Calculation**

When an extensometer is added, the system automatically calculates parameters such as ReH, ReL, Rp0.2, Fm, Rt0.5, Rt0.6, Rt0.65, Rt0.7, Rm, and E. Users can customize parameter settings and print graphical results.

7. Extensometer Removal Notification

The system automatically detects yield completion and switches data collection from deformation to displacement. A notification alerts users that the deformation switch is complete, allowing them to remove the extensometer.

8. Automatic Return

After testing, the moving crosshead automatically returns to its initial position.

9. Automated Calibration

The system calibrates load and elongation automatically using standard references, ensuring accuracy.

10. Dynamic Measuring Range Adjustment

- Modular Design:** The system supports a variety of interchangeable accessories, making hardware maintenance and function expansion easy.
- Auto-Switching:** During testing, the display range automatically adjusts based on test force and deformation, ensuring precise measurements.

TECHNICAL SPECIFICATIONS

Measurement Parameters	
Maximum test force	600 kN / 135,000 lb.f (can add load cells to extend the force range)
Accuracy class	0.5
Measuring range of test force	0.4%~100%FS (full scale)
Indicating error of test force	Within $\pm 0.5\%$ of indicating value
Resolution of test force	$\pm 1/300000$ 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 $\pm 0.5\%$ of indicating value
Resolution of deformation	$1/200000$ of maximum deformation up to $1/300000$

Measurement Parameters	
Indicating error of displacement	Within $\pm 0.5\%$ of indicating value
Resolution of displacement	0.025 μm
Control Parameters	
Adjustable range of force control rate	0.005~5%FS/s
Control accuracy of force control rate	When rate < 0.05%FS/s, within $\pm 2\%$ of setting value; When rate $\geq$ 0.05%FS/s, within $\pm 0.5\%$ of setting value.
Adjustable range of deformation rate	0.005~5%FS/s
Control accuracy of deformation rate	When rate <0.05%FS/s, within $\pm 2\%$ of setting value; When rate $\geq$ 0.05%FS/s, within $\pm 0.5\%$ of setting value.
Adjustable range of displacement rate	0.001~250mm/min
Control accuracy of displacement rate	When rate < 0.5mm/min, within $\pm 1\%$ of setting value; When rate $\geq$ 0.5mm/min, within $\pm 0.2\%$ of setting value
Other Parameters	
Effective testing width	750mm
Effective tension distance	650mm (include tensile fixture)
Crosshead effective travel stroke	1100mm
Main Unit size (length x width x height)	(1140 $\times$ 1580 $\times$ 2980)mm
Main Unit Weight	1500Kg
Voltage	3 phase, 380V, 50Hz, 5kW

Configuration

1. Main Unit: 600kN Door Structure

1. Machine Frame: TTM series frame – 1 set
2. Ball Screws: High-precision, zero-clearance – 2 pieces

2. Control & Measurement System

1. Servo motor, servo speed regulation and control system – 1 set
2. Synchronous Belt – 1 set
3. Load cells: 600kN capacity – 1 piece
4. Electronic Extensometer: Gauge length: 50mm, Deformation: 10mm – 1 piece
5. DSC-10TT Full-Digital Closed-Loop Measuring & Control System – 1 set
 1. Load Measuring System
 2. Displacement Measuring System
 3. Deformation Measuring System
6. DSC-10TT Software (English version)
7. Remote Control Unit: Includes LCD screen for real-time display of equipment status, force, and displacement; magnetic for flexible placement – 1 piece
8. PC (1 piece)
9. Printer (HP, Color Inkjet, A4) – 1 piece

3. Accessories (Customizable Upon Request)

1. Hydraulic Wedge Tensile Fixture – 1 set
 1. Jaw sizes: Flat 0-40mm; V: Ø8-Ø16mm, Ø16-Ø26mm, Ø26-Ø46mm
2. Compression Plates: Plate diameter Ø200mm – 1 set

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Remote Control Unit



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