Universal Tensile Tester with Touch Screen

Preface

Thank you for your support and trust in our products!

Welcome to the TS7003L Touchscreen Measurement and Control System. This manual serves as the dedicated operating guide for this system and is designed for use with various tensile and compression testing instruments. It aims to help operators quickly master device operation procedures, confidently configure test parameters, and ensure safe, accurate, and efficient testing.

Note: We continuously innovate and add new features. Should any discrepancies arise between the content of this manual and your actual software version, please refer to the software version you are using. Additional information is available through our official channels.

Chapter1 Overview

The TS7003L Touchscreen Measurement and Control System is designed for testing and control applications with tensile and compression testing machines. Its design specifications fully comply with Chinese national standards (GB) for testing software used in tensile, compression, peel, and related mechanical tests. The system's user documentation is primarily divided into a Quick Start Guide and an Operation Manual.

The TS7003L Touchscreen Measurement and Control System is a professional mechanical testing tool aligned with relevant national standards. It comprehensively supports multiple test types—including tension, compression, peel, tear, bending, and puncture (bursting)—to meet the mechanical performance evaluation needs of diverse materials.

The system features a rich set of practical functions:Supports seamless switching among various test protocols;Allows flexible configuration of key parameters such as test speed and preload force;Enables custom definition of result output items;Accommodates various specimen types, including sheets, bars, and tubes, with customizable settings for gauge length, support span, and other parameters;Offers dual calibration for both force and displacement to ensure data accuracy;Displays real-time data—including force, displacement, deformation—and their corresponding curves during testing;Supports manual data point capture for recording critical values;Automatically generates test reports upon completion and enables printing for recordkeeping;Includes an integrated online help module for quick troubleshooting of common issues, such as sensor collision errors.

It should be noted that the system supports future firmware updates. We will continuously enhance test functionalities and improve operational convenience and data stability based on evolving industry standards and user feedback. Updated versions, along with upgrade packages and release notes, will be available through official channels. Users can follow the provided instructions to upgrade the system and enjoy an improved experience.

To ensure stable operation, please strictly adhere to installation guidelines—such as proper cable routing and power supply matching—before use. Always verify wiring connections and voltage levels before powering on, and monitor limit protection during operation. This manual covers the complete workflow, from quick setup to calibration and maintenance, reflecting the features of the current system version. Should you encounter any operational questions, consult the built-in help system or contact our technical support team. We hope this manual serves as a reliable companion in helping you successfully complete all your testing tasks.

Chapter2 Quick Start

2.1.Overview

The Quick Start guide primarily provides instructions for rapid wiring setup.

2.2.Product Components

The product includes a touchscreen, a mainboard (mounted to the touchscreen via standoffs), matching connectors, a dedicated power supply, and a user manual.

【Installation Orientation】Install with the flexible flat cable (FFC/FPC) facing downward (opposite to the printed markings). Take care to protect the cable during installation.

【Power Supply Selection】Always use the provided dedicated power supply, which features dual-channel isolation for effective interference prevention.

【Touch Operation】The touchscreen is capacitive—simply touch it gently with the pad of your finger.

【Cutout Dimensions】Recommended panel cutout sizes:7-inch: 198 mm × 138 mm;5-inch: 154 mm × 92 mm

2.3.Wiring Diagram

For the 5-inch touchscreen, refer to Figure 2-1; for the 7-inch model, refer to Figure 2-2.

Note: **Pay special attention to the motherboard installation orientation.**

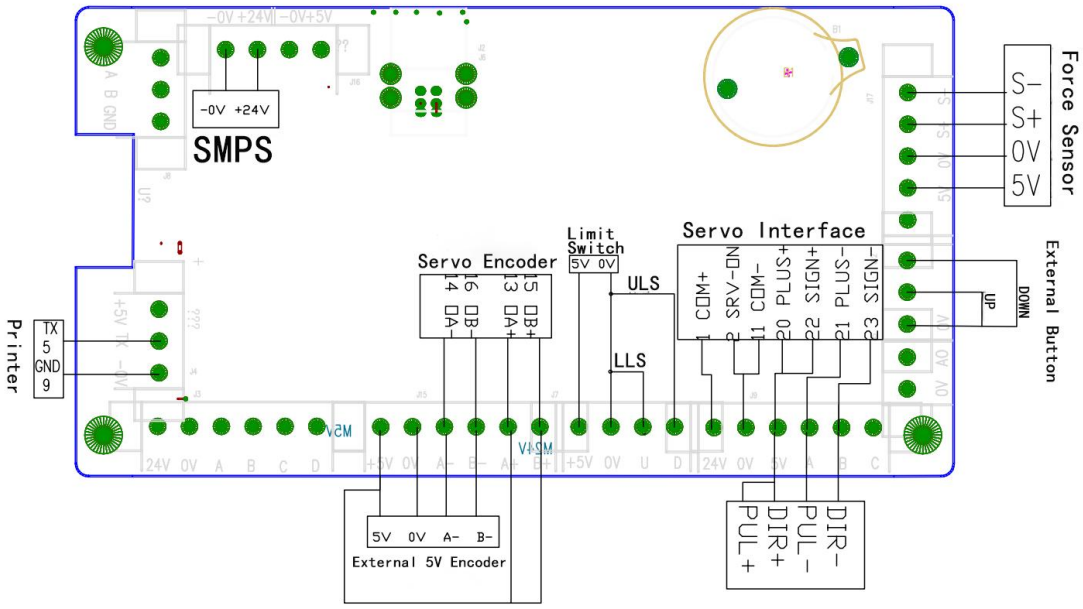

Figure 2-1: 5-inch Touchscreen Wiring

2.4.Power-On Requirements

【Check Wiring】Verify that the power supply polarity and voltage are correct. Use a multimeter to check for short circuits in the dual-channel power supply before powering on.

【Power-On Inspection】Immediately confirm the limit switch status after powering on. Note that the limit switch direction cannot be modified in software, while the motor direction can be configured in the Advanced Settings.

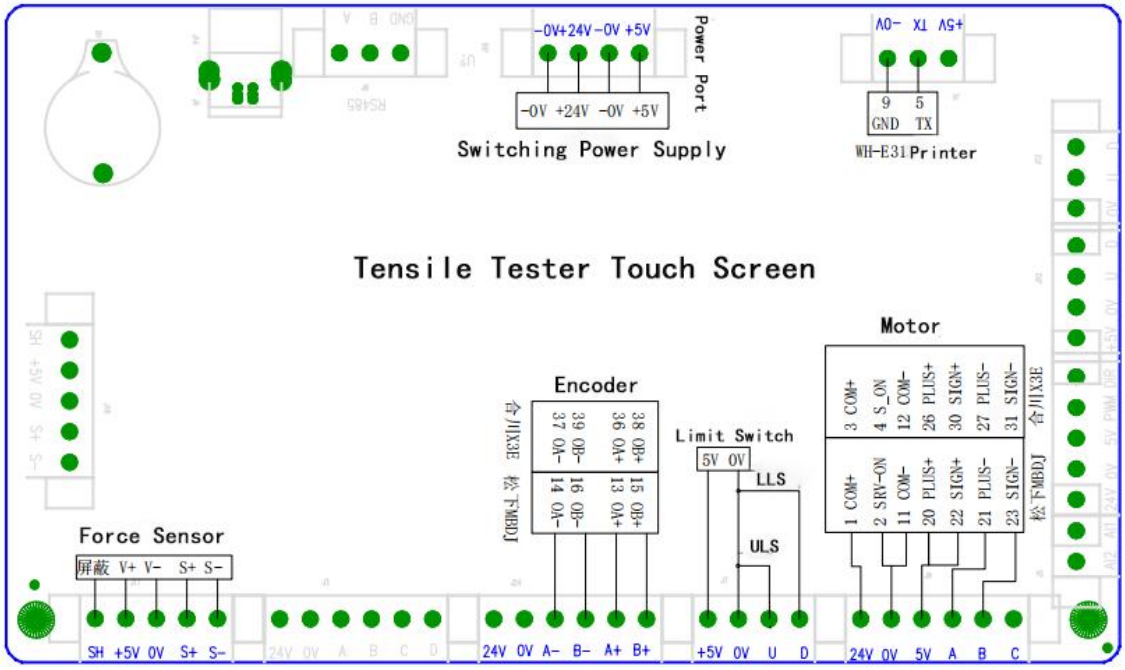

Figure 2-2: 7-inch Touchscreen Wiring

Chapter3 Test Interface Overview and Pre-Test Setup

3.1.Main Interface

The main interface primarily consists of a display area, a menu area, and a control area (see Figure 3-1).

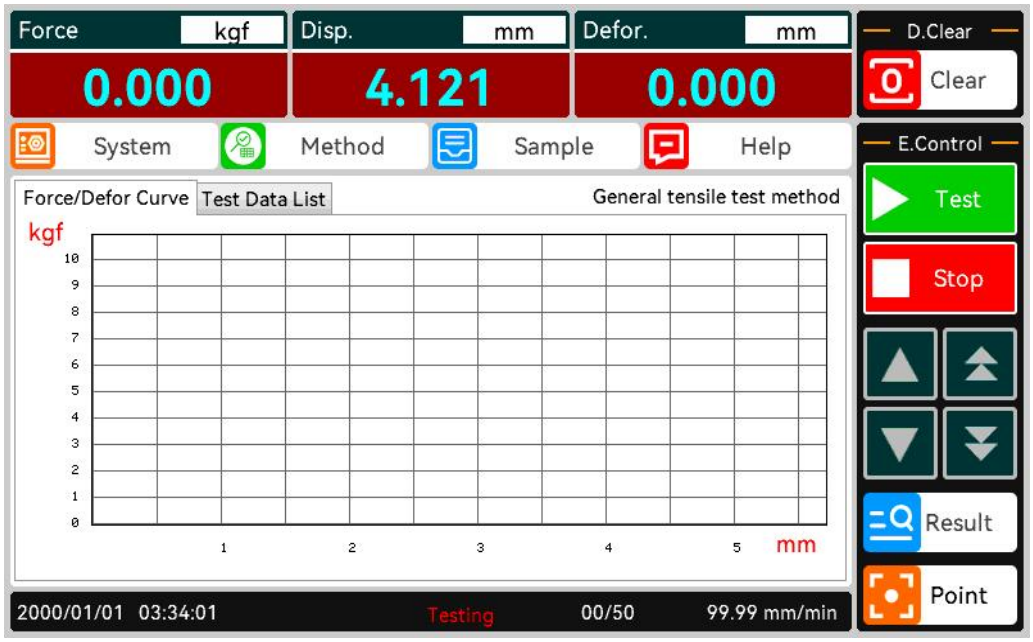

Figure 3-1: Main Interface

【Display Area】

Real-time displays current values such as force, displacement, and deformation. During a test, it also shows the corresponding real-time curve graph.

【Menu Area】

The main menu includes the following options: System Parameters, Test Programs, Specimen Information, View Data, and Help.。

【Control Area】

The control area contains commonly used buttons such as Test, Stop, Up, and Down. The functions of each button are as follows:

(1) Test Button: Starts the test. Upon completion, the test automatically ends and the system returns to its initial position.

(2) Stop Button: Ends the current test or halts any ongoing up/down movement.

(3) Zero Button: Manually resets parameters such as force and time to zero.

(4) Up Button: Initiates an upward movement of the crosshead.

(5) Down Button: Initiates a downward movement of the crosshead.

(6) Jog Up Button: Performs a momentary (jog) upward movement.

(7) Jog Down Button: Performs a momentary (jog) downward movement.

(8) Manual Data Point Button: Captures and records a data point manually during the test.

3.2.Control Method Settings (Test Program)

Click “Test Program” to enter the test program configuration interface (see Figure 3-2).

【Deformation Settings】

1. Deformation Selection: Allows switching between "Deformation" and "Displacement" modes.
2. Start Recording Deformation: Enables setting the threshold value (e.g., force or position) at which deformation recording begins.

【Direction Settings】

1. Running Direction: Click the corresponding area to toggle the test running direction (e.g., upward or downward).
2. Force, Displacement, and Deformation Display Settings: Allows switching the force value display mode among "Absolute" "Normal" or "Reverse"

【Automatic Fracture Detection】

1. Auto Start Judgment Force: Allows setting a threshold force value at which the system begins automatically detecting fracture.
2. Breakpoint ratio: Set the breakpoint ratio; the test stops when the set value is reached.

【Test Control】

1. Test Speed: Allows setting the crosshead movement speed during the test.
2. Preload force: Set the target force value for preload;
3. Auto return: Set the speed for automatic return;
4. Timed / Fixed force / Fixed displacement / Fixed deformation: Set any target value, and the test stops automatically when reached;

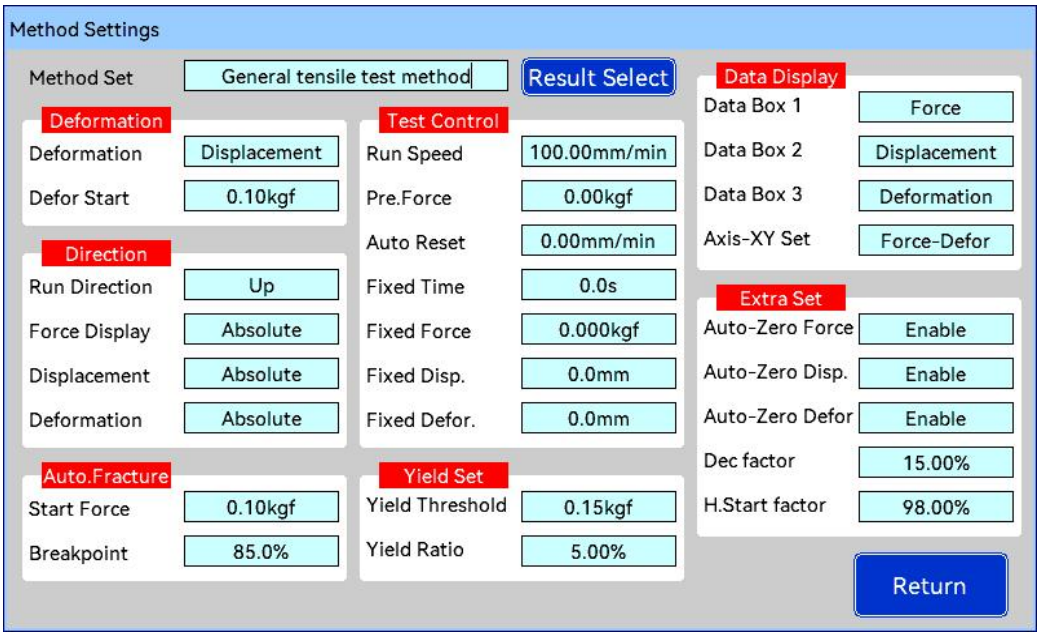

Figure 3-2: Test Program Interface

【Yield Setting】

1. Yield threshold: The yield threshold can be set;
2. Yield drop ratio: The value of the yield drop ratio.

【Data Display】

1. Data Box 1, 2, 3: Switchable display of test interface data such as "Force value", "Displacement" and "Deformation";
2. X-Y Axis Settings: Configurable display types for X-Y axes, including "Force-Deformation", "Force-Time" and "Deformation-Time".

【Other Settings】

1. Force Zero, Displacement Zero, and Deformation Zero Before Test: Set whether the zero clearing of the corresponding values is "Enabled" or "Disabled";
2. Deceleration Coefficient: In pressure-holding tests, decelerate during pressure holding to prevent overpressure;
3. Pressure-Holding Start Coefficient: In pressure-holding tests, the start coefficient of the force when the target force is reached.

【Control Area】

Click the light blue area on the right side of the Sample Scheme interface to enter the Scheme Selection interface (see Figure 3-3).

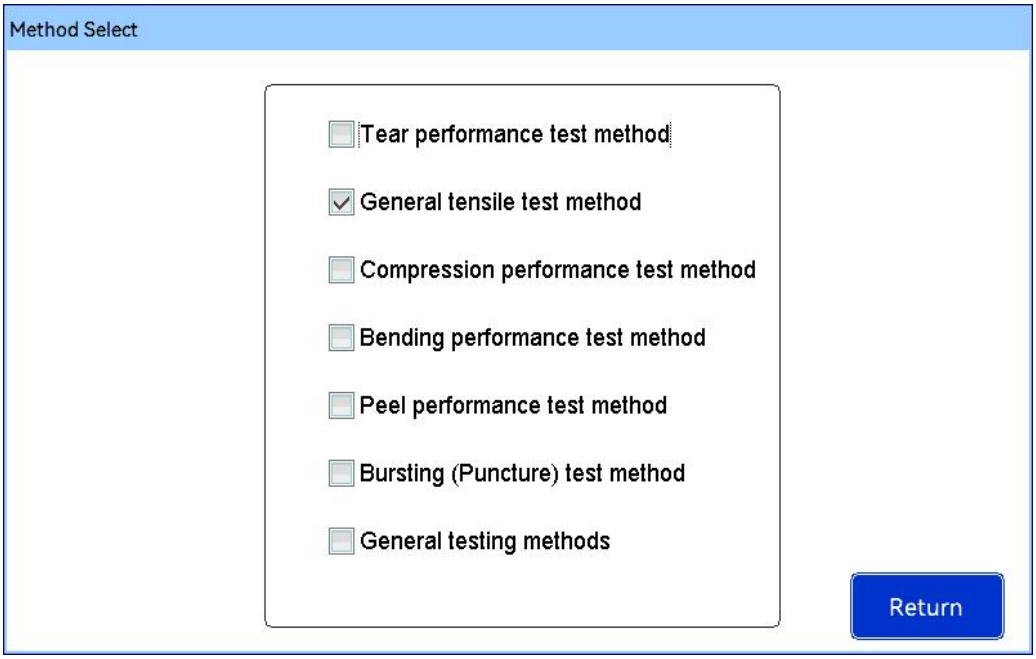

Figure 3-3 Scheme Selection Interface

【Result Selection】

Click Result Selection on the Sample Scheme interface to enter the Result Selection interface (see Figure 3-4), where you can select the data to be output on the result page. The test result corresponding to the tick box with a "√" will be output.

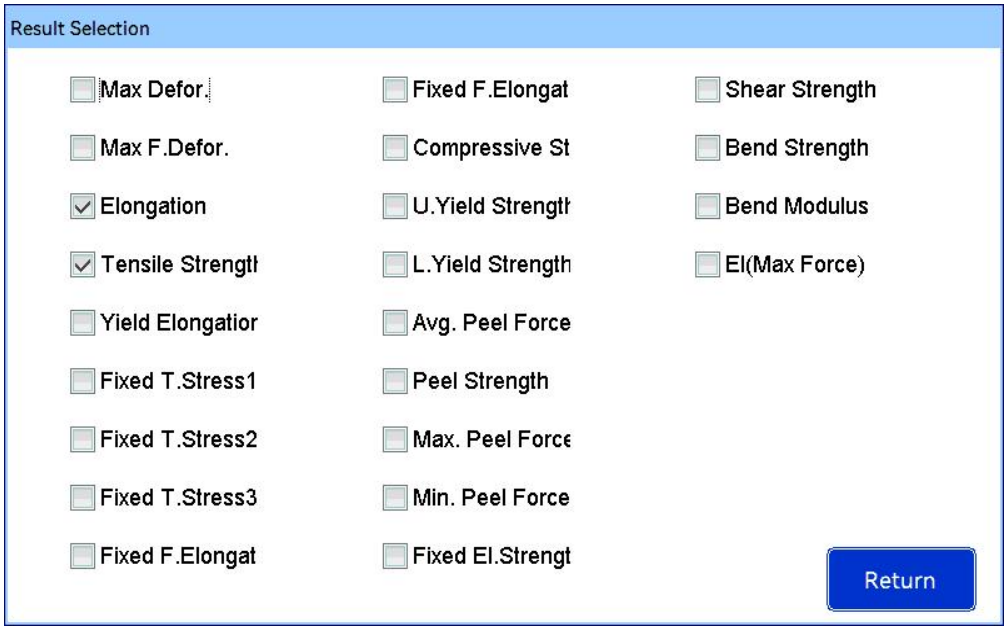

Figure 3-4 Result Selection Interface

3.3.Sample Information Setting

Click Sample Information to enter the Sample Information Setting interface (see Figure 3-5).

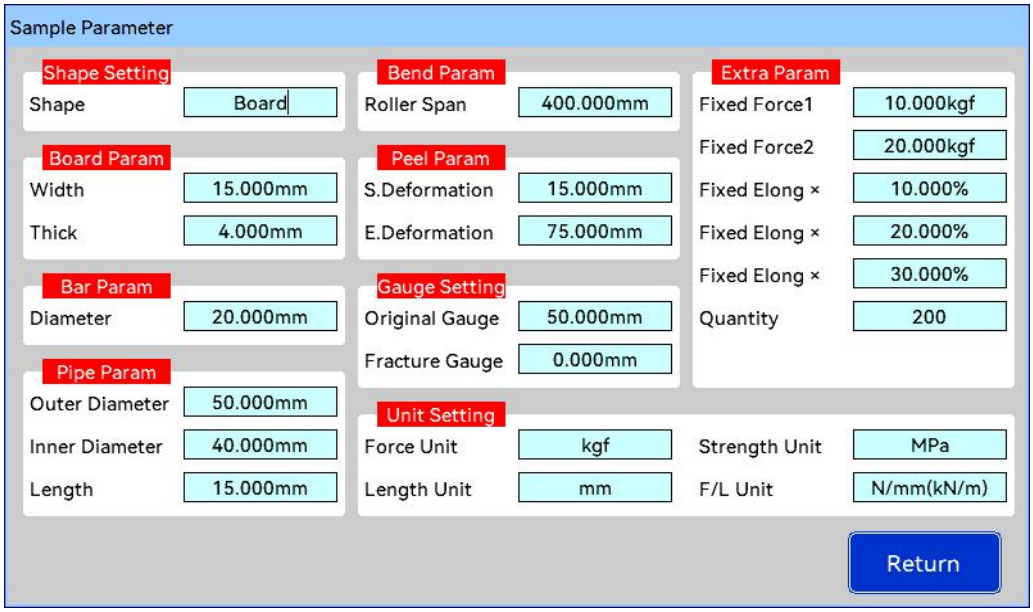

Figure 3-5 Sample Information Page

【Sample Shape Setting】

Tap Sample Shape to switch the sample shape automatically, including Sheet, Bar and Tube.

【Sheet Parameters】

Set the sample width and sample thickness.

【Bar Parameters】

Set the bar diameter.

【Tube Parameters】

Set the tube outer diameter, inner diameter and sample length.

【Bending Parameters】

Set the roller span.

【Peeling Parameters】

Set the starting deformation and ending deformation for peeling, tearing and other tests.

【Gauge Length Setting】

Set the original gauge length and final gauge length.

【Other Parameters】

Set Fixed Force 1, Fixed Force 2, Fixed Elongation X and Sample Quantity.

【Unit Setting】

Tap the corresponding unit box to switch units; the test parameter interface refreshes automatically when exited.

Chapter4 Test Process

Dear Customer, your test safety and optimal equipment condition are always our top priorities. Please perform the following operations before use, and only power on the equipment after confirming everything is correct.

1. First, check that all connections of the instrument are correct and the power wiring is properly connected!

2. Check that the limit switch position is appropriate. The position shall ensure that the instrument will not cause harm to personnel and equipment during movement. In case of an emergency, press the red emergency stop switch immediately!

4.1. Sample Information Setting

The initial interface at the first startup is as follows (see Figure 4-1):

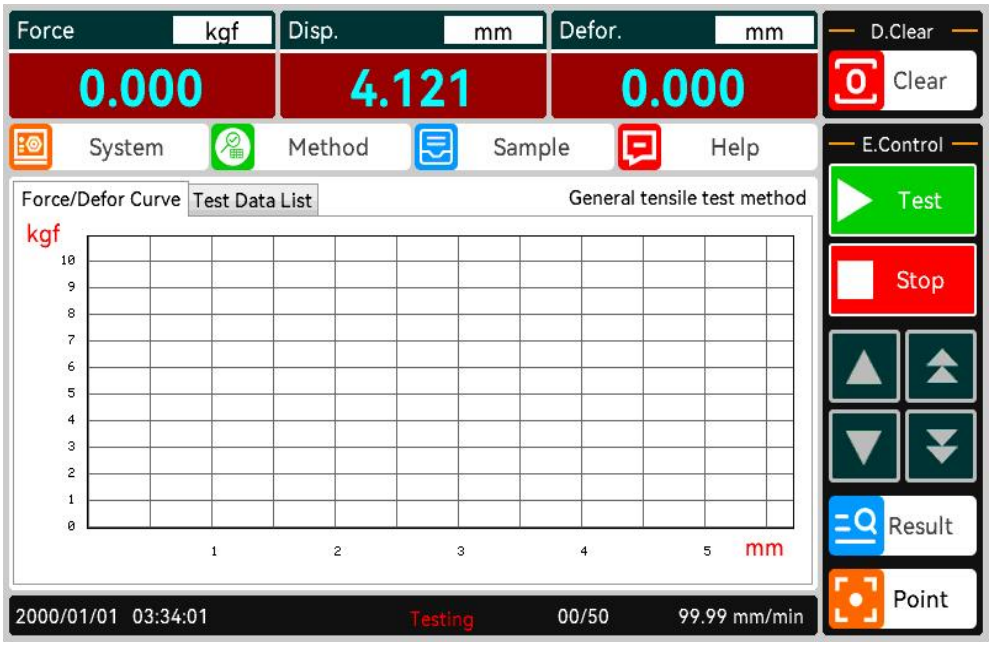

Figure 4-1 Test Interface

1) Adjust the crossbeam position via the touch screen keys or the physical keys on the key panel to confirm the equipment is under control.

2) Tap Zero Clear, then tap Up. Check if the displacement is greater than 0. If it is a negative value, open the test scheme and re-adjust the displacement display settings (Normal/Reverse/Absolute Value).

3) Pull or press the sensor manually. If the reading is negative, open the test scheme and adjust the force display settings to ensure a positive force reading during the test.

4) Tap the test data list on the main interface to view the displayed values and units of Maximum Force, Elongation at Break and Tensile Strength at Break.

5) Tap Sample Information on the navigation bar and set the result display units on the main interface in the Unit Setting section.

6) Open the test scheme interface, set the running direction to Up, select Displacement for deformation, and enter the running speed and preload force values. Enter the desired auto fracture judgment parameters and breakpoint ratio. Set the fixed time, fixed force, fixed displacement and fixed deformation values to 0, and set auto return to 0.

7) Open the sample parameter interface, select Sheet, and enter the values of width, thickness and original gauge length.

8) Adjust the crossbeam position and clamp the sample securely.

9) Tap the Run key on the touch screen or the Run button on the key panel to start the test, which will run until the sample fractures. After the sample fractures, the results are calculated automatically. If Auto Return is enabled in the test scheme, the crossbeam will return to the home position at high speed. If incorrect sample parameters are found, re-open the test parameter interface, enter the correct test parameters and then perform the test again.

10) Tap the Results Page to print the test report.

Chapter5 Calibration and Results

5.1.Calibration

Tap System Parameters → Parameter Calibration, enter the password, and access the parameter calibration interface (see Figure 5-1).

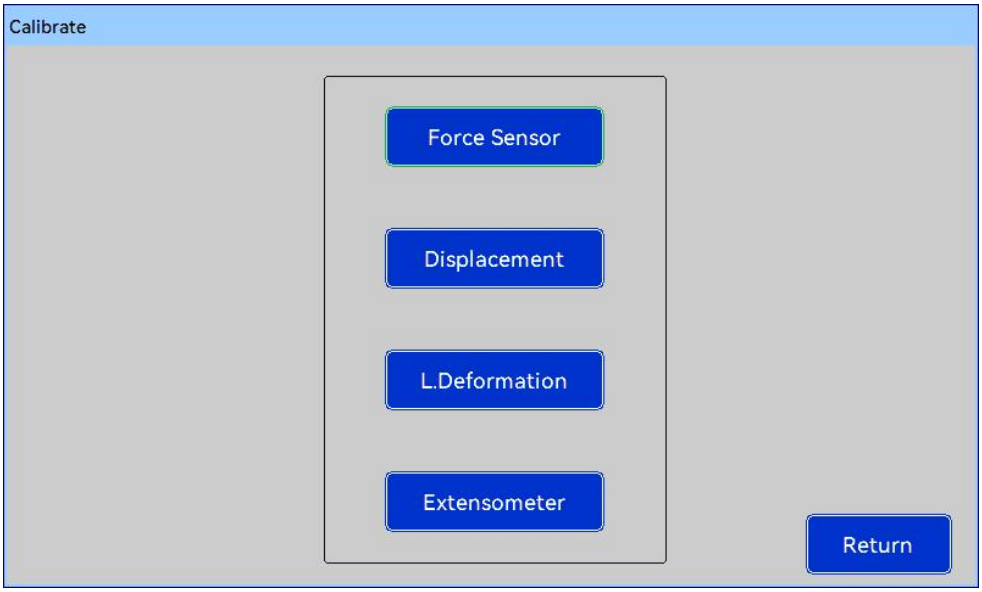

Figure 5-1 Parameter Calibration Interface

【Force Sersor】Tap to enter the force calibration interface.

【Displacement】Tap to enter the displacement calibration interface.

【L.Deformation】Tap to enter the large deformation calibration interface.

【Extensomrter】Tap to enter the tube parameters interface.

5.2.Force Calibration

Tap Force Calibration to enter the force calibration interface (see Figure 5-2).

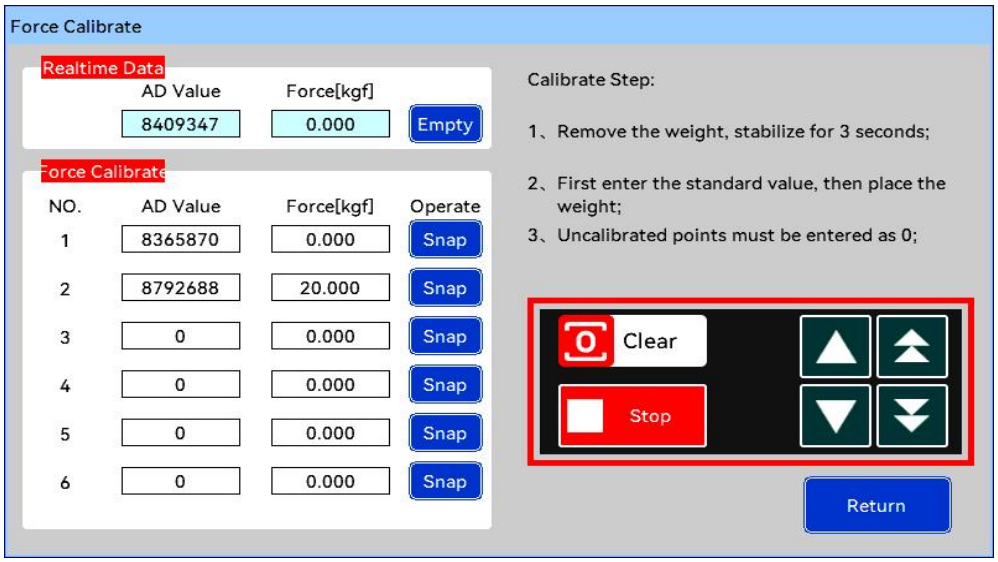

Figure 5-2 Force Calibration Interface

1. Sampling: Calibrate the force by sampling points in sequence.
2. Clear: Clear the current force value.
3. Zero Clear: Clear all previous calibration values before calibration.
4. Up: Tap this button to move up.
5. Down: Tap this button to move down.
6. Jog Up: Tap this button to jog up.
7. Jog Down: Tap this button to jog down.
8. Return: Tap this button to return to the parameter calibration selection interface.
9. Stop: Stop operation immediately.

5.3.Displacement Calibration

Tap Displacement Calibration to enter the displacement calibration interface (see Figure 5-3).

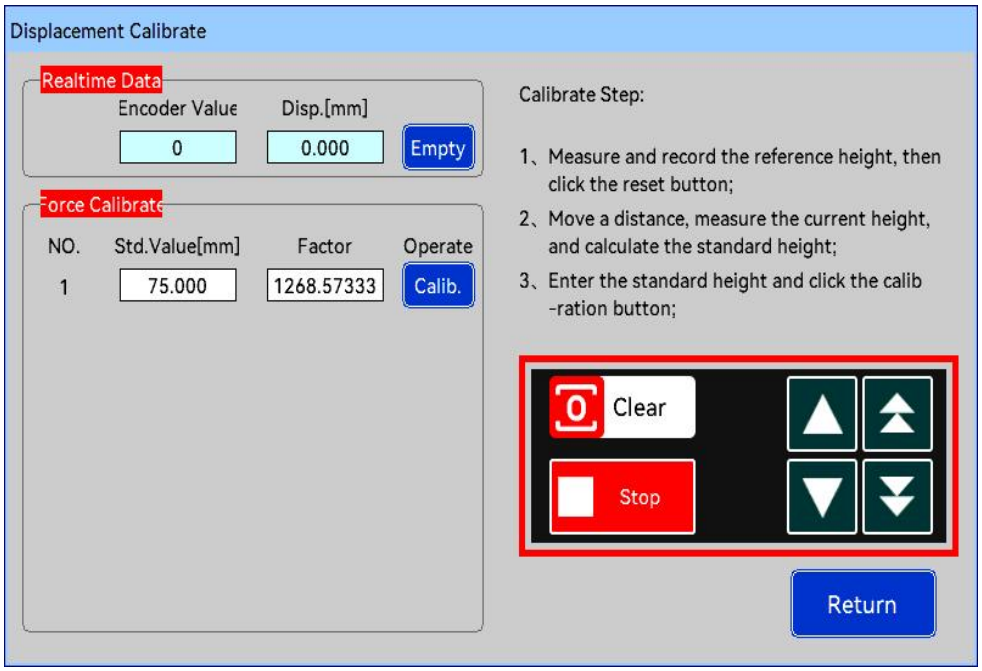

Figure 5-3 Displacement Calibration Interface

1. Clear: Clear the current value.
2. Zero Clear: Clear all previous calibration values before calibration.
3. Calibrate: Tap to calibrate the displacement.
4. Up: Tap this button to move up.
5. Down: Tap this button to move down.
6. Jog Up: Tap this button to jog up.
7. Jog Down: Tap this button to jog down.
8. Return: Tap this button to return to the parameter calibration selection interface.
9. Stop: Tap this button to stop operation.

5.4.Test Results

Go to Main Interface → Test Results to enter the test results interface (see Figure 5-4). View the test results, and select to print or delete the current/all results. Test results are not saved after power-off; print the results via the printer promptly after the test.

Sampling Window: Tap this button to enter the sampling window interface (see Figure 5-5). This window displays the number of sampling clicks on the test interface, as well as the force and deformation values at the sampling positions.

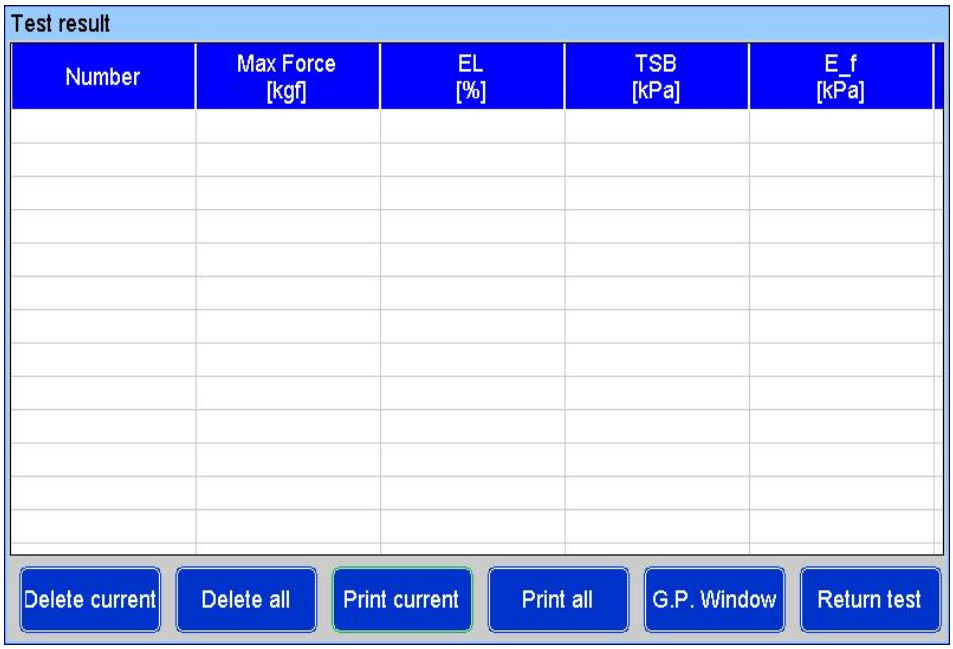

Figure 5-4 Test Results

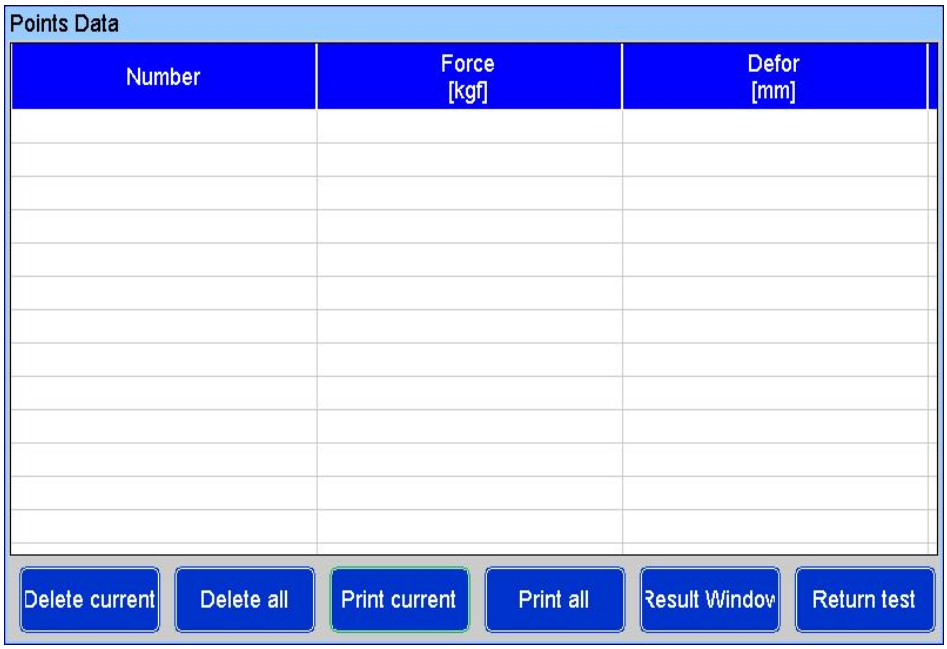

Figure 5-5 Sampling Window Interface

Chapter6 System Help

During the operation of the touch screen, if faults such as sensor collision occur, the touch screen provides a convenient on-site operation method to quickly resolve the fault and avoid more serious damage. In addition, the System Help menu of the touch screen offers on-site help documents, facilitating the viewing of operation methods and common fault resolution methods directly on the touch screen.

Tap the Help button on the multi-functional testing machine measurement and control system to enter the help interface. This interface displays safety tips, common problems and solutions, as well as operation methods (taking the tensile test as an example).

Figure 6-1 Help Interface 1

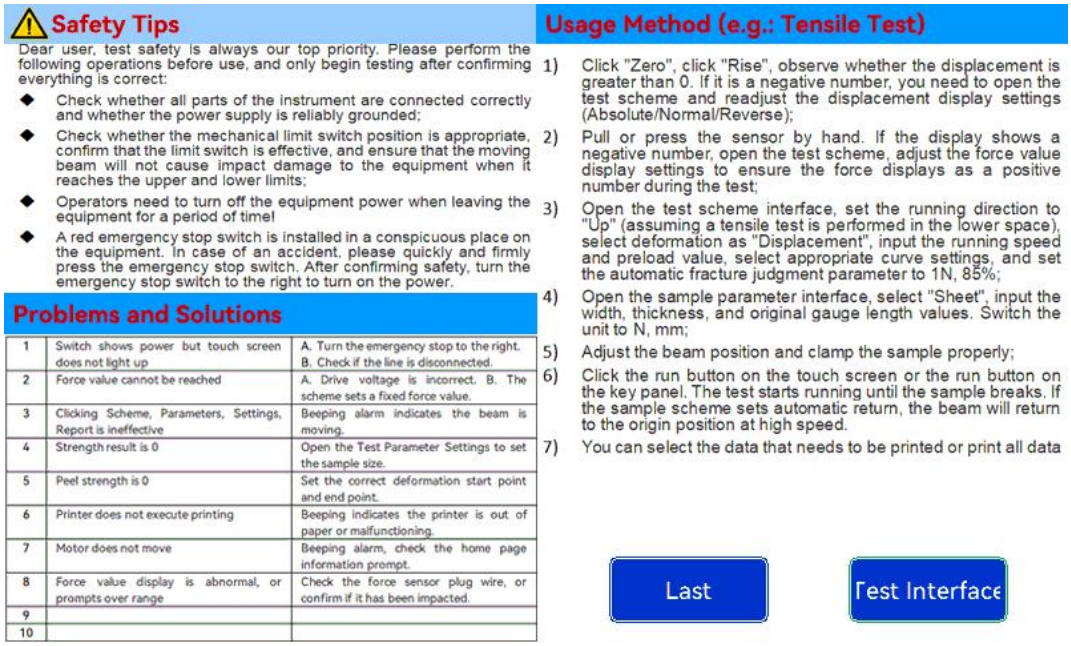

Figure 6-2 Help Interface 2