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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.

Chapter 1 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.

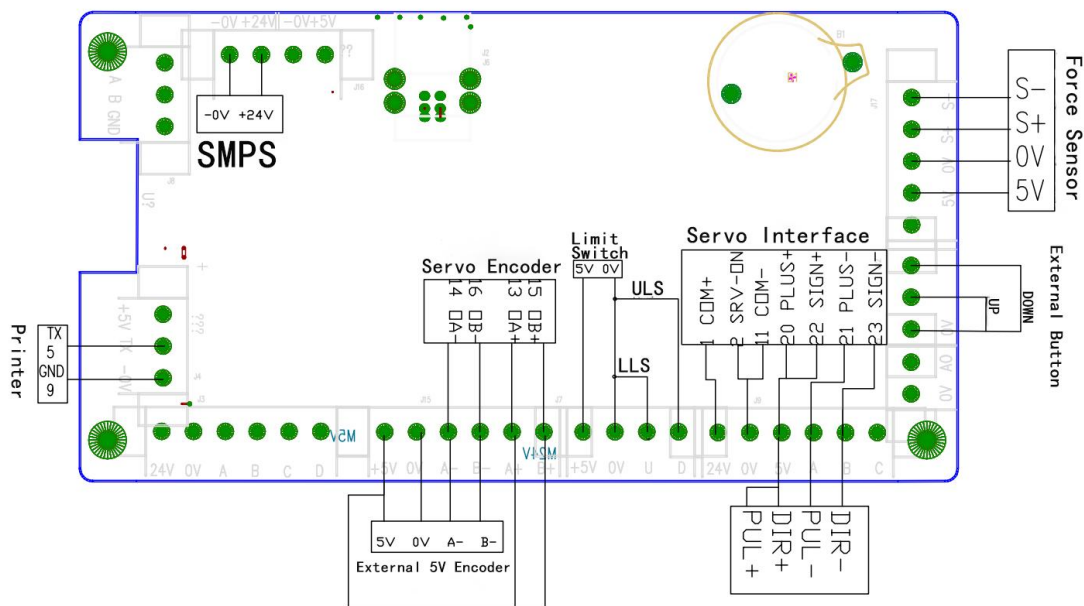


Figure 2-1: 5-inch Touchscreen Wiring

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.

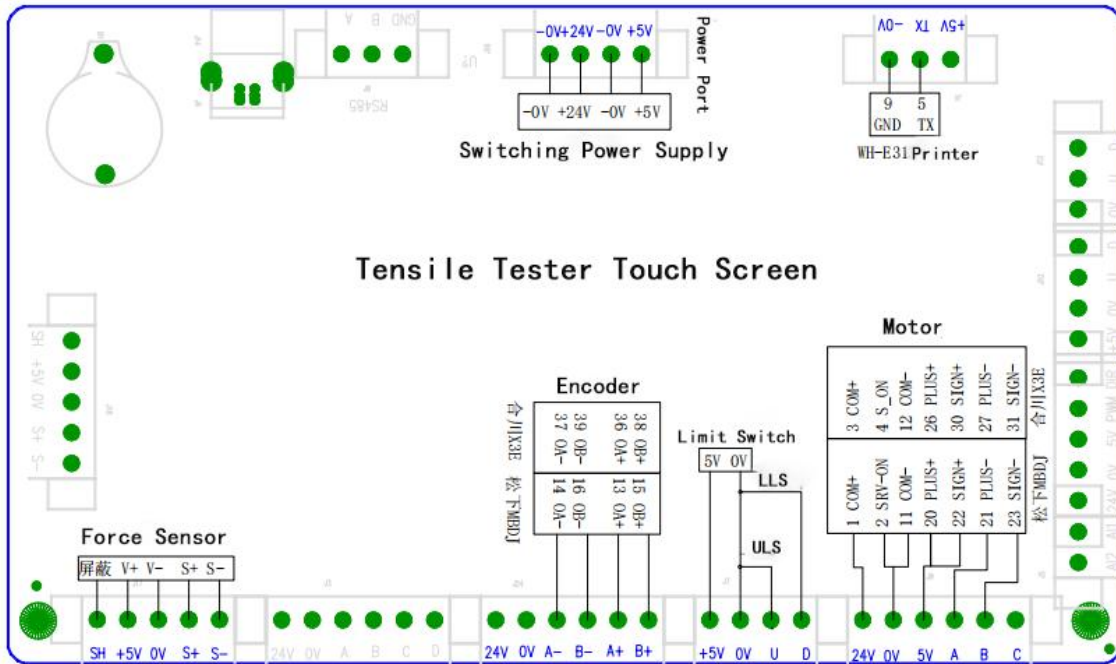


Figure 2-2: 7-inch Touchscreen Wiring

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).

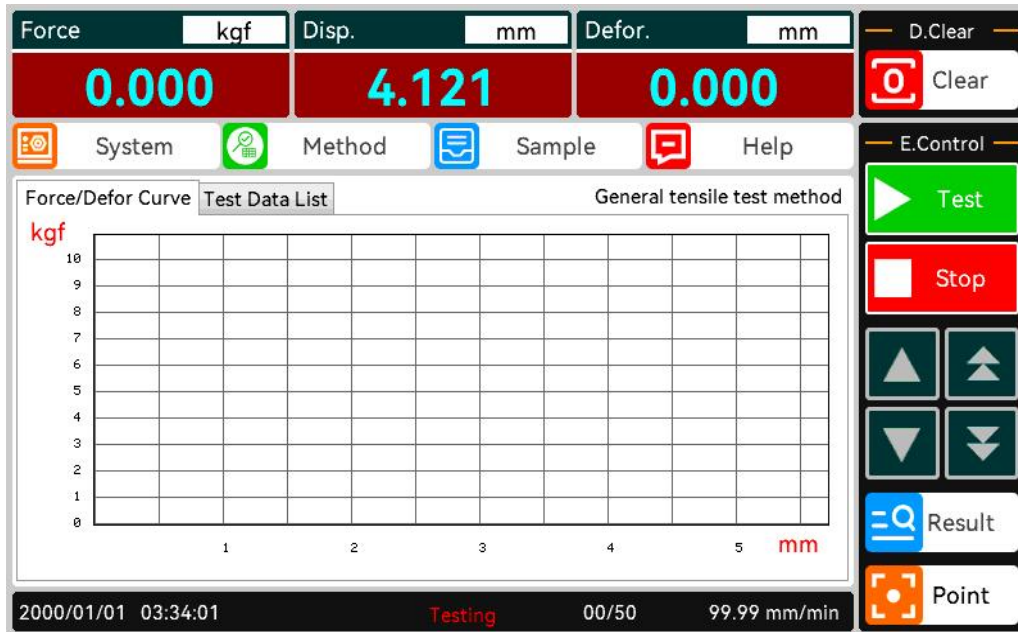


Figure 3-1: Main Interface

【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】

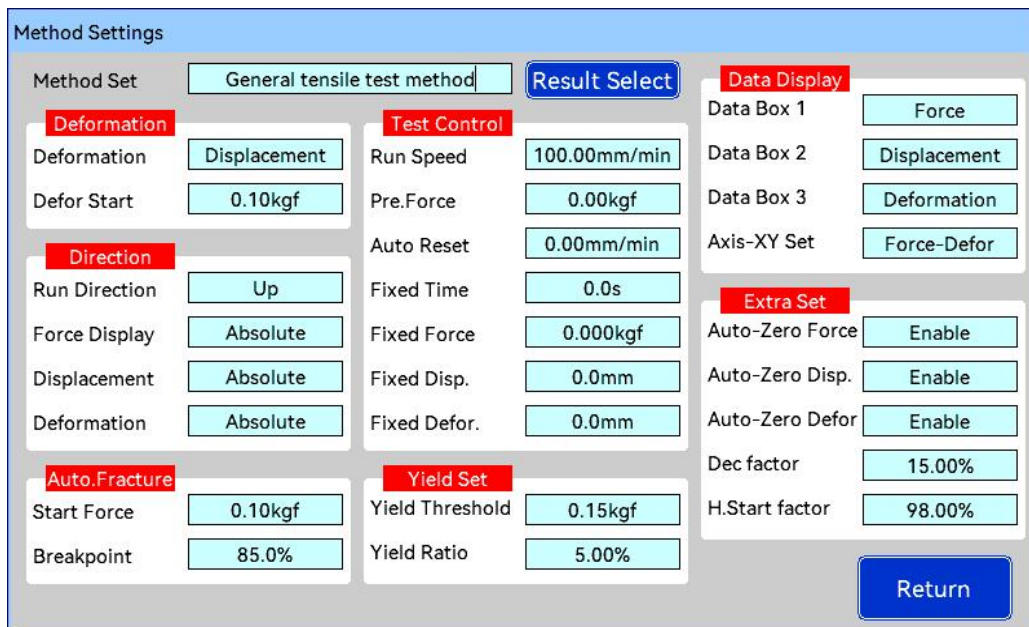
1. Running Direction: Click the corresponding area to toggle the test running direction (e. g., upward or downward).
2. Force, Displacement, and Deformation Display Settings: Allows switching the force value display mode among "Absolute" "Normal" or "Reverse"

【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;



Method Settings	
Method Set	General tensile test method
Result Select	
Deformation	
Deformation	Displacement
Defor Start	0.10kgf
Direction	
Run Direction	Up
Force Display	Absolute
Displacement	Absolute
Deformation	Absolute
Auto.Fracture	
Start Force	0.10kgf
Breakpoint	85.0%
Test Control	
Run Speed	100.00mm/min
Pre.Force	0.00kgf
Auto Reset	0.00mm/min
Fixed Time	0.0s
Fixed Force	0.000kgf
Fixed Disp.	0.0mm
Fixed Defor.	0.0mm
Yield Set	
Yield Threshold	0.15kgf
Yield Ratio	5.00%
Data Display	
Data Box 1	Force
Data Box 2	Displacement
Data Box 3	Deformation
Axis-XY Set	Force-Defor
Extra Set	
Auto-Zero Force	Enable
Auto-Zero Disp.	Enable
Auto-Zero Defor	Enable
Dec factor	15.00%
H.Start factor	98.00%
Return	

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).

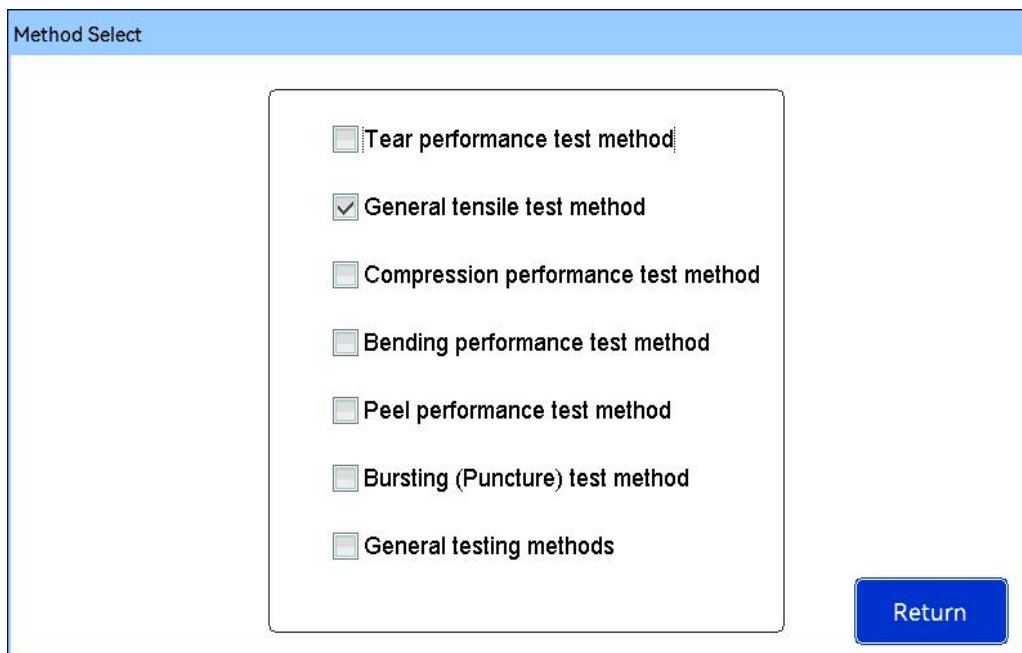


Figure 3-3 Scheme Selection Interface

【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.



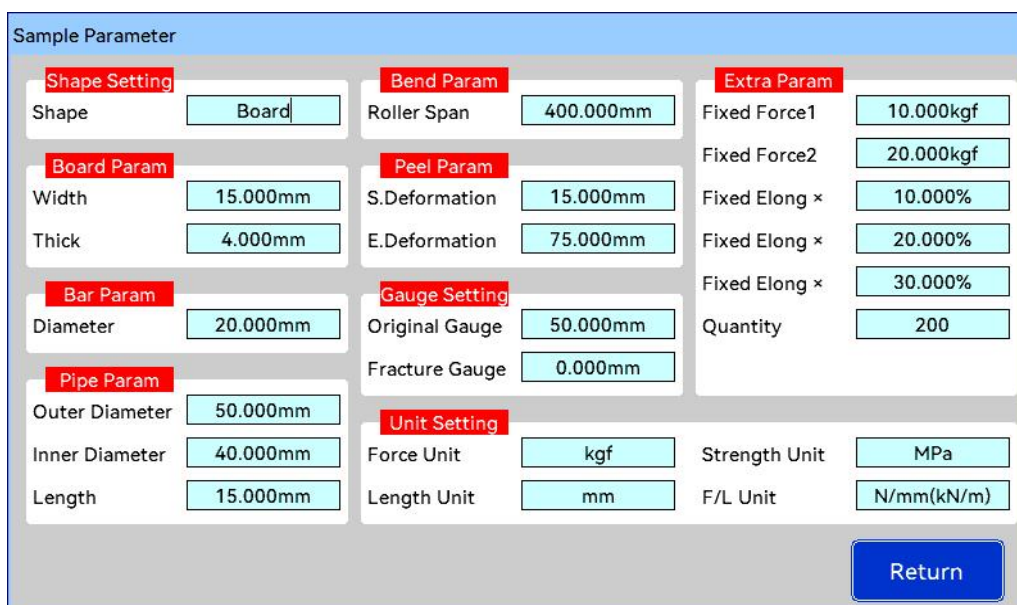
Result Selection		
<input type="checkbox"/> Max Defor...	<input type="checkbox"/> Fixed F.Elongat	<input type="checkbox"/> Shear Strength
<input type="checkbox"/> Max F.Defor.	<input type="checkbox"/> Compressive St	<input type="checkbox"/> Bend Strength
<input checked="" type="checkbox"/> Elongation	<input type="checkbox"/> U.Yield Strength	<input type="checkbox"/> Bend Modulus
<input checked="" type="checkbox"/> Tensile Strengt	<input type="checkbox"/> L.Yield Strength	<input type="checkbox"/> EI(Max Force)
<input type="checkbox"/> Yield Elongatior	<input type="checkbox"/> Avg. Peel Force	
<input type="checkbox"/> Fixed T.Stress1	<input type="checkbox"/> Peel Strength	
<input type="checkbox"/> Fixed T.Stress2	<input type="checkbox"/> Max. Peel Force	
<input type="checkbox"/> Fixed T.Stress3	<input type="checkbox"/> Min. Peel Force	
<input type="checkbox"/> Fixed F.Elongat	<input type="checkbox"/> Fixed EI.Strengt	

[Return](#)

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).



Sample Parameter					
Shape Setting		Bend Param		Extra Param	
Shape	Board	Roller Span	400.000mm	Fixed Force1	10.000kgf
Board Param		Peel Param		Fixed Force2	20.000kgf
Width	15.000mm	S.Deformation	15.000mm	Fixed Elong ×	10.000%
Thick	4.000mm	E.Deformation	75.000mm	Fixed Elong ×	20.000%
Bar Param		Gauge Setting		Fixed Elong ×	30.000%
Diameter	20.000mm	Original Gauge	50.000mm	Quantity	200
Pipe Param		Fracture Gauge			
Outer Diameter	50.000mm	0.000mm			
Unit Setting					
Inner Diameter	40.000mm	Force Unit	kgf	Strength Unit	MPa
Length	15.000mm	Length Unit	mm	F/L Unit	N/mm(kN/m)

[Return](#)

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):

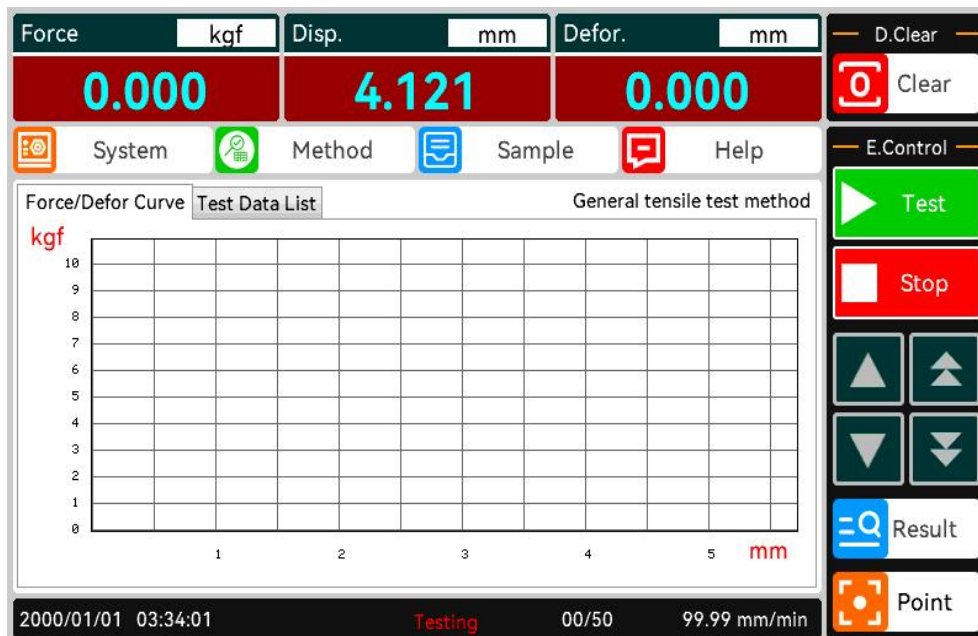


Figure 4-1 Test Interface

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).

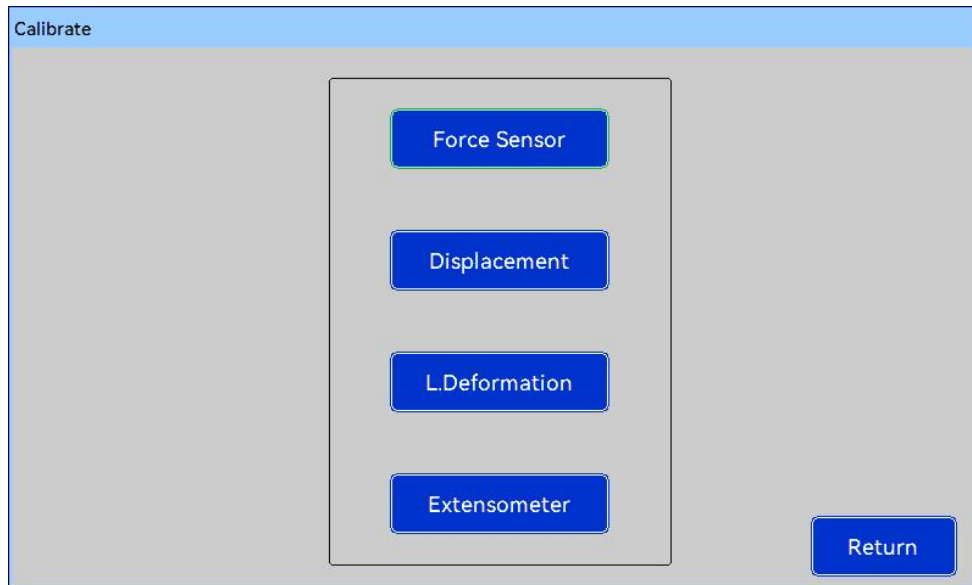


Figure 5-1 Parameter Calibration Interface

【Force Sensor】 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.

【Extensometer】 Tap to enter the tube parameters interface.

5.2. Force Calibration

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

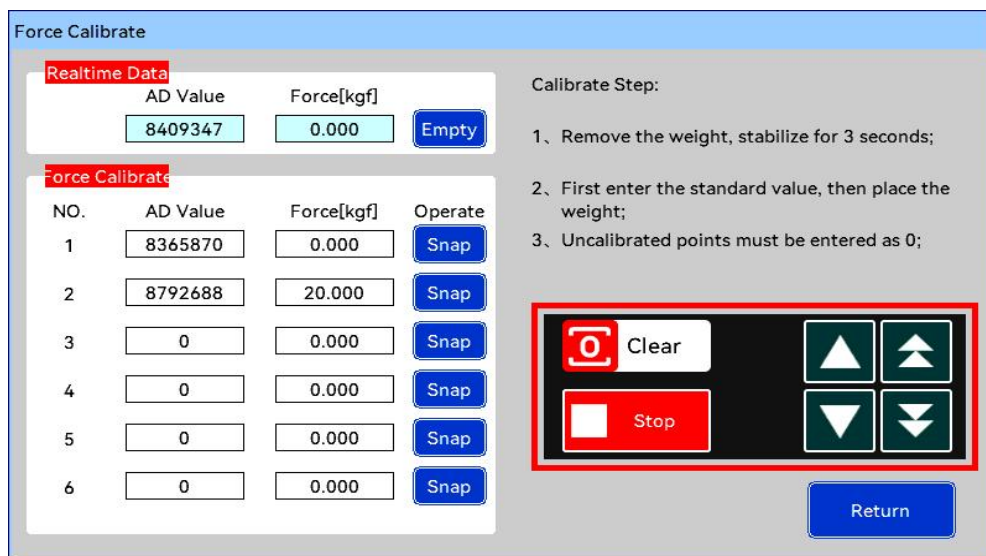


Figure 5-2 Force Calibration Interface

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).

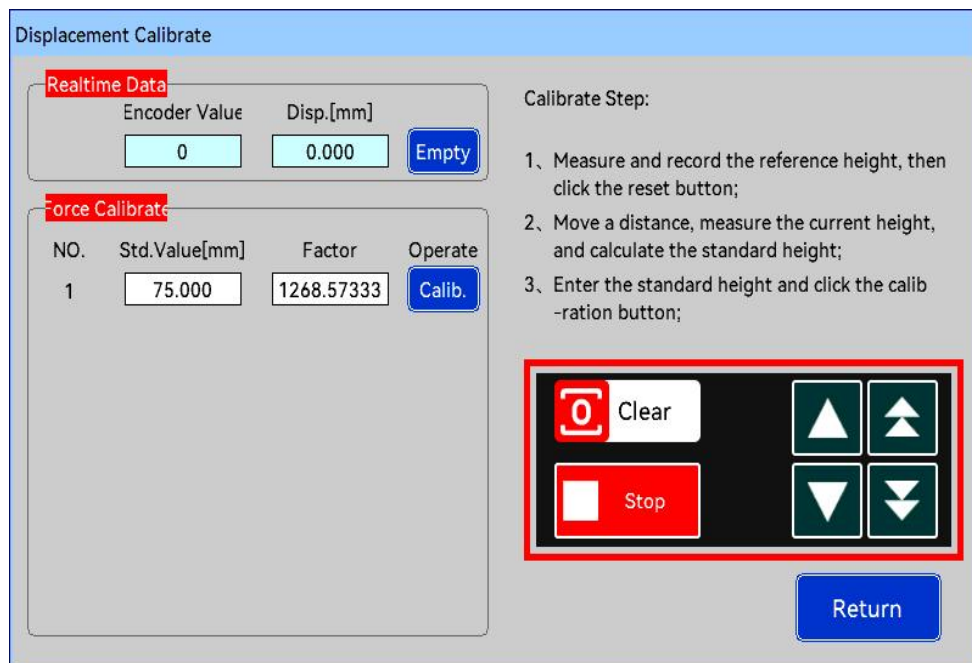


Figure 5-3 Displacement Calibration Interface

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.

Test result				
Number	Max Force [kgf]	EL [%]	TSB [kPa]	E_f [kPa]

Delete current
Delete all
Print current
Print all
G.P. Window
Return test

Figure 5-4 Test Results

Points Data		
Number	Force [kgf]	Deform [mm]

Delete current
Delete all
Print current
Print all
Result Window
Return test

Figure 5-5 Sampling Window Interface

Chapter 6 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).

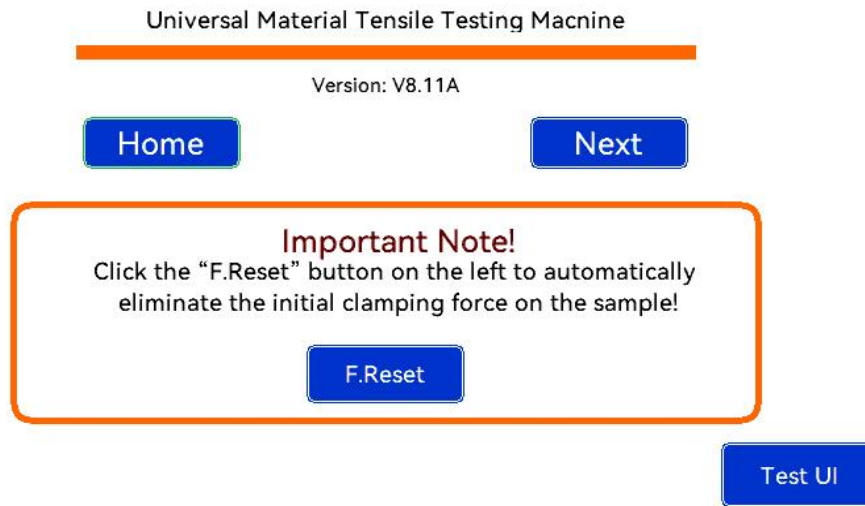


Figure 6-1 Help Interface 1

Safety Tips		Usage Method (e.g.: Tensile Test)	
<p>Dear user, test safety is always our top priority. Please perform the following operations before use, and only begin testing after confirming everything is correct:</p> <ul style="list-style-type: none"> Check whether all parts of the instrument are connected correctly and whether the power supply is reliably grounded; Check whether the mechanical limit switch position is appropriate, confirm that the limit switch is effective, and ensure that the moving beam will not cause impact damage to the equipment when it reaches the upper and lower limits; Operators need to turn off the equipment power when leaving the equipment for a period of time; A red emergency stop switch is installed in a conspicuous place on the equipment. In case of an accident, please quickly and firmly press the emergency stop switch. After confirming safety, turn the emergency stop switch to the right to turn on the power. 		<ol style="list-style-type: none"> Click "Zero", click "Rise", observe whether the displacement is greater than 0. If it is a negative number, you need to open the test scheme and readjust the displacement display settings (Absolute/Normal/Reverse); Pull or press the sensor by hand. If the display shows a negative number, open the test scheme, adjust the force value display settings to ensure the force displays as a positive number during the test; Open the test scheme interface, set the running direction to "Up" (assuming a tensile test is performed in the lower space), select deformation as "Displacement", input the running speed and preload value, select appropriate curve settings, and set the automatic fracture judgment parameter to 1N, 85%; Open the sample parameter interface, select "Sheet", input the width, thickness, and original gauge length values. Switch the unit to N, mm; Adjust the beam position and clamp the sample properly; Click the run button on the touch screen or the run button on the key panel. The test starts running until the sample breaks. If the sample scheme sets automatic return, the beam will return to the origin position at high speed. You can select the data that needs to be printed or print all data 	
Problems and Solutions			
1	Switch shows power but touch screen does not light up	A. Turn the emergency stop to the right. B. Check if the line is disconnected.	
2	Force value cannot be reached	A. Drive voltage is incorrect. B. The scheme sets a fixed force value.	
3	Clicking Scheme, Parameters, Settings, Report is ineffective	Beeping alarm indicates the beam is moving.	
4	Strength result is 0	Open the Test Parameter Settings to set the sample size.	
5	Peel strength is 0	Set the correct deformation start point and end point.	
6	Printer does not execute printing	Beeping indicates the printer is out of paper or malfunctioning.	
7	Motor does not move	Beeping alarm, check the home page information prompt.	
8	Force value display is abnormal, or prompts over range	Check the force sensor plug wire, or confirm if it has been impacted.	
9			
10			

Figure 6-2 Help Interface 2