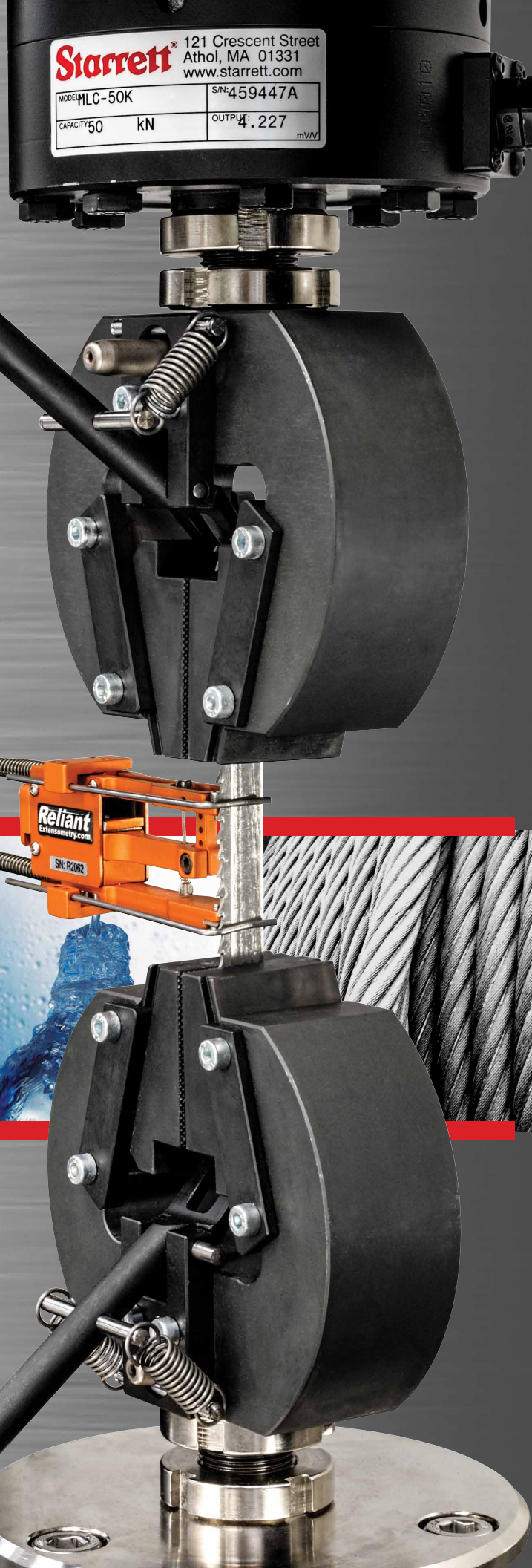


# L3 Series Software for Material Testing

## Operating Fundamentals



# Starrett®

**The Better Solution**



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## 2.0 L3 Series Software Operating Fundamentals

### 2.1 Operating Displays

Starrett L3 Series software is designed to operate on an all-in-one computer workstation with touchscreen capability. The interactive functions in our L3 Series software may be operated using touchscreen or using a standard mouse.



**NOTE**  
The minimum vertical pixel resolution of the touchscreen is 1080p.

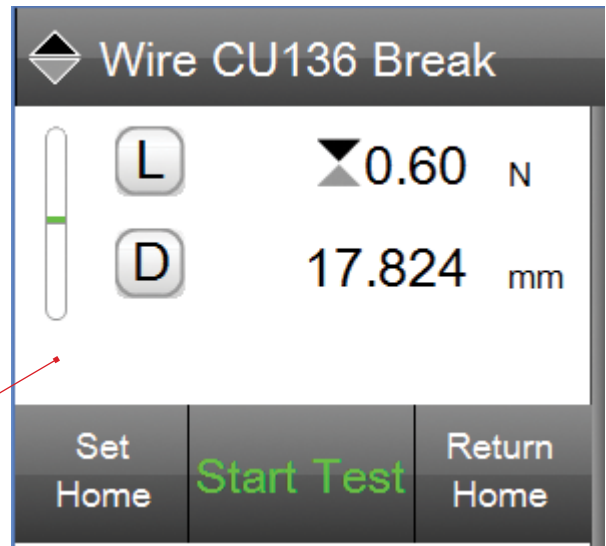
The L3 display views change based on the function the user is performing. All L3 display views have a common layout consisting of a Controller window, Results window, Main window, header and footer sections.

### 2.1.1 Controller Window

The Controller window is multi-functional. It displays the dynamic measurements of load, crosshead movement, crosshead speed velocity and displays the current measurements with respect to their target settings.

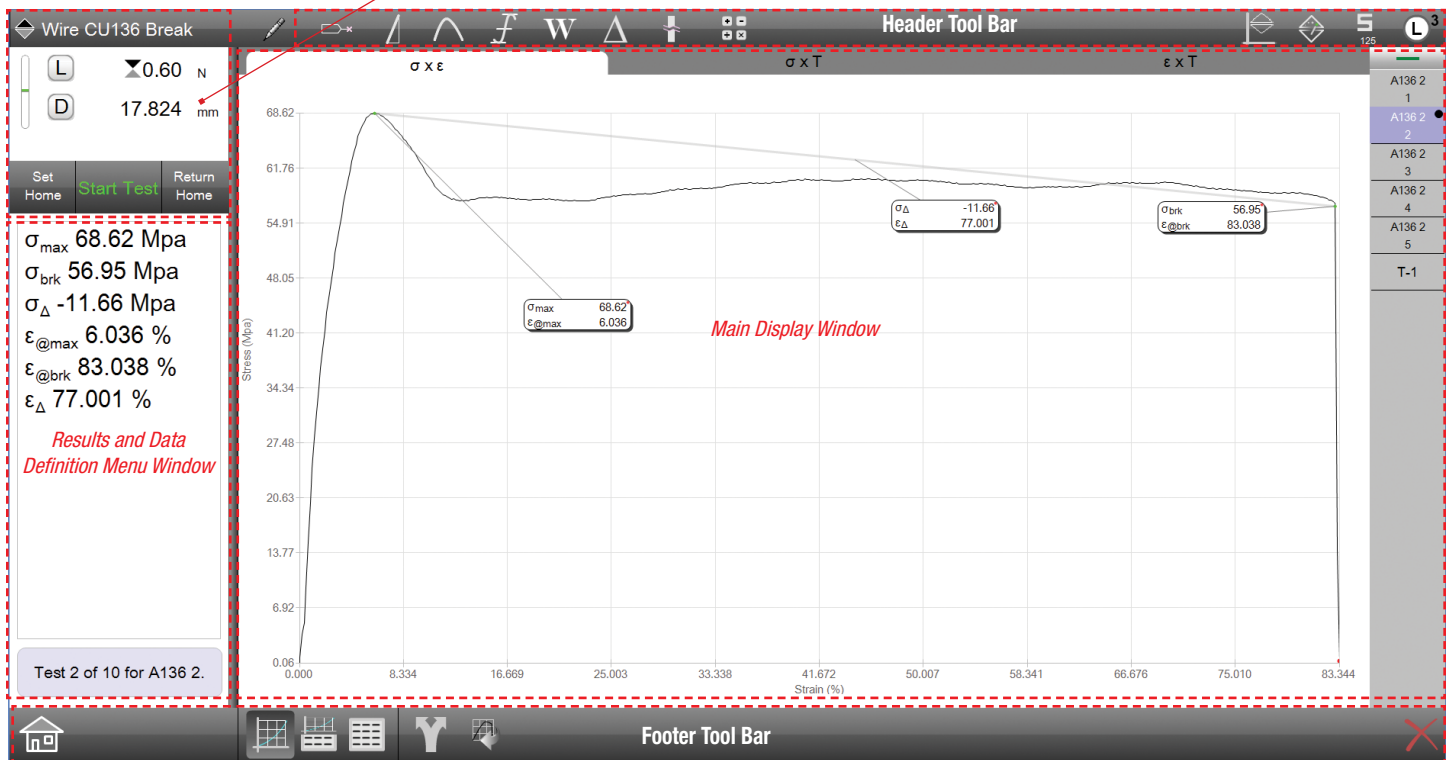
The Controller windows serves as your system's "dashboard" supplying you with accurate measurement details of your tests and the individual measurements that comprise your test.

The individual measurements supported by the Controller window are discussed in the following paragraphs.



*L3 Controller Window  
No Extensometer being used*

*Controller Window*



*Main Display Window*

*L3 Basic Display Layout*

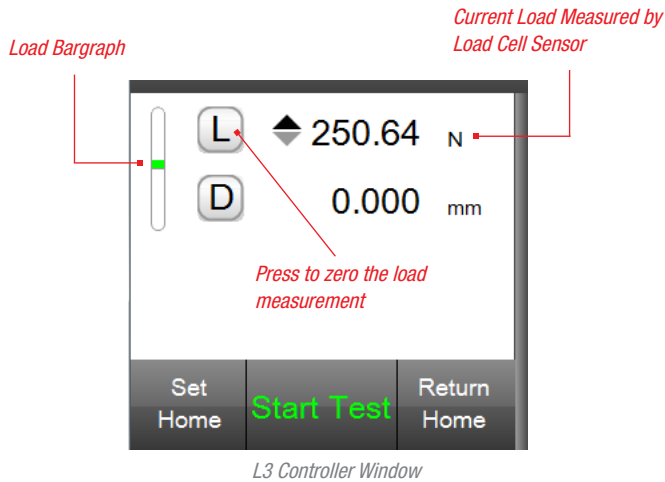
### 2.1.1.1 Load Measurement Indicators (L)

There are two indicators that display the load measurement from the attached load cell sensor.

The current load measurement is displayed numerically next to the L symbol with its associated units or measure.



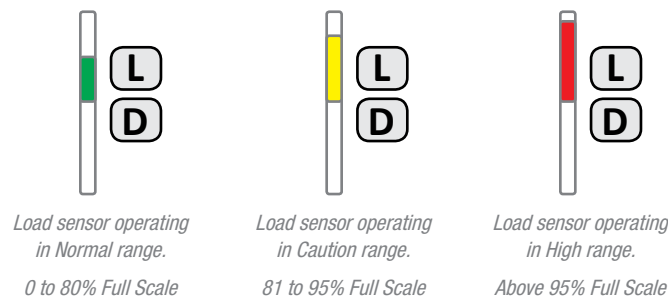
**NOTE**  
Press the L symbol to zero/tare the load cell sensor.



Additionally, the load bargraph displays the direction of load (tensile = above the center line and compression = below the center line). The load bargraph is intended to provide the user with an indication of the load being measured versus the full scale capacity of the load cell sensor being used. Color indication is used to represent the measured load versus the load sensor's capacity as follows:

Bargraph Color	Load Indication
GREEN	The sensor is operating within its normal range 0 to 80% of full scale capacity.
YELLOW	The sensor is operating in its caution range 81 to 95% of full scale capacity.
RED	The sensor is operating in its high range 96% and above. Be alert of the measured load overloading and potentially damaging the sensor.

*Load Sensor Status Indication*



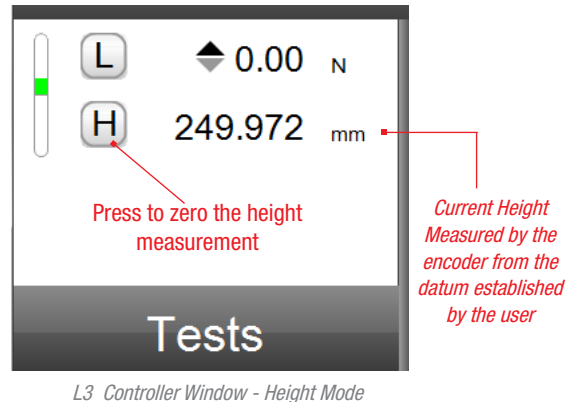
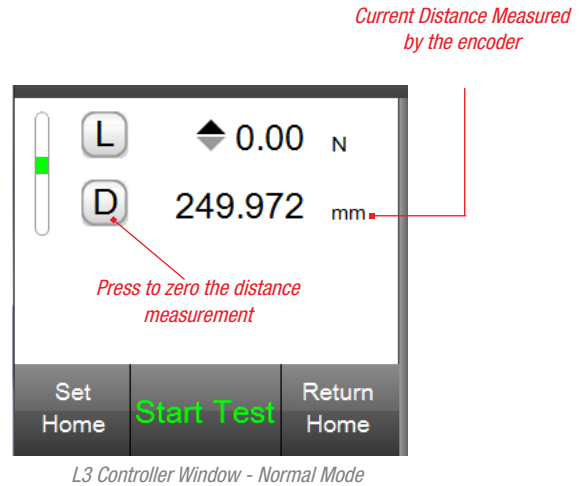
### 2.1.1.2 Crosshead Distance Indicator (D)

The D symbol is used to display the crosshead distance traveled. If the test system is in Height mode, the D is replaced by H to represent the height of the crosshead from the established datum.

The crosshead distance is the amount of crosshead movement from the start of the test.



**NOTE**  
Press the D or H symbol to zero/tare the distance or height value.



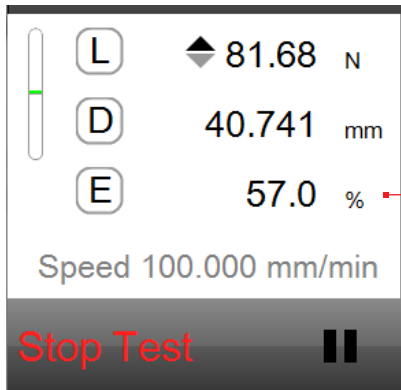
### 2.1.1.3 Extensometer Indicator (E)

The E symbol is used to display the sample elongation as measured by an external extensometer that is connected to the test frame.

The elongation E, is always expressed as a percent value indicating the change in sample length from its original value prior to load being applied.



**NOTE**  
Press the E symbol to zero/tare the elongation value.



*Current Strain measured by an Extensometer*

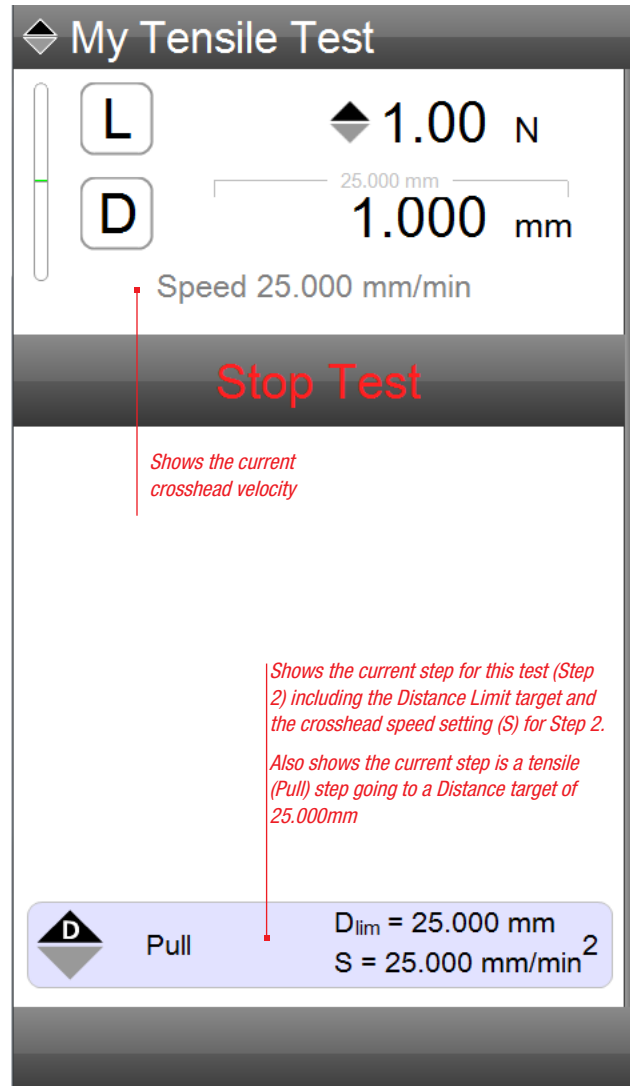
L3 Controller Window - Normal Mode with Extensometer

### 2.1.1.4 Crosshead Velocity Indicator

During a test run, the crosshead velocity is indicated. Velocity is displayed for the current step being performed. Velocity may change during a test if you have specified a different crosshead velocity for a step.

When automatically returning to the Home position, the crosshead velocity is returned at the maximum crosshead speed. Maximum velocity is an option in the System Settings - Motion Setup.

Velocity is displayed with the unit of measure equal to the units of measure for the Distance (D) or Height (H) indicator.



*Shows the current crosshead velocity*

*Shows the current step for this test (Step 2) including the Distance Limit target and the crosshead speed setting (S) for Step 2. Also shows the current step is a tensile (Pull) step going to a Distance target of 25.000mm*

L2 Plus Controller Window during an active test

### 2.1.1.5 Load Cell Status Indicator

The Load Cell Status Indicator shows the full scale load capacity of the connected load cell sensor. The load cell symbol changes color to Yellow or Red depending on the sensor's measured load versus its full scale capacity.

Selecting the Load Cell Status Indicator displays the sensor's characteristics, including its Overload History.

All Starrett load cell sensors are compliant with IEEE 1451.4 (TEDS). These sensors are "plug & play", e.g. your Starrett system automatically recognizes the sensor and its characteristics and performance specifications.

*Load Cell Status Indicator - Top right on all displays*

Select the Load Cell Indicator to view the attached sensor's identification and characteristics.

Overload History is displayed.

The current load cell sensor's full scale capacity is shown beneath the Load Cell Indicator symbol.

**Load Cell Info**

Model #	FLC-2000E
Serial #	672846
Calibration date	8/25/11
Number of overloads	7
<b>Overload History</b>	
Thu Dec 08 09:09:12 2011	
Thu Dec 08 09:09:09 2011	
Thu Dec 08 09:09:06 2011	
Thu Dec 08 09:09:02 2011	
Thu Dec 08 09:09:00 2011	
...	

*Load Cell Sensor Status View*

When the Overload History displays an overload event with a date that doesn't appear plausible, it indicates that a load cell overload occurred when the L3 software was not active, e.g. not launched during the overload event.

A load cell sensor can be overloaded by an operator over-deflecting the sensor. Light capacity load cell sensors can be overloaded simply by improper handling.

Load cell sensors can also be overloaded by improper use of the jog switch, which can cause the load cell to be forced against a hard stop.

### 2.1.1.6 Limits Indicator

During an active test run, an indicator will typically appear above or below the measured value in the Controller view. For example, if the active test step is "go to a compression load of 25N" a limit indicator will appear above the measured load value showing the target load of 25N.

*Shows the target load limit for this test step, e.g. 25N*

*Shows the target load limit is for compression.*

*Shows the current load being measured by load cell sensor.*

*Shows the current crosshead velocity*

*Shows the current distance traveled from Home position.*

**Stop Test**

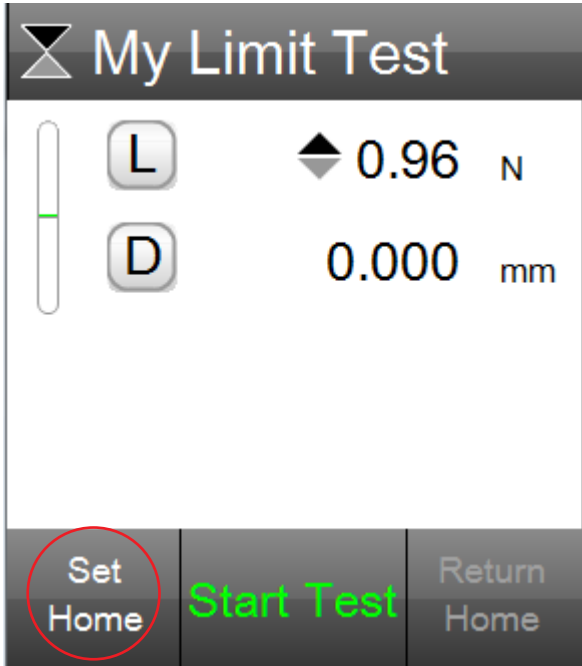
*Load Limit Indicator  
Displays target for active test run*

### 2.1.1.7 SET HOME Function

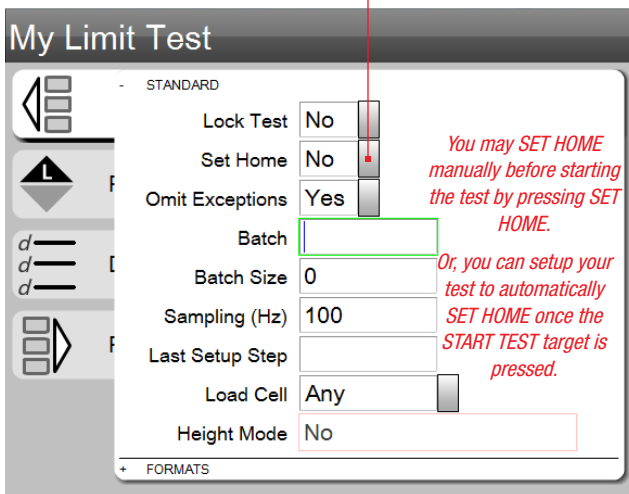
Pressing the SET HOME target automatically sets the position of the crosshead as the home position, e.g. where the test is started from.

You may press the SET HOME when manually starting a test, or you may configure your test setup to automatically SET HOME when you select the START TEST target.

Setting Home allows the crosshead to automatically return to this exact position for the next test run.



*Manually Set Home before Start Test*



*Pre Test Setup Menu - Set Home Option (Yes or No)*

### 2.1.1.8 START/PAUSE/STOP Function

The Controller window displays the START TEST-STOP TEST function. If an extensometer is used, the STOP TEST function also includes the ability to PAUSE a test turn.

The START-STOP target operates identically to the Start/Stop push button on your MMS or MMD Series test frame.

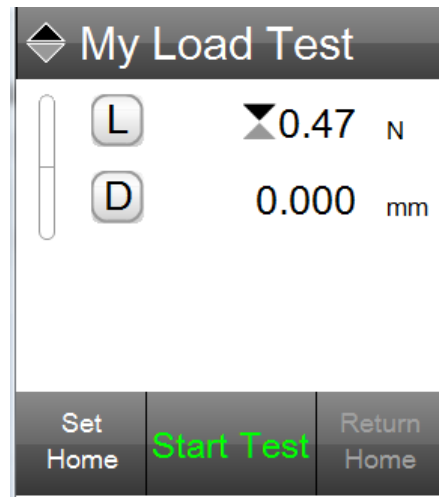


**NOTE**

Starrett recommends that you use the Start/Stop push button to start or stop your test. This will help eliminate longer term issues on your touchscreen display where repeated touches can mar the display.

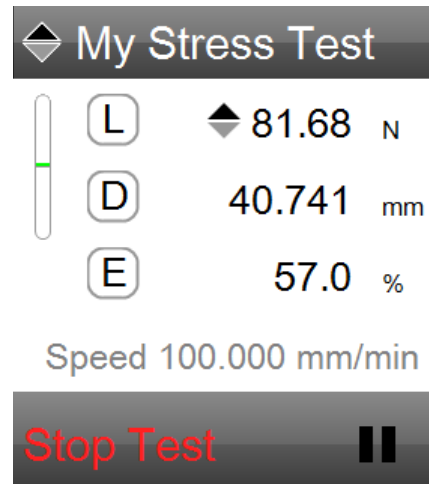
The START/STOP function can be used to Start a Test, Pause a Test, or Stop a Test. If you are using an extensometer and want to remove it from the sample prior to sample break, you press the Start/Stop push button to stop (pause) the test. You can resume, by pressing the Start/Stop push button again.

During an active test, the display will show STOP TEST. This is indication that the crosshead is active.



*Set Home*

*Press to manually set home position prior to Starting a test*



*Pause/Stop Test*

*Press to pause a test to remove an extensometer from the sample*



**CAUTION**

Tests performed at very slow speeds are difficult to distinguish whether or not a test is being performed and the crosshead is active. The crosshead is active when the STOP TEST label is displayed.

**CAUTION**

The Start/Stop push button features an LED indicator that shows the crosshead status. If the LED is displaying a solid GREEN, this is the same as START TEST, e.g. the crosshead is inactive and ready to test. During an active test, the LED displays a blinking RED indicating that the crosshead is active.

## 2.1.1.9 RETURN TO HOME Function

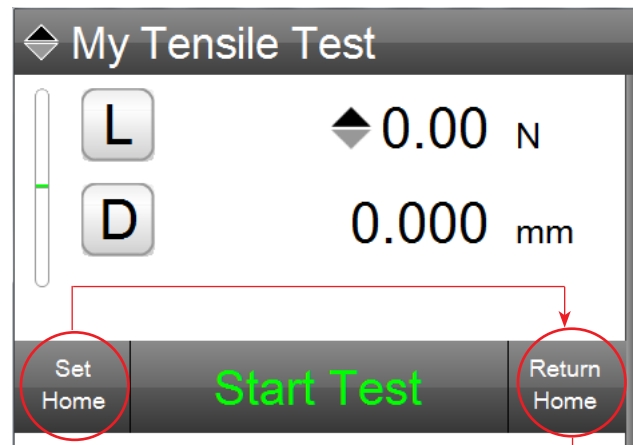
The RETURN TO HOME function may be used manually or automatically. The RETURN TO HOME function returns the crosshead to the SET HOME (start test) position after a test run is completed.

Once the test run is completed, you may press the RETURN TO HOME target. The crosshead will return to its start position (SET HOME). If SET HOME was not selected or configured as part of the test's Pre Test step, the RETURN TO HOME function is not available since no Home position was ever established.

**CAUTION**

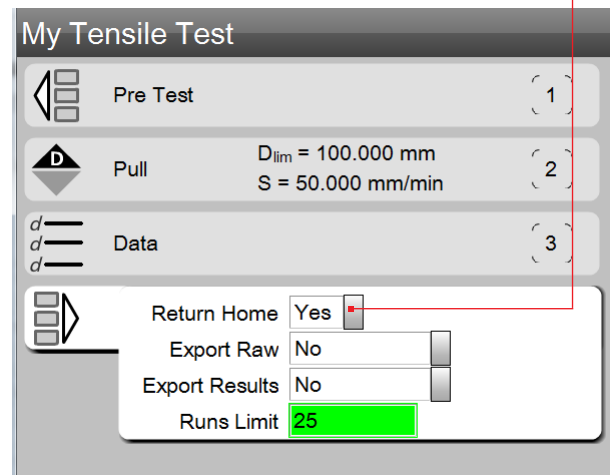
Care should be taken when using the RETURN TO HOME function for tensile tests. Prior to selecting the RETURN TO HOME function, it is recommended that the sample be removed from the test fixture.

In your test setup, you may use the Post Test step to configure your test to automatically RETURN TO HOME upon completing a test run.



*You must SET HOME for RETURN HOME to cause the crosshead to return to the start test position.*

*Press RETURN HOME or use the RETURN HOME option in your Post Test step.*



Setting Home

## 2.1.2 Results Window

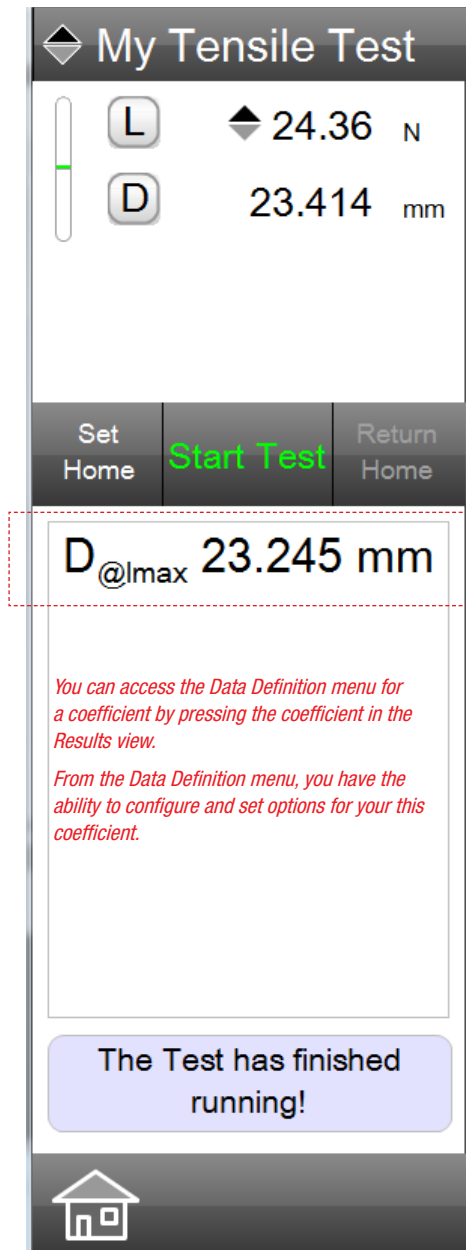
During test operation, the Results window can be used to display your most critical results. Results are also called Coefficients. Coefficients are your measured results and are presented with a label that identifies the coefficient; the measured result for the coefficient; and the unit of measure for the coefficient.

The Results window is also used to display the Data Definition Menu for a selected coefficient. The Data Definition Menu will be discussed in more detail in User Guide 5 - Analyzing Test Results.



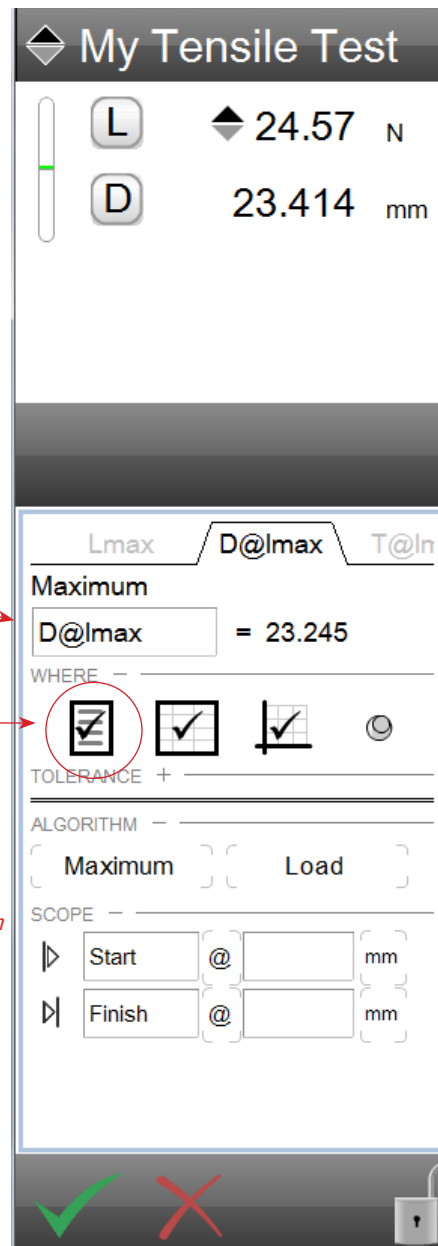
**NOTE**

The Data Definition Menu for a coefficient is used to determine where the coefficient gets displayed and what size the coefficient is displayed at in the Results window. This menu also allows you to rename your coefficient.



L3 Results View

Shows results of selected coefficients



L3 Data Definition Menu

Shows the options and functions available for the Distance @ Max Load

## 2.1.2.1 Coefficients/Results

Results are also called Coefficients in L3 Series software. Coefficients can be requested measurements prior to the test or as measurements after the test is completed, including derived and calculated results.



### NOTE

L3 Series software gives you complete flexibility to get a result at any time from the acquired data for your test run. You can request a result before or after completing a test run.

Here is a list of different coefficients that you can obtain using L3 Series software. Many of these are shown in the examples in **User Guide 5 - Analyzing Your Test Results**.



### NOTE

L3 Series software uses labels to represent coefficients. Labels may be renamed. Labels names are restricted to 8 characters.

Stress Coefficients	Coefficient Label
Maximum Stress	$\sigma_{max}$
Stress at a Point	$\sigma_{pt}$
Stress at a Break (Load-based)	$\sigma_{brk}$
Stress at a Break (%Drop from Max Load)	$\sigma_{brk}$
Stress at a Break (Rate of Change)	$\sigma_{brk}$
Average Stress	$\sigma_{avg}$
Minimum Stress	$\sigma_{min}$

*L3 Stress Coefficients*

Load Coefficients	Coefficient Label
Maximum Load	$L_{max}$
Load at a Point	$L_{pt}$
Load at a Break (Load-based)	$L_{brk}$
Load at a Break (%Drop from Max Load)	$L_{brk}$
Load at a Break (Rate of Change)	$L_{brk}$
Average Load	$L_{avg}$
Minimum Load	$L_{min}$
Load Relaxation Rate	$L_{rate}$

*L3 Load Coefficients*

Strain Coefficients	Coefficient Label
Maximum Strain	$\epsilon_{max}$
Strain at Maximum Stress	$\epsilon@_{\sigma_{max}}$
Strain at Minimum Stress	$\epsilon@_{\sigma_{min}}$
Strain at a Point	$\epsilon_{pt}$
Strain at a Break (All types)	$\epsilon_{brk}$
Average Strain	$\epsilon_{avg}$

*L3 Strain Coefficients*

Distance Coefficients	Coefficient Label
Maximum Distance	$D_{max}$
Distance at Maximum Load	$D@L_{max}$
Distance at Minimum Load	$D@L_{min}$
Distance at a Point	$D_{pt}$
Distance at a Break (All types)	$D_{brk}$
Average Distance	$D_{avg}$
Distance Creep	$D_{rate}$

*L3 Distance Coefficients*

Modulus/Rate Coefficients	Coefficient Label
Elastic Modulus	$\lambda$
Tangent Modulus	$\lambda$
Chord Modulus (Two Point)	$\lambda$
Hysteresis	$\lambda$
Spring Constant	$K$
Spring Rate	$K_{rate}$

*L3 Slope Coefficients*

*Examples of results when using Load/Distance modes*

Work/Energy Coefficients	Coefficient Label
Work	$W$

*L3 Energy/Work Coefficients*

Cyclic Coefficients	Coefficient Label
Distance at a specified Load	$D_{pt}$
Load at a specified Distance	$L_{pt}$
Load/Distance - Increasing	$L_{pt}$
Load/Distance - Decreasing	$L_{pt}$
Hysteresis	$H_{yst}$
Hysteresis Loss	$H_{loss}$
Load/Distance at a specified Elongation (Average)	$L_{pt}$

*L3 Coefficients commonly used with Cyclic Testing*

Peel Coefficients	Coefficient Label
Load at First Peak	$L_{Peak}$
Load at Last Peak	$L_{Peak}$
Load at a specified Peak	$L_{Peak}$
Load at First Valley	$L_{valley}$
Load at Last Valley	$L_{valley}$
Load at a specified Valley	$L_{Peak}$
Load at Highest Peak	$L_{Peak}$
Load at Lowest Valley	$L_{Peak}$
Number of Peaks	$L_{cnt}$
Number of Valleys	$L_{cnt}$
Average All Peaks	$L_{avg}$
Average of selected Peaks	$L_{avg}$
Average All Valleys	$L_{avg}$
Average of selected Valleys	$L_{avg}$

*L3 Coefficients commonly used with Peel Testing*

### 2.1.2.2 Test Status Messages

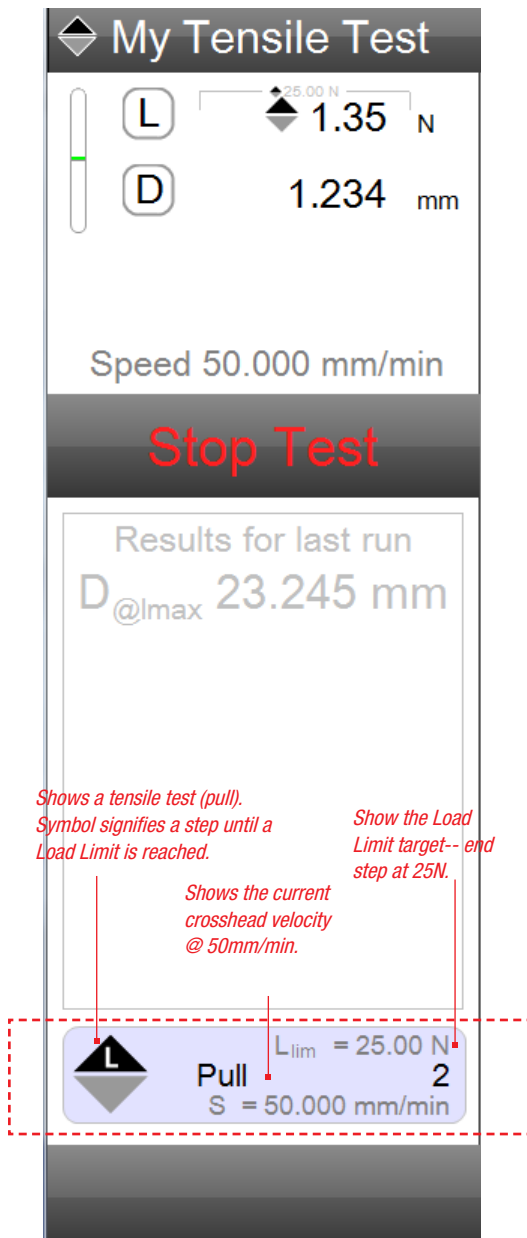
During an L3 test run, the current step and key attributes of that step are displayed in the test status message box. When the test is completed, the test status message box displays Completed Test.

The test status message box is only active during a test.

### 2.1.2.3 Data Definition Menus

Every coefficient has an associated Data Definition menu. This menu is used to configure the coefficient. Configuration options include:

- Coefficient Name
- Where to Display Coefficient
- Tolerance Limits Settings
- Algorithm Options
- Scope Limits

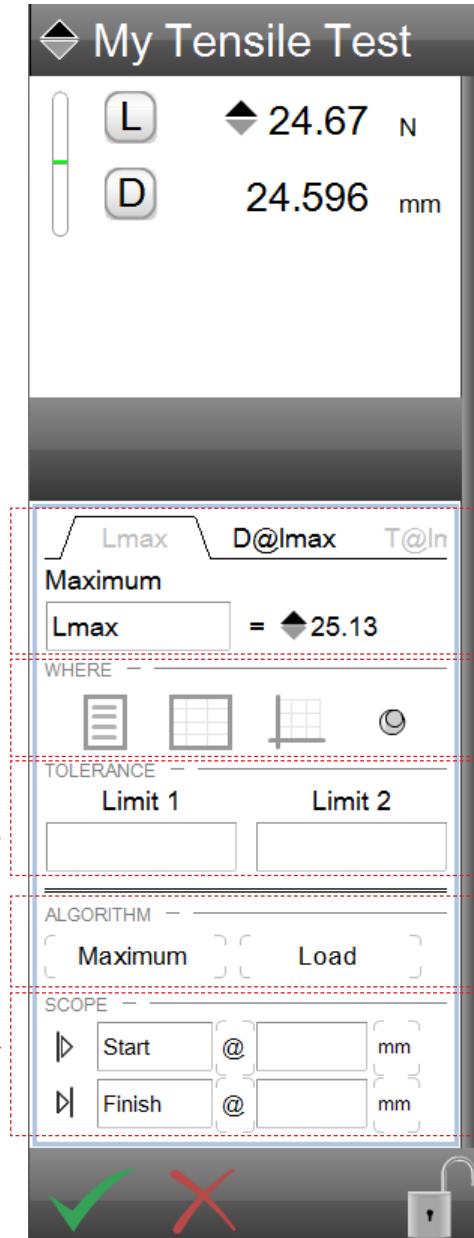


Shows a tensile test (pull).  
Symbol signifies a step until a Load Limit is reached.

Show the Load Limit target-- end step at 25N.

Shows the current crosshead velocity @ 50mm/min.

L3 Active Test Run  
Shows Step 2 status and key attributes



Coefficient NAME

WHERE to display coefficient

Coefficient TOLERANCE limits

Coefficient measurement ALGORITHM method

Coefficient SCOPE range

L3 Data Definition Menu  
Shows options/attributes for a coefficient

## Coefficient Name

Coefficients have default names, which are abbreviations for the coefficient. You have the option of changing the name here. The coefficient name is restricted to 16 characters.

Coefficients appear as “sets” in the Data Definition menu. For example, the coefficient for Load will also appear with the associated coefficient for Distance and Time. So, if the Point tool was used to find a particular Load on the graph, the Point tool will also find the Distance at the point as well as the Time at that point. Coefficient sets are distinguished in the Data Definition menu by individual tabs.

Changing the coefficient name in this menu only changes the name of this coefficient for this test setup. If you want to permanently change the coefficient name so it always appears with your preferred name, use the COEFFICIENT Settings function in the Main Settings section.



### NOTE

Coefficient names may be up to 16 characters in length.



### NOTE

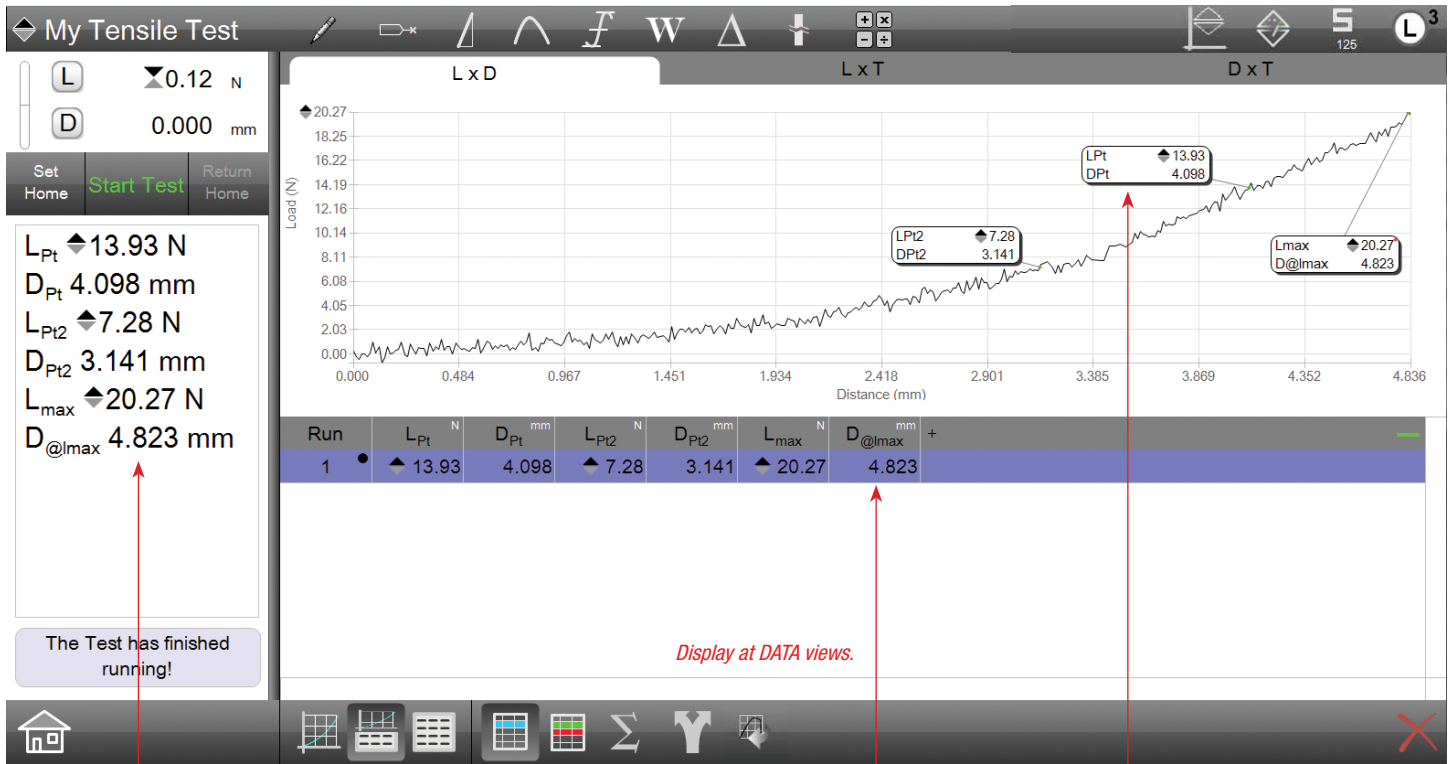
You can change the name globally using the main Settings menu. See **User Guide 7 - Security and System Settings**.

*Coefficient TYPES for this measured result*

*The “tab” shows the “active coefficient”. Change to another coefficient by select the tab for that coefficient.*

The screenshot displays the 'L3 Data Definition Menu' for a 'Maximum' analysis. At the top, there are three tabs: 'Lmax', 'D@lmax', and 'T@ln'. The 'Lmax' tab is currently selected and highlighted with a red dashed box. Below the tabs, the coefficient name 'Lmax' is shown in a text box, followed by an equals sign and a diamond icon with the value '25.13'. A red arrow points from the text 'Select to Rename the coefficient' to the 'Lmax' text box. Below this, there are sections for 'WHERE' (with icons for list, grid, and chart), 'TOLERANCE' (with 'Limit 1' and 'Limit 2' fields), 'ALGORITHM' (with 'Maximum' and 'Load' options), and 'SCOPE' (with 'Start' and 'Finish' fields, each followed by an '@' symbol and a unit field set to 'mm'). At the bottom of the screen, there are three icons: a green checkmark, a red X, and a lock icon.

L3 Data Definition Menu  
Menu using Min/Max/Avg Analysis Tool



Display at RESULTS view.

Display at DATA views.

Display at GRAPH views.

### Where to Display Coefficient

Coefficients have three options as to where it may be displayed:

- Results view
- Data view
- Graph view

You can specify WHERE to display the coefficient by selecting the symbol that represents the view: Results, Data or Graph.

The coefficient also has the option to be "pinned". When a coefficient is pinned, the L3 software automatically positioned the coefficient marker to the "best location". When unpinned, you may move the marker to the desired location.

Select the WHERE location you want the active coefficient to display.

A checkmark appears over the display location symbol indicating that the coefficient will be displayed at this view.

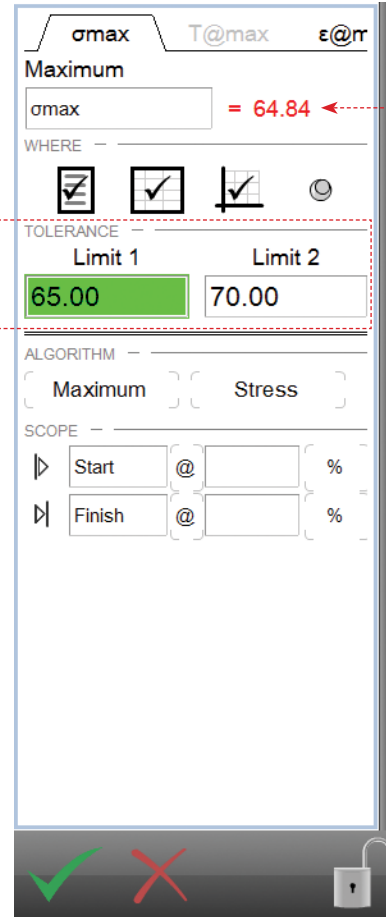
L3 Data Definition Menu  
WHERE specifies where coefficient is displayed

### Tolerance Limits

Use the tolerance limits to setup pass/fail criterion for your coefficient. When tolerance is used, the value of the coefficient must equal or full within the range you created by the Limit 1 and Limit 2 values. If the coefficient result falls outside this range, the coefficient will display in red and will be identified in the Data view as a "failed result".

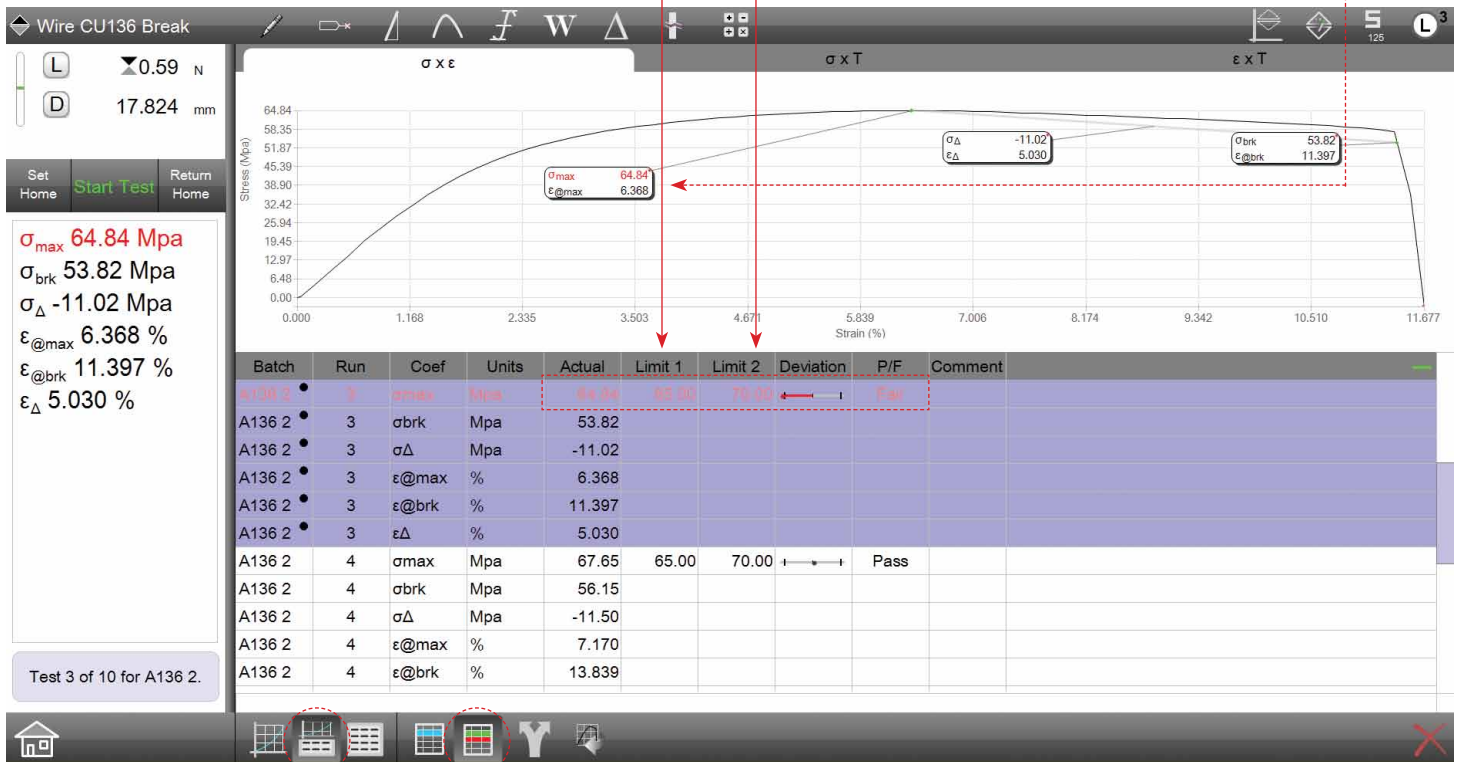
Enter your tolerance limits to define your tolerance range. Results equal to or within the tolerance range will report as "Pass" results and will display in black text.

Results that fall outside the tolerance range will report as "Fail" results and display in red text.



L3 Tolerance Definition

Coefficient in red indicates an "out-of-tolerance" result



L3 Split Graph with Tolerance view

Tolerance limits set for Distance at Maximum Load

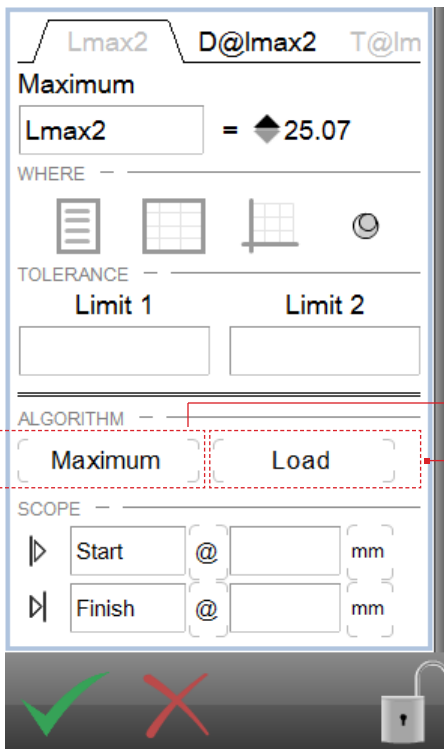
## Algorithm Options

Coefficients have different algorithms or methods that you may select for your coefficient. The algorithm determines how the results is measured and calculated.

For example, selecting the Min/Max/Avg tool will provide you with different algorithms for determining the Maximum or Minimum Stress.

A single coefficient may be calculated in multiple methods/algorithms.

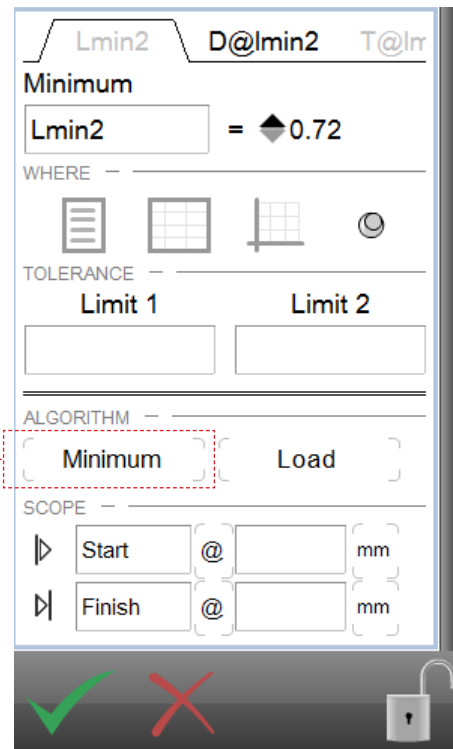
The various algorithms are discussed in detail in **User Guide 5 - Analyzing Test Results**.



L3 Data Definition menu  
Coefficient algorithm for this Load Point is "Maximum"

Select on the algorithm type available for the active variable. In this example, the active variable is LOAD and we switch from MAXIMUM to MINIMUM algorithm.

Select on the variable that the algorithm is being applied to. In this example, LOAD is the active variable. Selecting this target area will toggle the available variables between LOAD and DISTANCE.



L3 Data Definition menu  
Coefficient algorithm for this Load Point is "Minimum"



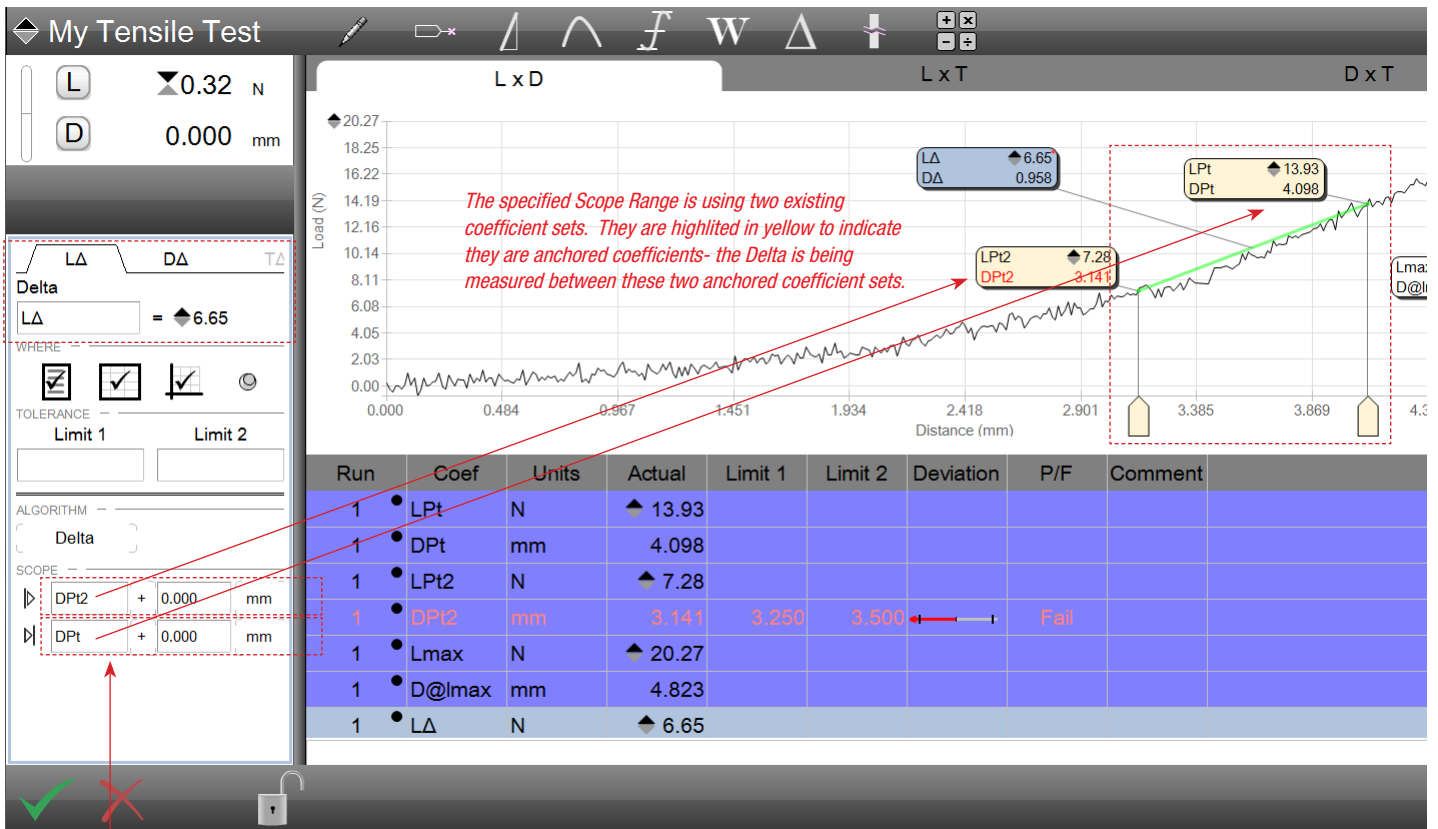
## Scope Limits

All coefficients have a scope. The scope is the region within your data collected for the test, or shown on the graph that you are interested in. For many coefficients the scope limits may be from the START to the FINISH of the test run. However, you may enter your own specified Start and Finish limits, which could be based on a step in your test setup, or a time or associated with another coefficient. Scope limits have units of measure that may be adjusted to find a specific result. For example, you want to know the load at 100mS after the maximum load. You can specify this using the Scope Limits. The Start is Lmax and the Finish is 0.01 S.s.

You may also establish a measurement between two existing coefficients. For example, you can measure the “delta” between two markers on the graph. Select the Delta tool and then move the scope handles until an existing marker changes its color to yellow, indicating an “anchored coefficient”. The “Delta” is measured between the two yellow markers.

Scope limits define the area/region you are interested in obtaining a result/coefficient.

Scope is discussed in detail in **User Guide 5 - Analyzing Test Results**.



L3 Data Definition menu  
Shows a Delta measurement between two existing coefficients

The scope is a delta measurement between the coefficient DPt2 and DPt and is based on the distance units (mm). You may enter the values for the scope or move the scope handles along the axis until the existing coefficient markers change to a yellow color. When the marker is yellow, it indicates an “anchored coefficient”- used to measure another coefficient.

### 2.1.2.4 Re-ordering Results

You may re-order your results in the Results view. At the Results view, select and Hold the result until a green highlight appears on the result. You can then use the mouse or your finger to move that result in your list of results in the Results view.

Dowel 24			Dowel 24			Dowel 24		
	<b>L</b>	0.35 N		<b>L</b>	0.35 N		<b>L</b>	0.35 N
	<b>D</b>	8.619 mm		<b>D</b>	8.619 mm		<b>D</b>	8.619 mm
Set Home	<b>Start Test</b>	Return Home	Set Home	<b>Start Test</b>	Return Home	Set Home	<b>Start Test</b>	Return Home
L <sub>max</sub> 54.71 N D <sub>@lmax</sub> 4.397 mm L <sub>Pt</sub> 20.00 N D <sub>Pt</sub> 0.804 mm			L <sub>max</sub> 54.71 N D <sub>@lmax</sub> 4.397 mm <b>L<sub>Pt</sub> 20.00 N</b> D <sub>Pt</sub> 0.804 mm			L <sub>max</sub> 54.71 N <b>L<sub>Pt</sub> 20.00 N</b> D <sub>@lmax</sub> 4.397 mm D <sub>Pt</sub> 0.804 mm		

Select the coefficient you want to reposition. Touch and hold, or mouse and hold to select.

A green highlight occurs when the coefficient is selected and active.

With the coefficient highlighted, drag the coefficient to the location you prefer. De-select using the mouse or touch.

## 2.1.3 Header Tool Bar

The header tool bar is dynamic and depending on the function you are performing can change to include different icons of interest.

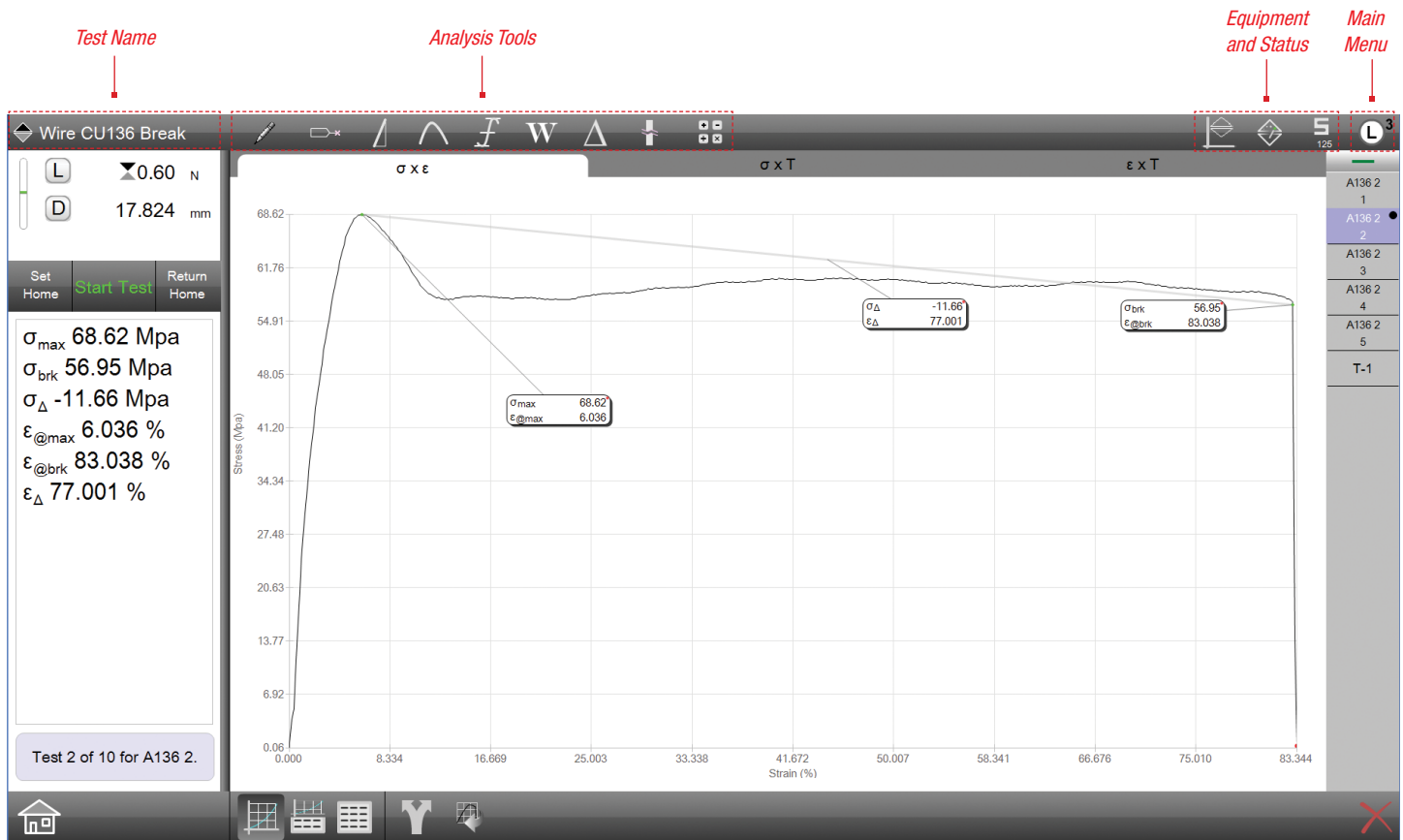
During normal operation, the header will display the following:

- Test Name
- Graphical Analysis Tools
- Equipment and Status Information
- L3 Main Menu Symbol



### NOTE

During the Data Definition function, the Equipment and Status Information is not displayed.



### 2.1.3.1 Test Name

The Test Name appears in the upper left corner of the header. The test name will also appear as a line on the Home view. Selecting the test name at the Home view will launch that test setup.

The Test Name dialog will appear once you have created a test and selected the check mark to accept.



**NOTE**

Your test name may be up to 16 characters in length. Test names may use alphabetical, numeric and symbol characters.



**NOTE**

Using your QWERTY keyboard, you can filter test names by entering a character. This will display only the test names that begin with that character. This is useful when you have multiple test setups.



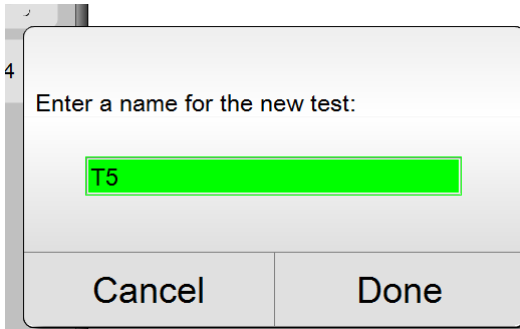
**NOTE**

The test name is shown in the header immediately above the Controller view. If the Controller view is narrowed, the test name may not display in its entirety. Expand the Controller view to its maximum width to view the entire test name.



**NOTE**

You may rename your test name using the Rename function. Select the test name from the Home view. Select the rename function, entering the new name for your test. Renaming a test may be restricted by Security settings.



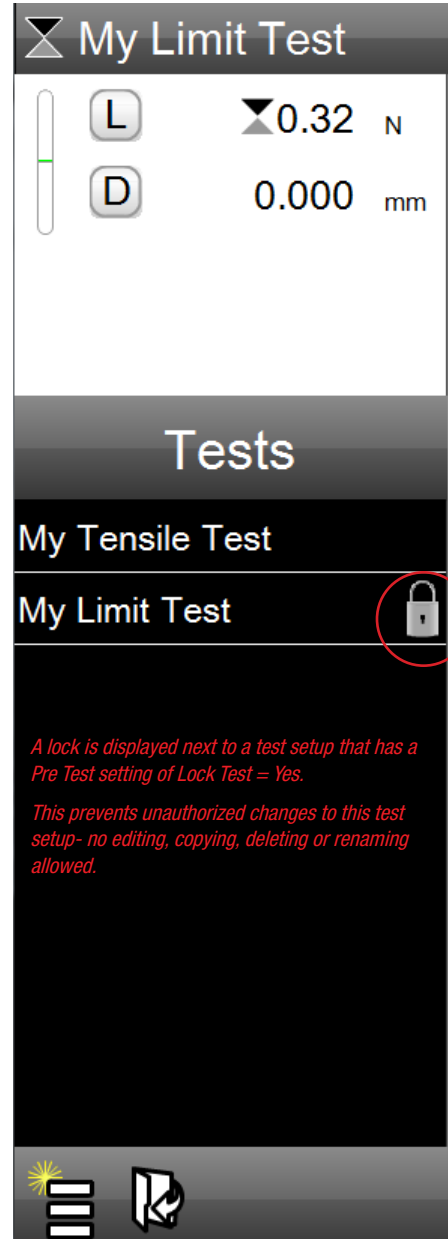
*L3 Test Name Dialog*

*Once you create a test, you are asked to name your test*



**NOTE**

A user with appropriate Security privileges may prevent a Test Setup from being edited, copied, deleted or renamed. When a test setup is locked, a lock icon appears next to the name in the Home menu.



*A lock is displayed next to a test setup that has a Pre Test setting of Lock Test = Yes.*

*This prevents unauthorized changes to this test setup- no editing, copying, deleting or renaming allowed.*

*L3 Home view*

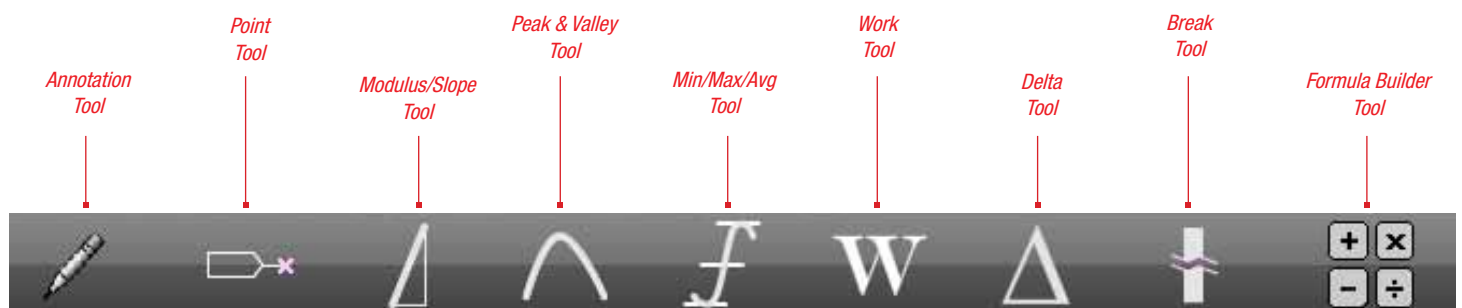
*Shows available Test Setups*

### 2.1.3.2 Graphical Analysis Tools

A set of test analysis tools appear above the main graph window. These tools are used to find or calculate results from your graph trace. There are eight (8) test analysis tool types:

- Annotation
- Point
- Modulus/Rate
- Peak/Valley
- Minimum/Maximum/Average
- Work
- Delta
- Break
- Formula Builder

These tools and their various functions are discussed in detail in **User Guide 5 - Analyzing Your Test Results**.



L3 Graphical Analysis Tools

### 2.1.3.3 Test Mode Indicator

Your L3 system has two test modes:

- Normal Mode
- Height Mode

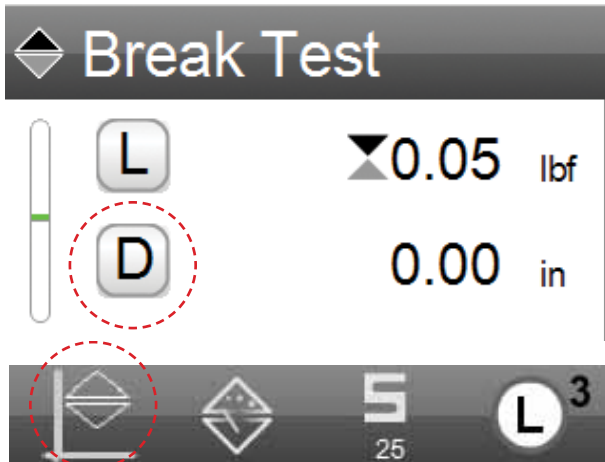
When in normal operating mode, the zero or datum position is established when you specify the Home position using the SET HOME command. When in normal mode, the D symbol is used to display the distance the crosshead is from the established Home position.

When in height operating mode, the zero or datum position is established using an automatic pre-test routine. The user must first place the system in Height mode. This can be done using the Pre Test step, or by selecting the Test Mode indicator and selecting the height mode. When in height mode, the H symbol in the Controller view represents the current height from the datum position.

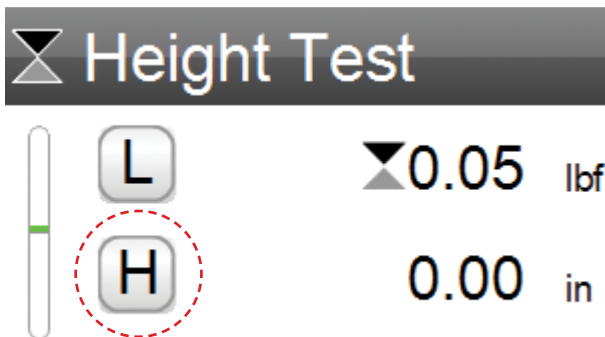


**NOTE**

Height Mode may not be used when in stress/strain testing.



*L3 Test Mode Indicator  
Normal Mode*



*L3 Test Mode Indicator  
Height Mode*

### 2.1.3.4 Joy Stick Speed Indicator

The joy stick speed indicator shows whether the joy stick is set to SLOW or NORMAL speed. Select the indicator to toggle between Slow and Normal speed.

When shown in SLOW speed mode, depressing the Up/Down joy stick causes the crosshead to move at the slowest velocity.

When shown in NORMAL speed mode, depressing the Up/Down joy stick causes the crosshead to move at a variable speed up to the maximum crosshead velocity you set in the SETTINGS/MOTION function. See **User Guide 7 - Security and System Settings** for details on how to set maximum velocity.



**CAUTION**

Do not attempt to change the speed while pressing down on the joy stick.



*L3 Joy Stick Velocity Indicator  
Slow Speed*



*L3 Joy Stick Velocity Indicator  
Normal Speed*

### 2.1.3.5 Extensometer Indicator

The Extensometer indicator lets you know the following:

- An extensometer is properly connected and communicating to your system;
- The extensometer's rated measuring range

If you press the extensometer indicator, the extensometer's status view will provide you with information about your instrument including serial number, model number, measuring range and calibration status.



**NOTE**

If no external extensometer is used, this symbol does not display.



*L3 Extensometer Indicator  
Displays when extensometer is connected to test frame*



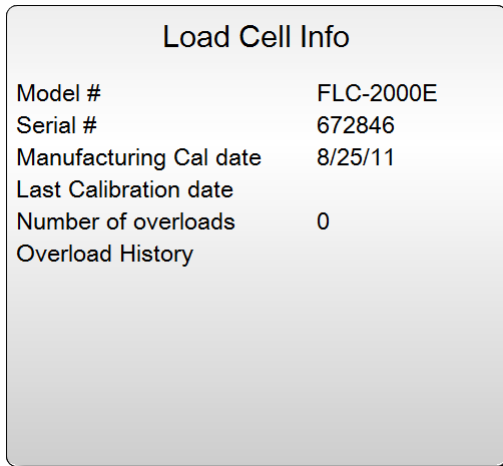
*L3 Extensometer Indicator  
Not displayed when extensometer is not connected to test frame*

### 2.1.3.6 Load Cell Indicator

The Load Cell indicator lets you know the following:

- A load cell is properly connected and communicating to your system;
- The load cell sensor's rated capacity

If you press the load cell indicator, the load cell sensor status view will provide you with information about your sensor including the sensor's serial number and the overload history.



L3 Load Cell Information Indicator

*When a load cell is overloaded, the overload is identified and time stamped showing the data and time the overload occurred.*

*Overload history remains displayed for a load cell forever.*

*An overloaded load cell isn't necessarily damaged requiring replacement.*

### 2.1.3.7 L3 Main Menu

The L2 Plus Main menu provides the following functions:

- Access to the main System Settings
- Ability to Print reports
- Ability to Log-In as a password protected user
- Ability to Log-Out the L3 system

#### System Settings

System Settings are discussed in detail in **User Guide 7 Security and System Settings**. The System Settings are the primary setup functions for your system and include Security settings, the display Language setting, Desktop options, Corrections and more.

#### Print Reports

The L3 Main menu is used to print one of the standard reports supplied in your L3 System. The report type available is displayed beneath the printer icon. From a specific view, the report type associated with that view may be printed by pressing the L3 Print symbol. Print types are discussed in detail in **User Guide 6 Managing Data**.

#### Page Setup

The Page Setup function is used to configure your print outputs. You may specify the format- portrait or landscape. And you may specify generic printout options such as margins.

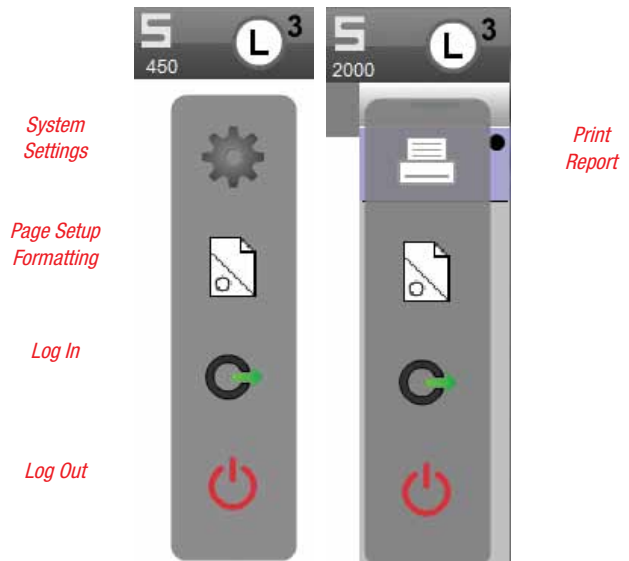
L3 printouts are all formatted to print landscape.

#### Log-In

Your L3 system allows you to restrict access to the system or certain system functions using password protection. When passwords and user names are utilized, a user will be required to log-in to the L3 system by accessing the L3 Log-in view; entering their user name and password.

#### Log-Out

The L3 Log-out function is used to log out of the L3 system. Systems setup to utilized user names and passwords will use this function to end a session for a user.



L3 Main Setting Menu

## 2.1.4 Footer Tool Bar

The Footer Tool Bar extends along the bottom of the L3 display views. The tool bar functions change based on the operating mode or functions being displayed.



### NOTE

The footer functions change based on the display view that is active.

### Home Menu - Footer

When at the Home menu where your test setups are listed, two functions are available using the symbols on the footer:

- Create a New Test
- Open a Test or Template

Selecting the Create New Test symbol will launch the L3 Test Builder application. From here, you can begin to create a new test setup.

Selecting the Open symbol takes you to the Metlogix directory. From this directory, you may access the TEST sub-directory and open a test from within this directory. Or, you may access the TEMPLATE sub-directory and create a new test using a test setup template that you created and saved.

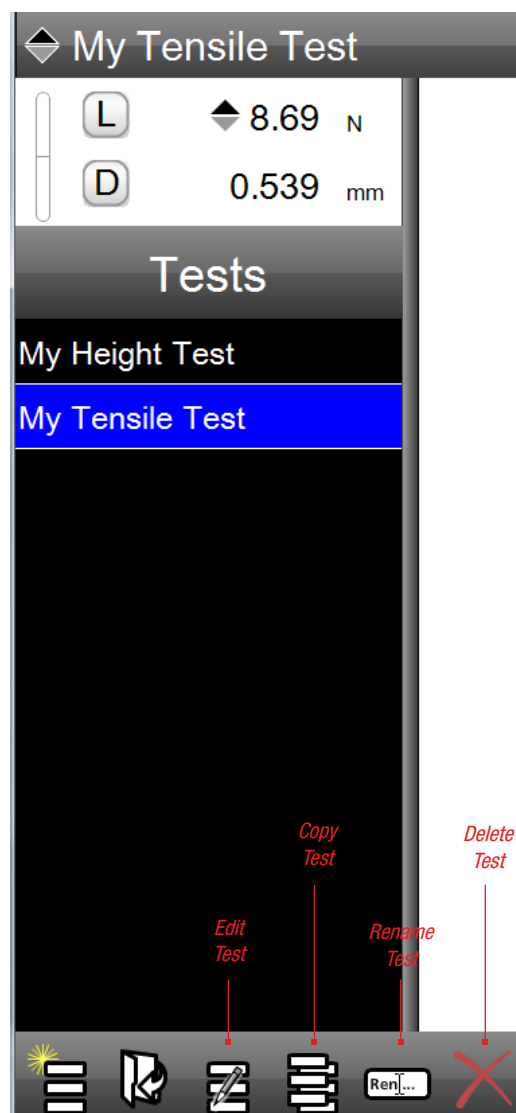
### Test Setup Edit - Footer

The footer tools at the bottom of the Controller window when you are in an edit view include:

- Home
- New Test
- Edit Test
- Copy Test
- Rename Test
- Delete Test



L3 Home menu view  
Create or Open a Test or Template



L3 Home menu view  
Edit the selected Test Setup



### 2.1.4.1 HOME Function

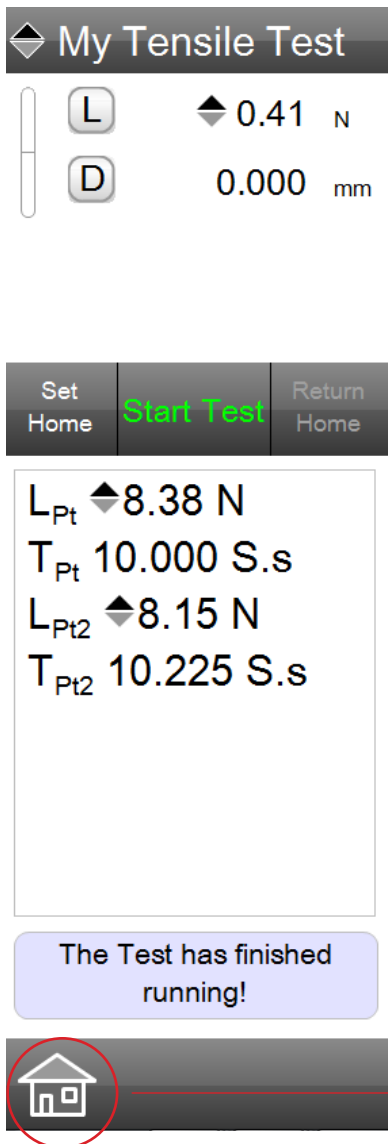
The Home function is displayed in the Controller window. Select the Home symbol to return to the Home view. The Home view is where your test setups are listed. From the Home view, you can select a test to perform or select a test to edit, copy, rename or delete. You can also create a new test from the Home view.

### 2.1.4.2 NEW TEST Function

Select the New Test symbol to launch the L3 Test Builder application. This application is used to create your test setups. The procedures used to create a test using the L3 Test Builder application are discussed in detail in **User Guide 3 Creating a Test**.

### 2.1.4.3 EDIT TEST Function

The Edit Test symbol lets you make changes to an existing test setup. From the Home view, select the test name, then select the Edit symbol. This will launch the L3 Test Builder and the test setup recipe for the selected test name.



L3 Home function



#### NOTE

A user may be restricted from making changes to a test setup.



#### NOTE

When editing a complex, multiple step test setup, its recommended that you use the Copy Test function. Copy the test and make changes to that version of the test.

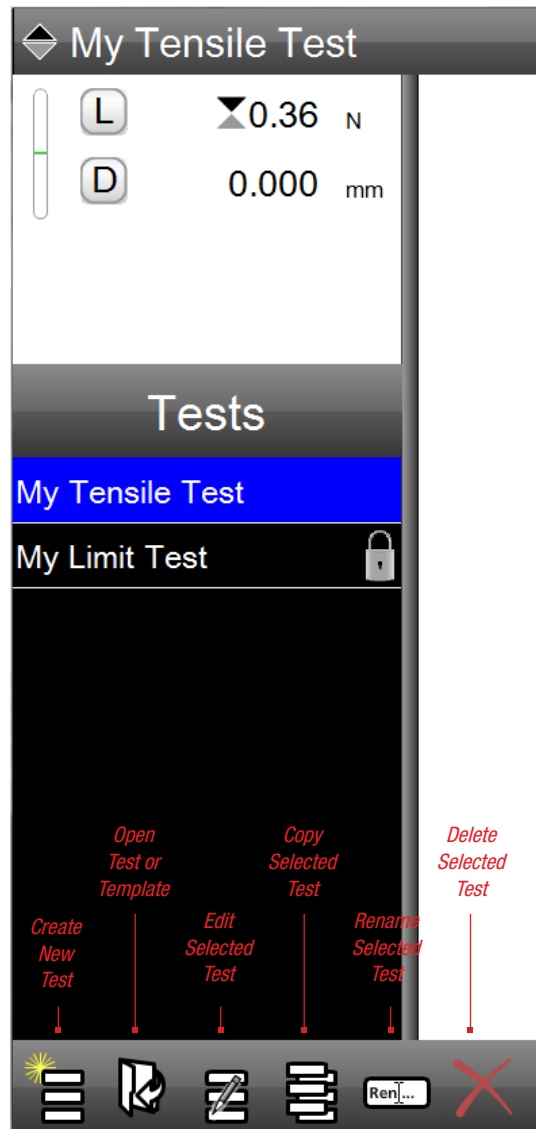
### 2.1.4.4 COPY TEST Function

The Copy Test function creates a new test using the copy of an existing test setup. From the Home view, select the test name, then select the Copy symbol. A new test is created showing the individual test steps from the original test setup. You may add or delete steps and then save your test with a new test name.



#### NOTE

It is good practice to copy a test prior to editing. This preserves the original test should you need to recall it.



L3 Edit functions

### 2.1.4.5 RENAME TEST Function

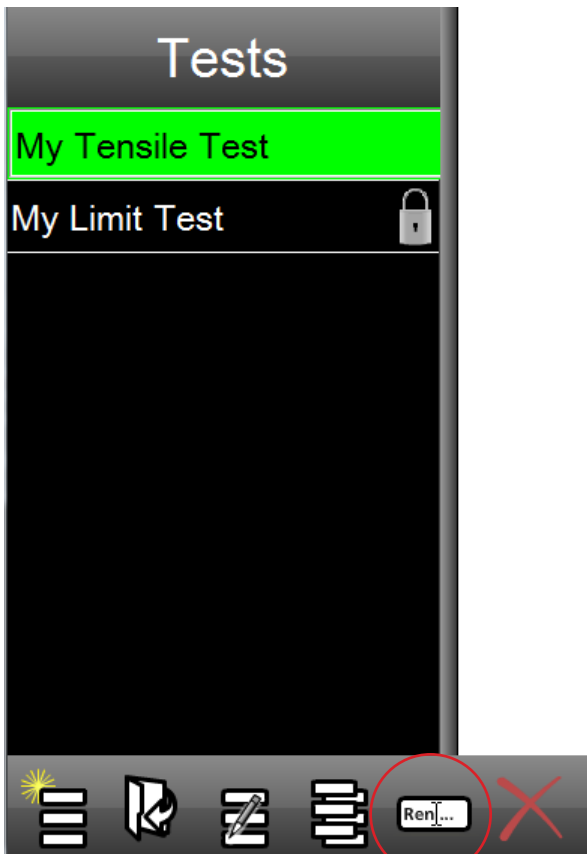
You may rename a test using the Rename function. From the Home view, select the test setup to rename, then select the Rename function. Use a keyboard to enter the new test setup name.



**NOTE**  
Test names may be up to 16 characters in length, including spaces.



**NOTE**  
Test names may be composed using alpha and numeric characters only. Symbols are not permitted.



*L3 Rename Test function*

### 2.1.4.6 DELETE TEST Function

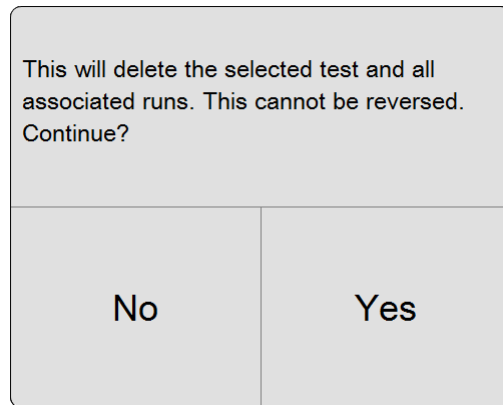
You may permanently delete a test by selecting the test from the Home view menu, and selecting the Delete function.



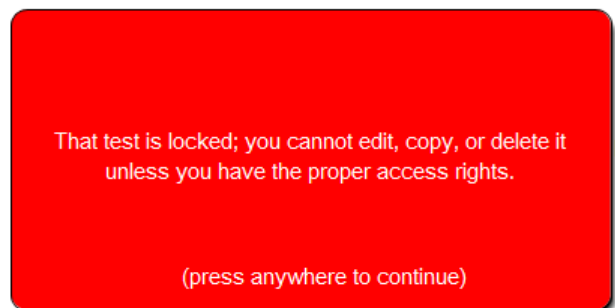
**NOTE**  
A warning message displays when you delete a test setup. This message requires acknowledgement so that you cannot accidentally delete a test setup.



**NOTE**  
When you delete a test, it is permanently deleted from the Home view menu.



*L3 Dialog when Deleting an unlocked test setup*



*L3 Dialog when Deleting a locked test setup*

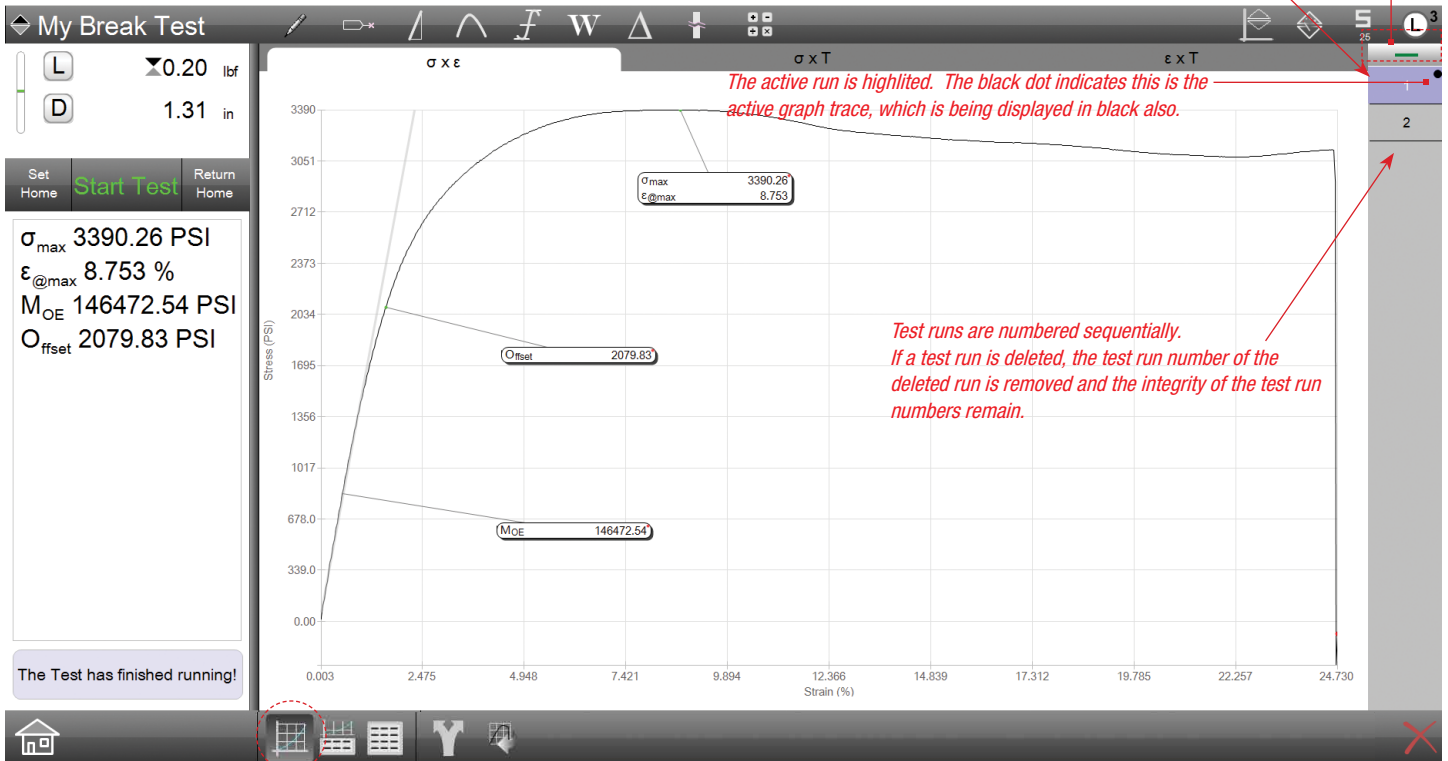
## 2.1.5 Runs List

Each individual test performed in a test setup is called a Run. The Runs List is a numerically arranged list representing the number of tests that have been performed for the current test setup.

A valid and successful Run is displayed with a black run number.

If a Run has a failed tolerance on a coefficient, the Run number is displayed in red.

If a Run was aborted due to an exception, the Run number is displayed in Red with an "x-out" indicating an invalid test.



## 2.1.6 Multi-Runs

You may display the graphs of runs in your Runs List individually or collectively (overlays). The Runs List mode is identified as in Single mode or Multi-Run mode by the green bar above the Runs List.

When the bar is single, only one graph is displayed for the run you specify.

Select the bar and the bar shows as a double bar indicating that you are now in Multi-Run mode. Select the Runs you want to display collectively in your graph view. Multi-Run mode operates in either the Full Graph view or Split Graph view.

Color dots indicate the trace on the graph that corresponds to that Run number.

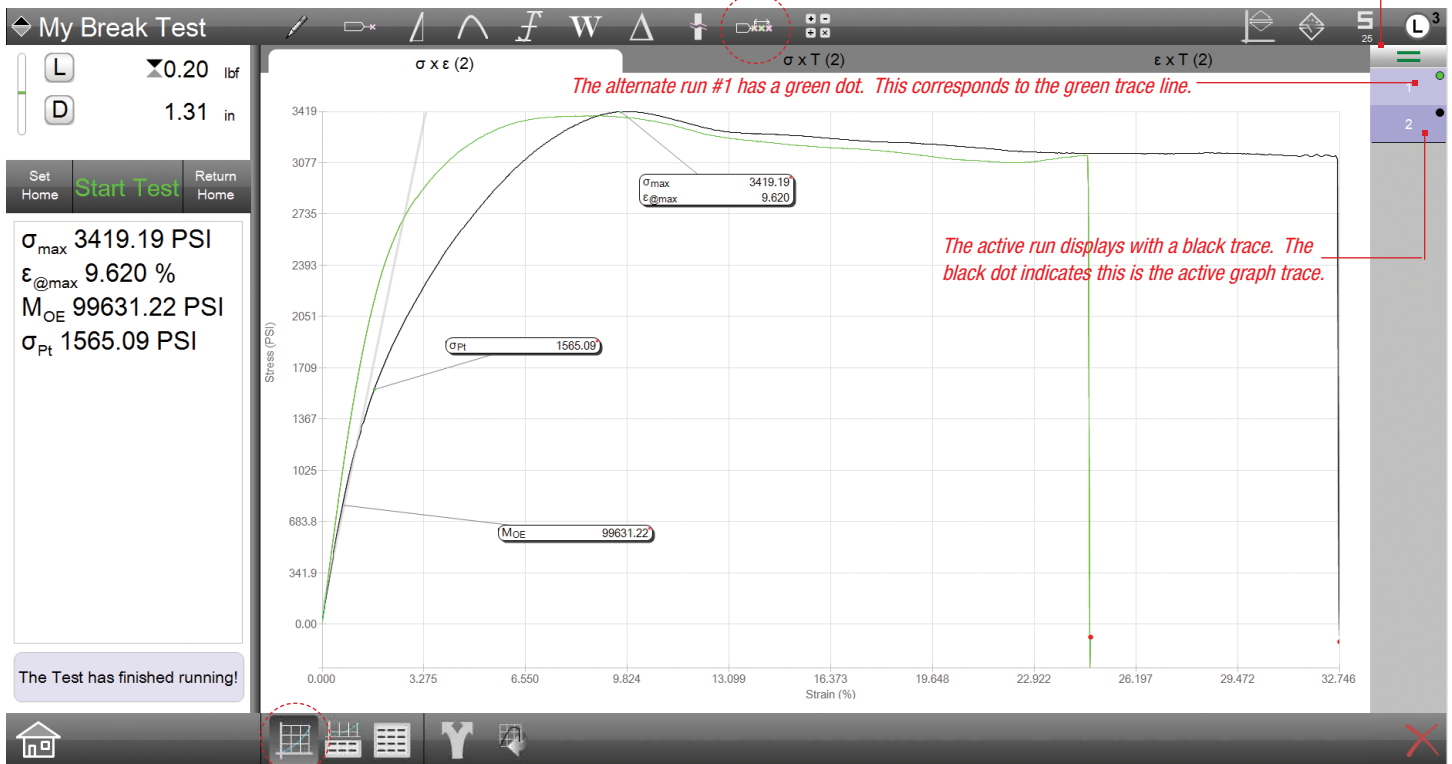


### NOTE

The active Run in a multi-run view always has the black dot and the graph trace is also displayed in black. If you switch to a different run, that Run will now have the black dot and its trace will display in black.

*The Multi-run tool appears when the graph displays multiple runs. This can be used to measure the deltas between the graph traces.*

*Select the target to display a single run in the graph or multiple runs together.*



*The alternate run #1 has a green dot. This corresponds to the green trace line.*

*The active run displays with a black trace. The black dot indicates this is the active graph trace.*

L3 Full Graph View  
Full graph in multi-view mode

## 2.1.7 Using Archived Runs for Analysis

You may use the offline archive function to compare historical run results to current and active runs. Comparing archived runs with active runs should be performed using the Multi-view function.

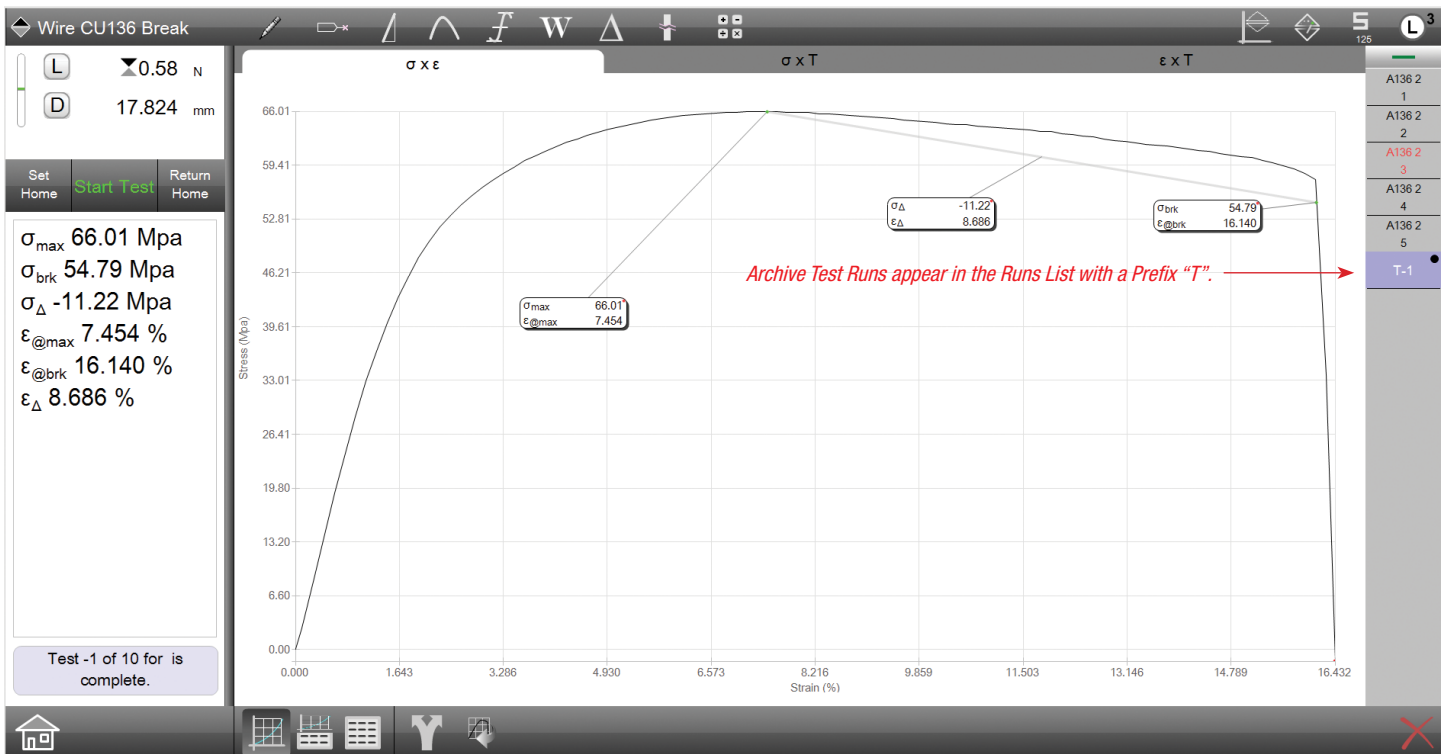
### 2.1.7.1 Archived Test Runs

When a Runs Limit is met, the oldest test run is moved to the Archive directory within your Metlogix directory. The archived run may then be opened using the Offline tool, which when selected, opens the Archive directory. From the Archive directory, you may select any test run. Selecting Open, the archived test run is placed in your active Runs List. Archived runs have a prefix "T". For example, when you load an archived run onto your active Runs List, the first archived run will display as "T-1".



#### NOTE

Any test run within your Archive directory may be imported to your active test and Runs List. Use care to make sure you are importing test runs that are associated with your current test setup and your current Runs List.



Full Graph showing Archived Run for analysis and comparison to Active Runs

### 2.1.7.2 Importing an Archived Run

Selecting the Archive function will open the Archive within the Metlogix directory, or where you have the Archive directory mapped to on your network.

To import an archived test run, select a run from the list. You may select more than one. The selected run does not need to be from the same test setup either.



**NOTE**

You may select any test run from the Archive directory. The selected test run does not have to have been created using the test setup associated with the active test runs.

The screenshot shows the 'Run to Import' dialog box with the following table of files:

Name	Date modified	Type	Size
Wire CU136 Break_A136_000007.mlrundata	12/4/2014 9:39 AM	MLXRUNDATA File	1 KB
Wire CU136 Break_A136_000006.mlrundata	12/4/2014 9:38 AM	MLXRUNDATA File	7 KB
Wire CU136 Break_A136_000005.mlrundata	12/4/2014 9:38 AM	MLXRUNDATA File	8 KB
Wire CU136 Break_A136_000004.mlrundata	12/4/2014 9:37 AM	MLXRUNDATA File	36 KB
Wire CU136 Break_A136_000003.mlrundata	12/4/2014 9:36 AM	MLXRUNDATA File	9 KB
Wire CU136 Break_A136_000002.mlrundata	12/4/2014 9:36 AM	MLXRUNDATA File	7 KB
Wire CU136 Break_A136_000001.mlrundata	12/4/2014 9:35 AM	MLXRUNDATA File	5 KB
Wire Break_A123_2_000003.mlrundata	12/4/2014 9:30 AM	MLXRUNDATA File	4 KB
Wire Break_A123_2_000001.mlrundata	12/4/2014 9:29 AM	MLXRUNDATA File	5 KB
Wire Break_A123_000003.mlrundata	12/4/2014 9:29 AM	MLXRUNDATA File	4 KB
Wire Break_A123_000002.mlrundata	12/4/2014 9:28 AM	MLXRUNDATA File	5 KB
Wire Break_A123_000001.mlrundata	12/4/2014 9:27 AM	MLXRUNDATA File	6 KB
My Break Test_000003.mlrundata	11/26/2014 3:16 PM	MLXRUNDATA File	16 KB
My Break Test_000002.mlrundata	11/26/2014 3:16 PM	MLXRUNDATA File	18 KB
My Break Test_000001.mlrundata	11/26/2014 3:16 PM	MLXRUNDATA File	21 KB
Formula Test_Ctrl V4 M 357_000001.mlrundata	11/26/2014 1:12 PM	MLXRUNDATA File	5 KB
Formula Test_000002.mlrundata	11/26/2014 10:40 ...	MLXRUNDATA File	17 KB
Formula Test_000001.mlrundata	11/26/2014 9:43 AM	MLXRUNDATA File	11 KB

Annotations on the graph and dialog box:

- Select ARCHIVE function.
- Opens the Archives sub-directory.
- Select the test runs you want to import.
- Select Open.

Full Graph showing Archived Runs sub-directory

### 2.1.7.3 Analyzing with an Archived Run

When an archived test run is imported to your active Runs List, the graph and data that make up the graph are copied to your L2 Plus system. You can then use your measurement tools to take new measurements. Or, you can use the measurements from your current active test runs to compare results with historical runs.

It may be necessary to re-measure results in the archived Run. Normally, when the archived Run is imported, the results associated with the current test Runs are automatically calculated and displayed with the archived Runs graph.

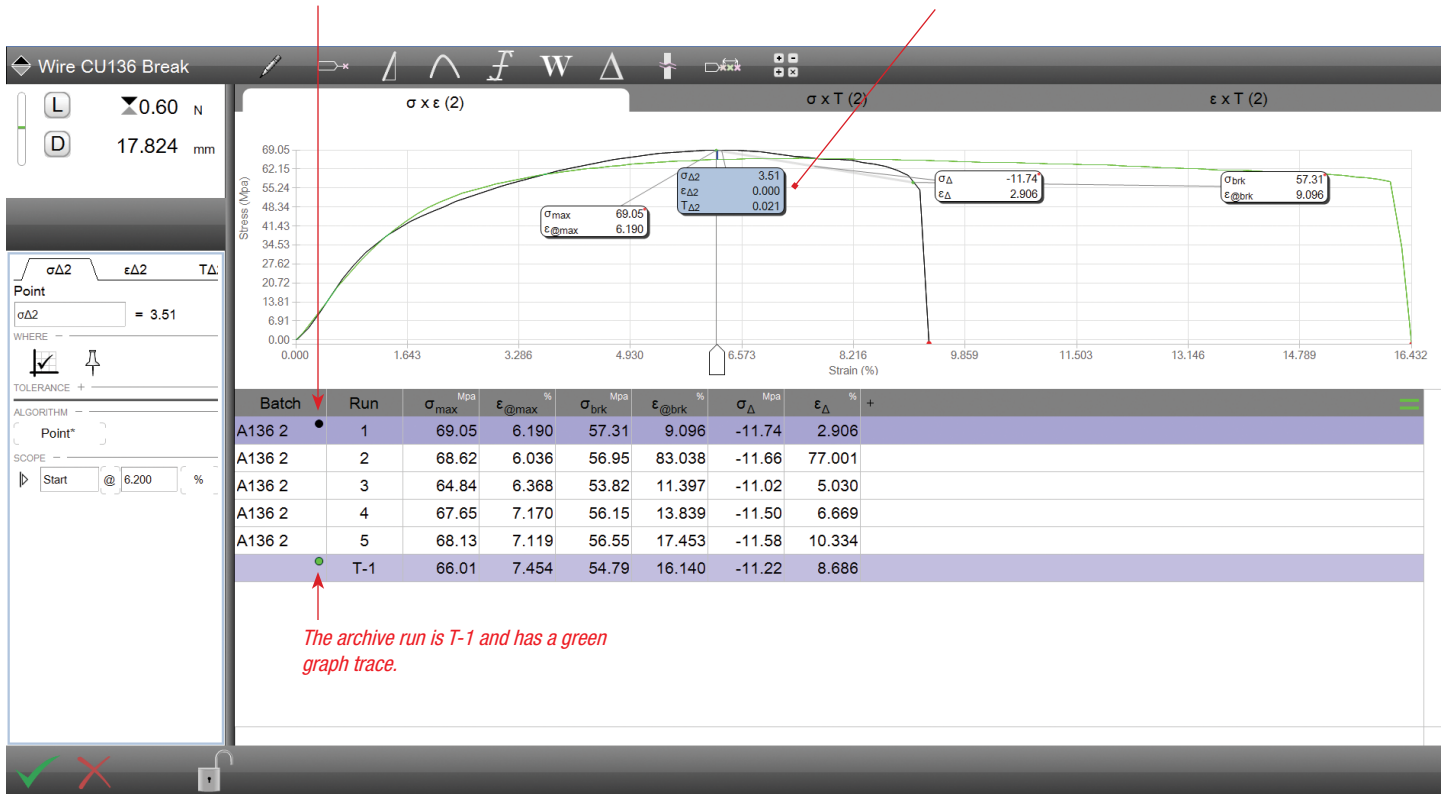


**NOTE**

When importing an archived Run, the archived Run may first show “XXX.X” for its coefficients. You may need to “re-link” the archived Run. You may do so, by simply choosing one of the active test runs, and then the archived run while in Multi-view.

*Run #1 from Batch ID A136 2 is from the active Runs List. This graph is displayed in black.*

*Marker displays the variance between active Run #1 and Archive Run T-1. The stress variance is 3.51 Mpa.*



*The archive run is T-1 and has a green graph trace.*

Full Graph showing Variance Measurement between Active Run and Archived Runs

### 2.1.7.4 Statistics using an Archived Run

Statistics may be re-calculated to include your Archived Run. You must select the archived Run with any of the active Runs you want statistical calculations for.

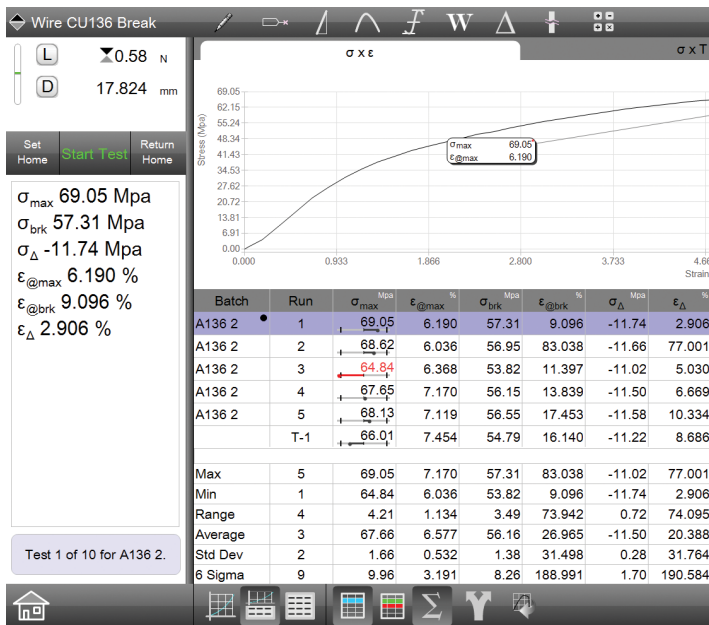
If the archived Run is not selected, its measured results are not included in your statistical results. Only the results from your active Runs List will be used to calculate statistics.



**NOTE**

An imported archive test run does not affect the statistics in your active test.

If you want to include the archived test run in your statistical calculation, you must use the multirun function and select the runs you want used for statistical calculations.



Statistics calculated on Active Test Runs #1 - 5 in Batch A136 2  
Archive Test Run T-1 Not Included

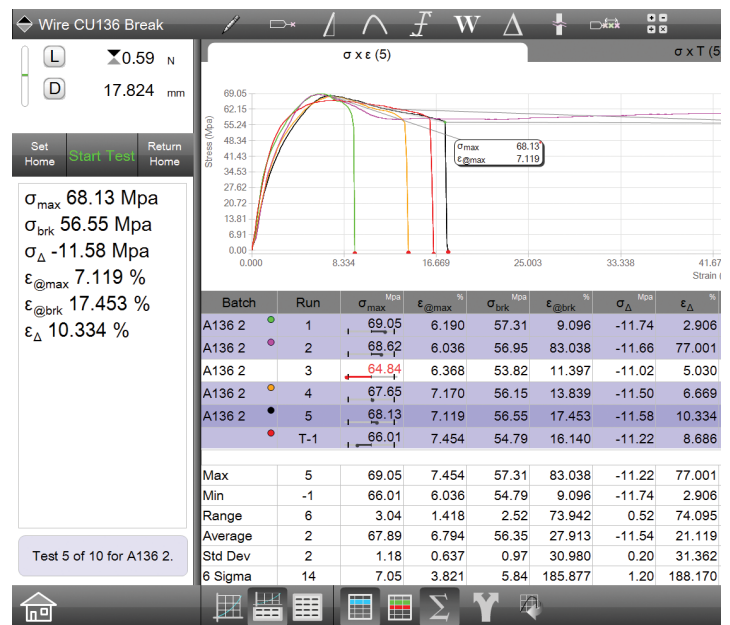
### 2.1.7.5 Removing (Deleting) an Archived Run

Remove the archive test run using the delete function on the display view. When the archived test run is deleted, it is deleted from the Runs List. The archived test run is not deleted from the source Archive directory.



**NOTE**

When you delete an archived run from a display view, the archived test run is removed from the Runs List. It is not permanently deleted from the Archive directory.



Statistics calculated on selected Test Runs from Batch 136 2  
Archive Test Run #T-1 is included



L3 Full Graph view  
Delete the Archive Run using Delete function



## 2.2 Graph Views

There are a variety of different graph views available depending on the type of tests being performed. A graph is the most common method for analyzing results using the Graphical Analysis Tools. Using the graph, combined with these tools, you have an easy method for measuring and determining the results for your test.

When tests are performed the following graph formats are available for viewing:

- Stress x Strain
- Stress x Time
- Strain x Time

Selecting the graph view is done by selecting the tab labeled with the respective graph view type.

Graphs are automatically scaled to a “best fit” size. Graph axes are labeled and increments are calculated based on the data rate and the “best fit” size.

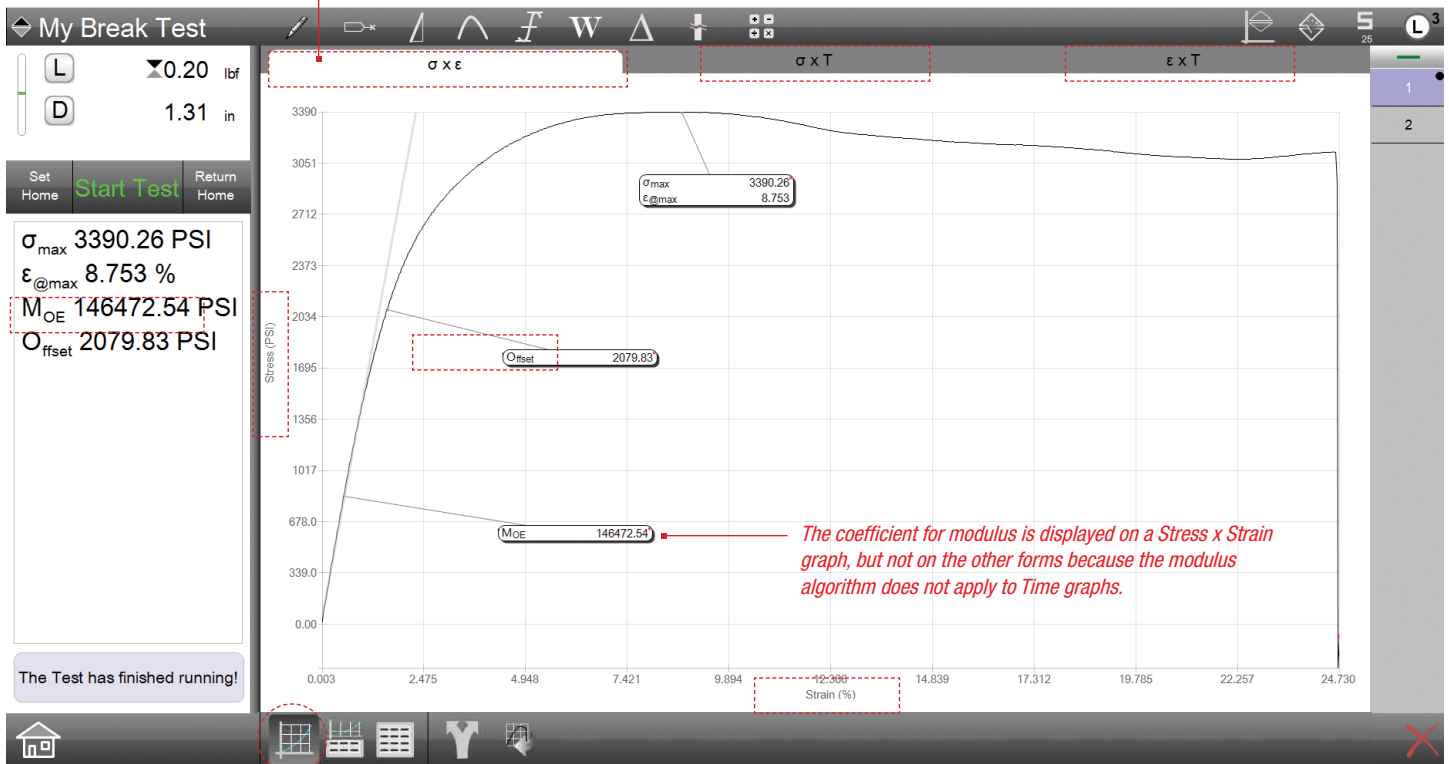
The following sections will illustrate the different graph views available.



**NOTE**  
Certain coefficients may not be visible on a particular graph format.

*Change the graph format by selecting the tab.*

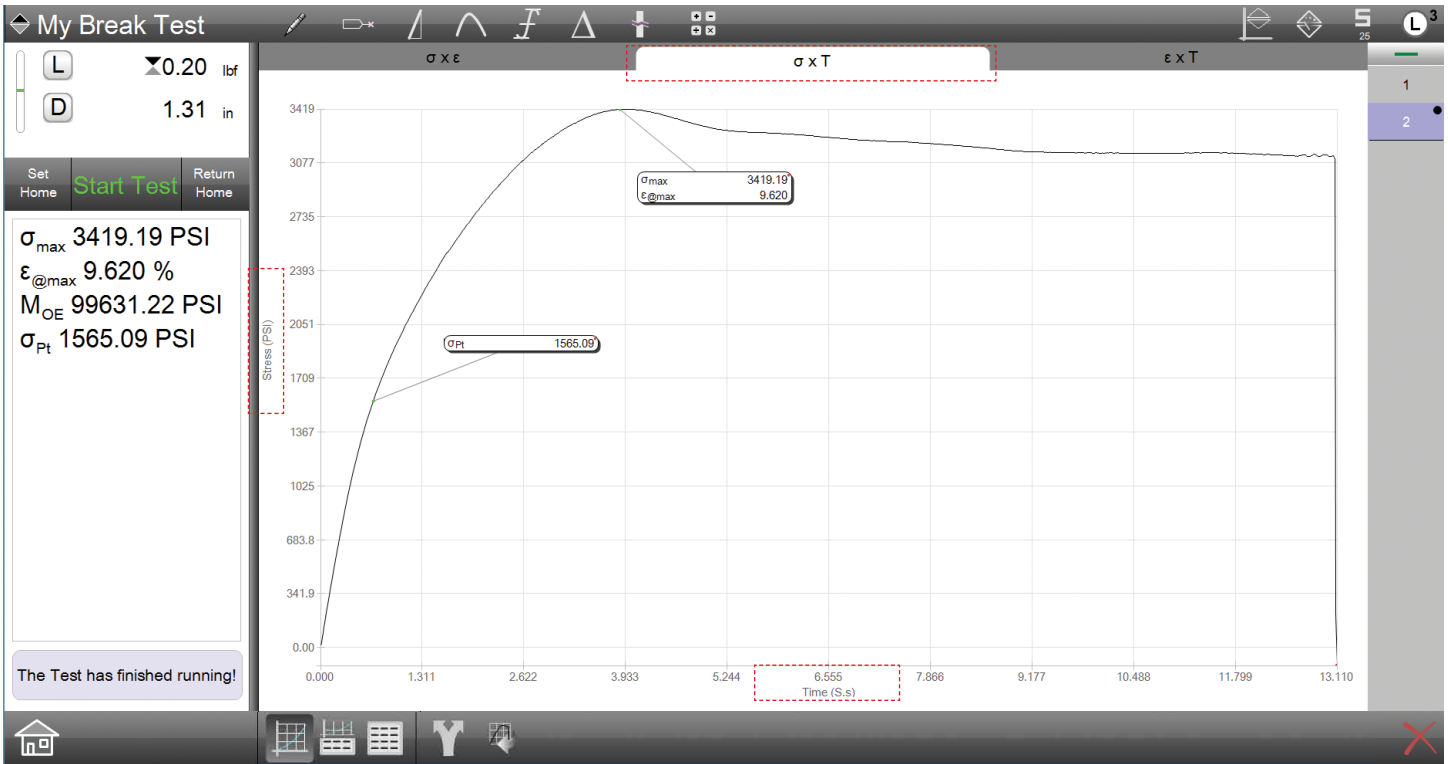
- *Stress x Strain ( $\sigma \times \epsilon$ )*
- *Stress x Time ( $\sigma \times T$ )*
- *Strain x Time ( $\epsilon \times T$ )*



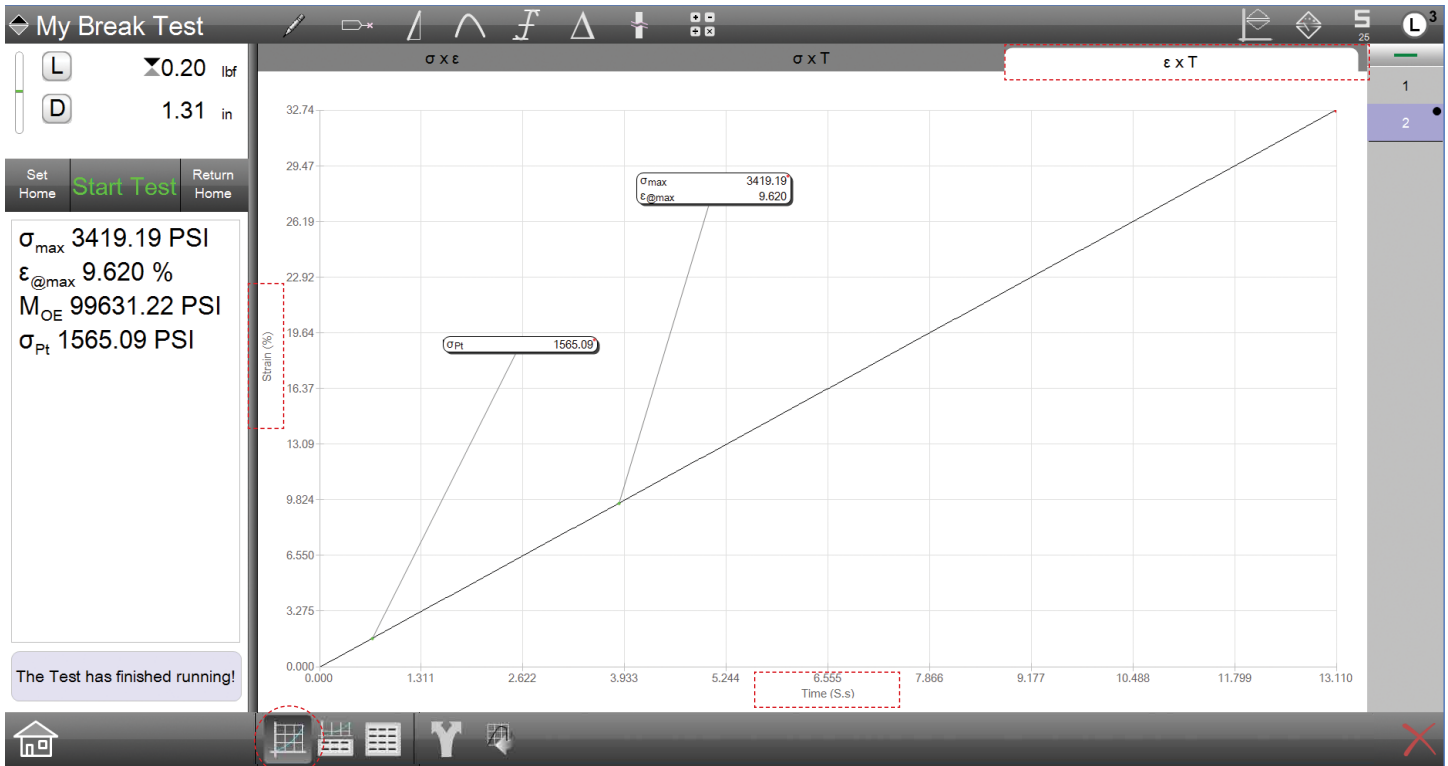
*The coefficient for modulus is displayed on a Stress x Strain graph, but not on the other forms because the modulus algorithm does not apply to Time graphs.*

L3 Full Graph view

Uses a Sample Definition Step, graph formats show Stress, Strain, and Time



L3 Full Graph view  
Shows Stress x Time



L3 Full Graph view  
Shows Strain x Time

## 2.2.1 Load-Distance Graph View

When no sample is characterized in the test setup, the test graphs will revert automatically to a Load, Distance, Time format. Stress and Strain will no longer be calculated. Select the L x D tab for load (y-axis) and distance (x-axis).

## 2.2.2 Load-Time Graph View

You may display a load versus time graph. Select the L x T tab to view load (y-axis) versus time (x-axis).

## 2.2.3 Distance-Time Graph View

You may display a distance versus time graph. Select the D x T tab to view distance (y-axis) versus time (x-axis).

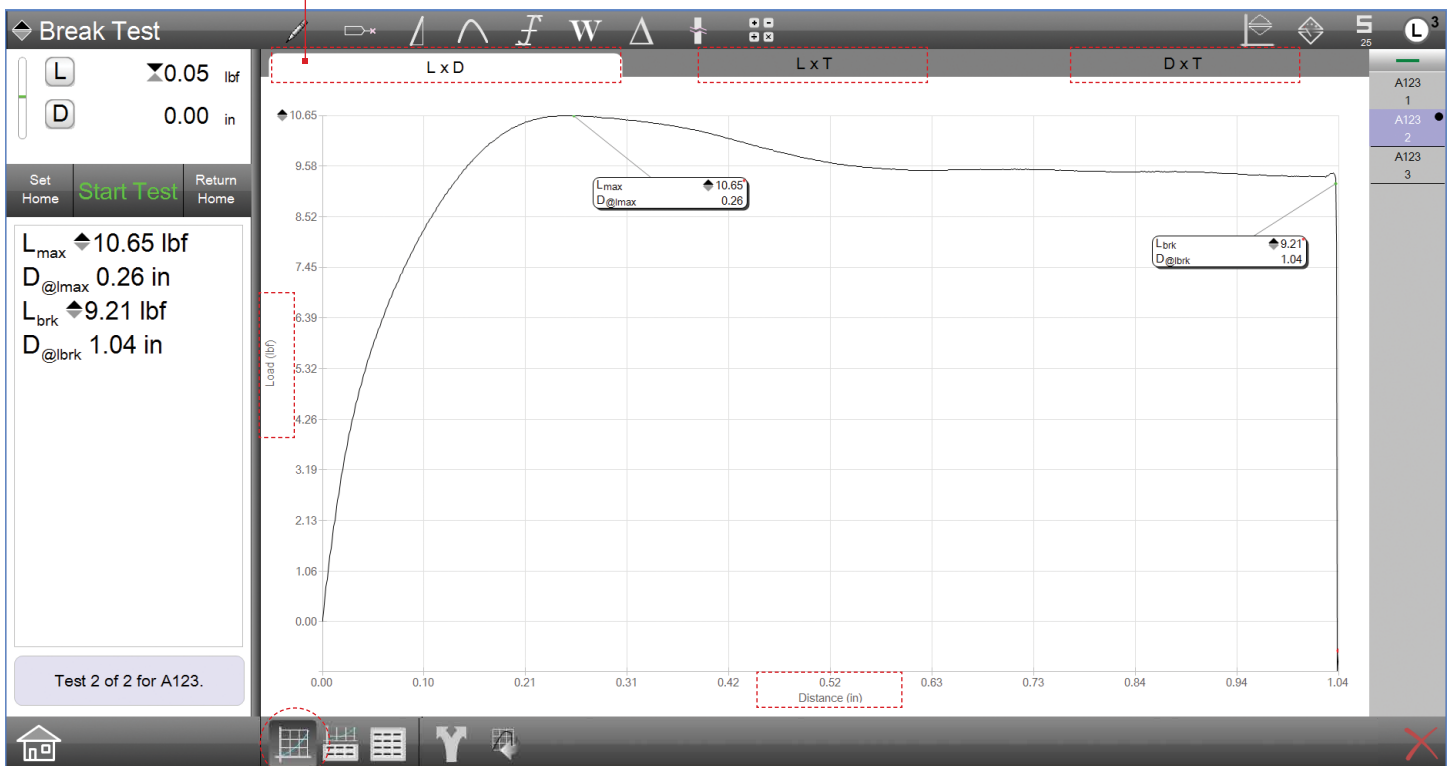


### NOTE

Certain coefficients may not be visible on a particular graph format.

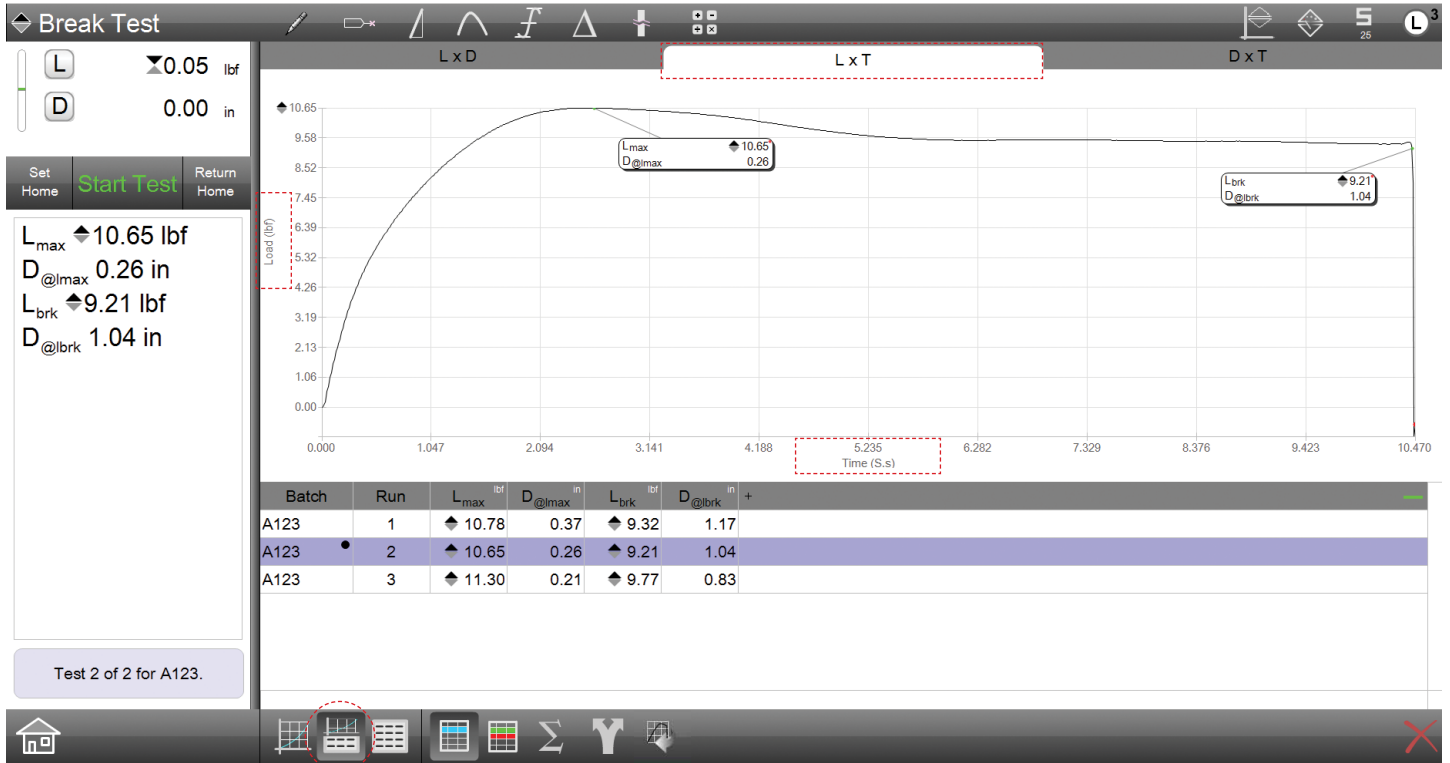
*Change the graph format by selecting the tab.*

- *Load x Distance (L x D)*
- *Load x Time (L x T)*
- *Distance x Time (D x T)*

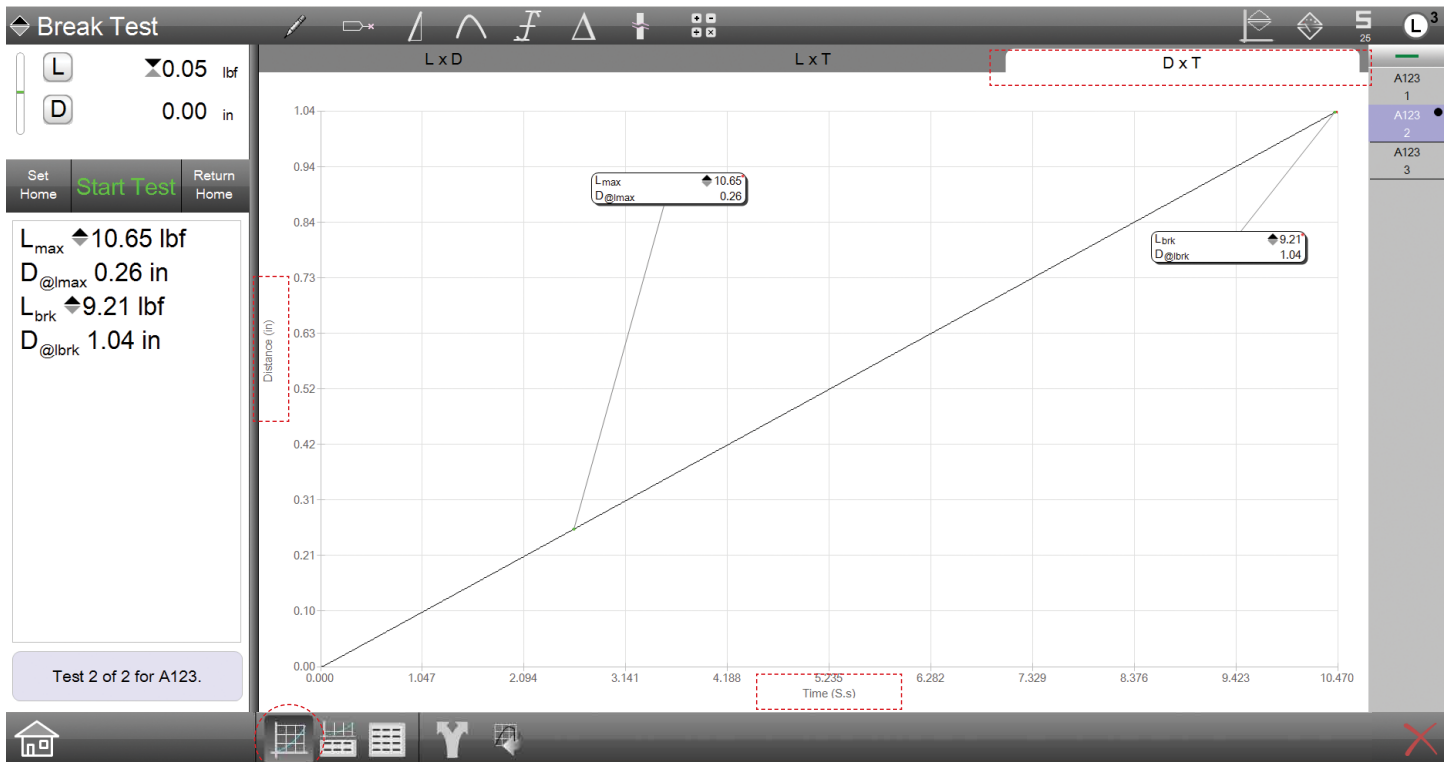


L3 Full Graph view

No Sample Definition Step, graphs show Load versus Distance



L3 Split Graph-Data view  
Shows Load x Time



L3 Full Graph view  
Shows Distance x Time

## 2.3 Data Table Views

The Data view displays results in a tabular, spreadsheet-like format. Runs are represented by rows. The columns of the table represent the coefficients and other supporting information for the test.

The Data view allows sorting of your data. Select the column header to toggle between ascending and descending order.

When tolerances are used, the Data view displays failed tolerances in red and includes a tendency bargraph.



### NOTE

Rows represent runs in the Data view. The row with the reference #1 is Run #1. There are no limits to the number of rows in a Data view. However, you may specify the maximum number of Runs in the Post Test step of your test setup.



### NOTE

Columns represent coefficients/results. For every coefficient you are using, there is a representative column in the Data view. However, in the Data Definition menu for a coefficient, you have the option of displaying the coefficient in the Data view or not using the WHERE option.

Use the WHERE function in the Data Definition menu to specify where you want to display your coefficient.

The checkmark indicates that LPT is to be displayed in the Results view, Data views and Graph views.

## 2.3.1 Graph-Data Table Split View

The split view displays the graph and data simultaneously. The individual features and functions of both the full graph and Data view displays are incorporated into this alternate view.

You may use the multi-run function to overlay multiple graph traces and show their corresponding row data.

L3 WHERE Data Definition menu  
Shows "where" you want the coefficient LPT displayed

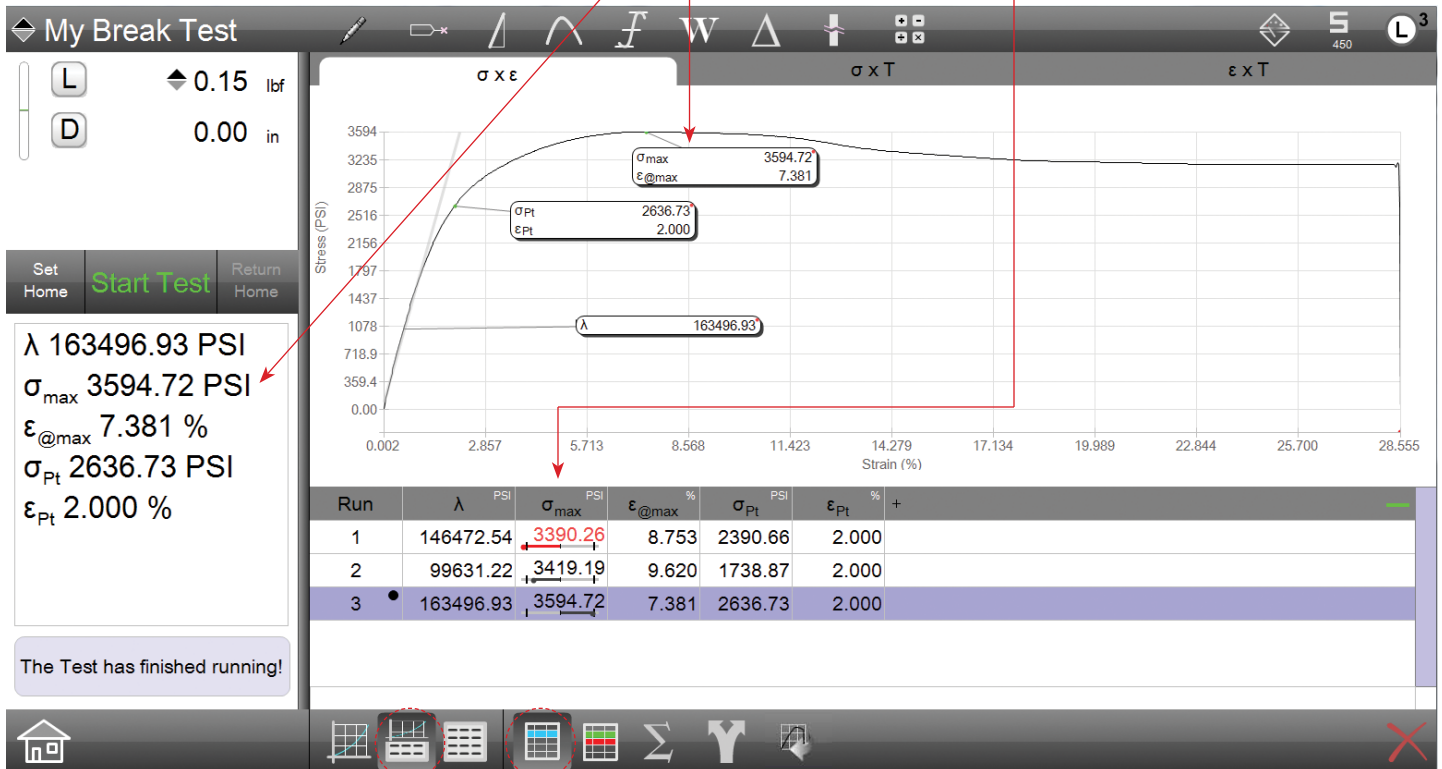
$\sigma_{max}$      $\epsilon_{@max}$      $T_{@max}$

Maximum

$\sigma_{max}$  = 3594.72

WHERE

Results view  Data Table views  Graph views



L3 Split Graph-Data Table view  
Displayed in Standard format

## 2.3.2 Statistics View

You have the ability to view basic statistical calculations using the Data view or the split view. Whenever data is displayed, selecting the sigma symbol will display the following statistics:

- Minimum
- Maximum
- Range
- Average
- Standard Deviation
- 6 Sigma

If more detailed statistics are required for statistical process control, you may export the raw data in a .csv format and integrate with your SPC software application for more comprehensive analysis and documentation.



**NOTE**

Statistics are available from the Data view or Graph-Data split view.



**NOTE**

Statistics may be calculated for all runs in the Data view or you can specify only the runs (rows) you want.

*The highlighted row indicates the test runs that are displayed in the graph.*

*You can adjust the viewing area by moving the header bar up/down. The graph is automatically sized.*

Run	$\lambda$	PSI	$\sigma_{max}$ PSI	$\epsilon_{@max}$ %	$\sigma_{Pt}$ PSI	$\epsilon_{Pt}$ %
1	146472.54	3390.26	8.753	2390.66	2.000	
2	99631.22	3419.19	9.620	1738.87	2.000	
3	163496.93	3594.72	7.381	2636.73	2.000	
Max	163496.93	3594.72	9.620	2636.73	2.000	
Min	99631.22	3390.26	7.381	1738.87	2.000	
Range	63865.71	204.46	2.239	897.86	0.000	
Average	136533.56	3468.06	8.585	2255.42	2.000	
Std Dev	33072.57	110.64	1.129	463.96	0.000	
6 Sigma	198435.40	663.86	6.774	2783.74	0.000	

*Select the large sigma symbol to display the statistics for this test setup. Statistics are calculated on all test runs or the runs (rows) you select.*

L3 Split Graph-Data Table view  
Displayed with Statistics

## 2.3.3 Tolerance View

When tolerances are used, you have the ability to display your results with your tolerance information. Select the TOL function and your results, including pertinent tolerance information is displayed collectively.

In the Tolerance view, each coefficient occupies a row in the data table. If a test run has five (5) coefficients, there will be five (5) rows for each coefficient.



**NOTE**  
You cannot display statistics and tolerance at the same time.

L3 TOLERANCE Data Definition menu  
Shows Tolerance Limits for stress max result

$\sigma_{max}$      $\epsilon_{@max}$      $T_{@max}$

**Maximum**

$\sigma_{max}$  = 3594.72

WHERE

**TOLERANCE**

Limit 1      Limit 2

3400.00      3600.00

The coefficients are listed on a row for each test run. The tolerance settings are displayed for all coefficients where a tolerance has been setup.

The Comment cells allow the operator to include comments on this result or the test run in general. Select the cell and enter your comment.

Use the Scroll Bar to navigate the data table up/down to view other test runs.

Run	Coef	Units	Actual	Limit 1	Limit 2	Deviation	P/F	Comment
1	$\lambda$	PSI	146472.54					
1	$\sigma_{max}$	PSI	3390.26	3400.00	3600.00		Fail	
1	$\epsilon_{@max}$	%	8.753					
1	$\sigma_{Pt}$	PSI	2390.66					
1	$\epsilon_{Pt}$	%	2.000					
2	$\lambda$	PSI	99631.22					
2	$\sigma_{max}$	PSI	3419.19	3400.00	3600.00		Pass	
2	$\epsilon_{@max}$	%	9.620					
2	$\sigma_{Pt}$	PSI	1738.87					
2	$\epsilon_{Pt}$	%	2.000					
3	$\lambda$	PSI	163496.93					
3	$\sigma_{max}$	PSI	3594.72	3400.00	3600.00		Pass	
3	$\epsilon_{@max}$	%	7.381					
3	$\sigma_{Pt}$	PSI	2636.73					
3	$\epsilon_{Pt}$	%	2.000					

The deviation bargraph displays where the result resides relative to the tolerance range- high or low or within the range. Failed results are displayed in red.

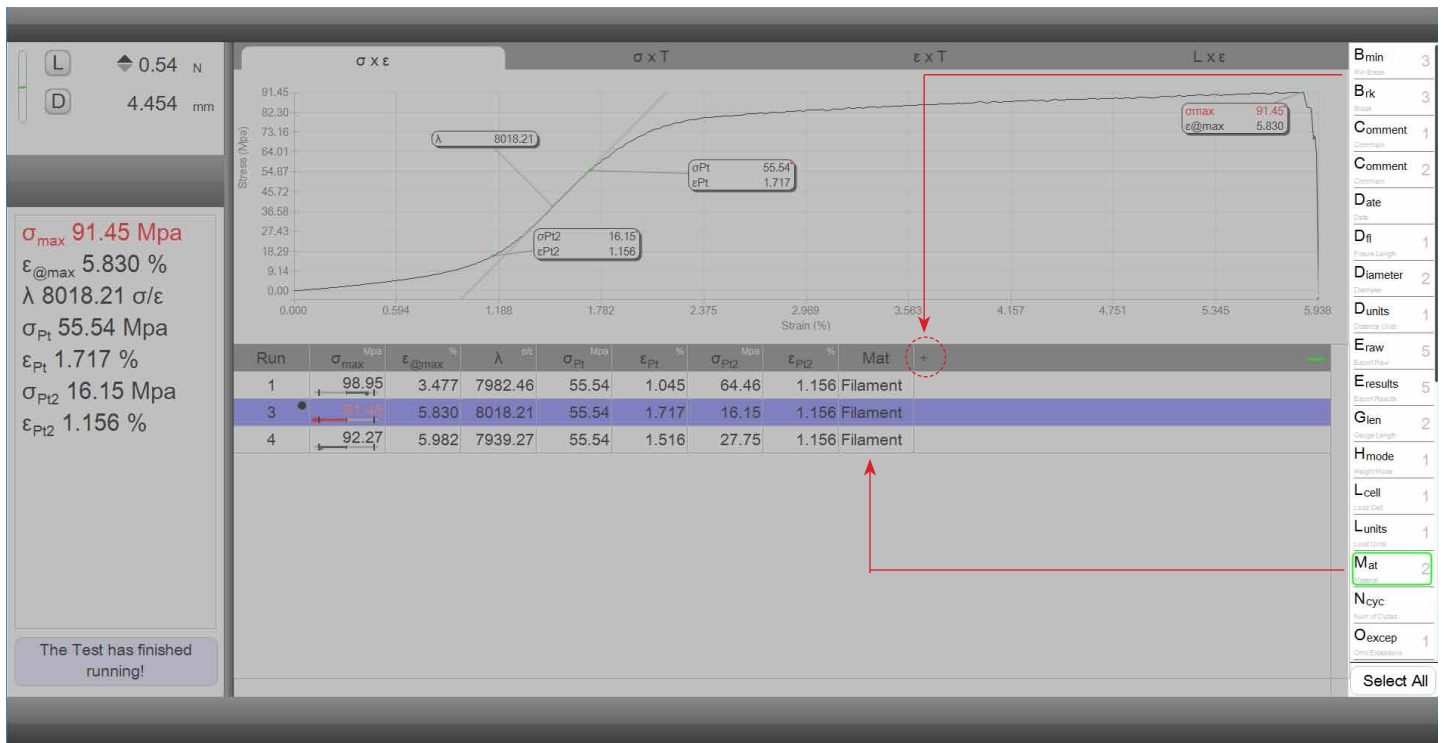
L3 Data view  
Full Tolerance Table

### 2.3.4 Extra Coefficients

L3 software allows certain information to be included in data table views that are not a measured result. From a Data view, the far right column contains a “+” sign. When you press or select this symbol, a list of “extra coefficients” are presented.

Extra coefficients may be useful to include in your Data views. Simply select the coefficient and it will be added to your table. You can move the column or remove the coefficient by selecting or de-selecting from the list of values.

Select the “+” symbol to display extra coefficients that you may include in your data table. These coefficients are generally not a measurement result, but additional information to help identify your test results.



L3 Split Graph-Data Table view  
Displaying Extra Coefficients list of values to include in your table



## 2.4 Exporting Data

Result data may be exported automatically or on-demand using the Share function. Result data may be the results or the raw data of the entire test run from start to completion.

You may also export certain information to the clipboard where it may be pasted into other applications, e.g. Microsoft® Excel®, Word®, etc. And you have the ability to export image files in different formats, again for incorporation into other types of document applications.



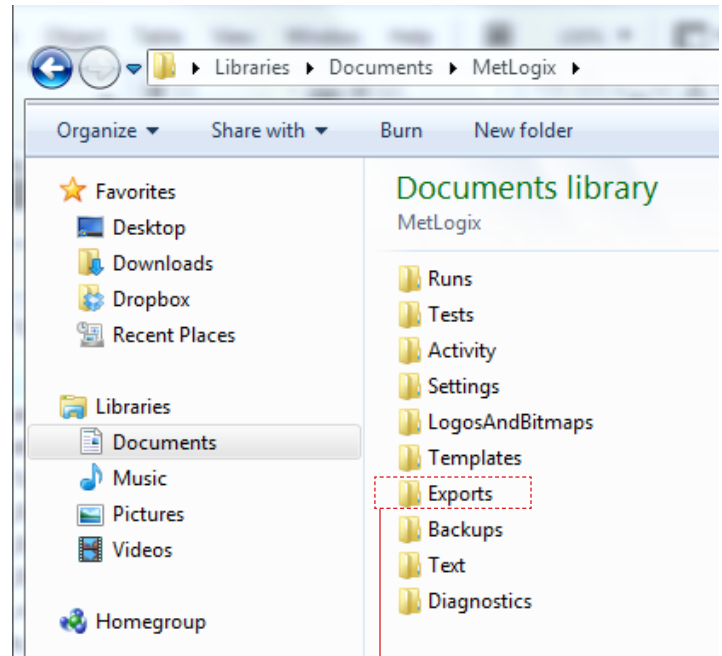
### NOTE

The factory default setting for Sampling Rate (Hz) is 100 (100 samples per second). The sampling rate may be set between 5 and 2000 samples per second. Higher sampling rates are prone to noise, so use care when specifying the rate. In most cases, 100 samples per second is sufficient. Lower sampling at 20-30 Hz is similar to what you would sample at using RS232.

Data and information may also be exported using the Share function. The Share function appears in the footer tool bar. There are four basic share options when you select this symbol:

- .CSV
- Raw Data
- Clipboard
- .BMP Image

L2 Plus Metlogix Directory  
Exported information is saved to the Exports sub-directory



Exports can be saved to the Export sub-directory within the Metlogix directory. Or, you may map the export to a location on your network using the File Settings.

The screenshot shows the 'My Break Test' software interface. On the left, there are control buttons for 'L' (Load) and 'D' (Displacement) with values 0.03 lbf and 0.00 in. Below these are 'Set Home', 'Start Test', and 'Return Home' buttons. A large display shows test results:  $\lambda$  146472.54 PSI,  $\sigma_{max}$  3390.26 PSI,  $\epsilon_{@max}$  8.753 %,  $\sigma_{Pt}$  2390.66 PSI, and  $\epsilon_{Pt}$  2.000 %. A message at the bottom says 'The Test has finished running!'. The main area is a graph of Stress (PSI) vs Strain (%). Below the graph is a table with 3 runs. A share menu is open, showing options: '.CSV', '.BMP', and 'Raw Data'. Red arrows point from the text 'Export Result data', 'Export to clipboard', 'Export Graph image', and 'Export Raw data' to the corresponding options in the share menu.

Run	$\lambda$	PSI	$\sigma_{max}$	PSI	$\epsilon_{@max}$	%	$\epsilon_{Pt}$	%
1	146472.54	3390.26	2390.66	2.000	8.753	2.000	2.000	2.000
2	99631.22	3419.19	3087.87	2.000	9.620	2.000	2.000	2.000
3	163496.93	3594.72	2636.73	2.000	7.380	2.000	2.000	2.000

L3Data Table Standard  
Selected the Export on-demand function (Share)

## .CSV Function

When the .CSV function is selected, the results for the currently shown test run is exported to the Export sub directory in the Metlogix directory.



### NOTE

When .CSV is selected using the Share function, a new file is created for the Export sub directory regardless of how you have configured Export Results in the Post Test step.

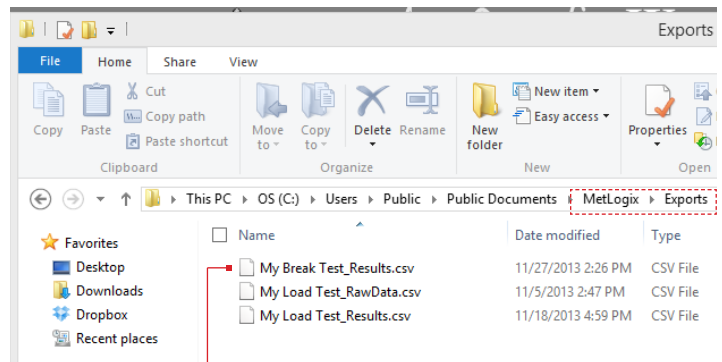
## Raw Data Function

When the Raw Data function is selected using the Share function, a new raw data file is created for the Export sub directory regardless of how you have configured Export Raw in the Post Test step.

## Clipboard Function

When the Clipboard function is selected, the displayed results are copied and saved to a clipboard where they may be pasted into another document, e.g. Word or Excel. The results only are saved.

L3 Metlogix Directory  
Exports being saved to sub-directory called EXPORTS



My Break Test

0.00 lbf  
0.00 in

Set Home **Start Test** Return Home

**λ 146472.54 PSI**

**σ<sub>max</sub> 3390.26 PSI**

**ε<sub>@max</sub> 8.753 %**

**σ<sub>Pt</sub> 2390.66 PSI**

**ε<sub>Pt</sub> 2.000 %**

The Test has finished running!

Run	λ	PSI			
1	146472.54				
2	99631.22	3419.19	9.620	1738.87	2.000
3	163496.93	3594.72	7.381	2636.73	2.000

A message is displayed when an export is being performed. Once the export is completed, the message is removed.

L3 Export Message

Shows data or results are being exported

## 2.4.1 Export Raw Data

Raw data are all of the data points captured during a test run. When you set the Sampling Rate (Hz) in the Pre Test step, you have specified how many data points per second are being sampled and used to generate your graph and other measurements.

When the Export Raw option is enabled, the raw data points for the completed test will be saved as a .csv file and saved to a directory that you designate in the Main Settings option.

- Go to the Main Settings menu.
- Select File Locations.
- Select the Directory where you want your data saved to.



### NOTE

When data is exported, it is exported in a .csv format.

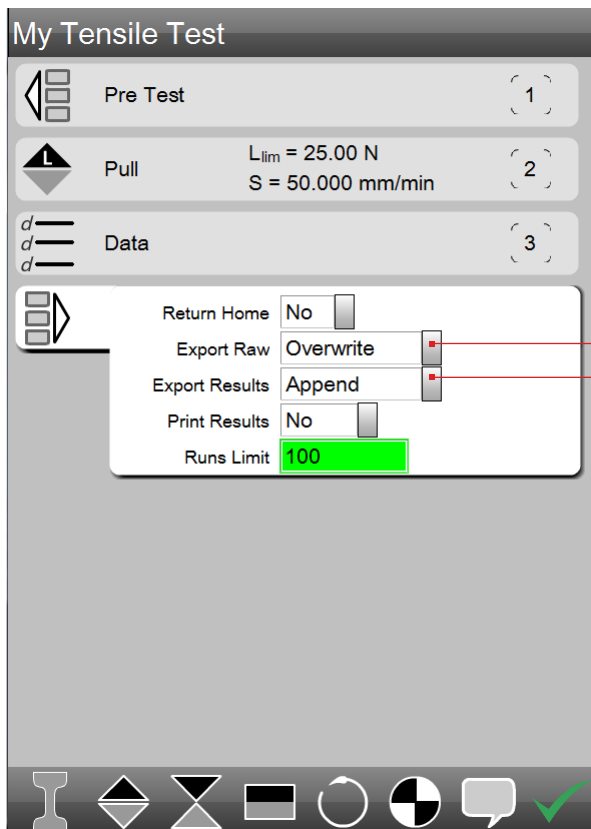


### NOTE

You may export up to 100,000 rows of data. A .csv file is created for each 25,000 rows from your test run. Up to four (4) separate .csv files are created if you are exporting 100,000 rows of data.

*The maximum number of rows for data is 100,000.*

*The maximum number of .csv files created for a test run is four (4).*



L3 Post Test Setup

In the Post Test step of your test setup, you may specify how this data is to be used by defining whether to export or not.

Once you have designated a file location, you have two options on how to transmit the file to the location:

### Overwrite Data

When Export Raw = OVERWRITE, raw data is exported to a .csv file. There is a single file and it includes all the raw data for that test run.



### CAUTION

When Overwrite is specified, all previous raw data for the previous run is over-written- it is permanently replaced by the new data.

### Auto Number Data

When Export Raw = AUTO NUMBER, raw data is exported to a .csv file. Each test run creates a new file and each new file is sequentially numbered for identification.



### NOTE

If you want to maintain the data for all test runs, use Auto Number. A separate file is created for each test run.

step	time	raw load	load	raw distance	distance	xtm	distance used
2	0	48.97 N	0.46 N	48.556 mm	0.091 mm	0 mm	0.091 mm
3	0.109	48.88 N	0.23 N	48.646 mm	0.182 mm	0 mm	0.182 mm
4	0.219	49.11 N	0.55 N	48.738 mm	0.273 mm	0 mm	0.273 mm
5	0.328	48.67 N	0.67 N	48.829 mm	0.364 mm	0 mm	0.364 mm
6	0.437	48.54 N	0.42 N	48.92 mm	0.455 mm	0 mm	0.455 mm
7	0.546	49 N	1.06 N	49.011 mm	0.546 mm	0 mm	0.546 mm
8	0.655	49.33 N	0.57 N	49.101 mm	0.637 mm	0 mm	0.637 mm
9	0.765	49.08 N	0.76 N	49.193 mm	0.728 mm	0 mm	0.728 mm
10	0.874	49.37 N	1.4 N	49.284 mm	0.819 mm	0 mm	0.819 mm
11	0.983	49.46 N	1.01 N	49.375 mm	0.91 mm	0 mm	0.91 mm
12	1.092	49.4 N	1.01 N	49.466 mm	1.001 mm	0 mm	1.001 mm
13	1.201	49.94 N	1.18 N	49.556 mm	1.092 mm	0 mm	1.092 mm
14	1.311	49.48 N	0.63 N	49.648 mm	1.183 mm	0 mm	1.183 mm
15	1.42	49.73 N	1.35 N	49.739 mm	1.274 mm	0 mm	1.274 mm
16	1.529	49.86 N	1.76 N	49.83 mm	1.365 mm	0 mm	1.365 mm
17	1.638	49.82 N	1.28 N	49.921 mm	1.456 mm	0 mm	1.456 mm
18	1.747	49.65 N	2.11 N	50.011 mm	1.547 mm	0 mm	1.547 mm
19	1.857	50.02 N	1.32 N	50.103 mm	1.638 mm	0 mm	1.638 mm
20	1.966	50.17 N	1.91 N	50.194 mm	1.729 mm	0 mm	1.729 mm
21	2.075	50.34 N	2 N	50.285 mm	1.82 mm	0 mm	1.82 mm
22	2.184	50.77 N	1.77 N	50.376 mm	1.911 mm	0 mm	1.911 mm
23	2.293	50.82 N	1.4 N	50.466 mm	2.002 mm	0 mm	2.002 mm
24	2.403	50.42 N	1.95 N	50.556 mm	2.093 mm	0 mm	2.093 mm
25	2.512	50.76 N	1.97 N	50.649 mm	2.184 mm	0 mm	2.184 mm
26	2.621	50.94 N	2.47 N	50.74 mm	2.275 mm	0 mm	2.275 mm
27	2.73	50.65 N	1.88 N	50.831 mm	2.366 mm	0 mm	2.366 mm
28	2.839	51.5 N	3.08 N	50.921 mm	2.457 mm	0 mm	2.457 mm
29	2.949	51.02 N	2.23 N	51.013 mm	2.548 mm	0 mm	2.548 mm
30	3.058	51.01 N	1.79 N	51.104 mm	2.639 mm	0 mm	2.639 mm
31	3.167	51.22 N	2.23 N	51.195 mm	2.73 mm	0 mm	2.73 mm

*Export Raw exports all of the data points from your graph based on the sample rate you set in Pre Test.*

*Export Results exports only the result data.*

Test Id	Run No.	UID	Run	LPT	Limit 1	Limit 2	TPT	LPT2	TPT2
My Tensile	1	13:10:22:1	1	9.44 N	8	12	10 S.s	9.58 N	9.975 S.s
My Tensile	2	13:10:22:1	2	8.38 N	8	12	10 S.s	8.45 N	10.1 S.s
My Tensile	3	13:10:23:1	3	7.95 N	8	12	10 S.s	8.33 N	10.1 S.s

### 2.4.2 Export Results

The Export Results function only exports the actual results data. No raw data is included. For every coefficient in your test, when Export Results is enabled, the results for your coefficients are exported in a .csv format to the File Location you specified in Settings.

The default for Export Results is No- you are not going to automatically export the results. However, you may also specify the following types:

#### Append Result Data

When Export Results = APPEND, results are exported to a .csv file within the Directory you established prior to your test. There is a single file and each result is appended to the file as a new row.

#### Overwrite Result Data

When Export Results = OVERWRITE, results are exported to a .csv file. There is a single file and there is only one row of results. When a new test is completed, the data in the row is replaced with the new data.

#### Auto Number Result Data

When Export Results = AUTO NUMBER, results are exported to a .csv file. Each test result creates a new file and each new file is sequentially numbered for identification.

### 2.4.3 Export to Clipboard

The export to clipboard function may be used to export your results data to an external document. From the current display, when the Share function is selected and then the Clipboard function, the Run number and all results displayed are saved to a clipboard where they may be pasted into another document, e.g. Word, Excel.



**NOTE**

When the clipboard is used, only the results are available for paste.

Test Id	Run No.	UID	Run	Lpt	Limit 1	Limit 2	TPt	LPT2	TPt2	Comment
1	1	13:10:22:1	1	9.44 N	8	12	10 S.s	9.58 N	9.975 S.s	
2	2	13:10:22:1	2	8.38 N	8	12	10 S.s	8.45 N	10.1 S.s	
3	3	13:10:23:1	3	7.95 N	8	12	10 S.s	8.33 N	10.1 S.s	

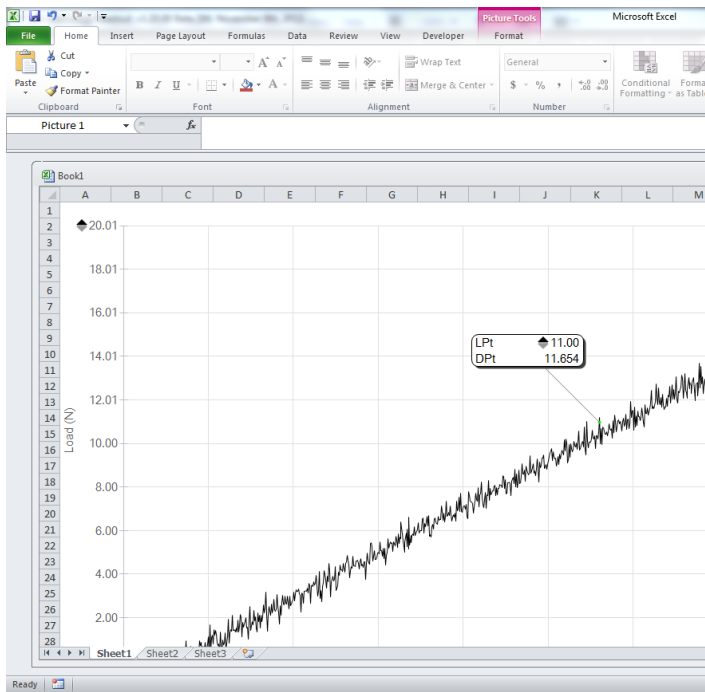
Excel Spreadsheet created from Export Result .csv file

## 2.4.4 Export Image

You can export an image of the currently displayed view using the Share function. The image is saved as a bitmap (.bmp) and applies to any views with a graph.

When you export an image using the Share function, a .bmp image file is created and sent to a “clipboard” where you may paste the image into another document, e.g. Microsoft Word or Excel.

The .bmp image you create is not saved in a directory.



L3  
Bitmap pasted into Excel

## 2.5 Navigation Tools

L3 software is designed to allow you to achieve maximum results through an array of graphic analysis tools. The software is optimized around touchscreen navigation, allowing you to touch the function you desire and get immediate results. Lists of values, touch targets, combo buttons, pinch zoom, panning, text blocks, tabs, etc. are all supported within your L3 software.

In addition to touchscreen navigation, L3 software may also be used with mouse and keyboard navigation as well.

### 2.5.1 Touchscreen Gestures

L3 software is optimized for touchscreen operation. Large touch targets are used to make selection precise and easy. Plus, all common types of touchscreen gestures are supported.

Gesture	How to perform	Description
Tap	Touch/tap the item you are interested in; can be a list of values; graphic analysis tool, view format, etc.	Most common method for selecting an item using touchscreen gestures.
Press and Hold	Press and hold does the same thing as right-clicking an item with a mouse.	To perform the action, touch the screen where you want to right-click, hold until a complete circle appears, and then lift your finger. The shortcut menu appears after you lift your finger.
Pan	Touch and drag with either one or two fingers	Use panning to see another part of a view that has scroll bars. For example, you can pan to see part of a long graph trace that doesn't appear in the window.
Zoom	To zoom out, touch two points on the item, and then move your fingers toward each other, as if you're pinching them together. To zoom in, touch two points on the item, and then move your fingers away from each other, as if you're stretching them apart.	Use zooming to make an item on the screen larger or smaller. With a graph trace, zooming in shows a smaller area in more detail; zooming out shows a larger area.
Window Shade	Increased or decreases the size of a Window.	Used in the Controller view. Lets you increase or decrease the Controller view- more room in results area and less room in Controller area.

L3 Touchscreen Gestures

### 2.5.1.1 Touch Targets

Touch targets are used throughout your L3 software. Targets are generally defined as tabs or pads, however, other forms are also used. For example, you can select a row in the Data view to view the graph of the selected run. Selecting a marker will open the Data Definition menu for the coefficients displayed in the marker. Text blocks are used, and when touched, allow you enter alpha and numeric characters.



**NOTE**

When a graph is displayed, you may touch above or below the graph when using certain tools to achieve a result. For example, if you use the Min/Max/Avg tool to find the maximum load, select the tool then select anywhere above the graph trace. The marker for Lmax will displayed at the point equal to the maximum load.

### 2.5.1.2 Panning

Panning is used in the graph views. Panning only operates when the graph has been made larger using the zoom function. This is because all graphs are automatically scaled to full view.

When the zoom function is used to increase the resolution of the graph and to magnify a particular area of the graph, scroll bars appear on both the y-axis and x-axis. You may pan the graph by operating these scroll bars, either by touch or using a mouse.

### 2.5.1.3 Pinch Zoom

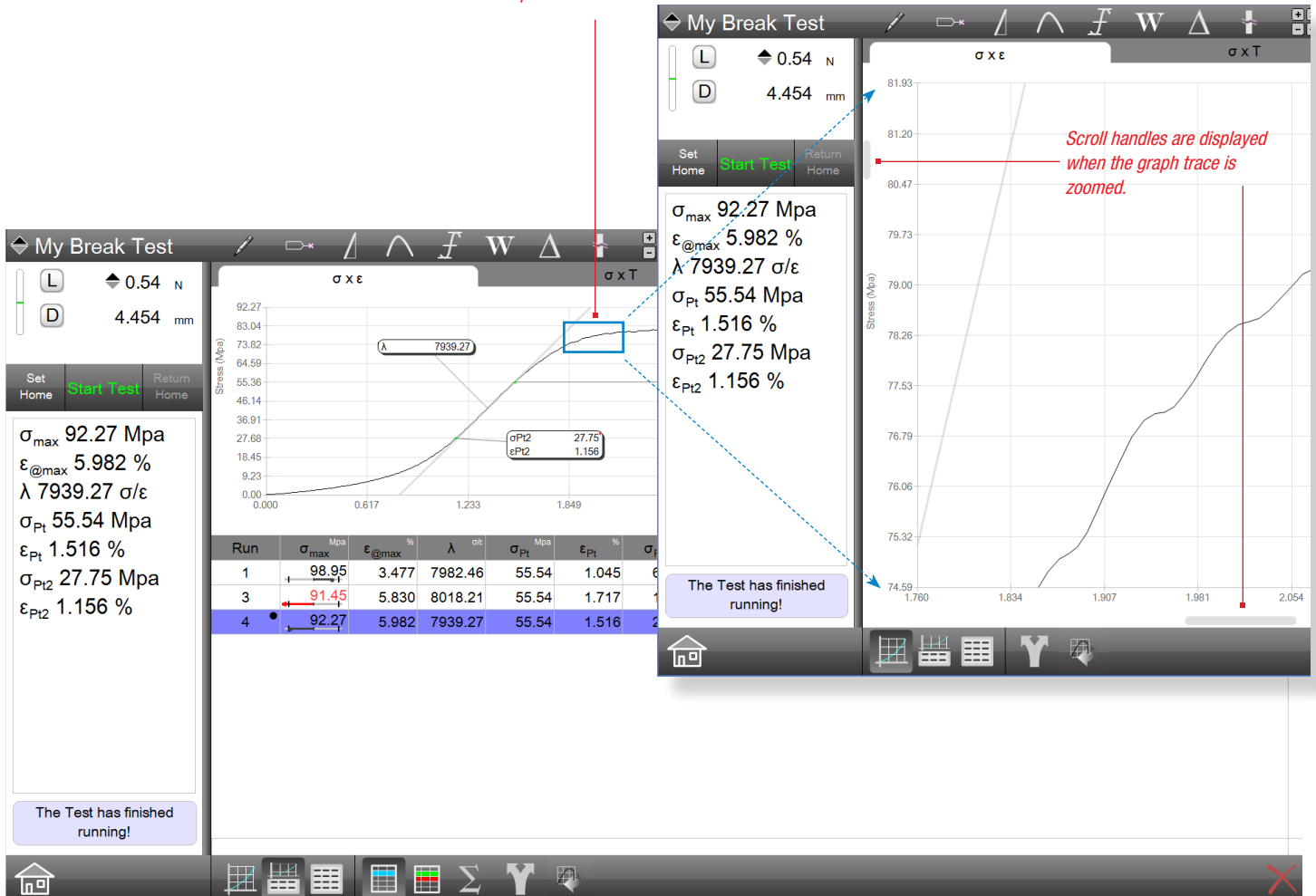
You may zoom and enlarge a graph trace by using two fingers to frame the area to zoom and then moving your fingers apart as you touch the screen of your L3 workstation.



**NOTE**

To return the graph trace size to its original shape, simple double tap the graph view.

*Zoom using your fingers or the mouse on the trace or on a point on the trace.*

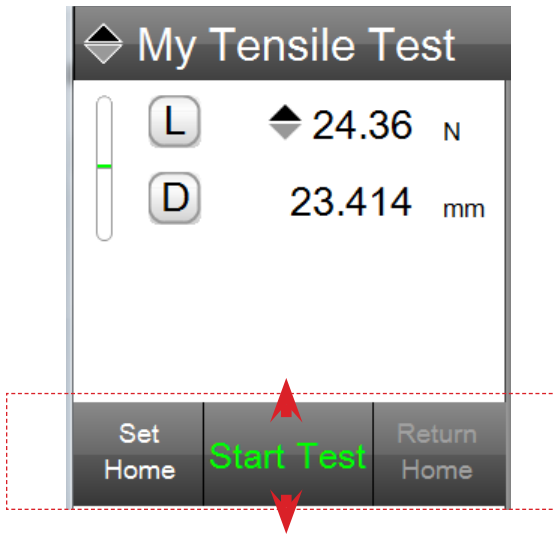


L3 Graph trace being “zoomed”

## 2.5.1.4 Window Shading

The Controller view has the only window shading function. This allows you to increase or decrease with viewable area in both the Controller and Results view sections.

To increase/decrease the viewable area, select the separation bar and slide the bar up/down.



Window Shading  
Expand or decrease a window are by adjusting the bars

## 2.5.2 Mouse Navigation

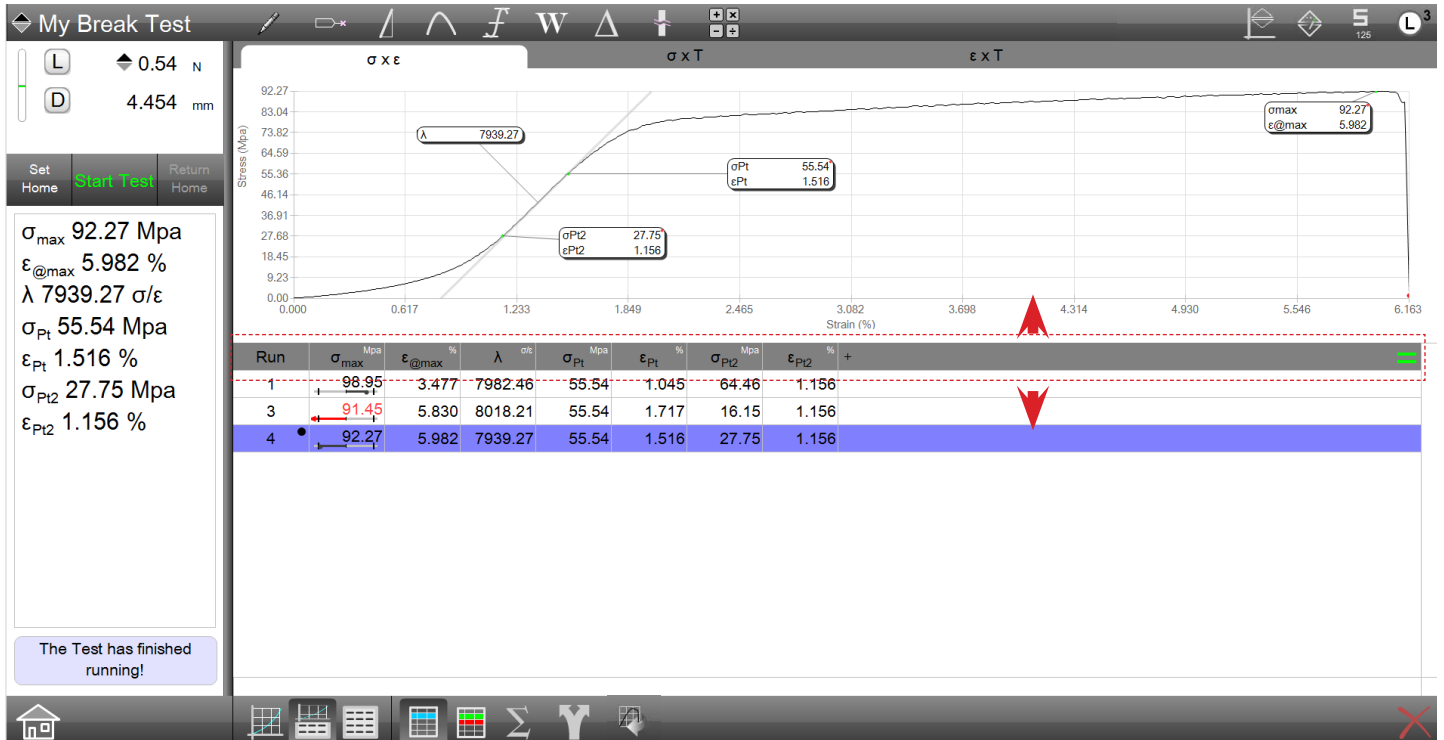
Mouse navigation may also be used to navigate through your L3 software. You may use a mouse exclusively or use a mouse with touchscreen navigation.

### 2.5.2.1 Mouse Up/Down

Use the mouse up/down key to scroll up/down within a view. In a graph view, using the up/down key increases/decreases the graph size.

### 2.5.2.2 Marquee Selection

Use the mouse to draw a marquee box which serves to zoom the area within the box. When a marquee box is used to zoom, the graph trace within the marquee may be zoomed larger or smaller.



Window Shading  
Window separators may be moved to adjust Window Size

### 2.5.2.3 Point Zoom

Point zoom is a unique function available when using a mouse. Point zoom allows you to select a specific point on the graph trace. Once this point is latched, you can then use the mouse up/down function to zoom based on that particular point.

### 2.5.3 Keyboard Entry

A USB or wireless keyboard may be used to enter alpha and numeric characters.

### 2.5.3.1 Text Length Rules

The following table shows the text character limits for various text blocks used within L3 software.



**NOTE**  
A space occupies one character.



**NOTE**  
Text may only use alpha and numeric characters. Punctuation characters, may not be used.

Text Block Location	Maximum Character Length (including spaces)
Test Name	24 characters
Sample Material Name	12 characters
Batch Name	16 characters
Coefficient Name	16 characters

*Text Length Rules*



*Zoom to a Graph Point*

*Use the mouse and marquee around a point on your graph for greater resolution*





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