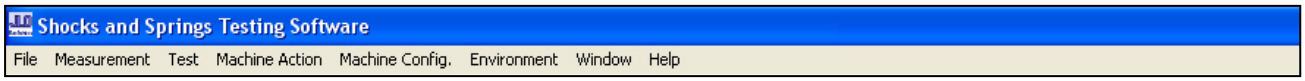
PRONELLO

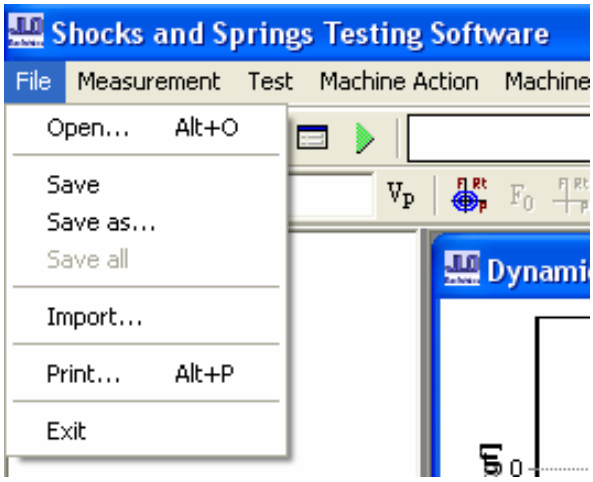
SOFTWARE
OPERATION HANDBOOK

Chapter 1

MENU BAR



1-1- File



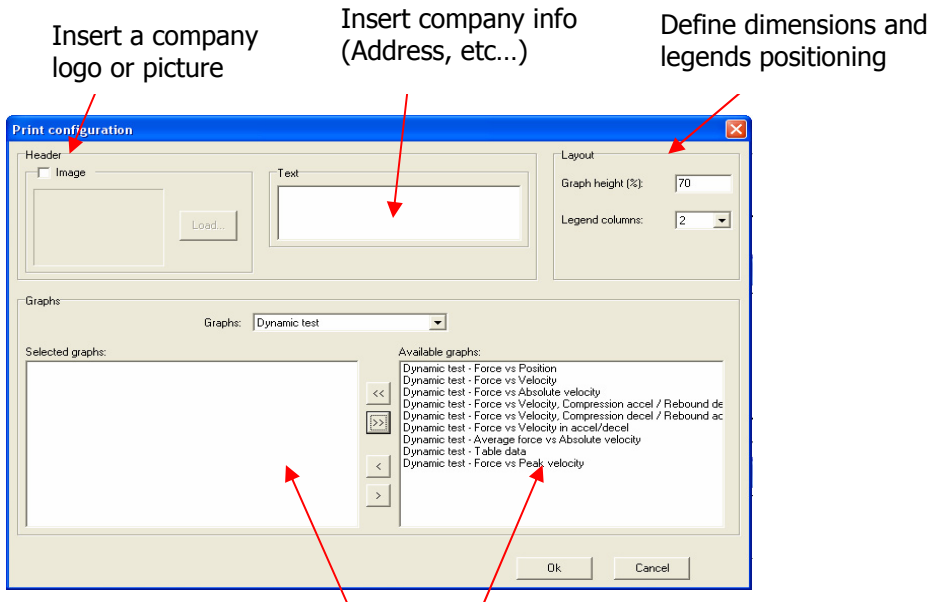
1-1-1-Open [Alt + O]: (Also see #1 button in the Command Bar – Chapter 2)
To open a test file, they appear in the presentation tree.

1-1-2-Save: (Also see #2 button in the Command Bar – Chapter 2)
To save a test file.

1-1-3-Save as: (Also see #2 button in the Command Bar – Chapter 2)
To save a test file with a different name.

1-1-4-Import:
To import a file in XML format.

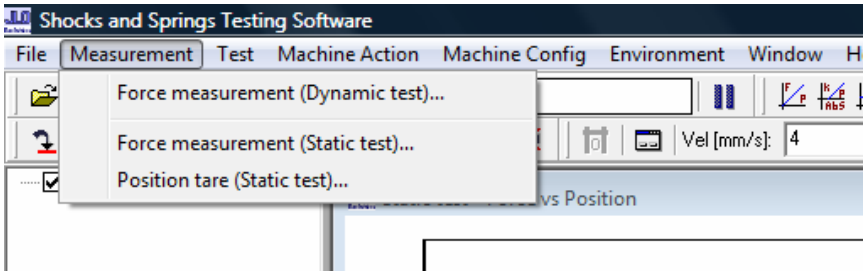
1-1-5-Print [Alt + P]: (Also see #4 button in the Command Bar – Chapter 2)
To print graphs or tables.



Move the graphs you would like to print from the Available column to the Selected. Tests that are hidden in the graph view will not be printed.

1-1-6-Exit: To quit the program.

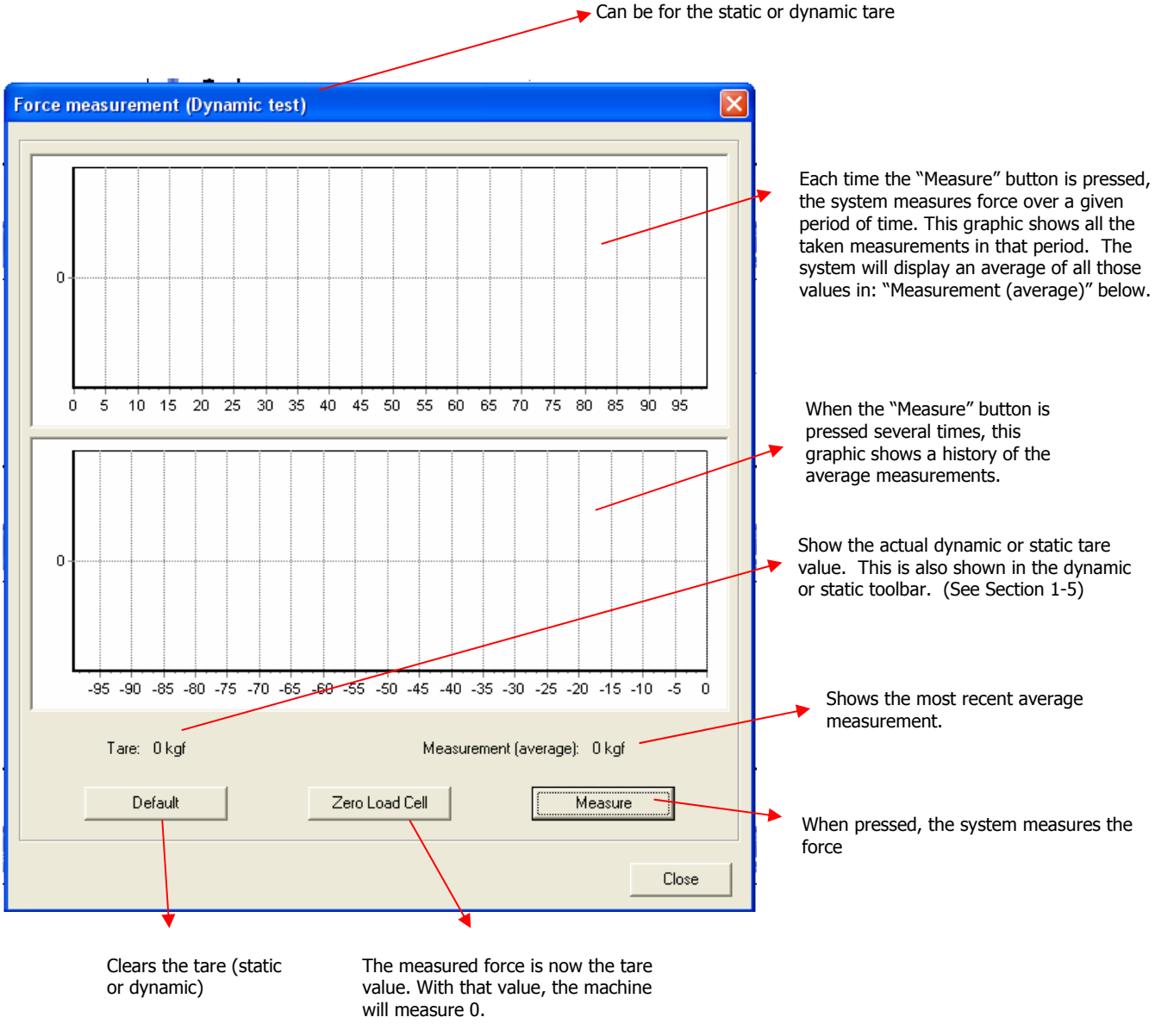
1-2- Measurement



1-2-1-Force measurement:

Dynamic Test = Sine wave test as used for testing a damper.
Static Test = Linear test as used for rating a coil spring.

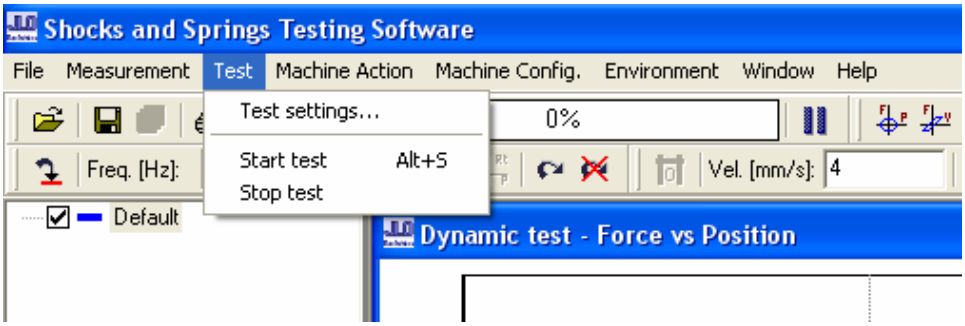
The user can configure two different tare values that correspond to either the Dynamic or Static test setup. This enables the user to switch between the two test types without having to change the force calibration to compensate for the difference in mounting hardware.



1-2-2-Position tare (Static Test):

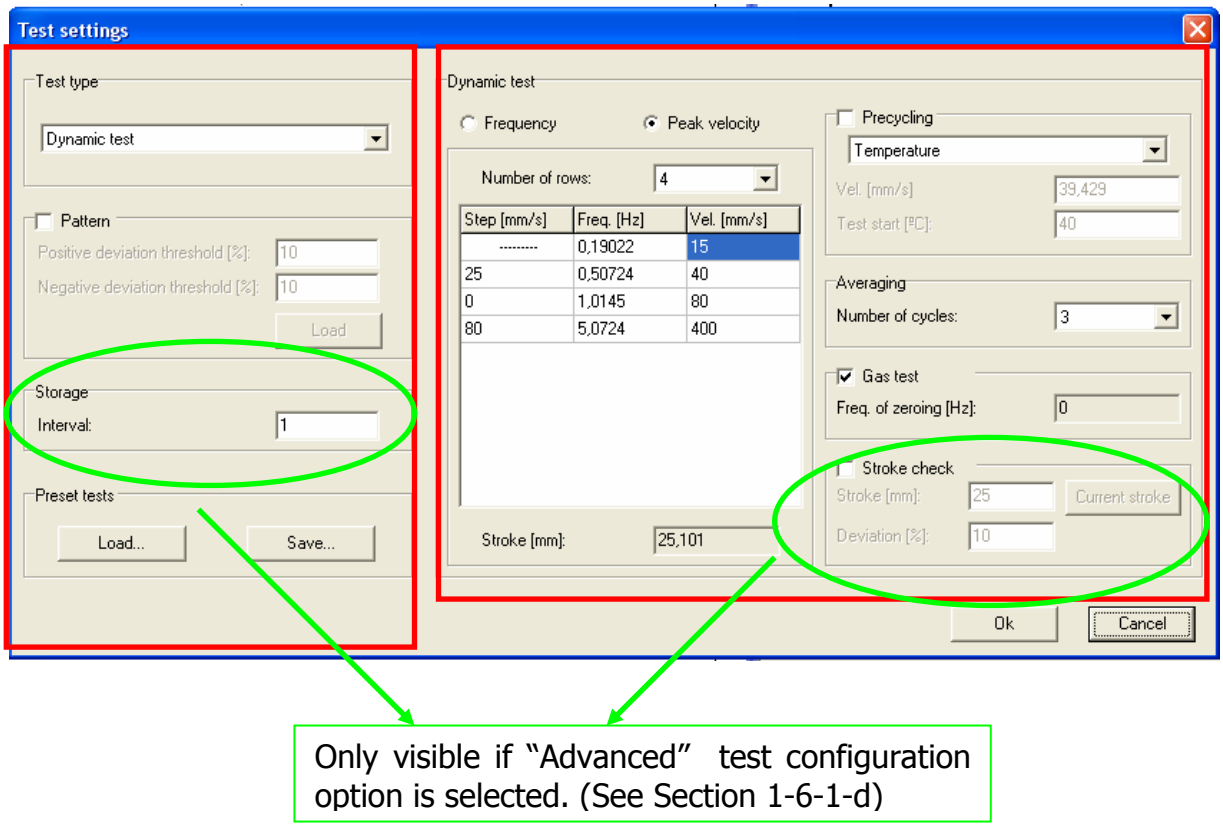
When absolute position is enabled (see section 1-5-1-b), Position tare allows the user to change the position that is referenced as the zero point. For example, if the end-of-stroke switch is at the top of the machine, but the user wants to have the zero position at another point in the stroke, the tare is the distance between the end-of-stroke switch and the desired zero point.

1-3- Test



1-3-1-Test settings (Also see #5 button in the Command Bar – Chapter 2)

Here the user defines the testing conditions for the Default test.



Only visible if "Advanced" test configuration option is selected. (See Section 1-6-1-d)

1-3-1-a-Test Type:

Choose between Dynamic or Static test.

1-3-1-b-Pattern:

When checked, you can load a test file to use as a pattern to compare with new runs. The test parameters will automatically update to the parameters of the pattern file, and are unchangeable. The user must insert the allowed % of deviation in the upper / lower limits that accepted tests may have from the pattern file. In Dynamic tests, the comparison is performed with velocity vs. force and in Static tests, with position vs. force.

1-3-1-c-Storage:

Only visible if "Advanced" test configuration option is selected. (See Section 1-6-1-d)

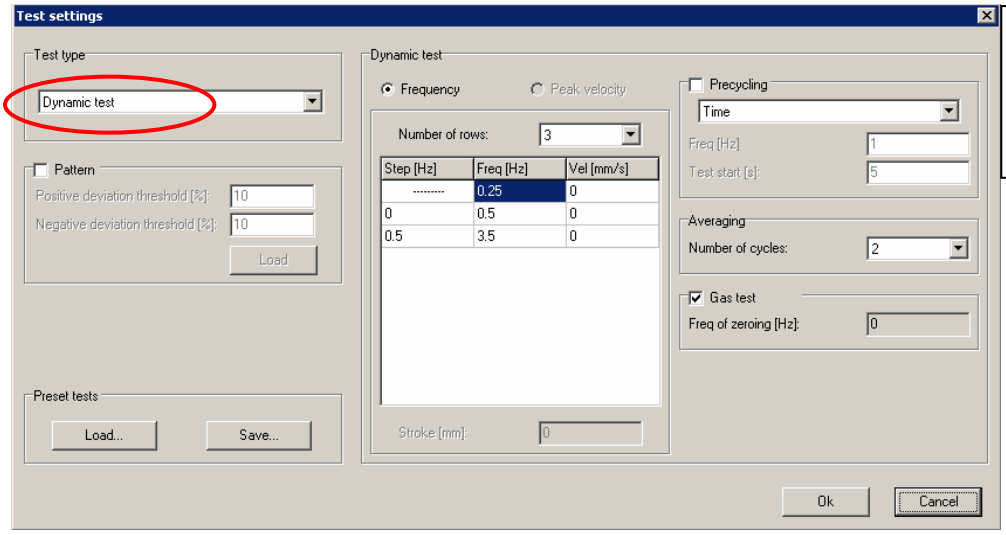
In order to conserve storage space, you can set the interval of performed tests to save. This means that if you choose an interval of 2, for example, the program will save tests number 1, 3, 5, 7. From the other tests (2, 4, …), the program will keep only the deviation value and the time they were performed for statistic purposes. It will also save tests that do not pass the deviation % independent of the configured interval storage.

1-3-1-d-Preset tests:

You can load & save test configurations. For example, configure a test that you would like to run after every race event. Next, choose Save under Preset Tests and name the file "Post Race". This file now holds the configuration that you just set. You can recall this configuration at any time by loading the "Post Race" file. Alternatively, you can load any previous test file, and the configuration from that test file will be automatically set as the current Default configuration.

WARNING: When loading a new configuration, if the stroke of the loaded configuration is different than the current stroke setting, this will have to be changed manually. See the document: "TM-M010-eng-Stroke change Dino …" where those "**" characters depend on your Dino Model.**

1-3-1-e1- DYNAMIC TEST: (See Section 1-3-1-a-Test Type)



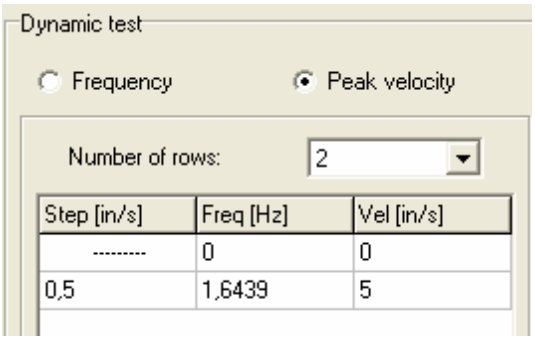
DYNAMIC test Configuration window

The user can configure the test using inputs of frequency or peak velocity; both tests are configured in the same manor.

The user defines the velocity/frequency that the system will use as reference points. The user can then configure an incremental step between every pair of references.
With a right click on the grid, the user can delete or insert rows at any place.

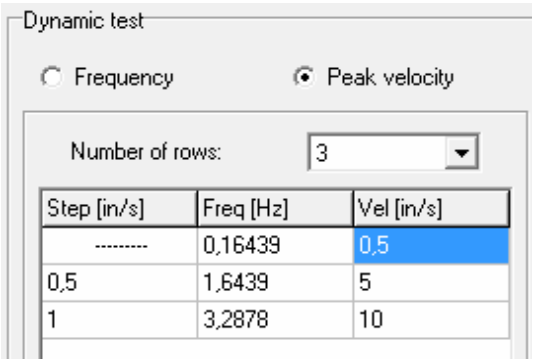
Example #1:
To make a simple test with at a peak velocity of 5 in/s, set the number of rows to 1 and enter 5.00 in the Vel [in/s] column.

Example #2:
The user can also make a test that collects data at multiple peak velocities, i.e. .5in/s to 5.0in/s in .5in/s steps. For this example, set the number of rows to 2. Enter the starting velocity on the first line, .5. Next, on the second line, enter the Step value of .5. Finally, on line 2, enter the ending velocity, 5.



This tells the system to begin the test at .5 in/s and to make a test every .5 in/s up to a maximum of 5 in/s.

Example #3:
To build on the test in Example #2, but take it up to 10 in/s in 1in/s steps, configure the test as follows.



This tells the system to begin the test at .5 in/s and to make a test every .5 in/s up to 5 in/s, then continue in 1 in/s steps up to 10 in/s.

Using up to 10 reference lines, you can build a test in any arrangement you desire.

Pre-cycling:
If checked, the user can choose 3 pre-cycling strategies.

- *Cycles:* Pre-cycle up to a quantity of cycles at a frequency or velocity.

- *Time:* Pre-cycle for a defined amount of time at a frequency or velocity.

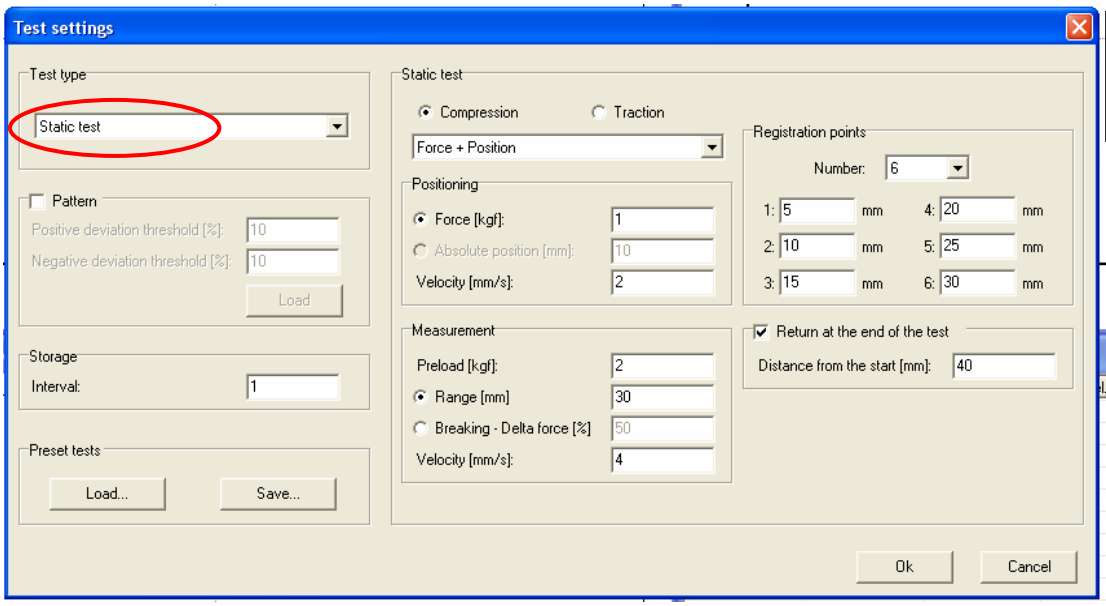
-*Temperature:* Pre-cycle until certain temperature is reached (temperature module is needed) at a frequency or velocity.

Averaging:
Quantity of cycles the system will average at each frequency.

Gas test:
If this option is checked, the test will run with the automatic zero strategy configured in the "Machine Parameters" menu (See Section 1-5-1) and shown here.

Stroke check:
Only visible if "Advanced" test configuration option is selected. (See Section 1-6-1-d)
If this option is checked, the system will record the machine stroke and the allowed deviation % as a part of the test configuration. So if later, the user wants to add tests to this file, it will be allowed only if the machines actual stroke is inside the allowed deviation. For most tests configurations, that will remain unchecked.

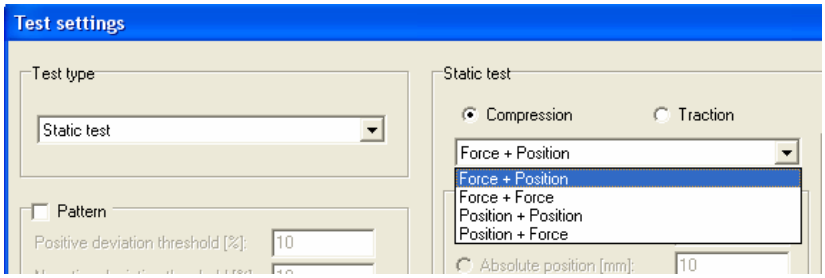
1-3-1-e2- STATIC TEST: (See Section 1-3-1-a-Test Type)



STATIC test Configuration window

Type of test
Choose between Compression or Traction test.

Type of variables to control
Choose the variables used to configure the test:



- *Force+ position*

The user must select a preload force and the test displacement limit.
For example: 25lb for preload and a test up to 1inch.

- *Force+ force*

The user must select a preload force and the test force limit.
For example: 25lb for preload and a test up to 100lb.

- *Position+ position*

The user must select a preload displacement and the test displacement limit.
For example: 1inch for preload and a test up to 2inches.

- *Position + force*

The user must select a preload displacement and the test force limit.
For example: 1inch for preload and a test up to 100lb.

Configure the variables

Positioning force - The force that when reached, begins the test. (This is not the preload amount. This is the trigger to begin the preload movement.)

Absolute position - If the absolute position option is enabled, the test will start when the motorized crossbar reaches a certain position instead of a certain force.

Positioning velocity - The velocity the machine will move with until the positioning force or absolute position is reached.

Measurement Preload – Set the amount of preload. (The units will change in accordance with the type of variables that are set to be controlled.)

Measurement Range - Set the range of the test. (The units will change in accordance with the type of variables that are set to be controlled.)

Breaking Delta Force [%] – The end of the test can be configured by the breaking force instead of ending at a determined stroke or force value. The test will be performed until the force drops to the configured %. Used in tests where the end occurs when the specimen breaks.

Test velocity - The velocity the machine will move with during the test.

WARNING: BE SURE THE VARIABLES ENTERED COOROSPOND WITH THE UNITS SELECTED.

Register Points:
From 1 to 6 the user can configure points to record and keep them for a table analysis. This table will be shown when: the file information window is selected, a test report is exported or when the test file is printed.

Return at the end of the test:
If checked, the machine will return to the position that the positioning force was reached, plus the distance inputed at "Distance from the start". This lets the user change the tested piece comfortably.

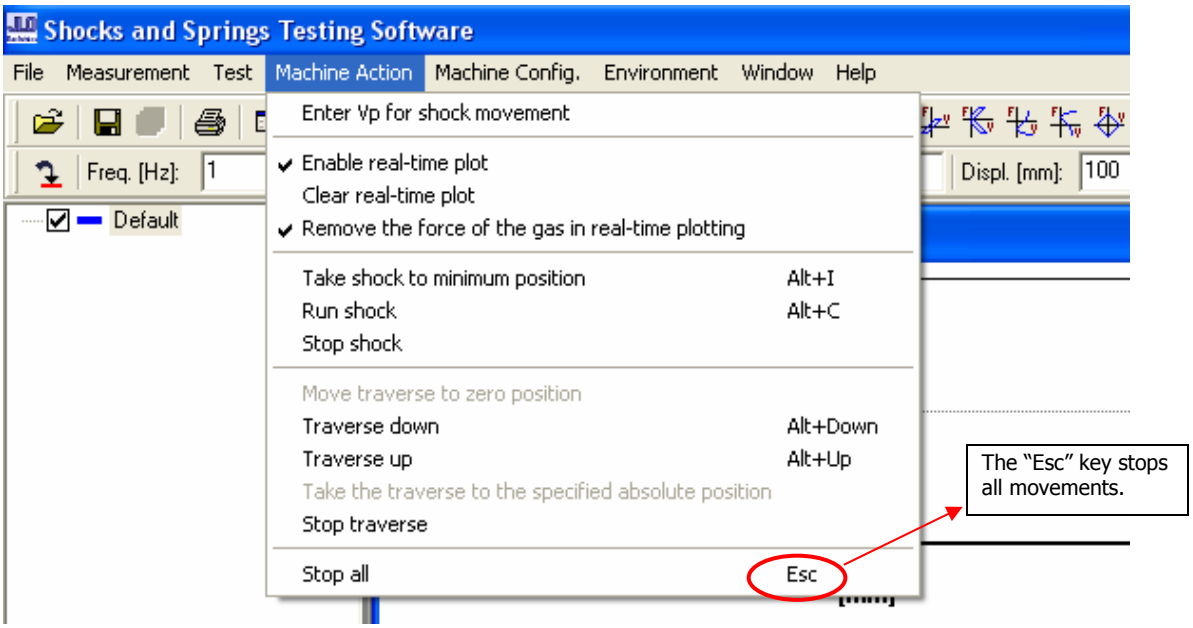
1-3-2-Start Test (Also see #6 button in the Command Bar – Chapter 2)

1-3-3-Stop Test (Also see #8 button in the Command Bar – Chapter 2)

Will stop the test and return to the lowest point.

1-4- Machine Action:

This menu is used to operate the machine directly, without the use of a configured test. Operating the machine in this manor will not result in data that is able to be saved. You can however, view the data in real-time graphs.



1-4-1- Enter Vp for shock movement. (Also see #12 button in the Command Bar – Chapter 2)

If checked, lets the user cycle the shock absorber at a specified peak velocity. If unchecked, the user must specify a frequency.

1-4-2- Enable real-time plot. (Also see #13 button in the Command Bar – Chapter 2)

If checked, enables real time plot. To view specific graphs in real time plot see Section 1-6-1-e3.

1-4-3- Clear real-time plot. (Also see #15 button in the Command Bar – Chapter 2)

Clears the graph area in the real time plot.

1-4-4- Remove the force of the gas in real-time plotting. (Also see #14 button in the Command Bar – Chapter 2)

If checked, the real-time plot will run with the automatic zero strategy configured in the "Machine Parameters" menu (See Section 1-5-1)

1-4-5- Take shock to minimum position [Alt + I]. (Also see #10 button in the Command Bar – Chapter 2)

Returns the machine to the lowest point.

1-4-6- Run shock:

Runs the machine at the specified frequency or velocity. **(See #11 in the Command Bar – Chapter 2)**

1-4-7- Stop shock

Will stop the machine and return to the lowest point.

1-4-8- Move load cell crossbar to zero position.
This appears if the absolute position is checked.

1-4-9- Load cell crossbar down [Alt + Down]:
moves the load cell crossbar down. The velocity and distance of the movement can be configured by the user in the static command bar.

1-4-10- Load cell crossbar up [Alt + Up]:
moves the load cell crossbar up. The velocity and distance of the movement can be configured by the user in the static command bar.

1-4-11- Take the load cell crossbar to the specified absolute position:
moves the load cell crossbar up or down, up to certain absolute position (configured by the user in the static command bar) from the zero position. Consider the user absolute position configured tare at "1-2-2-Position tare".

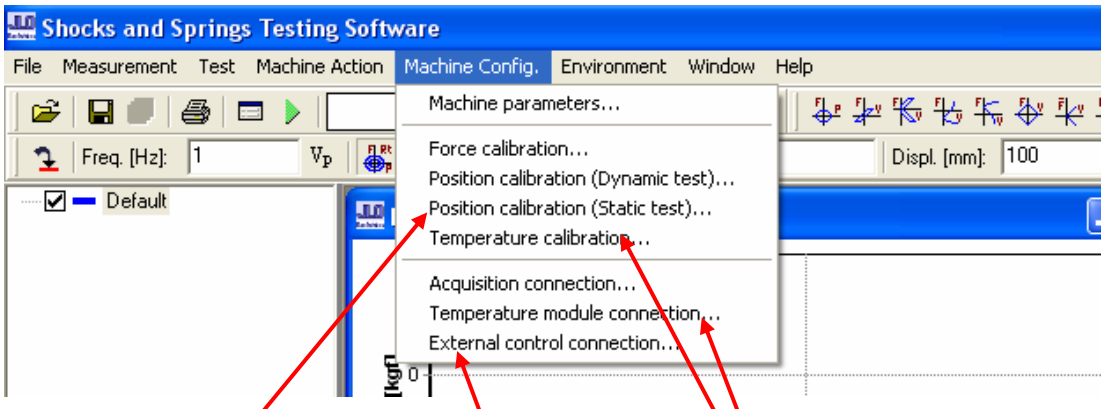
1-4-12- Stop load cell crossbar:

1-4-13- Stop all [Esc]:

WARNING: STOPPING A TEST WITH THE ESC BUTTON WILL NOT RETURN THE MACHINE TO THE LOWEST POINT. YOU MUST DO THIS MANUALLY. See 1-4-5 above.

1-5- Machine Config.:

This menu allows the user to set up the machine calibration factors and parameters.

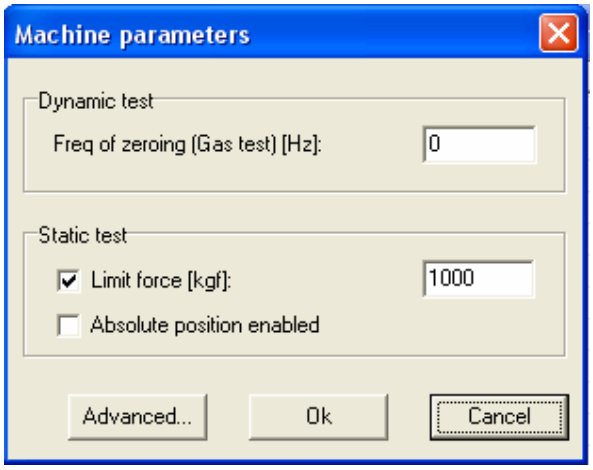


Only shown if the "Static Test" is enabled from: Environment – Settings – Advanced

Only shown if the "External control" is enabled from: Environment – Settings – Advanced

Only shown if the "Temperature module" is enabled from: Environment – Settings – Advanced

1-5-1- Machine parameters:



1-5-1-a- Dynamic Test

Frequency of zeroing (Gas test): Is the frequency in which the gas test is performed.

1-5-1-b- Static Test

Limit force: Maximum force allowed. If the machine reaches this force, all movement will stop.

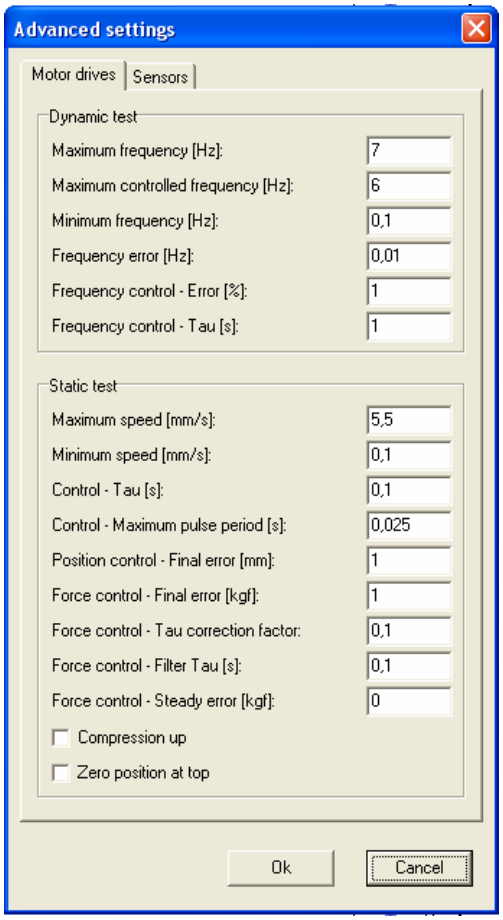
Absolute position enabled

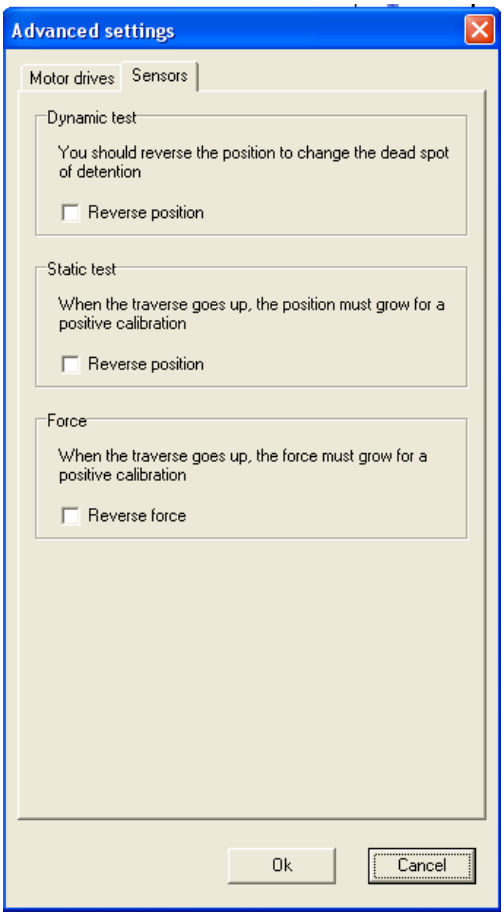
For this option, the machine must have an end-of-stroke switch connected to the acquisition system. Every time the machine is turned on, it will move to the end-of-stroke position and use this as the absolute zero position. With this option, the user can create tests using the absolute position reference. (See section 1-2-2-Position Tare)

In advanced, other options are available:

It is not advisable to change these options.
When users install the software, provided with the machine, all these parameters are configured automatically.

Also a calibration page is included in the CD installation.





MOTOR DRIVES

1-5-1-c- Dynamic Test

Maximum frequency [Hz]:
Is the maximum frequency for the AC Drive.

Maximum controlled frequency [Hz]:
Maximum frequency at which the software will allow the shock cycling.

Minimum frequency [Hz]:
Minimum frequency at which the software will allow the shock cycling.

Frequency error [Hz]:
The +/- absolute error that the program will allow for every test configured by frequency.

Frequency control – Error [%]:
The % of error that the program will allow for every test configured by frequency.

The total Frequency error is composed as:
“Frequency error [Hz]” + “Frequency control - Error [%]”

Frequency control – Tau [seg]:
Time constant of the frequency controller

1-5-1-d- Static test

Maximum speed [mm/s]:
Is the maximum velocity that the software will allow the load cell crossbar to move.

Minimum speed [mm/s]:
Is the minimum velocity that the software will allow the load cell crossbar to move.

Control Tau [seg]:
Time constant of the position-force controller

Control – Maximum pulse period [seg]:
This value limits the minimum velocity used by the controller.

Position control - Final error [mm]:
Is the error at which the control will position the motorized load cell crossbar.

Force control - Final error [Kgf]:
Is the error at which the control will position the motorized load cell crossbar, until the specified force is reached.

Force control – Tau correction factor:
Correction factor of the Tau Force, calculated from the relation force vs position.

Force control – Filter Tau [seg]:
Time constant for the Tau filtering of the force calculated from the relation force vs position.

Force control – Steady error [Kgf]:
Is the minimum final error value of the force controller.

Compression up:
Indicates the direction of compression. If checked, the machine makes a compression stroke when the motorized load cell crossbar moves up.

Zero position at top:
Indicates the position of zero force. If checked, this position is at the top.

SENSORS

1-5-1-e- Dynamic test

Reverse position:
Depending of the machine model, the encoder changes its position and you need to invert it. **I**f the dead spot of detention is not in the lowest position, you must check this option.

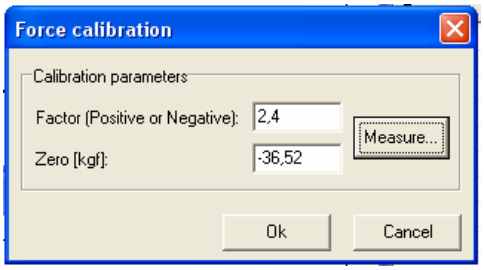
1-5-1-f- Static test

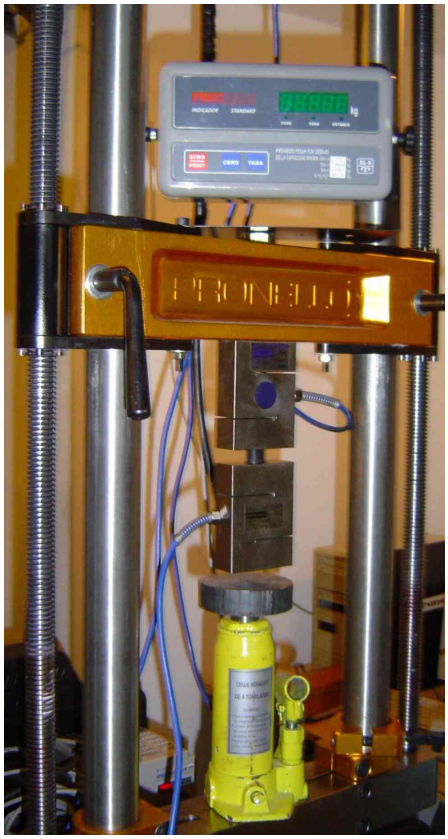
Reverse position:
When the load cell crossbar goes up, the position must increase for a positive calibration factor, it's necessary for the correct the data acquisition.

1-5-1-g- Force:

When the load cell crossbar goes up, the force must increase for a positive calibration factor. Otherwise the Limit force setting will not work and damage to the machine can occur. (See section 1-5-1)

1-5-2- Force calibration: These values are specified on the calibration page that is included with each machine.





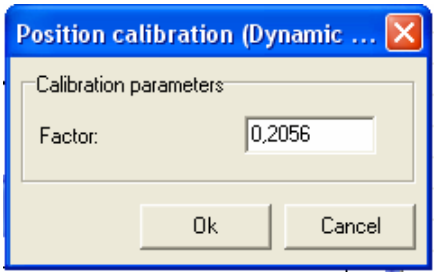
Factor (Positive or Negative):
Determines the scale factor of the force measurement.

Absolute zero:
Determines the scale offset of the force measurement.

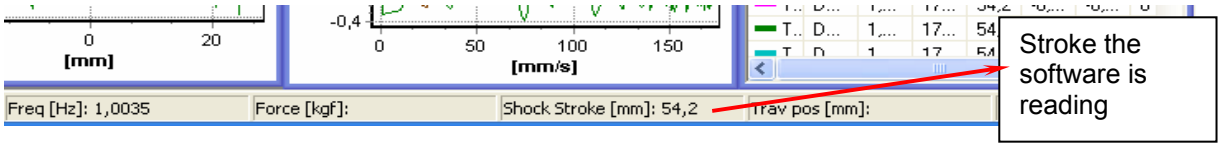
Measure: See section 1-2-1-Force measurement.

Factory calibration should be checked every two years, against another calibrated load cell with a display, like shown in the picture.

1-5-3- Position calibration (Dynamic Test): This value is specified on the calibration page that is included with each machine.



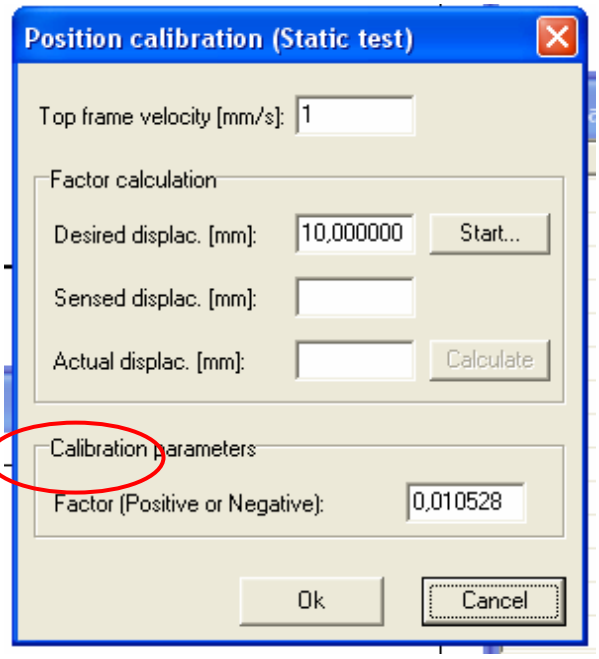
Recalibration is not usually required.
To recalibrate, the user must precisely measure the machine stroke, also write down the stroke the software is reading, and calculate the corrected factor as follows:
Corrected factor = Measured stroke * actual factor / stroke the software is reading



1-5-4- Position Calibration (Static Test): This value is specified on the calibration page that is included with each machine.

If recalibration is needed, follow these steps.

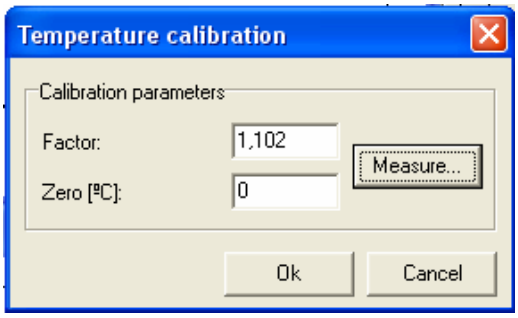
1. Enter a velocity for the load cell crossbar during the calibration.
2. Enter a desired distance for which to carry out the calibration.
3. Make an accurate measurement to later determine the ACTUAL displacement of the crossbar.
4. Press Start.
5. After the calibration has run, the computer will display the Sensed Displacement.
6. Enter the ACTUAL displacement as physically measured on the machine.
7. Press Calculate



1-5-5- Temperature calibration:

Only shown if the "Temperature module" is enabled from:
Environment – Settings – Advanced

This value is specified on the calibration page that is included with each machine.

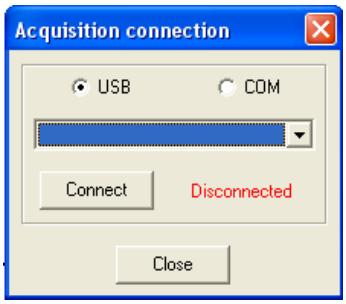


Only shown if the "Temperature module" is enabled from: Environment – Settings – Advanced

Factor:
Determines the scale factor

Absolute zero:
Determines the scale offset

1-5-5- Acquisition connection:



The type of connection must be marked based on the machine cable connection.
In case the machine has a series port (RS232), the user must test thru the different pc ports until one where the connection runs correctly (notice: "connected" in green color). Or check the port at the Device Manager from the PC Windows System.
If the pc or notebook does not have the RS232 plug, an adapter Serie RS232 to USB port must be used. This adapter always needs the corresponding drivers, which must be installed.
In machines with USB cable connection, the first time you plug the machine, the computer will ask to install the USB drivers which are in the delivered CD.

1-5-6- Temperature module connection:

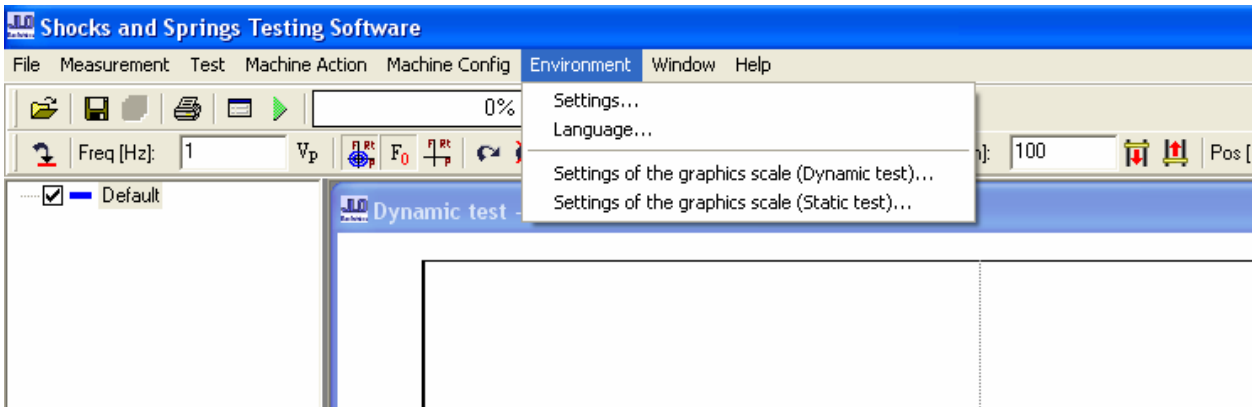
This must be connected if the user checks the "Temperature module enabled" option from **Environment – Settings – Advanced.**

1-5-7- External control connection:

This must be connected if the user checks the "External control enabled" option from **Environment – Settings – Advanced.**

1-6- Environment:

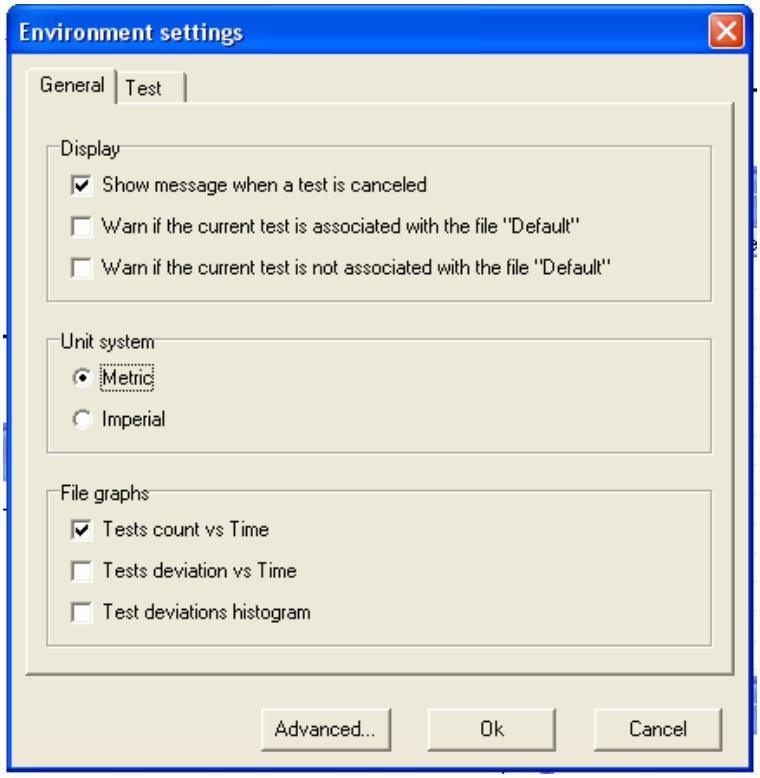
This menu controls the way the software looks and how it presents data.



1-6-1- Settings:

Depending on the user needs and the machine configuration, the system must be configured from here.

GENERAL



1-6-1-a- Display

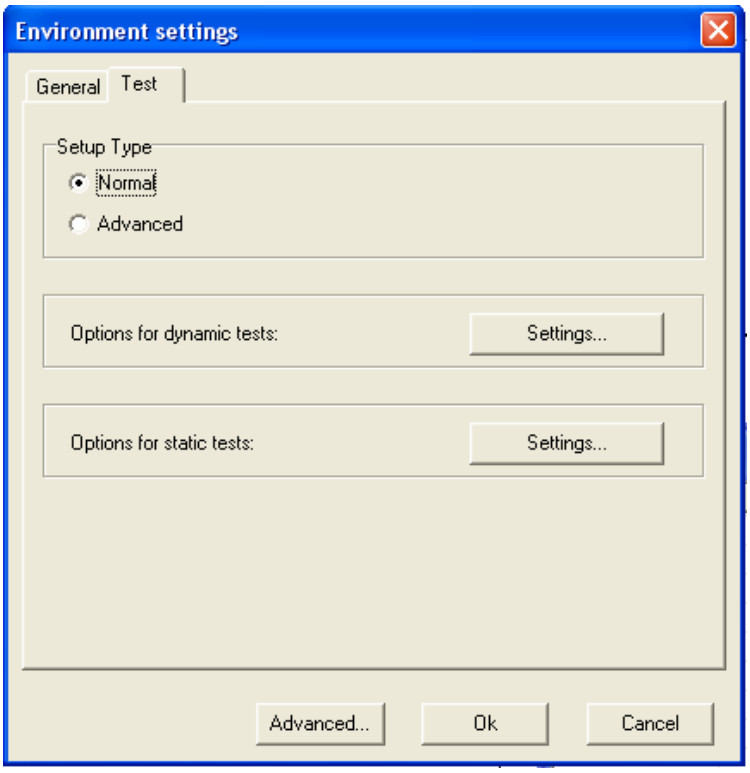
Show message when a test is canceled

Warn if the current test is associated with the file “Default”:
Warn if the current test is not associated with the file “Default”:
If checked, a window will pop up reminding you to double check that the physical setup of the machine matches the selected test profile.

1-6-1-b- Unit system:
Metric or Imperial

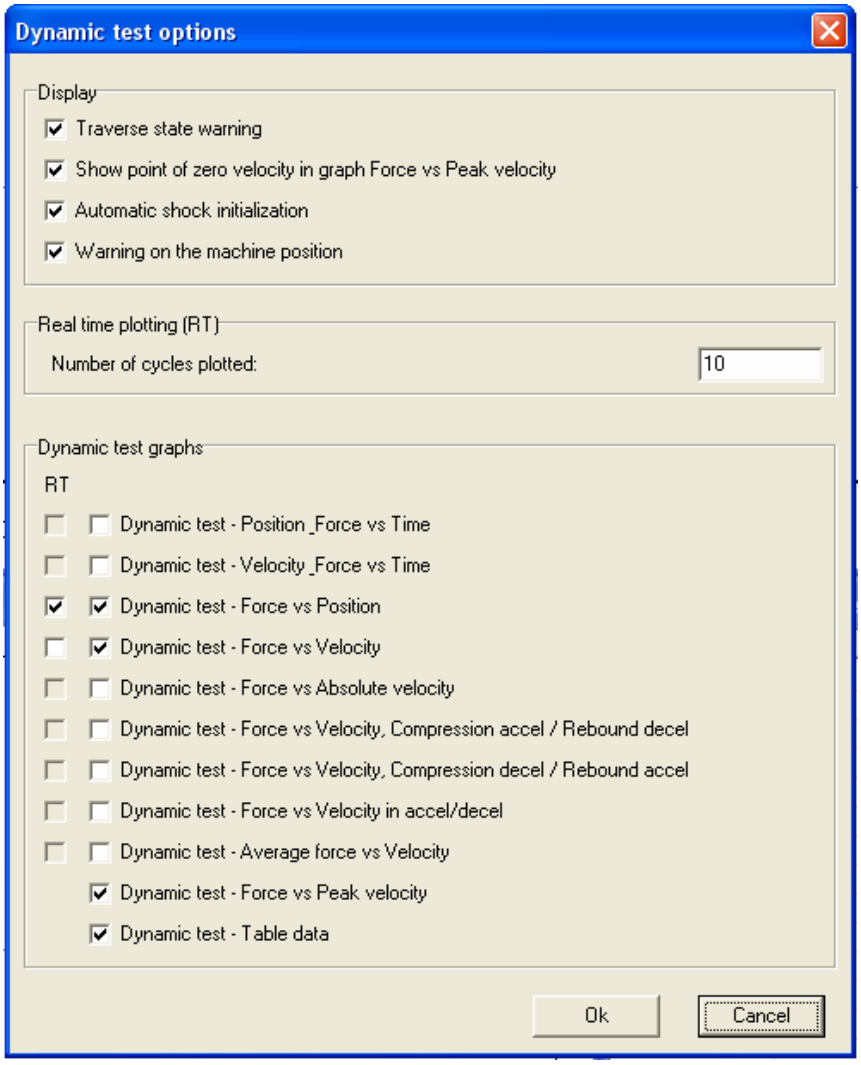
1-6-1-c- File graphs:
Used to analyze productivity and quality control.
Enables the following graphics:
1-Tests count vs. Time
2-Tests deviation vs. Time
3-Tests deviation histogram

TEST



1-6-1-d- Setup Type:
User can choose between Normal or Advanced test configuration type.
(See Section 1-3 Test)

1-6-1-e- Options for dynamic tests ⟹ Settings



1-6-1-e1- Display

Load cell crossbar state warning: If the machine has the electric movement control of the load cell crossbar, the Crossbar State Warning notice must be selected, to prevent trying to move it when it is clamped.

Show point of zero velocity in graph Force vs Peak velocity: If checked the graph joins the curve with that point.

Automatic shock initialization: moves the Dyno shaft to its bottom point every time the user cancels a test or at the startup of the program.

Warning on the machine position: if checked, it gives a warning message every time the machine has stopped without returning to the bottom position. i.e. After stopping a test with the “ESC” key.

1-6-1-e2- Real time plotting (RT)

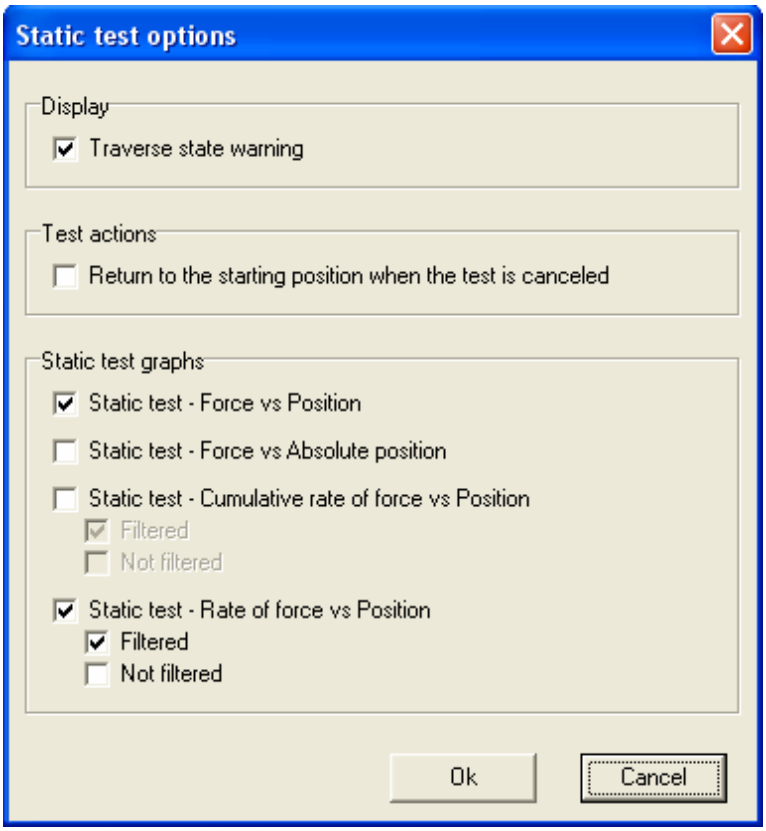
Number of cycles plotted: Is the number of cycles plotted in real time plotting. If the user chooses 10, when there are 11 plots on the screen, the systems erases the first plot, in order to maintain a graph of the last 10 cycles.

1-6-1-e3- Dynamic test graphs

When checked, the selected graphs will be available for viewing. There is also a shortcut icon placed in the command bar for each graph checked.

The "RT" column indicates which graphs will show a plot when Real Time Plotting in enabled.

1-6-1-f- Options for Static tests ⟹ Settings



1-6-1-f1- Display

Load cell crossbar state warning: If the machine has the electric movement control of the load cell crossbar, the Crossbar State Warning notice must be selected, to prevent trying to move it when it is clamped

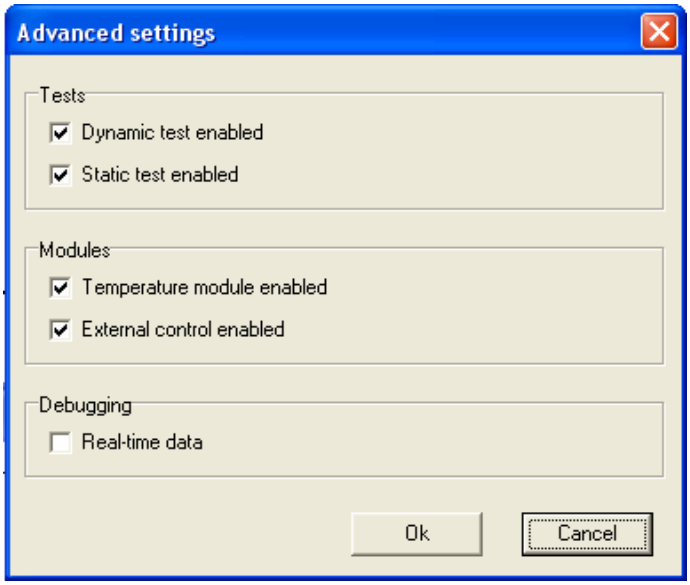
1-6-1-f2- Test actions

Return to the starting position when the test is canceled: If checked, the load cell crossbar goes to the initial position (the position when "play" was pressed) after a test is canceled.

1-6-1-f3- Static test graphs

When checked, the selected graphs will be available for viewing. There is also a shortcut icon placed in the command bar for each graph checked.

1-6-1-g- Environment Setting ⟹ Advanced



1-6-1-g1- Tests

Dynamics test enabled: Enables the controls for the testing of dampers.

Static test enabled: Enables the controls for the testing of springs. If the machine does not have a motorized load cell crossbar, this should be unchecked.

Note: If you have a machine with static and dynamic test capability, both options should be checked.

1-6-1-g2- Modules

Temperature module enabled: Lets the user connect a temperature sensor in order to control temperature variations during the test. Or do a damper warm up until a configured temperature.

External control enabled: This must be selected if the machine has an operating panel or external command module.

1-6-1-g3- Debugging

Real time data: If checked, shows a graph of the data (position, velocity and force) that is being measured by the machine.

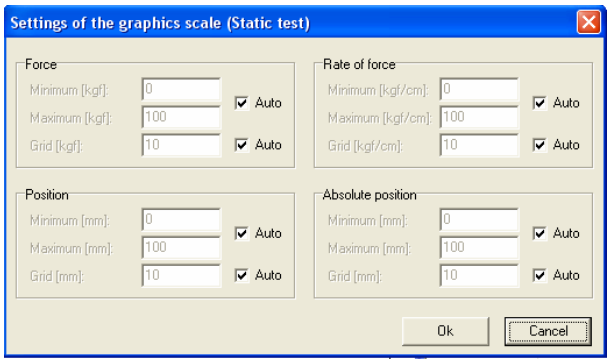
1-6-2- Language selection:

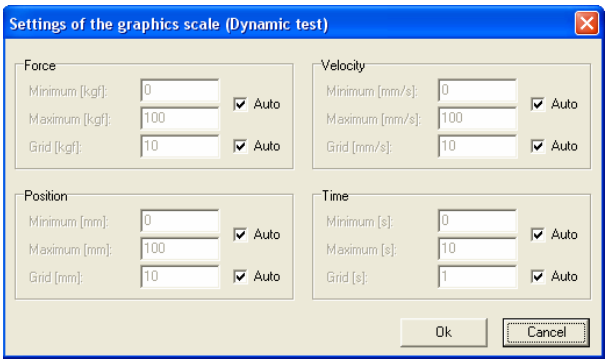
Users can select between English and Spanish.

1-6-3- Settings of the graphics scale (Dynamic and Static test):

Sets the scale to be plotted on the graph. When AUTO is checked, the graph will automatically scale to fit all the displayed curves.

This menu can also be accessed by left clicking on the axis line of any graph.





1-7- Window

Choose window layout Cascade or Tile.

This menu also displays all the graphs that are open.

1-8-Help

About:
Shows the software version