

*CS2-225 & CS2-1100
Force Tester*

User Manual



Warranty

This instrument is warranted against defects in workmanship, material and design for one (1) year from the date of delivery to the extent that AMETEK will, at its sole option, repair or replace the instrument or any part thereof which is defective, provided, however, that this warranty shall not apply to instruments subjected to tampering or, abuse, or exposed to highly corrosive conditions.

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This warranty is null and void if the purchaser fails to follow any and all instructions, warnings or cautions in the instrument's Instruction Manual.

If a manufacturing defect is found, AMETEK will replace or repair the instrument or replace any defective part thereof without charge; however, AMETEK's obligation hereunder does not include the cost of transportation, which must be borne by the customer. AMETEK assumes no responsibility for damage in transit, and the purchaser should present any claims for such damage to the carrier.

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CAUTION!

HIGH FORCES ARE OFTEN INVOLVED WITH THE MATERIAL TESTING PROCESSES.

The machine is powered by mains supply voltage

The machine is a Class 1 product, which means it **MUST** be connected to a mains socket outlet with a **PROTECTIVE EARTH CONNECTION**

Do not position the equipment so that it is difficult to operate the mains disconnect device (machine mains inlet socket)

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired

To maintain all aspects of the specification, only Chatillon approved accessories connections and components should be used

Strictly adhere to all specified safety procedures

PLEASE READ THIS MANUAL BEFORE USING THE FORCE TESTING MACHINE

List of Icons Used in this Manual



WARNING

The raised hand icon warns of a situation or condition that may lead to personal injury or death. Do not proceed until the warning is read and thoroughly understood. Warning messages are shown in bold type.



DANGEROUS VOLTAGE

The lightning icon warns of the presence of an uninsulated dangerous voltage within the product enclosure that might be of sufficient magnitude to cause serious shocks or death. Never open the enclosures unless you are an authorized and qualified CHATILLON service personnel. Never open any enclosure when power is connected to the system or its components.



CAUTION

The exclamation point icon indicates a situation or condition that may lead to equipment malfunction or damage. Do not proceed until the caution message is read and thoroughly understood. Caution messages are shown in bold type.



NOTE

The note icon indicates additional or supplementary information about the action, activity or concept. Notes are shown in bold type.

General Safety

Read this manual completely before attempting to use the CS series force tester. By following the instructions contained in this manual, the optimum safety, accuracy and performance can be attained.

Never operate the CS series force tester with the lower cover removed.

Use an industrial-quality Power Surge Suppressor with your CS System.

Always make sure that the supply power matches the setting on the Power Input Module BEFORE turning power ON. Failure to do so may cause serious damage to the tester.

The CS series force tester has a switchable mains input and may operate with 110V or 230V provided the Power Input Module is in the proper setting corresponding to the source power.

The equipment is a Class 1 product which must be connected to a mains socket outlet with a protective earth connection.

The CS series force tester has a moving crosshead! Exercise extreme caution during testing or whenever the crosshead is moving. Never place fingers inside the column.

Position the CS series force tester so that it is easy to access the mains power switch and mains power cord.

Never use the CS series force tester in a manner not specified by AMETEK.

Obey all warning labels on your CS series force tester.

General safety precautions must be followed when using this CHATILLON product. Failure to observe precautions and warnings may result in damage to the equipment, or injury to personnel.

It is understood that safety rules within companies vary. If a conflict exists between the material contained in all CHATILLON User's Guides and the rules of a company using a CHATILLON product, the more stringent rules should take precedence.

Safety Considerations

The mains supply is completely enclosed and provides no potentially hazardous outputs. Safety considerations are related to the power connections and physical mountings.

Electronic and mechanical components housed within the covers are to be serviced by authorized CHATILLON representatives only.

The final and full compliance with the requirements of the MSD 2006-42-EC will be dependent on the industry, application, material (to be tested), location (of the use), etc. the final user must take the necessary steps to ensure the safety of the operator, other people, machine and properties by providing guards, shields, screen, adequate lighting, adequate ventilation, etc.

Furthermore, when the machine is installed, wired and ready for its intended use the final user must conduct the final Risk Assessment on the machine, including all such safety measures (shield, guard, etc.), to satisfy the requirements of Machinery Directive and EHSR (Essential Health and Safety Requirements).



The mechanical Frame has a potential to crush objects! Please ensure your hands are kept away from the moving arm.



When designing custom fixtures! Ensure fixtures load ratings exceed the Loadcell maximum load rating. i.e. If the Loadcell used is 1kN, then the fixtures must be capable of withstanding 1kN load.

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1.0 Introduction

Welcome to your new CS series force tester. This equipment is extremely easy to use and has been designed to meet a broad range of applications. It is an accurate measurement system for various types of physical testing and incorporates an extensive range of features that make it ideal for performing complex testing applications.

The control console is a 2 in 1 laptop that folds into a touch screen that uses the Microsoft Windows 10 Pro operating system. The force tester frame is microprocessor controlled and uses 32-bit technology for highly accurate load measurement and rapid data acquisition.

The Windows operating system and machine control program are pre-loaded onto the Laptop Hard Drive. The test data can be copied onto a USB memory stick or transferred to the company network, via an Ethernet cable, if required.

The Laptop has 3 USB connectors. 1 on the left and 2 on the right-hand side. One USB connector is used to connect the control console to the force tester frame and the other 2 connectors may be used for connecting external USB devices.

The Laptop is also fitted with a power socket, HDMI port on the left side, and 2 additional available USB ports which may be used for Ethernet and RS232 connections by using the appropriate cable adaptor, depending on your PC connections.

The high stiffness frame incorporates a crosshead guidance system to prevent side loading of the sample under test. The crosshead is driven by single leadscrew, motor and DC PWM system to achieve a wide speed range over the full load range. The machine is capable of running full load at full speed. A range of highly accurate, interchangeable Loadcells are available for tension, compression and cycling through zero force measurements. The system is ideal for use in production, quality control, educational and research environments.

Note: No other software should be loaded on the Laptop since it may interfere with the operation of the software. This is a dedicated control Laptop.

1.1 SAFETY



CAUTION: Force Testers are very safe to use providing the instructions presented in this manual are followed precisely. We would like to draw your attention to both the Electrical Safety (Section 1.2) and Operational Precautions (Section 1.3). Please refer to both sections for details on safe operation of this equipment before operating your force tester.

A transparent splinter shield is available as an option for the CS2-225 (P/N 01/3909) and CS2-1100 (P/N 01/3910) to enclose the test sample (see section 14). A shield should be fitted if there is any danger of samples shattering during the test. The shield has an electronic interlock such that the test cannot be started until the hinged shield is closed. While not mandatory for many applications and countries, CHATILLON strongly recommends that users consider fitting this optional item.

The Force Tester is required to be secured to the workbench (see section 14).



CS2 Materials Testing Machine with optional grips and loadcell.

1.2 ELECTRICAL SAFETY

1. The CS2 Force Tester has been designed to meet the requirements of BS EN 61010-1:2010 safety requirements for electrical equipment for measurement, control and laboratory use.
2. The User Manual contains some information and warnings, which must be followed by the user to ensure safe operation and to keep the machine in safe condition.
3. The machine has been designed for indoor use. It may occasionally be subjected to storage temperatures between -17°C and +35°C (1.2°F and 95°F) without degradation of its safety.
4. Before switching on the machine make sure that it is set to the voltage of the mains electricity supply.
5. This machine complies with electrical safety grade Class 1, which means that it is “earthed apparatus” and requires the mains plug to contain a protective earth terminal. The mains plug must only be inserted in a socket outlet provided with a protective earth contact. The protective action must not be negated by the use of an extension cord without a protective conductor.
6. Make sure that only fuses with the required rated current and of the specified type are used for replacement. The use of makeshift fuses and the short-circuiting of fuse holders is prohibited.
7. There are no user serviceable parts within the machine.
8. The machine must be disconnected from all power sources before it is opened for any adjustments, replacement, maintenance or repair.
9. Capacitors inside the machine may still be charged even if the machine has been disconnected from all power sources.
10. Any adjustment, maintenance or repair of the opened machine when connected to the mains supply voltage should be avoided as far as possible but if inevitable, must only be carried out by a skilled person who is aware of the hazard involved.
11. Only use safety approved power cords that come with the CS series test machines.

1.3 OPERATIONAL PRECAUTIONS

CHATILLON testing machines are inherently safe if used properly. However, operators must be made aware that: -

- 1 High physical forces are involved.
- 2 Samples may shatter during a test.
- 3 Electrical power supplies are involved.
- 4 The following must **ALWAYS** be brought to the attention of any operator before they are allowed to use the machine. Hands, fingers and other parts of the body must at all times be kept well away from the moving crosshead. Operators should be particularly careful when moving the crosshead to insert test samples, to ensure that no part of the hand could be accidentally compressed as the crosshead and grips are jogged into position.

- 5 If there is any danger that liquids may be spilled during tests, operators must use a drip tray (which is available from CHATILLON) to guard against the possibility of any spillage entering the machine and giving rise to electrical or other hazards.
- 6 Take extra care when operating in compression mode where specimens may burst, shatter or fly out from between the platens. Operators should STAND CLEAR during testing. Splinter shields are available in various options to suit specific requirements.
- 7 All operators must receive adequate training in basic operation before being allowed to use the machine. Additional copies of this manual are available from AMETEK Inc.
- 8 Operators must ensure that the Emergency Stop Button is never obstructed.
- 9 Operators must ensure that other personnel working in or near the area are made aware that testing is taking place and that they should not approach the machine while it is in use.
- 10 Operators must ensure that the machine is regularly serviced and calibrated by CHATILLON, or one of their accredited service dealers.
- 11 To maintain EMC compatibility, the machine should only be used as prescribed in this manual. Connecting cables, plugs and sockets should be inspected regularly. Cables damaged or worn in any way should not be used. Accessories and accessory connecting leads, if suspect, should be replaced only with a CHATILLON approved replacement. Failure to observe this may cause your machine to infringe the EMC legal requirements.
- 12 **NEVER** attempt any form of machine maintenance without disconnecting the mains electrical supply.
- 13 **NEVER** attempt to test any samples with a type of grip or other accessory, which is not designed for that particular test. Never use grips or the machine for tests in excess of the stated load limits. A comprehensive range of alternative grips, together with an applications advisory service, is available from CHATILLON and their accredited dealers.

2.0 Installation

2.1 UNPACKING

The CS2 Force Tester on its own, without the packing and accessories weighs more than 50kg (110lb). Therefore, safe-lifting practices should be employed and lifting equipment used as necessary.

The CS2 Force Tester is packed in a rugged shipping carton to minimize damage caused from shipping mishandling.



NOTE: Please make a careful visual inspection of all the parts made to ensure that there is no obvious transit damage.



NOTE: Please check that you have received all the parts that were ordered. If there are any parts damaged, or any parts missing, please report this to your authorized CHATILLON representative.

2.2 SETTING UP YOUR FORCE TESTER

The CS2 Force Tester is a heavy item and great care should be taken in choosing the location where it is to be installed. Ensure the bench is capable of remaining firm and stable, withstanding the combined weight of the machine and any accessories supplied. Please see the Specification page at the end of this manual for the weight of the apparatus. The Force Tester column must be vertical, otherwise the results may be affected, particularly for very low loads. **The Force Tester may require securing to the bench (see section 14).**



CAUTION: At no time should the CS2 Force Tester be lifted by placing hands under the frame feet.

The CS2 Force Tester must be positioned such that the front can be easily accessed, and that the emergency stop button is not obstructed in any way. Please ensure utmost care is taken when lifting this instrument, use safe working practices. Lifting equipment should be used as necessary.

The two recommended methods are described below:

1. Lifting with a pallet. A pallet may be fitted under the machine so it may be lifted to the desired position with a forklift or a suitable lifting trolley.
2. Lifting by hand. The machine can be lifted manually, but at least 2 people should be employed to do this as the machine weighs more than 50kg (110lb). Do not lift using plastic base cover. Lift using the aluminum bottom.

The CS2 Force Tester may be shipped with the Loadcell cable plugged into the connector on the moving crosshead. If the cable is plugged in as shown to the right remove the 15-pin connector and plug it into the 15 pin D-sub connector in the lower rear of the CS2 Force Tester as shown in section 2.8.

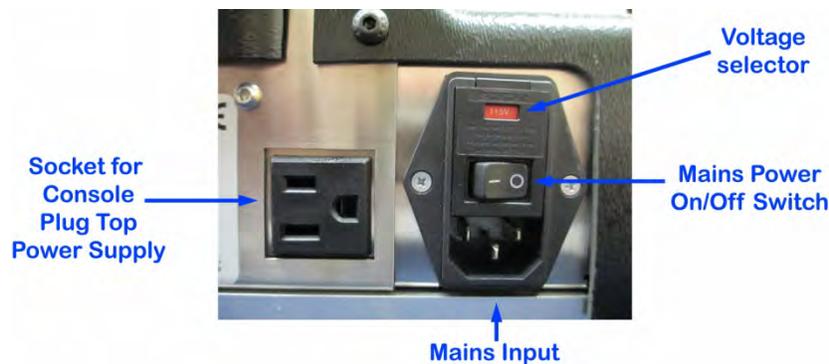
2.3 VOLTAGE SELECTION AND FUSES

The CS2 Force Tester can be used with electricity supplies of either 230VAC $\pm 10\%$ or 115VAC $\pm 10\%$. The supply frequency **must** be 50Hz to 60Hz.



CAUTION: You must check to ensure the correct voltage of your mains power supply has been selected on the mains input connector **BEFORE** you connect mains power to the machine or switch the machine ON.

To check the selected mains voltage, view the red window on the voltage selector. If this is not set correctly, use a small flat blade screwdriver to open the top of the voltage selector. The screwdriver should then be used to move the selector from the 115V position to the 230V position as appropriate. You **MUST** also check that the fuse rating is suitable for the supply voltage that you are using, and the correct fuse values are listed on the serial number label and also in the table below. The two fuses (live and neutral) are ceramic high breaking capacity type fuses (20mm x 5mm) and are located inside the voltage selector assembly.



Note that the fuses **MUST** be fitted with one end touching the pin end of the fuse holder



WARNING: Replace the fuses with the exact same type and rating as the ones supplied by factory. Do not replace with higher or lower rated fuses.

Fuse Ratings and Part Numbers

<u>Model</u>	<u>Fuse Rating</u>	<u>Part Number</u>	<u>Type</u>
CS2-225 - 115VAC	3.15A	SPK/LS/0011/A	T3A15H250 V
CS2-225 - 230VAC	3.15A	SPK/LS/0011/A	T3A15H250 V
CS2-1100 - 115VAC	6.3A	SPK/LS/0011/B	T6A3H250 V
CS2-1100 - 230VAC	6.3A	SPK/LS/0011/B	T6A3H250 V

2.4 CONTROL CONSOLE AND LOADCELL CABLES



NOTE: To maintain EMC compatibility, only connection leads supplied by CHATILLON should be used to connect the control console and Loadcell.

2.5 MOUNTING THE LAPTOP CONSOLE

The Laptop console is fitted with a rear mounted ball joint adapter. The force tester is supplied with another ball joint adapter fitted on the right-hand side of the vertical column. The Laptop console is attached to the force tester using the supplied spring-loaded clamp.

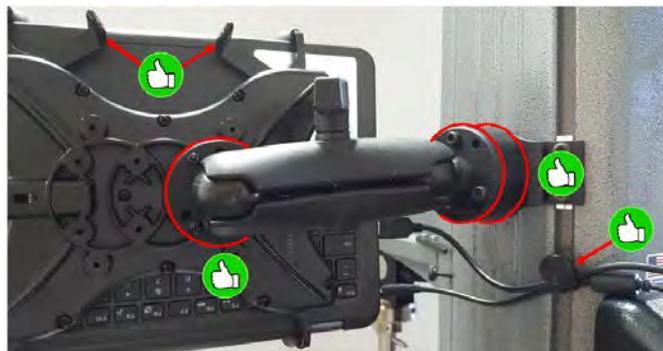
Squeeze the "spring" end of the clamp and position the other end over the ball joint adapter on the rear of the Laptop console. Ensure that the clamp is pointing towards the left-hand side of the Laptop console, and also ensure that the hand screw mechanism is towards the top of the Laptop control console. Attach the opposite end of the arm on the ball joint.

As shown below, with the Laptop folded, and the Touch Screen facing forward, position the Laptop Console bottom first onto the clamp. Squeeze the spring-loaded tabs on top of the clamp and gently tilt backwards the Laptop into rubber holding fingers and release.



Once fitted, position the Laptop console where it can be easily viewed and operated by the user. Once you have positioned the Laptop console, tighten the hand screw so that the Laptop console is secured in the intended position. Ensure that the control console does not move when pressing on the touch screen.

WARNING: Always support the Laptop console whenever adjusting the spring-loaded clamp. If the Laptop console falls from the mounting location, serious injury or damage to the equipment can result.



2.6 CONNECTING THE LAPTOP CONSOLE POWER CABLE

The Laptop console is powered using the supplied "plug top" power supply. Plug this into the mains outlet on the rear of the machine then connect the circular power supply plug to the DC input socket on the lower left-hand side of the Laptop console.

Ensure that the Laptop console power switch (below the DC input socket) is set to ON (I). Note that the Laptop console is switched ON by using the Laptop button on the upper right side of the Laptop and Turned OFF using the "Shut Down" menu button in the Windows menu.

2.7 CONNECTING THE LAPTOP CONSOLE USB CABLE

The Laptop console is connected to the force tester frame using the supplied USB A-B cable. Connect the cable into the USB sockets on the left-hand side of the Laptop console and connect the other end into the USB connector on the rear of the force tester frame.

2.8 CONNECTING THE LOADCELL EXTERNAL CABLE

The Loadcell external cable is connected to the 15-way connector on the rear of the machine.



2.9 ON-OFF SWITCH & SAFELINE SWITCH

The power input cable should be inserted into the mains input connector at the rear of the machine. Before switching on the machine, you MUST check the correct voltage has been selected on the mains input connector.

The main power switch is located above the mains input connector on the rear of the force tester base as shown in section 2.3. The switch is a rocker type with positions O and I. Press I to supply power to the machine and press O to turn power off.

NOTE: WHEN POWERING ON THE CS SERIES TEST MACHINE ENSURE THERE IS NO USB FLASH DRIVE PLUGGED INTO THE CONSOLE USB PORT. THE OPERATING SYSTEM MAY NOT BOOT UP PROPERLY IF A USB FLASH DRIVE IS PLUGGED INTO THE CONSOLE USB PORT. ONCE THE CS CONSOLE IS BOOTED UP A USB FLASH DRIVE CAN THEN BE INSERTED INTO THE USB PORT.

The safeline button is mounted on the left-hand side of the frame and is initially illuminated to indicate that there is no power to the crosshead motor circuit and the crosshead cannot move. The safeline circuit must be activated before the force tester can be used. Pressing the safeline button will turn the light off to indicate that the force tester is now ready for use. Use the main power switch to turn power off when the force tester is not required.

2.10 EMERGENCY STOP SWITCH

If for any reason the machine needs to be stopped without delay, an emergency stop mushroom switch is provided. Pressing the switch stops the CS2 Force Tester immediately. It can be released by turning a quarter-a-turn clockwise which will turn on the safeline indicator. The safeline will then need to be reactivated by pressing the safeline button. The machine will then go to the initialize/start-up sequence if the ON/OFF switch is already ON.



2.11 LOADCELLS

Before the machine is powered up, or any test set-ups are entered, a Loadcell should be fitted.

Carefully unpack the Loadcell(s) supplied with your machine. Please make all operators aware that these are precision load measuring devices and should be treated with great care. Please read **SECTION 5.1 FITTING A LOADCELL** before proceeding further.



NOTE: Loadcells are precision measuring devices. Always handle Loadcells with extreme care to prevent damage.



CAUTION: Please note that Loadcell overload is not covered by the warranty.

3.0 Initial Configuration

3.1 GENERAL

The Laptop console uses Windows 10 Pro for the Operating System together with a dedicated force tester program. Both items need to be configured before the system is fully operational and all features become available.

3.2 INITIAL LOG-IN



Switch the **Force Tester** on and press the Laptop Power ON button located in the top right-hand corner of the Tablet then wait for the CS2 "LOGIN" screen to appear.



Using the Laptop Touch Screen, touch the "LOGIN" button to display the "**HOME**" screen (Do not click on Username or Password).



Press the red "X" icon at the top of the screen (4th Icon from the left) to return to the "**WINDOWS Desktop**" screen.

The Laptop Console is setup by default from the factory as a CS2 Administrator with No User Name or Password login. Administrative tasks may be accomplished by logging into the CS2 as an Administrator User. The Tablet Console Time/Date, Networks, Virus Protections need to be setup as an Administrator User.

The force tester is supplied with 2 users called "CS Software" and "CS Administrator". The "CS User" log-on is set to automatically start the dedicated force tester program and bypass the "Windows" log-on screen.

3.3 LANGUAGES

Languages can be changed in Windows through the Control Panel Screen under "Microsoft Office Language Preferences. The Language can only be changed logged in as an Administrator.

3.4 COMPANY LOGO ON PRINTED REPORTS

The printed report (PDF or printout) contains a default logo on the top left-hand corner of the page and this can be replaced by your actual company logo. The logo must be stored in "png" format noting that a logo in a different format can be converted using Windows Paint or Photoshop etc. It is required to be logged in as cs-admin (CS Software Administrator) to add a Company Logo.

The default logo has dimensions of 528 x 96 pixels and it is recommended that a similar size is used for the actual company logo. Note that the maximum height of the replacement logo is constrained to 96 pixels and the maximum width is constrained to 528 pixels.

The company logo file must be called "**company_logo.png**" (**note the underscore**) and this must be stored in the "**C:\Program Files (x86)\AMETEK, Inc\Chatillon CS Control Software\Assets**" folder.

When viewing the control panel, click on the "Up" arrow on the Toolbar to display the "C:" drive then move around the drive to the "**C:\Documents and Settings\MyUser\Assets**" folder.

Copy your .png logo file to a USB memory stick then transfer this file to the folder, overwriting the original file "**company_logo.png**".

3.5 NETWORK CONNECTION

The NETWORK CONNECTIONS can be setup through the Control Panel and Network menus. The CS Series test machine Laptop has wireless and Bluetooth capabilities. The Laptop console can be connected onto an Ethernet connection via a USB to Ethernet adaptor (not supplied with Tester).

Note: the IT department should configure this because various security settings and user profiles are required to connect to a company network.

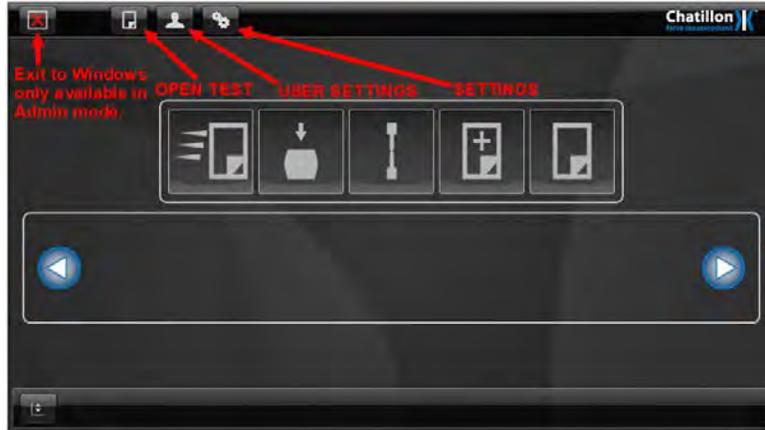
3.6 WINDOWS PASSWORD & LAPTOP STARTUP

The force tester is supplied with 2 users called "CS Software & CS Software Administrator" none of the logins have passwords. The Laptop bootup default is set to CS Software. Allow the CS2 Software to start even if it seems that nothing is happening as the software takes a couple of minutes to launch. ". When the CS2 software login window appears, click on the login button, no User or Password is required.

4.0 Dedicated Program Configuration

4.1 C S 2 LOG-IN AND THE HOME SCREEN

Press the "LOGIN" button to display the "**HOME**" screen (Leave the User Name and Password fields blank).



Press the "**SETTINGS**" Icon at the top of the screen (4rd Icon from the left) to display the "**CONFIGURATION**" screen.

Press the "**ABOUT**" button on the left-hand side of the screen (if not already selected) to display system information in the central area of the screen.



This central area shows the Current Date and Time, Force Tester Type, Force Tester Serial Number, Force Tester Firmware Version, Frame Capacity, Loadcell Serial Number, Loadcell Capacity, Last Loadcell Calibration Date and Console Software Version.



NOTE: The date and time is setup in the Windows Control panel while logged in as administrator. It is recommended to contact your AMETEK representative if your Tester needs to be calibrated.

4.2 USER SETTINGS

The Force Tester is shipped without a "Password" so that anyone can use the equipment and all features are available. The "Load Cell Calibration" button does have a factory Password. The access to the menu is restricted to calibration personnel. If you need access, please contact the Customer Care Dept. at AMETEK. If no user restrictions or user identification are required, then no further action is necessary. The Force Tester can be used, after it has been switched on, by pressing the "LOGIN" button to display the "**HOME**" screen. An operator will be able to exit into Windows using the red "X" button unless a user name and password are created.

If user restrictions and/or user identification are required, then one or more passwords must be created within the dedicated program.

To create a password, press the "USER SETTINGS" button at the bottom of the screen to display the "**USER PASSWORD**" screen.



The screenshot shows a software interface window titled "USER PASSWORD". At the top, there are three buttons: "Add", "Delete", and "Close". Below the buttons is a table with three columns: "Supervisor", "User Name", and "Password". The "Supervisor" column contains a checked checkbox. The "User Name" and "Password" columns are currently empty. There are blue up and down arrow buttons on the right side of the table, and a blue down arrow button in the bottom right corner of the window.

Supervisor	User Name	Password
<input checked="" type="checkbox"/>		

The top line is shown blank and this **MUST** be changed after one or more passwords have been defined otherwise the password security is not enabled.

Press the "ADD" button to create a new line in the table that contains "NewUser" for the User Name and "NewUser" for the Password. Press on the "NewUser" entry in the User Name column to display an alphanumeric keypad. The keypad may be split and moved around the screen as shown below.



Enter the required user name then press on the ENTER button. Press on the "NewUser" entry in the Password column to display an alphanumeric keypad. Enter the required password then press on the ENTER button.

Note that this operator is only allowed to select and run predefined tests unless the Supervisor checkbox is selected, when all features are accessible.

Repeat this procedure for all required operators, ensuring that at least one operator is defined as a supervisor.

The "Initial Log-in" must now be changed to prevent unauthorized access. Press on the "blank Password" entry at the top of the Password column to display an alphanumeric keypad. Enter a suitable "Master" password then press on the ENTER button.

If an operator is entered in error, or must be removed at a later date, press on the unwanted user name then press the "DELETE" button.

Press on the "CLOSE" button to return to the "CONFIGURATION" screen.

The Force Tester can now only be used after a user has logged on using a defined User Name and Password.

If a Supervisor password has been created, please ensure that this password is remembered, or securely stored for future reference, because AMETEK is not responsible for lost passwords.

4.3 SETTING DEFAULT UNITS

The "Global Default Units" are displayed on the right-hand side of the screen. Whenever a new test is performed, all test results will be reported in these units. Note that the result units can always be changed whenever the test results are displayed.

To change a default unit, press the relevant button to cycle through the available units.

The Force button provides units of N, gf, kgf, lbf and ozf.

The Speed button provides units of mm/min and in/min.

The Distance button provides units of mm and in.



4.4 CHANGING THE SAFETY SETTINGS

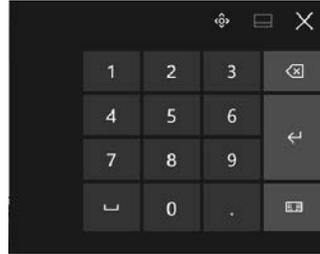
Press the "SAFETY SETTINGS" button on the left-hand side of the screen to display the "**SAFETY SETTINGS**" screen. These settings are used to protect the operator and to protect the Force Tester and fixtures.



4.5 GRIP PROTECTION

The Force Tester will always stop if the tensile or compressive force exceeds the Loadcell capacity. This is to protect the Loadcell and frame from excessive forces. This value may need to be reduced for special applications where the grip/fixture may not be able to withstand the maximum force value.

To reduce the maximum force that can be applied, reduce the Grip Protection value as required. To change the value, press on the "GRIP PROTECTION" entry Field to display a numerical keypad.



Enter the required value then press on the ENTER button. To change the unit (which will be initially set to the "Default" Force unit), press the button to the right of the Grip Protection entry Field to cycle through the available units.

Please note that the grip protection value is only updated after exiting the configuration screens, i.e. when the Home screen is re-displayed.

If any numeric field needs to be edited after an initial value has been entered, press two times (double tap) on the "GRIP PROTECTION" entry area.

To enter a barcode into the required field, press on the edit box field above the keyboard to enable the field then scan the barcode.

4.6 PINCH LOAD

The pinch load setting stops the Force Tester if an excessive compressive force is applied when the Force Tester is being jogged (driven using the positioning buttons). This is to protect the operator and should be set to a reasonably low value, e.g. 50N or 10lbf. Note that the pinch load feature uses the "displayed" load value, so the Force Tester must be re-zeroed whenever grips are changed or removed before trying to re-position the crosshead.

The maximum pinch load that can be set is 200N or 40lbf. However, AMETEK recommends that the pinch load is not set above 50N or 10lbf.

Assume that the pinch load is set to 10lbf and a compression plate weighing 15lb is fitted to the bottom of the Loadcell. If the compression plate is removed from the Loadcell, the Force Tester will display a compressive load of 15lbf. This exceeds the pinch load of 10lbf so the crosshead cannot be driven downwards. Therefore, the Force Tester must be re-zeroed before the crosshead can be driven downwards as normal.

To change the Pinch Load value, press on the "PINCH LOAD" entry field to display a numerical keypad, enter the required value then press on the ENTER button. To change the unit (which will be initially set to the "Default" Force unit), press the button to the right of the Pinch Load entry Field to cycle through the available units.

Please note that the pinch load value is only updated after exiting the configuration screens, i.e. when the Home screen is re-displayed.

4.7 SLOW JOG SPEED

The crosshead can be positioned, and the load re-zeroed using the buttons on the positioning panel (shown later). This panel has 2 buttons to move the crosshead up either fast or slow and another 2 buttons to move the crosshead down either fast or slow. The fast speed is fixed but the slow speed is adjustable and can be defined using the Slow Jog Speed setting. The slow speed is to allow the crosshead to be accurately positioned ready for fitting a sample so should be set to a reasonable value, e.g. 100mm/min or 4in/min.

The "Maximum" Slow Jog Speed is limited to 635mm/min (25in/min) for a CS2-225 and 508mm/min (20in/min) for a CS2-1100.

To change the Slow Jog Speed value, press on the "SLOW JOG SPEED" entry area to display a numerical keypad, enter the required value then press on the ENTER button. To change the unit (which will be initially set to the "Default" Force unit), press the button to the right of the Slow Jog Speed entry field to cycle through the available units.

Please note that the slow jog speed value is only updated after exiting the configuration screens, i.e. when the Home screen is re-displayed.

4.8 LOADCELL CALIBRATION INTERVAL

The Loadcell contains a memory device that stores the Loadcell value, serial number, calibration data and the date of the last calibration. This date is used to display an information message when the Loadcell calibration is due. The information message will be displayed after the time interval entered as the Loadcell Calibration Interval.

To change the Loadcell Calibration Interval, press on the "**LOADCELL CALIBRATION INTERVAL**" entry field to display a numerical keypad, enter the required interval then press on the ENTER button.

4.9 COMMUNICATIONS

Press the "COMMUNICATIONS" button on the left-hand side of the screen to display the "**RS232 SETTINGS**" screen. This feature is provided to allow the Force Tester to be operated via ASCII commands in the same way as earlier TCD frames and to output test results automatically at the end of your tests and to set the RS232 export parameters. Please contact AMETEK if you need additional information on ASCII Commands.

Please refer to renumber section 17 for details.

4.10 OVERLOADS

Press the "OVERLOADS" button on the left-hand side of the screen to display the "LOADCELL OVERLOADS" screen. This screen should ideally be blank but if the Loadcell has been overloaded, the relevant information will be displayed.

If any overloads are displayed, you may contact your authorized CHATILLON representative who can arrange to check the Loadcell for damage.

Please note that Loadcell overload is not covered by the warranty.

4.11 RETURNING TO THE HOME SCREEN

Press the "HOME" Icon at the top left of the screen to display the "**HOME**" screen.

4.12 CHANGING OPERATOR

If 2 or more operators have been defined during the installation, then the "Active" operator can log-off by pressing on the "**CHANGE USER**" Icon on at the top of the screen (2nd Icon from the left) to display the "LOGIN" screen. Another operator can now "LOGIN" using the defined User Name and Password.

Note that the "**HOME**" screen has 4 Icons along the top if the operator is defined as a Supervisor, but only 2 Icons along the top if the operator is defined as a User, i.e. this operator has restricted access rights.



Home Screen for a Supervisor



Home Screen for a User

Note that a "User" can select tests and perform tests but cannot create a new test, edit a test or change any program or machine settings. For additional security, a "User" won't be able to exit into Windows as the "X" button is disable.

4.13 JOG PANEL

The crosshead (moving arm) can be moved up and down to position it ready for testing. This is achieved by using the Jog Control Panel, which is displayed by pressing the "Jog Panel" Icon in the bottom left-hand corner of the screen.

Note that this control panel is accessible from any screen (except the "LOGIN" screen) and is closed by pressing on the Icon again.

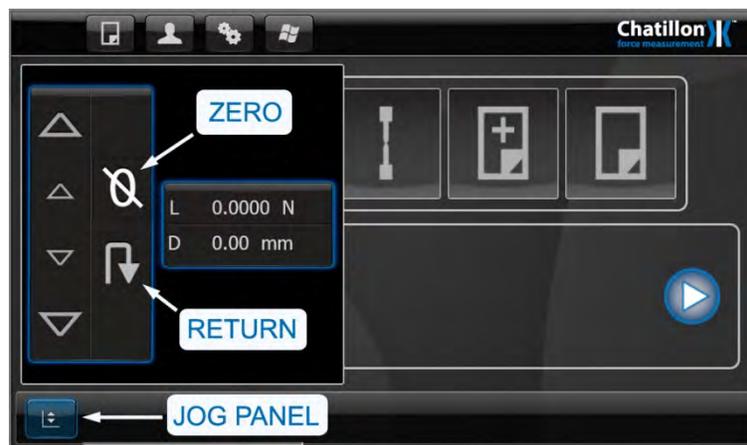
The Large Up arrow moves the crosshead upwards at maximum speed and the Large Down arrow moves the crosshead downwards at maximum speed.

The Small Up arrow moves the crosshead upwards at the defined Slow Jog Speed and the Small Down arrow moves the crosshead downwards at the defined Slow Jog Speed.

In each case, the crosshead only moves while the relevant button is pressed and will stop when the button is released.

The actual load and distance values are displayed on the Jog Control Panel and these values can be zeroed by pressing on the zero button (Ø).

The crosshead can be automatically driven back to a previously defined zero position (Auto Return) by pressing on the return button. Note that the machine will continue to move even when the button is released and will stop when the distance display shows 0.00.



4.14 TURNING OFF THE CS2 FORCE TESTER

To turn OFF the CS Series test machine go to the Main screen and follow the screens below for “User & Supervisor”.



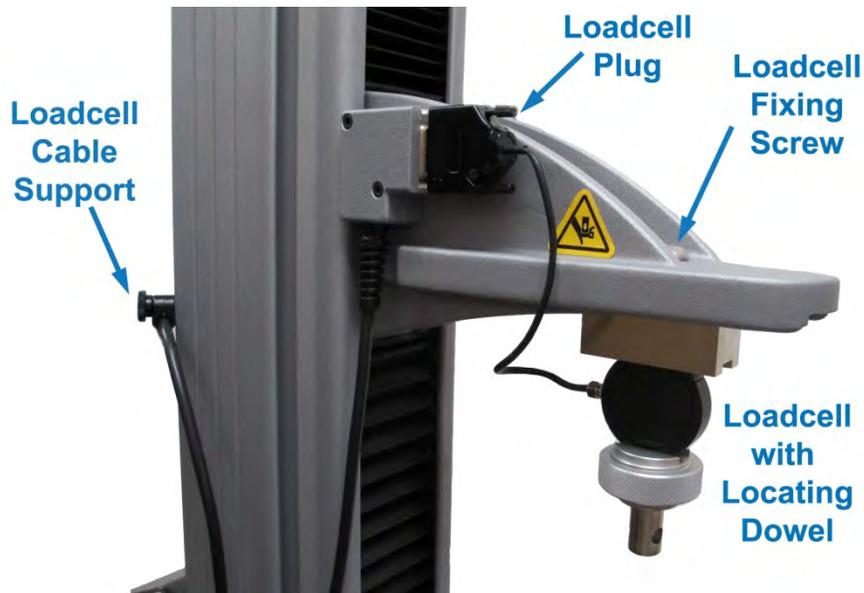
The CS2 tablet should always be shut down FIRST before turning OFF the main power switch. Then the power switch in the rear of the tester may be turned OFF.

5.0 Preparing the Force Tester

5.1 FITTING A LOADCELL

Place the Loadcell fixing screw through the top of the hole in the crosshead and carefully offer up the Loadcell with the connecting lead facing inwards under the crosshead.

Screw the fixing screw into the Loadcell, taking care to ensure that the locating dowel on top of the Loadcell, locates in the hole in the moving crosshead. Tighten the screw with the 8mm hexagonal key provided. Connect the Loadcell plug into the socket on the top of the moving crosshead and finger tighten the two retaining screws.



The Loadcell Cable Support can be adjusted up or down the Column Extrusion by loosening the thumbscrew. Ensure there is plenty of length in the cable connected to the crosshead so that the crosshead can travel without pulling on the cable.

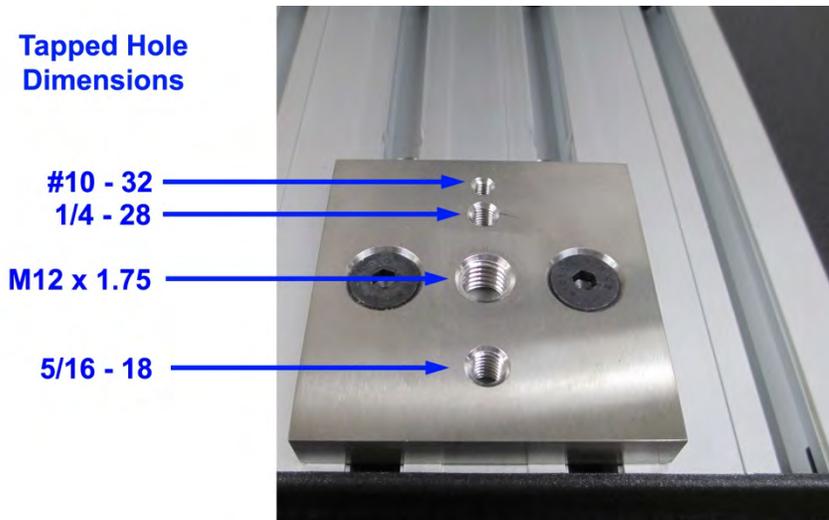
5.2 T SLOT TABLE

The base of the force tester is fitted with a "T" slot table together with a universal mounting plate to allow a range of fixtures to be used.

The mounting plate is secured to the "T" slot table using 2 fixing bolts and this can be positioned as required by loosening the bolts using the 5mm hexagonal key provided.

The mounting plate has 4 tapped holes to allow a range of Chatillon fixtures to be used.

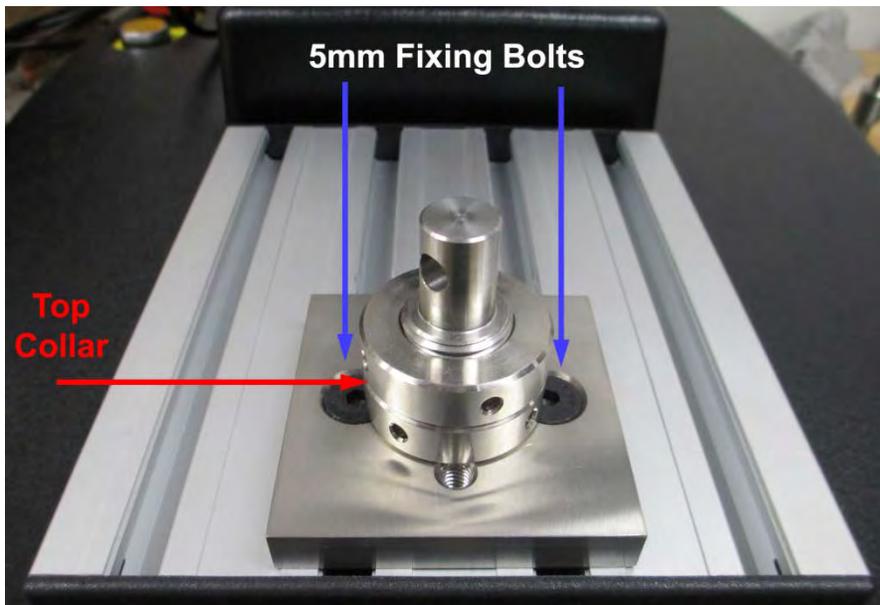
The dimensions of the tapped holes are shown below. Note that these are all imperial threads except for the M12 x 1.75 which is a metric thread.



5.3 LOWER ANCHOR PIN

The force tester is supplied with a Lower Anchor Pin assembly which is fitted to the "T" slot table using two 5mm countersunk bolts.

If the Lower Anchor Pin is to be used, it should be adjusted so that it is accurately aligned with the pin on the attached Loadcell. Carefully drive the crosshead downwards, using the jog keys, until the Loadcell eye end is just above the lower anchor pin. Loosen the 2 fixing bolts using the 5mm hexagonal key provided. Align the lower anchor pin to the Loadcell anchor pin and then re-tighten the 2 fixing bolts.



The top collar on the Lower Anchor Pin should be used to secure the lower grip in place. Use the small spanner wrench provided to tighten the collar upwards against the bottom of the lower grip.

Extreme care must be taken when maneuvering the crosshead, particularly when low force Loadcells are being used as they can easily be damaged even at moderate speeds.

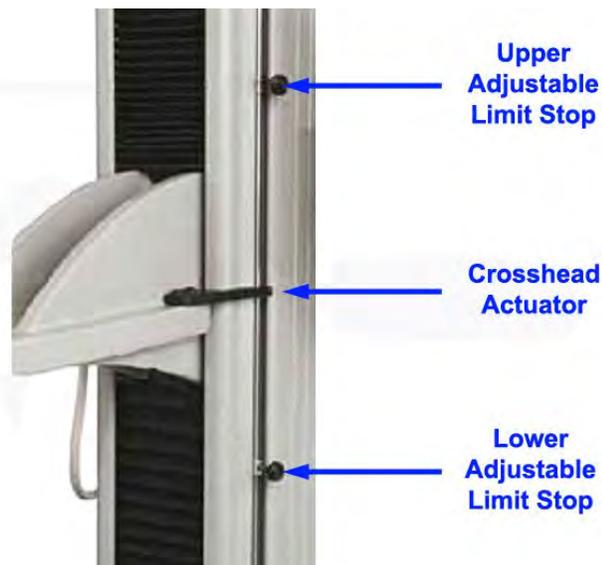
As an additional precaution during compression testing the lower (hardware) limit stop should be set so that the compression plates cannot come together either during or after a test.

5.4 LIMIT STOPS

The CS2 Force Tester is fitted with two mechanically activated limit stops. These can be used as extra protection to stop Loadcells, grips or fixtures coming into contact. The upper one can be used to back up the test upper limit. Activating a limit stop will result in the machine stopping.

To adjust the lower limit stop, first loosen the lower limit stop screw and move the stop to the bottom of its travel in the slot. Drive the moving crosshead to the lowest position that it may go to safely, without damaging any fitted grips or fixtures. When this position has been reached, drive the crosshead up by 3mm (0.125 inch). Move the lower adjustable limit stop up until it stops against the crosshead actuator within the column. Tighten the screw in this position. Ensure the screws are free to move vertically to actuate the switches.

To adjust the top limit stop, loosen the upper limit stop screw and move the screw to the top of its travel and tighten the screw temporarily in this position. Drive the moving crosshead to the highest position it may go to safely, without damaging any fitted grips or fixtures. When this position has been reached, drive the crosshead down by 3mm (0.125 inch). Loosen the upper limit stop screw and move the screw down to the limit stop cross head actuator and tighten the screw in this position. Once again, ensure the screws are free to move vertically to actuate the switches.



If during a test or when maneuvering the crosshead, a limit stop switch is activated, an error message will be displayed on the control console.

When the error display has been cleared the machine will only allow the operator to drive the crosshead away from the limit stop, i.e. upwards if the lower limit stop was operated or downwards if the upper limit stop was operated.

6.0 Defining a Test

The Force Tester can be used in a number of different ways: -

- 1 Perform a Single Stage Test without Saving Data (Quick Test)
- 2 Create a Compression Test File, Perform Tests and Save Data
- 3 Create a Tension Test File, Perform Tests and Save Data
- 4 Create a Multi-Action Test File, Perform Tests and Save Data
- 5 Load a Previously Defined Test, Perform Tests and Save Data

6.1 NOTES

Option 1 does not store any test data, although the data can be exported and/or printed.

Options 2, 3 and 4 create test files that are used to store the test parameters, test results and graphical data. These files are used to test samples immediately after the file is created but can also be used to test further samples at a later date. This allows the statistics of many samples to be viewed and analyzed.

The machine can store a maximum of 50 Tests.

7.0 Single Stage Test Without Saving Data

This "Quick Test" feature is provided to allow a quick test to be performed on a sample, in either Tension or Compression mode, where the test results and graphical data are not required to be stored in a test file. However, the test data can be exported and/or printed if required.

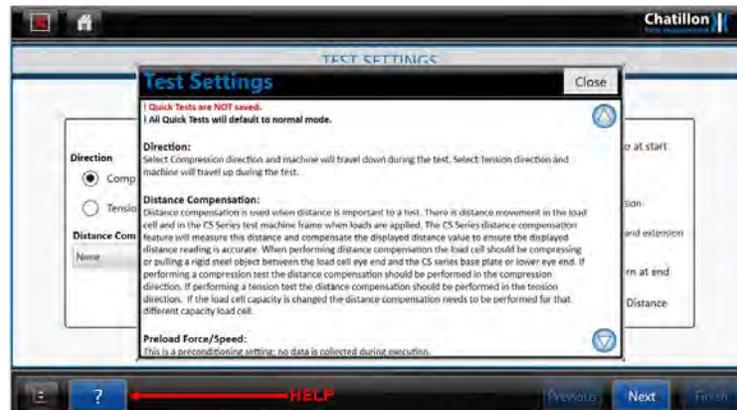
7.1 BASIC SETTINGS SCREEN



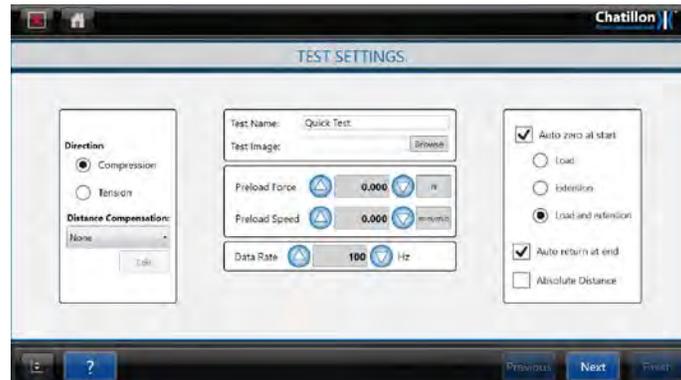
Press the large "QUICK TEST" icon on the "HOME" screen to display the "TEST SETTINGS" screen.

A test is created by moving through a sequence of configuration screens which is intuitive and easy to use.

Each configuration screen has a "HELP (?)" button at the bottom of the screen and pressing this "?" button will display relevant "HELP" information. Each help screen only displays the information for the displayed configuration screen for ease of use.



The first configuration screen displays the "Basic Settings" for the test and includes "Direction", "Distance Compensation", "Preload", "Data Rate", "Auto Zero" and Auto Return".



Select the required "**Direction**" using the controls on the left-hand side of the screen. Note that Compression means move the crosshead downwards during the test and Tension means move the crosshead upwards during the test.

Please note that some special fixtures may need the opposite direction to be selected, e.g.. a compression cage will require Tension mode to compression the sample.

The "**Distance Compensation**" is a specialized feature that is required when distance accuracy is important, and this is explained in section 11.

Decide if the test requires a "**Pre-Load**". Pre-Load effectively zeroes the distance measurement at the preload force and is used when there is a possibility that the sample may be slack in the fixture or when performing a compression test.

If a preload is not required, leave the "PRELOAD FORCE" value set to 0.

If a preload is required, press on the "PRELOAD FORCE" entry field to display a numerical keypad, enter the required value then press on the ENTER button.

If any numeric field needs to be edited after an initial value has been entered, press two times (double tap) on the relevant entry field.

To enter a barcode into the required field, press on the edit box field above the keyboard to enable the field then scan the barcode.

To change the unit (which will be initially set to the "Default" Force unit), press the button to the right of the Preload Force entry field to cycle through the available units.

If a preload force has been defined, press on the "PRELOAD SPEED" entry field to display a numerical keypad, enter the required value then press on the ENTER button. To change the unit (which will be initially set to the "Default" Force unit), press the button to the right of the Preload Speed entry field to cycle through the available units.

The "**Data Rate**" is the speed of data read and stored during a test. For most tests a 100Hz (100 samples a second) data rate will provide accurate readings of force, distance and time. The amount of data stored at 100Hz will not use an excessive amount of system memory.

When performing very long tests, it is recommended that the data rate is reduced to use less memory and a suitable data rate is 10Hz. When performing very short tests, the data rate can be increased up to 1000Hz, if required, noting that more memory will be used during the test because more data is being stored. A higher rate helps capture rapid changing events.

Select the required "**Auto Zero**" action using the controls on the right-hand side of the screen. When Auto Zero is selected, the force tester distance and force will be set to Zero before every test.

However, please note that this feature can cause incorrect force readings especially if wedge grips are being used. When a wedge grip is tightened, a compressive force may be applied to the sample and if this is zeroed out by the Auto Zero function, a force offset is produced, and any measured force values will be incorrect.

It is therefore recommended that the force tester is Zeroed before a BATCH of tests is started and NOT zeroed between each test.

Select the required "**Auto Return at End**" action using the control on the right-hand side of the screen. The force tester will stop at the end of the test unless "**Auto Return at End**" has been selected when the crosshead will return to its home position.

Note that the home position is the position where the crosshead was when the force tester was last zeroed so is usually the start of test position.

Note that the use of Automatic Return may cause damage to the Loadcell and/or the grips at the end of a Tension test if the crosshead returns after breaking a stiff sample, e.g. a rigid plastic or metal sample.

Absolute Zero is required when a test needs to start from the same reference point zero and travel to a distance from zero no matter where the crosshead's position is at. See paragraph 8.0 for additional information.

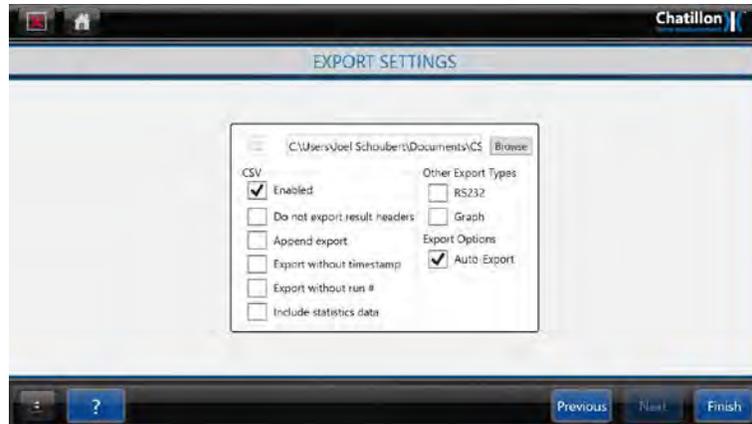
This is because the sample will generally have increased in length during the test, so a compressive force will be applied to the Loadcell and grips as the crosshead returns at maximum speed to its home position.

7.2 TEST LIMITS SCREEN (See Paragraph 8.5 Test Limits Screen)

7.3 EXPORT SETTINGS SCREEN

After the Limits have been set, press on the **"NEXT"** button at the bottom of the screen to display the **"EXPORT SETTINGS"** screen. If NO results are to be exported or printed, press on the **"FINISH"** button at the right of the screen to display the **"QUICK TEST -TEST GRAPH"** screen.

If the measured results are to be exported or printed, then press on the "File Name" entry field to display an alphanumeric keypad. Enter the required File name then press on the ENTER button. Press on the "BROWSE" button to display a "Browse for Folder" dialog then select (or create) the required folder to contain this information.



7.4 DISPLAYING THE TEST SCREEN

After the Export Settings have been set, press on the **"FINISH"** button at the bottom of the screen to display the **"QUICK TEST -TEST GRAPH"** screen.



Please refer to section 10 for details regarding test samples.

8.0 Defining a Compression or Tension Test

The "**Quick Test**" feature shown in section 7 does not store any test data in a test file so these tests cannot be analyzed at a later date.

Therefore, 3 other options are provided to create test files that are used to store test results and graphical data and these files can be analyzed at a later date.

8.1 CREATING A COMPRESSION TEST FILE

This option is provided to create a Compression Test File.

8.2 CREATING A TENSION TEST FILE

This option is provided to create a Tension Test File.

8.3 TEST FILE

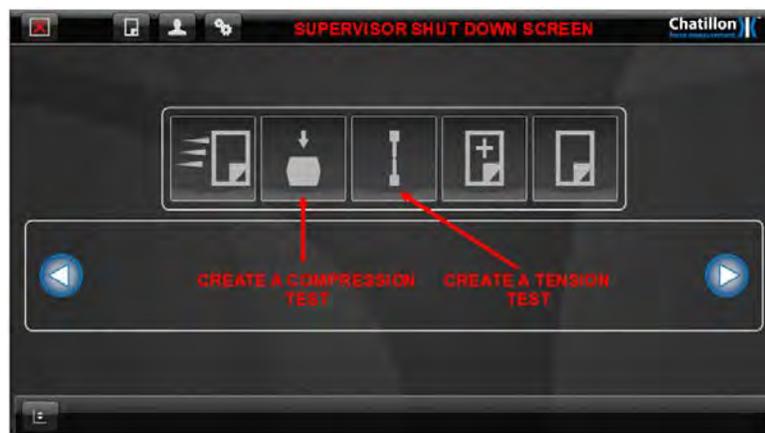
The test file is used to store the test parameters, test results and graphical data. These files are used to test samples immediately after the file is created but can also be used to test further samples at a later date. This allows the statistics of many samples to be viewed and analyzed.

Please note that the creation of a Compression Test File and the Creation of a Tension Test File use the same procedures as shown in the following sections.

Note that the machine can only store a maximum of 50 Tests.

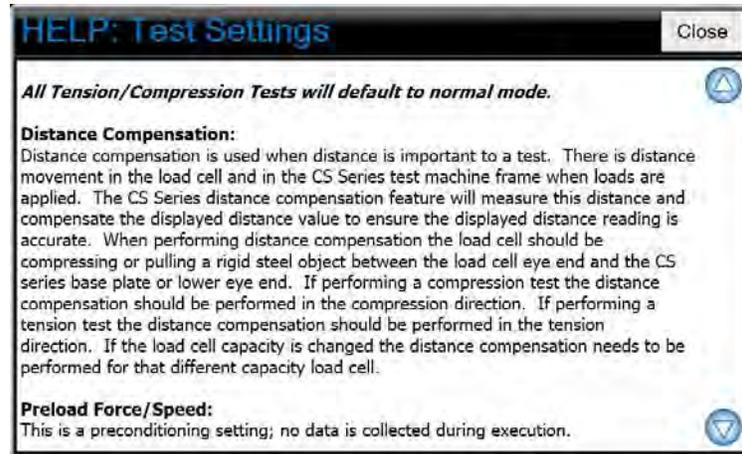
8.4 BASIC SETTINGS SCREEN

Press the large "**COMPRESSION**" Icon on the "**HOME**" screen or the large "**TENSION**" Icon on the "**HOME**" screen (as required) to display the "**TEST SETTINGS**" screen.



A test is created by moving through a sequence of configuration screens which is intuitive and easy to use.

Each configuration screen has a "HELP (?)" button at the bottom of the screen and pressing this "?" button will display the relevant "HELP" screen. Each help screen only displays the information for the appropriate configuration screen for ease of use.



The first configuration screen displays the "Basic Settings" for the test and includes "Test Name", "Test Image", "Distance Compensation", "Preload", "Data Rate", "Auto Zero", "Auto Return", and "Absolute Distance".



Note that there is NO "Direction" selector because the test direction has already been selected using the large icons on the "Home" screen

Press on the "Test Name" entry field to display the alphanumeric keypad then enter the required name for the test file.

Please note that if a Test Name is NOT entered, then the system will automatically name the test files "New Test" followed by a sequential test number in brackets, e.g. "New (Test 1)", "New (Test 2)", "New (Test 3)" etc.

For information, the test files are stored in the control console in a folder called "**C:\Documents and Settings\MyUser**". The operator does not have to use Windows to select, use or store these test files because these functions are built into the Dedicated Test Program.

A small picture can be displayed in the Test Selector area (see later) to assist the operator when selecting a test file. The picture should be in **.jpg** format and this must be stored in the "**C:\Documents and Settings\MyUser**" folder.

WINDOWS explorer is needed to copy these picture files, so the CS2 program must be closed and the operator logged onto Windows as an Administrator.

If a picture is required (and it has already been copied to the folder) then press on the "BROWSE" button to display a "File Open" dialog, then select the required picture file.

The "**Distance Compensation**" is a specialized feature that is required when distance accuracy is important and this is explained in section 11.

Decide if the test requires a "**Pre-Load**". Pre-Load effectively zeroes the distance measurement at the preload force and is used when there is a possibility that the sample may be slack in the fixture or when performing a compression test. If a preload is not required, leave the "PRELOAD FORCE" value set to 0.

If a preload is required, press on the "PRELOAD FORCE" entry field to display a numerical keypad, enter the required value then press on the ENTER button. To change the unit (which will be initially set to the "Default" Force unit), press the button to the right of the Preload Force entry field to cycle through the available units.

If any numeric field needs to be edited after an initial value has been entered, press two times (double tap) on the relevant entry field.

To enter a barcode into the required field, press on the edit box field above the keyboard to enable the field then scan the barcode.

If a preload force has been defined, press on the "PRELOAD SPEED" entry field to display a numerical keypad, enter the required value then press on the ENTER button. To change the unit (which will be initially set to the "Default" Force unit), press the button to the right of the Preload Speed entry field to cycle through the available units.

The "**Data Rate**" is the speed of data read and stored during a test. For most tests a 100Hz (100 samples a second) data rate will provide accurate readings of force, distance and time. The amount of data stored at 100Hz will not use an excessive amount of system memory.

When performing very long tests, it is recommended that the data rate is reduced to use less memory and a suitable data rate is 10Hz. When performing very short tests, the data rate can be increased up to 1000Hz, if required, noting that more memory will be used during the test because more data is being stored. A higher rate helps capture rapid changing events.

Select the required "Auto Zero" action using the controls on the right-hand side of the screen. When Auto Zero is selected, the force tester distance and force will be set to Zero before every test.

However, please note that this feature can cause incorrect force readings especially if wedge grips are being used. When a wedge grip is tightened, a compressive force may be applied to the sample and if this is zeroed out by the Auto Zero function, a force offset is produced and any measured force values will be incorrect.

It is therefore recommended that the force tester is Zeroed before a BATCH of tests is started and NOT zeroed between each test

Select the required "Auto Return at End" action using the control on the right-hand side of the screen. The force tester will stop at the end of the test unless "Auto Return at End" has been selected when the crosshead will return to its home position. Note that the home position is the position where the crosshead was when the force tester was last zeroed so is usually the start of test position.

Note that the use of Automatic Return may cause damage to the Loadcell and/or the grips at the end of a Tension test if the crosshead returns after breaking a stiff sample, e.g. a rigid plastic or metal sample. This is because the sample will generally have increased in length during the test so a compressive force will be applied to the Loadcell and grips as the crosshead returns at maximum speed to its home position.

When "Absolute Distance" is checked, all limits will be referenced from the Absolute Distance instead of the Relative Position of the Cross-head.

The "Absolute Distance" is used when a test requires to use the same height no matter where the cross head is located before the test. For example, if the crosshead is jogged away from the Absolute Distance to place a part between compression plates, the crosshead will move back to the Absolute Height and then stop to the preset distance limit.

8.5 TEST LIMITS SCREEN

After the basic settings have been set, press on the "OK" button at the bottom of the screen to display the "LIMITS" screen.



Define the required "Test Speed". Press on the "TEST SPEED" entry field to display a numerical keypad, enter the required value then press on the ENTER button. To change the unit (which will be initially set to the "Default" Force unit), press the button to the right of the Test Speed entry field to cycle through the available units.

Decide how the test is to end. There are 2 methods provided to stop a test and these can be used together.

- 1 Stop at a "Limit", which can either be a force or a distance
- 2 Stop when the sample "Breaks", i.e. the force drops in a defined way

a Stop at a Force Value

To stop the test at a force value, select the "LOAD" option, press in the "LOAD" entry field to display a numerical keypad, enter the required value then press on the ENTER button.

To change the unit (which will be initially set to the "Default" Force unit), press the button to the right of the Load entry field to cycle through the available units.

b Stop at a Distance Value

To stop the test at a distance value, select the "DISTANCE" option, press on the "DISTANCE" entry field to display a numerical keypad, enter the required value then press on the ENTER button. To change the unit (which will be initially set to the "Default" Force unit), press the button to the right of the Distance entry field to cycle through the available units.

c Stop ONLY when the Sample Breaks

To stop ONLY when the sample breaks, select the "NO LIMITS" option then define the "Break" operation using the controls on the right-hand side of the screen. (See later). **Note: "No Limits" can only be selected if a Break Test is selected.**

d Stop at a Force Value or when the Sample Breaks

To stop the test at a force value OR if the sample breaks, select and define the "LOAD" option as shown above, then define the "Break" operation using the controls on the right-hand side of the screen. (See later).

To change the unit (which will be initially set to the "Default" Force unit), press the button to the right of the Load entry field to cycle through the available units.

e Stop at a Distance Value or when the Sample Breaks

To stop the test at a distance value OR if the sample breaks, select and define the "DISTANCE" option as shown above, then define the "Break" operation using the controls on the right-hand side of the screen. (See later).

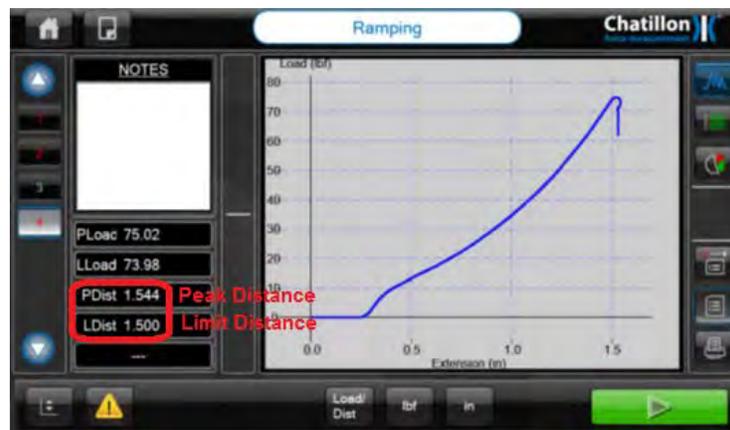
To change the unit (which will be initially set to the "Default" Force unit), press the button to the right of the Distance entry field to cycle through the available units.

The **"Ramping"** when enabled, acts as a damper before a Limit is reached and helps reduce "Overshoot" conditions for Force and Displacement.

The ramping is to be ON when it is critical to end the test at a precise Load or Distance limit. Ramping is ON by default for every new test created. It is vital to have Ramping ON when Testing hard materials and/or when the compression test ends very close to any hard surfaces to assure that the CS2 Tester doesn't overshoot the limit.



Ramping turned on



Ramping turned off

The Ramping is to be turned OFF when Peak Results and Data must capture an event close to the set limits. Caution: When Ramping is turned OFF, the motor will drive past the set Load or Distance Limits.

Defining a Sample Break

Decide what is considered to be sample break. There are 2 methods provided to detect a sample break together with an optional threshold.

- a Sharp Break Detector
- b Percentage Drop Detector

The Sharp Break detector will detect a break if the force falls quickly so is suitable for samples that break quickly, **usually with some noise.**

The Percentage Drop detector will detect a break if the force falls to a specified percentage of the maximum load so is suitable for **samples that crack or tear** so that the load falls too slowly for the Sharp Break Detector to operate correctly.

Therefore, this is mainly used as a safety feature or as a special Force Drop indicator, so it is important to note that the "Break Load" value may **NOT** give a useful result.

In both cases, the Break Detector is inhibited at low load values to prevent it from triggering if the load falls slightly due to grip movement or noise etc. and the required threshold load (starting load) is entered in the Activate box **and will stop ONLY when the Sample Breaks**

To stop ONLY when the sample breaks, select the "NO LIMITS" option then define the "Break" operation using the controls on the right-hand side of the screen. (See later). **Note: "No Limits" can only be selected if a Break Test is selected.**

8.6 QUESTION SCREEN

After the Export Settings have been set, press on the "OK" button at the bottom of the screen to display the "**QUESTION**" screen.

This screen allows a single question to be displayed either before a test or after a test. The question prompt will appear before or after the selected stage sequence. If NO question is required, press on the "**CANCEL**" button at the right of the screen to display the "**TEST RESULTS**" screen.

If a question is required, select the required option then press on the "Label" entry field to display an alphanumeric keypad. Enter the required Label then press on the ENTER button. Press on the "Question" entry field to display an alphanumeric keypad. Enter the required Question then press on the ENTER button.



Note that the "Label" cannot be more than 7 characters long, but the "Question" can consist of up to 22 characters. The "Label" is used to display the information on the screen, but the "Question" is used to display a user prompt on the question dialog. (See later).

8.7 TEST RESULTS SCREEN

After the question has been set, press on the **"NEXT"** button at the bottom of the screen to display the **"TEST RESULTS"** screen.



Press on the top left drop-down button labeled **"NONE"** to display a drop-down list containing "NONE", "OVERALL RESULTS", optionally "QUESTION STAGE" and "TENSION STAGE".

Note that the last option of **"TENSION STAGE"** will be replaced by **"COMPRESSION STAGE"** if a Compression Test was selected from the **"HOME"** screen.



If the **"OVERALL RESULTS"** option is selected using the top left drop-down button, then pressing on the drop-down button underneath it will display a second drop-down list.

This list provides test results that are based upon general test information and contains "NONE", "TIME DURATION", "OVERALL PASS/FAIL RESULT", "RECORD NUMBER", "DATE" and "TIME".



If the **"QUESTION STAGE"** option is selected using the top left drop-down button, then pressing on the second drop-down button will display a second drop-down list.

This list provides test results that are based upon the question so only contains "ANSWER".

If the **"TENSION STAGE"** option is selected using the top left drop-down button, then pressing on the drop-down button underneath it will display a second drop-down list.

This list provides test results that are based on the force tester measurements and contains "NONE", "PEAK LOAD", "BREAK LOAD", "AVERAGE LOAD", "LOAD AT LIMIT", "CUSTOM LOAD AVERAGING", "SECOND PEAK LOAD," "SPRING RATE", "DISTANCE AT PEAK LOAD", "DISTANCE AT BREAK", "DISTANCE AT PEAK" and "DISTANCE AT LIMIT", "DISTANCE AT SECOND PEAK LOAD".



The selected result will be available for printing and exporting (see later) but can also be displayed on the graph screen after each test. To display this result, check the checkbox to the left of the result selectors.

Note that only 5 results can be displayed on the graph screen and any remaining checkboxes will be disabled after 5 results have been selected.

If a **"TENSION STAGE"** result is selected, the controls to the right-hand side of the result selectors are now enabled and these can be used to provide Pass/Fail criteria for the selected test result. The Pass/Fail values can be either Min/Max or Variance. Select the required option then enter the required values and units.

The test will be identified as a "Pass" if **ALL** "Pass/Fail" parameters are met otherwise it will be identified as a "Fail". The "Pass/Fail" status is shown by the color of the test number shown at the left-hand side of the "Test Screen" as shown in section 11.

If a Pass parameter is a "Peak Load" value between (say) 12 lbf and 18 lbf, then the MIN value should be set to 12 lbf and the MAX value should be set to 18 lbf.

If any numeric field needs to be edited after an initial value has been entered, press two times (double tap) on the relevant entry field.

To enter a barcode into the required field, press on the edit box field above the keyboard to enable the field then scan the barcode.

Note that BOTH values must be entered, so if a Pass parameter is a "Break Load" value of greater than (say) 12 lbf, then the MIN value should be set to 12 lbf and the MAX value should be set to the Loadcell capacity, e.g. 225 lbf.

8.8 ARCHIVE AND EXPORT SETTINGS SCREEN

After the Test Results have been selected, press on the **"NEXT"** button at the bottom of the screen to display the **"ARCHIVE AND EXPORT SETTINGS"** screen.



If NO results are to be exported or printed, press on the **"FINISH"** button at the right of the screen to display the **"TEST GRAPH"** screen.

If the measured results are to be exported or printed, then press on the "File Name" entry field to display an alphanumeric keypad. Enter the required File name (without a suffix) then press on the ENTER button. Press on the "BROWSE" button to display a "Browse for Folder" dialog then select (or create) the required folder to contain this information.

To export the data to the specified CSV file, enable the CSV option.

To create a pdf document, select the Graph option.

To Auto Export a CSV or Graph, select the “**Auto-Export**” box.

To Export Results in ASCII format through the RS232 port select the “**RS232**” box.

To exclude result headers from the data output select “Do not export result headers” option.

To add results to an existing CSV file, select the “**Append Export**”.

The statistics data includes the maximum, minimum, median and mean values for each measured result.

If the user requires only numerical data to be exported such as Peak Force or Distance at Limit you can select “**Export without Run #**” and “Do not export result headers” options.

The “**AUTO ARCHIVE**” option automatically exports the data when the required number of tests have been performed then empties the test file ready for additional tests. This reduces the amount of memory required. If the “Auto-archive after 500 test runs” box is not checked the CS Series console will automatically archive the data after 500 test runs to the default folder **C:\Documents and Settings\MyUser\My Documents\CSX**.

Check the “**AUTO ARCHIVE AFTER TEST**” box to automatically archive after each test.

8.9 DISPLAYING THE TEST GRAPH SCREEN

After the Export Settings have been set, press on the “**FINISH**” button at the bottom of the screen to display the “**TEST GRAPH**” screen.

This screen has a title showing the previously entered test name.



Please refer to section 10 for details regarding test samples.

9.0 Defining a Multi-Action Test

The "Compression" or "Tension" tests shown in section 8 are used to store test results and graphical data and these files can be analyzed at a later date.

However, these tests only provide a single test action and do not provide a "Sample Height" feature so there is another option to create a Multi-Action (Multi-Stage) test file that is used to store test results and graphical data and this file can be analyzed at a later date.

9.1 CREATING A MULTI-ACTION TEST FILE

This option is provided to create a Multi-Action Test File that will be used to store the test parameters, test results and graphical data. These files are used to test samples immediately after the file is created but can also be used to test further samples at a later date. This allows the statistics of many samples to be viewed and analyzed.

A Multi-Action Test can be used to create a cyclic test, a constant load test, a relaxation test and special tests where the operator can remove the sample for visual examination etc. A Multi-Action test can consist of Tensile Stages, Compressive Stages, Creep (Hold Load) Stages, Relaxation (Hold Extension) Stages, Zero Stages and Question Stages.

A Multi-Action Test also provides a "Height" or "Datum" feature that allows the height of a sample to be automatically measured during the test. This is useful for testing springs and foams, etc. where the sample is compressed to a percentage of its original height (length).

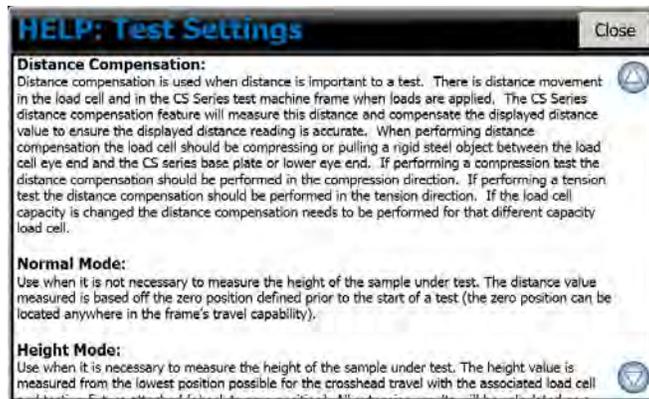
Note that a cyclic test is created by defining the required actions then repeating these actions for a specified number of times or for a specified time duration. Therefore, there is NO screen provided for defining a cyclic test, only the screens to define the actions and the repeat conditions.

9.2 BASIC SETTINGS SCREEN

Press the large "**MULTI-ACTION**" icon on the "**HOME**" screen to display the "**TEST SETTINGS**" screen.

A test is created by moving through a sequence of configuration screens which is intuitive and easy to use.

Each configuration screen has a "**HELP (?)**" button at the bottom of the screen and pressing this "**?**" button will display the relevant "**HELP**" screen. Each help screen only displays the information for the appropriate configuration screen for ease of use.



The first configuration screen displays the "Basic Settings" for the test and includes "Test Name", "Test Image", "Height Mode", "Distance Compensation", "Preload", "Data Rate", "Auto Zero" and "Auto Return".

Press on the "Test Name" entry field to display the alphanumeric keypad then enter the required name for the test file.

Please note that if a Test Name is NOT entered, then the system will automatically name the test files "New Test" followed by a sequential test number in brackets, e.g. "New Test (1)", "New Test (2)", "New Test (3)" etc.

For information, the test files are stored in the control console in a folder called "**C:\Documents and Settings\MyUser\My Documents\CSX**". The operator does not have to use Windows to select, use or store these test files because these functions are built into the Dedicated Test Program.

A small picture can be displayed in the Test Selector area (see later) to assist the operator when selecting a test file. The picture should be in .jpg format and this needs to be stored in the "**C:\Documents and Settings\MyUser\My Documents\CSX**" folder.

WINDOWS explorer is needed to copy these picture files so the CS2 program must be closed and the operator logged onto Windows as an Administrator.

If a picture is required (and it has already been copied to the folder) then press on the "BROWSE" button to display a "File Open" dialog, then select the required picture file.

The "**Height Mode**" is a specialized feature that is required for automatic sample height measurement and this is explained in section 12. This feature is disabled when "Absolute Distance" is enable.

The "**Distance Compensation**" is a specialized feature that is required when distance accuracy is important and this is explained in section 11.

Decide if the test requires a "**Pre-Load**". Pre-Load effectively zeroes the distance measurement at the preload force and is used when there is a possibility that the sample may be slack in the fixture or when performing a compression test. This feature is disabled when "Absolute Distance" is enable.

If a preload is not required, leave the "PRELOAD FORCE" value set to 0.

If a preload is required, press on the "PRELOAD FORCE" entry field to display a numerical keypad, enter the required value then press on the ENTER button. To change the unit (which will be initially set to the "Default" Force unit), press the button to the right of the Preload Force entry field to cycle through the available units.

If any numeric field needs to be edited after an initial value has been entered, press two times (double tap) on the relevant entry field.

To enter a barcode into the required field, press on the edit box field above the keyboard to enable the field then scan the barcode.

If a preload force has been defined, press on the "PRELOAD SPEED" entry field to display a numerical keypad, enter the required value then press on the ENTER button. To change the unit (which will be initially set to the "Default" Force unit), press the button to the right of the Preload Speed entry field to cycle through the available units.

The "**Data Rate**" is the speed of data read and stored during a test. For most tests a 100Hz (100 samples a second) data rate will provide accurate readings of force, distance and time. The amount of data stored at 100Hz will not use an excessive amount of system memory.

When performing very long tests, it is recommended that the data rate is reduced to use less memory and a suitable data rate is 10Hz. When performing very short tests, the data rate can be increased up to 1000Hz, if required, noting that more memory will be used during the test because more data is being stored. A higher rate helps capture rapid changing events. Higher data rates will take longer for the data to be saved at the end of the test.

Select the required "**Auto Zero**" action using the controls on the right-hand side of the screen. When Auto Zero is selected, the force tester distance and force will be set to Zero before every test. This feature is disabled when "Absolute Distance" is enable.

However, please note that this feature can cause incorrect force readings especially if wedge grips are being used. When a wedge grip is tightened, a compressive force may be applied to the sample and if this is zeroed out by the Auto Zero function, a force offset is produced and any measured force values will be incorrect.

It is therefore recommended that the force tester is Zeroed before a BATCH of tests is started and NOT zeroed between each test. This will also improve repeatability of results.

Select the required "**Auto Return at End**" action using the control on the right-hand side of the screen. The force tester will stop at the end of the test unless "**Auto Return at End**" has been selected when the crosshead will return to its home position. Note that the home position is the position where the crosshead was when the force tester was last zeroed so is usually the start of test position. This feature is disabled when "Absolute Distance" is enable.

Note that the use of Automatic Return may cause damage to the Loadcell and/or the grips at the end of a Tension test if the crosshead returns after breaking a stiff sample, e.g. a rigid plastic or metal sample. This is because the sample will generally have increased in length during the test so a compressive force will be applied to the Loadcell and grips as the crosshead returns at maximum speed to its home position.

9.3 SELECT NEXT STAGE SCREEN

After the basic settings have been set, press on the "**NEXT**" button at the bottom of the screen to display the "**SELECT NEXT STAGE**" screen.

This screen allows one or more "Test Actions" to be defined to create a test sequence.



The icon at the left-hand side of the screen shown above shows "Normal Mode" (Red dot halfway up the vertical line).



The icon at the left-hand side of the screen shown above shows "Height Mode" (Red dot at the bottom of the vertical line).

Note that the "CYCLE" and "HOLD" buttons are not enabled until either a "TENSION" Stage or a "COMPRESSION" Stage have been defined.

9.4 CREATE A TENSION STAGE

Press on the "TENSION" button in the center of the screen to display the "**LIMITS**" screen.

Define the required "**Test Speed**". Press on the "TEST SPEED" entry field to display a numerical keypad, enter the required value then press on the ENTER button. To change the unit (which will be initially set to the "Default" Force unit), press the button to the right of the Test Speed entry field to cycle through the available units.

Decide how the test is to end. There are 2 methods provided to stop a test and these can be used together.

- 1 Stop at a "Limit", which can either be a force or a distance
- 2 Stop when the sample "Breaks", i.e. the force drops in a defined way

a Stop at a Force Value

To stop the test at a force value, select the "LOAD" option, press on the "LOAD" entry field to display a numerical keypad, enter the required value then press on the ENTER button. To change the unit (which will be initially set to the "Default" Force unit), press the button to the right of the Load entry field to cycle through the available units.

b Stop at a Distance Value

To stop the test at a distance value, select the "DISTANCE" option, press on the "DISTANCE" entry field to display a numerical keypad, enter the required value then press on the ENTER button. To change the unit (which will be initially set to the "Default" Force unit), press the button to the right of the Distance entry field to cycle through the available units.

c Stop ONLY when the Sample Breaks

To stop ONLY when the sample breaks, select the "NO LIMITS" option then define the "Break" operation using the controls on the right-hand side of the screen. (See later).

Note: "No Limits" can only be selected if a Break Test is selected.

d Stop at a Force Value or when the Sample Breaks

To stop the test at a force value OR if the sample breaks, select and define the "LOAD" option as shown above, then define the "Break" operation using the controls on the right-hand side of the screen. (See later).

e Stop at a Distance Value or when the Sample Breaks

To stop the test at a distance value OR if the sample breaks, select and define the "DISTANCE" option as shown above, then define the "Break" operation using the controls on the right-hand side of the screen. (See later).

f Defining a Sample Break

Decide what is considered to be sample break. There are 2 methods provided to detect a sample break together with an optional threshold.

a Sharp Break Detector

b Percentage Drop Detector

The Sharp Break detector will detect a break if the force falls quickly so is suitable for samples that break quickly, **usually with some noise**.

The Percentage Drop detector will detect a break if the force falls to a specified percentage of the maximum load so is suitable for **samples that crack or tear** so that the load falls too slowly for the Sharp Break Detector to operate correctly.

Therefore, this is mainly used as a safety feature or as a special Force Drop indicator so it is important to note that the "Break Load" value may **NOT** give a useful result.

In both cases, the Break Detector is inhibited at low load values to prevent it from triggering if the load falls slightly due to grip movement or noise etc. and the required threshold load (starting load) is entered in the Activate box.

When the "Tension" Stage has been defined, press on the "OK" button at the bottom of the screen to return to the "**SELECT NEXT STAGE**" screen. This screen now shows an Icon at the right-hand side of the screen and the picture on this Icon shows that "1" is a "Tension" Stage.



If no other stages are required, press on the "NEXT" button at the bottom of the screen to display the "**QUESTION**" screen. If other stages are required, refer to the following sections.

9.5 CREATE A CYCLE TEST

A "Simple" cycle test consists of 2 stages that are repeated for a set number of times. The first action could be (say) move upwards by 10 inches and the second action could be (say) move downwards to the initial starting position. This action requires 2 TENSION Stages that have stage limits of "10 in" and "0 in" respectively.

Note that the "Return" Stage is still a **TENSION** Stage because the crosshead does not move below the initial starting position.

When these 2 stages have been defined, the "**SELECT NEXT STAGE**" screen now shows 2 Icons at the right-hand side of the screen and BOTH pictures show a "Tension" Stage.



This test action will perform 1 cycle, e.g. move up by 10 inches then move back to the start of test position. Also note that the "CYCLE" button is now enabled.

To create a multi-cycle test, press on the "CYCLE" button in the center of the screen to display the "**CYCLE**" screen.



Decide how the cycling is to end. The 2 methods provided to end the cycling and in both cases, the test action is repeated from Stage 1 (Simple Cycle).are: -

- 1 Stop after a defined number of cycles.
- 2 Stop at the end of the SECOND stage when the test duration exceeds the specified time value.

Assume that the test action (e.g. move up by 10 inches then move back to the start of test position) takes 18 seconds for each cycle. The time at the end of cycle 1 is 18 seconds, end of cycle 2 is 36 seconds, end of cycle 3 is 54 seconds and end of cycle 4 is 72 seconds. If a test duration of 60 seconds (1 minute) is selected, the test will end at the end of cycle 4.

When the cycle action has been defined, the "**SELECT NEXT STAGE**" screen now shows 3 icons at the right-hand side of the screen with the cycle "Loop" indicated by a "Bracket".



Note that the "Cycle" feature can only be used once in a complete test so the "CYCLE" button is disabled after it has been used.

Also note that a "Cycle" action can consist of more than 2 Stages and can occur anywhere within the test sequence, e.g.

- 1 Move up by 5 inches then move up another 2 inches then move back to the start of test position. Repeat this action for 10 times.
- 2 Apply 20 lbf then cycle between 40 lbf and 50 lbf for 10 times.

9.6 CREATE A COMPRESSION STAGE

A "Compression" Stage is created in the same way as a "Tension" Stage, i.e. press on the "COMPRESSION" button in the center of the screen to display the "**LIMITS**" screen.

9.7 CREATE A HOLD LOAD STAGE

A "Hold Load" Stage is used to maintain a "Constant Load" on the sample for a specified time period and is commonly used to measure "Sample Creep" so is also called a CREEP Test. The Force Tester is set to a special mode to move the crosshead as necessary to maintain the specified load for the required time period.

Typical tests are foam tests, carton tests, paint can strength, seal strength (go/no go). The test either checks that the sample can withstand the force for a time period or measures the change in sample size over the time period.

Press on the "HOLD" button in the center of the screen to display the "**HOLD LIMITS**" screen.

Select "LOAD" to define a CREEP Test then enter the required HOLD duration.



9.8 CREATE A HOLD EXTENSION STAGE

A "Hold Extension" Stage is used to hold the Crosshead at a fixed position for a specified time period and is also called a RELAXATION Test.

Typical tests are rubber door seals. The seal is held at a fixed distance between the door and the frame and the test measures the change in seal force over the time period.

Press on the "HOLD" button in the center of the screen to display the "**HOLD LIMITS**" screen.

Select "DISTANCE" to define a RELAXATION Test then enter the required HOLD duration.

9.9 CREATE A ZERO STAGE

The Load and Distance values may be automatically zeroed at the beginning of the test by using the Auto Zero feature. However, these values may also be zeroed during a test by selecting a Zero Stage.

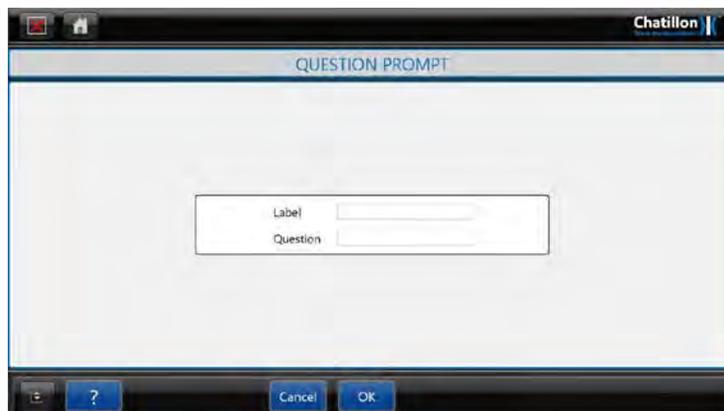
Press on the "ZEROING" button in the center of the screen to display the "**ZEROING**" screen.



Select "ZERO LOAD VALUE" and / or "ZERO DISTANCE VALUE" as required. Note that the crosshead will stop briefly to allow the system to zero.

Also note that if the DISTANCE option is selected, then the crosshead will not return to its start of test position during an Auto Return.

9.10 CREATE A USER INPUT STAGE



A dialog can be displayed during the test sequence to prompt the user to perform some action or to request information from the user. This information is stored in the test file but cannot be used to control the test.

Press on the "Label" entry field to display an alphanumeric keypad. Enter the required Label then press on the ENTER button. Press on the "Question" entry field to display an alphanumeric keypad. Enter the required Question then press on the ENTER button.

Note that the "Label" cannot be more than 7 characters long, but the "Question" can consist of up to 22 characters. The "Label" is used to display the information on the screen, but the "Question" is used to display a user prompt on the question dialog. (See later).

9.11 EDITING OR DELETING A STAGE

A previously defined stage can be edited or deleted as required. Select the required stage by pressing on it in the "STAGE LIST" shown on the right-hand side of the screen, to enable the "EDIT" and "DELETE" buttons.

Press the "EDIT" button to redisplay the relevant configuration screen then change the settings as required.

Press the "DELETE" button to remove the stage from the "STAGE LIST".

Note that there is NO undo feature to restore a deleted stage.



9.12 ADDING A STAGE

Pressing on one of the 6 stage buttons will normally add the new stage to the bottom of the "STAGE LIST" which is shown on the right-hand side of the screen.

However, a stage may be inserted WITHIN the "STAGE LIST" by selecting the stage BELOW the required new stage and then pressing on one of the 6 stage buttons to add the new stage ABOVE the selected stage.

The screen below shows that stage 3 is selected.



If the "HOLD" stage button is pressed, then a "HOLD" stage will be inserted between stages 2 and 3 so that the "CYCLE" stage now becomes stage 4. Note that the Cycle Loop "Bracket" now encloses stages 1 to 4.



If another stage is required at the BOTTOM of the stage list and a stage is selected, press on the "EDIT" button to view the stage then close the stage. All stages will be de-selected in the "STAGE LIST" so the next stage will be added at the bottom of the "STAGE LIST".

9.13 TEST RESULTS SCREEN

After all stages have been set, press on the "NEXT" button at the bottom of the screen to display the "TEST RESULTS" screen.

Press on the top left drop-down button labeled "NONE" to display a drop-down list containing a list of every stage shown in the "STAGE LIST" on the right-hand side of the "SELECT NEXT STAGE" screen.

This list could contain "NONE", "OVERALL RESULTS", "TENSION STAGE", "COMPRESSION STAGE", "HOLD STAGE", "ZEROING STAGE", "QUESTION STAGE" and/or "CYCLE STAGE".



If the **"OVERALL RESULTS"** option is selected using the top left drop-down button then pressing on the drop-down button underneath it will display a second drop-down list.

This list provides test results that are based upon general test information and contains "NONE", "TIME DURATION", "OVERALL PASS/FAIL RESULT", "RECORD NUMBER", "DATE" and "TIME".



If the **"TENSION STAGE"** or **"COMPRESSION STAGE"** option is selected using the top left drop-down button then pressing on the drop down button underneath it will display a second drop-down list.

This list provides test results that are based on the force tester measurements and contains "NONE", "PEAK LOAD", "BREAK LOAD", "AVERAGE LOAD", "LOAD AT LIMIT", "CUSTOM LOAD AVERAGE", "SECOND PEAK LOAD", "SPRING RATE", "DISTANCE AT PEAK LOAD", "DISTANCE AT BREAK", "DISTANCE AT PEAK" and "DISTANCE AT LIMIT", "DISTANCE AT SECOND PEAK LOAD".



The selected result will be available for printing and exporting (see later) but can also be displayed on the graph screen after each test. To display this result, check the checkbox to the left of the result selectors.

Note that only 5 results can be displayed on the graph screen and any remaining checkboxes will be disabled after 5 results have been selected.

If the **"QUESTION STAGE"** option is selected using the top left drop-down button then pressing on the second drop-down button will display a second drop down list.

This list provides test results that are based upon the question so only contains "ANSWER".

If the **"CYCLE STAGE"** option is selected using the top left drop-down button then pressing on the second drop-down button will display a second drop-down list. This list provides test results that are based upon cycling so only contains "CYCLES COMPLETED".

Note that the **"HOLD STAGE"** and **"ZEROING STAGE"** options do not provide any test results.

If a **"TENSION STAGE"** or **"COMPRESSION STAGE"** result is selected, the controls to the right-hand side of the result selectors are now enabled and these can be used to provide Pass/Fail criteria for the selected test result. The Pass/Fail values can be either Min/Max or Variance. Select the required option then enter the required values and units.

The test will be identified as a "Pass" if **ALL** "Pass/Fail" parameters are met otherwise it will be identified as a "Fail". The "Pass/Fail" status is shown by the color of the test number shown at the left-hand side of the "Test Screen" as shown in section 10.

If a Pass parameter is a "Peak Load" value between (say) 12 lbf and 18 lbf, then the MIN value should be set to 12 lbf and the MAX value should be set to 18 lbf.

If any numeric field needs to be edited after an initial value has been entered, press two times (double tap) on the relevant entry field.

To enter a barcode into the required field, press on the edit box field above the keyboard to enable the field then scan the barcode.

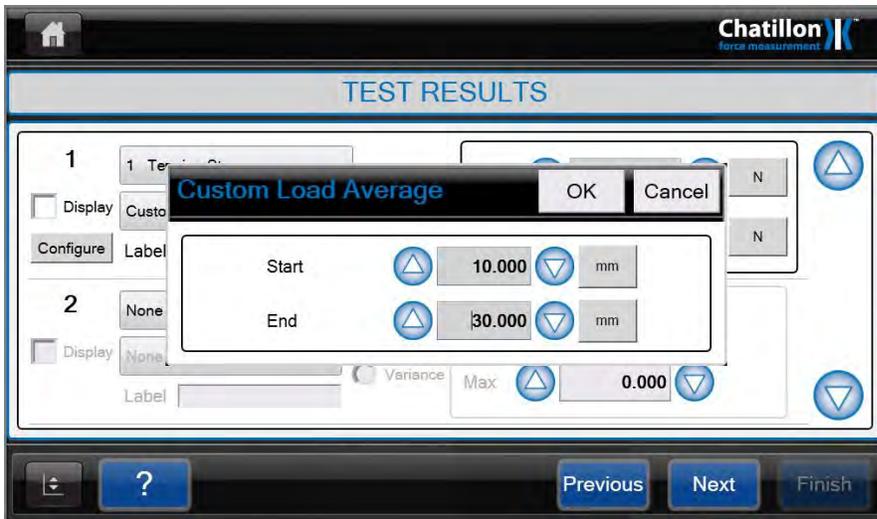
Note that BOTH values must be entered, so if a Pass parameter is a "Break Load" value of greater than (say) 12 lbf, then the MIN value should be set to 12 lbf and the MAX value should be set to the Loadcell capacity, e.g. 225 lbf.

The CS series has 2 Load Average Results **"Load Average"** and **"Custom Load Average"**. The Load Average Result will calculate the load average over the entire test. The Custom Load Average Result will need to be configured with a start distance and an end distance. The Custom Load Average Result will calculate the load average between the two configured distance points. The Custom Load Average result is useful for peel type tests.

To set up a Custom Load Average result, select “Custom Load Average (CLA)”:



Then press the “Configure” button and this screen will appear:



Then enter in the Start and End Distance for the test and then press “OK” button.

“**Second Peak Load**” captures the second highest load peak during a test Stage and “**Distance Second Peak**” captures the second highest distance peak during a test Stage

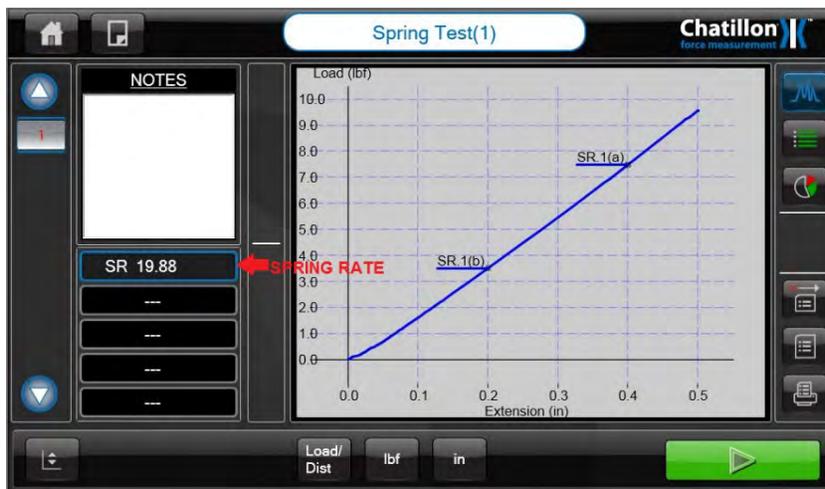
The “**Spring Rate**” calculates the rate of Compression or Tension between 2 points in percentage or distance.

To change the unit (which will be initially set to the "Default" Force or Distance unit), press the button to the right of the Upper & Lower entry fields to cycle through the available units.



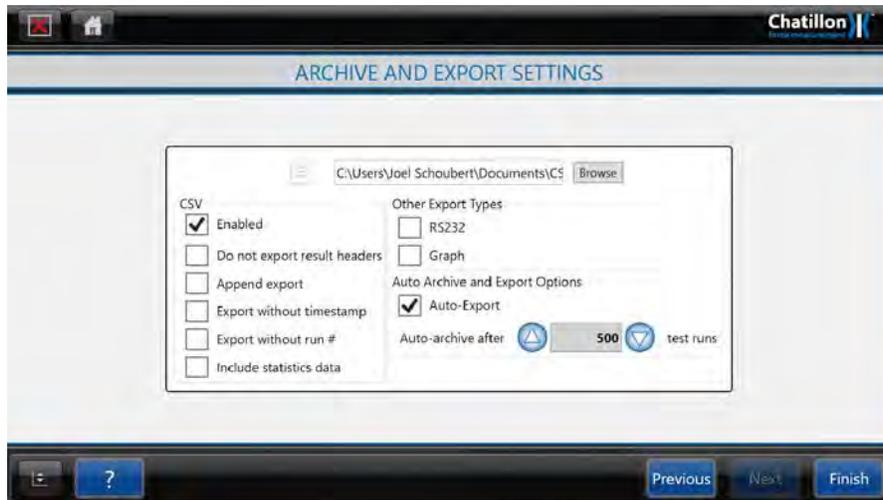
Then press the “Configure” button and this screen will appear: Enter the Percentages of Design force, Percentages of Design Distance, Force or Distance.

The Graph will plot both points and calculate the rate as below.



9.14 ARCHIVE AND EXPORT SETTINGS SCREEN

After the Test Results have been selected, press on the "NEXT" button at the bottom of the screen to display the "**ARCHIVE AND EXPORT SETTINGS**" screen.



If NO results are to be exported or printed, press on the "FINISH" button at the right of the screen to display the "**TEST GRAPH**" screen.

If the measured results are to be exported or printed, then press on the "File Name" entry field to display an alphanumeric keypad. Enter the required File name (without a suffix) then press on the ENTER button. Press on the "BROWSE" button to display a "Browse for Folder" dialog then select (or create) the required folder to contain this information.

To export the data to the specified CSV file, select the CSV option "**Enable**".

To create a **PDF** document, select the **GRAPH** option.

To Auto Export a CSV or GRAPH select the "**Auto-Export**" box.

To Export Results in ASCII format through the RS232 port select the RS232 box.

To exclude result headers from the data output select "Do not export result headers" option.

The statistics data includes the maximum, minimum, median and mean values for each measured result.

If the user requires only numerical data to be exported such as Peak Force or Distance at Limit you can select "Export without Run #" and "Do not export result headers" options.

The "**AUTO ARCHIVE**" option automatically exports the data when the required number of tests have been performed then empties the test file ready for additional tests. This reduces the amount of memory required. If the "Auto-archive after 500 test runs" box is not checked the CS Series console will automatically archive the data after 500 test runs to the default path **C:\Documents and Settings\MyUser\My Documents\CSX\ folder**.

9.15 DISPLAYING THE TEST GRAPH SCREEN

After the Archive and Export Settings have been set, press on the **"FINISH"** button at the bottom of the screen to display the **"TEST GRAPH"** screen.

This screen has a title showing the previously entered test name.



Please refer to section 10 for details regarding test samples.

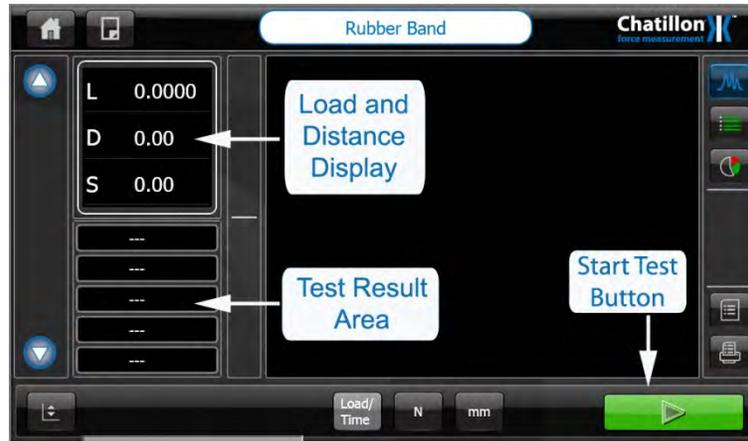
10.0 Using the Force Tester

10.1 PERFORMING A TEST

A test can be performed whenever the "**TEST GRAPH**" screen is displayed.

This screen will be displayed immediately after defining a new test or can be displayed by loading a saved test file - **Please refer to section 11**.

The "**TEST GRAPH**" screen displays the test name at the top of the screen, a "Blank" main area, a load and distance display, test result area and "Start Test" button as shown below.



The sample now has to be fitted or positioned ready for testing.

If the crosshead (moving arm) needs to be moved up or down, press the "Jog Panel" Icon at the bottom left-hand corner of the screen to display the Jog Control Panel.



The new crosshead position can also be manually zeroed using this Panel.

When the crosshead is in a suitable position for testing, press the "Jog Panel" Icon again to close the Jog Control Panel.

The test is started by pressing on the green "START TEST" button at the bottom right-hand side of the screen.

If a pretest question has been defined, a dialog will be displayed requesting this information. Enter the relevant information then press on the "OK" button.



To enter a barcode into this dialog, press on the dialog to enable it then scan the barcode.

When the test is running, test progress information is displayed in the top of the "Graph" field. The "live" load and distance display shows the measurements during the test and the vertical "Load Bar" shows the real time absolute load.

To abort or stop a test press the RED Stop button in the lower right corner of the control console display.



The vertical "Load Bar" indicates the actual load on the Loadcell and will be displayed as a small horizontal line when there is no eye end or grip fitted to the Loadcell.

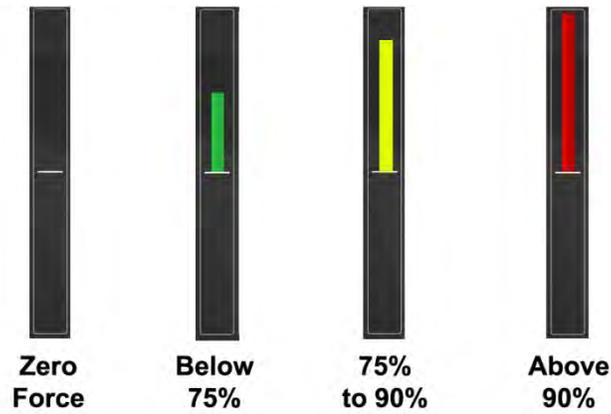
Please note that when an eye end and grip is fitted to the Loadcell, the "Load Bar" will indicate a small tensile load (bar above horizontal line) due to the weight of the grips or fixtures. Also note that the "Load Bar" does not reset to zero when the "ZERO" button is pressed on the Jog Control Panel. For the CLC-250G Loadcell there may be up to a 10% shift on the load bar graph when nothing is attached to the Loadcell. This is due to gravity pull on the Loadcell shaft.

The "Load Bar" changes color to show the actual load relative to the Loadcell capacity for both Tension and Compression loads.

The Load Bar is green from zero force to 75% Loadcell capacity.

The Load Bar is yellow from 75% Loadcell capacity to 90% Loadcell capacity.

The Load Bar is red above 90% Loadcell capacity.

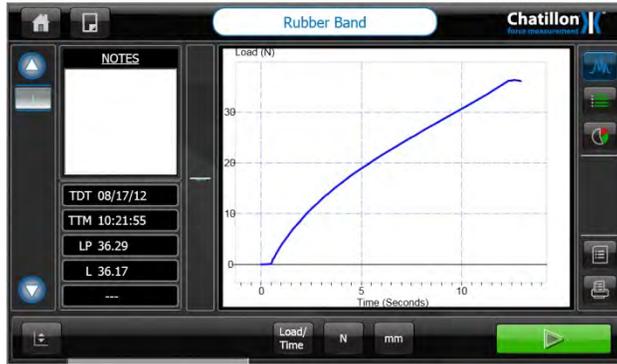


Load Bar for Tension Forces



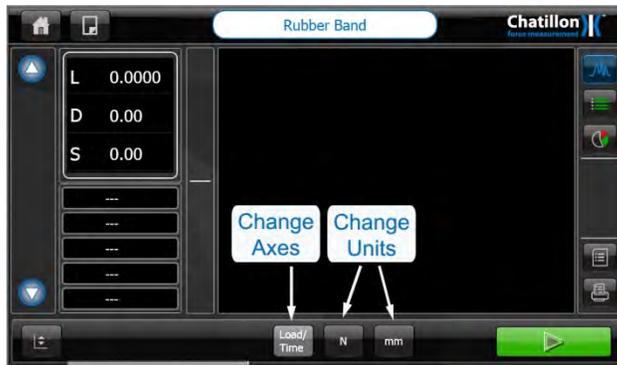
Load Bar for Compression Forces

When the test has finished, the test graph is displayed in the "Graph Area" and the selected results are displayed in the "Test Results" area to the left of the graph as shown below.

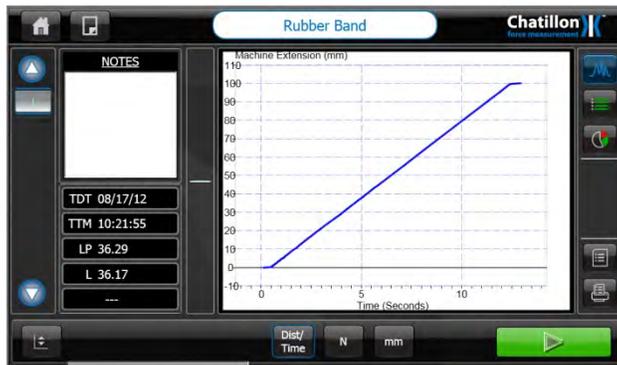


The picture above shows the default graph axes of Load / Time.

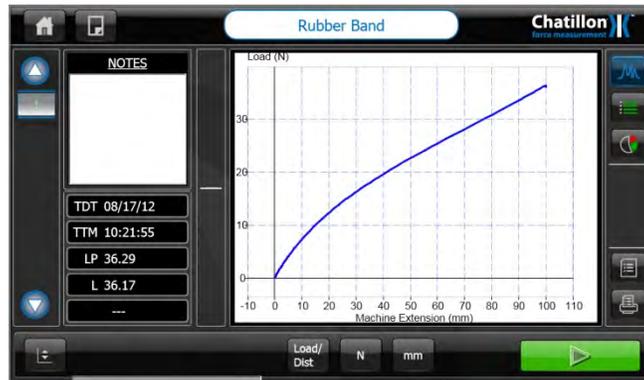
Other axes of Distance / Time and Load / Distance are available and the graph will cycle through the available axes by repeatedly pressing the "CHANGE AXES" button.



Therefore, pressing the "CHANGE AXES" button changes the graph to show Distance / Time as shown below.



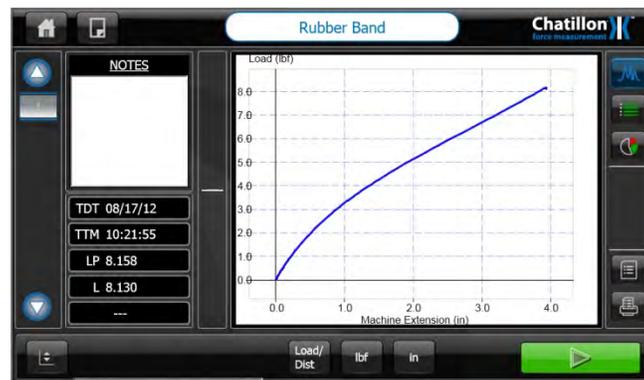
Pressing the "CHANGE AXES" button again changes the graph to show Load / Distance.



The graph and measured results shown above are displayed using the previously defined default Load Axis Unit of "N" and the previously defined default Distance Axis Unit of "mm".

The graph load axis and load results will cycle through the available Load Axis units by repeatedly pressing the "CHANGE FORCE UNITS" button.

The graph distance axis and distance results will cycle through the available Distance Axis units by repeatedly pressing the "CHANGE DISTANCE UNITS" button.

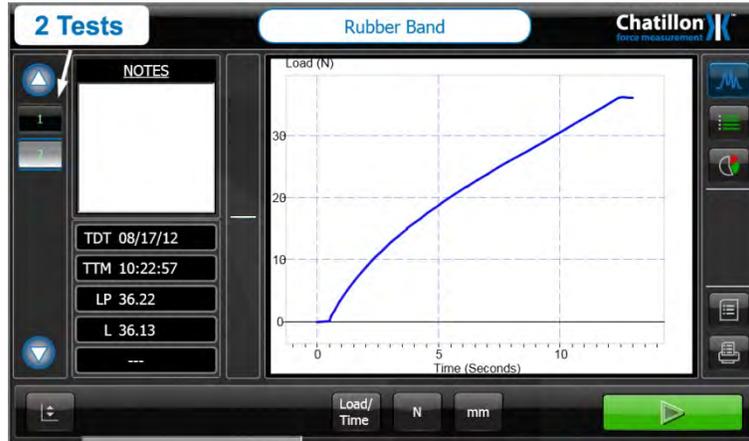


The tested sample now has to be removed and replaced by the next sample to be tested.

The second test is started by pressing on the green "START TEST" button at the bottom right-hand side of the screen.

If a pretest question has been defined, the dialog will be displayed requesting this information. Enter the relevant information then press on the "OK" button.

When this second test has finished, the new test graph is displayed in the "Graph Area" and the selected results are displayed in the "Test Results" area to the left of the graph.



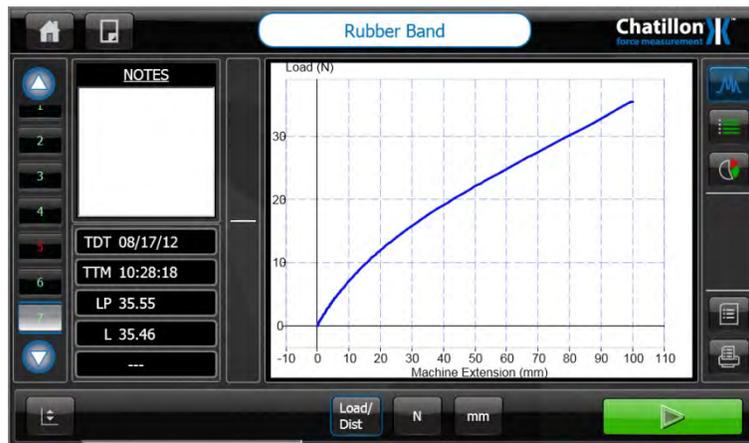
The left-hand vertical area of the screen now displays two buttons, marked "1" and "2", to show that 2 tests have been performed. Both numbers are shown in green because the measured values are within the optional pass/fail parameters. A number will be shown in red if the relevant test fails the pass/fail parameters.

Note that every test will pass by default if no pass/fail parameters are specified.

At the end of test number 2, the graph and selected results are displayed for test number 2.

The graph and results for tests number 1 can be displayed by pressing on the button marked "1" at the left-hand area of the screen.

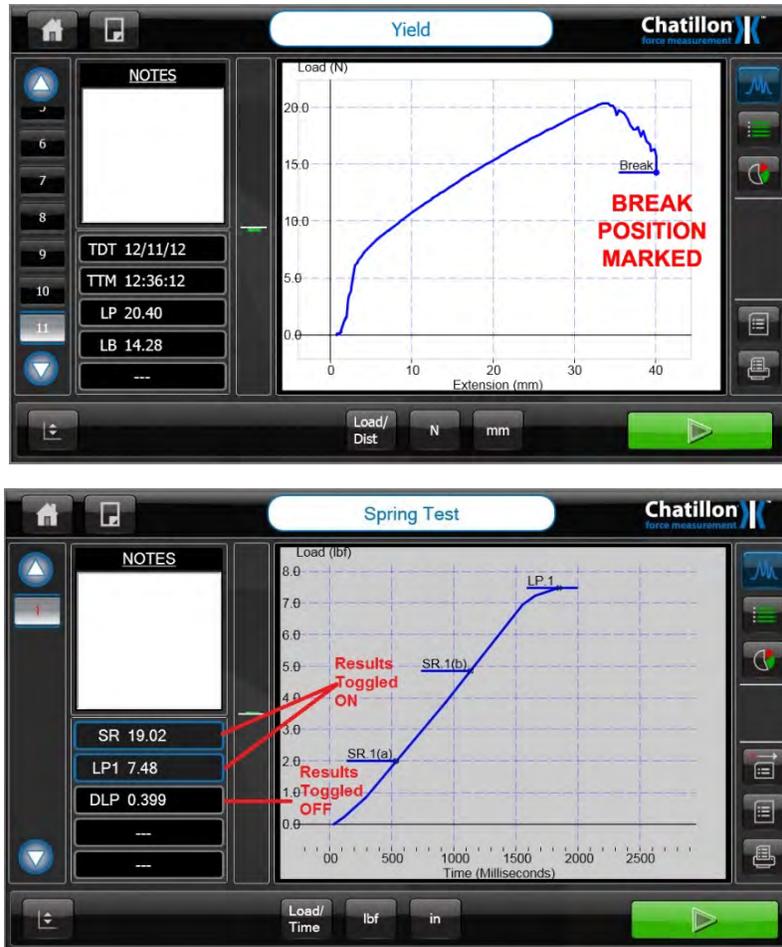
Continue testing until the required number of samples has been tested.



The screen shown above indicates that 7 samples have been tested. This screen also shows that sample number 5 failed the pass/fail criteria because numbering on the button marked "5" is shown in red.

10.2 MARKERS AND NOTES

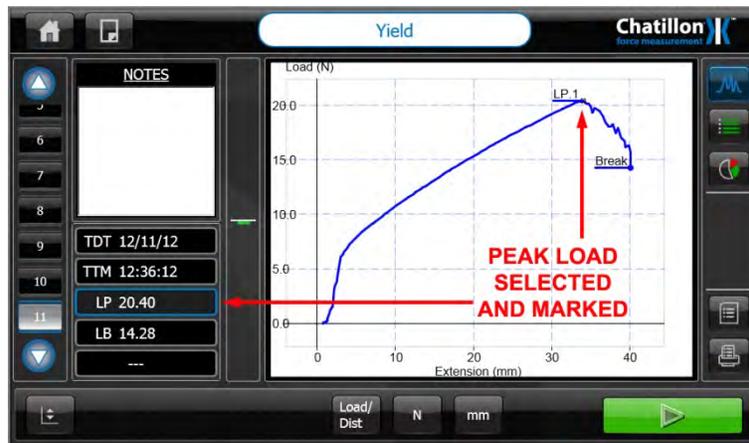
If the "Break Detector" is used and a "Break" is detected, then this is automatically marked on the graph as shown below: -



A "Marker" can also be placed on the graph for any result by pressing on the required "Result" button to the left of the graph. The result buttons operate as toggle switches. Click on the result button and the result marker shows on the graph, click again on the result button and the result marker is removed from the graph. The result marker ON or OFF is stored independently for each test. The screen above shows that the Peak Load (LP) result has been calculated but the peak is not marked on the graph.

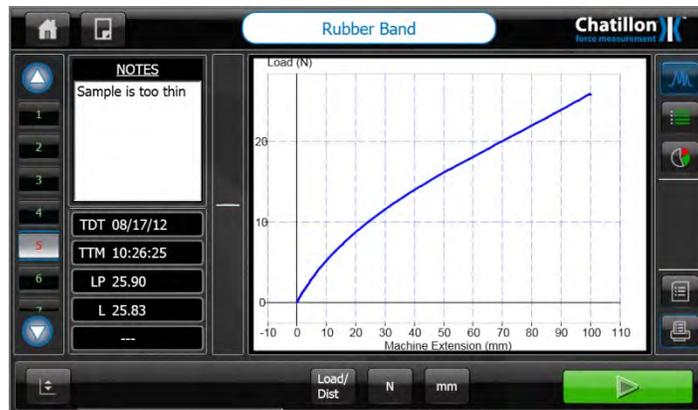
To mark the "Load Peak" position, press on the "LP" button to the left of the graph.

Note that the button is outlined in blue and the position is marked on the graph as "LP1" as shown below.



To remove the marker, press on the "LP" button again. The blue outlining around the button is removed and the marker is also removed.

Note that if the "Load Peak" is requested on 2 or more "Stages", then the markers on the graph will be suffixed by the "Stage Number", e.g. "LP1", "LP3" etc (assuming that Stages 2 and 4 are "Return" strokes to create a 2 cycle test). A note can be added to any test by pressing on the white block in the "Notes" area and entering the required note or comment. The next screen shows an example note.



10.3 ARCHIVING, EXPORTING & PRINTING; GRAPHS, DATA & RESULTS

At any time at the end of a test or tests, results can be archived by pressing the “ARCHIVE RESULTS button on the right-hand side of the screen”.

The Raw Graph Data Points can be exported to a CSV file by pressing the “EXPORT DATA” button on the right-hand side of the screen.

When a test graph is displayed, the graph can be printed to a PDF document by pressing the “PRINT TO PDF FILE” button on the right-hand side of the screen.



The “PRINT TO PDF FILE” button creates a PDF document with a "Screen Dump" of the current graph.

This document is created "On Demand" and can be useful if printed documentation of a test graph is required.

Note that this document also includes the date and time when the "Screen Dump" was created, e.g. 2012-12-11 11:30:38.

Also note that a folder location prompt will appear after of the “PRINT TO PDF FILE” button is pressed to locate in the folder specified.

The “EXPORT DATA” button creates a CSV (comma delimited file) that contains the Raw Graph Data in 4 columns to allow the graph to be recreated in Excel etc.

The data columns are: -

Time, Load, Machine Extension and **Extension** if a **Preload** was not used.

OR

Time, Load, Machine Extension and **Extension from Preload** if a **Preload** was used.

The CSV file is stored in the folder specified on the "ARCHIVE AND EXPORT SETTINGS" screen during the test configuration.

The CSV file is saved with an automatic filename which consists of the “**Test Name**”, the “**Run Number**” and a “**Date/Time**” stamp which is the Date/Time when the file was created, e.g.

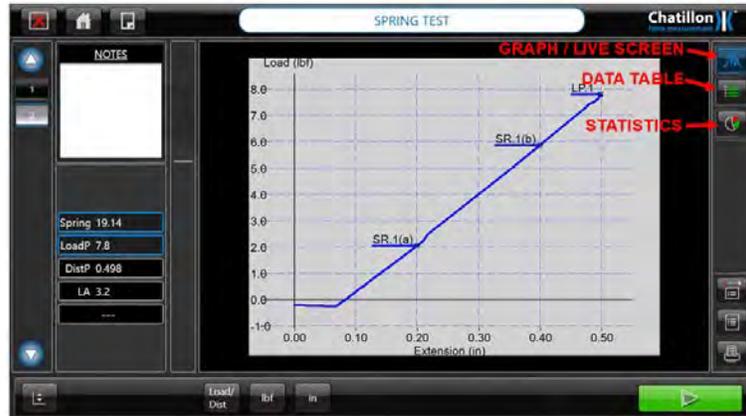
Rubber_Band_1_2012-12-11_12-09-05.csv

Note that the Date/Time stamp is NOT the Date/Time when the test was performed.

This CSV file is created "On Demand" and can be useful if it is required to analyze the graph trace using Excel etc.

10.4 DATA TABLE AND STATISTICS

The "Graph" area normally displays the last test graph during the testing sequence but can also display a table of test results or the calculated test statistics by using the "VIEW" buttons on the right-hand side of the screen.



A table of test results is displayed by pressing on the "DATA TABLE" button.

The screenshot shows the Chatillon software interface for a "Rubber Band" test. The main display is a table of test results:

Run	Date	Time	ML (N)	LL (N)
1	08/17/12	10:21:55	36.29	36.17
2	08/17/12	10:22:57	36.22	36.13
3	08/17/12	10:24:13	36.09	36.03
4	08/17/12	10:25:15	35.99	35.92
5	08/17/12	10:26:25	25.90	25.83
6	08/17/12	10:27:34	35.42	35.33
7	08/17/12	10:28:18	35.55	35.46

The values for Run 5 are highlighted in red. At the bottom, there are buttons for "N" and "mm", along with a green play button. On the right side, there are several icons for navigation and settings.

The data table shown above displays the measured results for every test. The values are displayed in either red or green depending upon the pass/fail criteria for each test.

A table of test statistics is displayed by pressing on the "STATISTICS" button.

The screenshot shows the Chatillon force measurement software interface. At the top, there is a title bar with a home icon, a mobile phone icon, and a label 'Rubber Band'. The Chatillon logo is in the top right corner. Below the title bar, there is a summary box with the following data:

Tests Run:	7
Passed:	6
Failed:	1
Excluded:	0

Below the summary box is a table of test statistics:

Result	Max	Min	Rng	Avg	Std Dv	COV
Date						
Time						
ML (N)	36.29	25.90	10.39	34.49	3.52	0.1021
LL (N)	36.17	25.83	10.34	34.41	3.52	0.1022

At the bottom of the screen, there are navigation buttons: a left arrow, 'N', 'mm', and a green play button.

The test statistics are shown above. The top left area shows the test status for every test. The test status is normally the pass/fail status and the example screen shows that 7 samples were tested and that 6 samples passed and 1 sample failed.

The formula used to calculate the standard deviation uses the divide by "n" method so is the same as the Excel STDDDEV method. The standard deviation is a measure of how widely values are dispersed from the average value (the mean).

The test results for a bad test (e.g. test number 5 where the sample was too thin) can be excluded from the statistics by pressing on the required sample number (may need to use a stylus) then pressing on the yellow "X" displayed on the right-hand side of the screen.

The screenshot shows the Chatillon force measurement software interface. At the top, there is a title bar with a home icon, a mobile phone icon, and a label 'Rubber Band'. The Chatillon logo is in the top right corner. Below the title bar, there is a table of test results:

Run	Date	Time	ML (N)	LL (N)
1	08/17/12	10:21:55	36.29	36.17
2	08/17/12	10:22:57	36.22	36.13
3	08/17/12	10:24:13	36.09	36.03
4	08/17/12	10:25:15	35.99	35.92
5	08/17/12	10:26:25	25.90	25.83
6	08/17/12	10:27:34	35.42	35.33
7	08/17/12	10:28:18	35.55	35.46

At the bottom of the screen, there are navigation buttons: a left arrow, 'N', 'mm', and a green play button.

The selected test is shown with a yellow background in the data table.

The selected test in the previous table is excluded (removed) from the statistics as shown below.



The top left area still shows that 7 samples were tested but now 6 samples passed and 1 sample was excluded.

If the excluded sample is to be reused in the statistics, press on the required sample number then press on the yellow "X" displayed on the right-hand side of the screen to remove the yellow background.

When all samples have been tested, exit the test sequence by pressing on the "HOME" button at the top left of the screen to redisplay the "HOME" screen

10.5 PRINTING AND EXPORTING DATA TABLE AND STATISTICS

When the data table or test statistics are displayed, the test report can be printed to a PDF document by pressing the "PRINT REPORT" button on the right-hand side of the screen.

The test results for all tests in the data table (but not including any excluded results) can be exported to a CSV by pressing the "EXPORT RESULTS" button on the right-hand side of the screen.



The "PRINT REPORT" button" creates a PDF document with the measured results as shown in the example printout below.

Yield

S/N: CS25 S/No:108126 Operator:
 Frame Capacity: 1000 N Date: 2012-12-12 08:29:08
 Load Cell S/N: 10091254
 Load Cell Capacity: 100.0 N

Statistical Test Results

Tests Run: 11
 Passed: 11
 Failed: 0
 Excluded: 0

Result	Date	Time	Max	Min	Rng	Avg	Std Dev
Peak (N)			85.10	11.57	73.53	29.96	23.08
Break (N)			85.10	12.60	72.41	34.84	24.59

Test Results

Run	Date	Time	Peak (N)	Break (N)
1	12/11/12	12:26:08	51.43	51.43
2	12/11/12	12:26:49	48.91	35.99
3	12/11/12	12:26:55	44.66	30.14
4	12/11/12	12:29:29	95.10	85.10
5	12/11/12	12:31:13	11.87	
6	12/11/12	12:32:05	13.63	12.60
7	12/11/12	12:32:30	11.77	
8	12/11/12	12:33:49	15.19	
9	12/11/12	12:34:33	13.01	12.87
10	12/11/12	12:35:16	14.07	
11	12/11/12	12:36:12	20.00	14.28

2012-12-12 08:29:08 Yield Page 1 of 1

This document is created "On Demand" and can be useful if printed documentation of the test results is required.

Note that the document is stored in the folder specified on the "ARCHIVE AND EXPORT SETTINGS" screen during the test configuration except for the "PRINT REPORT" button" where a user needs to determine the PDF file location after the prompt.

Also note that your Company Logo may be inserted at the top left of the document as shown in section 3.7.

The "EXPORT RESULTS" button creates a CSV (comma delimited file) that contains the Raw Graph Data in 4 columns to allow the graph to be recreated in Excel etc.

This CSV file is created "On Demand" and can be useful if it is required to analyze the test data using Excel etc. or to transfer the test data to a database.

Note that the file is stored in the folder specified on the "ARCHIVE AND EXPORT SETTINGS" screen during the test configuration.

The CSV file contains data rows for: -

Statistics Table (OPTIONAL - Selected during the test configuration)

Run Number (OPTIONAL - Selected during the test configuration)

Excluded

All Test Results

Notes (If any have been added by the user)

This data may be preceded by the **Result Headers** if selected during the test configuration.

An example export is shown below: -

Test Runs,11

Passed,11

Failed,0

Excluded,0

Result,Max,Min,Rng,Avg,Std Dv,COV

Date (),,,,,,,

Time (),,,,,,,

Peak (N),85.10,11.57,73.53,29.98,23.08,77.01,

Break (N),85.10,12.68,72.41,34.64,24.55,70.89,

Run,Excluded,Date,Time,Peak (N),Break (N),Dist@P (mm),Dist@B (mm),Notes,

1,,12/11/12,12:26:08,51.43,51.43,46.99,46.99,,

2,,12/11/12,12:26:49,48.91,35.94,24.52,31.83,,

3,,12/11/12,12:28:09,44.66,30.14,21.65,26.72,,

4,,12/11/12,12:30:29,85.10,85.10,48.56,48.68,,

5,,12/11/12,12:31:13,11.57,,34.56,,

6,,12/11/12,12:32:05,13.63,12.68,42.11,45.58,,

7,,12/11/12,12:32:51,11.77,,44.14,,

8,,12/11/12,12:33:49,15.19,,46.32,,

9,,12/11/12,12:34:33,13.01,12.87,38.02,38.75,,

10,,12/11/12,12:35:16,14.07,,42.18,,

11,,12/11/12,12:36:12,20.40,14.28,34.03,40.15,,

10.6 TEST NOTES

- 1 If a percentage drop break detector is used to end the test, the Force at Break value is not a "True" break value but is the specified percentage of the maximum force value.
- 2 If a time duration result is requested, this may be slightly longer than the actual test time duration because of latency at the start of the test.
- 3 If a hold time is specified, the results for the hold stage are measured at the end of the hold duration.
- 4 If a preload is required, a suitable value is 1% of the expected maximum force. Values as high as 5% of the expected maximum force can be used, but this may affect the sample height if the height feature is used.
- 5 If a test question has been defined, then this is shown as a question mark (?) on the graph screen due to space limitations. The actual question is shown on the "DATA TABLE" screen.

10.7 LOADING A SAVED TEST FILE

Every test file created using the "Compression Test", "Tension Test" or "Multi-Action Test" Icons on the "HOME" screen is stored in the internal memory and can be easily retrieved for analysis or further testing.

Note that the "HOME" screen Icons are different along the top if the operator is defined as a Supervisor, compared to the operator defined as a User, i.e. this operator has restricted access rights.



Home Screen for a Supervisor



Home Screen for a User

A previously saved test file can be loaded by pressing on the large “LOAD A SAVED TEST FILE” Icon on the main screen or the small Icon at the top left of the screen. In both cases, the “**TEST SELECTION**” screen is displayed which shows all the test files present in the internal memory.



Example Test Selection Screen for a Supervisor



Example Test Selection Screen for a User

Note that a "User" can only OPEN select and use test files but a "Supervisor" has full access to all of the file maintenance features as shown in section 10.7.

The screens shown above list the test files in the “Default” order of “**Test Name**”, i.e. the tests are listed in alphabetical order.

Note that if a "Test Image" was specified in the relevant test setup, then this will be displayed at the bottom right of each test file icon.

The tests can also be listed in 3 alternative orders of "Date", "Run" and "Favorites".



The test files can be displayed in "**REVERSE Date**" order by pressing on the "DATE" button along the top of the screen.

Note that the "Date" is the date that the test file was created. The newest test file is listed first then the other files are listed in descending order of date of creation.

The test files can be displayed in "**REVERSE Number of Tests**" order by pressing on the "RUN" button along the top of the screen. The test file with the greatest number of tests is listed first then the other files are listed in descending order of number of tests.

If any test files have been assigned as "Favorites" (see next section), then these will be listed first by pressing on the "FAVORITES" button along the top of the screen. This makes it easy to assign the favorite tests as shown in the next section.

Press on the required test file to **select** it, noting that the selected test icon will be outlined in blue as shown below.



Also note that additional buttons will be displayed along the bottom of the screen for a "Supervisor". Press on the "**OPEN**" button at the bottom of the screen to open the test file and display the "**TEST GRAPH**" screen ready for testing or for analyzing, printing or exporting data.

10.8 FAVORITES FEATURE

The previous section showed that previously saved test file can be loaded by pressing on the large "LOAD A SAVED TEST FILE" Icon on the main screen or the small Icon at the top left of the screen.

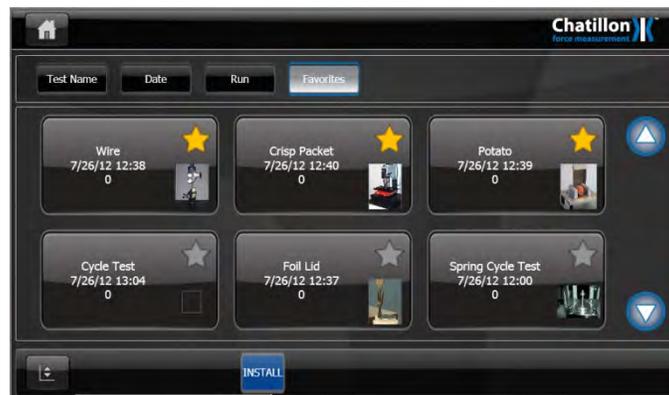
However, for ease of use, up to 10 Test Files can also be displayed directly on the main screen if they are marked as "Favorites". This simplifies the test selection because only specified test files are displayed on the main screen even if many more test files are stored in the internal memory.

To select a file or files for the "Favorites" feature, display the "**TEST FILE**" screen by pressing on the large "LOAD A SAVED TEST FILE" Icon then press on the "Star" displayed at the top right of the required test file Icon to mark the file as "Favorite".



The "Star" will be displayed in yellow to indicate that the file is a "Favorite".

The screen below shows the "Favorite" files listed first, by pressing on the "FAVORITES" button along the top of the screen. This screen shows that 3 files are marked as "Favorites".



To remove a file from the "Favorites" screen, press on the yellow "Star" on the test file Icon. The "Star" will then be displayed in grey to indicate that the file is no longer a "Favorite".

Exit the "**TEST FILE**" screen by pressing on the "**HOME**" button at the top left of the screen to redisplay the "**HOME**" screen.

Note that the "**HOME**" screen now displays the "Favorite" files in the lower area. These files will open and display the "**TEST GRAPH**" screen ready for testing by pressing on the relevant icon.

Note that the CS Series only allows a maximum of 10 Favorite tests to be stored in memory.



Home Screen for a Supervisor with Favorites Displayed



Home Screen for a User with Favorites Displayed

10.9 TEST FILE MAINTENANCE

The test files are stored on the Hard Drive and all testing is performed using these files. The test setups may also be backed up or transferred to another CS Series Force Tester if required as shown in the following sections.

All file maintenance is accessed using the "**TEST SELECTION**" screen and can only be performed by a "Supervisor".

This screen will display the "**INSTALL**" button at the bottom of the screen but the additional buttons shown below will be displayed if one of the test files is selected.



10.10 COPY A TEST

This feature is useful if a similar test file is required for 2 or more products. Create the test file with a suitable name for the first product, e.g. "**Rubber Seal Type A**". Display the "**TEST SELECTION**" screen, press on the test file icon to select it then press on the "**COPY**" button.

The "**TEST SETTINGS**" screen is displayed with a "Default" Test Name of "**Copy of**" followed by the original test name, e.g. "**Copy of Rubber Seal Type A**".

Change the Test Name to suit the product, e.g. "**Rubber Seal Type B**" then step through all the screens by pressing on the "NEXT" button then finally press the "FINISH" button. This test will then be available ready for use.

Note that the test settings can be changed during this process if the test file is similar to, but not identical to, the original file.

Also note that if a "Favorite" test is copied, then the new test will also be marked as a "Favorite" unless there are already 10 "Favorite" files.

10.11 EDIT A TEST

This feature is useful if an existing test requires modification, e.g. change the test speed.

WARNING! All data in the test file will be deleted by this procedure so if the previous test data is required, open the file then print and/or export the data before using this feature.

Display the "**TEST SELECTION**" screen, press on the test file icon to select it then press on the "**EDIT**" button.

The "**TEST SETTINGS**" screen is displayed. If the test data has not been exported etc, press on the "**HOME**" button at the top left of the screen to redisplay the "**HOME**" screen.

To edit the test, step through all the screens by pressing on the "**NEXT**" button, changing any settings as required then finally press the "**FINISH**" button. This modified test will then be available ready for use.

10.12 DELETE A TEST

This feature is useful if a test file is no longer required.

WARNING! All data in the test file will be deleted by this procedure so if the previous test data is required, open the file then print and/or export the data before using this feature.

10.13 EXPORT A TEST

This feature is useful for backup purposes or to transfer a test file from one CS2 Force Tester to another CS2 Force Tester. This can be used to ensure that 2 or more Force Testers in a Laboratory are running the same test files. Note that the test file only contains test setup information and does not contain any test results.

The test file can be exported directly to the network if the Force Tester is connected to the network via an Ethernet cable (see section 3.8).

Alternatively, the test file can be exported to a USB stick if this is connected into one of the unused USB sockets on the control console.

Display the "**TEST SELECTION**" screen, press on the test file icon to select it then press on the "**EXPORT**" button.

A "Save As" dialog is displayed with the test name already entered. Please note that this filename must not be manually changed because this will not alter the restored filename. Also note that the filename has a "tst" suffix and this must not be changed.

Select the required storage drive using the top drop-down box, select the required storage folder in the main area of the dialog then press on the "**SAVE**" button to save the test setup to this location.

10.14 INSTALL A TEST

This feature is required to transfer a test file into the Force Tester.

A previously exported test file can be imported from a USB stick or directly from the network if the Force Tester is connected to the network via a USB to Ethernet cable (see section 3.8) adaptor.

Display the "**TEST SELECTION**" screen then press on the "**INSTALL**" button.

An "Open" dialog is displayed. Select the required drive using the top drop-down box, select the required folder in the main area of the dialog then locate the setup file. Press on the "**OPEN**" button to install this test setup to the Force Tester. . Note that the test file only contains test setup information and does not contain any previous test results.

11.0 Distance Compensation

11.1 GENERAL

The "**Distance Compensation**" is a specialized feature that is required when distance accuracy is important. Please note that there will always be movement in the Loadcell during a test because it is a physical transducer and movement is necessary to measure the applied forces. There will also be movement in the force tester frame when it is loaded to full capacity.

The "normal" distance measurement is suitable for most tests but may give errors when very small distances are being measured at high forces, e.g. compression tests on rigid materials (ceramics etc.)

The "**Distance Compensation**" feature significantly reduces the distance errors during small movements at high forces. The combined Loadcell and frame movement under load is measured and compensated by performing a special "Test" with either a VERY STIFF tension sample fitted into tensile grips or no sample fitted between compression plates.

Note that the "Distance Compensation" feature is available for all types of test.

The "**TEST SETTINGS**" screen has a "Distance Compensation" option shown on the left-hand side and this option defaults to "NONE". Press on the "Distance Compensation" drop-down to display the "Distance Compensation" names.

The force tester has storage for up to 10 named compensation factors. These are all initially undefined and are named "Empty 0", "Empty 1" etc as shown below. If a "Distance Compensation" has been previously created, it

11.2 CREATING A NEW DISTANCE COMPENSATION

A "Distance Compensation" test is named, created and performed using a series of steps as shown below:-

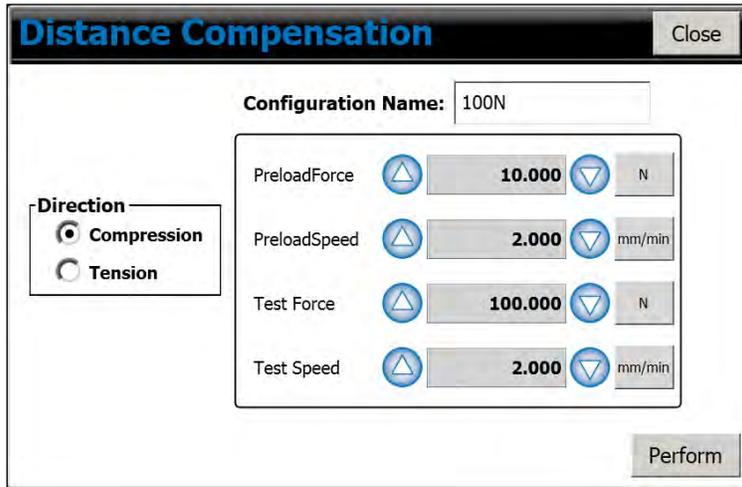
- 1 Display the "**TEST SETTINGS**" screen for the required type of test.
- 2 Display the jog panel as shown in section 10.
- 3 Use the jog panel to move the crosshead to a suitable position to perform the compensation.

If a Tension Compensation is being performed, move the crosshead to fit the stiff sample into the required grips.

If a Compression Compensation is being performed, carefully move the crosshead downwards, using the jog panel, until the compression plates are close together, e.g. separation of approximately 1mm (.04in).

- 4 Use the jog panel to zero the machine at this position screen.
- 5 Close the jog panel.
- 6 Press on "Distance Compensation" drop-down to display the "Distance Compensation" names".
- 7 Select one of the "Empty" names, e.g. "Empty 0". Note that any previously defined "Distance Compensation" name may also be selected and replaced if no longer required.

8 Press on the “EDIT” button to display the “**DISTANCE COMPENSATION**” screen.



9 Select the same direction as the main test direction, e.g. Tension or Compression.

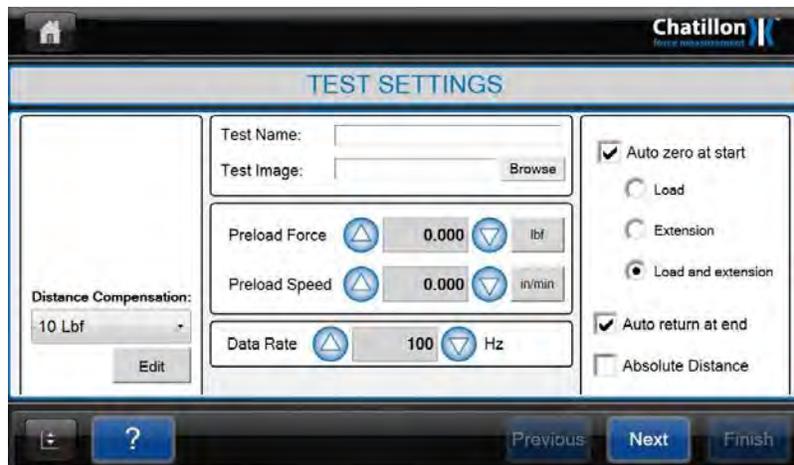
10 Press on “Configuration Name” then enter a suitable name for this compensation factor, e.g. “10Lb”.

11 Define a suitable “Preload Force”, noting that a suitable value is 1% of the “Test Force” then define a suitable “Test Speed”, which may be the same as the “Test Speed”, e.g. “5 mm/min”.

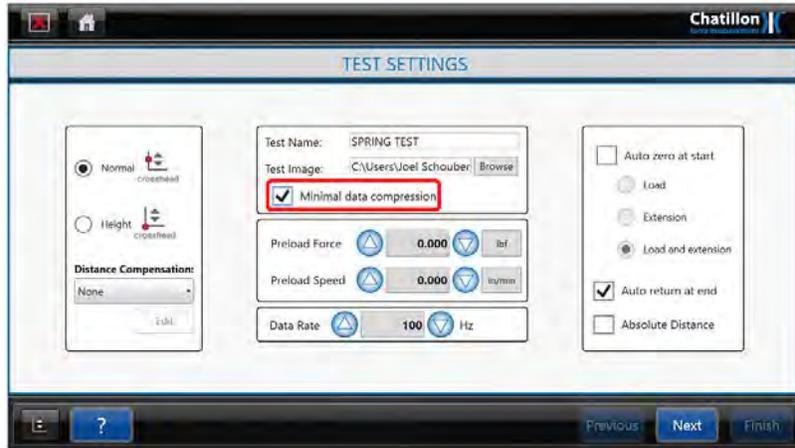
12 Press on the “PERFORM” button to start the test. The force tester will automatically move up and down as required to create and store the “Distance Compensation” values and a message will be displayed during the test action. Note that this may take a couple of minutes depending upon the test speed.

13 When the test has finished, press on the “CLOSE” button to return to the “**TEST SETTINGS**” screen.

14 The newly created “Distance Compensation” factor is now displayed in the drop-down box and can be selected when required.



Minimal Data compression shows extra graph details that would normally be filtered by the noise filtering data compression algorithm. Use of this option may significantly increase the file size on disk



12.0 Height Mode

Note that the "Height" mode is only available for a Multi-Action test.

The "Height Mode" is used when it is required to measure the height of the sample, e.g. measure the "free length" of a compression spring or measure the initial thickness of a block of foam.

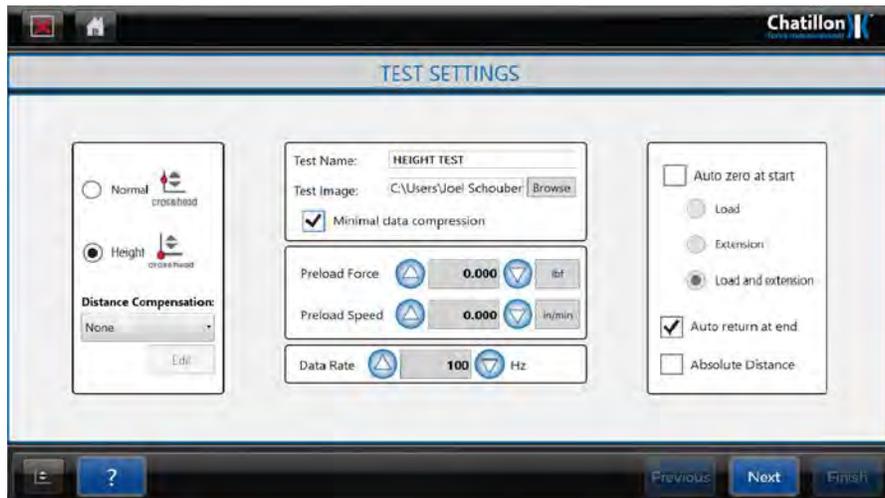
The "Height Mode" can also be used to measure the height of the sample when a specified force is applied.

12.1 CREATING A HEIGHT MODE TEST

A "Height Mode" test is created using a series of steps as shown below:-

Note that this example sequence shows how to create a "Height Mode" test to measure the "free length" of a compression spring then measure the height of the spring when it has a defined compressive force applied.

- 1 Display the "**TEST SETTINGS**" screen for a Multi-Action test.
- 2 Press on the Height" option at the left-hand side of the screen.



- 3 Define a suitable preload force (1N in the example screen above) and a suitable Preload speed (10mm/min in the example screen above). A Preload is required for all Height tests. **NOTE: The minimum preload force is 0.1% of Loadcell capacity. A larger preload force can be implemented, but not a lower preload.**
- 4 Select "Load" auto-zero if required.

Note that the extension cannot be auto-zeroed during a "Height Mode" test. Never place a "ZERO DISTANCE" step in a "Height Mode" test.

- 5 Press on the "NEXT" button to display the "**SELECT NEXT STAGE**" screen.



- 6 Note that the icon at the left-hand side of the "**SELECT NEXT STAGE**" screen shows "Height Mode" (Red dot at the bottom of the vertical line).
- 7 Press on the "COMPRESSION" button in the center of the screen to display the "**LIMITS**" screen.



- 8 Set the required Test Speed, then select the Load option and set the Load to the value required for L1.
- 9 Press on the "OK" button to close the screen and return to the "**SELECT NEXT STAGE**" screen.

10 Press on the "COMPRESSION" again to redisplay the "LIMITS" screen.



11 Set the Test Speed to the required value (150mm/min in the example screen above), then select the Load option and set the Load to the value required for L2.

12 Press on the "OK" button to close the screen and return to the "SELECT NEXT STAGE" screen.

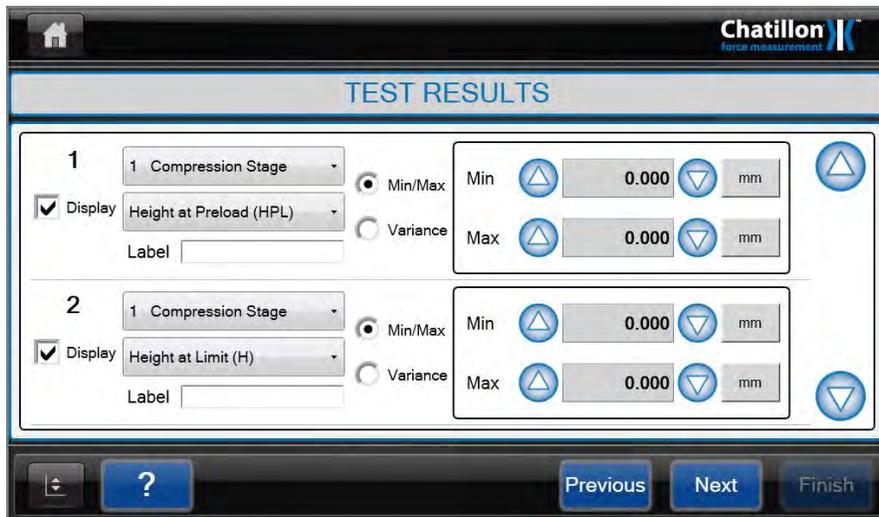


13 Note that the right-hand side of the screen shows that 2 actions have been defined.

- 14 Press on the “NEXT” button to display the “**TEST RESULTS**” screen.



- 15 Press on the top drop-down control for result 1 to display the list of “Stages” then select “1 Compression Stage”.
- 16 Press on the bottom drop-down control for result 1 to display the list of “Results” then select “Height at Preload (HPL)”.
- 17 Press on the top drop-down control for result 2 to display the list of “Stages” then select “1 Compression Stage”.
- 18 Press on the bottom drop-down control for result 1 to display the list of “Results” then select “Height at Limit (H)”.



- 19 Press on the top drop-down control for result 3 to display the list of “Stages” then select “2 Compression Stage”.

- 20 Press on the bottom drop-down control for result 2 to display the list of “Results” then select “Height at Limit (H)”.



12.2 PERFORMING A HEIGHT MODE TEST

A "Height Mode" test is performed using a series of steps as shown below:-

Note that this example sequence shows how to use the “Height Mode” test to measure the "free length" of a compression spring then measure the height of the spring at 2 load points L1 & L2.

- 1 Create or open a multi-action test that has the "Height Mode" selected.
- 2 Display the “GRAPH” screen ready for testing.
- 3 Display the jog panel as shown in section 10.
- 4 Use the jog panel to move the crosshead to a suitable position to allow the sample to be placed between the compression plates.
- 5 Use the jog panel to **ZERO** the machine at this position.
- 6 Carefully move the crosshead downwards, using the jog panel, until the compression plates are close together, e.g. separation of approximately 1mm (.04in).
- 7 **Do NOT zero the machine at this position.**
- 8 Close the jog panel.
- 9 Start the Test by pressing on the green “START” button. A dialog will indicate that the datum will be found before testing can commence.



- 10 Press on the “OK” button. The crosshead will move downwards to touch the compression plates together and apply the preload force.
- 11 The crosshead will automatically lift to the position defined in step 4 then a dialog will indicate that the sample should be placed on the bottom compression plate.

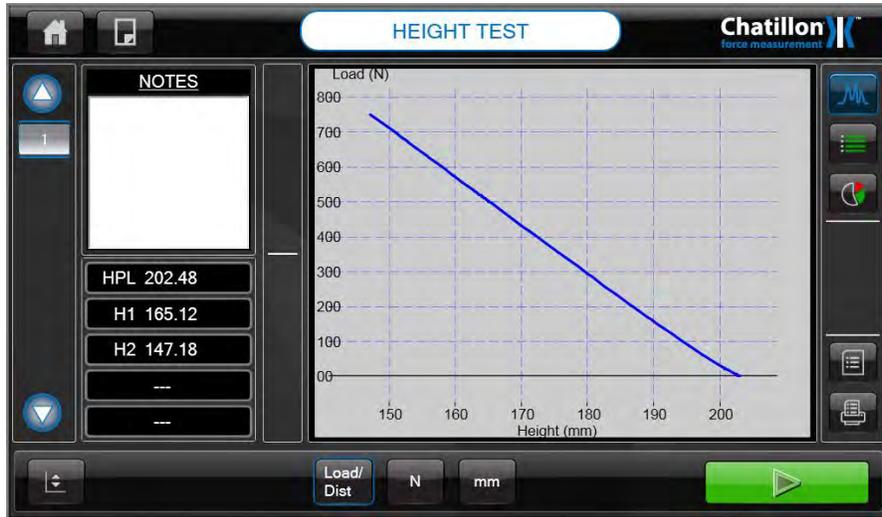


- 12 Place the sample onto the bottom compression plate then press on the “OK” button.
- 13 The test will be performed and test progress displayed in the “Graph” area.



- 14 Note that the “Live” display on the left-hand side of the “Graph” area shows the “Height” during the test, e.g. 154.66mm in the example screen shown above.

- 15 When the test finishes, the test graph and results will be displayed. The example screen shown below shows that the “Free Height” is 202.48mm, the “Height at L1” is 165.12mm and the “Height at L2” is 147.18mm.



- 16 Place the next sample onto the bottom compression plate then press on the green “START” button to perform the next test.

13.0 Loadcells

ALL machine operators should be aware that CHATILLON Loadcells are precision force measuring devices, which should be treated with the utmost care to avoid accidental damage. In particular low force Loadcells are easily damaged if abused or used without sufficient care.



NOTE: Do not submit Loadcells to physical shock of any kind. **DO NOT DROP!**

NOTE: When a Loadcell is removed from the force tester, immediately store it in a safe and dry place.

13.1 GENERAL PRECAUTIONS

The following points should be considered:

1. When installing the upper grip onto the Loadcell eye end, avoid bumping the eye end. If the grip is a close fit, **DO NOT FORCE IT**, establish the reason and rectify. Immediately set, or re-set, the bottom limit stop so the grips will not meet when the crosshead is lowered. See section 5.3 LIMIT STOPS.
2. In both tension and compression tests, center the specimen in line with the axis of the Loadcell and the bottom fixed anchoring device or pin to avoid side thrust.
3. In compression tests, care must be taken to avoid bringing the platens together or against solid specimens at high speed. Loadcells thus damaged cannot be repaired. Ensure that the lower crosshead limit is set correctly. See section 5.3 LIMIT STOPS.
4. In compression tests, if special lower fixtures are used, ensure that they are fixed in position so they cannot be accidentally moved to block the normal downward movement of the upper fixture, e.g. where a tongue on the upper fixture must fit into a slot in the lower fixture.
5. Avoid overloading beyond the Loadcell rated capacity. Prior to testing ensure, if possible, that the maximum force anticipated will not exceed the capacity of the fitted Loadcell.
6. CHATILLON Loadcells are built to exceed the standards as set out by ASTM, BS, DIN etc. All Loadcells on CS Series Force Tester machines are user-changeable. Various capacities are available from 2.5N up to the capacity of the frame.



NOTE: The force tester incorporates overload protection, which will stop the testing frame if capacity is exceeded in either tension or compression. However, at higher speeds, momentum may carry the crosshead far enough after shut-off to damage the Loadcell.

Loadcells that incur damage due to overloading cannot be repaired.

Please note that Loadcell overload damage is not covered by the warranty.

13.2 ADDITIONAL LOADCELLS

The following standard Loadcells are available for your CS2 Force Tester.

Order Number	Capacity		Accuracy % FSD
CLC-250G	250gf	2.5N	0.25%
CLC-250G-DED	250gf	2.5N	0.1%
CLC-0002	2lbf	10N	0.25%
CLC-0002-DED	2lbf	10N	0.1%
CLC-04-5	4.5lbf	20N	0.25%
CLC-04-5-DED	4.5lbf	20N	0.1%
CLC-0010	10lbf	50N	0.25%
CLC-0010-DED	10lbf	50N	0.1%
CLC-0020	20lbf	100N	0.25%
CLC-0020-DED	20lbf	100N	0.1%
CLC-0050	50lbf	250N	0.25%
CLC-0050-DED	50lbf	250N	0.1%
CLC-0100	100lbf	500N	0.25%
CLC-0100-DED	100lbf	500N	0.1%
CLC-0200	200lbf	1000N	0.25%
CLC-0200-DED	200lbf	1000N	0.1%
CLC-0500	500lb	2500N	0.25%
CLC-0500-DED	500lbf	2500N	0.1%
CLC-1000	1000lbf	5000N	0.25%
CLC-1000-DED	1000lbf	5000N	0.1%

13.3 LOADCELL RESOLUTION

Loadcell	lbf Resolution	N Resolution
CLC-250G	0.5 lbf X 0.0001 lbf	2.5 N X 0.0005 N
CLC-0002	2 lbf X 0.0002 lbf	10 N X 0.001 N
CLC-04-5	4.5 lbf X 0.0005 lbf	20 N X 0.002 N
CLC-0010	10 lbf X 0.001 lbf	50 N X 0.005 N
CLC-0020	20 lbf X 0.002 lbf	100 N X 0.01 N
CLC-0050	50 lbf X 0.005 lbf	250 N X 0.02 N
CLC-0100	100 lbf X 0.01 lbf	500 N X 0.05 N
CLC-0200	200 lbf X 0.02 lbf	1000 N X 0.1 N
CLC-0500	500 lbf X 0.05 lbf	2500 N X 0.2 N
CLC-1000	1000 lbf X 0.1 lbf	5000 N X 0.5 N

Loadcell	kgf Resolution	gf Resolution
CLC-250G	0.25 kgf X 0.0001 kgf	250 gf X 0.05 gf
CLC-0002	1 kgf X 0.0001 kgf	1000 gf X 0.1 gf
CLC-04-5	2 kgf X 0.0002 kgf	2000 gf X 0.2 gf
CLC-0010	5 kgf X 0.0005 kgf	5000 gf X 0.5 gf
CLC-0020	10 kgf X 0.001 kgf	10000 gf X 1 gf
CLC-0050	25 kgf X 0.002 kgf	25000 gf X 2 gf
CLC-0100	50 kgf X 0.005 kgf	50000 gf X 5 gf
CLC-0200	100 kgf X 0.01 kgf	100000 gf X 10 gf
CLC-0500	250 kgf X 0.02 kgf	250000 gf X 20 gf
CLC-1000	500 kgf X 0.05 kgf	500000 gf X 50 gf

14.0 Installation Notes

14.1 SPLINTER SHIELD

A transparent splinter shield (part number is 01/3909) is available as an option to enclose the test sample (see section 14). A shield should be fitted if there is any danger of samples shattering during the test. The shield has an electronic interlock such that the test cannot be started until the hinged shield is closed. While not mandatory for many applications and countries, CHATILLON strongly recommends that users consider fitting this optional item.

If a shield fitted with electronic interlock is used, an error message will be displayed on the control console if the door is open when a test is started.

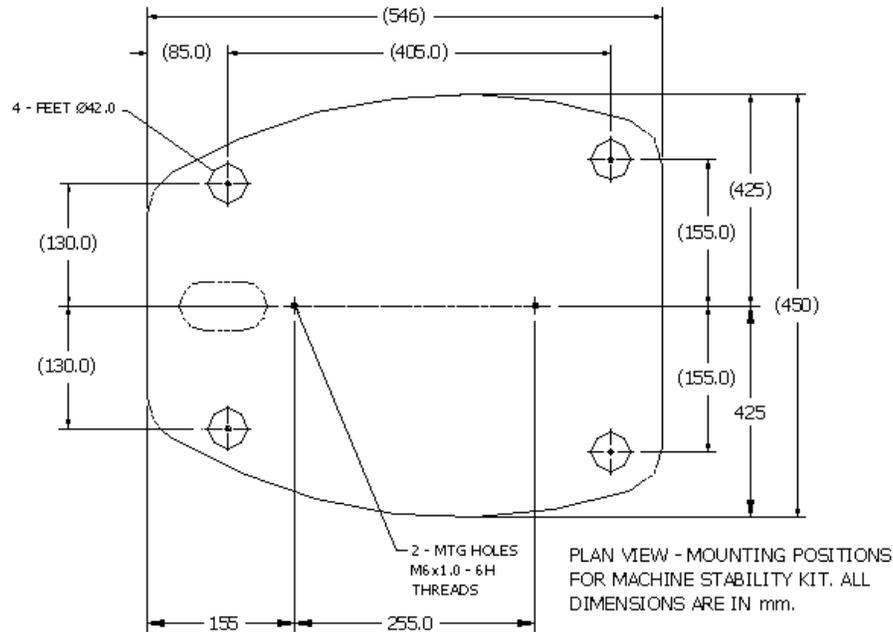
If a shield fitted with electronic interlock is used, an error message will be displayed on the control console and the test in progress will be aborted if the door is opened during a test.



14.2 SECURING TO THE WORKBENCH

The force tester is a heavy item and cannot normally tip over. However, if there is the possibility that users can pull against the vertical column, then there is a risk that the machine may be pulled over.

It is required that the CS Series force tester is secured to the bench using the 2 tapped holes in the base of the machine. The template below shows the location of 2 holes that are required in the top of the workbench for the two M6 bolts. The CS Series test machine has 2 screws, 2 spacers and two washers as part of the standard accessories to properly mount the test machine to a standard workbench. If the two mounting screws are the wrong length you may substitute the screws with standard M6 X P1.0 screws.



15.0 Error Conditions

If an error occurs on the CS2 testing frame, a message will be displayed on the console describing the error. This message must be cleared by pressing the “OK” button before proceeding.

The ERROR messages are as follows:

Motor Drive Fault

This indicates that the motor drive system has reported an error condition.

Upper limit switch

The adjustable upper limit switch has been hit. This can be cleared by adjusting the upper limit or driving off it using the jog down keys.

Lower limit switch

The adjustable lower limit switch has been hit. This can be cleared by adjusting the lower limit, or driving off it using the jog up keys.

No Loadcell Available

An attempt has been made to drive the machine without a loadcell connected. Ensure the loadcell is properly connected and try again.

Splinter Shield Open

The optional splinter shield fitted to the machine is open. A test cannot be started until the splinter shield is closed.

Cell Overload

The load applied to the system is in excess of 110% of the loadcell rating. Use the jog keys to remove the load.

Safety Overload

The load applied to the loadcell is in excess of the safety load limit in the global settings. This limit only applies when the crosshead is moving downwards during return or under control of the jog keys.

Frame Overload

The load applied to the system is in excess of 115% of the frame rating. Use the jog keys to remove the load.

Grip Overload

The load applied to the system is in excess of the grip protection limit in the global settings. This limit only applies during a test.

Drive System Error

The motor control system has not been able to maintain adequate control of the motor and has shut down as a safety precaution. This will usually indicate a fault within the motor drive or distance measurement system.

Accessory Connected/Disconnected

An accessory has been connected or removed while the crosshead is being driven.

Loadcell Changed

The Loadcell has been connected or disconnected.

16.0 Cleaning and Maintenance

16.1 CLEANING EXTERNAL FINISH AND TRIM

The finish and appearance of your testing frame can be maintained by regular cleaning with a damp cloth containing a small amount of mild detergent. The frame should be turned OFF and disconnected from the mains supply whilst cleaning is taking place. Strong proprietary cleaners and petroleum based or other solvents should not be used.



CAUTION: Take care to use only a damp cloth. NO moisture must ever be allowed to get into the testing frame. Wipe the frame dry before connecting to the mains supply and restarting.

16.2 MAINTENANCE

In normal use and conditions, your force testing frame should be serviced and calibrated annually by CHATILLON or one of their appointed agents. There are no user serviceable or adjustable parts within the force tester frame, therefore service and calibration should only ever be undertaken by engineers trained for the task.

If the frame is being used in a particularly arduous way or under extreme conditions, your appointed service agent may recommend more frequent calibration/service.

17.0 Communications

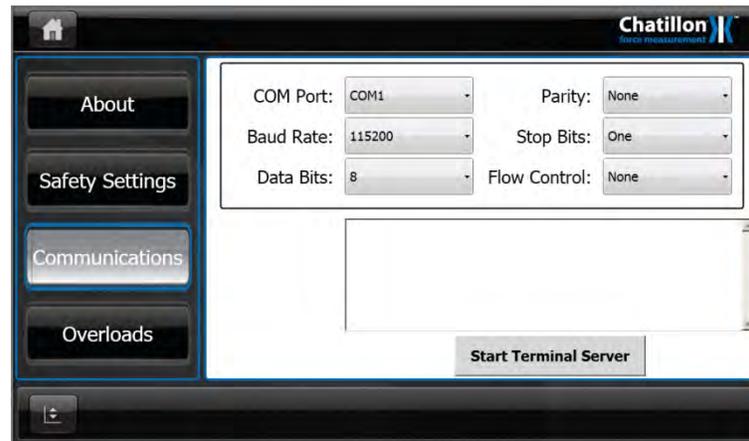
The CS2 Laptop Console has USB ports that, with an adaptor SPK/CS2/XXXX may be used for ASCII send and receive commands from an external computer. Please contact AMETEK if you wish to control the CS2 testing using an external PC. This is a complex setup.

17.1 CONFIGURING THE COMMUNICATIONS

Press the "**SETTINGS**" Icon at the top of the screen (3rd Icon from the left) to display the "**CONFIGURATION**" screen.



Press the "**COMMUNICATIONS**" button on the left-hand side of the screen (if not already selected) to display the "**COMMUNICATIONS**" screen.



Set the communication parameters as shown in the above picture (as listed below)

Baud Rate = 115,200

Data bits = 8

Parity = None

Stop bits = 1

Flow control = None

The computer will need to run an RS232 communications program, e.g. Hyperterminal and this must be set to use the same communication parameters as the Force Tester.

17.2 USING THE COMMUNICATIONS

17.21 RS232 Auto Export:

Set the communication parameters per paragraph 17.1. The test results can then be exported automatically after each test. Make sure to use a Cross-Over RS232 cable and that the RS232 box is checked.



After the Test results have been selected in the “**RESULTS**” screen, the RS232 output will export results as the example below:

```

1, 0.92, 0.989, ,
2, 4.20, 1.001, ,
3, 1.86, 0.595, ,
1, 0.94, 1.002, Fail, Yes, , |
2, 1.80, 0.461, Pass, No, ,

```

No Pass / Fail or Prompt used in the first 3 tests.

Message entered at the end of the test after the prompt. Any text can be entered.

Upper & Lower Limits set on Force between 1 & 2 Lbf

Position at Peak Force

Force with Pass / Fail limits set between 1 & 2 Lbf

Test Sequence (2 different runs)

18.0 Technical Specifications

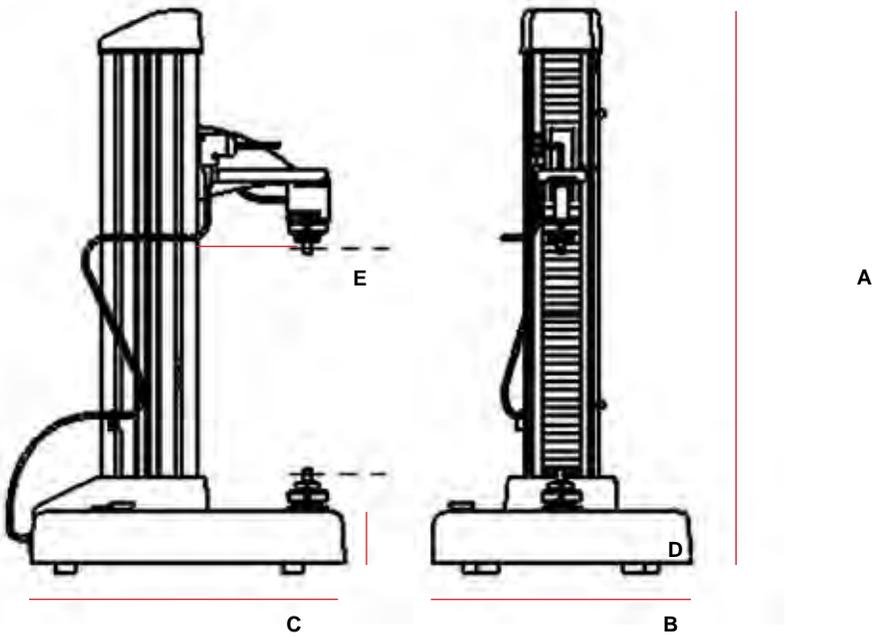
18.1 TECHNICAL SPECIFICATION CS2-225

Maximum Force (Tension and Compression)	1000N (225lbf)
Crosshead Travel Between Eye Ends	500mm (19.7in)
Throat Depth	180mm (7.1in)
Displayed Distance Resolution	0.01mm (.001in)
Crosshead Speed Range	0.01 to 1270mm/min (0.001-50in/min)
Crosshead Speed Accuracy - Unloaded	+/-1.0% of Selected Speed - 2% to 100% of Max Speed
Loadcell Force Accuracy (Non-Dedicated)	+/-0.25% of Full Scale
Loadcell Force Accuracy (Dedicated)	+/-0.10% of Full Scale
Internal Data Sampling Rate	8000Hz (8000 samples per second)
Useable Data Sampling Rate	1000Hz (1000 samples per second)
Operating Temperature	5°C to 35°C (40°F to 95°F)
Relative Humidity	20% to 85% (Non-Condensing)
Supply Voltage	115+/-10%VAC or 230+/-10%VAC
Supply Frequency	50-60Hz
Power Rating	115VAC @ 3.15A or 230VAC @ 3.15A
Fuses (2) for 115VAC & 230VAC Units	T3A15H250V (3.15A Slow Blow Ceramic)
Frame Deflection at Maximum Force	1.4mm (0.055in) Maximum
Weight of Machine	52kg (115lb)
Available Data Memory on CF Card	16 GB

18.2 TECHNICAL SPECIFICATION CS2-1100

Maximum Force (Tension and Compression)	5000N (1124lbf)
Crosshead Travel Between Eye Ends	800mm (31.5in)
Throat Depth	150mm (5.9in)
Displayed Distance Resolution	0.01mm (.001in)
Crosshead Speed Range	0.01 to 1016mm/min (0.001-40in/min)
Crosshead Speed Accuracy - Unloaded	+/-1.0% of Selected Speed - 2% to 100% of Max Speed
Loadcell Force Accuracy (Non-Dedicated)	+/-0.25% of Full Scale
Loadcell Force Accuracy (Dedicated)	+/-0.10% of Full Scale
Internal Data Sampling Rate	8000Hz (8000 samples per second)
Useable Data Sampling Rate	1000Hz (1000 samples per second)
Operating Temperature	5°C to 35°C (40°F to 95°F)
Relative Humidity	20% to 85% (Non-Condensing)
Supply Voltage	115+/-10%VAC or 230+/-10%VAC
Supply Frequency	50-60Hz
Power Rating	115VAC @ 6.3A or 230VAC @ 6.3A
Fuses (2) for 115VAC & 230VAC Units	T6A3H250V (6.3A Slow Blow Ceramic)
Frame Deflection at Maximum Force	1.7mm (0.067in) Maximum
Weight of Machine	66kg (145lb)
Available Data Memory on CF Card	16 GB

19.0 Overall Dimensions

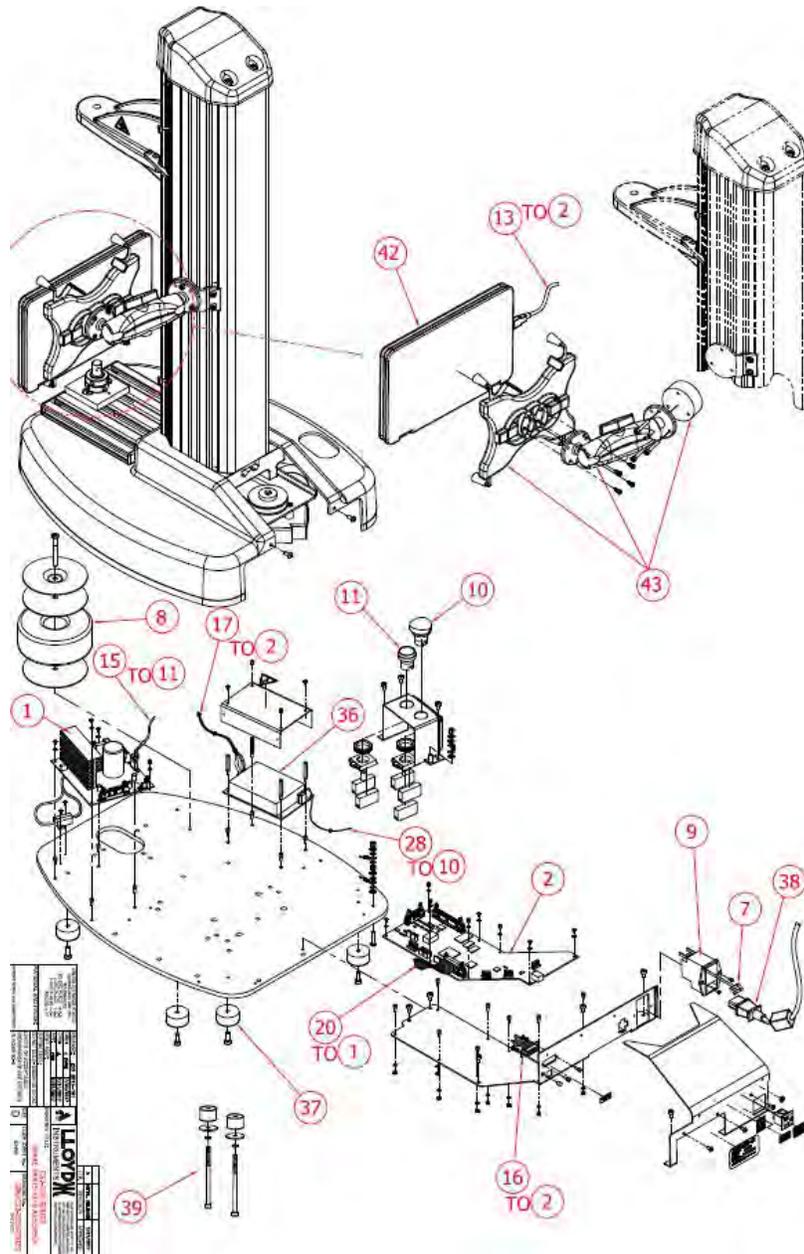


CS2-225		mm	in
A	Height	1016	40.0
B	Width (excluding control console)	460	18.1
C	Depth	557	21.9
D	Base Height	108	4.3
E	Throat Depth	180	7.1

CS2-1100		mm	in
A	Height	1301	51.2
B	Width (excluding control console)	460	18.1
C	Depth	557	21.9
D	Base Height	108	4.3
E	Throat Depth	150	5.9

21.0 Spare Parts Kits

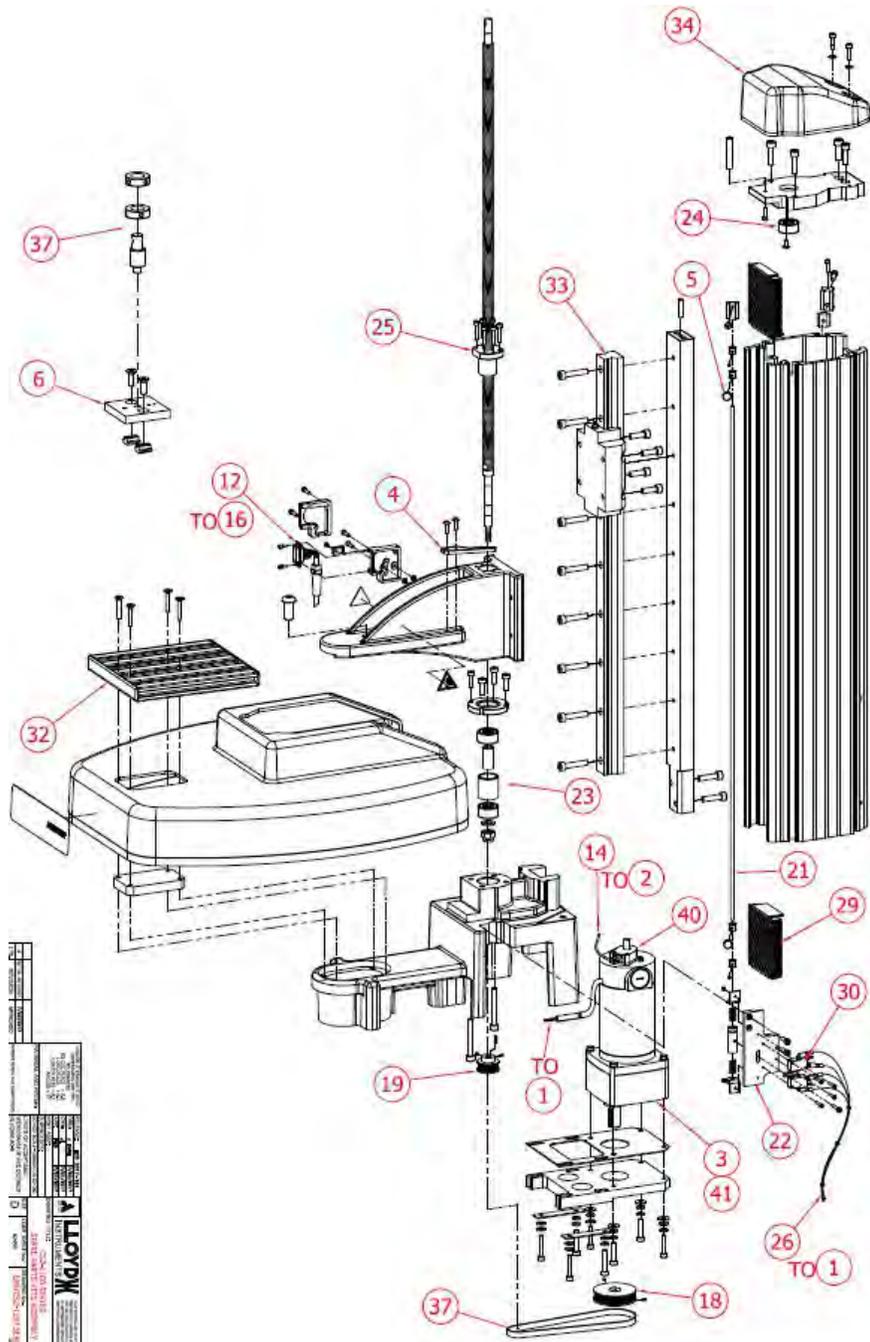
SPK-CS2-225 Sheet A



SPK-CS2-225 Sheet B

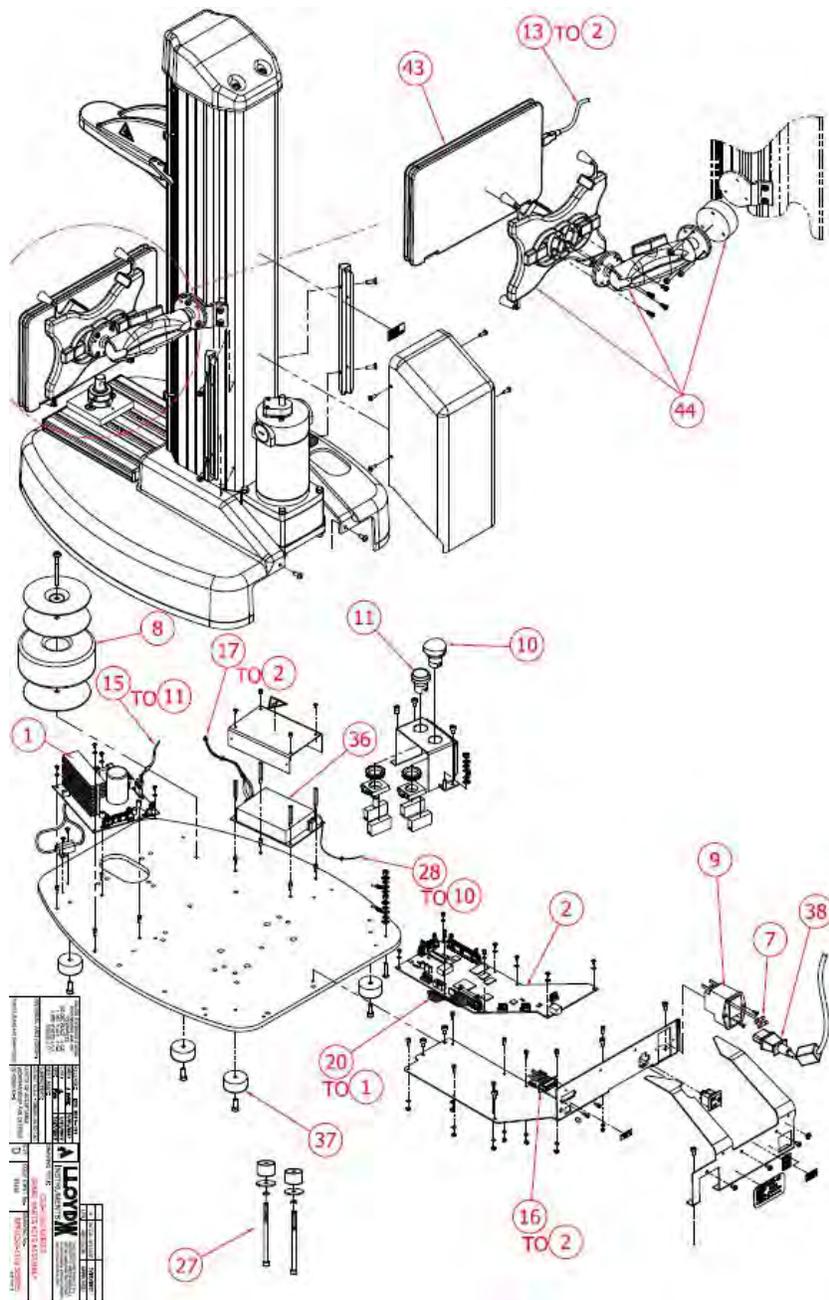
CS2-225 SPARE PARTS LIST

ITEM	PART NO.	DESCRIPTION
1	SPK/LS/0004/A	MOTOR DRIVE PC BOARD ASSEMBLY
2	SPK/CS/0005	PROCESSOR PC BOARD ASSEMBLY
3	SPK/LS/0006/A	MOTOR ASSEMBLY WITH ENCODER
4	SPK/LS/0007	CROSSHEAD LIMIT ACTUATOR ARM
5	SPK/LS/0008	LIMIT STOP SCREW ASSEMBLY
6	SPK/CS/0010	BASE PLATE ASSEMBLY
7	SPK/LS/0011/A	FUSES (1PAIR)
8	SPK/LS/0013/A	TRANSFORMER ASSEMBLY
9	SPK/LS/0014/A	POWER ENTRY MODULE ASSEMBLY 230VAC
9	SPK/LS/0014/B	POWER ENTRY MODULE ASSEMBLY 115VAC
10	SPK/LS/0015	E-STOP SWITCH ASSEMBLY
11	SPK/LS/0016	SAFE-LINE SWITCH ASSEMBLY
12	SPK/LS/0017	LOAD CELL LOOM ASSEMBLY
13	SPK/CS/0018	CONTROL CONSOLE USB CABLE
14	SPK/LS/0019	ENCODER LOOM ASSEMBLY
15	SPK/LS/0020	SAFE-LINE LOOM ASSEMBLY
16	SPK/LS/0021	INTERNAL LOAD CELL LOOM ASSEMBLY
17	SPK/LS/0023	LOOM ASSEMBLY. POWER SUPPLY TO PROCESSOR PCB
18	SPK/LS/0024/A	MOTOR PULLEY
19	SPK/LS/0025/A	LEADSCREW PULLEY
20	SPK/LS/0026	LOOM MOTOR DRIVE TO PROCESSOR
21	SPK/LS/0027/A	LIMIT ROD ASSEMBLY 500mm TRAVEL
22	SPK/LS/0028	LOWER LIMIT SWITCH ASSEMBLY
23	SPK/LS/0029/A	LOWER BEARING ASSEMBLY
24	SPK/LS/0030	UPPER BEARING
25	SPK/LS/0031/A	LEADSCREW ASSEMBLY
26	SPK/LS/0032	LOOM - LIMIT SWITCHES TO PMW DRIVE
27	SPK/LS/0033	LOOM - MOTOR TO MOTOR DRIVE
28	SPK /LS/0034	LOOM - PSU TO E-STOP SWITCH
29	SPK/LS/0035/A	FOLDING COVER 500-800mm TRAVEL (1 PAIR)
30	SPK /LS/0036	LIMIT SWITCHES (1 PAIR) WITH HARDWARE
31	SPK/LS/0037/A	TIMING BELT
32	SPK/CS/0038	T-SLOT ASSEMBLY
33	SPK/LS/0039/A	LINEAR RAIL ASSEMBLY 500mm TRAVEL
34	SPK/LS/0040	TOP COVER
35	SPK/CS/0041	LOWER EYE END ASSEMBLY
36	SPK/LS/0042	POWER SUPPLY UNIT
37	SPK/LS/0043	RUBBER FOOT (SET OF 4)
38	SPK/LS/0046/A	POWER CORD ASSEMBLY, 1 15 VAC, US MAINS
38	SPK/LS/0046/B	POWER CORD ASSEMBLY, 230 VAC, EURO MAINS
38	SPK/LS/0046/C	POWER CORD ASSEMBLY, 230 VAC, UK MAINS
38	SPK/LS/0046/D	POWER CORD ASSEMBLY, 230 VAC, CHINA/AUST MAINS
39	SPK/CS/0050	SPACER KIT - MACHINE BENCH MOUNTING
40	SPK/CS/0051	CABLE ASSEMBLY RS232 TO USB
41	SPK/CS/0054	CABLE MANAGEMENT KIT
42	SPK/CS2/0055	CONTROL CONSOLE LAPTOP
43	SPK/CS2/0056	MOUNT ASSEMBLY - CONTROL CONSOLE LAPTOP
44	SPK/CS2/0057	LAPTOP WITH MOUNT ASSEMBLY AND CABLE MANAGEMENT KIT



SPK-CS2-1100 Sheet A

SPK-CS2-1100 Sheet B



CS2-1100 SPARE PARTS LIST		
ITEM	PART NO.	DESCRIPTION
1	SPK/LS/0004 /A	MOTOR DRIVE PC BOARD ASSEMBLY
2	SPK/CS/0005	PROCESSOR PC BOARD ASSEMBLY
3	SPK/LS/0006/B	MOTOR ASSEMBLY WITH ENCODER
4	SPK/LS/0007	CROSSHEAD LIMIT ACTUATOR ARM
5	SPK/LS/0008	LIMIT STOP SCREW ASSEMBLY
6	SPK/CS/0010	BASE PLATE ASSEMBLY
7	SPK/LS/0011/B	FUSES (1PAIR)
8	SPK/LS/0013/B	TRANSFORMER ASSEMBLY
9	SPK/LS/0014/C	POWER ENTRY MODULE ASSEMBLY 230VAC
9	SPK/LS/0014/D	POWER ENTRY MODULE ASSEMBLY 115VAC
10	SPK/LS/0015	E-STOP SWITCH ASSEMBLY
11	SPK/LS/0016	SAFE-LINE SWITCH ASSEMBLY
12	SPK/LS/0017	LOAD CELL LOOM ASSEMBLY
13	SPK/CS/0018	CONTROL CONSOLE USB CABLE
14	SPK/LS/0019	ENCODER LOOM ASSEMBLY
15	SPK/LS/0020	SAFE-LINE LOOM ASSEMBLY
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37	SPK /LS /0043	RUBBER FOOT (SET OF 4)
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38	SPK/LS/0046/B	POWER CORD ASSEMBLY, 230 VAC, EURO MAINS
38	SPK/LS/0046/C	POWER CORD ASSEMBLY, 230 VAC, UK MAINS
38	SPK/LS/0046/D	POWER CORD ASSEMBLY, 230 VAC, CHINA/AUST MAINS
39	SPK/CS/0051	CABLE ASSEMBLY RS232 TO USB
40	SPK/LS/0052	ENCODER KIT-LS5 & LS2.5 SERIES
41	SPK/LS/0053	MOTOR ASSY-LS5 & LS2.5 SERIES
42	SPK/CS/0054	CABLE MANAGEMENT KIT
43	SPK/CS2/0055	CONTROL CONSOLE LAPTOP
44	SPK/CS2/0056	MOUNT ASSEMBLY - CONTROL CONSOLE LAPTOP
45	SPK/CS2/0057	LAPTOP WITH MOUNT ASSEMBLY AND CABLE MANAGEMENT



International Symbols

WEEE Directive

This equipment contains electrical and electronic circuits and should not be directly disposed of in a landfill site.



RoHS

This product is RoHS and China RoHS compliant.

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