James Heal

OPERATOR'S GUIDE

Elmatear^2
Intelligent Digital
Tear Tester

Model 855

Elmatear^2
Data Logger Software

Covering Serial Numbers
855/11/5000 and upwards

James H. Heal & Co. Ltd.
Halifax, England

THE QUEEN'S AWARDS
FOR ENTERPRISE:
INTERNATIONAL TRADE
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Setting the Standard

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INTRODUCTION TO ELMATEAR^2

Thank you for investing in a James Heal **Elmatear^2** Intelligent Digital Tear Tester.

As standard, the instrument capacity is 64N, the optional E-Pendulum Kit doubles the capacity to 128N. Compared with the traditional Elmendorf Tear Tester, the testing routine is simplified and accelerated. The operator selects the unit of measurement and the number of plies – the test result is displayed digitally – no calculations, conversion factors or look-up tables are required. All calculations, including statistics, are carried out by the instrument and displayed on the LCD Touch Screen.

Awkward Pendulums and Pointers have been replaced with easy-to-change, manageable weights. The operation of Elmatear^2 is intrinsically safe – release of the Pendulum Weight requires both hands, and finger traps have been eliminated. The Cutting Blade is simple to adjust to meet the requirements of different Test Methods and Standards. It is titanium nitride coated for a longer life.

Elmatear^2 is supplied complete – the price of the instrument includes a set of Pendulum Weights, equivalent to the traditional Pendulums A-D, Pendulum Check Weights, one (1) spare Cutting Blade and four (4) textile Specimen Preparation Templates.

*An *optional* Pendulum Weight, equivalent to the traditional Pendulum E, increasing the instrument capacity to 128 Newtons, is also available. This optional kit does not require any modifications to be made to the standard instrument. This kit also contains a Pendulum Check Weight, pinned jaw faces and serrated jaw faces for testing specimens with high tear resistance.

You will find the optional Data Logger Software indispensable for storing and printing test results. An optional Specimen Preparation Guillotine is available, principally for non-textile specimens.

Key Features

- Capacity up to 128N
- 5.1 inch LCD Graphics Touch Screen operation
- Fast and intuitive software
- USB data output
- Automatic Pendulum detection
- Specimen notch detection
- Serrated and pinned jaw faces available
- Tear force displayed digitally
- Units of measure: N, cN, mN, kgf, gf, lbf, ozf
- Range warnings
- Instant Pendulum arrest mechanism
- Built-in statistical analysis
- PC Software Package – Data Logger Software
- Table-top instrument
- Supplied with Calibration Check Weights and Specimen Preparation Templates
- Long-life titanium nitride coated blade
- Ergonomic front loading design
- Intrinsically safe – two-handed Pendulum release and no finger traps

Summary of Test Procedure

The mean force required to propagate a single tear in a material is determined by measuring the work done in tearing it through a fixed distance of 86mm (twice the tearing length of 43mm). **Elmatear**^{2} consists of a Z-shaped Pendulum carrying a clamp which is in alignment with a fixed clamp when the Z-shaped Pendulum is in the raised starting position with maximum potential energy.

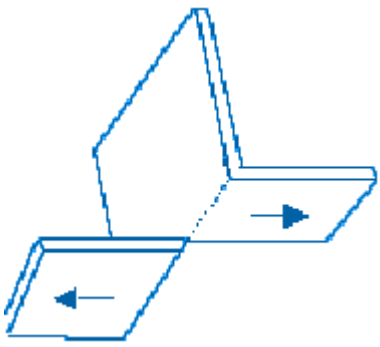
Elmatear^2 employs the energy conversion principle, i.e., potential energy converted to kinetic energy, to determine the work done. The potential energy is stored in the Pendulum by raising its centre of gravity to a known distance above its neutral point. The work done on the test specimen is the difference between the original potential energy and the sum of remaining kinetic and potential energies at the completion of the tear. This sum determines the amplitude of the Z-shaped Pendulum swing. All air resistance and friction losses are compensated for through calibration and thus this amplitude is used to calculate the work done. The tearing force is calculated by dividing the work done by twice the tear length (2 x 43mm).

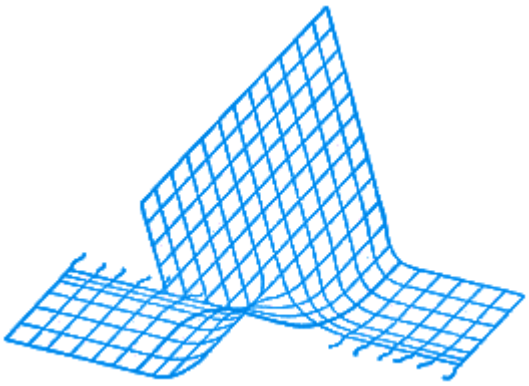
The test specimen is fastened in the clamps and the tear is started by pre-cutting / notching the specimen between the two clamps. The Pendulum-Arm is then released and the specimen is torn as the moving jaw moves away from the fixed jaw.

The difference in the angle from the vertical of the centre of gravity of the pendulum between the downswing and the upswing is a measure of the energy absorbed in tearing the sample. This angular movement is measured using a digital encoder and converted to the mean tearing force by the microprocessor in the apparatus.

The digital display shows the tearing force in the chosen units.

The mode of tearing is more or less as shown in the figures below, but the relative angle of pull changes continuously during the test. This means that the mode of failure is a continuously changing combination of in and out of plane tensile and shear.





Scope of Application

The test procedure is applicable to woven textile fabrics, coated fabrics, foils, paper, board, plastic films, nonwoven fabrics, laminates and other sheet materials. It is not applicable to knitted textile fabrics or isotropic materials such as felts.

Standards

Textile	Paper	Nonwoven	Plastics
ASTM D 1424	APPITA P 400	ASTM D 5734	ASTM D 1922
DIN 53862	ASTM D 689	WSP 100.1	GB/T 11999
EN ISO 13937-1	BS 4468		ISO 6383-2
ISO 4674-2	CSA D9		JIS K 7128-2
ISO 9290	DIN 53128		NF T54 141
M&S P29	EN 21974		
NEXT 17	GB/T 455		
NF G07-149	ISO 1974		
	JIS P 8116		
	PAPTAC D9		
	SCAN P11		
	SNV 198482		
	TAPPI T414		
	UNI 6444		

OPERATOR SAFETY

Read this manual thoroughly before operating the instrument.

- Take precautions when moving the instrument – it weighs approximately 70 kg.
- Exercise extreme caution when handling the blade - it is very sharp !
- When releasing the Pendulum, do not lean forward into the instrument.
- The path of the swinging Pendulum-Arm is shown by the dashed circle in the figure below.

- Do not store the Pendulum Weights or any other items on the instrument base.
- Do not attempt to unload the specimen until the Pendulum-Arm has come to rest.
- Only change the Pendulum Weight when the Pendulum-Arm is in the raised position as shown above.
- When notching/pre-cutting a specimen, ensure your free hand and fingers are clear of the blade.

INSTALLATION

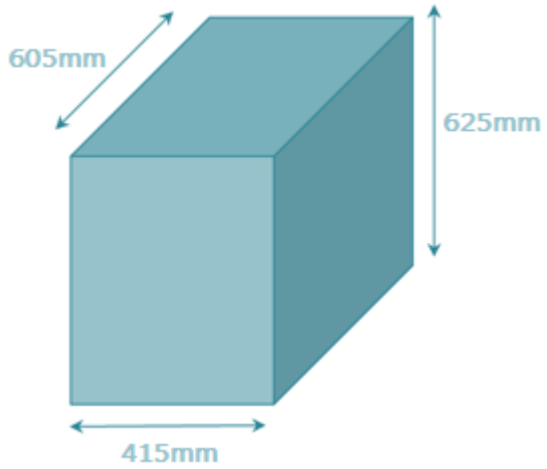
Unpacking

Before disposing of any of the packaging, check the delivery against your order.
Report any discrepancies back to your Agent immediately.

Remove the **red plastic** transit screw before using the knife.

903-303	Elmatear^2 Digital Tear Tester Model 855 Single Phase 85-264V 50/60Hz Capacity: 64 N, 6400 gf, 14.4 lbf
	3 x Pendulum Weights (B-D) (Pendulum A has no weights) 4 x Check Weights (A-D) 4 x Textile Specimen Preparation Templates 1 x Cutting Board 1 x Spare Blade 1 x Blade Setting Tool 1 x 2mm Hex Driver 1 x 17mm A/F open ended Spanner (used for levelling the instrument)
	Optional Accessories
794-742	PC Software Package (Data Logger) Comprising Windows-compatible software on CD-ROM Permits logging of tear force values, statistical calculations, saving, printing, exporting results and report generation including 2 metre USB cable
201-855	ISO Certificate of Calibration for Elmatear
794-736	E-Pendulum Kit Extends capacity to 128 N, 12800 gf, 28.8 lbf 1 x Set (4) of Pendulum Weights (E) 1 x Check Weight (E) 1 x Set (4) Serrated Jaw Inserts 1 x Set (4) Puncture Pin Jaw Inserts
855-spares	Spares Kit
	comprising: (parts are also available separately)
761-813	Cutting Blade
794-738	Wheel Block Set
528-950	Blade Arm
375-513	Torsion Spring
794-737	Plain Jaw Face Set
195-252	LCD Touch screen Protector
130-825	Fuse 1A 20mm Anti-surge
160-462	Electromagnetic Brake Assembly
390-237	Shot-bolt Assembly
794-739	Serrated Jaw Face Set
794-741	Puncture Pin Jaw Face Set
	Spare Specimen Preparation Templates
772-108	Template 100 x 63 mm - ISO 9290 Method B
772-109	Template 100 x 63 mm (Shaped) - ASTM D1424 and ISO 9290 Method A
772-117	Template 102 x 63 mm (Notched) - ASTM D1424-96
772-118	Template 100 x 63mm (Notched) - ISO 13937-1

Dimensions



Instrument footprint when unpacked.

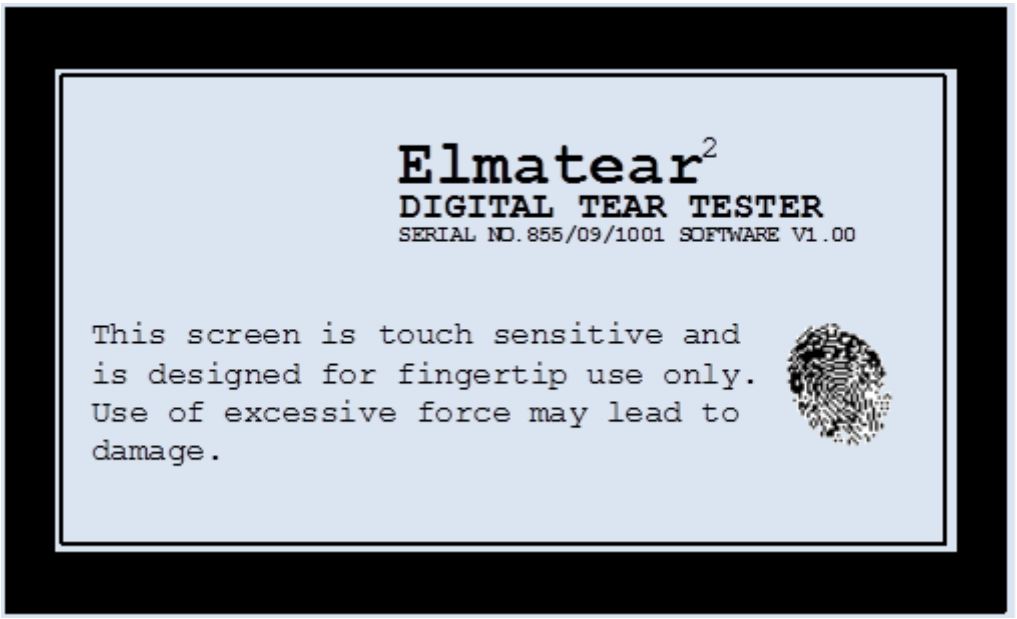
Instrument weight when unpacked.

Electrical Connection

A single phase, 85-264VAC, 50/60Hz supply is required. The instrument is rated at 60W. A 1.0 amp, 20mm anti-surge fuse is fitted. The instrument is supplied with a mains lead.

Touch Screen

When the instrument is connected to the electricity supply and switched you will see this message first:



The touch sensitive screen is designed for fingertip use only – do not use pens, pencils or other pointed implements on the screen. The use of excessive force may lead to damage.

To clean the screen use a lint free cloth dampened with water to wipe the screen gently. Do not use solvents or solvent based cleaners.

Levelling

The levelling procedure is twofold:

Firstly, level the instrument widthways.
Loosen the locking collar and adjust the front Handwheel until the Levelling Bubble is central, tighten the locking nut using the 17mm open ended spanner (supplied) or an adjustable spanner.

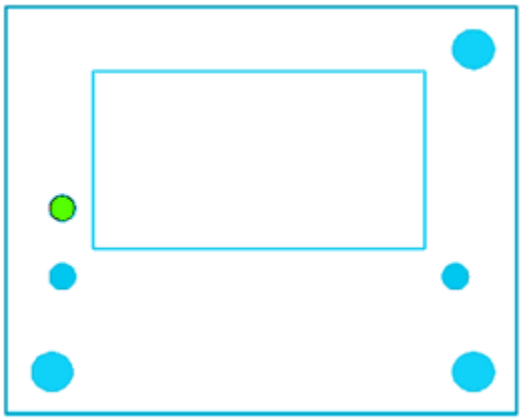
Secondly, level the instrument lengthways using the back Handwheels until the Levelling Bubble is fully centralised within the black circle.

When using a different Pendulum, it is advisable to check the level and repeat the above procedure if required. As a matter of routine, we advise the instrument level is checked at least weekly.

Levelling Bubble

Holes for Bench Fixing (x2)

Levelling Handwheels (x3)



Securing to Work Surface

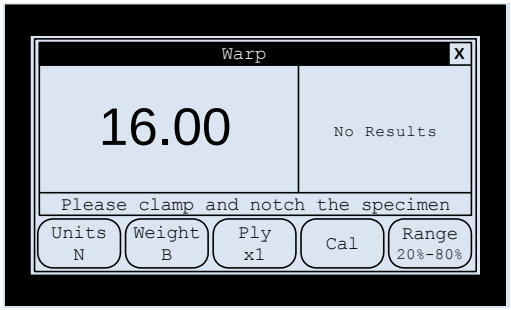
Due to the unique rapid arresting mechanism it is not necessary to fix the instrument to the work surface. However, when testing using Pendulum E, the instrument may move. If the instrument moves the results will not be correct. In this case, we recommend the instrument is firmly secured to a sturdy workbench.

Two holes are provided for this purpose. The bolts and wing-nuts are also supplied with the instrument for securing. The distance between the holes is 460mm (centre to centre) and the required hole size is 9mm. Recheck the level of the instrument after fixing to a work surface and correct if required.

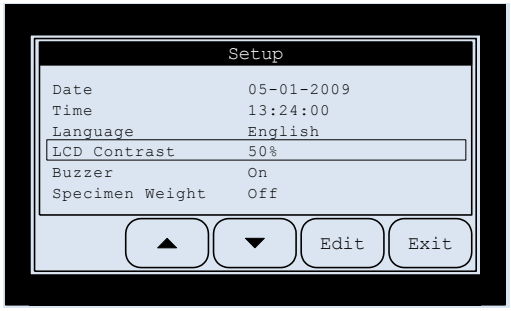
THE SETUP SCREEN

The Setup Screen allows you to set:

- Current date and time
- Language
- LCD display contrast
- Buzzer
- Specimen weight.



Press the X in the top right-hand corner of the screen to access the Setup Screen.



Use the **up/down** keys to select the required option then press **Edit**.

Date (Format dd-mm-yyyy)
The date is displayed in day/month/year format. To edit the date, highlight the **Date** option and touch **Edit**. Use the up/down keys to change the day value. Subsequent presses of the **Edit** keys moves you to the month and year settings respectively. Press **Edit** to complete the change.

Time (Format hh:mm:ss)
The time is displayed in hours : minutes : seconds format. To edit the time, highlight the **Time** option and touch **Edit**. Use the up/down keys to change the hours value. Subsequent presses of the **Edit** keys moves you to the minutes and seconds settings respectively. Press **Edit** to complete the change.

Language (Options: English, French, German, Spanish, Italian)
This is the language the screens and test reports appear in.
There are five (5) languages to choose from.

LCD Contrast (Range: 0 to 100%)
This adjusts the viewing angle/contrast of the LCD display.
For best viewing, adjust the contrast when the machine has been switched on for at least 10 minutes.

Buzzer (Options: Off, On)
Elmatear^2 emits a short beep whenever a key is pressed or when a tear result falls outside of the required range. Set it to Off if not required.

Weight (0 to 999 gm-2)
This is the specimen weight in gm^{-2} used to calculate the Tear Index value often used for paper tests. Set it to 0 if not required.

CALIBRATION PROCEDURE

Elmatear^2 Intelligent Digital Tear Tester has a unique calibration feature which will automatically zero the instrument and detect the attached Pendulum Weight. It will also perform a Free-Swing Test which checks the pendulum mechanism for any mechanical friction.

It is recommended to perform a **Cal**ibration on a weekly basis or when changing the Pendulum Weight, whichever is sooner. The Calibration Procedure is carried out with no specimen in the jaws.

Raise the Pendulum

Delete any previous test results then press the **Cal** key.

Raise the Pendulum-Arm to the start height and fit the required Pendulum Weight.

X = no specimen in jaws !

SCREEN PROMPT:
If the Pendulum-Arm is not in the correct start position you will be prompted to "Please raise the pendulum".

Close the Clamps

Remove any test specimen from the clamps and rotate the handles into a vertical position to close them. Remove any Check Weight which may be attached to the pendulum.

X = no specimen in jaws !

SCREEN PROMPT:
You will be prompted to "Please remove any test specimen and close the clamps before releasing the pendulum. DO NOT FIT A CHECK WEIGHT".

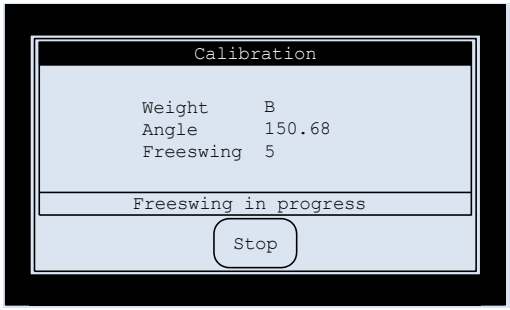
Release the Pendulum

Press both of the Pendulum Switches at the same time to release the pendulum.

X = no specimen in jaws !

SCREEN PROMPT:
After releasing the Pendulum-Arm the screen will display the Pendulum Weight (A-E), calibration angle and continue to do a Free-Swing Test.

Free-swing



The Free-Swing Test monitors the pendulum mechanism for any mechanical friction and automatically stops after 36 cycles.

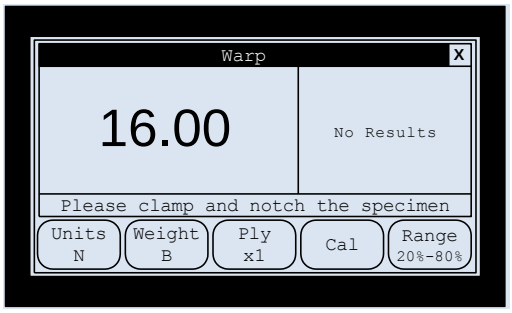
It can be stopped at any point by pressing the **Stop** key.

Press **OK** to complete the calibration.

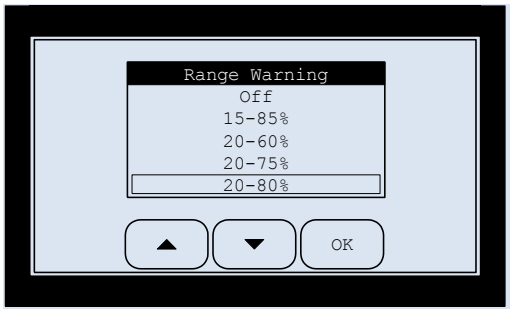
RANGE WARNING FEATURE

Some standards or test methods require the tear force result to fall within a certain range of the instruments capacity.

Elmatear^2 Intelligent Digital Tear Tester has a range warning feature which alerts you to results that fall outside of the required force range, and will guide you what to do next to get the results to fall within the required range. Set this feature to Off if not required.

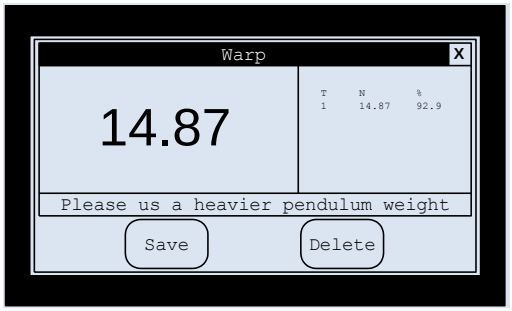


Press **Range** to display the Range Warning screen.



Use the **up/down** arrow keys to select the required range or select **Off** if this feature is not required.

Press **OK** when you have finished.



If the tear force falls outside the required range you will be guided what to do, in an attempt to get the result to fall within the required range:

- Use a heavier pendulum weight
- Use a lighter pendulum weight
- Increase the number of ply
- Decrease the number of ply

OPERATION

Changing Pendulum Weights

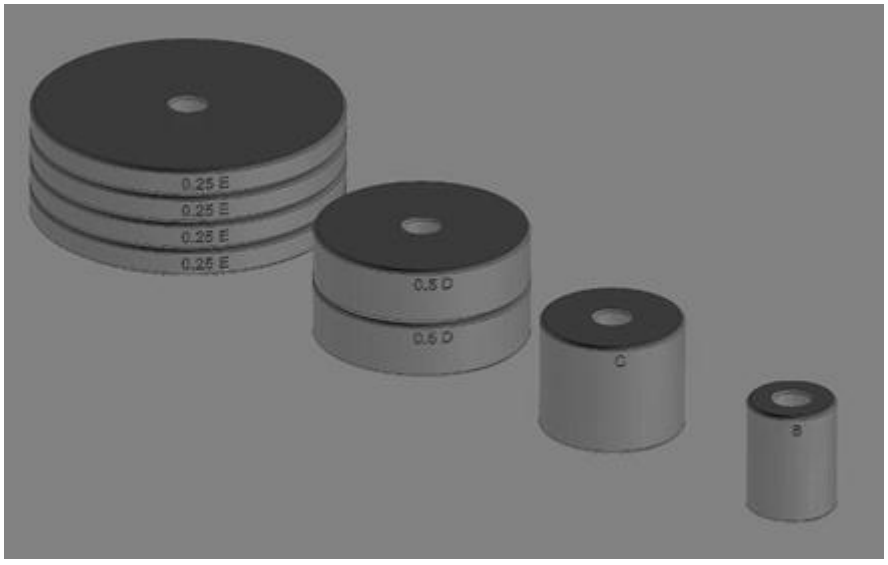
Elmatear^2 Intelligent Digital Tear Tester is supplied with a set of four (or five) Pendulums:
A, B, C and D (and E).

With the Knurled Handwheel attached only, the instrument has the capacity of Pendulum A. No additional weight is added.

To increase the capacity of the instrument simply add a Pendulum Weight.
Pendulums B and C are single weights.
Pendulum D, is comprised of two identical, manageable weights, each labelled “0.5D”.
The optional Pendulum E, is comprised of four identical weights, each labelled “0.25E”.

The Knurled Handwheel must be fitted at all times.
The Knurled Handwheel must be sufficiently tight to prevent the weights from rotating.
If the weights are able to rotate during operation the results will not be correct.

Do not store Pendulum Weights or any other items on the instrument base.



After changing a Pendulum Weight, select the **Cal** option and follow the on-screen instructions.
The instrument will detect which Pendulum Weight is fitted and zero the instrument.

Pendulum Weight Ranges

Weight	N	cN	mN	kgf	gf	lbf	ozf
A	8	800	8000	0.82	816	1.8	29
B	16	1600	16000	1.63	1632	3.6	58
C	32	3200	32000	3.26	3263	7.2	115
D	64	6400	64000	6.53	6526	14.4	230
E	128	12800	128000	13.05	13052	28.8	460

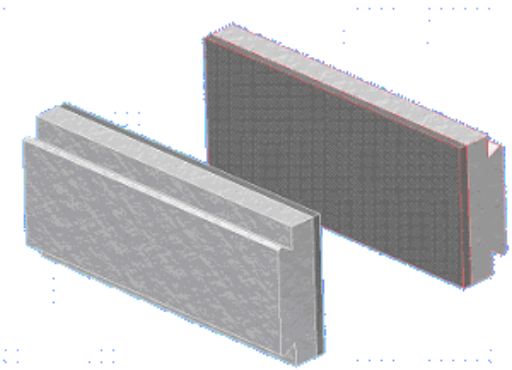
Changing the Jaw Faces

The standard jaw faces are coated with rubber.
The optional E-Pendulum Kit contains two other types of jaw faces are supplied:

- Serrated Jaw Faces
- Puncture Pin / Rubber Jaw Faces

These are used to provide additional specimen gripping at high tearing forces.

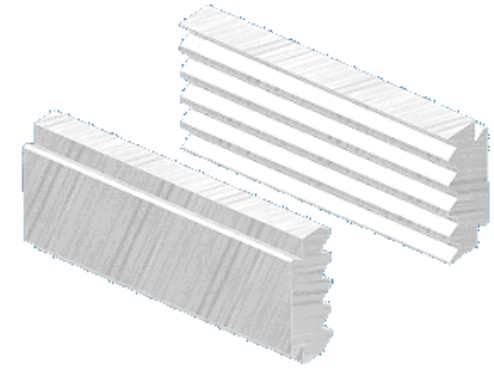
Each jaw face is held in place by two grub screws. Using the hex driver supplied in the Kit, loosen the grub screws until the jaw face slides out. Slide the new jaw face into the jaw and re-tighten the grub screws. Ensure the short edges of the jaw faces are aligned with edges of the jaws to provide the correct jaw separation.



Plain Jaw Faces

These are supplied as standard with the 64N instrument.

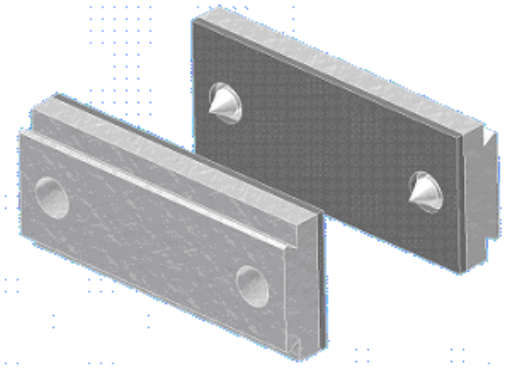
They are rubber coated.



Serrated Jaw Faces

These are supplied with the optional E-Pendulum Kit.

They have uncoated metal faces.



Puncture Pin Jaw Faces

These are also supplied with the optional E-Pendulum Kit.

They are rubber coated and with pins for addition gripping.

Mounting the Test Specimen

Set the Pendulum-Arm in the raised position to align the jaws by pulling the lever towards the Operator. The specimen is held between a pair of jaws, one moveable and the other fixed to the instrument. The moving jaw is attached to a Pendulum-Arm to which the Pendulum Weights are added.

Position the test specimen centrally in the jaws so that the long side of the test specimen is parallel to the upper edge of the jaws. Clamp the test specimen centrally and with the bottom edge carefully set against the base of the jaws.

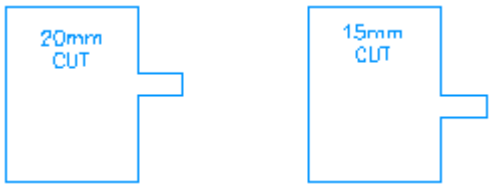
Jaw Operation

Place a test specimen centrally in the jaws.
Rotate the handles into a vertical position to close them.

After testing, raise the Pendulum-Arm to the starting position.
Return the jaw handles to the horizontal position and remove the tested specimen.

Checking the Cut Length

A single Blade Setting Tool is provided. This must only be used as a guide. When placed one way in the jaws it will indicate a 20mm cut.
When placed the other way it will indicate a 15mm cut.

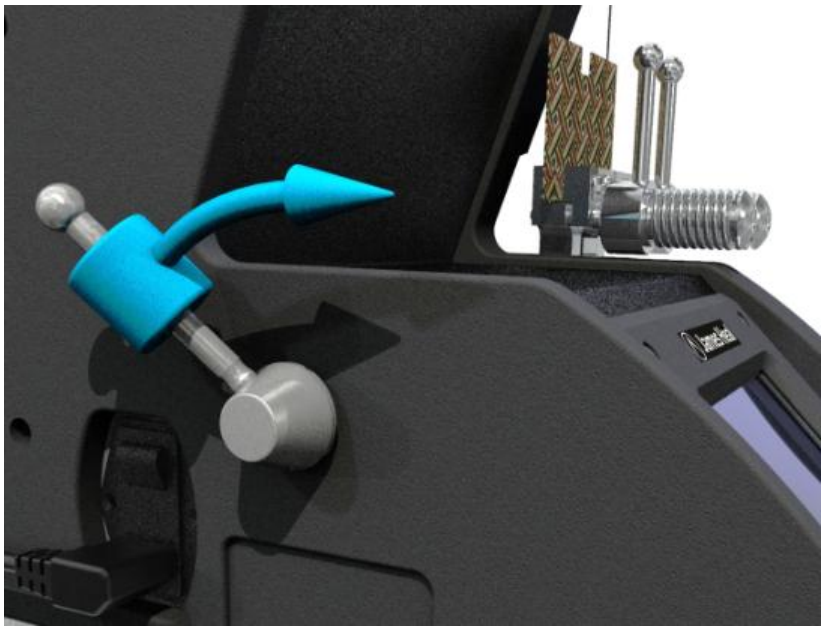


Place the Blade Setting Tool in the left hand fixed jaw and secure it. Slowly raise the Cutting Blade towards the Blade Setting Tool. The Cutting Blade should just touch the Blade Setting Tool as it passes.

The nature of the material under test influences the cut length achieved with a given blade setting. When changing materials it is advisable to always check the cut length using a calibrated steel rule. The tearing length should always be 43mm.

Knife (Cutting Blade) Operation

Rotate the Knife Lever clockwise towards the Operator to cut/notch the specimen to initialise a tear. If the specimen has not been notched the test cannot proceed.



Operation Check List

- Check the instrument is level.
- Check the electrical power is connected and switched on.
- Check the Pendulum Weight(s) are secured to prevent rotation.
- Check the Jaw Faces are secure.
- Check the instrument has been calibrated using the **Cal** option.
- Check the Cutting Length of the Blade.
- Check the Specimen is clamped by the Jaws.
- Check the Specimen has been “notched” (pre-cut).
- Check there is nothing in the path of the Pendulum-Arm and attached Pendulum Weight.
- Set the Units of Measure and number of Ply required.
- The instrument is now ready to operate.

PERFORMING A TEST

This example guides you through performing a tear test and sending the results to a Personal Computer via the Data Logger Software. It assumes you want the results in Newtons, have fitted the 16N Pendulum Weight 'B', are testing 1 specimen ply at a time and require the results to fall within 20% to 80% of the range.

Raise the Pendulum

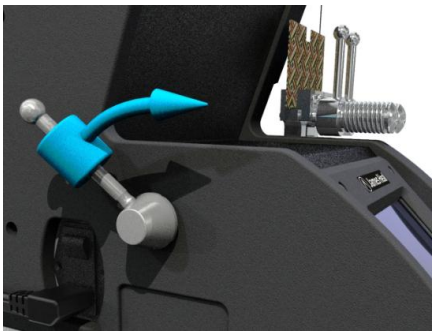
Pull the Pendulum Lever down to lift the Pendulum-Arm to the start position.

SCREEN PROMPT:
If the pendulum is not in the correct start position you will be prompted to "Please raise the pendulum".

Clamp the Specimen

Place a test specimen centrally in the Clamps and rotate the handles into a vertical position to close them.

Notch the Specimen



Move the Knife Lever towards you to cut/notch the specimen and initialise a tear.

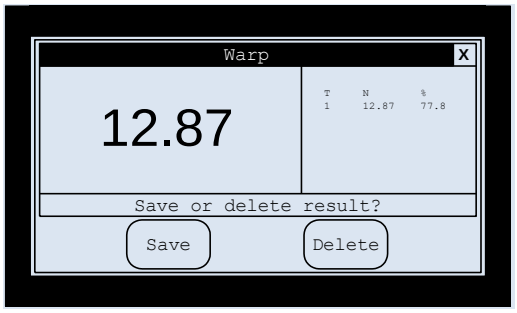
SCREEN PROMPT:
If the specimen has not been notched you will be prompted to "Please clamp and notch the specimen". Once the specimen is notched the screen will display "Ready to release the pendulum".

Release the Pendulum

Press both of the Pendulum Switches at the same time to release the Pendulum-Arm. Keep clear of the swinging mechanism.

After tearing the specimen, the Pendulum-Arm will come to a complete stop and the tear force will appear on the screen.

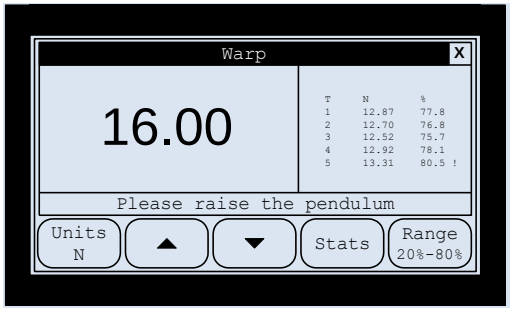
Save the Result



If you are satisfied with the result press **Save** to store it.

When using the **Range Warning** feature and the tear force falls outside the required range on specimen No.1, the "User prompt area" will guide you what to do next. For example, use a heavier or lighter pendulum or increase or reduce the number of ply to get the result to fall within the required range.

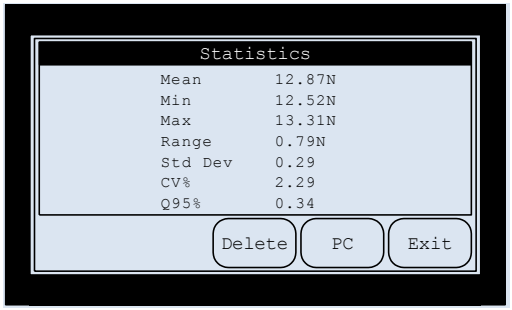
Add more tests



Repeat the previous steps until you have performed the required number of tests.

*The results window shows last 5 test results. You can use the **up/down** arrow keys to scroll through other results. Press the **Units** key to change the tear force units.*

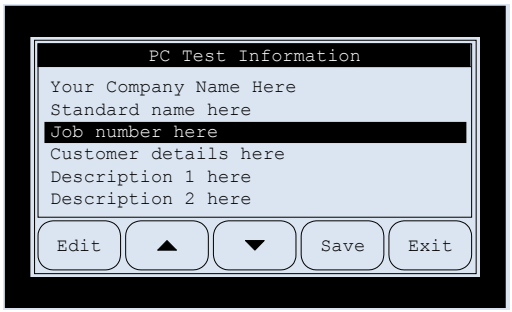
Statistical Analysis



Press the **Stats** key to display a statistical analysis then press the **PC** key.

Press the **Delete** key when you wish to start a new series of tests. Press **Exit** if you wish to add more tests.

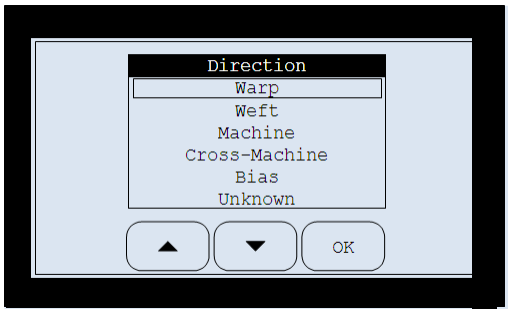
PC Test Information



Press **Edit** to fill in your required test information before pressing **Save** which sends the test report to the PC connected to the instrument's USB port.

Note:
The PC must be connected and running the Elmatear[2] Data Logger Software.

Change Test Direction



Touch the Direction Bar and a list of pre-set directions will be presented.

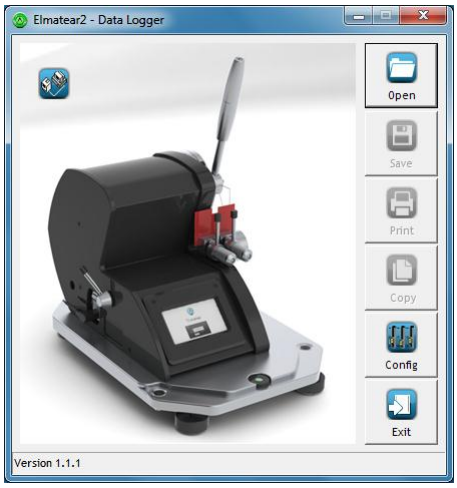
Use the up or down arrows to move to the new choice and then press **OK**.

Test Report

```
Your Company Name Here

Document        000001
Date            05-01-2008
Time            13:24:15

Standard name here
Job number here
Customer details here
Description 1 here
Description 2 here

N Tests         5
N Ply           1
Direction       Warp
Pendulum        D           20%-80%

T               N           %
1               12.87       77.8
2               12.70       76.8
3               12.52       75.7
4               12.92       78.1
5               13.31       80.5 !

!= Range Warning

Mean            12.87
Min             12.52
Max             13.31
Range           0.79
Std Dev         0.29
CV%             2.29
Q95%            0.34

Instrument      Elmatear2 Model 855
Machine SN      855/09/1001
Software        V1.00
Free Swings     >35 checked 05-01-2009
Manufacturer    James H Heal & Co Ltd
```

This is an example test report that the Data Logger Software receives, stores and prints.

USING THE DATA LOGGER SOFTWARE



Data Logger Software features

- Automatic download, print and storage of test reports on your PC.
- Provides tools to Recall, Edit, Save, Delete and Print stored test reports.
- Provides drag and drop copying and copy to clipboard for pasting into other applications.

Requirements

- **Elmatear**^{2} Intelligent Digital Tear Tester
- **Elmatear**^{2} Data Logger Software supplied on CD-ROM (794-735)
- USB Cable x 2 metre type A – B (154-184)
- A PC with a USB port running Windows XP/Vista/7 operating system
- Any PC capable of running one of the above mentioned Operating Systems will be sufficient for the requirements of the **Elmatear**^{2} Data Logger

Connecting Elmatear^2 to a PC

Connect the supplied USB cable to the **Elmatear**^{2} instrument and your personal computer

The flat connector (type A) fits in your PC. The square connector (type B) fits into the instrument

Power up the PC first, followed by **Elmatear**^{2}

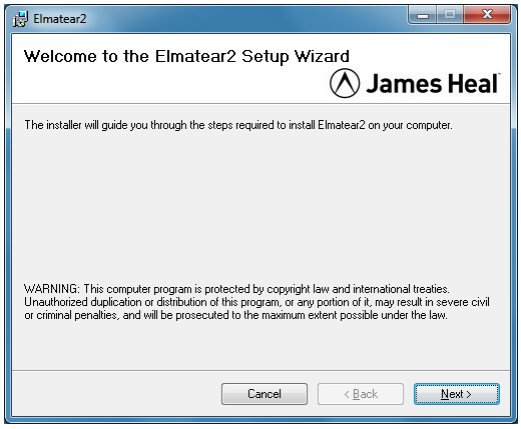
Installing the Elmatear^2 Data Logger Software

Before running the setup program to install the Data Logger Software, it is recommended to exit all other programs.

Insert the CD into your CD-ROM drive.

The set-up program will start the installation wizard, which will guide you through the set-up procedure.

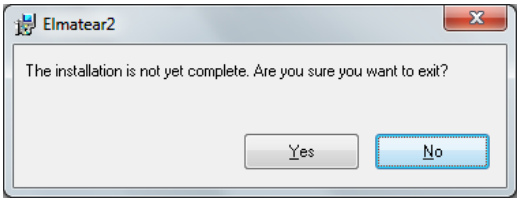
If the set-up program does not start automatically, click the Windows 'START' button then choose 'RUN…' and type "D:\setup.exe" where "D" is the drive letter of your CD-ROM.



Installation Wizard

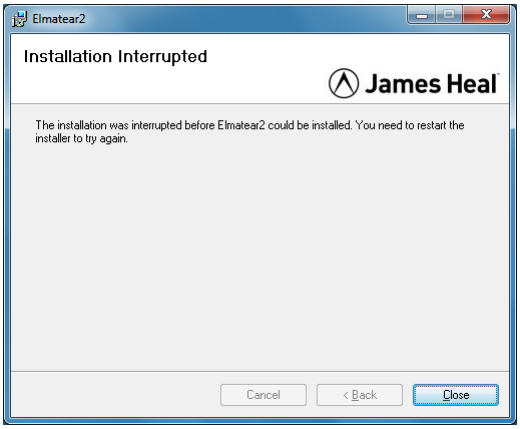
Place the CD in the DVD/CD drive on your PC. The CD will auto-run.

Follow and accept the default prompts.



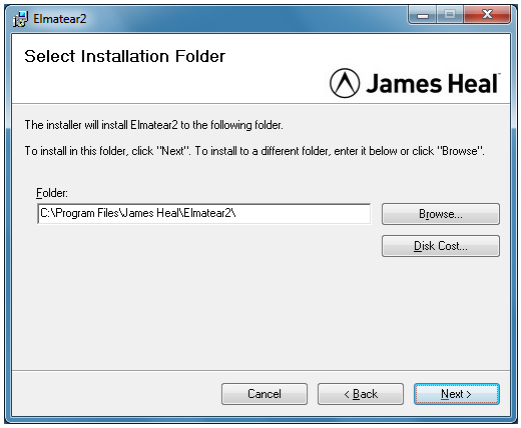
To cancel the installation at any time press "Cancel".

You will be prompted with "are you sure ?"



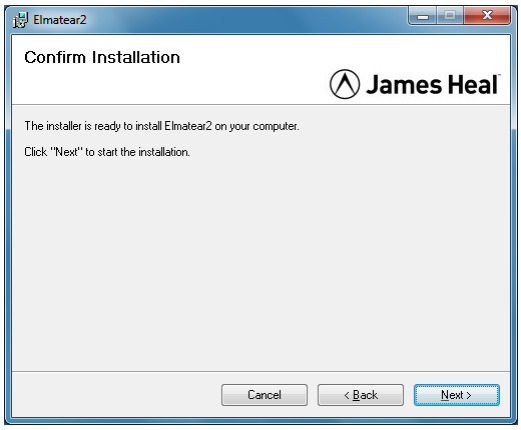
If you answer "yes" the installation will be aborted.

If you answer "No" the installation will continue.

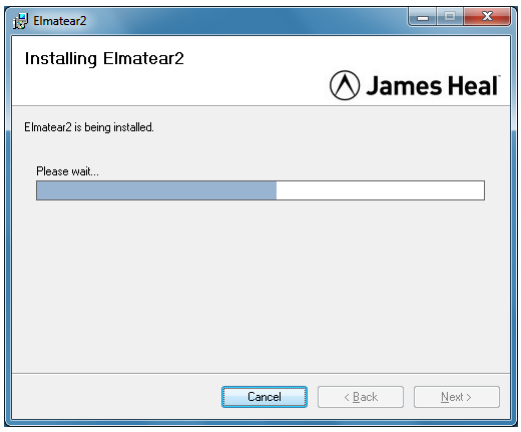


It is recommended to accept the default folder for installation.

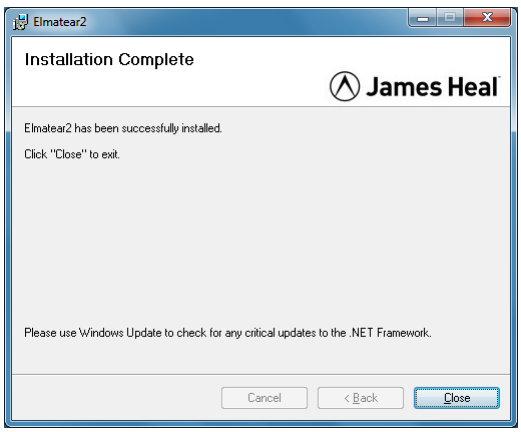
Due to Windows security policies, if you select an alternative folder, the installation may fail.



Click “Next” to start the installation.



The installation progress is displayed.



The installation has completed.

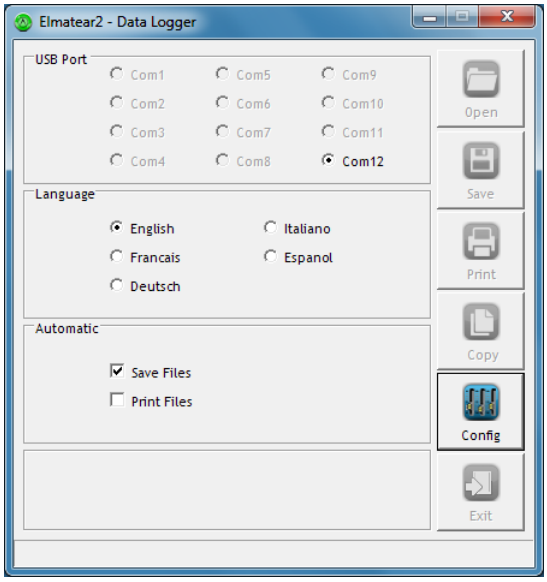
Click “Close”.

Running the Data Logger Software

Always make sure the **Elmatear²** is switched **ON** before starting the Data Logger software.

Double click the **Elmatear²** icon on your desktop to start the program.

If the software cannot find the machine you will see an error message like this:



It is very important to select the correct USB port for communication with the **Elmatear²**.

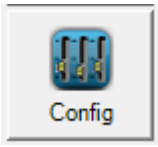
The icon in the top left-hand corner of the screen indicates your connection status.

Good Connection

Bad Connection

If you have a Bad Connection select another USB port using the "Config" button.

Configuring the Software



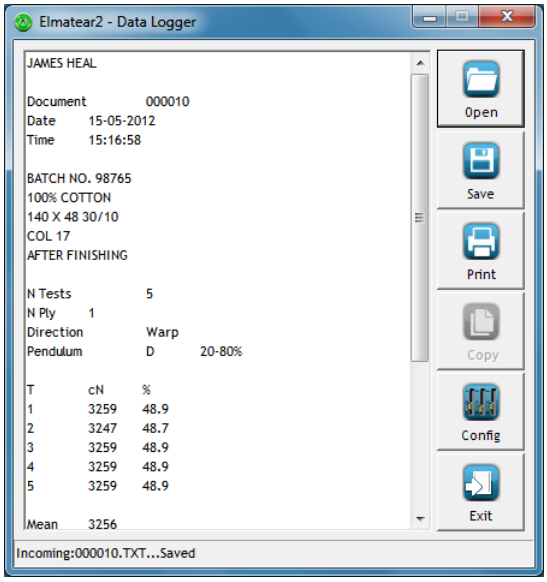
Config lets you setup communications with **Elmatear²**. You can select the desired language and options to automatically save and print the incoming test reports.

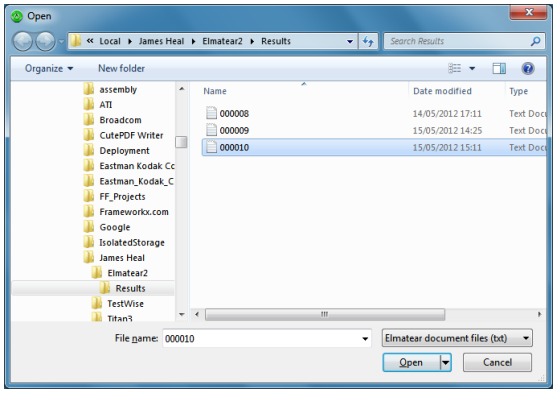
USB Port
These are the *active* COM ports on your PC. Select the one which gives you a Connected icon.

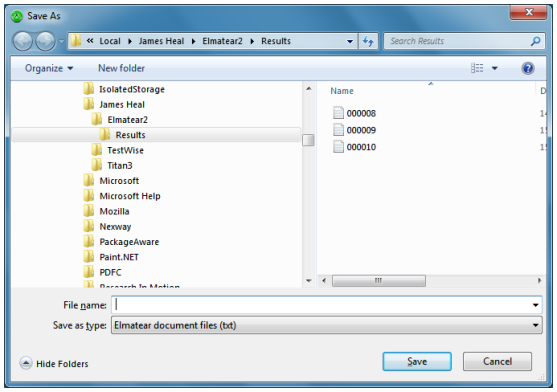
Language
Clicking on any of the language options instantly changes the on-screen text to the chosen language.

Automatically Save Files
Tick this option if you want Data Logger to automatically save a test document when it is received from **Elmatear²**.
Data Logger will automatically assign a unique filename based on the document reference number.

Automatically Print Files
Tick this option if you want Data Logger to automatically print out each test report as it is arrives from **Elmatear²**. Print out is to the Windows Default printer.







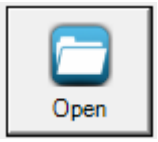
Operating the Data Logger

With the software configured you are now ready to receive test reports from **Elmatear²**. The Data Logger is designed to run as a background task, constantly monitoring data from the instrument. When data arrives, it is displayed on the screen and automatically saved and printed if required. Original files are saved as read-only so you will always have a master copy that has not been altered in any way. Each file is given a unique 6-digit document number, e.g., 000123.txt and is stored in the C:\jhh\Elmatear2 folder.

Sending Test Results to the Data Logger

When you have completed your tear tests on **Elmatear²**, press the **Stats** key then press the **PC** key. Fill in the Specimen Data then press the **Save** key to send the data to the Data Logger.

Open a Document



Saved test documents can be recalled by using the **Open** button.

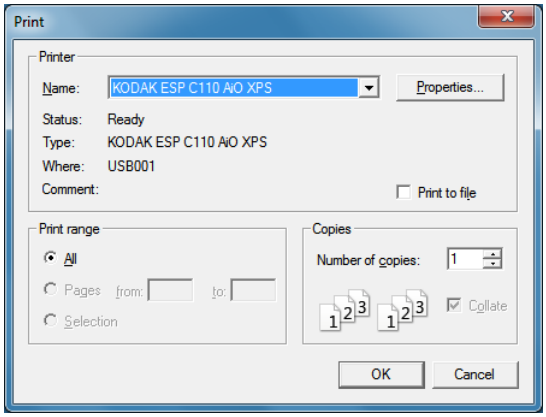
Users who are familiar with using Windows will recognise the common dialogue box functions on this screen.

From here you can select and look in folders on different drives and networks. Create new folders and list files by name/date. It is also possible to delete individual files by highlighting the file and pressing the delete key.

Saving a Document

After opening or editing a file you may wish to save the test document with a *different* filename.

You will be prompted if you attempt to save a document with a filename that already exists.

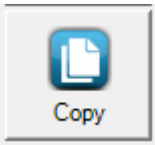


Printing a Document
After opening or editing a file you may wish to print the test document.

Users who are familiar with using Windows will recognise the common dialogue box functions on this screen.

From here you can select a local or network printer and the number of copies you require.

Copying Text From the Document



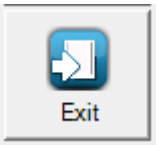
Test documents are displayed and saved in Rich Text Format (RTF).
Data Logger has been designed to allow you to copy text to the clipboard for subsequent pasting into another application like a word processor, or for drag and drop pasting.

To copy-to-clipboard simply highlight the text with the mouse and press the **Copy** button.
Go to the required Application and select Paste from the Edit menu or use the Ctrl-V shortcut.

Always use a *proportionally spaced font* such as Courier New to maintain the format (spacing) of the test document or use drag-and-drop copying which will do this automatically for you.

For drag-and-drop copying, simply highlight the text, then drag and drop the highlighted text onto the required application.

Exit
Quits the **Elmatear**^{2} Data Logger without prompting.



VERIFICATION OF ELMATEAR^2

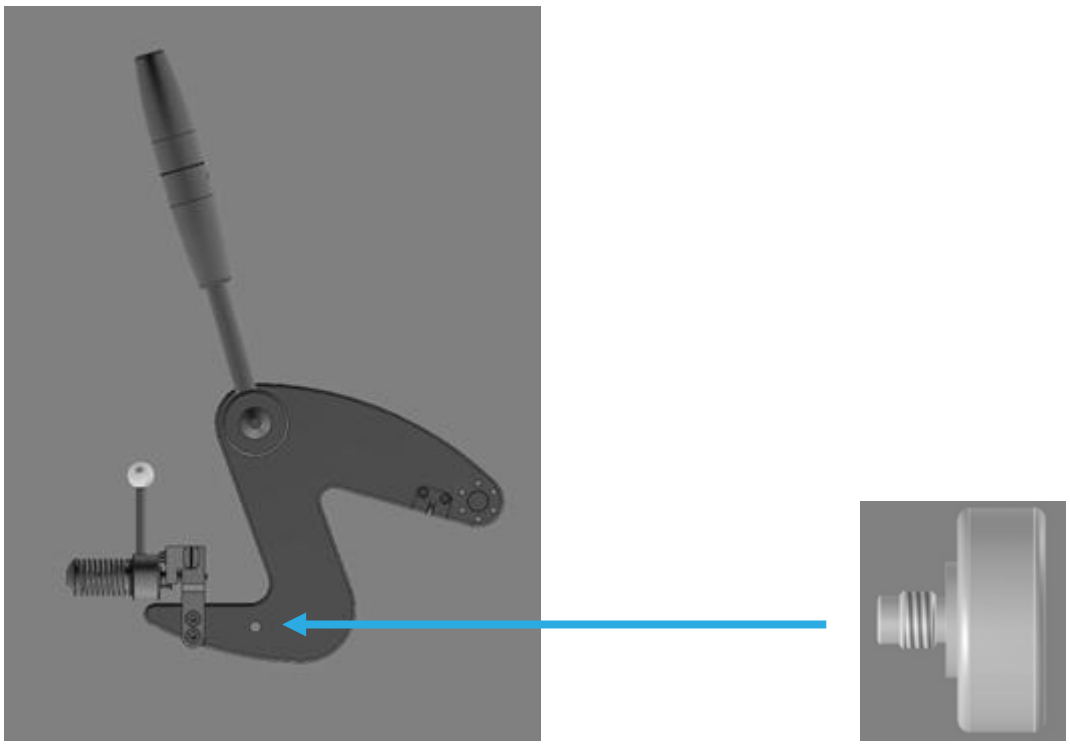
James Heal Service & Calibration

Full servicing and calibration can only be carried out by **James Heal Service & Calibration**.

Verification using Check Weights

Elmatear^2 is supplied with a set of Check Weights, one for each corresponding Pendulum.
This enables the operator to confirm the unit is functioning correctly.
This method provides one check point approximately mid-range of each Pendulum.
This method does not replace a calibration performed by a Service & Calibration Engineer.
DO NOT USE CHECK WEIGHTS WHEN CARRYING OUT NORMAL CALIBRATION.

- Check the instrument is level.
- Set the instrument to measure in Newtons and with Single (1) Ply.
- Close both the jaws of the instrument, i.e., no specimen in jaws.
- Fit the Pendulum Weight of your choice and secure using the Knurled Handwheel.
- **Cal**ibrate the instrument.
- Raise the Pendulum-Arm to the test position.
- Attach the corresponding Check Weight by screwing into the position shown below.



- (Notch the “specimen” even though there is nothing in the jaws).
- Release the Pendulum and press **Save** to record the result.
- Repeat the test four more times then press **Stats** to show the mean.
- The mean result should fall between the two figures in the table below.

Pendulum	Minimum Reading (Newtons)	Maximum Reading (Newtons)
A	3.956	4.135
B	7.91	8.27
C	15.82	16.54
D	31.65	33.08
E	63.30	66.16

Note: Only use the Check Weight with its associated Pendulum.

If the reading falls outside the range:

- Adjust the rear levelling feet in ¼ turn increments and repeat the test until the reading is correct.
- Remove the check weight and check the instrument still reads zero.

If the reading is still unsatisfactory, check the following:

- The instrument is not moving during the test.
- If it is, securely fix the instrument to a rigid workbench using the bolts provided.
- The locking nuts for the adjusting feet are tight.
- The Knurled Handwheel is sufficiently tight to prevent the Pendulum Weight(s) from rotating.
- The jaws are empty and closed.

Free Swing Count

Some standards or test methods stipulate that the Pendulum-Arm's ability to swing freely is checked. On **Elmatear**^{2} the procedure has been automated. It is advisable to perform this check at least once every week.

The Free-Swing Count is part of the **Cal**ibration procedure.

If the reading is unsatisfactory, check the following:

- The instrument is level and stable.
- If Pendulum E is in use, the instrument may require fastening to a rigid workbench.
- Both locking collars for the adjusting feet are tight.
- The Knurled Handwheel is sufficiently tight to prevent the weights from rotating.
- The jaws are empty and closed.

If the count remains significantly down on previous results contact
James Heal Service & Calibration.

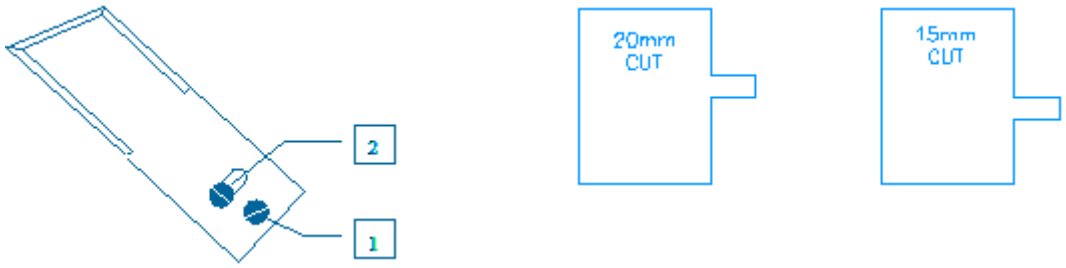
Replacing the Cutting Blade

Periodically, the blade will need replacing.
The blade is specially treated with titanium nitride to prolong its life.
The durability of the blade depends on the nature of the material under test and the use of the instrument.
Exercise caution when replacing the blade.
A dull blade is still dangerous.
Remove the blade and discard responsibly.

Setting Cut Length

A Blade Setting Tool is provided as a *guide* to the cut length.
The nature of the material under test influences the cut length achieved with a given blade setting.
When changing materials it is advisable to always check the cut length using a calibrated steel rule.

Set the unit to Pendulum A capacity.
The Blade Setting Tool is placed and gripped in the fixed jaw.
When the knife blade is set to the correct position, the blade will just clear the Setting Tool.
Adjustment of the blade is carried out as follows:



Loosen Screw No.1, by turning counter clockwise, sufficient to allow the blade to pivot.
Adjust the blade as required and re-tighten Screw No.2 , by turning clockwise, sufficient to hold the blade in place. Repeat this procedure until the blade until it just clears the Setting Tool.

Clamp Gap

Check that the distance between the clamps (the Clamp Gap) is 2.8 ± 0.3mm and that when the Pendulum-Arm is in its initial starting position that the clamps are in alignment.

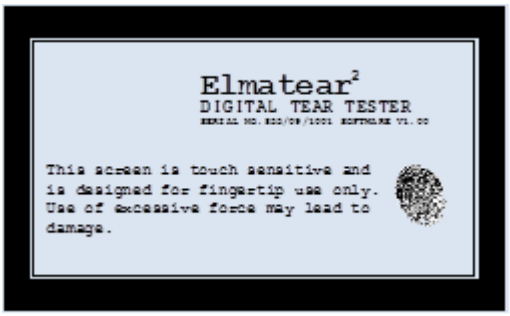
CARE AND MAINTENANCE

General

Between service and calibration visits no regular maintenance is required.
Simply keep the instrument free from dust and debris.
Wipe clean with a lint free cloth dampened with water.
Do not use solvents or solvent-based cleaning agents.

Touch Screen

The touch sensitive screen is designed for fingertip use only – do not use pens, pencils or other pointed implements on the screen. The use of excessive force may lead to damage.



To clean the screen use a lint free cloth dampened with water to wipe the screen gently.
Do not use solvents or solvent based cleaners.

James Heal Service & Calibration

James Heal Service & Calibration is a totally comprehensive, worldwide support programme.
When you buy instrumentation from us, it is the beginning rather than the end of an association.

Our aim is simple :
To provide precisely the services you need to maintain and protect the value of your investment.

For any enquires you may have regarding your instrument please contact **James Heal Service & Calibration** by e-mail, phone or fax.

In all communications please quote the serial number of your instrument and the software version number, e.g., 855/11/5000 and V1.00.

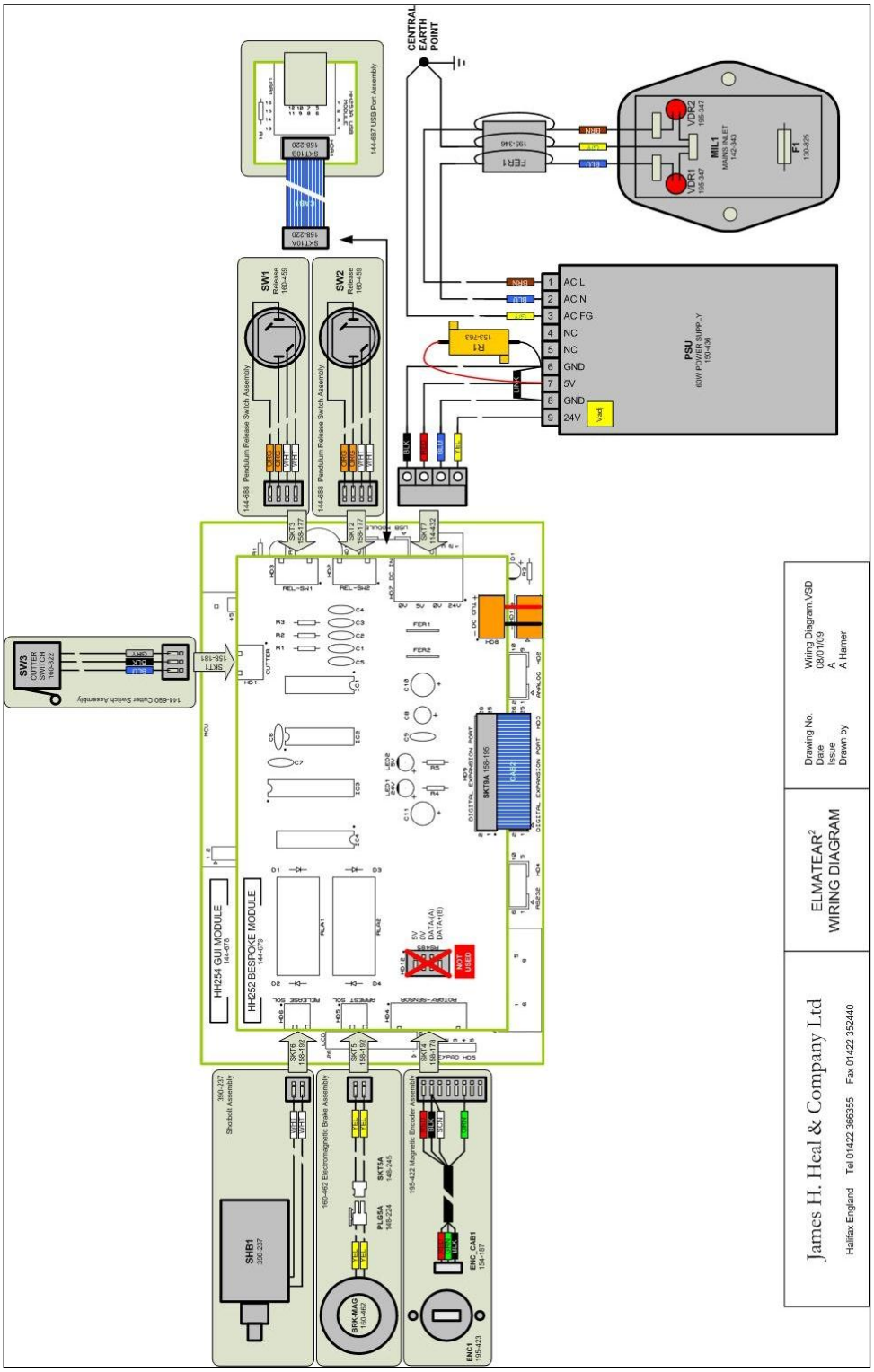
James Heal Service & Calibration contact details:

e-mail	support@james-heal.co.uk
Telephone	+44 (0) 1422 366355
Fax	+44 (0) 1422 352440

TECHNICAL SPECIFICATION

Angular Resolution	0.09°
Measuring Accuracy	±1% of full scale reading
Specimen Thickness	3.5mm (maximum)
Tear Length	43mm
Number of Ply	1 to 16
Cut Length	15mm or 20mm (adjustable)
Blade	Titanium nitride coated
Units of Measure	N, cN, mN, kgf, gf, lbf, ozf
Calibration	Automatic zeroing Automatic weight detection Calibration check by supplied check-weights Mechanical friction check by free-swing procedure
Display	5.1" LCD Graphics touch screen
Safety Features	Specimen cut sensor Two handed pendulum release switches Pendulum arrest mechanism
Statistical Analysis	Standalone statistical analysis calculates: Mean, maximum, minimum, range, standard deviation, coefficient of variation, 95% confidence limits and tear index for up to 100 tests. Visual and audible range warning
Computer Interface	USB Port (compatible with USB 2.0)
Data Logger Software	Comprising a Windows-compatible CD and USB serial cable For logging of tear force values, statistics, saving, exporting and report generation.
Weight	Instrument only: 73kg Shipping weight: 82kg maximum
Dimensions	Instrument footprint: 414mm x 605mm x 625mm (width depth height) Shipping dimensions: 690mm x 500mm x 820mm (width depth height)
Electrical Supply	85 to 264VAC 50/60Hz 60W (single phase)

ELECTRICAL DRAWING



PRODUCT COMPLIANCE

Elmatear^2 Intelligent Digital Tear Tester, Model 855, is CE marked and complies with the following International and European requirements of :

Machinery Directive (98/37/EC)
Implemented in the UK through the following: -
Supply of Machinery (Safety) Regulations 1992 (SI 1992 No. 3073)
Supply of Machinery (Safety) (Amendment) Regulations 1994 (SI 1994 No. 2063)

Electromagnetic Compatibility Directive (89/336/EEC)
Based on product specific standard EN 61326-1:2006
Implemented in the UK through the following:
Electromagnetic Compatibility Regulations 1992 (SI 1992 No. 2372)
Electromagnetic Compatibility (Amendment) Regulations 1994 (SI 1994 No. 3080)
Electromagnetic Compatibility (Amendment) Regulations 1995 (SI 1995 No. 3180)

Low Voltage Directive (2006/95/EC)
Implemented in the UK through the following: -
Electrical Equipment (Safety) Regulations 1994 (SI 1994 No. 3260)

REVISION HISTORY

See front cover for Publication number, e.g., 290-855-1$A.

Rev	Date	Originator	Details of revision
A	20-03-09	PG	New release
B	09-06-09	PG	Page 12. Changes to Calibration procedure. 290-855-2 also updated in parallel.
C	10-07-09	PG	Front Cover logo updated Pages 12 and 25. Changes to Calibration procedure to reflect changes to software in V1.01. 290-855-2 also updated in parallel.
D	06-06-10	PG	Table page 26 changed. Check Weight values for Pendulum E amended.
E	29-06-10	PG	Table page 14 amended, Pendulum Weight Ranges, cN column.
F	21-05-12	PG	Rebranded (major changes to appearance of document). 290-855-2updated in parallel.