L3 Long-range Extensometer Calibration

1   Purpose and Scope

This document covers the verification/calibration procedure for the TTL-based long-range extensometer (model QC-551) on L3 Series testing frames. The higher-resolution encoder of the stand crosshead is used to verify the reported distance traveled by the extensometer. The effective resolution of the extensometer can then be adjusted if necessary.

2   Procedure

- Start with the following parameters in Metlogix.ini, setting the resolution of the extensometer to the specified resolution from the manufacturer, and enabling the debug distance display of the extensometer travel in the L3 DRO:

```
[Hardware]
TTLExtEnable=1                  ; enable TTL Extensometer
TTLExtResolution=0.01          ; resolution (mm) of 1100mm tall extensometer
TTLExtLength=30                ; default gage length (mm)
TTLExtShowDist=1              ; enable distance display
```

- Seat the bottom arm of the extensometer firmly into the parked position so it will not move during the procedure. Affix the top arm securely to the stand crosshead so that it will travel along with it:

Move the crosshead down so that the starting point for the test is near the gage length (this distance is not critical, so do NOT travel too close and risk damaging the arms with a collision). It would be wise at this point to set the lower hardware limit switch on the stand so that the crosshead can not move further down and crush the extensometer arms.

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- Create a simple test in L3 that pulls to a specified distance (we are using 500mm in the example below). Remember to add a material Sample step and specify that you are using an extensometer.

Ⓛ³ L3 Metrology Readout 2.05.00, 2022 June 07

Ext-500mmPull

	Step	Details	#
◁	Pre Test		1
I	Sample	$M_{at} =$ $S_{hape} =$ Irregular	2
D ▲▼	Pull	$D_{lim} = 500.000$ mm $S = 300.000$ mm/min	3
d— d— d—	Data		4
▷	Post Test		5

- Zero all values on the DRO and run the Test. Note the values reported when the Pull completes:

Ⓛ³ L3 Metrology Readout 2.05.00, 2022 June 07

⬥ Ext-500mmPull

L	⬥ 2.02 N
D	500.017 mm
E	501.390 mm

Set Home	Start Test	Return Home

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You may want to run the test several times to assess the repeatability and come up with an average distance value for the extensometer travel.

● If the crosshead distance (D) and the reported extensometer distance (E) are not in agreement, the extensometer resolution can be adjusted/corrected according to the following formula:

New Resolution = (D/E)*(Current Resolution)
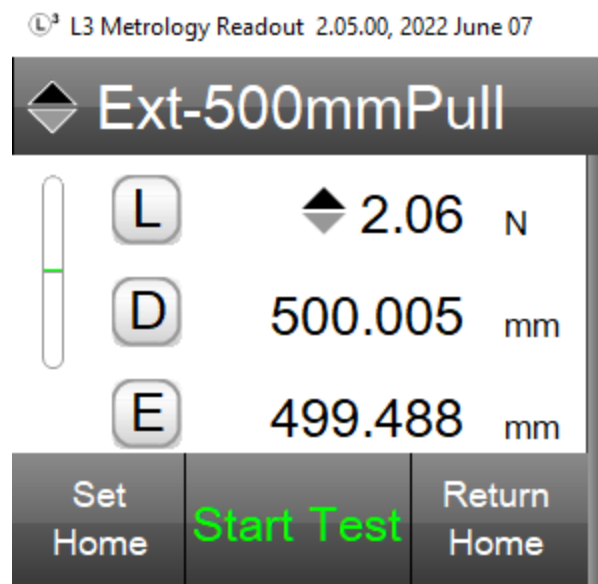
In the example above, we get the following result:

(500.017/501.390)*(0.01) = 0.009972616

● Enter the calculated resolution value in Metlogix.ini (rounded to three or four significant figures should be sufficient):

[Hardware]
TTLExtResolution=0.00997

● Restart the L3 software so it is using the new resolution value.
● Repeat the test and confirm that the reported distance values are in better agreement (within the established repeatability of the extensometer):

L3 Metrology Readout 2.05.00, 2022 June 07

Ext-500mmPull

L ⬍ 2.06 N

D 500.005 mm

E 499.488 mm

Set Home | Start Test | Return Home

● Remove the TTLExtShowDist parameter from Metlogix.ini.