Description: Load Calibration for Material Testing Systems

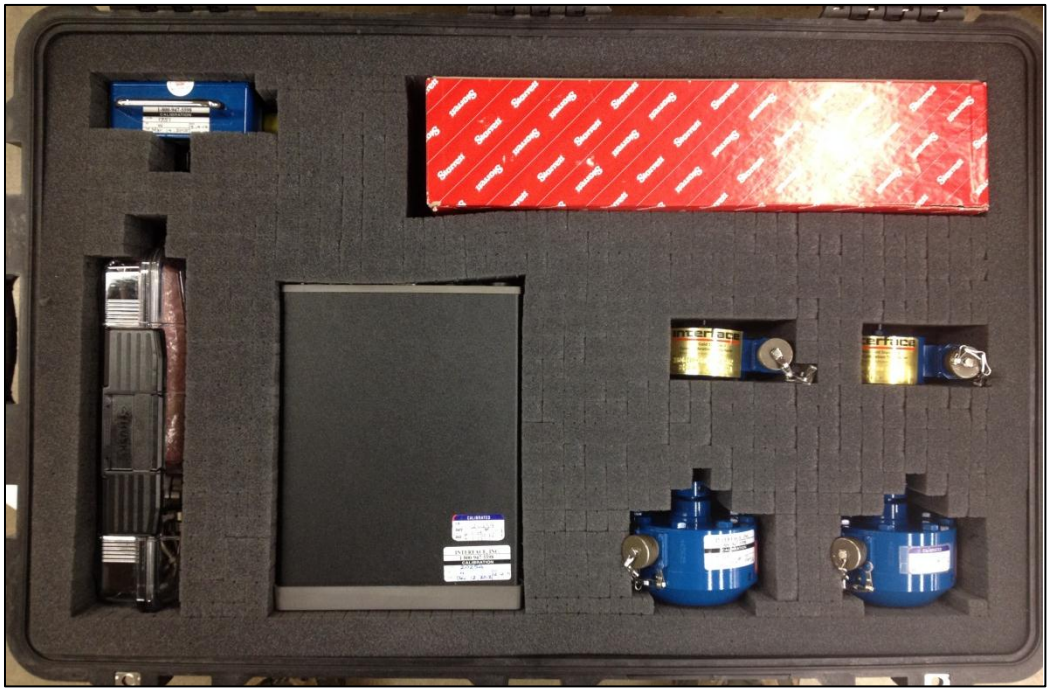
Reference Standard: ASTM E4-10

Reference Documents: Calibration Kit Certificates of Calibration (All artifacts)
Interface 9840 Digital Indicator User Guide CD

Equipment Necessary:
Starrett Calibration Kit containing the following items and with current and valid Certificates of Calibration traceable to NIST:

- Interface Model 9840 Digital Indicator
- Interface 1600 Series Load cell Sensors
- Deadweights for International Gravity
- Personal Computer with Load Calibration Worksheet (Excel Form)
- Mechanical Adapters: grip pins, clevis alignment spacers
- Digital Thermometer and Humidity Indicator

Personnel: Individuals who have received authorized training by The L.S. Starrett Company on this Work Instruction are certified to perform this Work Instruction.



Verify Calibration Kit Contents:

#	Model Number	QTY	Description
1	Pelican 1650 Case	1	Protective Carrying Case
2	1606-50	1	Cal Sensor 10N to 250N
3	1606-300	1	Cal Sensor 60N to 1500N
4	1610-1000	1	Cal Sensor 180N to 4500N
5	1610-2000	1	Cal Sensor 360N to 9000N
6	9840	1	Digital Read Out
7	CX-0440	1	Load Cell Simulator
8	CT-153-10	1	10' Cable for Load Cell Simulator
9	Power Cables	2	Digital Readout Power Cable (+Spare)
10	Extech RH/Temperature Pen	1	Humidity/Temperature Pen
11	M7-234 (PRINT)	1	F2740IQ 2" Digital Indicator
12		1	Digital Indicator Crosshead Mount
13	KIT-CLEVIS15-S-M6	2	Steel - 15.9mm clevis adapter with M6 thread
	KIT-CLEVIS15-S-M12	2	Steel - 15.9mm clevis adapter with M12 thread
	KIT-CLEVIS15-S-M16	2	Steel - 15.9mm clevis adapter with M16 thread
14	12709-0	1	Steel - 15.9mm clevis extension with M6 thread
	15100-0	1	Steel - 15.9mm clevis extension with M12 thread
15	Clevis Pins	4	Pins for 15.9mm Clevis
14	M7-279 (PRINT)	1	Centering Rod Top
15		1	Centering Fixture Bottom M6
16		1	Centering Fixture Bottom M12
17		1	Slotted M12 Coupling
18		1	Slotted M6 Coupling
19		1	Slotted Coupling
20	Screw driver	1	Flat blade screw driver
21	Allen Wrench	1	5mm
22	Allen Wrench	1	1.27mm
23	Box Wrench	1	10mm
24	Parallels	2	Steel Parallels
25			
26	Troemner Double Hook Deadweights	1	50 g
27		1	100 g
28		1	200 g
29		1	300 g
30		1	400 g
31		1	500 g
32		1	1 kg
33		1	2 kg
34		1	3 kg
35		1	4 kg
36		1	5 kg
37	Tension Calibration Hook	1	1 M6 threaded Hook
38	Compression Calibration Hook	1	1 M6 threaded centering cone, box, and hook

Procedure:

1.0 Starrett Material Test System "Warm-up".

System should warm-up for at least 15 MINUTES before carrying out your calibration.

1.1 Connect the Starrett load cell to be calibrated to the Starrett Material Test Frame.

1.2 Place the Starrett load cell in a horizontal position on top of the test frame's crosshead to compensate for zero offset.

DO NOT INSTALL LOADCELL TO THE CROSSHEAD.

1.3 Turn Material Test Frame to ON using the power On/Off switch located on the test frame's back panel.

1.4 Turn on the Starrett user interface device (tablet or all-in-one personal computer) that is used with this Starrett load cell and material test system.

1.5 Set the Material Test frame's jog switch speed to **SLOW POSITION**.

1.5.1 On tablet devices using Starrett L2 software, select the arrow icons displayed on the tablet. Select until the arrows are shown with a thick line denoting SLOW SPEED mode.

1.5.2 On all-in-one personal computer devices using Starrett L2 Plus software, select the speed indicator icon in the upper tool bar until the pointer displays pointing to the left indicating SLOW SPEED mode.

Procedure:

2.0 Starrett Calibration System "Warm-up".

System should warm-up for at least 15 MINUTES before carrying out your calibration.

IMPORTANT

Always keep the Calibration Kit in a room-temperature environment. NEVER leave the Calibration Kit in a cold vehicle over-night.

IMPORTANT

MAKE SURE POWER SWITCH ON THE INTERFACE 9840 DIGITAL INDICATOR IS OFF BEFORE MAKING CONNECTIONS.

2.1 Connect the power cable to the 9840 Digital Indicator and source supply.

2.2 Connect "standard" load cell to be used to the 9840 Digital Indicator and the connector labeled "Load A".
This is a 9-pin female connector.

2.3 Turn power to 9840 Digital Indicator to its ON position.
During power-up the 9840 Digital Indicator will display the following:
- Interface Version Number
- Interface Serial Number
- Interface Option Number
- Serial Number of load cell connected to Channel A.
- The mV constant used on the load cell connected to Channel A.
- The Excitation voltage used (10V) with this load cell connected to Channel A.

Make sure to allow calibration system (indicator and load cell standard) to warm-up for at least 15 minutes before taking any
measurements.

2.0 Supplement - Enter a new load cell into the 9840 Digital Read Out

a) Press “Item” and “Unit” at the same time
b) Scroll to “Calibration” (press “Unit” to scroll)
c) Enter Password “888” (use “+”, “-“, and “item” buttons to adjust)
d) Select “>Load” Cell Type
e) Select “>>Cal by mV/volt”
f) Select “>>>2-Point mV/volt” Cal”
g) Select “Channel A”
h) Enter Serial number, add “T” for tension and “C” for Compression
i) Enter Cal Date
j) Select “N” for choose unit (N=Newtons)
k) Enter load cell capacity in N max
l) Enter Excitation Voltage (use SEB, Static Error Band, off of calibration certificate
m) For “No Masses Ready” have the load cell plugged in to the 9840 digital readout out with no load applied
n) The box will then read “Reading….” Then “Calibration Done”

Selecting Other Sensors

a) Press “Item” and “Unit” at the same time
b) Scroll to “>Sensor Select”
c) Select “Channel A”
d) Select appropriate load cell
e) Verify the load cell data while it flashes on the 9840 digital readout display

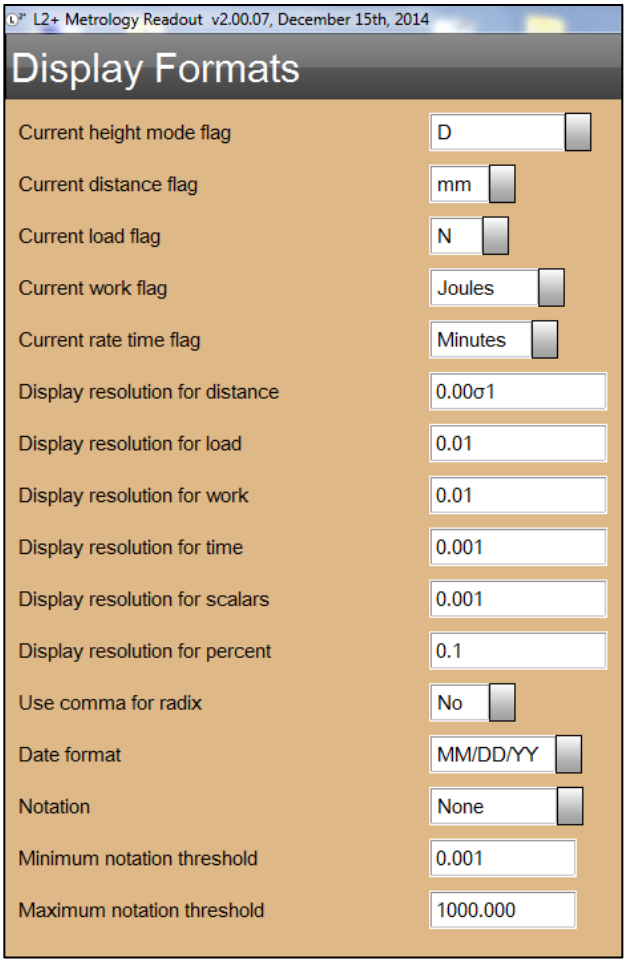
Procedure:

3.0 Lx System Settings Adjustments

Select Lx to setup SETTINGS prior to calibration.

IMPORTANT

It is recommended you use SI units for calibration, e.g. Newtons (N) for load and millimeters (mm) for displacement/distance. However, if your customer prefers USA/Imperial units, e.g. pounds-force (lbf) for load and inches (in) for displacement/distance, make the necessary changes as required on your Lx System and your Calibration Worksheet.



3.1 Select the Lx icon to display the Main Settings dialog.

3.2 Select the SETTINGS icon.

3.3 Select the DISPLAY FORMATS target to launch the Display Formats settings options.

3.4 Verify and change if necessary your Display Formats Setting.
Display Format settings should be:
- Current inch/mm flag = mm
- Current load flag = N

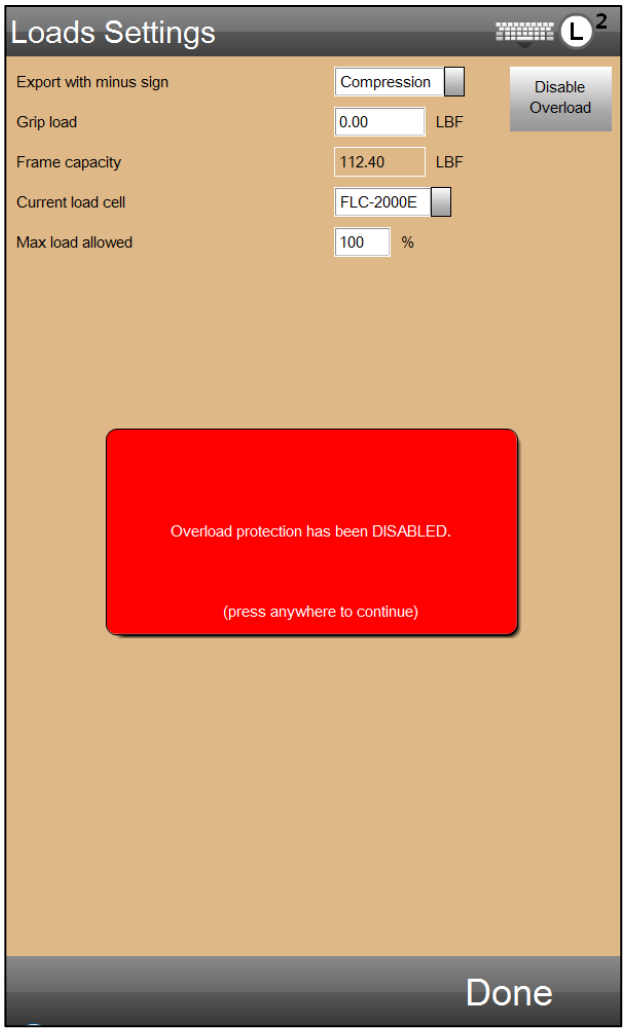
Select DONE on your Lx software. This will take you to the main Settings view again.

3.5 Select the LOADS target to launch the Load settings options.

3.6 Select the DISABLE OVERLOADS target.

IMPORTANT

Disabling Overloads removes all inherent protection on your Starrett Lx System. The Starrett load cell and the Starrett frame are no longer protected from damage due to overloading. **USE EXTREME CAUTION WHEN POSITIONING THE CROSSHEAD AND WHEN APPLYING A LOAD TO YOUR LOAD STRING.**



3.7 A dialog box will display asking you to "Enter overload password:"

3.8 Enter the Starrett password that permits you to Disable Overloads. This password was supplied to all authorized Starrett Service personal that are certified to perform Load Calibrations per this Work Instruction.

NOTE

If you do not know the Starrett password, contact Starrett Technical Support.

IMPORTANT

You should not continue with the calibration if you have not Disabled Overloads.

3.9 After you enter the Starrett Password, a message will display on the Lx System: "Overload protection has been DISABLED."

3.10 Select DONE. This will return you to the main Settings view.

Procedure:

4.0 Document your Calibration

Setup on your Calibration Worksheet for Load per ASTM E4-10.

4.1 Record Starrett Service Representative information onto Calibration Worksheet. Enter the following:

- Technician Name
- Service Date
- Service Time In
- Service Time Out

4.2 Record the Customer information for your calibration. Enter the following on to your Calibration Worksheet:

- Company
- Address
- City/State/Postal
- Country
- Customer PO
- Contact Name
- Contact Phone
- Contact Email

	A	B	C	D	E	F	G	H	I	J
1	Certificate of Calibration - Starrett Load Cell Sensor - Force									
2										
3	Technician Name	(Technician Name)							Service Date	1/1/1900
4									Time In	12:00
5	Company	(Company)				Customer PO	(Customer PO#)		Time Out	12:01
6	Address	(Street Address)				Contact Name	(Contact Name)			
7	City/State/Postal	(City, State, Postal)				Phone	(Phone Number)			
8	Country	(Country)				Email	(Email)			
9										

4.3 Record the Instrument information for your calibration. Enter the following on to your Calibration Worksheet:

- Starrett Load cell being calibrated Model No.
- Starrett Load cell Serial No.
- Starrett Load cell FS Capacity
- Starrett Load cell Type (T, C or T/C)

NOTE

All Starrett load cells are calibrated in both directions T (tension) and C (compression), so you would specify T/C. If you are only calibrating one direction at the customer's request, enter the direction as either T (tension) or C (Compression).

- Starrett Test Frame Model No.
- Starrett Test Frame Serial No.
- Starrett Test Frame FS Capacity
- Starrett Test Frame FS Travel
- Starrett User Interface, specify interface is either a Tablet or an All-in-One (AIO) computer.
- Starrett Lx Type, specify the system as either: L2, L2Plus, S2, or L3 system.
- Lx Software Revision Number

	A	B	C	D	E	F	G	H
10	Instrument							
11	Load Cell Model	(Load Cell Model	Serial No.	(Serial Number)	FS Capacity	(FS Capacity (N)	Type	T/C
12	Test Frame Model	FMS-500	Serial No.	0004-A332-5FA8	FS Capacity	(FS Capacity (N)	FS Travel	380mm
13	User Interface	(Tablet/AIO)	Lx Type	(L2, S2, L2Plus, L3)	SW Rev	(SW REV.)	Firmware Rev	(Firmware Rev)
14								
15	Test Conditions							
16	Temp (F) Start	100	Humidity	100%	Local Gravity	9.7919 m/s2	Excitation	10V
17	Temp (F) End	100						

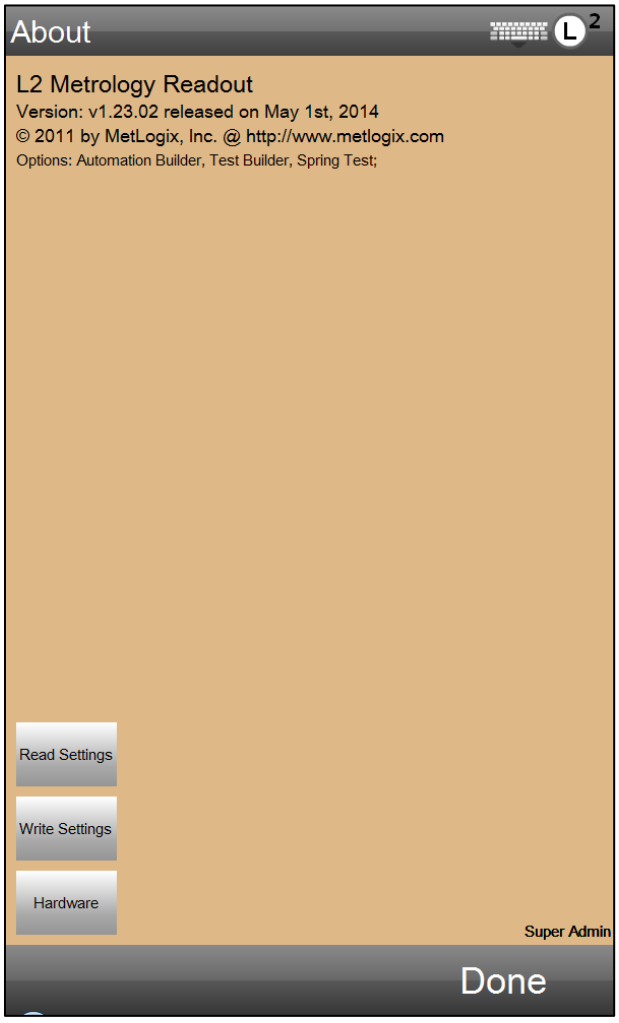
NOTE

Locate the Lx software revision level by selecting ABOUT at the main Settings page.

- Starrett Lx Firmware Revision Number

NOTE

Locate the Lx firmware revision level by selecting ABOUT at the main Settings view, the selecting the HARDWARE target.



4.4 Record the Test Conditions for the location where the calibration is being performed. Enter the following on to the Calibration Worksheet:

- Room Temperature

NOTE

Record the Room Humidity using the certified instrument supplied in your Calibration Kit.

- Room Humidity

NOTE

Record the Local Gravity using the certified instrument supplied in your Calibration Kit.

- Local Gravity

NOTE

The Excitation Voltage for all Starrett load cells and for the standard load cells is 10V.

- Excitation = 10V

4.5 Enter the Traceability information for all standards and artifacts being used for your calibration.

	A	B	C	D	E	F	G	H	I	J
21	Verification	Make	Model	Cal Agency	Cal Date	Due Date	ID	Units	Resolution	Accuracy
22	Load Cell	Interface	1600-1500N	NVLAP	5/17/2013	5/17/2014	123456	N	10,000:1	+/-0.05% FS
23	Distance Indicator									
24	Thermometer									
25	Humdity									
26	Clock									

IMPORTANT

All standards and artifacts must be the property of the L.S. Starrett Company and be a component within your Starrett Calibration Kit.

All standards and artifacts must be current, e.g. their calibration date must be within one year of the Last Calibration Date and before the Next Calibration Date.

Your Calibration Kit will include copies of the Certificate of Calibration traceable to NIST (or your local accrediting body). If these copies of the Certificate of Calibrations are not included in your Calibration Kit, contact Starrett Technical Support immediately for this information.

4.6 Enter the Calibration Test Method and Standard being used for the calibration. The recommended standard is ASTM E4-10; however, other recognized standards and methods that are identical or reciprocal to the ASTM standard may be used.

- Test Method being used = ASTM (may differ in locations outside the USA)
- Standard = E4-10 (may differ in locations outside the USA)

4.7 Enter Verification Identification of Artifacts/Standards used in this calibration. Each standard or artifact used must have the following information:

- Make (Manufacturer)
- Model Number (Manufacturer's Model Number)
- Cal Agency (the agency that calibrates this standard or artifact for the L.S. Starrett Company)
- Cal Date (the current Cal Date located on the Certificate of Calibration)
- Cal Due Date (the date when the standard or artifact is due for re-calibration and certification)
- Standard or Artifact Identification Number (ID is the serial number of the device located and recorded on its Calibration Certificate).
- Cal Units of Measure (what the units of measure are that the standard or artifact was calibrated with, if recorded).
- Standard or Artifact Resolution (identify the standard or artifacts resolution capability recorded on its Calibration Certificate).
- Accuracy of the Standard or Artifact as stated on the Certificate of Calibration.

Record the Verification Identification information for each of the following standards or artifacts that are possibly used for this Work Instruction:

- Standard 1600 Series Load cell
- Standard Deadweights info (if used)
- Standard 9840 Digital Indicator
- Standard Thermometer
- Standard Humidity Reader
- Standard Clock used for Time

Procedure:

5.0 Document the Load Calibration Points

Select the load cell from the drop down list, the Load Calibration points will automatically populate on to the Calibration Worksheet

	A	B	C	D	E
28	Select Load Cell Size (N) from drop down list:			Select Load Cell	
29	Load Measurement			1500	SETUP
30	Direction	Points	Target	2000 2500 5000 10000 25000 50000 Select Load Cell	Observed
31	Tension	1	-		
32	Tension	2	-		
33	Tension	3	-		
34	Tension	4	-		

NOTE

Lx systems have ten (10) calibration points for both the tensile direction and compression direction. So there are a total of twenty (20) possible points, plus Zero for a standard force measurement calibration.

Procedure:

6.0 Starrett Load cell Zero Offset

This procedure will zero any offset that may be present on the Starrett load cell prior to calibration.

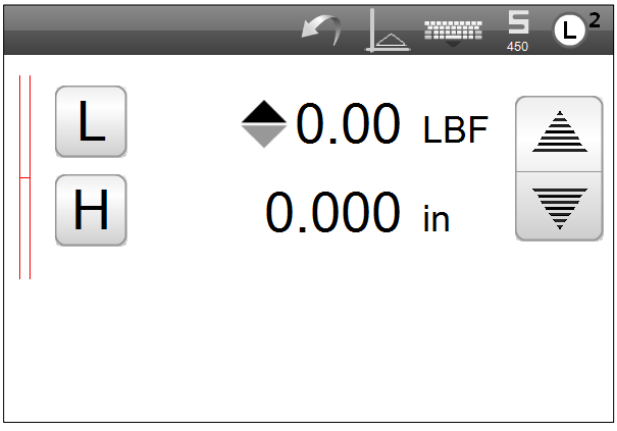
NOTE

Perform the Zero Offset step after the 15 minute "warm-up" period.

6.1 Remove the clevis assembly from the Starrett load cell being calibrated.

6.2 Position the Starrett load cell so that it is lying horizontally on the top of the test frame's crosshead.

6.3 Zero the LOAD on the Starrett load cell by selecting the L target on the user interface, e.g. tablet or AIO computer.



Procedure:

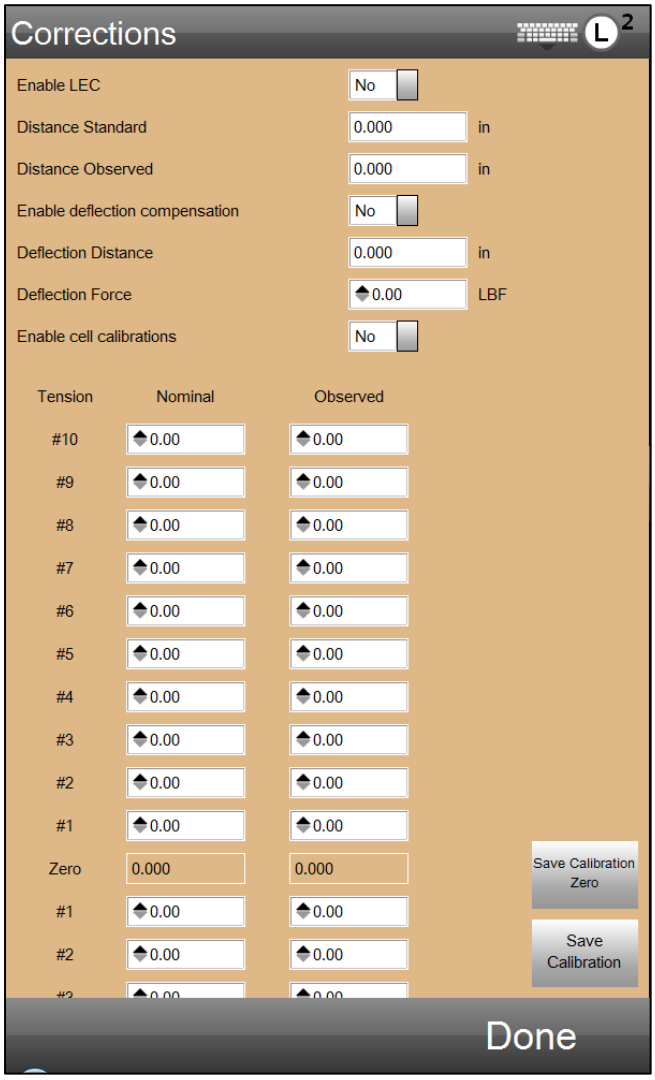
7.0 Corrections Settings Adjustments

Verify your LOADCELL CORRECTIONS settings by selecting the CORRECTIONS target on the main Settings view.

7.1 Go to the Lx LOADCELL CORRECTIONS setting.
- Select the Lx icon on the Home view.
- Select the Settings icon.
- Select the CORRECTIONS setting.

7.2 Verify the Corrections currently set for your Lx System. They will read as follows:
- Enable LEC = No
- Distance Nominal = 0.00mm (Note: this may have a value if corrections were made at the last calibration).
- Distance Observed = 0.00mm (Note: this may have a value if corrections were made at the last calibration).
- Enable deflection compensation = No (Note: if this is enabled “YES”, change to “NO”.
- Deflection Distance = 0.00mm (Note: change to 0.00mm if a value is present)
- Deflection Force = 0.0N (Note: change to).0N if a value is present)
- Enable cell calibrations = No

Select DONE.



Procedure:

8.0 Align the baseplate to the crosshead with the alignment tool

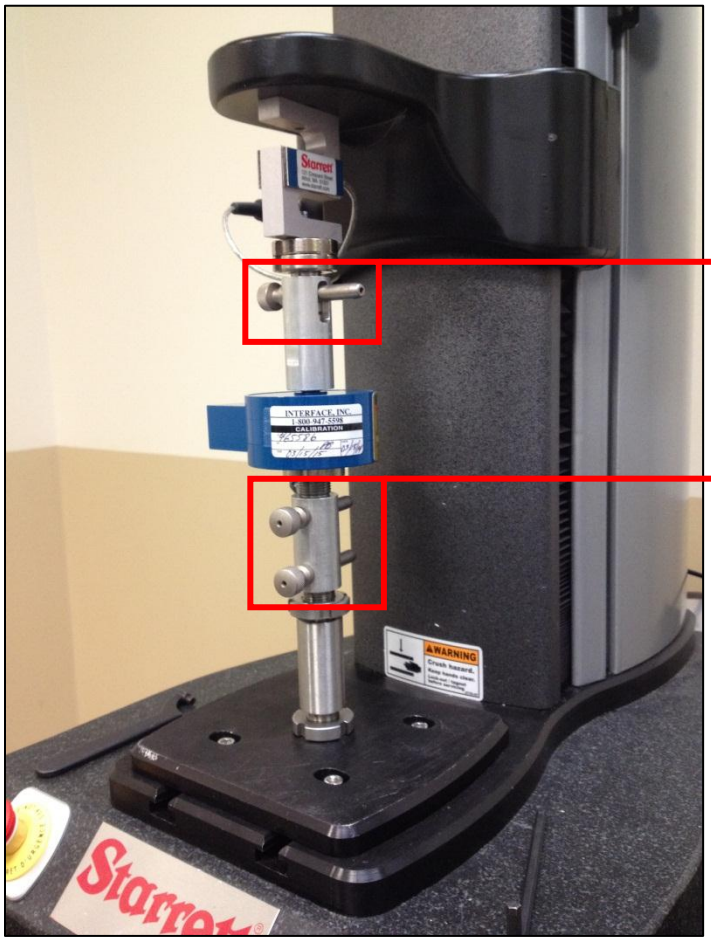
8.1 Calibration Load String Assembly

Assemble the Load String assembly, which consists of the following:

- Starrett load cell attached to Lx crosshead
- Master load cell attached to Starrett load cell
- Clevis attached to the master load cell
- Alignment adapter (top) connected to the clevis on the master load cell and secured with grip pin
- Alignment adapter (bottom) connected to the clevis on the Lx System base and secured with grip pin.

IMPORTANT

The load string should move freely. It should not be tightened so that it is rigid. Be careful not to over tighten the load cells to one another- allow some movement while making sure the load cells are secured to one another.



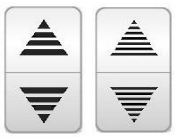
Procedure:

9.0 Calibration Load String Alignment

This procedure is used to align the load string prior to calibration.

9.1 Place the Lx System to SLOW SPEED.

Slow / Fast



- If a TABLET pc is used (L2 System), on the tablet's Home view display, select the arrow keys until the lines within the arrow change from a thin (narrow) line to a thick (bold) line. The bold line represents SLOW SPEED. The crosshead will move at its slowest speed when the jog key is used in either an up or down position.

Slow / Fast

- If an AIO pc is used (L2Plus or L3 Systems), select the crosshead velocity icon in the upper tool bar of the Home view display. When the pointer inside the symbol is pointed to the left, the system is in SLOW SPEED mode. If the pointer is pointed to the right, the system velocity is in NORMAL SPEED mode. Make sure the pointer is pointing to the left for SLOW SPEED mode.

9.2 Verify that your Lx System is in SLOW SPEED mode. Press and Hold the jog key UP to move the crosshead upward. The crosshead should move at a very slow speed. If it does not and ramps to a faster speed, repeat Step 9.1 because the Lx System is not in Slow Speed mode.

9.3 Place the alignment spacer on to the Lx System base clevis. Fasten to the clevis with a grip pin and tighten the clevis using the locking rings.

9.4 Make sure clevis is attached to the STANDARD load cell. Thread the clevis onto the Standard load cell if missing.

9.5 Using the jog switch, lower the crosshead and Standard load cell slowly until the top clevis mates with the alignment spacer. Lower the crosshead and Standard load cell until the through-holes on the clevis and alignment spacer allow a grip pin to be fastened.

IMPORTANT

Use EXTREME CARE when moving the crosshead and the Standard load cell being careful not to OVERLOAD the load cell.

9.6 Secure the load string by checking that both grip pins (bottom base clevis and top load string) are inserted all of the way.

9.7 Test the load string movement. There should be some side-to-side movement (slack) on your load string. **There should be no load on the load string.**

IMPORTANT

You load string must NOT be rigid. The load string should move slightly.

Procedure:

10.0 Configure Your 9840 Digital Indicator

Your 9840 Digital Indicator has been pre-configured by Starrett. Listed within the 9840 Digital Indicator's software are the STANDARD LOADCELLS. Each Standard Load cell is configured with its Static Error Band (SEB) rating. Each Standard load cell has two SEB ratings. One SEB rating is for Tension. The other SEB rating is for Compression.

IMPORTANT

Refer to the 9840 Digital Indicator User Manual, supplied on a CD within the Calibration Kit for detailed instructions on how to use the instrument.

IMPORTANT

When you select your Standard load cell from the list within your 9840 Digital Indicator, it is critically important that you select the CORRECT CHANNEL. The Channel will display the Standard load cell that is active within the Digital Indicator's software.

IMPORTANT

The Standard load cell, connected to your Load String and to your 9840 Digital Indicator has two Channels within the 9840 Digital Indicator. One channel is used for TENSION and the Standard load cell identifier will have a prefix "T" followed by an Identification Number (usually the serial number for the load cell taken from the Calibration Certificate.

This same Standard load cell also has a Channel for COMPRESSION. You will select the Channel in your 9840 Digital Indicator that has the prefix "C" followed by the same Identification Number (the serial number of the Standard load cell taken from the Calibration Certificate).

IMPORTANT

Calibrating using the incorrect Channel will result in an inaccurate calibration.

10.1 Selecting the TENSION Channel for your Standard Load cell

To select the correct Channel perform the following:

- Select the ITEM key on the 9840 Digital Indicator to cycle through the load cells that have been configured for your Calibration system.

- Continue pressing the ITEM key until you have displayed the load cell that is used in your Load String and that is connected to the 9840

Digital Indicator using the 9-pin LOAD A connector on the back of the indicator. **The correct Standard load cell should have a suffix**

"T".

- Verify that the load cell displayed on the 9840 Digital Indicator matches the Standard load cell connected to the Load String and the

9840 Digital Indicator.

- Press the UNITS key to match the units of measure to be used for calibrating load, e.g. select Newtons (N) for load calibrations.

Procedure:

11.0 Zero the Starrett Load cell

This procedure will zero the Starrett load cell prior to calibration.

11.1 With the load string connected to the base of the test frame, use the jog key to remove all load from the string by moving the crosshead up or down until the L value on the Lx system reads 0.00N.

11.2 Go to the CORRECTIONS Setting in your Lx System and select the SAVE CALIBRATION ZERO button. Select Done to return to the Home view.

Procedure:

12.0 Zero the Standard Load cell

This procedure will zero the 9840 Digital Indicator and the Standard load cell used for the calibration.

12.1 After the Starrett load cell is zeroed (Section 12), remove all loads on the load string by pressing the jog switch. The load string should move freely and no load should be applied to the string.

12.2 When you are sure no load is applied, press the TARE key on the 9840 Digital Indicator to zero the Standard load cell.

Procedure:

13.0 Measure Calibration Points - TENSION

IMPORTANT

When moving to a calibration point, DO NOT USE THE Lx SYSTEM'S USER INTERFACE as your guide to stop. You should watch the 9840 Digital Indicator (Nominal) and move the crosshead and the applied load until the 9840 Digital Indicator is displaying your calibration point.

IMPORTANT

The 9840 Digital Indicator's display of load will not be stable, e.g. the displayed value will fluctuate. This is normal. Allow the value to reach some level of stability and then record the value (midpoint) between the fluctuation high and low values. For example, if the displayed value fluctuates between 99.94N and 100.13N, the Nominal value you use should be 100.03N.

IMPORTANT

SAVE OFTEN! When you are entering your Nominal and Observed results into the Calibration Worksheet, Save Often. If a computer crash occurs, the risk of losing your calibration data is minimized.

IMPORTANT

It is STRONGLY RECOMMENDED that you manually write down all Nominal and Observed calibration results. This ensures that you have a hard-copy backup.

Perform the data acquisition of TENSION calibration points as follows:

13.1 Using the jog switch in SLOW SPEED mode, manually position the crosshead upward until the 9840 Digital Indicator equals or is near the FIRST TENSION calibration point.

13.2 Record the first tensile reading on the 9840 Digital Indicator (Nominal) and the measured value on the Lx System's user interface (Observed) into the Calibration Worksheet for SETUP RUN, Point 1.

13.3 Using the jog switch in SLOW SPEED mode, manually position the crosshead upward until the 9840 equals or is near the SECOND TENSION calibration point. Use the 9840 Digital Indicator as your guide to the calibration point.

13.4 Record the second tensile reading on the 9840 Digital Indicator (Nominal) and the measured value on the Lx System's user interface (Observed) into the Calibration Worksheet for SETUP RUN, Point 2.

13.5 If necessary, repeat the same steps for measurements 1 through 4 until all specified points on the Calibration Worksheet are populated.

13.6 Once all data points are entered for SETUP RUN, repeat the entire procedure for Tensile points for Calibration Runs 1, 2 and 3. Record all measurements into the Calibration Worksheet for Nominal (Indicator) and Observed (Lx System).

13.7 Return to your zero load position by pressing the jog key until the L reading on the Lx System is near 0.00N.

IMPORTANT

Do not switch to Compression until all three (3) Calibration Runs have been completed in Tension direction.

Alternate Method

13.8 Build a program that moves to the necessary load steps at less than 1/2in/mm (12.5mm/min) and hold load at each step. Hold for at least 30 seconds for the load to stabilize

Procedure:

14.0 Change Channel to Compression on your 9840 Digital Indicator

Your 9840 Digital Indicator has been pre-configured by Starrett. Listed within the 9840 Digital Indicator's software are the STANDARD LOADCELLS. Each Standard Load cell is configured with its Static Error Band (SEB) rating. Each Standard load cell has two SEB ratings. One SEB rating is for Tension. The other SEB rating is for Compression.

IMPORTANT

Refer to the 9840 Digital Indicator User Manual, supplied on a CD within the Calibration Kit for detailed instructions on how to use the instrument.

IMPORTANT

When you select your Standard load cell from the list within your 9840 Digital Indicator, it is critically important that you select the CORRECT CHANNEL. The Channel will display the Standard load cell that is active within the Digital Indicator's software.

IMPORTANT

The Standard load cell, connected to your Load String and to your 9840 Digital Indicator has two Channels within the 9840 Digital Indicator. One channel is used for TENSION and the Standard load cell identifier will have a prefix "T" followed by an Identification Number (usually the serial number for the load cell taken from the Calibration Certificate.

This same Standard load cell also has a Channel for COMPRESSION. You will select the Channel in your 9840 Digital Indicator that has the prefix "C" followed by the same Identification Number (the serial number of the Standard load cell taken from the Calibration Certificate).

IMPORTANT

Calibrating using the incorrect Channel will result in an inaccurate calibration.

14.1 Selecting the COMPRESSION Channel for your Standard Load cell

To select the correct Channel perform the following:

- Select the ITEM key on the 9840 Digital Indicator to cycle through the load cells that have been configured for your Calibration system.

- Continue pressing the ITEM key until you have displayed the Standard load cell that is used in your Load String and that is connected to the 9840 Digital Indicator using the 9-pin LOAD A connector on the back of the indicator. **The correct Standard load cell should have a prefix "C".**

- Verify that the load cell displayed on the 9840 Digital Indicator matches the Standard load cell connected to the Load String and the 9840 Digital Indicator.

- Press the UNITS key to match the units of measure to be used for calibrating load, e.g. select Newtons (N) for load calibrations.

Procedure:

15.0 Measure Calibration Points - COMPRESSION

Perform the data acquisition of COMPRESSION calibration points as follows:

15.1 Using the jog switch in SLOW SPEED mode, manually position the crosshead upward until the 9840 Digital Indicator equals or is near the FIRST COMPRESSION calibration point.

15.2 Record the first tensile reading on the 9840 Digital Indicator (Nominal) and the measured value on the Lx System's user interface (Observed) into the Calibration Worksheet for SETUP RUN, Point 1.

15.3 Using the jog switch in SLOW SPEED mode, manually position the crosshead upward until the 9840 equals or is near the SECOND COMPRESSION calibration point. Use the 9840 Digital Indicator as your guide to the calibration point.

15.4 Record the second tensile reading on the 9840 Digital Indicator (Nominal) and the measured value on the Lx System's user interface (Observed) into the Calibration Worksheet for SETUP RUN, Point 2.

15.5 If necessary, repeat the same steps for measurements 1 through 4 until all specified points on the Calibration Worksheet are populated.

15.6 Once all data points are entered for SETUP RUN, repeat the entire procedure for Compression points for Calibration Runs 1, 2 and 3. Record all measurements into the Calibration Worksheet for Nominal (Indicator) and Observed (Lx System).

15.7 Return to your zero load position by pressing the jog key until the L reading on the Lx System is near 0.00N.

Procedure:

16.0 Complete the Calibration Worksheet for All Calibration Runs 1, 2 and 3.

Make sure all Nominal and Observed measurements for Tension and Compression, for all four (4) Runs, have been entered accurately into the Calibration Worksheet.

16.1 Double verify all values entered into Calibration Run 1, Calibration Run 2 and Calibration Run 3 for each Calibration Point. The Calibration Worksheet will automatically calculate the Error (N) and the Error (%).

16.2 The Calibration Worksheet will calculate the Corrections to be used for the Starrett load cell. The Corrections for the Starrett load cell are an average of Calibration Runs 1 and Calibration Runs 2. Calibration Run 3 is important because it is used to calculate the Uncertainty Statement that will appear on the Certificate of Calibration for the Starrett load cell.

16.3 Percent Error greater than 10% could be a result of an improper calibration or a damaged load cell which may not be possible to calibrate. A well preforming load cell should be less than 1%.

Procedure:

17.0 Enter Calibration Nominal and Observed values into the Lx System's CORRECTIONS setting for the Starrett load cell that was calibrated.

Use the calculations performed in your Calibration Worksheet to enter the Correction values for each of your calibration points.

17.1 Go to the Lx System's CORRECTIONS setting.

17.2 Enter the NOMINAL values at each calibration point for Tension and Compression.

IMPORTANT

The Nominal values are the values recorded and taken from the 9840 Digital Indicator.

17.3 Enter the OBSERVED values at each calibration point for Tension and Compression.

IMPORTANT

The Observed values are the values recorded and taken from the Lx System.

17.4 Select the SAVE CALIBRATION button.

17.5 Change the "Enable cell calibrations" option to YES.
- Select DONE.
- Select DONE.

17.6 Power cycle your Lx System as follows:
- Log out of your Lx software.
- Turn power OFF on your Lx test frame.
- Wait 10 seconds before power-up.
- Power-up your Lx test frame.

- Launch you Lx software.

17.7 Verify that the Field Calibration Date displayed when selecting the load cell icon on your Lx System is displaying the calibration date that the Starrett load cell was just calibrated on.

17.8 Verify that no zero offset is present on the calibrated Starrett load cell. The bar graph should not display green at either the tensile or compressive directions with no load applied. A very slight green line indication is acceptable; however, a larger green bar indicates a zero offset problem which may mean:
- the load cell must be re-calibrated
- the load cell is physically damaged and must be replaced if another calibration does not remove the indication
-Greater than 10% of the bar could indicate either an improper calibration or a permanently damaged load cell

Procedure:

18.0 Take as Left readings

Repeat Step 3 and Steps 8 through 16
Record As Left reading on calibration sheet

Procedure:

19.0 Affix Calibration Sticker to Lx System

Once all calibration information is recorded and securely saved, the Starrett technician can complete the Calibration Sticker.

19.1 Prepare the Starrett Calibration Sticker as follows:
- Enter the Calibration Date
- Enter the Starrett Technician's Name (Print)
- Enter the Starrett Technician's Signature

19.2 Remove any existing Calibration Sticker.

19.3 Place the Calibration Sticker where it can be easily viewed. The Calibration Sticker must be firmly affixed to the Starrett Load cell.

Procedure:

20.0 Submit Calibration Worksheet to Starrett for Certificate of Calibration Document for Customer.

In order for a Certificate of Calibration to be prepared for your customer, you must save your Calibration Worksheet with data and submit via email to L.S. Starrett.

The information on your Calibration Worksheet will be used to generate and print the Certificate of Calibration for this load cell for your customer.

The Certificate of Calibration will be mailed to your customer contact within 48 hrs.

Starrett will retain the Calibration Worksheet for your customer and this calibration service, and Starrett will retain a pdf of the Certificate of Calibration for this load cell. The pdf will be identified as an "Uncontrolled Document" using a watermark.

IMPORTANT

The Calibration Worksheet with data should be archived in a secure, password-protected area, e.g. server, cloud, etc. The Calibration Worksheet with data should be archived for three (3) years.