



**Operating Instructions
STX-1 Series
Digital Strap Tension Meter**

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Sec 1. SAFETY.

WARNING: When using cordless, electronic instruments, always follow basic safety precautions to reduce the risk of fire, electric shock and personal injury.

READ AND SAVE ALL INSTRUCTIONS FOR FUTURE USE. Before use, ensure all users read and understand this manual, as well as any labels packaged with or attached to the instrument.

1. **KNOW YOUR INSTRUMENT.** Read this manual carefully to learn your tension meter's applications and limitations, as well as the potential hazards associated with this type of instrument.
2. **AVOID DANGEROUS ENVIRONMENTS.** Do not use your instrument in the presence of explosive atmospheres (gaseous fumes, dust or flammable materials). Do not submerge your instrument in liquids.
3. **USE THE RIGHT TOOL OR INSTRUMENT.** Do not use this instrument to do a job for which it is not recommended.
4. **CHECK FOR DAMAGED PARTS.** Inspect instrument before use. Check for any binding of moving parts, improper mountings, broken parts and any other condition that may affect operation. Do not use a damaged instrument. Tag damaged instrument "DO NOT USE" until repaired. For repair, send instruments directly to Tensitron, Inc.
5. **GUARD AGAINST ELECTRIC SHOCK** when connecting power supply to voltage source.
6. **MAINTAIN INSTRUMENT CAREFULLY.** Keep handles dry, clean and free from oil and grease. Do not lubricate. All roller bearings are sealed.
7. **DO NOT USE INSTRUMENT IF** it has received a sharp blow, been dropped or damaged in any way. Do not disassemble. Incorrect reassembly may result in the risk of electric shock, fire or exposure to battery fluids. If instrument is damaged return it to Tensitron, Inc. for repair.
8. **STANDARD POWER SUPPLY IS RATED FOR 100-240 VAC** and includes several "blades" allowing use with European, US, Australian and other plug configurations.
9. **DO NOT USE INSTRUMENT WHEN TEMPERATURE** is below 35°F or above 115°F. Charging in direct sunlight or near a heat source will not produce a full charge and may permanently damage battery pack.
10. **STORE INSTRUMENT AND CHARGER** in a cool, dry place. Do not store where temperatures may exceed 120°F or fall below 35°F for storage times less than one month. Never let LCD display or battery pack assembly freeze.
11. **WARNING:** Only use battery pack assemblies provided by Tensitron, Inc. with your meter (P/N: STX-15-BATT). Other types of batteries may leak or explode, causing personal or property damage if charged in this device.

Sec. 2. CHARGING INSTRUMENT BATTERIES.

1. Connect power supply cable to instrument.
2. Plug the power supply into a 100 – 240 VAC outlet.
3. Fully charge battery prior to first use (approximately eight hours).
4. Battery pack assembly cannot be overcharged, however instrument will remain on while plugged into power supply.
5. Fully charged battery assemblies will operate approximately six hours +/- 20% depending

upon usage and backlighting intensity.

6. Battery charge level is indicated in the upper, right-hand corner of display.

Sec. 3. OPERATION: QUICK START.



Figure 1

Operation Panel

Display

Operation Buttons:
Off / Escape
On / Enter / Zero
Arrow Up
Arrow Down
Store

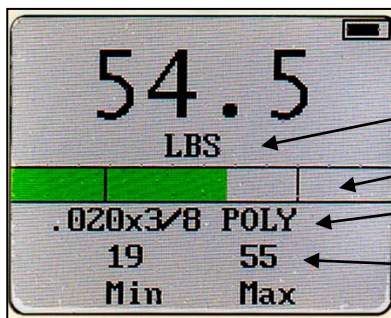


Figure 2

Image 2: Display Details

Battery Charge Level

Selectable Tension in Kg, daN, Lbs.

Set Point Display

Select Strapping Size – Instrument automatically adjusts calibration

Displays Min and Max tension measurements.

1. **POWER UNIT ON** by pressing **ON** button. Main display will indicate: **Tension** (in Lbs, DecaNewtons or KG), **Material** (with the description of calibration/strapping selected), along with the minimum and maximum tension values.
2. **NAVIGATION:** Use either the up (↑) or down (↓) arrows to move between screens. To make or enter a selection press the Enter key. To exit a setting press the Escape (ESC) key.
3. **DATA LOGGING.** Use this feature to store individual tension values by depressing the **STORE** key. For additional information on logging and viewing data refer to Sec 4.9.
4. **READING OF TENSION.** Variations in materials and thicknesses affect tension

readings. It is essential to select the correct material and size before use, or tension values may be incorrect.

5. **TENSION UNITS.** Using either the up or down arrows, scroll to **TENSION UNITS** and then press **ENTER**. Next, select from: **Kilograms, DecaNewtons, or LBS** and ENTER selection.

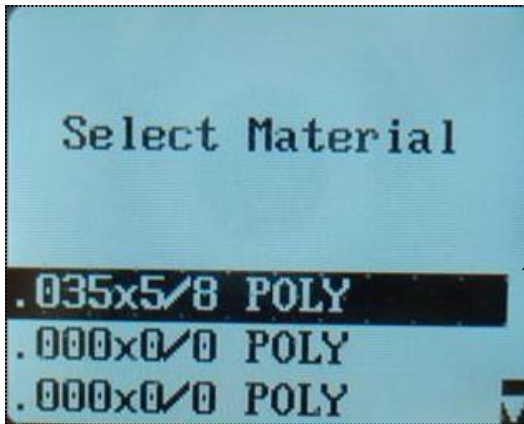


Figure 3

6. **SELECT MATERIAL.** Using either the up or down arrows, scroll to **SELECT MATERIAL** and then press ENTER. Next scroll through the various descriptions until the correct strapping size and material is highlighted and then press ENTER. Note: your main display will indicate the strapping size selected. If your specific material is not listed, follow the calibration instructions included at the end of these instructions, or send a 15' sample of your material/cable and the instrument to Tensitron to have it added to the menu.
7. **ZERO INSTRUMENT.** Hold the instrument in the attitude your reading will be taken in before you engage it to the tensioned material/strapping and press **ZERO**.
8. **ENGAGE INSTRUMENT ONTO TENSIONED STRAPPING** by slipping or guiding the instrument's three contact elements onto the strap. The proper routing of the strapping is under the two outer guide (or contact) pins, and over the center contact element (sensor). **Do not exceed the maximum tension range of the instrument or damage will occur.**

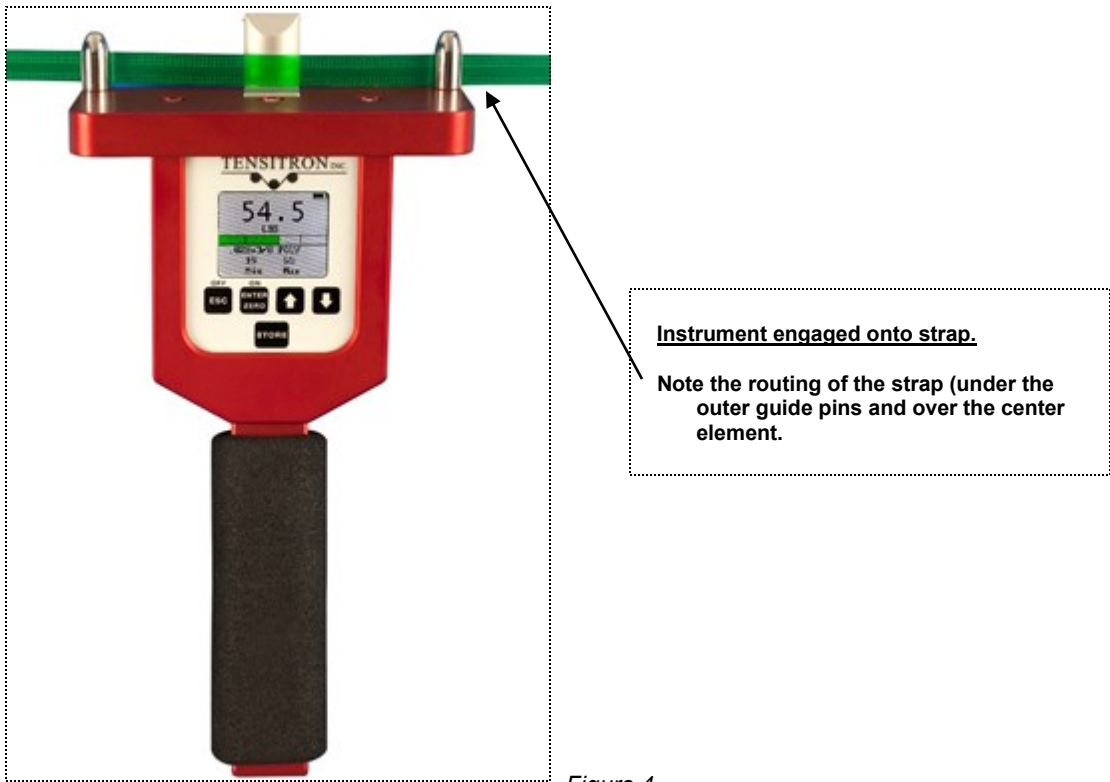


Figure 4

Sec. 4. ADDITIONAL TECHNICAL INFORMATION.

1. **LCD REFRESH RATES.** To either speed up or slow down the instrument's LCD refresh rates scroll to **SETUP** and press ENTER. Next, scroll to **LCD REFRESH RATE** and press ENTER and then select and enter your preference (1, 2 or 5 Hz).
2. **CUSTOM NAMES.** Custom Calibrations, listed as Custom 0 – 9, can be renamed so that the Main Display indicates your name for the selection. Scroll to **SETUP** and press ENTER. Next, scroll to **CUSTOM NAMES** and press ENTER. Next, scroll to the description you wish to rename and then press ENTER. Then using the up or down arrows select the number, letter or character for the beginning of your new name and then press ENTER. Follow the same procedure for each sequential letter or space for your new description. Continue pressing ENTER until all spaces in the description have entered values, including the blank spaces. Once your new name has been entered you will be automatically be returned to the **SETUP** screen.

3. **RE-CAL TENSION** is used to program calibrations into the instrument. It is not used for checking accuracy. To verify accuracy refer to "How to check accuracy on page 12. More detail on this feature is shown later in this document.
4. **AUDIO**. Scroll to **SETUP** and press ENTER. Next scroll to **AUDIO** and press ENTER and then make and enter your preference. (Beep ON or OFF)
5. **BACKLIGHT** This feature is used to adjust the visual intensity of the LCD screen. Scroll to **SETUP** and press ENTER. Next, scroll to **BACKLIGHT** and press ENTER and then make and enter your preference. (Low, Medium or Full Intensity)
6. **DISPLAY CONTRAST**. Increase or decrease LCD display contrast by selecting: **SETUP**, then select **CONTRAST**, and finally manipulate contrast using the up or down arrow key. Remember to **ENTER** your new setting.
7. **SETPOINT MENU**. This feature allows a graphical representation of the applied tension to be displayed on the main display beneath the tension units. A colored bar will advance and retract in conjunction with increasing or decreasing tension values. Additionally the user can define their safe operating tension range which will then display in green. Values under this operating range will display in amber and tensions above operating range will indicate in red.

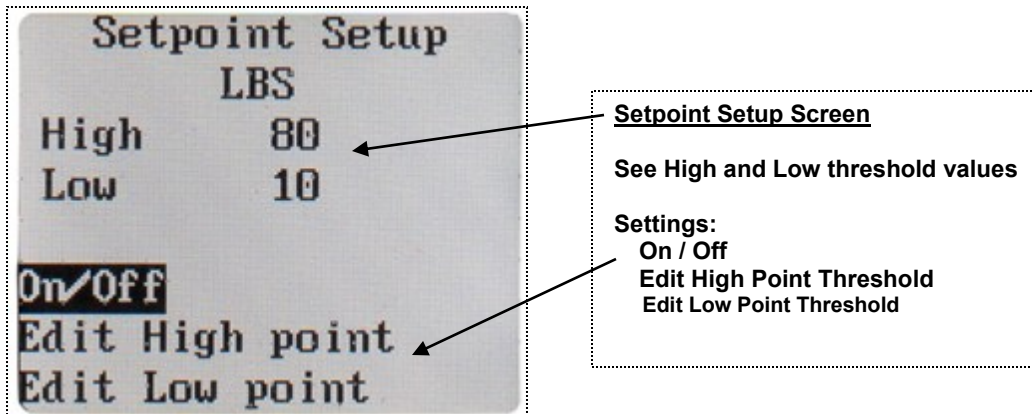
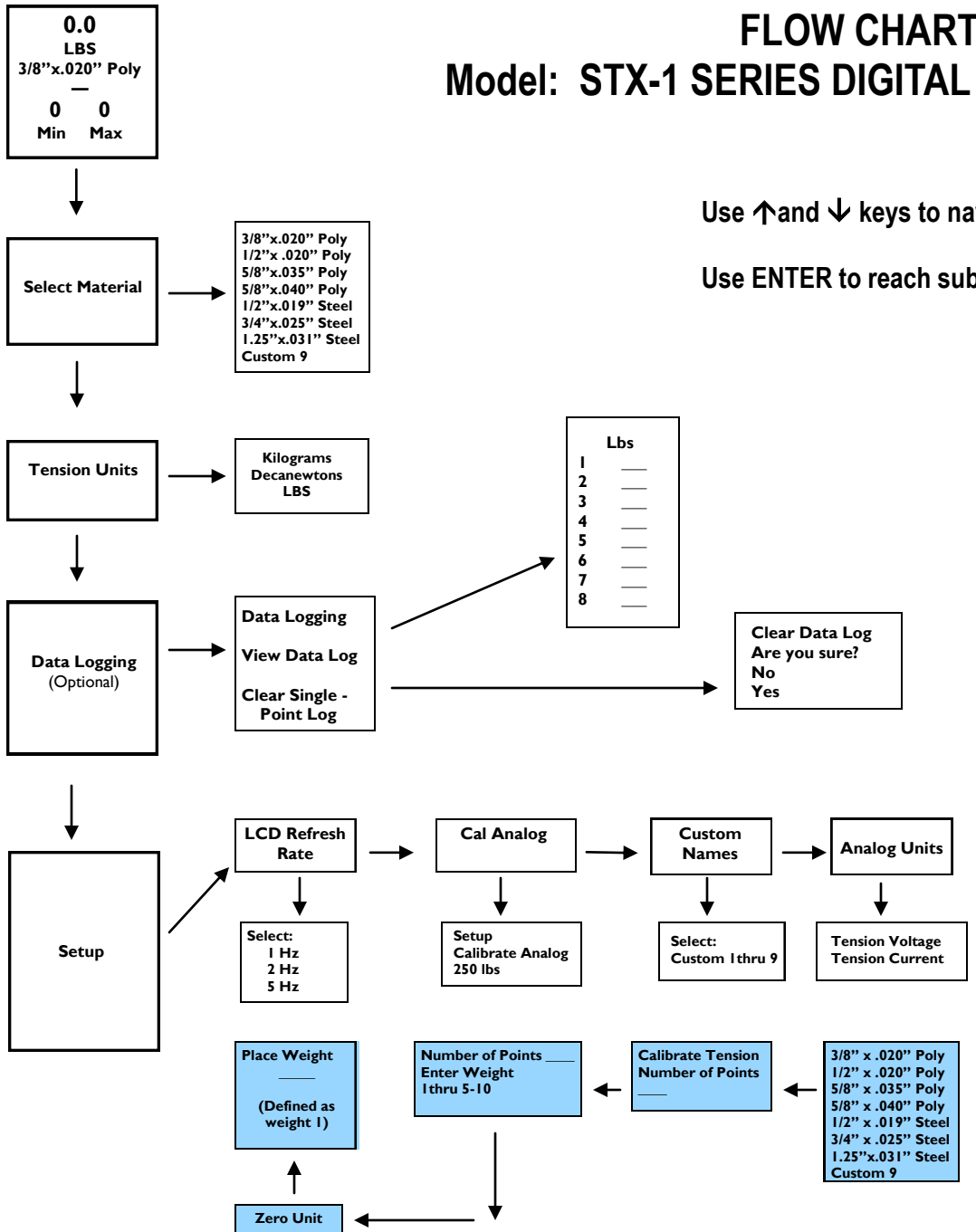


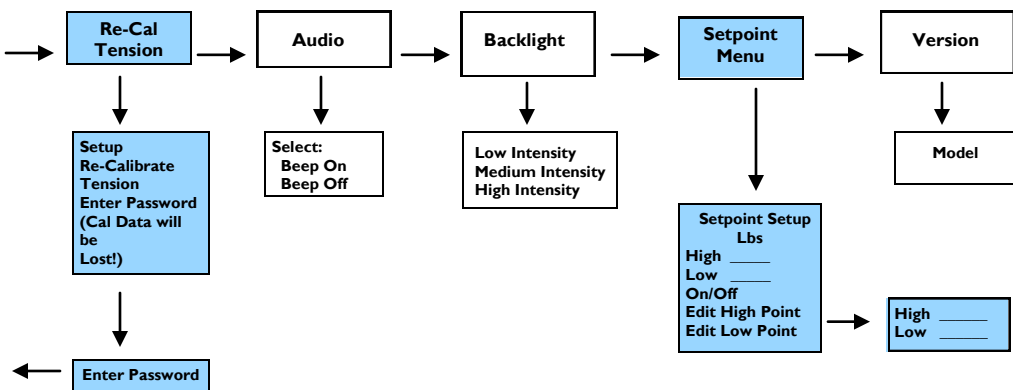
Figure 5

7. **TURNING ON AND ADJUSTING SETPOINT MENU**. Scroll to **SETUP** and press ENTER. Next, scroll to **SETPOINT MENU** and press ENTER. Follow and enter the prompts to turn this feature on or off as well as to edit your high and low values.
8. **VERSION**. Scroll to **SETUP** and press ENTER. Next, scroll to **VERSION** and press ENTER to see instrument Model Number and software version.
9. **DATA LOGGING**. Each time the instrument's **STORE** key is pressed, it will also log this data into memory for later reviewing. To view this logged data, scroll to **DATA LOGGING** and press ENTER. Then scroll to **VIEW DATA LOG** and press ENTER. To clear stored data, scroll to **CLEAR SINGLE PT LOG**, press ENTER and follow the prompts.

FLOW CHART

Model: STX-1 SERIES DIGITAL





STANDARD STX-1 SERIES INSTRUMENTS

| Model | Resolution | Range | Accuracy* |
|-------------------|------------|--------------|-----------|
| STX-250-1 | 0.5 Lbs | 5 – 250 Lbs | 1% |
| STX-500-1 | 1 Lbs | 25-500 Lbs | 1% |
| STX-1000-1 | 5 Lbs | 50-1000 Lbs | 1% |
| STX-2000-1 | 10 Lbs | 100-2000 Lbs | 2% |

STXM-1 Instruments - Multiple Calibrations for different Poly and PET strap sizes.

| Model | Resolution: | Range: | Accuracy* |
|--------------------|-------------|--------------|-----------|
| STXM-250-1 | 0.5 Lbs | 5–250 Lbs | 3% |
| STXM-500-1 | 1 Lbs | 25-500 Lbs | 3-1/2% |
| STXM-1000-1 | 5 Lbs | 50-1000 Lbs | 4% |
| STXM-2000-1 | 10 Lbs | 100-2000 Lbs | 4% |

AVAILABLE OPTIONS FOR ALL INSTRUMENTS

- **A** Analog Output option. 0-5 VDC or 4-20 mA with Software-definable ending sequences. Provided with 10' cable. Data output at 40 Hz. (*See separate instructions.*)
- **E** RS-232 Serial Output option. Provided with 10' cable to interface with your receiving device. Select data sampling rate from 1, 2 or 5 Hz. (*See separate instructions.*)

Instruments can be configured with either option.

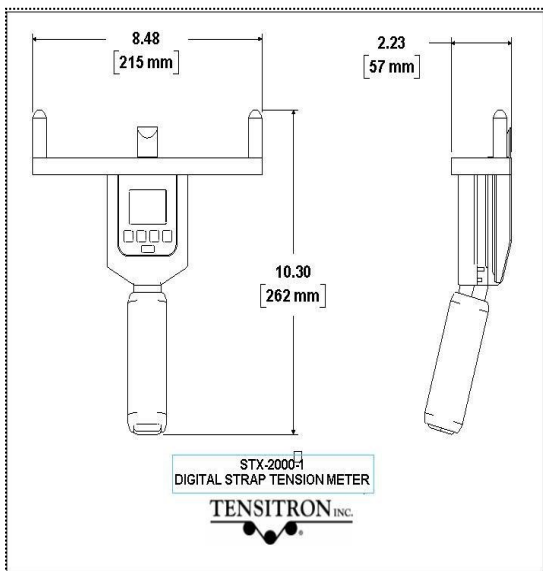
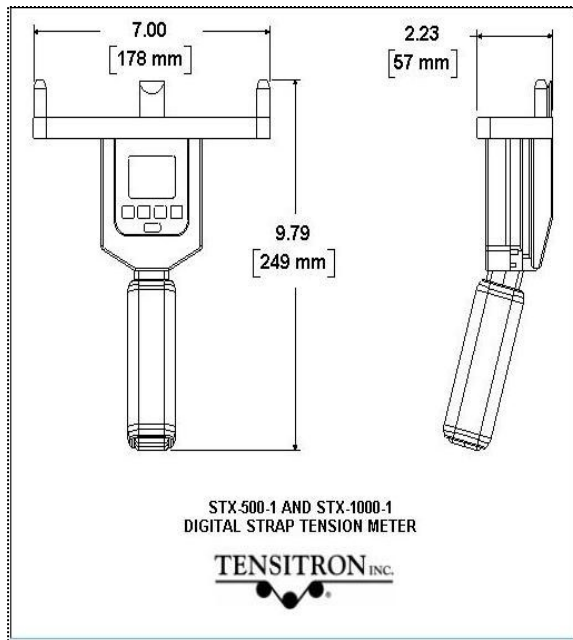
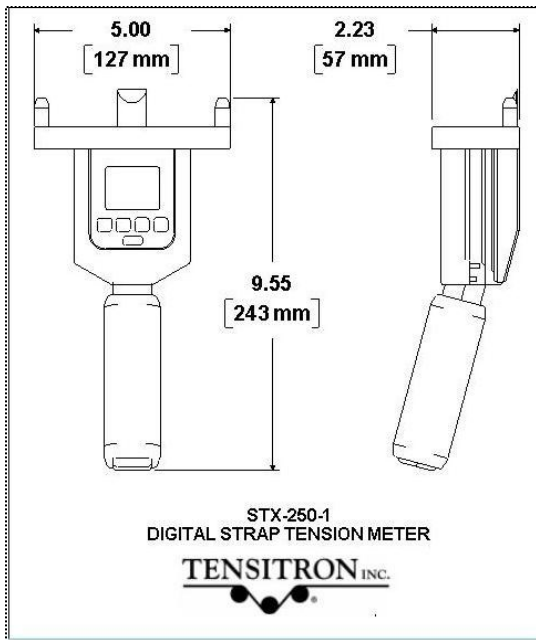


Figure 6

SPECIFICATIONS

- ◆ Approximate weight is 2.3 lb. (Weight varies depending upon instrument configuration).
- ◆ Re-chargeable NIMH battery with power supply provided. Approximately 6 hours of operation per battery charge depending upon backlighting intensity.
- ◆ Power Supply operates with input voltages from 100 – 240V and includes several interchangeable “blades” allowing use with European, US, Australian and other plug configurations.
- ◆ Instruments may be operated continuously while connected to power supply.
- ◆ Automatic shutoff after 10 minutes of non-use.
- ◆ Durable, lightweight carrying case with protective foam inserts.
- ◆ **CE certification** complying with heavy, industrial immunity standards.

FEATURES

- Large, easy to read, color graphic display with adjustable backlighting.
- Display shows tension, name of calibration selected, minimum and maximum tension values and battery charge level.
- Select tension values to display in lb, Kg, or Deca Newtons.
- Push the STORE button to activate the Memory Function to store multiple tension measurements and display the MIN and MAX of these stored readings.
- Select strap material and size from menu. Instrument automatically adjusts calibration to correct setting.
- Up to 10 calibrations can be programmed into instrument. (All calibrations password protected).
- Adjustable LCD refresh rates allow for stable digital readings.
- All models typically available from stock.
- All models factory-calibrated and ready for use
- Calibration values traceable to National Standards. Calibration certificate included.

HOW TO CHECK ACCURACY

To verify the accuracy of your instrument, simulate a tension load on your strapping by suspending known weights to a sample length of the material. Then verify these values with the instrument, e.g., if a 100 lb weight is freely suspended from a single length of strapping, the strap is now tensioned to 100 lbs, and your instrument should indicate 100 lbs on the display when properly engaged to the material. To correctly obtain readings, first zero your instrument in the attitude it will be used for testing, then engage the instrument to the tensioned strapping and note the reading. When performing this test, using a micrometer, measure your strapping thickness and make certain it is dimensionally within tolerance (+/- .003" of size), and not out of specification.



Free hanging weight on a single length of strapping to simulate tension.

Figure 7



Micrometer for measuring strapping thickness.

Figure 8

KEEP IT SIMPLE. *Only simulate tensions using free-hanging weights on correctly-sized strapping material. Never use any device that attempts to convert rotational torque values into tension loads, as these types of systems are highly inaccurate.*

FOR BEST RESULTS ALWAYS TAKE SEVERAL READINGS OF THE STRAPPING TENSION BY DISENGAGING AND THEN RE-ENGAGING THE INSTRUMENT FROM THE STRAP ITSELF.

Verify the tension value. For example, if your suspended weight is 50.0 lbs your instrument should also indicate 50.0 lbs +/- 5.0 lbs once properly engaged to the strapping. This procedure confirms the instrument's accuracy and it is now ready for use.

Proper Engagement of Instrument to Cable

- **ENGAGE INSTRUMENT ONTO TENSIONED STRAPPING** by slipping or guiding the instrument's three contact elements onto the strap. The proper routing of the strapping is under the two outer guide (or contact) pins, and over the center contact element (sensor). See Figure 9



Do not exceed the maximum tension range of the instrument or damage will occur.

Figure 9

How to program a custom, or 5-10 point multi-linearization calibration

****IMPORTANT: This feature should only be used by a calibration facility using certified and traceable dead weights. Do not use this feature for a simple accuracy check.***

****If you want to verify or check the accuracy to a cable go to: "How to Check Accuracy" on page 12.***

****When performing a multi-linearization calibration keep it simple. Only simulate tensions using traceable, free hanging dead weights on correctly sized straps which are dimensionally within tolerance (+/- .003"). Never use any device which attempts to convert rotational (torque) values into tension loads, as these types of systems are highly inaccurate. Additionally any load cell system must be routinely checked for accuracy using traceable dead weights as these types of systems are also highly inaccurate and generally do not meet the minimum repeatable accuracy standards required by ISO-17025. For best accuracy always use traceable, free hanging dead weights on a single length of strapping.***

****When calibrating these instruments tension values must be entered in lbs. Note: If your dead weight standards are in Kilograms, convert their values into lbs: 1 KG = 2.2046 lbs***

1. Scroll to **SETUP** and press ENTER. Next, scroll to **RE-CAL TENSION** and press ENTER. The screen will now display: **SETUP, RE-CALIBRATE TENSION, ENTER PASSWORD, CAL DATA WILL BE LOST!**

2. **Password.** To proceed with this re-calibration you must enter the following sequence of key strokes: Press **ENTER** once, then press the **UP** arrow once and then finally the **ENTER** button. These three inputs: **ENTER, UP, ENTER** are the password which cannot be changed.

3. The display now indicates: **SETUP RE-CALIBRATE TENSION** with a list of the calibration names and custom names that have been programmed into the instrument. Scroll to the description you wish to recalibrate, highlight it and then press **ENTER**.

4. The next screen will indicate: **CALIBRATE TENSION, NUMBER OF POINTS.** Using the up and down arrows select the number of cal points you will be tensioning the cable to, the minimum of which is 5 points (zero is a calibration point and already set so you will need to define a minimum of 4 increasing tension values such as: 50, 100, 150 and 200). If necessary you can adjust the number of calibration, or weight points up to 10 points, or another value over 5. If 10 cal points were selected the entries could look something like this: 10, 20, 30, 40, 50, 60, 70, 80, 90.

5. **ENTER WEIGHT.** After selecting the number of calibration points you'll need to define these weight values. Using the up or down arrows select your first tension, or weight cal-point and then press **ENTER**. *Note: Do not use 0 (zero) as this value is already programmed into the instrument.* Next, use the up or down arrows to select your **weight 2** value making sure that the value entered is greater than the previous entry in **weight 1**. Next, select increasing weight values for the additional weight points but not exceeding the maximum tension range of the instrument.
6. **CALIBRATE TENSION.** Next you will calibrate the instrument using the weight values you previously selected. To properly simulate these tensions, suspend a single length of your strapping from above and add or suspend known weights onto the strapping in the values you've previously selected, when prompted.
 - a. **CALIBRATE TENSION, NUMBER OF POINTS __, ZERO UNIT.** Without any strapping engaged to the instrument hold it in the attitude you will be taking the reading in and press **ENTER** to zero the unit. Next the display will prompt you to suspend the weight value you previously selected in step 5. If, for example you selected 50 lbs for your first weight value the instrument will indicate:
PLACE WEIGHT 50.
 - b. Suspend the exact weight value from your cable that you've previously selected (in this example it would be 50 lbs).
 - c. Next, engage the instrument to your tensioned strapping and then press **ENTER** once the reading has stabilized.
 - d. Repeat steps b. and c. for the remaining number of weight points by suspending additional weights to your strapping in the values previously selected and entering these readings.
 - e. Once the last weight value has been entered, the instrument will return to the **SETUP** menu. Next, press the **ESCAPE** key to return to the main display.
 - f. The main display will now indicate the strapping/material description that you have just finished calibrating. If the name on the display is not the material you just recalibrated you have re-programmed the incorrect description. If this happens you will need to recalibrate both the material indicated on the display along with the material you thought you were calibrating.
 - g. After completing a calibration always recheck the values. Refer to "How to Check Accuracy" on page 12 for additional information.



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