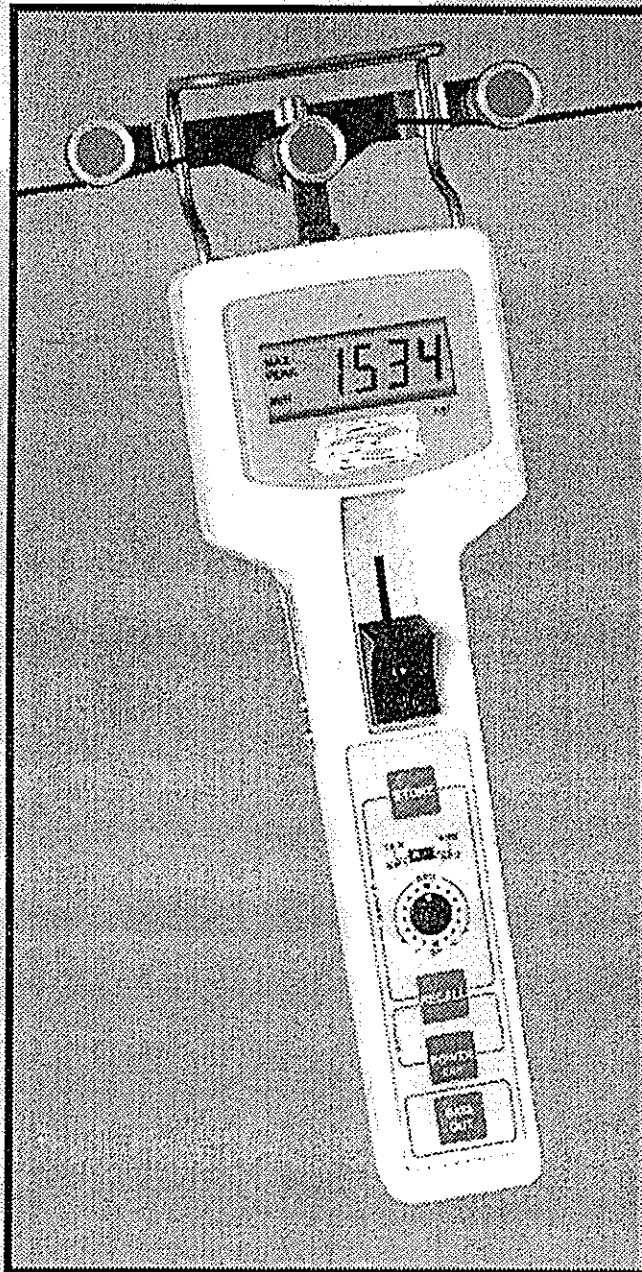
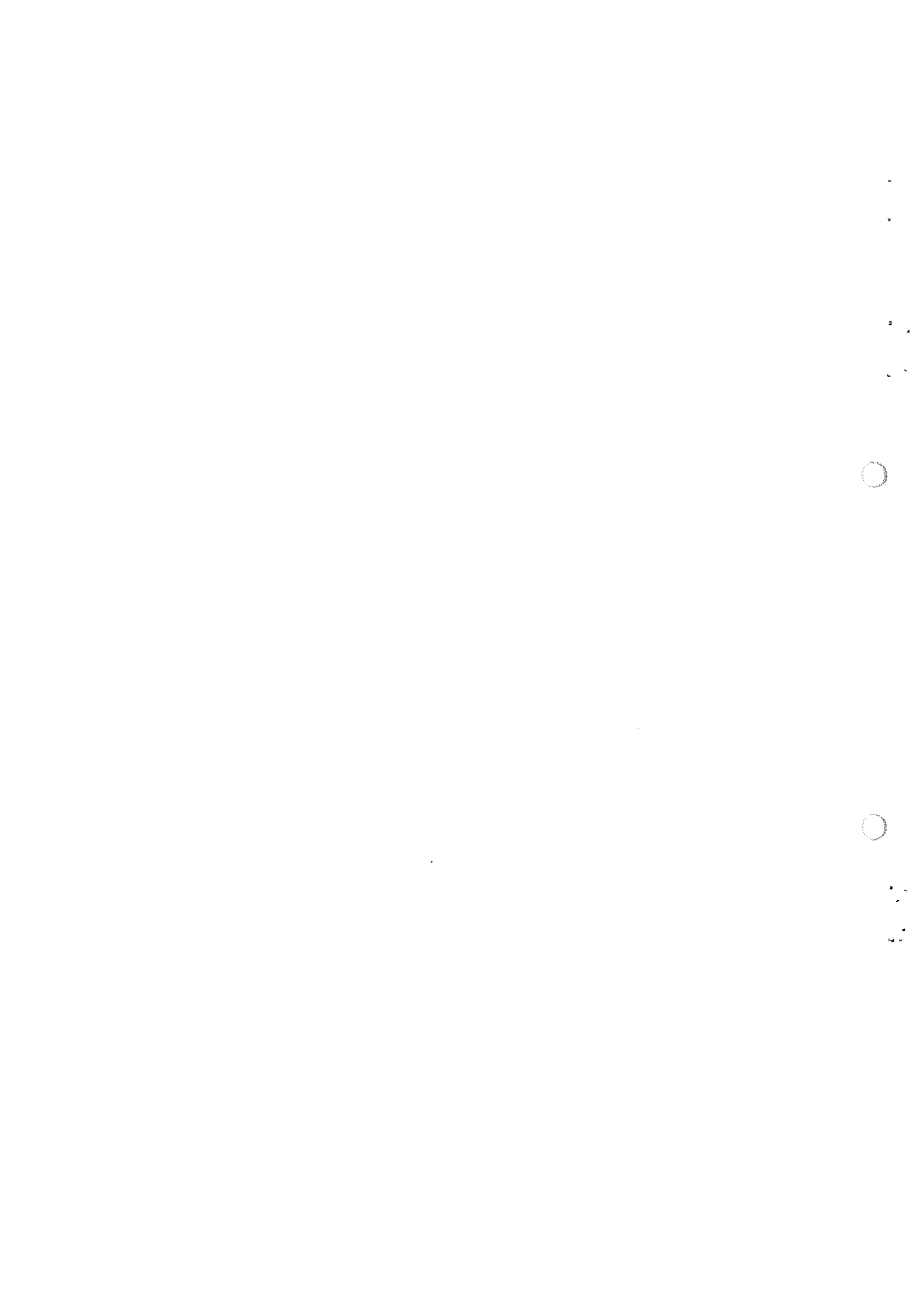


SHIMPO

DTMX

Operating Instructions





INDEX

<p>1.00 INTRODUCTION 2</p> <p>2.00 DTMX OVERVIEW 3</p> <p>3.00 DESCRIPTION OF KEYS 4</p> <p style="padding-left: 20px;">3.10 Auxiliary Functions</p> <p>4.00 QUICK START INSTRUCTIONS .. 5</p> <p style="padding-left: 20px;">4.10 Setup</p> <p style="padding-left: 20px;">4.20 Operation</p> <p>5.00 SETUP 8</p> <p style="padding-left: 20px;">5.10 Installing Batteries</p> <p style="padding-left: 20px;">5.20 AC Adapter</p> <p style="padding-left: 20px;">5.30 Configuring Dip Switches</p> <p style="padding-left: 40px;">5.31 Access the DIP Switch Block</p> <p style="padding-left: 40px;">5.32 Setting the DIP Switches</p> <p style="padding-left: 20px;">5.40 Material Rigidity Selector</p> <p style="padding-left: 20px;">5.50 Thickness Compensator.</p> <p style="padding-left: 40px;">5.51 Preparing Sample</p> <p style="padding-left: 40px;">5.52 Inserting Sample</p> <p style="padding-left: 20px;">5.60 Gravity Correction (Zero)</p> <p>6.00 BUILT-IN MEMORY SYSTEM 14</p> <p style="padding-left: 20px;">6.10 Standard Memory</p> <p style="padding-left: 40px;">6.11 Viewing Data</p> <p style="padding-left: 40px;">6.12 Clearing Data</p> <p style="padding-left: 20px;">6.20 Standard NAPO Memory</p> <p style="padding-left: 20px;">6.30 On-Demand Data Logging</p> <p style="padding-left: 40px;">6.31 Viewing Data</p> <p style="padding-left: 40px;">6.32 Clearing data</p> <p style="padding-left: 20px;">6.40 Continuous Data Logging</p> <p style="padding-left: 40px;">6.41 Viewing Data</p> <p style="padding-left: 40px;">6.42 Clearing data</p>	<p>7.00 DOWNLOADING DATA 19</p> <p style="padding-left: 20px;">7.10 Output Cables</p> <p style="padding-left: 20px;">7.20 Connector Pinouts</p> <p style="padding-left: 20px;">7.30 Analog Output</p> <p style="padding-left: 20px;">7.40 Serial Output - Printer</p> <p style="padding-left: 40px;">7.41 Signal Characteristics</p> <p style="padding-left: 40px;">7.42 Printer Setup Data</p> <p style="padding-left: 20px;">7.50 Serial Output - Computer</p> <p style="padding-left: 40px;">7.51 Signal Characteristics</p> <p style="padding-left: 40px;">7.52 Data Format</p> <p>8.00 CALIBRATION 23</p> <p style="padding-left: 20px;">8.10 Checking Calibration</p> <p style="padding-left: 20px;">8.20 Field Calibration Adjustment</p> <p style="padding-left: 20px;">8.30 Special Calibrator</p> <p>9.00 GENERAL NOTES 25</p> <p style="padding-left: 20px;">9.10 Turning Power On/OFF</p> <p style="padding-left: 20px;">9.20 Display Indicators & Codes</p> <p style="padding-left: 40px;">9.21 Over Range</p> <p style="padding-left: 40px;">9.22 EPROM Error</p> <p style="padding-left: 40px;">9.23 Low Battery</p> <p style="padding-left: 20px;">9.30 Standard Dev. & Avg. Formulas</p>
---	--

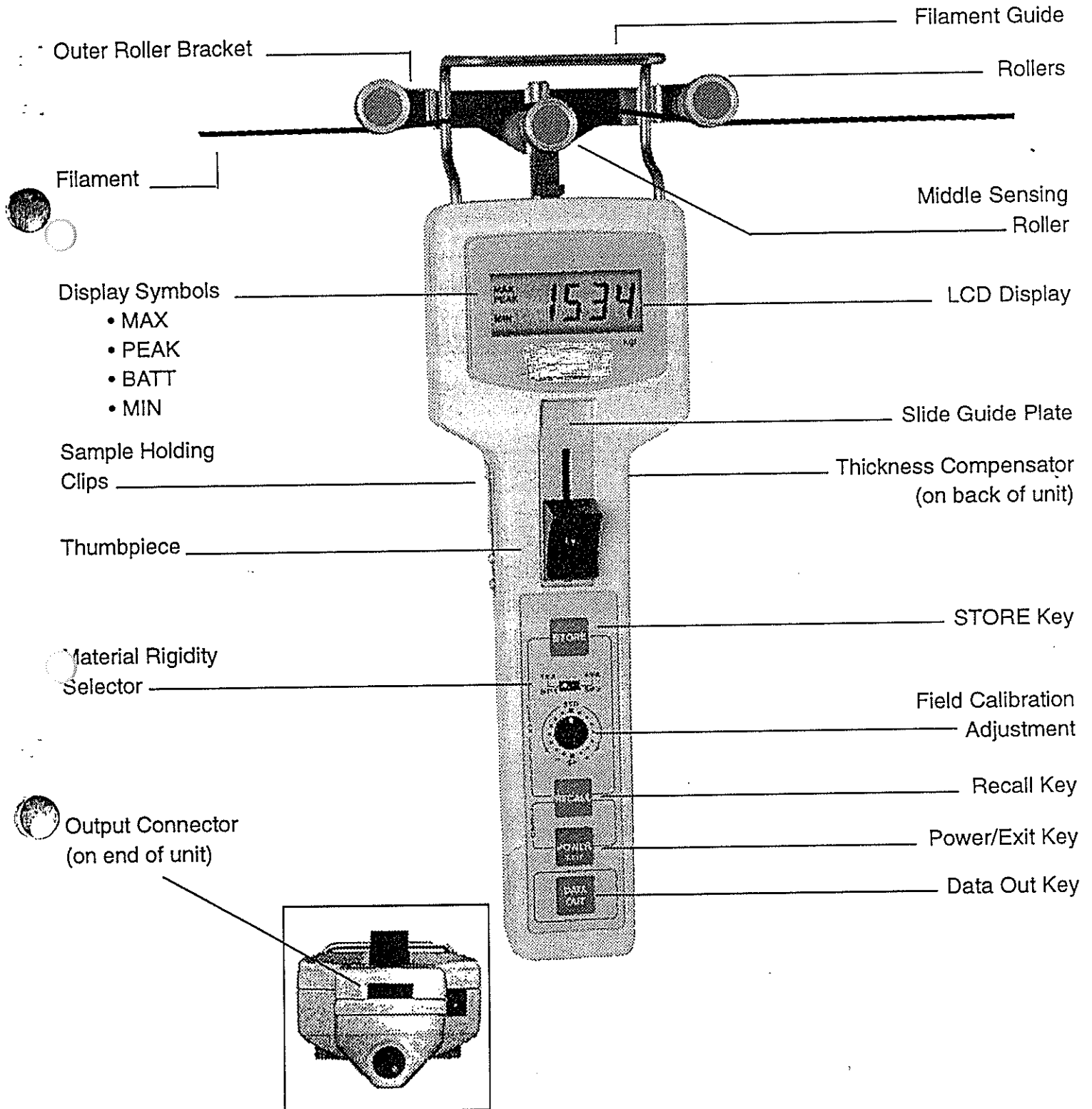
1.00 INTRODUCTION

The **SHIMPO** DTMX Digital Tension Meter is a hand-held device which accurately measures the running as well as static tensions of a wide variety of process materials including yarns, fibers, wires, optical fibers, etc. It employs the "three-roller principle" of tension measurement where the outer two reference rollers are fixed to create a known angle of wrap over the middle sensing roller. The middle roller is part of a precision strain gauge sensing system which accurately measures the resulting force on the roller. This value is converted into a highly accurate and repeatable tension value using proprietary computer calibration formulas which correct for different material diameters, rigidities, gravity and other critical parameters. The DTMX is powered by four AA batteries and is supplied in a rugged, die-cast aluminum housing.

The DTMX takes 62 tension measurements per second and displays the average of these measurements over a user-selected interval of 0.5, 1, 2 or 4 seconds, the Display Update Rate. This permits the user to determine the extent of averaging (or damping) required to "stabilize" the tension readings, making them much easier to read and eliminating the undesirable "bouncing needle" condition found on most mechanical tension meters. To set or change the Display Update Rate, refer to Configuring Dip Switch Settings, Section 5.30.

A built-in data logging system is provided which permits storage of 100 individual data points plus *maximum*, *minimum*, *peak*, *average* and *standard deviation* values. The recorded data and statistics can be recalled to the display for viewing, downloaded to the battery-powered Printer (or other serial printer) or downloaded to a Personal Computer. The DTMX can also be mounted in-line for extended periods using the threaded mounting holes on the rear side of the housing. For long term analysis, an AC adapter can be connected. The DTMX can be connected to a Chart Recorder (or other recording device) using its 0-1 VDC analog output. For those familiar with RS-232 communication, the DTMX can also be "polled" from a Host Computer.

2.00 DTMX OVERVIEW



3.00 DESCRIPTION OF MEMBRANE KEY FUNCTIONS

Key	Description of Functions
STORE	<ul style="list-style-type: none"> Starts/Stops scanning for Max/Min/Peak values. (Standard Memory) Starts/Stops automatic recording of values into memory (Continuous Data Logging Model). Loads displayed value into memory (On-Demand Data Logging Model).
RECALL	<ul style="list-style-type: none"> Enters Recall Mode to review statistics and recorded Data. In recall mode, changes display from LAST → MAX → MIN → PEAK → LAST → MAX etc. When in Data Logging Mode: changes display from LAST → MAX → MIN → PEAK. → AVERAGE → STANDARD DEVIATION → DATA #1 → DATA #2 → DATA #3 etc.
POWER EXIT	<ul style="list-style-type: none"> Turns power on. Turns power off if pressed and held for 5 or more seconds. Exits from Recall Mode when reviewing statistics and data.
DATA OUT	<ul style="list-style-type: none"> Initiates downloading of data.
STORE + RECALL	<ul style="list-style-type: none"> Clears all data in Basic Memory and Extended Memory ("CCCC" momentarily shown on display).
RECALL + POWER EXIT	<ul style="list-style-type: none"> Zeros gauge ("Tare") for use in any orientation ("Gravity Correction").

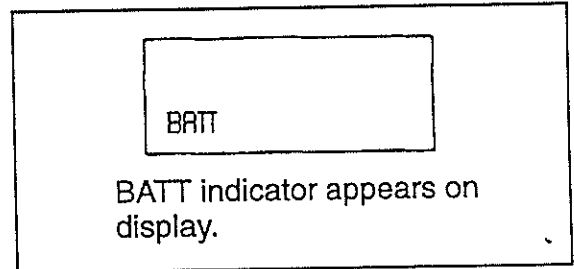
3.10 Auxiliary Functions

Key	Description of Functions
POWER EXIT + STORE	<ul style="list-style-type: none"> Changes from Tension Measurement Mode into Thickness Measuring Mode when both keys are pressed and held for four or more seconds.
POWER EXIT + DATA OUT	<ul style="list-style-type: none"> Changes from Tension Measurement Mode into Battery Voltage Measuring Mode when both keys are pressed and held for four or more seconds.
STORE + DATA OUT	<ul style="list-style-type: none"> Exits Material Thickness or Battery Voltage Modes and returns to Tension Measuring Mode when both keys are pressed.

4.00 QUICK START INSTRUCTIONS

4.10 Setup


1. Insert a sample of the process material into the Thickness Compensator and secure the ends of the sample under the Sample Holding Clips on each side of the unit.

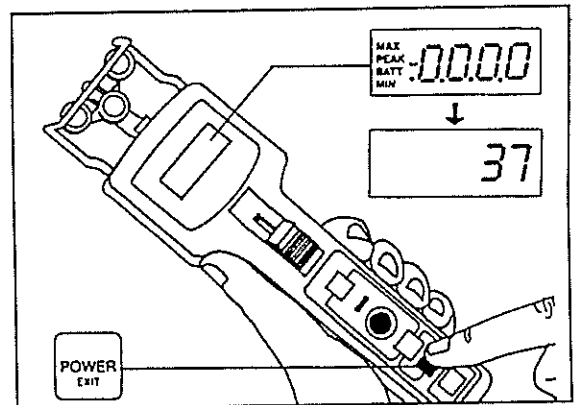


Note: Thickness Compensator is not used on the DTMX-0.2 Model.

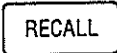

2. Set the **Material Rigidity Selector** to "TEX" or "WIRE"
3. Set the **Field Calibration Adjustment** to "STD"

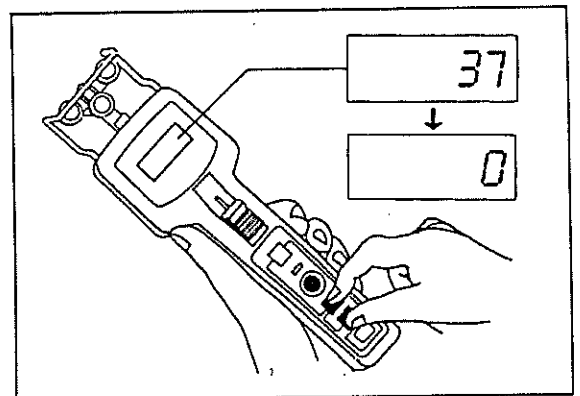
4.20 Operation

1. Turn the unit on by pressing the  key. Display should show zero when unit is in measuring position. If the gauge displays zero go to Step 3, otherwise perform a Gravity Correction Procedure (Step 2).

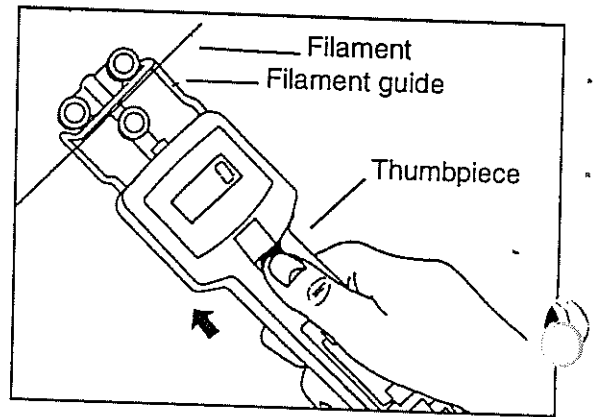


2. Position the DTMX into the measuring position and perform a Gravity Correction procedure (Zero):

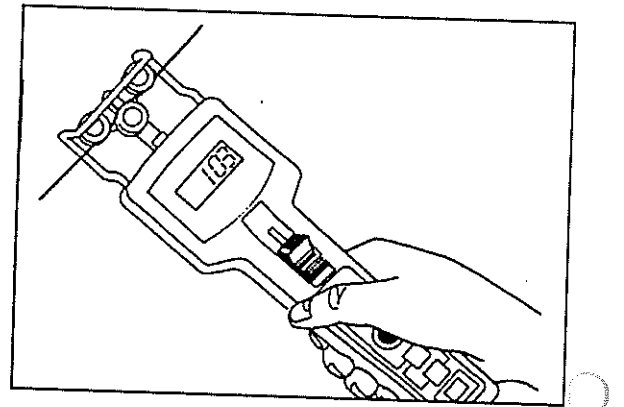
Press the  and  keys simultaneously, and hold until the display shows "0" or "0.0".



3. Open the 3-roller system by pushing the Thumbpiece forward until the outer rollers extend beyond the filament guide. Position the DTMX so that the process material contacts the Filament Guide and passes between the outer rollers and the middle sensing roller.

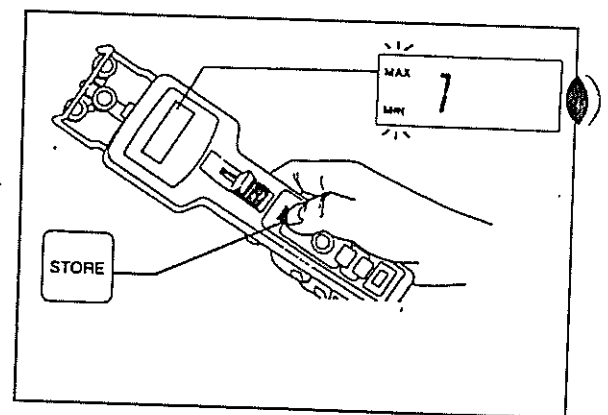


4. Release the Thumbpiece SLOWLY until it returns to its original position. **Do not let it snap back as this could effect the calibration and damage the instrument.** The display will begin to show tension readings.

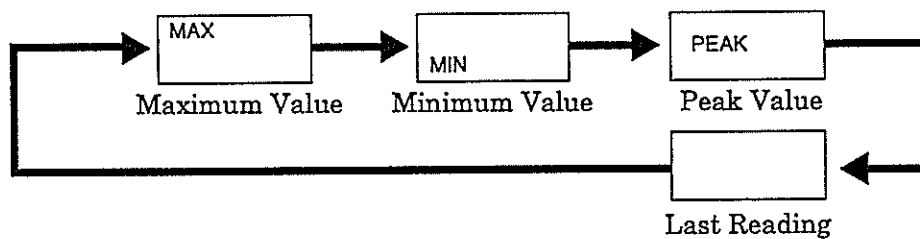
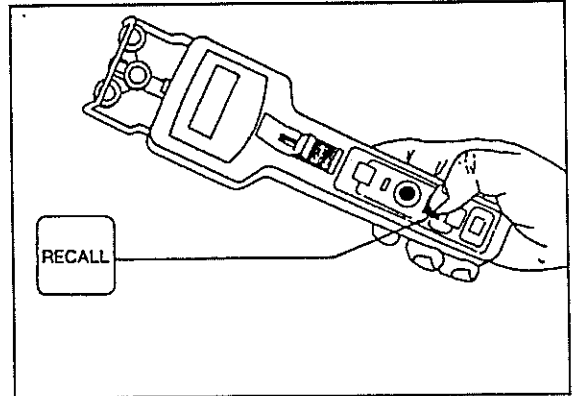


5. Press the key to start and stop the Standard Memory system.

The MAX, PEAK and MIN indicators will blink on and off indicating that the memory is active and up to 100 readings will be stored *continuously* or *on-demand*, as indicated in Sections 6.10, 6.30 and 6.40.



6. Press the **RECALL** key repeatedly to review the data stored in memory.



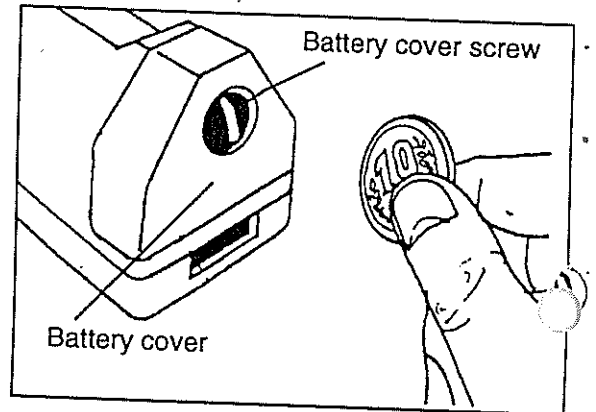
Press the **POWER EXIT** key at any time to exit Recall Mode.

The DTMX will automatically power off after 120 seconds of inactivity. To manually turn off the power, press and hold the **POWER EXIT** key for 5 seconds.

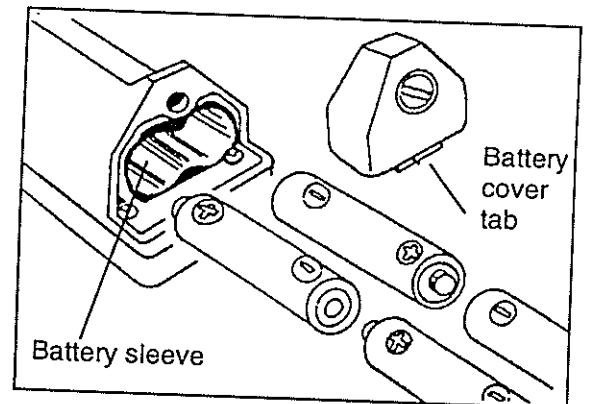
5.00 SETUP

5.10 Installing/Replacing Batteries

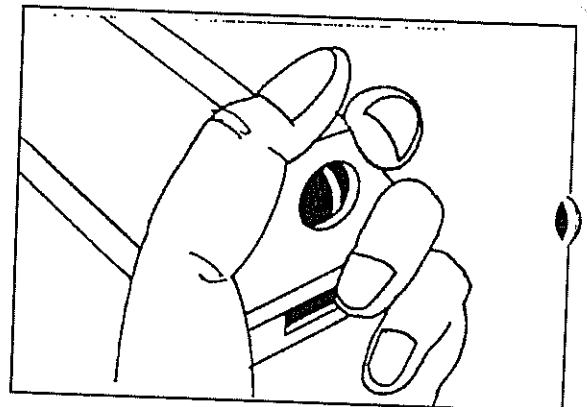
1. Using a slotted screwdriver or coin, loosen the battery cover screw located at the end of the unit by turning the screw counterclockwise.



2. Insert four (4) AA, 1.5 Volt batteries into the battery sleeve. Insert them in the direction indicated on the top of the sleeve.



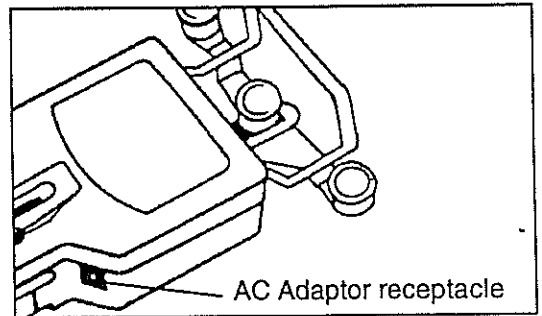
3. Replace battery cover by first inserting the tab of the cover into the slot of the housing and pressing the cover into place. Tighten the screw by turning it clockwise.



NOTE: If battery cover will not close, confirm that the batteries are inserted in the proper orientation. Refer to step 2 above.

5.20 Using AC-Adapter

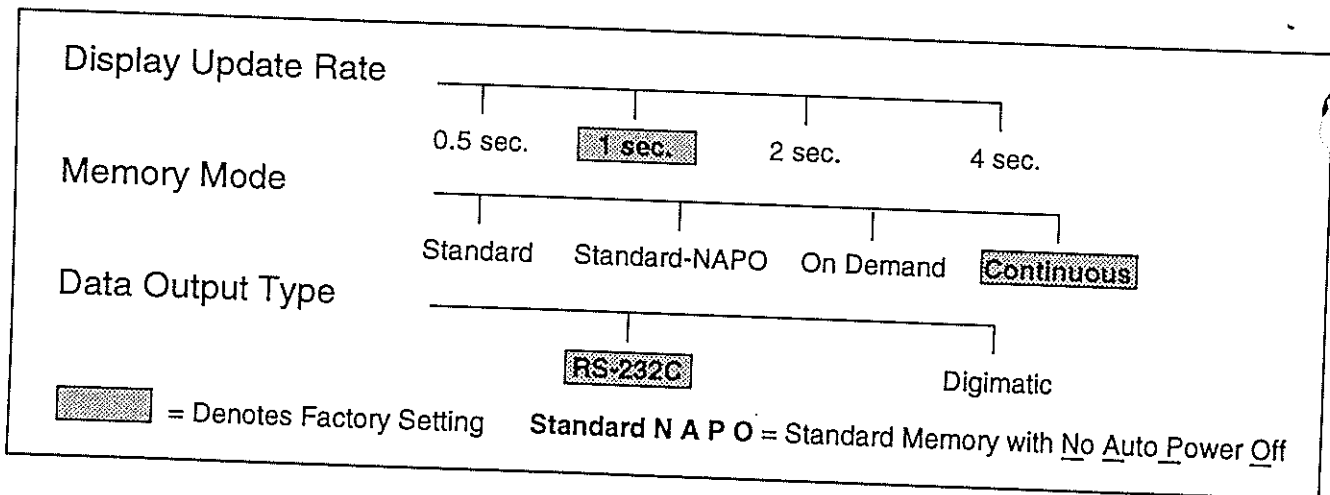
The optional AC-DTMX AC Adapter can be used as an alternative to batteries. Plug one end of the AC-adapter into an appropriate AC outlet and the other end into the receptacle located on the side of the DTMX.



Note: When using the AC adapter, *do not remove the batteries* as they are used to save the data in memory when the power is turned off.

5.30 Configuring Dip Switches

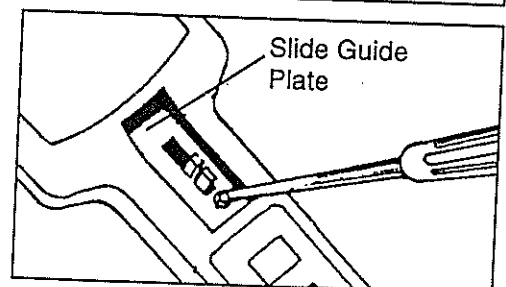
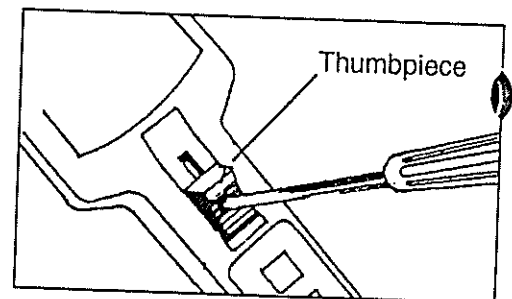
The DTMX is supplied with six (6) dip switches permitting the user to select desired *Display Update Rate*, *Memory Mode* and *Data Output Type* as detailed below.



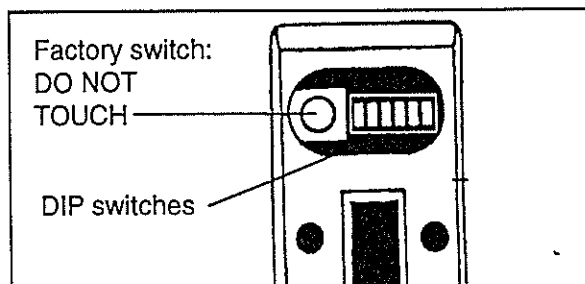
To access the dip switches, the Thumbpiece and Slide Guide Plate must be removed. Refer to access instructions below.

5.31 Accessing The Dip Switch Block

1. Turn the DTMX power off by pressing and holding the **POWER EXIT** key for five (5) or more seconds. The display will go blank.
2. Using a small Phillips screwdriver, remove the screw in the center of the Thumbpiece. Remove the Thumbpiece and screw. The Slide Guide Plate and screw will be visible.
3. Using a small Phillips screwdriver, remove the screw at the bottom of the Slide Guide Plate and remove plate.

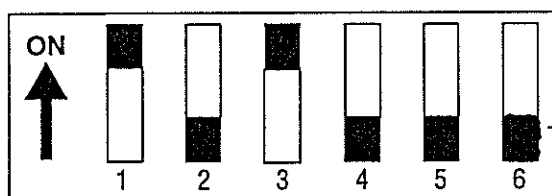


4. The Dip Switch Block will be located at the top of the opening after removing the Slide Guide Plate.



5.32 Setting Dip Switches

Using a small slotted screwdriver or other pointed tool, slide each of the five (5) Dip Switches into the ON (up) or OFF (down) position as indicated in the illustration below for the desired setting. Dip Switch #6 is valid when Material Rigidity Selector is selected to "WIRE".



WIRE	
Material	DIP-6
Copper	OFF
Steel	ON

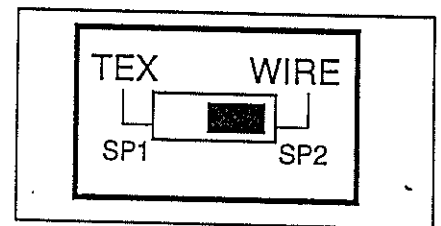
Display Update Rate	DIP-1	DIP-2
0.5 sec	OFF	OFF
1.0 sec	ON	OFF
2.0 sec	OFF	ON
4.0 sec	ON	ON

Data Output	DIP-5
RS-232C	OFF
Digimatic	ON

Memory Mode	DIP-3	DIP-4	Data Stored in Memory
Standard Memory	OFF	OFF	MIN, MAX, PEAK
Standard Memory Without Auto-Power Off	ON	ON	MIN, MAX, PEAK
Extended Memory (Continuous Mode) automatically entered	ON	OFF	MIN, MAX, PEAK, AVG, STD. DEV. plus 100 data points
Extended Memory (On-Demand Mode)	OFF	ON	MIN, MAX, AVG, STD. DEV. plus 100 data points manually entered

5.40 Material Rigidity Selector

The Material Rigidity Selector permits the user to set the DTMX for use on Textiles or Wires. It is used in the computer calibration formulas to provide the highest measurement accuracy.



There are two material to be choice in "WIRE" position. One is the Copper and another one is steel, these are selected by DIP Switch #6.

See 5.32 Setting Dip Switches.

The Material Rigidity Selector is also used to select a *special calibration* (SP1 or SP2) which is optionally available. Refer to Special Calibration, Section 8.30.

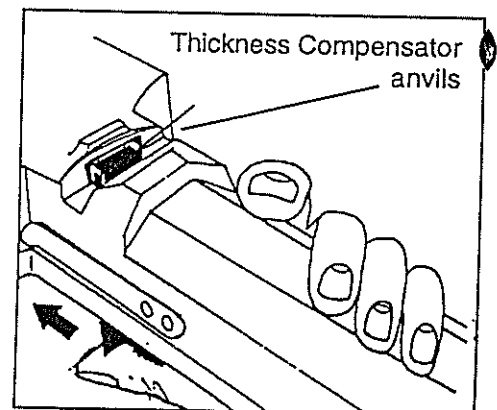
5.50 Thickness Compensator

When using the "three-roller" principle of tension measurement, an increase in material diameter will result in an increased tension reading even when the line tensions are unchanged. The DTMX is supplied with a proprietary Thickness Compensation system which automatically shifts the outer rollers to compensate for this effect. Additionally, the Thickness Compensator measures the material diameter with an accuracy of 0.01 mm (0.0004 ") for use as a factor in the computer calibration formula.

The Thickness Compensator is located on the back of the instrument. When the Thumbpiece is pushed forward, two metal plates (anvils) will separate creating a slot for insertion of the material sample.

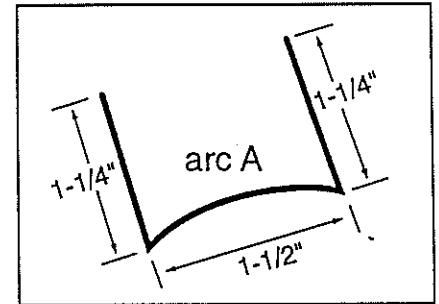
NOTE: 1. Some monofilaments, wires and other difficult-to-bend samples will need special preparation prior to insertion into the Thickness Compensator. See Preparing Sample for Thickness Compensator.

2. It is unnecessary to use the Thickness Compensator on the DTMX- 0.2 because the range of material diameters used with this model is inconsequential.



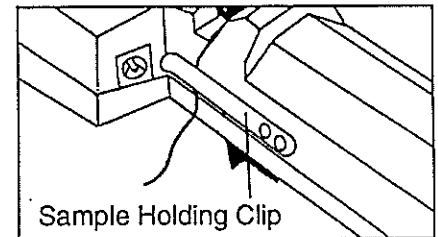
5.51 Preparing Sample For Thickness Compensator

When using monofilament, wire or other difficult-to-bend materials, the sample must be prepared properly before inserting into the Thickness Compensator. Using the pliers supplied, bend the sample as noted in the sketch. For monofilaments, maintain arc "A" as shown, so sample bends into anvils.



5.52 Inserting Sample Into Thickness Compensator

Push the Thumbpiece forward to separate the two anvils. Insert the sample into the slot and slowly release the Thumbpiece back to its resting position. The material sample should be secured between the two anvils. Place the ends of the sample under the Sample Holding Clips located on each side of the unit. If the ends stick up bend them back so they will not present a safety hazard.

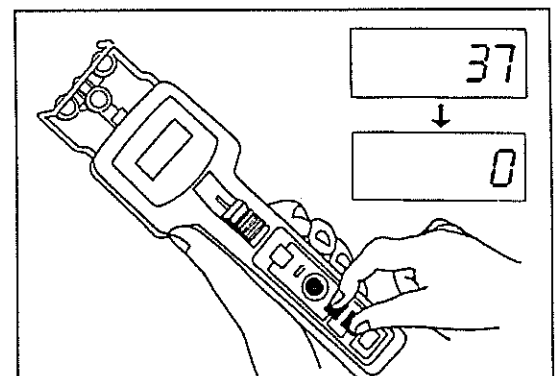


NOTE: In lieu of a sample, an equivalent shim can be inserted into the Thickness Compensator as long as its compressed thickness is the same as the process material. The shim should be secured using a spray adhesive on one side, so it will not fall out each time the Thumbpiece is pushed forward.

5.60 Gravity Correction Procedure (ZERO)

The DTMX is factory calibrated for use in the right-handed, horizontal position (vertical material path) with 3 rollers aligned vertically. When using the DTMX in any other orientation, a *Gravity Correction Procedure (Zero)* should be performed.

Hold the instrument in the measuring position and press the **RECALL** and **POWER EXIT** keys simultaneously. The display will show zero.



The DTMX is now ready for use.

6.00 BUILT-IN MEMORY SYSTEM

The DTMX Built-In Memory system can be configured to operate in one of the following modes: *Standard Memory*, *Standard Memory With No Auto Power Off*, *On-Demand Data Logging* and *Continuous Data Logging*. The latter two are part of the Extended Memory. Data recorded in the Standard Memory or the Extended Memory can be recalled to the LCD Display for viewing or downloaded to a printer or PC. To set the Memory Mode, refer to Configuring Dip Switches, Section 5.30.

6.10 Standard Memory Mode

The DTMX takes 62 tension measurements per second and displays the average of these measurements over a user-selected Display Update Rate of 0.5, 1, 2 or 4 seconds. The Standard Memory system checks each displayed value and retains the Maximum, Minimum and Peak tension values which occurred during the *Measuring Interval*. The *Measuring Interval* is started and stopped by pressing the key.

Maximum Value: highest *displayed* value during measuring interval
Minimum Value: lowest *displayed* value during measuring interval
Peak Value: highest *transient* value of all of the measurements used to calculate each displayed value

Note: The MAX/MIN/PEAK indicators on the LCD display will flash on and off, indicating that the Standard Memory system is activated.

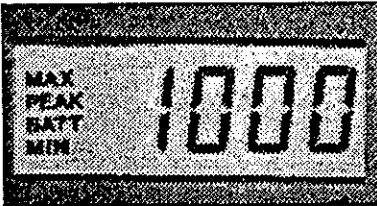
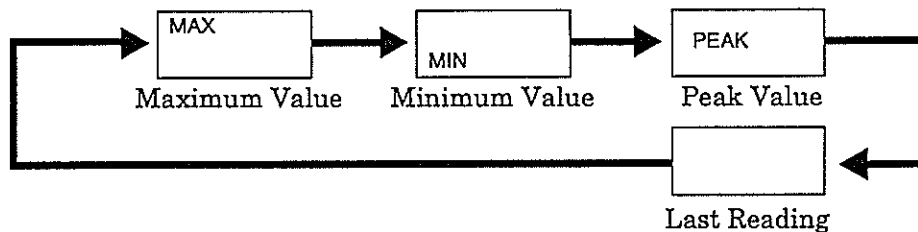
To Start/Stop measuring interval for Standard Memory, press key.

6.11 Viewing Data in Standard Memory

To view data stored in Standard Memory, press the **RECALL** key.

The following will be displayed when the **RECALL** key is pressed repeatedly. Each time the key is pressed the displayed value with change.

Action	Display Will Show	LCD Indicator
Press RECALL key	Maximum Value	MAX
Press RECALL key	Minimum Value	MIN
Press RECALL key	Peak Value	PEAK
Press RECALL key	Last Reading	none

Press the **POWER EXIT** key at any time to exit the Recall Mode.

6.12 To clear all data stored in the Standard Memory

Press the **STORE** key and the **RECALL** key simultaneously

6.20 Standard Memory with No Auto Power Off (Standard - NAPO)

This memory mode is identical to the Standard Memory Mode detailed above, except that when configured in this mode the power will not turn off automatically after 120 seconds of inactivity.

6.30 On-Demand Data Logging Mode

When configured for *On-Demand Data Logging Mode*, up to 100 data points can be stored in memory along with the calculated *average* and *standard deviation* of the stored values. Each data point can be manually entered into memory.

When the key is pressed the currently displayed tension reading will be stored into memory and the memory location (a number from 1 to 100) will momentarily flash on the display.

To Store a Data Point in memory, press the key.

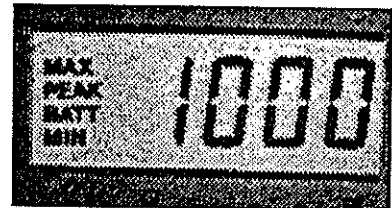
Note: The first time the key is pressed the MAX/MIN indicators will flash on and off on the LCD display. When the memory is full (100 data points in memory), the MAX/MIN indicators will stop flashing and remain on the display.

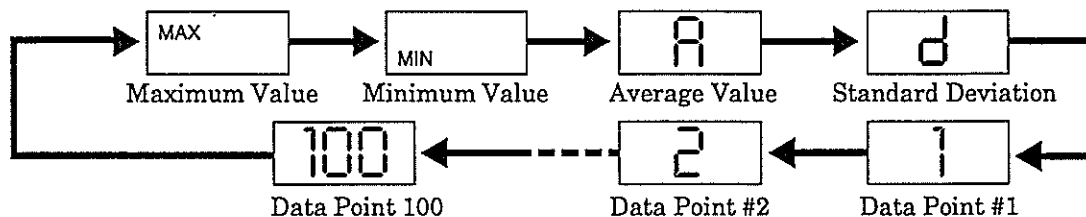
6.31 Viewing Data Stored in On-Demand Data Logging Mode

To view data stored in Extended Memory press the key.

The following will be displayed when the key is pressed repeatedly. Each time the key is pressed the displayed value will change.

Action	Display Will Show	LCD Indicator
Press RECALL key	Maximum Value	MAX
Press RECALL key	Minimum Value	MIN
Press RECALL key	Average Value	" A "
Press RECALL key	Standard Deviation	" d "
Press RECALL key	Date Point #1	" 1 "
Press RECALL key	Data Point #2	" 2 "
⋮	⋮	⋮
Press RECALL key	Data Point #100	" 100 "





Press the key at any time to exit the Recall mode

6.32 To Clear All Data Stored in the Extended Memory.

Press the key and the key simultaneously.

6.40 Continuous Data Logging Memory Mode

When configured for *Continuous Data Logging Mode*, up to 100 data points can be stored in memory along with the calculated average, peak and standard deviation values of the data stored in memory. Each displayed value is automatically entered into memory at a rate equal to the selected Display Update Rate of 0.5, 1, 2 or 4 seconds.

When the key is pressed the MAX/MIN/PEAK indicators on the LCD Display will begin to flash indicating that each displayed value is being automatically stored in memory. The indicators will continue to flash until the key is pressed again to stop the automatic storage or until the memory is full. The indicators will stop flashing and remain on the display.

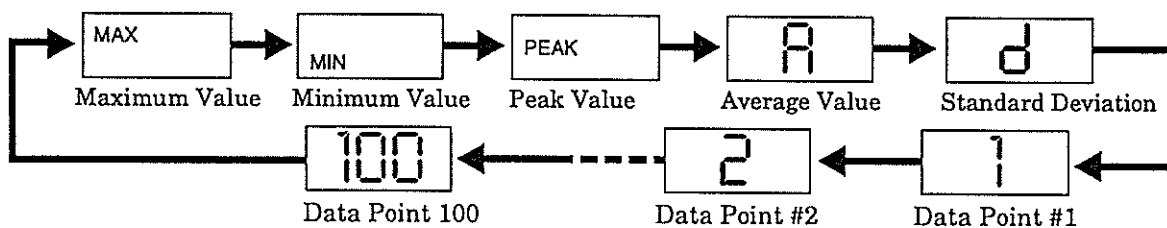
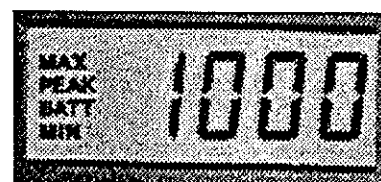
To start or stop the automatic storage of each displayed tension value into memory, press the key.

6.41 Viewing Data In Continuous Data Logging Mode

To view data stored in the Extended Memory press the **RECALL** key

The following will be displayed when the **RECALL** key is pressed repeatedly. Each

Action	Display Will Show	LCD Indicator
Press RECALL key	Maximum Value	MAX
Press RECALL key	Minimum Value	MIN
Press RECALL key	Peak Value	" P "
Press RECALL key	Average Value	" A "
Press RECALL key	Standard Deviation	" d "
Press RECALL key	Date Point #1	" 1 "
Press RECALL key	Date Point #2	" 2 "
⋮	⋮	⋮
Press RECALL key	Date Point #100	" 100 "



time the key is pressed the displayed value will change.

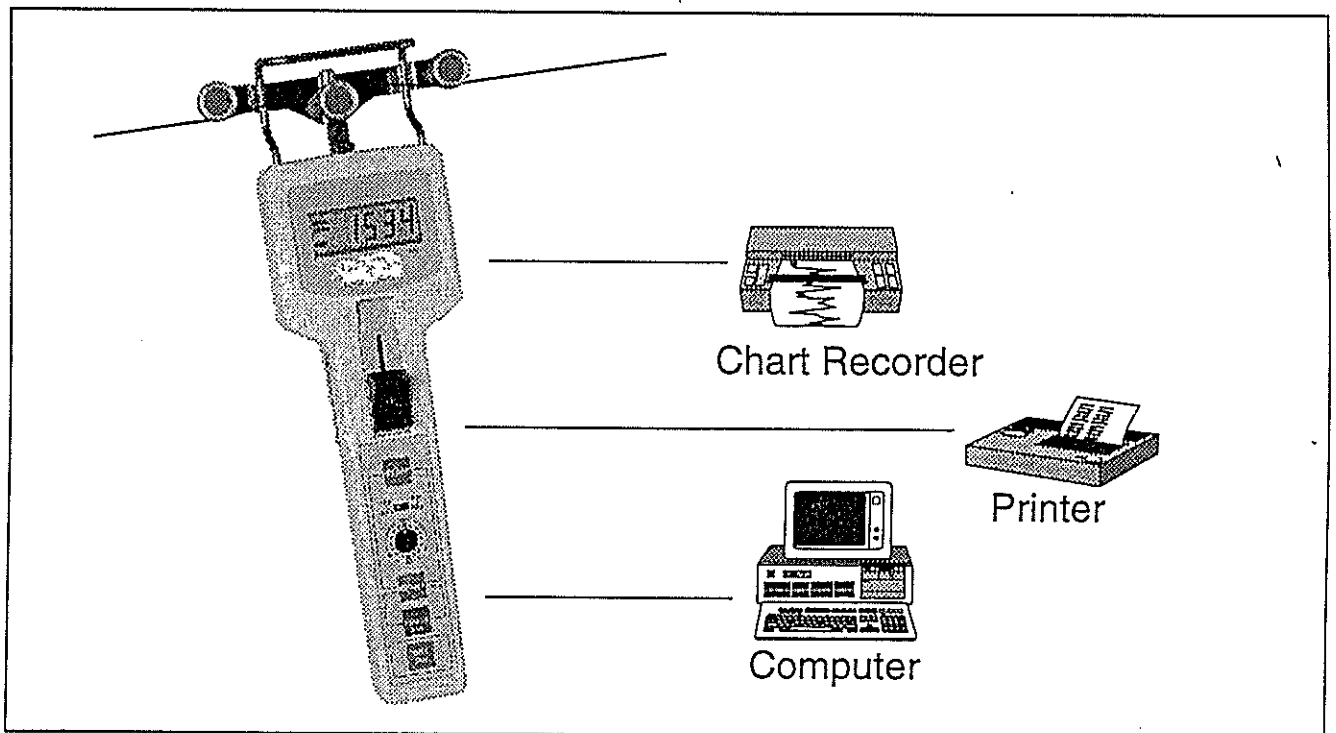
Press the **POWER EXIT** key at any time to exit the Recall Mode.

6.42 To Clear All Data Stored in the Extended Memory.

Press the **STORE** key and the **RECALL** key simultaneously.

7.00 DOWNLOADING DATA

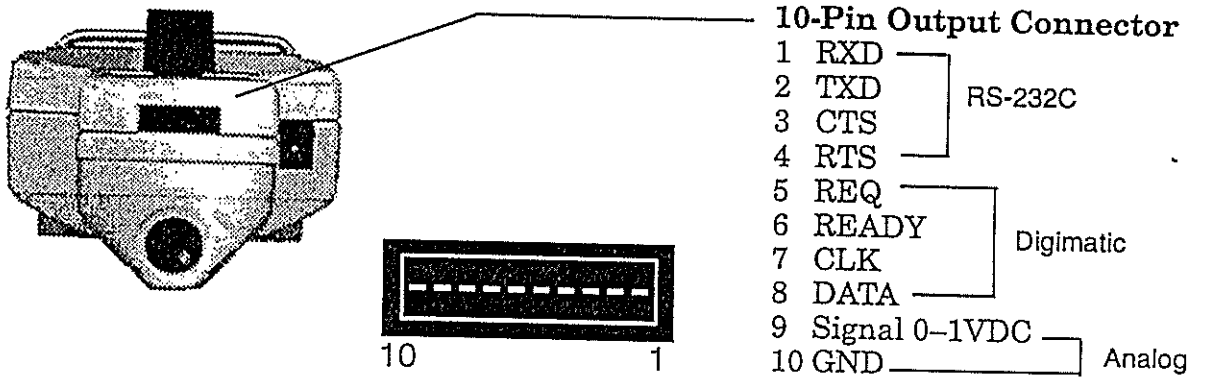
When configured for either *Continuous Data Logging Memory Mode* or *On-Demand Data Logging Memory Mode*, the recorded data can be downloaded for record-keeping purposes using the DTMX Serial and Analog outputs.



7.10 Output Cables (Option)

- Serial Cable (10' length) for connection to PC's or other serial recording devices.
- Analog Cable (10' length) for connection to Chart Recorders or other analog recording devices including PC's with Analog-to-Digital Converter cards. It is supplied with two bare leads for easy connection to a

7.20 Output Connector Pin Outs



7.30 Analog Output


The analog output permits users to connect the DTMX to Chart Recorders and other analog recording devices for trending and other data recording purposes. The analog output is continuously updated at all times and does not have to be turned on or off.

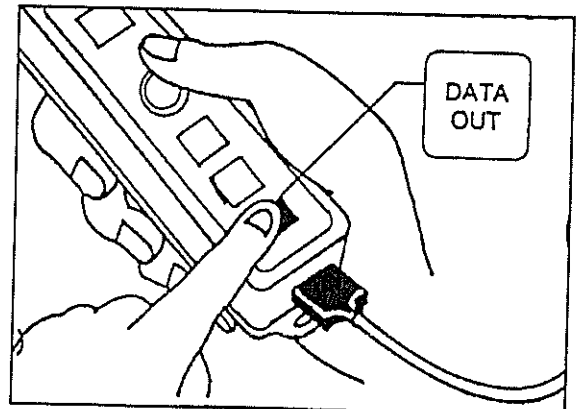
Signal Type	0-1 VDC
D-to-A Converter	12 bit
Frequency Response	16 msec (62.5 Hz)
Impedance	2 K Ohm (minimum)

Pin #	Function
9 ...	Signal (0-1) VDC
10 ...	Ground

7.40 Serial Output — Printer

The DTMX can be connected to the battery-powered printer (or other serial printer) for downloading the recorded data and all calculated statistics.

Press the  key to print recorded data.



7.41 Printer Setup Data

Signal	Baud Rate	Word Length	Parity	Stop Bits	EOL Delimiter
RS-232C	4800	8-bit	None	2-bits	CR + LF

7.42 Printer Setup Data

STATISTICS	
UNITS	9
DATA	12
MAX	154.2
MIN	101.5
AVG	137.7
DEV	13.77
DATA	
1	101.5
2	120.7
3	140.7
4	133.9
5	135.2
6	136.8
7	140.5
8	146.4
9	147.4
10	146.4
11	148.6
12	154.2
** END **	

*On-Demand
Data Logging Mode*

STATISTICS	
UNITS	9
DATA	12
MAX	154.2
MIN	101.5
PEAK	157.5
AVG	137.7
DEV	13.77
DATA	
1	101.5
2	120.7
3	140.7
4	133.9
5	135.2
6	136.8
7	140.5
8	146.4
9	147.4
10	146.4
11	148.6
12	154.2
** END **	

*Continuous
Data Logging Mode*

7.50 Serial Output — Computer

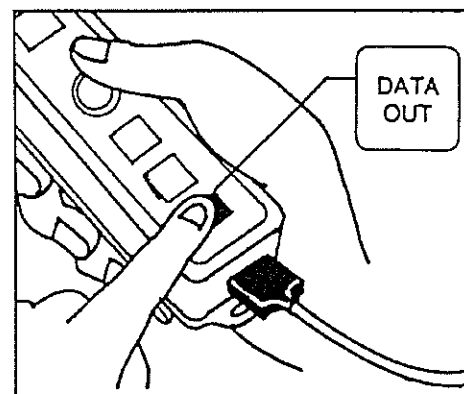
The DTMX can be connected to Personal Computers or other serial recording devices for downloading the recorded data and all calculated statistics. Additionally, a user can request a data point from a Host Computer (Poll Command) and perform a Zero ("Tare"). See below for details.

Press the DATA
OUT key to download recorded data.

Remote Host Computer Commands (Poll)

Request Data Point "D" (ASCII capital letter "D")

Zero "Z" (ASCII capital letter "Z")



7.51 Signal Characteristics

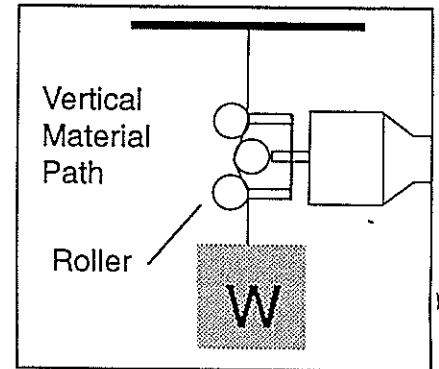
Signal	Baud Rate	Word Length	Parity	Stop Bits	EOL Delimiter
RS-232C	4800	8-bit	None	2-bits	CR + LF

7.52 Data Format

1	2	3	4	5	6	7	8	9	10	11	12	13
	S	T	A	T	I	S	T	I	C	S	CR	LF
CR	LF											
U	N	I	T	S				3	f	CR	LF	
D	A	T	A					x	x	x	CR	LF
M	A	X						x	x	x	CR	LF
M	I	N						x	x	x	CR	LF
P	E	A	K					x	x	x	CR	LF
A	V	G						x	x	x	CR	LF
D	E	V						x	•	x	CR	LF
CR	LF											
	D	A	T	A							CR	LF
		1						x	x	x	CR	LF
		1						x	x	x	CR	LF
1	0	0						x	x	x	CR	LF
	*	*		E	N	D		*	*		CR	LF

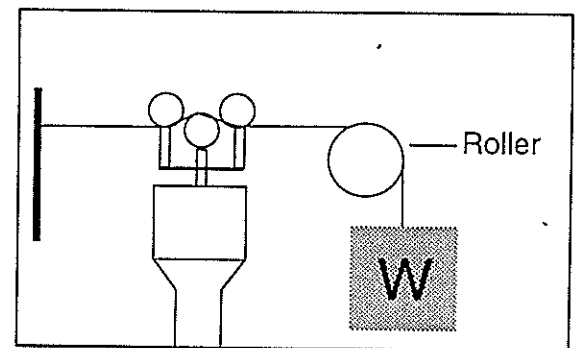
8.10 Checking Calibration

It is important to check the calibration of the DTMX frequently to insure that the gauge continues to perform within factory specifications. Implementing a periodic calibration check will help identify when (and if) the gauge goes out of calibration due to unreported damage, overload, or other unknown reason.



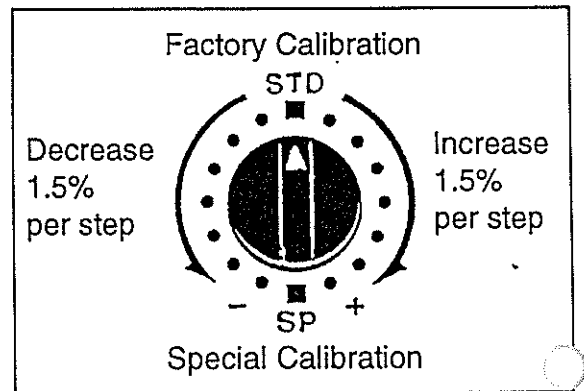
To check the calibration:

1. Suspend a known weight "W" from the process material in either a vertical or horizontal direction, best simulating the orientation that will be used during actual measurement. Fix the process material at one end. When fixing the process material horizontally, use a roller (or other free-rotating guide) prior to fixing the known weight. Refer to sketches. Select a weight within the expected operating tension range of the application
2. Setup DTMX by inserting sample into Thickness Compensator, setting Material Rigidity Selector and performing a Gravity Correction (Zero) if using a horizontal material path. Refer to Quick Start Instructions, Section 4.0.
3. The DTMX should display a value equal to (or within quoted accuracy specification) of the known Weight "W". If not, refer to Field Calibration Adjustment, Section 8.20.



8.20 Field Calibration Adjustment

The Field Calibration Adjustment permits the end user to "shift" the calibration curve to provide better accuracy when the factory standard calibration is not suitable. Each step on the Field Calibration Adjustment will increase (clockwise) or decrease (counterclockwise) the displayed value by 1.5%.



Increase: [7 steps] x [1.5% per step] = +10.5%

Decrease: [7 steps] x [1.5% per step] = -10.5%

If a Field Adjustment Calibration is not adequate, the accuracy of the DTMX can be increased further by ordering a Special Calibration using a calibration sample supplied by the user. Refer to ~~Special Calibration, Section 8.30.~~

8.30 Special Calibration

If the standard Factory Calibration and the Field Calibration Adjustment does not provide the desired accuracy, a Special Calibration can be ordered. Up to two Special Calibrations can be provided (SP1 and SP2). A 10' sample of the process material(s) must be provided for calibration purposes.

8.31 To Set DTMX for Special Calibration #1 (SP1)


1. Set Material Rigidity Selector to "TEX"
2. Set Field Calibration Adjustment to "SP"


8.32 To Set DTMX for Special Calibration #2 (SP2)

1. Set Material Rigidity Selector to "WIRE"
2. Set Field Calibration Adjustment to "SP"

9.00 GENERAL NOTES

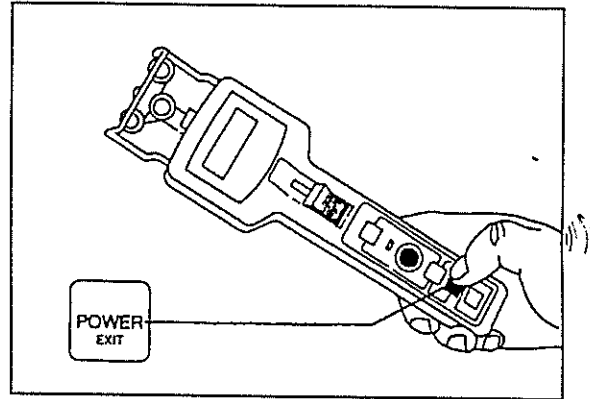
9.10 Turning Power On/Off

Turn Power On: Press  key

Turn Power Off: Press and the  key for five (5) seconds

Note: DTMX will power off automatically after 120 seconds of inactivity, except for the following instances:

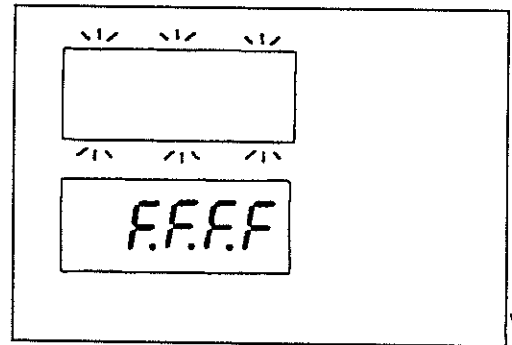
- Memory Mode configured for Standard - NAPO (No Auto Power Off)
- When AC Adapter is used
- While logging data in Continuous Data Logging Memory Mode (unit will power off when memory is full)
- While downloading data



9.20 LCD Display Indications and Codes

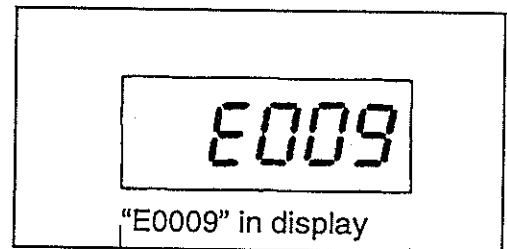
9.21 Over Range Display

When a displayed value is flashing on & off, this indicates that this reading is higher than the maximum range of the unit. The accuracy of the flashing value is not guaranteed. When all F's are displayed, this indicates that the current value greatly exceeds the maximum range of the unit.



9.22 EProm Error

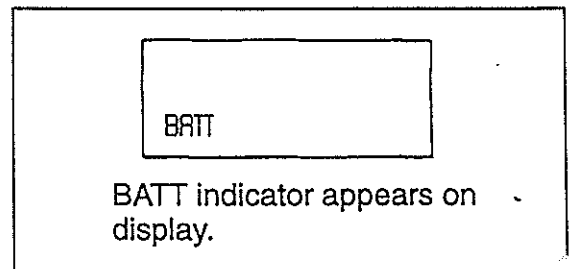
When this code is displayed, the EProm is not responding properly. Try the following steps to clear the problem. If code will not clear, contact factory:



1. Turn power off and then on again. Try this a few times.

9.23 Low Battery

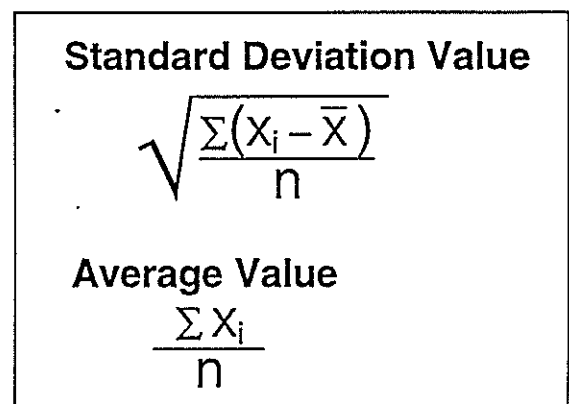
When the BATT indicator appears on the display, the batteries are low. If data is stored in memory, download it before replacing batteries as the data will be lost when the batteries are removed.



9.30 Standard Deviation & Average Formulas

The formula indicated is used to calculate the Standard Deviations & Average of all the data stored in the Extended Memory when the DTMX is configured for:

- On-Demand Data Logging Mode
- Continuous Data Logging Mode



SPECIFICATIONS

※Measuring unit : N, cN(daN), lb may be ordered optionally.

MODEL	DTM _X ^B -0.2	DTM _X ^B -0.5	DTM _X ^B -1	DTM _X ^B -2	DTM _X ^B -2.5B	DTM _X ^B -5B	DTM _X ^B -10B	DTM _X ^B -20B
Measuring range	0.0~200gf	1.0~500.0gf	100~1000gf	200~2000gf	250~2500gf	500~5000gf	1.00~10.00kgf	2.00~20.00kgf
String	1000deniel or smaller (or $\phi 0.15$ did.) or smaller	$\phi 0.05 \sim \phi 0.25$	$\phi 0.1 \sim \phi 0.4$	$\phi 0.3 \sim \phi 0.7$	$\phi 0.3 \sim \phi 0.7$	$\phi 0.5 \sim \phi 1.2$	$\phi 0.7 \sim \phi 1.4$	Customer's wires
Steel	$\phi 0.08$ or smaller	$\phi 0.01 \sim \phi 0.15$	$\phi 0.05 \sim \phi 0.25$	$\phi 0.15 \sim \phi 0.4$	$\phi 0.15 \sim \phi 0.4$	$\phi 0.3 \sim \phi 0.7$	$\phi 0.4 \sim \phi 0.8$	
Copper	$\phi 0.15$ or smaller	$\phi 0.05 \sim \phi 0.25$	$\phi 0.1 \sim \phi 0.4$	$\phi 0.3 \sim \phi 0.6$	$\phi 0.3 \sim \phi 0.6$	$\phi 0.4 \sim \phi 1.0$	$\phi 0.7 \sim \phi 1.2$	
Roller span	38mm				100mm			150mm*200mm
Accuracy	$\pm 1\%$ F.S.			$\pm 1.5\%$ F.S.				
Update time	0.5,1,2,4 sec. Selectable							
Memory	DTMB.....Last, Max., Min.,peak readings							
	DTMX.....Last, Max.,Min.,peak, 100 readings.							
Max. speed	1000m/min.							
Field adjustment	Max. $\pm 10.5\%$ of reading/notch $\pm 1.5\%$							
Display	4 digit large LCD(Character height 11.5mm)							
Output signal (DTMX only)	Analog output	0~1VDC(0~Ratings), (D/A output, Transfer time Approx.16m sec 3000 bit						
	Digital output	RS-232C or Digimatic output change-over system						
Dimensions	(W)76X(D)48X(L)275mm							
Wire guide	65mm							
Weight	Approx. 650g				Approx. 700g			
Power	UM3X4 (Alkaline battery:Continuous 20 hours. AC Adaptor (Option for overseas only)							
Operating temperature	0~45°C 90%RH or less							
Accessories	Alkaline batteries (4 pcs.) Carrying case (1 pce.)							
Major applications	<ul style="list-style-type: none"> Elastic string Gold & Silver metal string of 0.15 or smaller Coated optical fibre Synthetic fibre wire winder 	<ul style="list-style-type: none"> Optical fibre binder Carbon fibre binder Copper wire binder Steel wire binder 	<ul style="list-style-type: none"> Alameda fibre Film for capacitor Food film Brass wire of up to 0.3 dia. Copper coil Magnetic tape 	<ul style="list-style-type: none"> Carbon fibre Steel wire of up to 0.1 dia. Copper filament of W20X0.1t. Tire cable 	<ul style="list-style-type: none"> Material of small bending angle. Steel wire for OA (Copying machine printer, etc) 	<ul style="list-style-type: none"> Carbon fibre Roll scale (10mm width X 0.05 thide) 	<ul style="list-style-type: none"> Tungsten wire of 0.8mm dia. or smaller. Flat and timing belt of up to 15mm width 	<ul style="list-style-type: none"> Customers wires

Note 1) Shimpo standard calibration wire is Nylon tegus string-for finishing, steel wire - SUS 304 (Hardness Hv531~541), Copper wire-tin coated wire (Hardness Hv 69~82).
 Note 2) For materials which vibrates or deforms(such as rubber)accuracy may not be guaranteed.
 Note 3) Care and attention should be taken-operating in special conditions.

- Specifications for RS-232C output SIGNAL.
 Baud rate : 4800BPS • Parity : None • Stop bit : 2 bit
 Data bit : 8 bit • Indent code : CR+LF
 Sending out control by inputing CTS.
 Signal pending out is permitted or prohibited.

SPECIAL SPECIFICATIONS

- CALIBRATION FOR OTHER THAN WIRE MATERIALS;
TAPE, FILM.

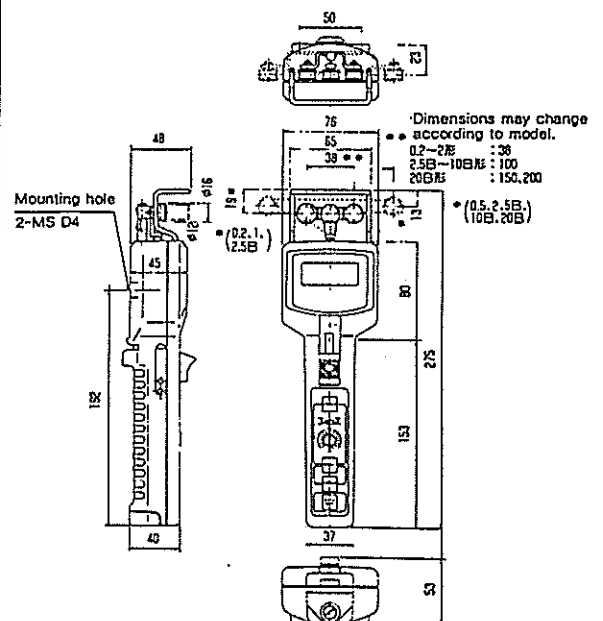
For other material than wires, flat rollers as shown can be built in and special calibration can be provided at factory.



- NO WIRE GUIDE

Please specify if wire guide is not necessary.

DIMENSIONS



Manufactured by

NIDEC-SHIMPO CORPORATION

338 Tonoshiro-cho, Kuze, Minami-ku, Kyoto, Japan

Phone:Kyoto (075)934-8255

Telex:5429903 SHIMPO J FAX:(075)934-4898