

# Instruction Manual

Valid as of: 01.06.2017 • Please keep the manual for future reference!



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## **1 Warranty and liability**

In principle, the supply of the device is subject to our “General Conditions of Sale and Delivery.” These have been provided to the operating company on conclusion of the contract, at the latest.

Warranty:

- SCHMIDT tension meters are warranted for 12 months.

Parts subject to wear, electronic components and measuring springs are not covered by the warranty. No warranty or liability will be accepted for bodily injury or property damage resulting from one or several of the following causes:

- Misuse or abuse of the device.
- Improper mounting, commissioning, operation and maintenance of the device (e.g. verification interval).
- Operation of the device if any safeguards are defective or if any safety and protection precautions are not properly installed or not operative.
- Failure to comply with the notices in the Operating Instructions regarding transport, storage, mounting, commissioning, operation, maintenance and setup of the device.
- Any unauthorized structural alteration of the device.
- Insufficient inspection of device components that are subject to wear.
- Opening the device or improper repair work.
- Disasters caused by the effects of foreign objects or by force majeure.

### **1.1 Notices within the operating instructions**

The fundamental prerequisite for the safe handling of this device and its troublefree operation is the knowledge of the basic safety notices and safety instructions.

These Operating Instructions contain the most important notices for the safe operation of the device.

These Operating Instructions, in particular the safety notices, must be observed by any person who works with the device. In addition, the local valid rules and regulations for the prevention of accidents must be complied with.

The representations within the Operating Instructions are not true to scale.

The dimensions given are not binding.

General indications of direction, such as FRONT, REAR, RIGHT, LEFT apply when viewing the front of the device.

### **1.2 Responsibilities of the operating company**

In compliance with the EC Directive 89/655/EEC, the operating company agrees to only permit persons to work with the device who:

- are familiar with the basic regulations on industrial safety and accident prevention and who have been trained in handling the device.
- have read and understood the chapter on safety and the warning notices in these Operating Instructions and have confirmed this with their signatures.
- are examined regularly on their safe and conscientious working method.

### **1.3 Responsibilities of the personnel**

All persons who work with the device agree to perform the following duties before starting work:

- to observe the basic regulations on industrial safety and accident prevention.
- to read the chapter on safety and the warning notices in these Operating Instructions and to confirm with their signatures that they have understood them.

#### 1.4 Informal safety measures

The Operating Instructions must always be kept on hand where the device is operated. Apart from the Operating Instructions, the generally and locally valid regulations on accident prevention and environmental protection must be provided and complied with.

#### 1.5 Training of the personnel

Only trained and instructed personnel is permitted to work with the device. The responsibilities of the personnel must be clearly defined for mounting, commissioning, operation, setup, maintenance, and repair. Trainees may only work with the device under the supervision of experienced personnel.

#### 1.6 Intended use

The device is intended exclusively to be used as a tension meter. Any other use or any use exceeding this intention will be regarded as misuse. Under no circumstances shall HANS SCHMIDT & Co GmbH be held liable for damage resulting from misuse.

The intended use also includes:

- Complying with all notices included in the Operating Instructions and observing all inspection and maintenance works.

#### 1.7 Dangers in handling the device

The device was designed according to the state of the art and the approved safety standards. Nevertheless, its use may cause serious or fatal injury to the user or third persons, and/or an impairment of the device or of other material assets.

The device may only be applied:

- For its intended use in a faultless condition with regard to the safety requirements.
- Malfunctions that could impair safety must be remedied immediately.
- Personal protective equipment must be used according to the EC Directive 89/686/EEC.



**The device must not be operated in potential explosive areas and must not come into contact with aggressive substances.**

#### 1.8 Copyright

The copyright on these Operating Instructions remains with the company HANS SCHMIDT & Co GmbH.

These Operating Instructions are intended for the operating company and its personnel only. They contain instructions and notices that may only be reproduced on the prior written permission of

HANS SCHMIDT & Co GmbH

and under indication of the complete reference data.

Violations will be prosecuted.

#### 1.9 Declaration of conformity, RoHs II and WEEE registration

In compliance with the EU Directives 2014/30/EU and 2011/65/EU



**HANS SCHMIDT & CO GmbH is registered in compliance with the German Electrical and Electronic Equipment Act (ElektroG) under WEEE Reg. No. DE 48092317.**

## 2 Available models

### 2.1 General Information

**1** These Operating Instructions refer to the DTS model of the DT Series; they are also applicable to the following models: DTSEB, DTSE, DTSF und DTSL.

The individual models of the DT Series are also available with the following modifications (customized versions):

- Special tension ranges
- Customized measuring head width for applications with limited access space
- Customized distance between the two outside guide rollers to minimize deflection of fragile material

#### 2.1.1 Available DTS models

Model	Tension Ranges cN	*Measuring Head Width mm	**SCHMIDT Calibration Material 1 (Polyamide (PA) Monofilament)	***Material Thickness Compensator Included
DTS-200	0.2 - 200.0	66	0.12 mm Ø	
DTS-500	0.5 - 500.0	66	0.12 + 0.20 mm Ø	yes
DTS-1000	10 - 1000	66	0.20 + 0.40 mm Ø	yes
DTS-2000	20 - 2000	66	0.40 + 0.70 mm Ø	yes
DTS-2500	25 - 2500	116	0.40 + 0.70 mm Ø	yes
DTS-4000	40 - 4000	66	0.50 + 0.80 mm Ø	yes
DTS-5000	50 - 5000	116	0.60 + 1.00 mm Ø	yes
DTS-10K	0.1 - 10.00 daN	116	0.80 + 1.40 mm Ø	yes
DTS-20K	0.2 - 20.00 daN	166	1.20 + 1.80 mm Ø	yes
DTS-30K	0.3 - 30.00 daN	216	1.40 + 2.00 mm Ø	yes
DTS-50K	0.5 - 50.00 daN	216	steel rope 1.5 mm Ø (7 x 7 x 0.15)	
DTS-60K-V1	0.6 - 60.00 daN	280	steel rope 2.0 mm Ø (7 x 7 x 0.30)	

International unit of tensile force: 1 cN = 1.02 g = 0.01 N, 1 daN = 1.02 kg = 10.0 N

\* Depending on model, either width of filament guide or outer distance between outside guide rollers.

\*\* Suitable for 95 % of all applications. PA = Polyamide Monofilament. If the material to be measured differs significant from the SCHMIDT calibration material in diameter, rigidity, shape, etc., we recommend calibration using customer supplied material. Instruments with calibration on customer sample are not adjusted and calibrated on material 1.

### 2.1.1 Available DTS models



Model	Tension Range cN	Textile Industry Applications	Wire Industry Applications (Copper Wire)
DTS-200	0.2 - 200.0	max. 200 tex	max. 0.15 mm Ø
DTS-500	0.5 - 500.0	max. 500 tex	0.05 - 0.25 mm Ø
DTS-1000	10 - 1000	max. 1000 tex	0.10 - 0.40 mm Ø
DTS-2000	20 - 2000	max. 2000 tex	0.30 - 0.60 mm Ø
DTS-2500	25 - 2500	max. 2500 tex	0.30 - 0.70 mm Ø
DTS-4000	40 - 4000	max. 4000 tex	0.35 - 0.90 mm Ø
DTS-5000	50 - 5000	max. 5000 tex	0.40 - 1.00 mm Ø
DTS-10K	0.1 - 10.00 daN	max. 10000 tex	0.70 - 1.40 mm Ø
DTS-20K	0.2 - 20.00 daN	max. 20000 tex	1.00 - 2.00 mm Ø
DTS-30K	0.3 - 30.00 daN	max. 30000 tex	1.20 - 2.50 mm Ø
DTS-50K	0.5 - 50.00 daN	max. 50000 tex	1.40 - 3.00 mm Ø
DTS-60K-V1	0.6 - 60.00 daN	max. 60000 tex	1.80 - 3.50 mm Ø

Guide Rollers:

V-grooved	Line Speed max. m/min	Roller Material
<b>Standard</b>	2000	Hard-coated aluminium
Code <b>K</b>	3500	Hard-coated aluminium
Code <b>H</b>	5000	Plasma-coated aluminium
Code <b>T</b>	1000	Plastic (POM) black
Code <b>W</b>	1000	Nickel-plated steel
Code <b>ST</b>	1000	Hardened steel
Code <b>B</b>	1000	Tempered steel for measuring tire cord
Code <b>CE2</b>	1000	ceramic-coated aluminium
<b>Asymmetrical groove</b> Code <b>ASY</b>	1000	Hard-coated aluminium (not for DTS-200)
Code <b>ASYB</b>	1000	Tempered steel for measuring tire cord (not for DTS-200)
Code <b>V1</b>	1000	Hard-coated aluminium (only for DTS-60K-V1)
<b>U-grooved</b> Code <b>U</b>	2000	Hard-coated aluminium (not for DTS-200)

## 2.1.2 Available DTSL models



Model	Tension Ranges cN	*Measuring Head Width mm	**SCHMIDT Calibration
DTSL-2500	150 - 2500	185	With convenient material for each roller design or customer supplied samples
DTSL-5000	250 - 5000	185	
DTSL-10K	1 - 10.00 daN	235	
DTSL-20K	2 - 20.00 daN	235	
DTSL-50K-R4	5 - 50.00 daN	226	With convenient or customer supplied sample
DTSL-50K-R5	5 - 50.00 daN	226	
DTSL-60K-R4	6 - 60.00 daN	276	
DTSL-60K-R5	6 - 60.00 daN	276	

\* Outer distance between outside guide rollers.

\*\* The model DTSL do not include a material thickness compensator

### DTSL Guide Rollers:

V-Groove	Line Speed max. m/min	Roller Material
<b>Standard</b>	4000	Hardened steel
<b>U-Groove</b> Code <b>R1</b>	4000	Hard chrome-plated steel (radius 5)
Code <b>R4</b>	1000	Hardened steel (Ø 8 - 11 mm) only DTSL-50K-R4 and DTSL-60K-R4
Code <b>R5</b>	1000	Hardened steel (Ø 12 - 15 mm) only DTSL-50K-R5 and DTSL-60K-R5
<b>flat</b> Code <b>B6</b>	2000	Hardened steel, width 6 mm
Code <b>B10</b>	2000	Hardened steel, width 10 mm

## 2.1.3 Available DTSF models



Model	Tension Ranges cN	*Measuring Head Width mm	**SCHMIDT Calibration
DTSF-200	1 - 200.0	140	0.12 mm Ø
DTSF-500	1 - 500.0	140	0.20 mm Ø
DTSF-1000	10 - 1000	140	0.30 mm Ø
DTSF-2000	20 - 2000	140	0.50 mm Ø

\* Outer distance between outside guide rollers.

\*\* Suitable for 95 % of applications. PA = Polyamide Monofilament  
The model DTSF do not include a material thickness compensator

### DTSF Guide Rollers:

V-Groove	Line Speed max. m/min	Roller Material
<b>Standard</b>	4000	Hard-coated aluminium
Code <b>T</b>	4000	Plastic (PVC red)



## 2.1.4 Available DTSE models



Model	Tension Ranges cN	*Measuring Head Width mm	**SCHMIDT Calibration
DTSE-200	1 - 200	36	0.12 mm Ø
DTSE-500	1 - 500	36	0.20 mm Ø
DTSE-1000	10 - 1000	36	0.30 mm Ø
DTSE-2000	20 - 2000	36	0.50 mm Ø

\* Width of bracket assembly.

\*\* Suitable for 95 % of applications. PA = Polyamide Monofilament  
The model DTSE do not include a material thickness compensator

### DTSE Guide Rollers:

V-Groove	Line Speed max. m/min	Roller Material
Standard	900	Hard-coated aluminium
Code K	2000	Hard-coated aluminium

## 2.1.5 Available DTSB models



Model	Tension Ranges cN	*Measuring Head Width mm	Roller Widths mm
DTSB-500	5 - 500	55	7, 10, 15, 20
DTSB-1000	50 - 1000	55	7, 10, 15, 20, 30,41
DTSB-2000	100 - 2000	55	7, 10, 15, 20, 30,41
DTSB-2500	150 - 2500	117	7, 10, 15, 20, 30,41
DTSB-4000	200 - 4000	55	7, 10, 15, 20, 30,41
DTSB-5000	250 - 5000	117	7, 10, 15, 20, 30,41
DTSB-10K	0.5 - 10 daN	117	7, 10, 15, 20, 30
DTSB-20K	1 - 20 daN	167	7, 10, 15, 20, 30
DTSB-30K	1.5 - 30 daN	217	7, 10, 15
DTSB-50K	2.5 - 50 daN	217	7, 10

\* Outer distance between outside guide rollers.

SCHMIDT calibration - according to measuring range and roller width - with a textile ribbon or thin tape.

The model DTSB do not include a material thickness compensator

### DTSB Guide Rollers:

V-Groove	Line Speed [m/min ... max.]	Roller Material
Standard	1000	Hard-coated aluminium

## 2.2 Specifications

<b>Calibration:</b>	According SCHMIDT factory procedure
<b>Accuracy:</b>	For PA from 5 % up to 100 % full scale: $\pm 0.5$ % full scale $\pm 1$ digit remaining tension range and other calibration materials: $\pm 3$ % full scale $\pm 1$ digit
<b>Accuracy DTSL:</b>	From 5 % up to 100 % full scale: $\pm 3$ % full scale $\pm 1$ digit remaining tension range, device with tension range 50 and 60 daN and customer supplied material: $\pm 5$ % full scale $\pm 1$ digit
<b>Memory for material curves:</b>	1 for SCHMIDT calibration plus 4 for customized calibrations
<b>Measuring units:</b>	Force (switchable): cN, daN, g, kg, N, lb Thickness (switchable): mm, inch
<b>Overrange:</b>	Approx. 10 % full scale, full scale, without accuracy guarantee
<b>Overload protection:</b>	100 % full scale
<b>Measuring principle:</b>	Strain gauge bridge
<b>Measuring roller deflection:</b>	Max. 0.2 mm
<b>Signal processing:</b>	digital
<b>Measuring frequency:</b>	Max. 1 kHz (1000 measurements/sec), internal 8 kHz
<b>Display:</b>	Graphic LCD display 3 different displays: numeric, numeric with bargraph, X-Y-diagramm (time-tension)
<b>Display update time:</b>	2/sec (Display update)
<b>Memory:</b>	MIN, MAX, PEAK, AVG and LAST.
<b>Damping:</b>	Adjustable electronic damping (averaging)
<b>Cal. Adjustment:</b>	$\pm 10$ steps in 1 % increments
<b>Thickness compensation:</b>	Max. 2.5 mm (not available for all models)
<b>Auto power off:</b>	Approx. 3 minutes of non-use
<b>Signal processing:</b>	16 bit A/D
<b>Temperature coefficient:</b>	Gain: less than $\pm 0.01$ % full scale /°C at 25° C Zero point: better than $\pm 0.03$ % full scale /°C at 25° C
<b>Temperature range:</b>	10 - 45° C
<b>Air humidity:</b>	85 % RH, max.
<b>Power supply:</b>	LiPo Accumulator (approx. 40 h continuous use, charging time approx. 3 1/2 h), USB AC adapter 100 - 240 V AC, adapters (EU/USA/UK/AUS-NZ)
<b>Housing material:</b>	Die-cast aluminium
<b>Housing dimensions:</b>	265 mm x 78.5 mm x 46 mm (L x W x H)
<b>Weight:</b>	Up to DTS-50K approx. 875 g / 1550 g
(net / gross)	DTS-60K-V1 approx. 1040 g / 2700 g

## 2.3 Connecting the tension meter



The requirements of the CE specification are only complied with if the tension meter is equipped and operated with equipment supplied by HANS SCHMIDT & Co GmbH. Certification to the CE specification does not extend to, and shall be invalid for any other combination. For damage resulting thereby we assume no liability.

## 2.4 Delivery includes

- 1 Tension meter with accumulator
- 1 USB AC adapter with 4 adapters (EU/US/UK/AUS-NZ)
- 1 USB cable
- 1 Certificate of compliance with the order 2.1 under EN 10204
- 1 Operating Instructions
- 1 Carrying case

## 2.5 Unpacking

Unpack the tension meter and inspect it for any shipping damage. Notices of defect must be announced immediately, in writing, at the latest within 7 days on receipt of the goods.

## 3 Operations

### 3.1 Notes before starting measurement



**Have you read and understood the Operating Instructions, in particular Chapter 1 “Basic Safety Notices” ?**

**You are not permitted to operate the tension meter before doing so.**

**Before working with the instrument you must put on your personal protective clothing, if necessary. For example, eye protectors, gloves, etc.  
To avoid damage do not move the center roller by hand.**

**Tensions that exceed the tension range of the instrument by more than 100 % may cause permanent damage to the measuring spring and must be avoided under any circumstances.**



**The ID plate with the CE mark and the serial number as well as the calibration label (optional) are provided on the backside of the instrument, the SCHMIDT Quality Seal is provided on the surface.**

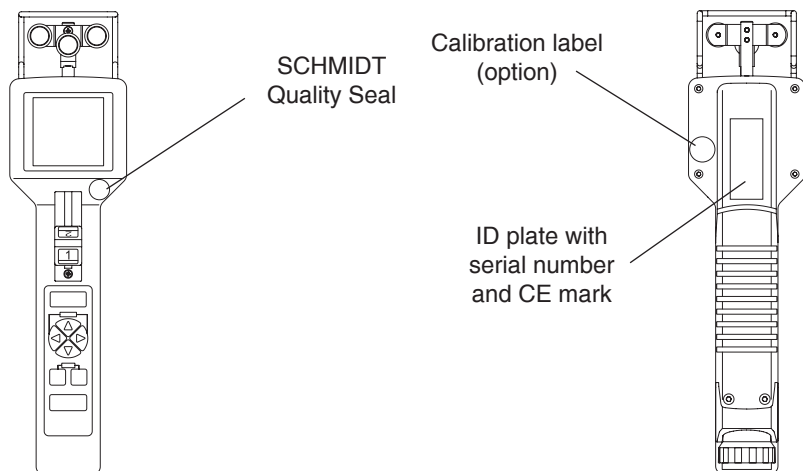
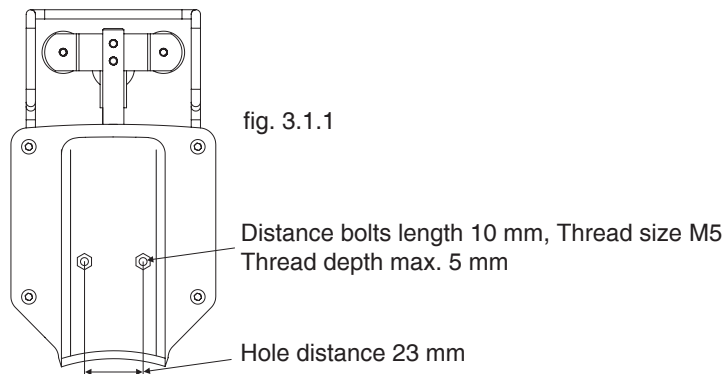


fig. 3.1

### 3.1.1 Stationary mounting of the unit - optional

(Code MH - with distance bolts)

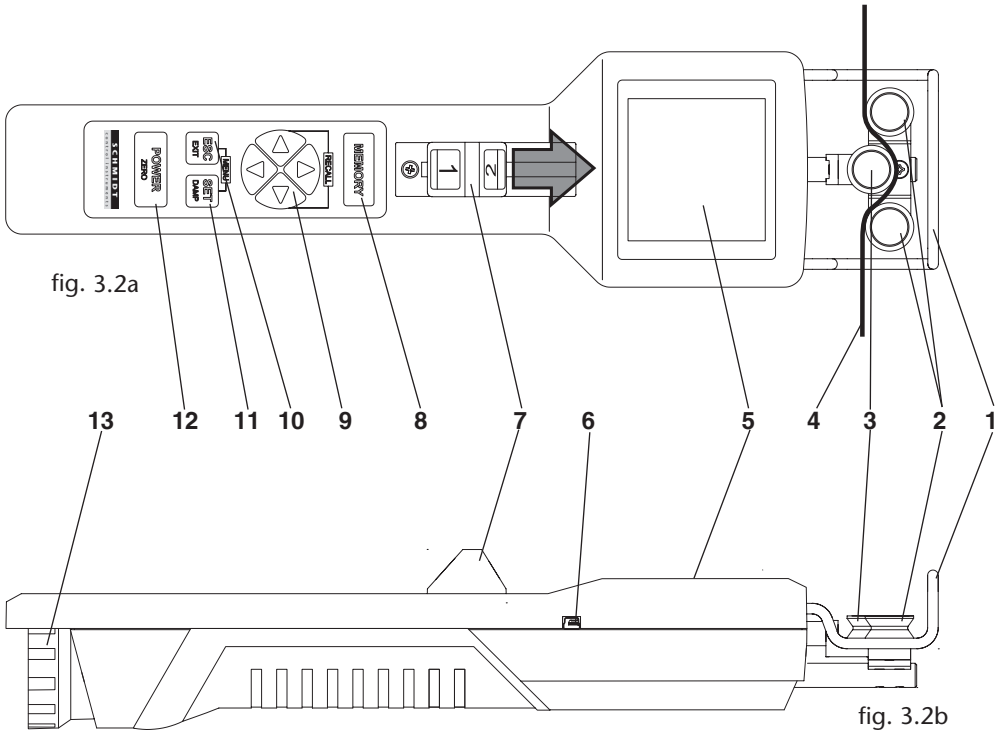


Optionally, the tension meter can be delivered with distance bolts for stationary use. The dimensions are given in Fig. 3.1.1. The distance bolts can be removed.



**Only factory-made threaded holes for the distance bolts are permissible (otherwise, we cannot accept any warranty).**

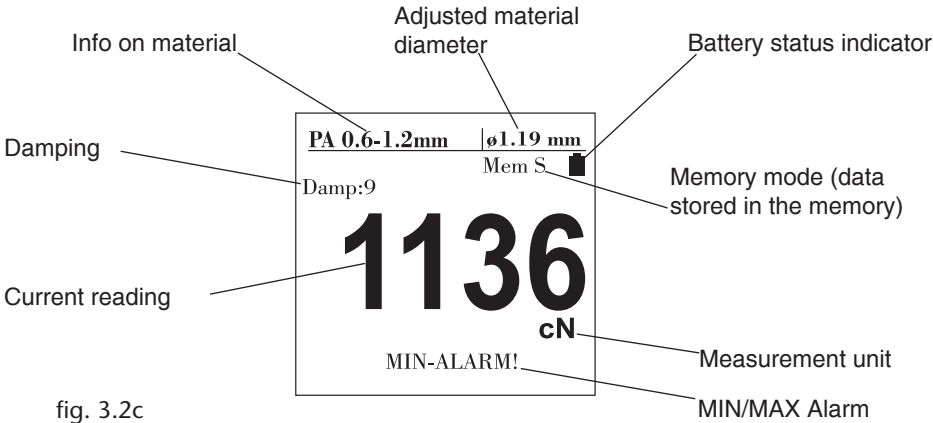
### 3.2 Operating and display elements



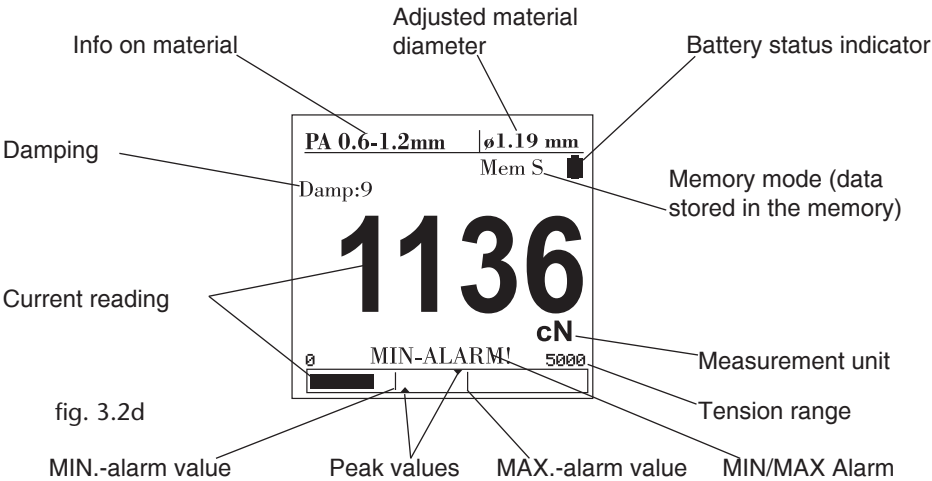
- |   |                                 |    |   |
|---|---------------------------------|----|---|
| 1 | Filament guide                  | 8  | „MEMORY“ key  |
| 2 | Guide rollers                   | 9  | Arrow key   |
| 3 | Measuring roller                | 10 | „ESC / EXIT“ key  |
| 4 | Material to be measured         | 11 | „SET / DAMP“ key  |
| 5 | Display                         | 12 | „POWER / ZERO“ key  |
| 6 | USB interface / power connector | 13 | Adjustment wheel for material thickness compensator (subject to model or measuring range - otherwise a cover cap is provided) |
| 7 | Thumbpiece                      |    |   |

3.2 Operating and display elements

Numeric display

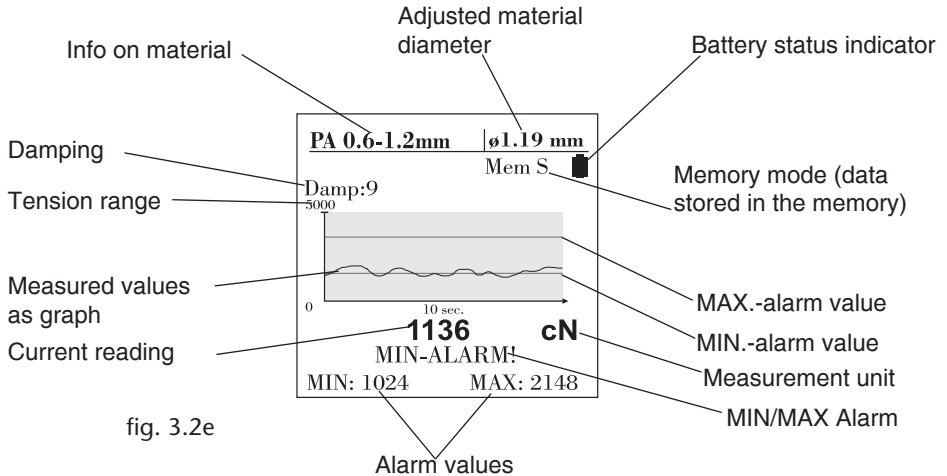


Display with bargraph



## 3.2 Operating and display elements

### Graphic display



•  
1

The Y-axis can be scaled with the ▲ and ▼ buttons.


**3 Scalings:** total measuring range, set limits range plus approx. 1/3 of MAX.-alarm value and minus approx. 1/3 of MIN.-alarm value, set limits range.

The scaling is only possible, if limit values are entered and the damping is not activated.

With the ◀ or ▶ button the X-axis can be scaled. The setting range is 0.5 to 60 sec.

The scaling can also be changed during the measurement, whereby values already displayed are deleted when the X-axis is changed.

### 3.3 Setup

The tension meter is delivered with a built-in rechargeable LiPo battery, which has been charged at the factory. The tension meter can only be switched on if the battery is still working, i.e. if the battery has enough charge. If the instrument does not power up or if the battery level indicator shows only one bar  after power-up (Chapter 3.3.2), the battery needs to be recharged.



**To ensure maximum battery life, avoid discharging it completely or charging it frequently for short periods. The battery should not be stored for an extended period of time when empty. After a maximum storage period of one year, the battery has to be recharged.**

#### 3.3.1 Charging the battery

**The battery can only be charged at a temperature between +5 °C and +45 °C.**



**Before you connect the AC adapter, verify that the supply voltage is correct (100 V - 240 V).**

**HANS SCHMIDT & Co. GmbH provides no warranty or liability for any damage resulting from the use of AC adapters from other manufacturers.**

To charge the battery, remove the rubber stopper from the USB interface. Then connect the cable of the AC adapter to the USB output.

The battery can also be charged by connecting the USB cable to a PC.

When the battery is fully charged, the battery level indicator will show 5 bars .

The charging time is approx. 3 ½ hours (using the AC adapter).




**Battery overcharging is not possible**

#### 3.3.2 Switching the tension meter on

Press and hold the  button (for approx. 1 sec.) until the DISPLAY shows the measuring range, the software and hardware versions, e.g. E 1.0, and then "0".

During startup, the tension meter performs an automatic zero adjustment. If the tension meter does not display zero, perform a manual zero adjustment procedure (see chapter 3.5.2).

Holding the  button makes the display freeze so that you can read the measuring range and the software and hardware versions.



**While switch-on the tension meter, make sure not to move it. Otherwise, the automatic zero adjustment will be faulty.**

#### 3.3.3 Switching the tension meter off

**Automatic switch-off (if enabled):**

- After an idle period of 3 minutes, the tension meter switches off.

**Manual switch-off:**

- Press and hold the  button for 5 seconds.



### 3.4 Tension meter settings

Thumbpiece positions

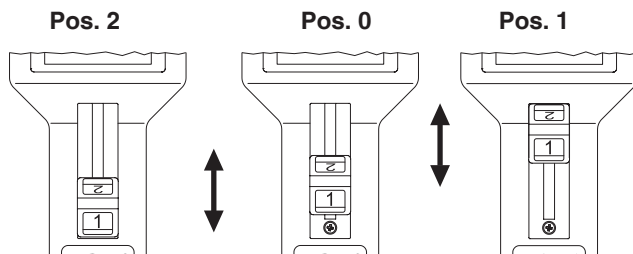


fig. 3.4

2 = Measurement position

0 = Adjustment position

1 = Threading position (guide rollers in their forward position)



**Menu settings can be changed with the thumbpiece in Pos. 0 (Adjustment position). To perform measurements the thumbpiece must be in the measurement position (2).**

#### Tension meter settings

- Press the **ESC** and **SET** buttons simultaneously to access the main menu.
- The **▲** and **▼** buttons can be used to select the various menu items of the main menu, the submenus and the settings menus.
- Press the **►** button to open the selected menu; by pressing the **◄** or **ESC** button you can close the menu without saving changes.
- In menus with multi-digit fields (e.g. date) use the **◄** and **►** buttons to move forward and backward between digits.
- Press the **SET** button to save the settings and exit the settings menu or press the **ESC** button to exit the current menu without saving.
- To exit the main menu press the **ESC** button.

### 3.4 Tension meter settings

Main Menu	Submenu	Settings Menu	Description
Material	[1] to [11]		Chapter 3.4.1 Material-Set-up
Cal. Adjustment	—	[- 10 %] - [+ 10 %]	Chapter 3.5.6
Display Chapter 3.2	—	[numeric] <b>[Bargraph]</b> [Graphic]	<ul style="list-style-type: none"> <li>Measured value displayed as number and alarm monitoring</li> <li>Measured value displayed as number, bar graph trend display and alarm monitoring</li> <li>Measured value displayed as graphical trend, measured value/limit values as numbers</li> </ul>
Alarms	—	<b>[ON]</b> , [OFF]	<p>Activate/deactivate the alarm for all calibrations.</p> <p>The alarm of a material characteristic is only active if the [Alarm] menu item in Material Setup is activated as well.</p>
Peak Display		[ON], <b>[OFF]</b>	Activate/deactivate the peak values in the bar graph display.
Settings	Tension Unit	<b>[cN]</b> , [N], [lb], [g], [kg]	Set the measurement unit. The available units may vary depending on the measuring range of the device.
	Diameter Unit	<b>[mm]</b> , [inch]	To select between mm and inch.
	Contrast	[0] - [10]	To adjust the contrast
	Backlight	[ON], [OFF], <b>[AUTO]</b>	Switch the display light on or off. With the AUTO setting, the light switches on and off automatically depending on the ambient light.
	Brightness	[1], <b>[2]</b> , [3]	Set the display brightness.
	Screen Rotation	[0°], [90°], [180°]; [270°], <b>[AUTO]</b>	To set the display orientation to be fixed or to automatically adapt to the current orientation of the device.
	Auto Power Off	<b>[ON]</b> , [OFF]	Toggle the „Auto Power off“ function on and off.
	Language	<b>[EN]</b> , [DE]	Select between the english and german user language.
	Date/Time	[Time], [Date], [Timeformat]	Set the time, date, and date/time format.
	Password	[0000] - [9999]	Chapter 3.4.2
	Factory reset		Reset to the factory settings.

Factory settings are illustrated bold

### 3.4.1 Material menu

In the material menu you can make the settings for the selected material characteristics and perform the calibration. To perform the calibration, the weights for the selected calibration points must be available.

Material Setup	Submenu	Settings Menu	Description
No. of the characteristic material curve 1 - 5	—	[character], [numbers], [special character]	To enter a name for the selected material characteristic.
Damping	—	[1] - [9]; <b>[5]</b>	Chapter 3.5.4
Alarms	—	<b>[ON]</b> , [OFF]	To activate or deactivate the alarm function for the material characteristic.
High limit	—	[0000] - [9999]	If the set limit value is exceeded, the display reads MAX-ALARM.
Low limit	—	[0000] - [9999]	If the value falls below the set limit value, the display reads MIN-ALARM.
Calibration Chapter 3.6.1	Start		To perform a calibration, follow the instructions shown on the display.
	Cal. Points	between [10 %] and [100 %] of the tension range	Set three calibration points for which a calibration should be performed.
	Weights	<b>[cN/daN]</b> [g/kg]	Set the unit of the calibration weights used.

Factory settings are illustrated bold

### 3.4.2 Password

By setting a password, you can block the access to some menu parts for unauthorized users:

0000 All menus are accessible.

0001 - 0999 The Material, Cal. Adjustment, Settings, and Memory Settings menus are locked

1000 - 9999 The entire menu is locked.



**To apply a changed password, exit the main menu.**

**Entering 0000 as the password disables the password feature.**

**If you forgot the password, please contact HANS SCHMIDT & Co GmbH to request the master password. As an alternative, you can perform a factory reset. Please note, that in this case, you will lose any customer-defined calibrations.**

### 3.4.3 Factory reset

A factory reset resets the tension meter to its original manufacturer settings. This procedure will delete all settings, including any customer-defined material characteristics (calibrations); the factory calibration, however, will be kept.



**Customer calibrations will be deleted.**

## 3.5 Operation procedure

### Requirements:

- Switch the tension meter on (chapter 3.3)
- Define the required tension meter settings (chapter 3.4)
- Select the desired material characteristic (chapter 3.4.1)
- Set the material thickness compensator (chapter 3.5.1), if equipped
- Bring the tension meter into the desired measuring position and carry out a zero adjustment as described in chapter 3.5.2, if required.

### 3.5.1 Material thickness compensator

(only for devices with thumbwheel)

The 3-roller-system for tension measurement relies on the displacement of the middle roller (measuring roller) to give an indication of the line tension. As the material thickness changes, there will be a change in the tension reading, even when the line tension has not changed. To compensate for this effect, high-range instruments are usually equipped, as necessary, with a material thickness compensator, which automatically shifts the outer rollers. To adapt the tension meter to the diameter of the material to be measured, push the thumbpiece into the adjustment position "0" (chapter 3.5.3) and pull the thumbwheel of the material thickness compensator backward to the adjustment position (Fig. 3.5.1). Turn it clockwise or anti-clockwise until the desired diameter, such as  $\varnothing 0.26 \text{ mm}$ , appears in the upper right part of the display. Then push the thumbwheel of the material thickness compensator back to the measurement position (Fig. 3.5.1). If you set a diameter that has not been calibrated for the selected material characteristic, the set diameter is displayed with a black background color, e.g.  $\varnothing 0.26 \text{ mm}$ . The tension meter can be used anyhow, but please note, that depending on the material to be measured, slight deviations in the measured values might occur.

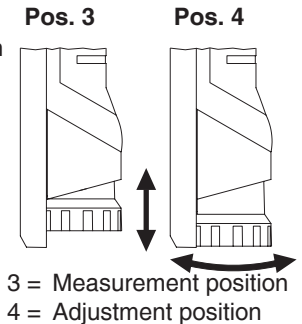


fig. 3.5.1



**If you rotate the thumbwheel while the thumbpiece is in position 2 (measuring position fig 3.4), the reading on the display will be updated, but the value will not be used by the instrument to determine the tension – false measurement!**

**The maximum material thickness you can set is 2.50 mm. Setting a higher diameter can damage the tension meter.**

### 3.5.2 Zero adjustment of the measurement position

Each time the measurement position is changed, the tension meter will automatically perform a zero adjustment.



**If the tension meter does not display zero in its measuring position, perform a manual zero adjustment procedure.**

**For this purpose, no material to be measured must have been inserted yet!**



#### **Requirements:**

- The tension meter has been switched on as described in chapter 3.3.2.

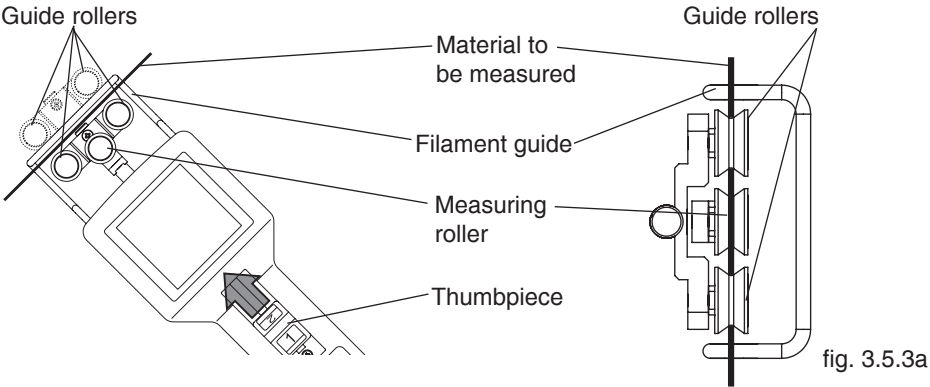
#### **To carry out zero adjustment:**

- Bring the tension meter into the desired measuring position and make sure not to move it.

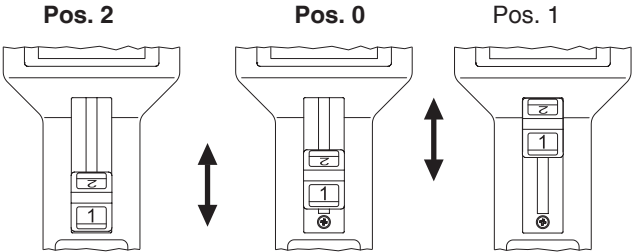
- Press the  button.

The DISPLAY momentarily shows  and then switches to .  
The tension meter is now adjusted to its new measuring position and ready to take measurements.

3.5.3 Inserting and removing material to be measured



Thumbpiece positions



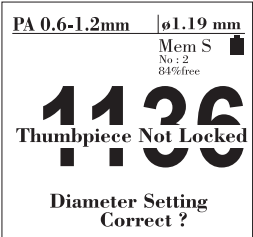
- 2 = Measurement position
- 0 = Adjustment position
- 1 = Thread in position (the guide rollers extend forward)

Inserting the material to be measured:

- Push the thumbpiece in the direction of the arrow into its threading position 1 (Fig 3.5.3a) until the outer guide rollers extend beyond the filament guide.
- Position the material to be measured into the tension meter in such a way that it contacts the Filamente guide and passes between the outer rollers and the middle measuring roller (see fig. 3.5.3a).
- **Slowly** move the thumbpiece back into the adjustment position (Fig. 3.5.3b). It is important to ensure that the material to be measured runs smoothly between the measuring roller and the guide rollers.
- Push the thumbpiece into the measuring position (2) (Fig 3.5.3b).
- The display shows the measured tension value.



If the thumbpiece is not in position 2, a corresponding message is issued on the display. If the thumbpiece is not locked, faulty measurements might result.



### 3.5.3 Inserting and removing material to be measured (cont.)



fig. 3.5.3d  
Numerical Display



fig. 3.5.3e  
Display with bargraph

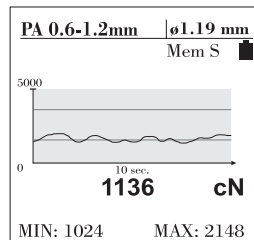


fig. 3.5.3f  
Graphical Display



Press the ▲ and ▼ button simultaneously to change the different display modes during the working mode.



**Do not let the thumbpiece snap back as this could affect the calibration and damage the instrument.**

**While measuring the thumbwheel of the material thickness compensator must be set to the measurement position, so that the material diameter is not altered inadvertently.**




**If you rotate the thumbwheel while the thumbpiece is in position 2 (measuring position), the reading on the display will be updated, but the value will not be used by the instrument to determine the tension – false measurement!**

#### **To remove the material to be measured:**

- Push the thumbpiece in the direction of the arrow into its threading position (1) (Fig 3.5.3b).
- Remove the material to be measured.
- **Slowly** set back the thumbpiece into the adjustment position (0) (Fig. 3.5.3b).

### 3.5.4 Damping

Feature to be used for tensions that vary strongly

In the Damping menu (chapter 3.4.1), you can specify separate damping factors for each material characteristic. Back in the display mode, press the  button to activate or deactivate the damping function. This is recommended if the displayed values vary strongly. Press the  button to increase the damping value or the  button to decrease it.

•  
1

**Changes made to the damping factor using the arrow keys are not saved permanently in the material characteristic. If you disable the damping feature or select a different material characteristic, the damping factor will be reset to the value originally saved for the material characteristic.**

The factory setting for the damping factor is 5. The average shown on the display is calculated as follows:

$$\frac{5 \text{ old measured values} + 4 \text{ new measured values}}{9}$$

Damping can be changed in 9 steps from 01 = low damping:

$$\frac{1 \text{ old measured value} + 8 \text{ new measured values}}{9}$$

to 9 = high damping:

$$\frac{8 \text{ old measured values} + 1 \text{ new measured value}}{9}$$

### 3.5.5 Using the alarm function

**Requirements:**

In the Material Setup menu, make sure that the MIN and MAX limit values have been set for each material characteristic.

The limit value alarm can be enabled in the main menu.




### 3.5.6 Cal. Adjustment

By performing a calibration adjustment, you can adjust a material characteristic calibrated for a particular material to a different material or diameter without creating a new material characteristic.

#### Requirements:

- Prepare the measuring setup as shown in Fig. 3.5.6a.
- Make sure that the thumbpiece is in the adjustment position (chapter 3.5.3).
- Set the material thickness as described in chapter 3.5.1.
- Select the desired material (chapter 3.4.1).
- Move the tension meter into the desired measuring position and carry out a zero adjustment, if required.

#### Adjusting:

- Select the „Cal. Adjustment“ menu item from the main menu (Fig. 3.5.6b)
  - Insert the material to be measured (chapter 3.5.3) and push the thumbpiece into the measuring position.
  - Press the ▲ or ▼ key to perform the calibration adjustment until the value on the display corresponds to the weight suspended to the material.
- The adjustment can be performed in 1 % steps within the range from +10 % to -10 %.
- Press the  button to save the determined value.

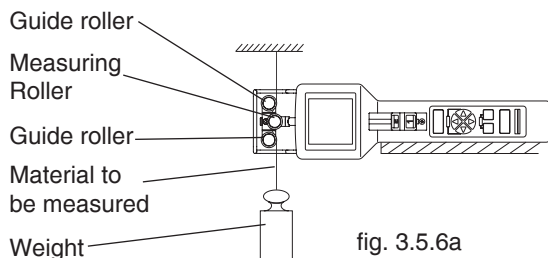


fig. 3.5.6a

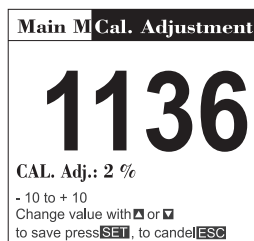


fig. 3.5.6b



**Please note that this is a general value. So determine it separately for each material characteristic and note it down for later reference. It is not possible to save it per material characteristic.**

**To disable calibration adjustment, reset the value to 0 % in the „Cal. Adjustment“ menu.**

### 3.5.7 Peak value

During a measurement cycle, the tension meter automatically calculates the Peak Minimum and Peak Maximum values. If these values should not be displayed in the bar graph or in the statistics, disable their display in the main menu. Regardless, the Peak values will be used and shown always in the software **Tension Inspect 3**.

3.6 Creating a material characteristic

The tension meter has been calibrated on material 1 according our SCHMIDT procedure for a vertical material path and cannot be deleted or overwritten. The the materials and diameters are given in chapter 2. Factory calibrations using customer supplied materials follow the same procedure. In this case, however, the calibration on Schmidt material 1 is omitted

1

**The material characteristics 1 has been preset in the factory and cannot be overwritten. For these material characteristic, you can only change the damping factor, the alarm function setting, and the limit values.**

3.6.1 Calibration procedure

Calibrations of the tension meter are performed according to the SCHMIDT factory procedure using weights that correspond to 10 %, 50 %, and 90 % of the measuring range. In 95 % of all industrial applications, the SCHMIDT calibration has been proven to provide the best results. In particular, it is suitable for comparative purposes. If the material to be measured differs significantly from the SCHMIDT calibration material in material type, diameter, rigidity, shape, etc., we recommend to perform a calibration using customer-supplied material. In addition to the two factory-preset materials, you can save up to 9 additional materials.

1

**The material thickness unit used for the calibration is the same as currently selected in the „Settings menu“.**  
**It is not possible to overwrite the factory calibrations.**

Calibration Units and Calibration Points

- You can select Newton or Kilogram as the unit of the calibration weights.
- For the calibration of the tension meter, three calibration weights are used. For example, if you select 10 %, 40 %, 70 % for the calibration, the weights must correspond to 10 %, 40 %, and 70 % of the measuring range.  
In this example, you need the following weights for the DTX-1000:  
Calibration in Newton: 100 cN, 400 cN, and 700 cN  
Calibration in Kilogram: 100 g, 400 g, and 700 g

1

**The measured values are displayed in the unit set in the „Settings“ menu, independent from the unit that was used to calibrate the material characteristic.**  
**So that they are available when you verify the calibration later or repeat the calibration after a factory reset.**

e. g.

Material to be measured	Unit	Calibration points	Ø 1	Ø 2
Steel wire	cN	10 %, 30 %, 50 %	0.4 mm	0.6 mm

### 3.6.1 Calibration procedure (cont.)

**Requirements:**

- The thumbpiece must be in the adjustment position (Fig. 3.5.3b).
- The material thickness compensator (if existing) must be set to the adjustment position (chapter 3.5.1)
- The unit for the material thickness must have been set (chapter 3.4)

**To perform the calibration procedure**

- Select a new material or edit an existing one (by re-entering the values) from the „material“ menu.
- Enter a designation (you can use the software supplied with the tension meter alternatively).

Vertical calibration (standard for SCHMIDT calibrations)

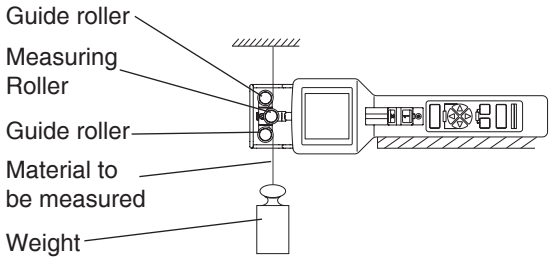


fig. 3.6.1

**i** While performing the calibration, the tension meter must be fixed in such a way that the material to be measured runs smoothly between the guide rollers and the measuring roller.

**i** The display gives detailed information on the calibration.

In the „Material“ menu, select Calibration.

Mat	Mat	Calibration
Start		
Cal. Points	: 10 40 70%	
Weight in	Newton	
Scroll with  or  to return press		

**Step 1:**

Set the calibration points and weights, e.g. in Newton using the calibration points 10 %, 50 %, and 90 % of full scale

Start: Select the Start menu item.

Alternative calibration points:

10 %, 40 %, 70 %	10 %, 30 %, 60 %
10 %, 30 %, 50 %	10 %, 20 %, 40 %
10 %, 40 %, 90 %	10 %, 60 %, 90 %
10 %, 60 %, 100 %	

We recommend to use the 10 %, 50 %, 90 % setting for an initial calibration. If the measured values are not accurate enough when you check the calibration, repeat the calibration using other calibration points.

We recommend that you align the middle of the tension range to be measured with the middle calibration point.

3.6.1 Calibration procedure (cont.)

Mai	Mat	Mat	Calibration
Diameter 1			
0.66 mm			
Adjust diameter to material thickness to save press <b>ESC</b> , to return <b>ESC</b>			

Step 2:  
Set the diameter  
This step is only required for tension meters with a material thickness compensator

Mai	Mat	Mat	Calibration
Zero point			
4472			
Place instrument to cal. pos., wait for stable readings to save press <b>ESC</b> , to return <b>ESC</b>			

Step 3:  
Perform a zero adjustment with the tension meter in its measuring position

Mai	Mat	Mat	Calibration
Point 1: 10% Diameter 1 Weight: 100 cN 4665			
Insert sample, hang weight 1 wait for stable readings to save press <b>ESC</b> , to return <b>ESC</b>			

Step 4:  
Calibrate calibration point 1  
Insert material to be measured

Mai	Mat	Mat	Calibration
Point 2: 40% Diameter 1 Weight: 400 cN 4783			
hang weight 2 wait for stable readings to save press <b>ESC</b> , to return <b>ESC</b>			

Step 5:  
Calibrate calibration point 2

Mai	Mat	Mat	Calibration
Point 3: 70% Diameter 1 Weight: 700 cN 5012			
hang weight 3 wait for stable readings to save press <b>ESC</b> , to return <b>ESC</b>			

Step 6:  
Calibrate calibration point 3

Mai	Mat	Mat	Calibration
ESC to save and exit SET to continue with second diameter			

Step 7:  
Exit the calibration process or calibrate a second diameter. In this case, continue with step 2.

1

By calibrating a second diameter, you can define a material thickness range to be used for the material, e.g. 0.1 - 0.3 mm.  
Therefore the tension meter can be used for a diameter range instead of a specific diameter only

Once you have completed the calibration, make sure to verify it as described in chapter 3.6.2. In case of a large deviation, repeat the calibration or select different calibration points.

### 3.6.2 Verifying the calibration

When verifying the calibration, make sure to select the same material, calibration position and calibration points as used for creating the associated material characteristic. Otherwise, the precision of the measurements will not be sufficient.

The tension meter has been calibrated on material 1 according our SCHMIDT procedure for a vertical material path and cannot be deleted or overwritten. The diameters and materials are given in chapter 2. Calibrations of the tension meter are performed according to the SCHMIDT factory procedure using weights that correspond to 10 %, 50 % and 90 % of the measuring range.

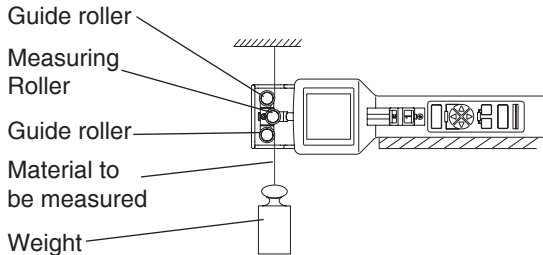


fig. 3.6.2

- Attach a weight vertically to the material to be measured that corresponds to the tension to be measured (make sure to select the correct unit). The weight must hang freely. (Always use a fresh portion of the material to be measured.)
- Insert the material as described in chapter 3.5.3.



**Do not let the thumbpiece snap back as this could affect the calibration and damage the instrument.**

- Before verifying the calibration, move the instrument slowly up and down to compensate for any mechanical friction losses and thus ensure repeatability of the measurements.
- The tension value shown on the display should be equal to the mass of the suspended weight.

If the verification of the calibration shows a deviation beyond the allowable tolerance so that reliable operation is no longer possible, the instrument needs to be re-calibrated or returned to the factory for repair.

## 3.7 Memory functions

You can store and display the statistics of one measuring series (last measured value, the average, the minimum and maximum measured values, the peaks, the standard deviation).

### 3.7.1 Save data

- Press the **MEMORY** button to start recording the measured values.
- While recording is in process, “Rec S” flashes on the display.
- Press the **MEMORY** button again to stop recording.
- To save the recorded data, press the **SET DAMP** button (the display shows “Mem S”).  
Data, stored in the memory before, will be overwritten.
- Press the **ESC EXIT** button to stop recording the measured values without saving



Fig. 3.7.1

- To abort data recording, press the **ESC EXIT** button. This stops the procedure. No data will be saved.

### 3.7.2 Displaying the saved measured values

- Press the „Recall“ ◀ and ▶ buttons simultaneously to display the saved data.



The display will only show statistical values:

- Name of the material to be measured
- Date and time of the measurement series
- Last reading
- Average
- Max.
- Min.
- Peak max.
- Peak min.
- Standard deviation (Std dev)
- Number of measured values (Records)

### 3.7.3 Deleting the saved measured values

If data is saved in the tension meter, the display shows “Mem” .

#### Deleting data:

- Press the „Recall“ ◀ and ▶ buttons
- Then press the  button and confirm with the  button.  
This clears the memory.

**4 Service and maintenance**

The tension meter is easy to maintain.  
Depending on operating time and load, the instrument should be checked according to the locally valid regulations and conditions (as described in Chapter 3.6.2). The use of other test methods than the procedure described in Chapter 3.6.2 may cause deviating measuring results.

**4.1 Rollers**

You should regularly inspect the rollers to assure that they are running easily and smoothly. You can replace the rollers yourself, as necessary. Please indicate the tension meter model and the serial number (given on the rear side of the tension meter) in your spare-parts order.

For example:

**To order spare rollers:**

- Model: DTS-1000 (given on rear side of tension meter)
  - Serial number: 920 - 888888 (given on rear side of tension meter)
  - Standard rollers: Model number R592004
  - Delivery: 1 set (3 pcs.) of spare rollers 2000 m/min, incl. mounting tool
- or
- Model: DTS-1000-K (given on rear side of tension meter)
  - Serial number: 920 - 888888 (given on rear side of tension meter)
  - Code **K** rollers: Model number R592003
  - Delivery: 1 set (3 pcs.) of spare rollers 3500 m/min, incl. mounting tool

**5 Cleaning**

For cleaning the unit do not use any



**AGGRESSIVE SOLVENTS**

such as trichloroethylene or similar chemicals.



**NO WARRANTY OR LIABILITY**

shall be accepted for damage resulting from improper cleaning.

**6 Verification interval**

The question of finding the right frequency of calibration accuracy verification depends on several different factors:

- ➔ Operating time and load of the SCHMIDT tension meter
- ➔ Tolerance band defined by the customer
- ➔ Changes to the tolerance band compared to previous calibrations

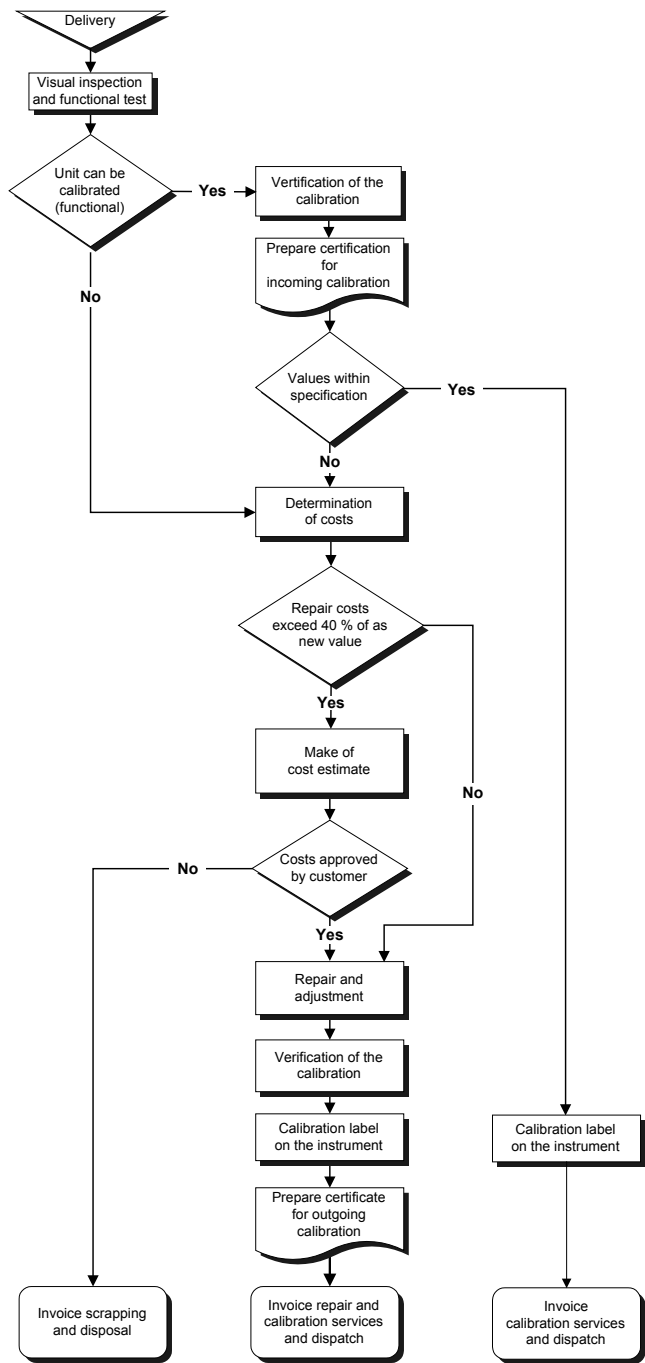
Therefore, the interval between verifications of calibration must be determined by the user's Quality Assurance Department, based on the user's experience.

Assuming normal operating time and load as well as careful handling of the tension meter, we recommend a verification interval of one year.



6.1 Verification of calibration and determination of repair costs

Flow chart for verifying the calibration of used tension meters, incoming and outgoing verification with Inspection Certificate 3.1 according to DIN EN 10204



## 7 Correspondence

If you have any questions regarding the instrument or Operating Instructions or their use, please indicate all the following details which are given on the ID plate:

- 1) Model
- 2) Serial number

## 8 Repairs

### Shipping instructions:

We kindly ask for return free of charge for us, if possible by airmail parcel. All occurring charges, if any (such as freight, customs clearance, duty etc.), will be billed to customer. For return from foreign countries, we ask you to include a proforma invoice with a low value for customs clearance only, e.g. 50 Euro, each and to advise the shipment in advance by fax or eMail.



**To avoid unnecessary follow-up questions, and the resulting loss of time or possible misunderstandings, please return the instrument with a detailed fault description to our service department. Please indicate in your order whether you require an Inspection Certificate 3.1 according to DIN EN 10204.**

**Service address:**

**HANS SCHMIDT & Co GmbH  
Schichtstr. 16  
D-84478 Waldkraiburg  
Germany**

Subject to change without notice!

Note:

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*Force Gauge*



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*Electronic Lengthmeter*



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