

Instruction Manual

Valid as of: 01.11.2018 • 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 DTX model of the DT Series; they are also applicable to the following models: DTXB, DTXE, DTXF und DTXL.

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 DTX models

Model	Tension Ranges cN	*Measuring Head Width mm	**SCHMIDT Calibration Material 1 (Polyamide (PA) Monofilament)	**SCHMIDT Calibration Material 2 (soft-annealed Copper Wire)	***Material Thickness Compensator Included
DTX-200	1 - 200.0	66	0.12 mm Ø	0.10 mm Ø	
DTX-500	1 - 500.0	66	0.12 + 0.20 mm Ø	0.16 + 0.25 mm Ø	yes
DTX-1000	10 - 1000	66	0.20 + 0.40 mm Ø	0.25 + 0.40 mm Ø	yes
DTX-2000	20 - 2000	66	0.40 + 0.70 mm Ø	0.40 + 0.60 mm Ø	yes
DTX-2500	25 - 2500	116	0.40 + 0.70 mm Ø	0.40 + 0.60 mm Ø	yes
DTX-4000	40 - 4000	66	0.50 + 0.80 mm Ø	0.50 + 0.80 mm Ø	yes
DTX-5000	50 - 5000	116	0.60 + 1.20 mm Ø	0.60 + 1.00 mm Ø	yes
DTX-10K	0.1 - 10.00 daN	116	0.80 + 1.40 mm Ø	0.80 + 1.20 mm Ø	yes
DTX-20K	0.2 - 20.00 daN	166	1.20 + 1.80 mm Ø	steel rope: 1.5 mm Ø steel rope: 2.0 mm Ø	yes
DTX-30K	0.3 - 30.00 daN	216	1.40 + 2.00 mm Ø	steel rope: 1.5 mm Ø steel rope: 2.5 mm Ø	yes
DTX-50K	0.5 - 50.00 daN	216	steel rope 1.5 mm Ø (7 x 7 x 0.15)	steel rope 2.0 mm Ø (7 x 7 x 0.30)	
DTX-60K-V1	0.6 - 60.00 daN	280	steel rope 2.0 mm Ø (7 x 7 x 0.30)	steel rope 2.5 mm Ø (7 x 7 x 0.40)	

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 and 2.

The DTXB is calibrated depending to the range on a textile ribbon or thin tape.

2.1.1 Available DTX models



Model	Tension Range cN	Textile Industry Applications	Wire Industry Applications (Copper Wire)
DTX-200	1 - 200.0	max. 200 tex	max. 0.15 mm Ø
DTX-500	1 - 500.0	max. 500 tex	0.05 - 0.25 mm Ø
DTX-1000	10 - 1000	max. 1000 tex	0.10 - 0.40 mm Ø
DTX-2000	20 - 2000	max. 2000 tex	0.30 - 0.60 mm Ø
DTX-2500	25 - 2500	max. 2500 tex	0.30 - 0.70 mm Ø
DTX-4000	40 - 4000	max. 4000 tex	0.35 - 0.90 mm Ø
DTX-5000	50 - 5000	max. 5000 tex	0.40 - 1.00 mm Ø
DTX-10K	0.1 - 10.00 daN	max. 10000 tex	0.70 - 1.40 mm Ø
DTX-20K	0.2 - 20.00 daN	max. 20000 tex	1.00 - 2.00 mm Ø
DTX-30K	0.3 - 30.00 daN	max. 30000 tex	1.20 - 2.50 mm Ø
DTX-50K	0.5 - 50.00 daN	max. 50000 tex	1.40 - 3.00 mm Ø
DTX-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
Standard	2000	Hard-coated aluminium
Code K	3500	Hard-coated aluminium
Code H	5000	Plasma-coated aluminium
Code T	1000	Plastic (POM) black
Code T	4000	Plastic (PVC) red only for DTXF
Code W	1000	Nickel-plated steel
Code ST	1000	Hardened steel
Code B	1000	Tempered steel for measuring tire cord
Code CE2	1000	ceramic-coated aluminium
Asymmetrical groove Code ASY	1000	Hard-coated aluminium (not for DTX-200)
Code ASYB	1000	Tempered steel for measuring tire cord (not for DTX-200)
Code V1	1000	Hard-coated aluminium (only for DTX-60K-V1)
U-grooved Code U	2000	Hard-coated aluminium (not for DTX-200)

2.1.2 Available DTXL models



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

* Outer distance between outside guide rollers.

** The model DTXL do not include a material thickness compensator and is calibrated only on one material

DTXL Guide Rollers:

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

2.1.3 Available DTXF models



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

* Outer distance between outside guide rollers.

** Suitable for 95 % of applications. PA = Polyamide Monofilament
The model DTXF do not include a material thickness compensator and is calibrated only on one material

DTXF Guide Rollers:

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

2.1.4 Available DTXE models



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

* Width of bracket assembly.

** Suitable for 95 % of applications. PA = Polyamide Monofilament
The model DTXE do not include a material thickness compensator and is calibrated only on one material

DTXE 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 DTXB models



Model	Tension Ranges cN	*Measuring Head Width mm	Roller Widths mm
DTXB-500	5 - 500	55	7, 10, 15, 20
DTXB-1000	50 - 1000	55	7, 10, 15, 20, 30,41
DTXB-2000	100 - 2000	55	7, 10, 15, 20, 30,41
DTXB-2500	150 - 2500	117	7, 10, 15, 20, 30,41
DTXB-4000	200 - 4000	55	7, 10, 15, 20, 30,41
DTXB-5000	250 - 5000	117	7, 10, 15, 20, 30,41
DTXB-10K	0.5 - 10 daN	117	7, 10, 15, 20, 30
DTXB-20K	1 - 20 daN	167	7, 10, 15, 20, 30
DTXB-30K	1.5 - 30 daN	217	7, 10, 15
DTXB-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 DTXB do not include a material thickness compensator and is calibrated only on one material

DTXB Guide Rollers:

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

2.2 Specifications

Calibration:	According SCHMIDT factory procedure
Accuracy:	For PA from 5 % up to 100 % full scale: ± 0.5 % full scale ± 1 digit remaining tension range and other calibration materials: ± 3 % FS* ± 1 digit
Accuracy DTXL:	From 5 % up to 100 % full scale: ± 0.5 % full scale ± 1 digit remaining tension range, device with tension range 50 daN and 60 daN and customer supplied material: ± 5 % FS* ± 1 digit
Memory for material curves:	2 for SCHMIDT calibration plus 9 for customized calibrations
Measuring units:	Force: cN, daN, g, kg, N, lb and Thickness: mm, inch
Overrange:	Approx. 10 % full scale, full scale, without accuracy guarantee
Overload protection:	100 % full scale
Measuring principle:	Strain gauge bridge
Measuring roller deflection:	Max. 0.2 mm
Signal processing:	digital
Measuring frequency:	Max. 1 kHz (1000 measurements/sec.), internal 8 kHz
Display:	Graphic LCD display with 3 different displays: numeric, numeric with bargraph, X-Y-diagramm (time-tension)
Display update time:	2/sec (Display update)
Memory:	MIN, MAX, PEAK, AVG and LAST. 60.000 values at 255 measuring periods
Memory modes:	5 Memory modes with statistical evaluation
Damping:	Adjustable electronic damping (averaging)
Cal. Adjustment:	± 10 steps in 1 % increments
Thickness compensation:	Max. 2.5 mm (not available for all models)
Output signal:	USB
Auto power off:	Approx. 3 minutes of non-use
Signal processing:	16 bit A/D
Temperature coefficient:	Gain: less than ± 0.01 % full scale /°C at 25° C Zero point: better than ± 0.03 % full scale /°C at 25° C
Temperature range:	10 - 45° C
Air humidity:	85 % RH, max.
Power supply:	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)
Housing material:	Die-cast aluminium
Housing dimensions:	265 mm x 78.5 mm x 46 mm (L x W x H)
Weight:	Up to DTX-50K approx. 875 g / 1550 g
(net / gross)	DTX-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 Tension Inspect 3 Software for PC WIN 7 or higher
- 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.

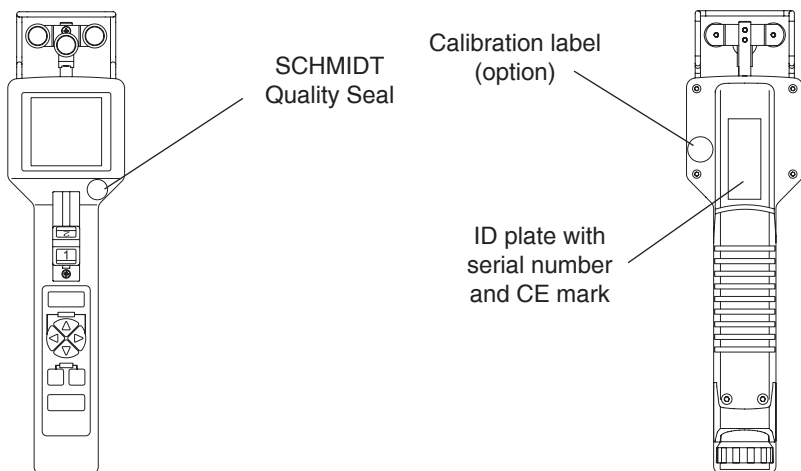
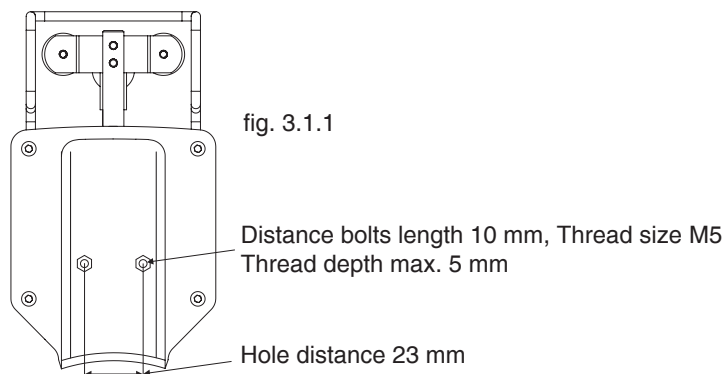


fig. 3.1

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).

3.1.2 Wi-Fi communication (optional)

(Code WL - with Wi-Fi antenna)

Tension meters equipped with the Wi-Fi feature can transmit measured values to a PC via Wi-Fi.



Requirements:

- The Wi-Fi feature must have been enabled in the Wi-Fi Setup.

Manual connection to a network

- Select „Wi-Fi Setup/Settings“ and enter the name of the network (SSID) and the password (PW).

Automatic connection to a network

- Select Scan Network in the menu „Wi-Fi Setup/Settings“.
All available networks will be displayed.
- Select the desired network and confirm the network name (SSID) by pressing .
- Enter the password required for this network and confirm with .

1 The name (SSID) of the currently selected network is displayed under „Wi-Fi Setup/Settings“.

If you do not need the Wi-Fi feature you can remove the antenna.

3.1.2 Wi-Fi communication (optional) (cont.)

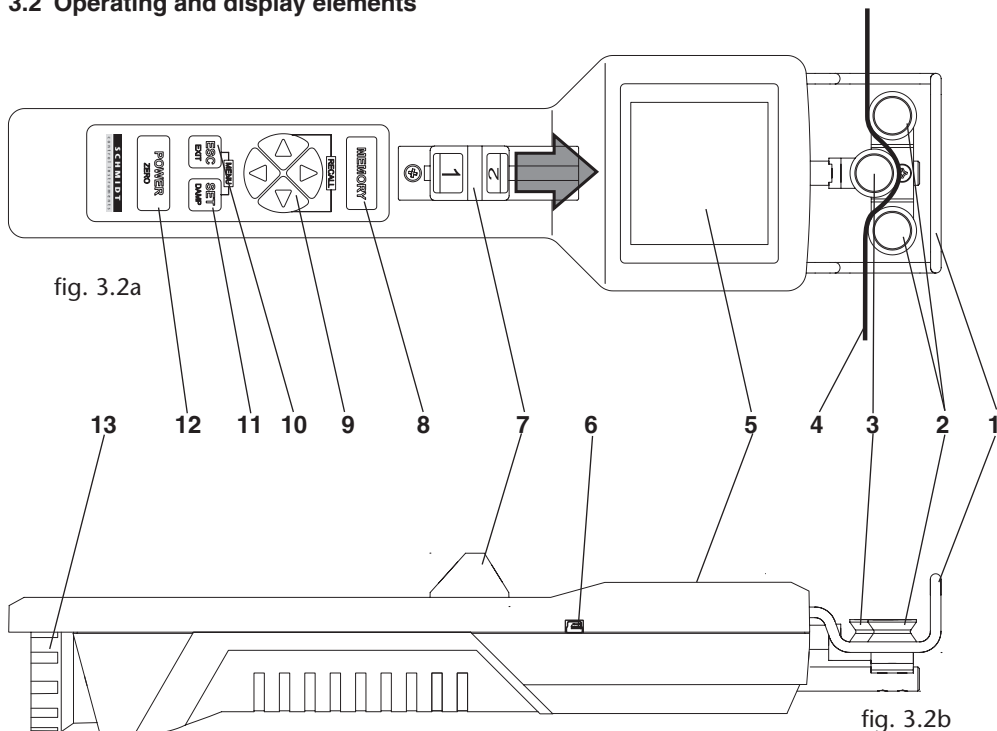


This device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

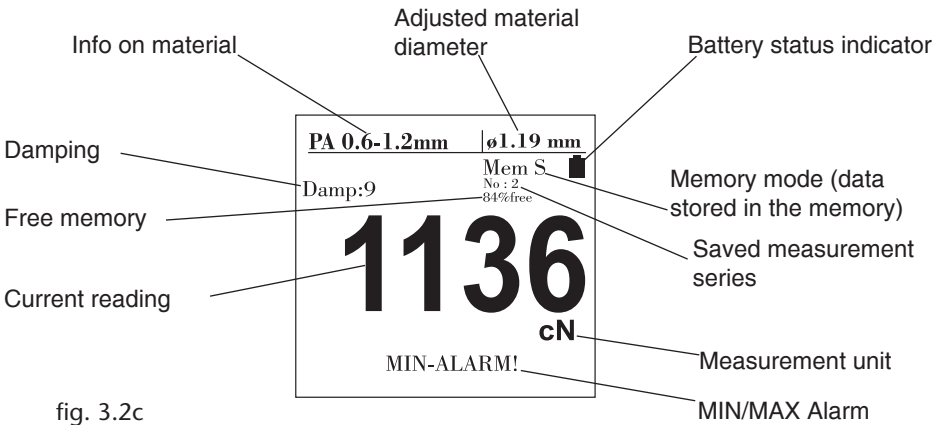
3.2 Operating and display elements



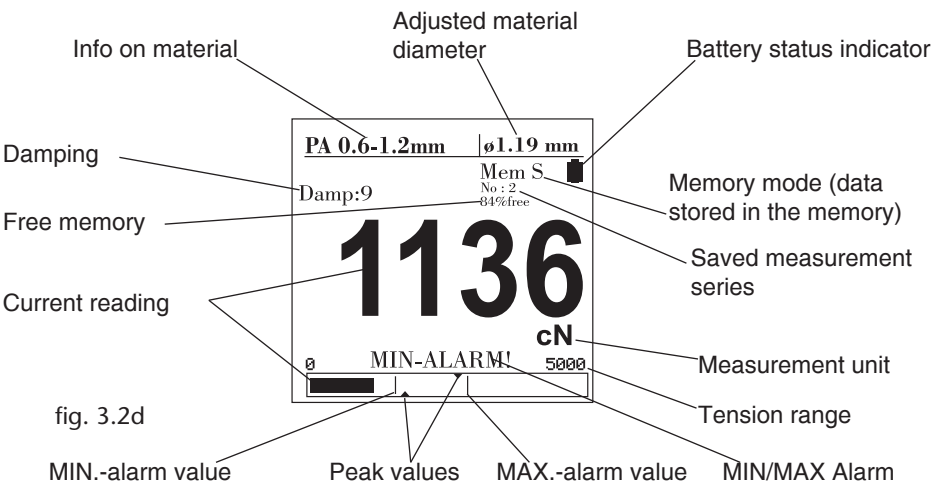
- | | |
|-----------------------------------|--|
| 1 Filament guide | 8 „MEMORY“ key |
| 2 Guide rollers | 9 Arrow key |
| 3 Measuring roller | 10 „ESC / EXIT“ key |
| 4 Material to be measured | 11 „SET / DAMP“ key |
| 5 Display | 12 „POWER / ZERO“ key |
| 6 USB interface / power connector | 13 Adjustment 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

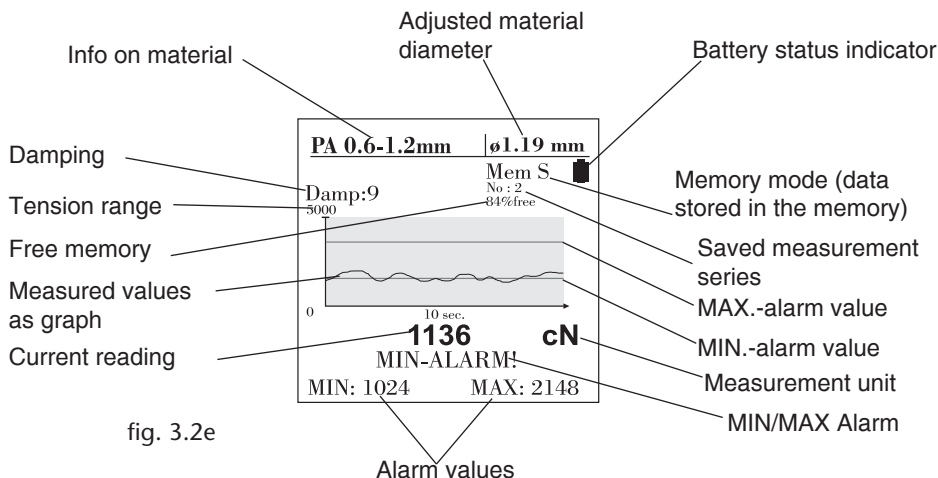


Display with bargraph




3.2 Operating and display elements

Graphic display



- i** 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, 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

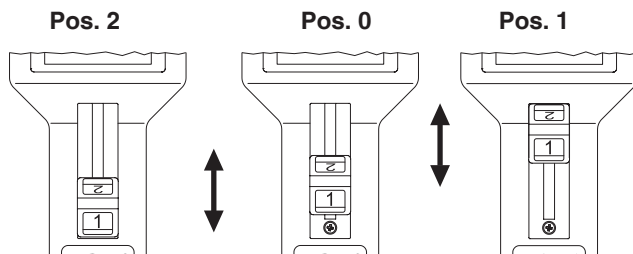


fig. 3.4

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  and  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  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  button to save the settings and exit the settings menu or press the  button to exit the current menu without saving.
- To exit the main menu press the  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] [Bargraph] [Graphic]	<ul style="list-style-type: none"> Measured value displayed as number and alarm monitoring Measured value displayed as number, bar graph trend display and alarm monitoring Measured value displayed as graphical trend, measured value/limit values as numbers
Alarms	—	[ON] , [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], [OFF]	Activate/deactivate the peak values in the bar graph display.
Settings	Tension Unit	[cN] , [N], [lb], [g], [kg]	Set the measurement unit. The available units may vary depending on the measuring range of the device.
	Diameter Unit	[mm] , [inch]	To select between mm and inch.
	Contrast	[0] - [10]	To adjust the contrast
	Backlight	[ON], [OFF], [AUTO]	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], [2] , [3]	Set the display brightness.
	Screen Rotation	[0°], [90°], [180°]; [270°], [AUTO]	To set the display orientation to be fixed or to automatically adapt to the current orientation of the device.
	Auto Power Off	[ON] , [OFF]	Toggle the „Auto Power off“ function on and off.
	Language	[EN] , [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.
	Wi-Fi Setup		Chapter 3.1.2
Memory Settings	Memory Mode	[S] , [C], [F], [H], [D]	Chapter 3.7

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 - 11	—	[character], [numbers], [special character]	to enter a name for the selected material characteristic. The name can also been adjusted by using the provided software
Damping	—	[1] - [9]; [5]	Chapter 3.5.4
Alarms	—	[ON] , [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	[cN/daN] [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.

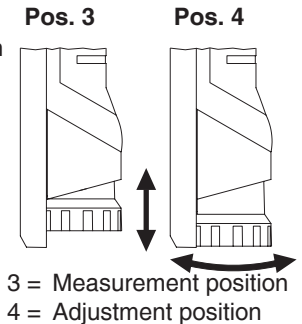


fig. 3.5.1



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.

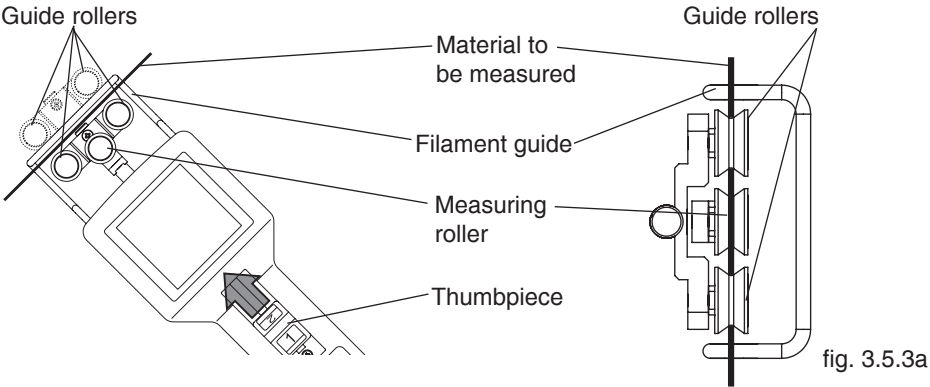
To carry out zero adjustment:

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

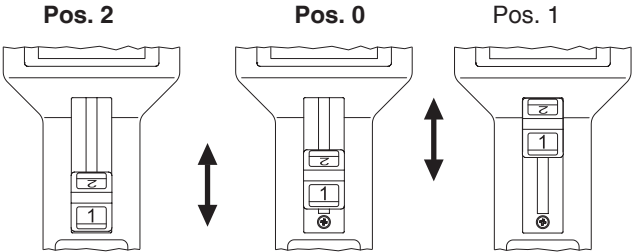
- Press the  button.

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



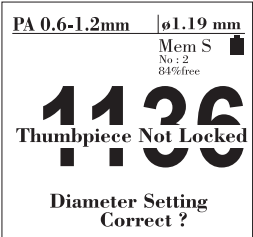
- 2 = Measurement position
- 0 = Adjustment position
- 1 = Thread in position (the guide rollers extend forward)

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

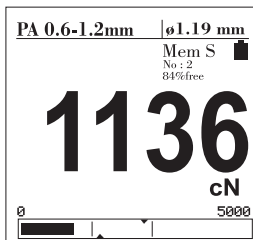


fig. 3.5.3e
Display with bargraph

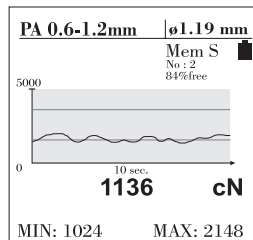


fig. 3.5.3f
Graphical Display



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.

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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.

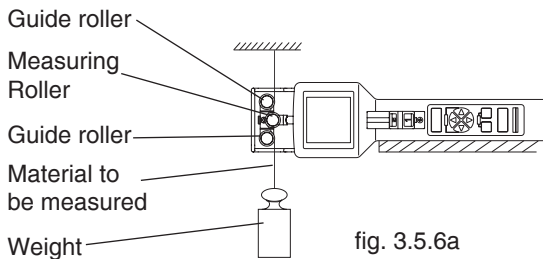


fig. 3.5.6a

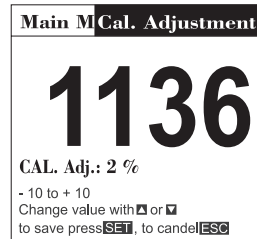


fig. 3.5.6b



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 and material 2 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 and 2 is omitted

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The material characteristics 1 and 2 have been preset in the factory and cannot be overwritten. For these material characteristics, 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.

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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

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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)

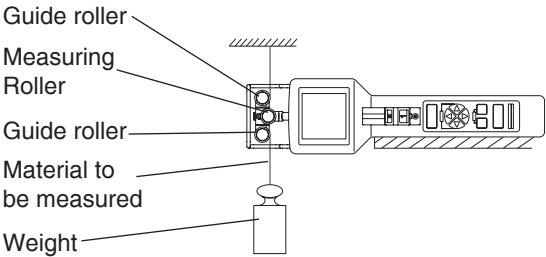


fig. 3.6.1

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 ESC , to return ESC			

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 ESC , to return ESC			

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 ESC , to return ESC			

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 ESC , to return ESC			

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 ESC , to return ESC			

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.

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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 and material 2 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.

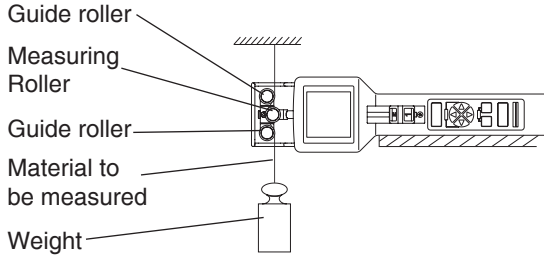


fig. 3.6.2

- 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

The tension meter is delivered with 4 different memory modes. You can store up to 255 measurement series at one or more machine positions. The tension meter can store up to 60000 measured values.

All saved measured values and statistic datas can be transferred to a PC (for further processing, e.g. in Excel). For this purpose, use the software supplied with the tension meter.

Recall of memory: The display only shows the last measured value, the average, the minimum and maximum measured values, the peaks, the standard deviation and the number of measured values per measurement series.

By pressing the  button you can transfer all data from the selected measurement series to a PC.

You can select the desired memory programs from the main menu.

Memory Mode “S” – Standard

Data is recorded during a user-defined period.

The system will only determine and save statistical values.

Memory Mode “H” – Hold, Freeze Display

The last max. 128 values are saved. In graphical mode, you can freeze the display and thus view the course of the tension values after completion of the measurement. The system will determine statistical values and save them together with the measured values. Peak values are not determined.

Memory Mode “C” – Continuous

Data is recorded during a user-defined period (min. 10 sec, max. 8 hrs 20 min). The system will acquire 2 measured values/sec, determine statistical values, and save them for each measurement series together with the measured values.


Memory Mode “F” - Fast

Data is recorded during a user-defined period (min. 1 sec, max. 60 sec.). The system will acquire 1000 measured values/sec, determine statistical values, and save them for each measurement series together with the measured values.

Memory Mode „D“ - on demand



Recording single readings by the operator instigation.

Statistical values and readings will be saved for only one measurement series.

 **Changing to another memory mode will delete any saved data. When you select the memory mode, a corresponding message is displayed.**
The selected memory mode and the saved data will be kept even after switching off the tension meter.

3.7.1 Selecting the memory mode

Requirements:

- The tension meter has been switched on as described in chapter 3.3.2.
- Open the menu by pressing the  and  buttons simultaneously and select Memory Settings.
- Select the desired memory mode in the user navigation.



If the memory already contains data, a message will inform you that the data will be deleted.



3.7.2 Memory mode “S” – standard

3.7.2.1 Saving Data

Requirements:

- In the main menu, select „Memory Settings“ and then memory mode “S”.

To save the first measurement series:

- Press the  button to start recording the measured values.
- While recording is in process, “Rec S” flashes on the display.
- Press the  button again to stop recording.

The data is saved automatically (the display shows “Mem S”, the memory position and the free memory space).





Fig. 3.7.2.1



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

To save more measurement series:

- Press the  button to start recording the measured values.
- While recording is in process, “Rec S” flashes on the display.
- Press the  button again to stop recording.


The data is saved automatically (the display shows “Mem S”, the memory position, and the free memory space)

3.7.2.2 Displaying the saved measured values

- Press the RECALL ◀ and ▶ buttons simultaneously to display the saved data.
- The ▼ and ▲ buttons allow you to switch between the various measurement series.

The display will only show statistical values:

- Number of batch (File)
- 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)

By pressing the  button, you can send the statistical data from the selected measurement series to a PC. For this purpose, a suitable communication program, such as Terminal, must be installed on the PC. See chapter 4.3

3.7.2.3 Displaying the saved measured values on a PC

The SCHMIDT software **Tension-Inspect 3** is supplied with the tension meter. It allows you to easily and accurately analyze the saved measured values and export them to an Excel table.

Sample memory printout



17.10.2016 11:37	DTX-Series 1000 cN	Unit : cN
Material: CU 0.25-0.4mm		
Start: 11:32:30 17.10.16		
Stop: 11:32:38 17.10.16		
Last: 233		
Avg: 236		
Max: 244		
Min: 219		
Std dev: 6		
Peak max: 535		
Peak min: 45		
HI-Alarm: 850		
Lo-Alarm: 150		
Records: 16		

3.7.2.4 Deleting the saved measured values

If data is saved in the tension meter, the display shows “Mem” and indicates the free memory space.

3.7.2.4 Deleting the saved measured values (Cont.)

Deleting data:

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

3.7.3 Memory mode “H”

The last max. 128 values are saved. In graphical mode, the display freezes so that you can view it after completion of the measurement. In numerical mode, the last measured value is displayed.



This memory mode does not record PEAK values.

3.7.3.1 Saving data

Requirements:

- In the main menu, select „Memory Settings“ and then memory mode H.
- Set the X-axis as described in chapter 3.2

To save the first measurement series:

- Press the  button to freeze the recording of the measured values.

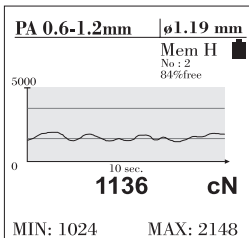






fig. 3.7.3.1

If you recorded less than 128 measured values, you can continue recording by pressing the  button. If the graphics window is full, its contents will be shifted to the left and you can only freeze the last 128 measured values.

- To save the graphics and measured values for later evaluation, press the  button.
This returns the tension meter to measuring mode.
- If you press the  or  button, no data will be saved and the tension meter returns to measuring mode.


3.7.3.2 Displaying the saved measured values

- Press the „Recall“ ◀ and ▶ buttons simultaneously to display the saved data.
- The ▼ and ▲ buttons allow you to switch between the various measurement series.

The display will only show statistical values:

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

The measuring values can be shown as a graph by pressing ▶

By pressing the  button, you can send all data from the selected measurement series to a PC. For this purpose, a suitable communication program, such as Terminal, must be installed on the PC. See chapter 4.3

3.7.3.3 Displaying the saved measured values on a PC

The SCHMIDT Software **Tension-Inspect 3** is supplied with the tension meter. It allows you to easily and accurately analyze the saved measured values and export them to an Excel table.

Sample memory printout



17.10.2016 12:22	DTX-Series 1000 cN	Unit cN
Material: CU 0.25-0.4mm	Material: CU 0.25-0.4mm	Material: CU 0.25-0.4mm
Start: 12:15:44 17.10.16	Start: 12:16:21 17.10.16	Start: 12:17:20 17.10.16
Stop: 25 sec.	Stop: 25 sec.	Stop: 25 sec.
Last: 207	Last: 246	Last: 272
Avg: 231	Avg: 235	Avg: 234
Max: 321	Max: 313	Max: 333
Min: 134	Min: 140	Min: 137
Std dev: 34	Std dev: 31	Std dev: 39
Peak max: 0*	Peak max: 0	Peak max: 0
Peak min: 0*	Peak min: 0	Peak min: 0
HI-Alarm: 850	HI-Alarm: 850	HI-Alarm: 850
Lo-Alarm: 150	Lo-Alarm: 150	Lo-Alarm: 150
Records: 128	Records: 128	Records: 128
211	195	184
246	278	285
231	186	200
219	279	284
266	223	202
186	260	285
293	223	201
182	278	307
208	189	178

*PEAK are not recorded; therefore 0 in the printout

3.7.3.4 Deleting the saved measured values

If data is saved in the tension meter, the display shows "Mem" and indicates the free memory space.

Deleting data:

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

3.7.4 Memory mode “C”

Data is recorded during a user-defined period. The tension meter records 2 measured values/sec.

3.7.4.1 Saving data

Requirements:

- In the main menu, select „Memory Settings“ and then memory mode C.

To save the first measurement series:




- Press the  button to start recording the measured values.
- While recording is in process, “Rec C” flashes in the display.
- Once the set time has elapsed, no more data will be saved (the display shows “Mem C”, the memory position and the free memory space).
- If you press the  button before the set time has elapsed, no more data will be saved. The data is saved automatically (the display shows “Mem C”, the memory position and the free memory space)







fig. 3.7.4.1

- 1** • To abort data recording, press the  button. This deletes the procedure. No data will be saved.

To save more measurement series:

- Press the  button to start recording the measured values.
- While recording is in process, “Rec C” flashes in the display.

3.7.4.2 Displaying the saved measured values


- Press the „Recall“  and  buttons simultaneously to display the saved data.
- The  and  buttons allow you to switch between the various measurement series.

3.7.4.2 Displaying the saved measured values (Cont.)

The display will only show statistical values:

- Number of batch (File)
- 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)

The measuring values can be shown as graph by pressing ►

By pressing the  button, you can send all data from the selected measurement series to a PC. For this purpose, a suitable communication program, such as Terminal, must be installed on the PC. See chapter 4.3

3.7.4.3 Displaying the saved measured values on a PC

The SCHMIDT software **Tension-Inspect 3** is supplied with the tension meter. It allows you to easily and accurately analyze the saved measured values and export them to an Excel table.



Sample memory printout

17.10.2016 12:29	DTX-Series 1000 cN	Unit cN
Material: CU 0.25-0.4mm	Material: CU 0.25-0.4mm	
Start: 12:22:19 17.10.16	Start: 12:24:05 17.10.16	
Stop: 12:22:24 17.10.16	Stop: 12:24:10 17.10.16	
Last: 236	Last: 238	
Avg: 233	Avg: 234	
Max: 241	Max: 243	
Min: 221	Min: 218	
Std dev: 6	Std dev: 8	
Peak max: 534	Peak max: 577	
Peak min: 42	Peak min: 36	
HI-Alarm: 850	HI-Alarm: 850	
Lo-Alarm: 150	Lo-Alarm: 150	
Records: 10	Records: 10	
	235	240
	237	243
	241	241
	237	241
	233	239
	225	232
	221	222
	230	218
	208	189

3.7.4.4 Deleting the saved measured values

If data is saved in the tension meter, the display shows “Mem” and indicates the free memory space.

Deleting data:

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

3.7.5 Memory mode “F”



Data is recorded during a user-defined period. The tension meter records 1000 measured values/sec.

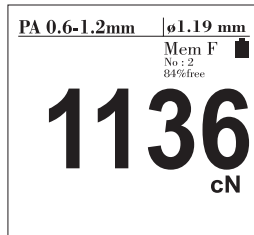
3.7.5.1 Saving data

Prerequisites:

- In the main menu, select „Memory Settings“ and then memory mode F.


To save the first measurement series:

- Press the  button to start recording the measured values.
- While recording is in process, “Rec F” flashes in the display.
- Once the set time has elapsed, no more data will be saved (the display shows “Mem F”, the memory position, and the free memory space).
- If you press the  button before the set time has elapsed, no more data will be saved. The data is saved automatically (the display shows “Mem F”, the memory position and the free memory space)



- **1** To abort data recording, press the  button. This deletes the procedure.
No data will be saved.

To save more measurement series:

- Press the  button to start recording the measured values.
- While recording is in process, “Rec F” flashes in the display.


3.7.5.2 Displaying the saved measured values

- Press the „Recall“ ◀ and ▶ buttons simultaneously to display the saved data.
- The ▼ and ▲ buttons allow you to switch between the various measurement series.

The display will only show statistical values:

- Number of batch (File)
- 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)

The measuring values can be shown as graph by pressing ▶

By pressing the  button, you can send all data from the selected measurement series to a PC. For this purpose, a suitable communication program, such as Terminal, must be installed on the PC. See chapter 4.3

3.7.5.3 Displaying the saved measured values on a PC

The SCHMIDT software **Tension-Inspect 3** is supplied with the tension meter. It allows you to easily and accurately analyze the saved measured values and export them to an Excel table.



Sample memory printout

17.10.2016 12:29	DTX-Series 1000 cN	Unit cN
Material: CU 0.25-0.4mm	Material: CU 0.25-0.4mm	Material: CU 0.25-0.4mm
Start: 11:38:09 17.10.16	Start: 11:39:10 17.10.16	Start: 11:40:12 17.10.16
Stop: 11:38:17 17.10.16	Stop: 11:39:18 17.10.16	Stop: 11:40:20 17.10.16
Last: 237	Last: 221	Last: 239
Avg: 236	Avg: 234	Avg: 235
Max: 246	Max: 243	Max: 245
Min: 216	Min: 217	Min: 214
Std dev: 125	Std dev: 115	Std dev: 120
Peak max: 570	Peak max: 544	Peak max: 564
Peak min: 40	Peak min: 44	Peak min: 40
HI-Alarm: 850	HI-Alarm: 850	HI-Alarm: 850
Lo-Alarm: 150	Lo-Alarm: 150	Lo-Alarm: 150
Records: 8000	Records: 8000	Records: 8000
374	229	385
410	206	382
438	190	399
461	189	410
478	215	430
489	278	454
497	355	466
498	415	466
492	441	467

3.7.5.4 Deleting the saved measured values

If data is saved in the tension meter, the display shows “Mem” and indicates the free memory space.

Deleting data:

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

3.7.6 Memory mode “D”

Recording single readings by the operator instigation.

3.7.6.1 Saving data

Requirements:

- In the main menu, select „Memory Settings“ and then memory mode D.

Saving:


- By pressing the  button the current reading will be saved.



fig. 3.7.6.1

3.7.6.2 Displaying the saved measured values

- Press the RECALL ◀ and ▶ buttons simultaneously to display the saved data.

The display will only show statistical values:

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

3.7.6.3 Displaying the saved measured values on a PC

The SCHMIDT software **Tension-Inspect 3** is supplied with the tension meter. It allows you to easily and accurately analyze the saved measured values and export them to an Excel table.



Sample memory printout

17.10.2018 11:37	DTX-Series 1000 cN	Unit : cN
Material: PA 0.2 mm		
Start: 11:32:30 17.10.18		
Stop: 11:32:38 17.10.18		
Last: 233		
Avg: 230		
Max: 244		
Min: 219		
Std dev: 6		
HI-Alarm: 850		
Lo-Alarm: 150		
Records: 6		
	219	
	222	
	244	
	234	
	228	
	233	


3.7.6.4 Deleting the saved measured values

If data is saved in the tension meter, the display shows “Mem” and indicates the free memory space.

Deleting data:

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

4 PC Communication (USB Interface)

 The requirements of the CE specification are only complied with if the tension meter is equipped and operated with connecting cables supplied by HANS SCHMIDT & Co GmbH. Certification to the CE specification does not extend to, and shall be invalid for any other combination. Under no circumstances shall HANS SCHMIDT & Co GmbH be held liable for any damage resulting from the use of non-SCHMIDT sensors or cables.

4.1 Installing the USB Driver

For data transfer to the PC, you will need a USB driver. If no matching driver is installed on your PC, the Windows Found New Hardware Wizard appears when you connect the unit to the computer for the first time. Follow the wizard steps. Specify the location of the driver on the supplied CD-ROM. You will find the driver in the “Driver” folder.

4.2 The TENSION INSPECT 3 Program

The **Tension Inspect 3** software from SCHMIDT is described in a separate user manual.

4.3 Terminal program

The contents of the memory can be transferred to a PC using the USB interface of the tension meter.

Connect the DTX to the computer using the USB cable type EK0662 which is supplied with the tension meter.

Prerequisites:

A communication program, such as Terminal, must be installed and configured on the computer.

PC communication commands (polling)

Requesting data:

(data is requested by PC polling)

- The ASCII character "r" is used to transfer the contents of the memory to the PC.

5 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.

5.1 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: DTX-1000 (given on rear side of tension meter)

Serial number: 921 - 888888 (given on rear side of tension meter)

Standard rollers: Model number R592104

Delivery: 1 set (3 pcs.) of spare rollers 2000 m/min, incl. mounting tool
or

Model: DTX-1000-K (given on rear side of tension meter)

Serial number: 921 - 888888 (given on rear side of tension meter)

Code **K** rollers: Model number R592103

Delivery: 1 set (3 pcs.) of spare rollers 3500 m/min, incl. mounting tool

6 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.

7 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.

8 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

9 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.

1 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!

More than 70 years - Worldwide -

Hans Schmidt & Co GmbH

Mailing address:

P. O. B. 1154
84464 Waldkraiburg Germany

Shipping address:

Schichtstr. 16
84478 Waldkraiburg Germany

Phone:

int. + 49 / (0)8638 / 9410-0

Fax:

int. + 49 / (0)8638 / 4825

int. + 49 / (0)8638 / 67898

e-mail:

info@hans-schmidt.com

Internet:

<http://www.hans-schmidt.com>