



MI&T Mess- & Prüftechnik Berlin  
Measuring Instruments & Testers

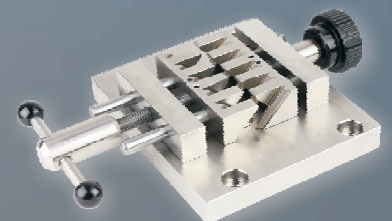
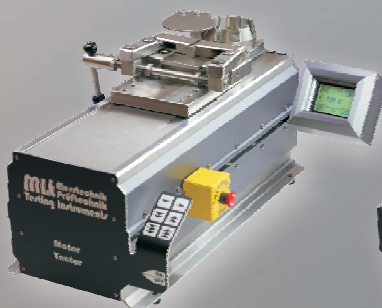
**Kraftmessgeräte  
Prüfstationen  
Prüfsysteme**

## Advanced force measurement



MI&T Mess- & Prüftechnik Berlin  
Measuring Instruments & Testers

**Force Gauges  
Test Stations  
Test Systems**



**MI&T GmbH** Mess- und Prüftechnik **Berlin**  
Measuring Instruments & Testers  
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### Universal Test Station MTM

Type series up to 2000 N

Models:

MTM 5/10/25/50/100/200

Multifunctional test stations with motor drive, position sensor and various test programmes



### Motorized Test Station ATM

Type series up to 2000 N

Models:

ATM 5/10/25/50/100/200

Motor drive with adjustable test speed and automatic motor drive, Break Stop function and pre-set of test load



### Motorized Tester FTM

Type series up to 2000 N

Models:

FTM 5/10/25/50/100/200

Motorized testers for constant test speed, 3 factory-provided test speeds



### Digital Tester FTS

Type series up to 1000 N

Models:

FTS 5/10/25/50/100

Testers manually operated by hand wheel, self-locking linear drive features hold of test specimen under load.



### Pull & Press Tester FTH

Type series up to 500 N

Models:

FTH 5/10/25/50

Manual tester operated by hand lever. Load slide with precise linear motion, allowing rapid sequence of tests. Serial interface for data output.



### Pull & Press Tester PTH 50

Manual Tester, 500 N capacity

Model:

PTH 50

Tester manually operated by hand lever. Load slide with precise linear motion, allowing rapid sequence of tests. Serial interface for data output.



### Universal Test Station MTM

Type series up to 10 kN

Models:

MTM 500/1000

Multifunctional test stations with motor drive, position sensor and various test programmes



### Motorized Test Station ATM

Type series up to 10 kN

Models:

ATM 500/1000

Motor drive with adjustable test speed and automatic motor drive, Break Stop function and pre-set of test load



### Motorized Tester FTM

Type series up to 10 kN

Models:

FTM 500/1000

Motorized testers for constant test speed, 3 factory-provided test speeds



### Heavy-duty Test Station STM

Test Station with 50 kN capacity

Model:

STM 50kN

Motorized test station with adjustable test speed and automatic motor-driven clamping device for cables.



### Cable Tester FTC

Type series up to 500 N

Models:

FTC 5/10/25/50

Manual pull tester with hand lever operation and cable clamp-ing fixture with automatic gripp-ing during hand lever actuation.



### Cable Tester PTC

Manual Tester, 500 N capacity

Model:

PTC 50

Manual pull tester with hand lever operation and cable clamp-ing fixture with automatic gripp-ing during hand lever actuation.



Product range continue next page

### Force Measuring System CMS

Models:

CMS 5/10/20/50/100/200/250  
500/1000/5000

High-precision force measuring system with external load cell for measurements of tensile and compressive forces.



### Hand Tester DFG

Force ranges: 0- 2/5/10/2/50/  
100/200/500/1000 N

Handy and ergonomically shaped force gauge with internal load cell for mobile use and stationary use with test stands.



### Manual Test Stand TSH

Models:

TSH, TSHL

Handwheel-operated manual test stand for precise force measurements in combination with force gauges. Operation in vertically as well as horizontally arrangement



### Test Benches PTB & FTB

Models:

PTB 50, FTB 5/10/25/50/100

Small and handy test benches for testing the tension force of cable tie tighten pistols (tie rap guns);

The test benches can be positioned length- and crosswise to the operator



### Clamping Tools and Test Fixtures

Large selection of standard fixtures and clamping tools for a wide range of applications as well as design and manufacturing of customized special tools



### KeyTast and KeySoft Data Logger

With the KeyTast and KeySoft interfaces measured values from measuring instruments with serial port can be send via an USB port resp. serial of the PC directly to PC programs



### Precision Load Cells

Models:

SM 5/10/20/50/100/200/250  
500/1000/5000

High-precision force transducers in various designs for tensile and compressive forces.



### Digital Force Gauge DFGS

Force ranges: 0- 1000/2000/  
5000/10000/20000 N

Force Gauge with external load cell for measurements of tensile and compressive forces. Small and handy unit for mobile use and stationary use with test stands.

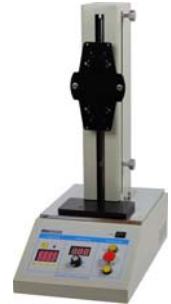


### Motorized Test Stands TSM

Models:

TSM

Motorized vertical test stands for precise force measurements in combination with force gauges and application-specific testing tools



### Test Device DFG-KBP 500

Models:

DFG-KBP 500H,  
DFG-KBP 500V

Handy devices for testing the tensile force of cable tie tighten pistols, well suited for mobile use and for tests to be carried out quickly



### Testing Tools for cable tie pistols

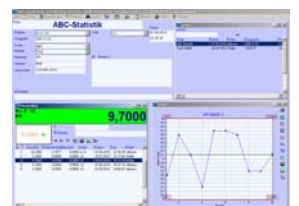
Testing tool kits for testing the tensioning force of manually and pneumatically operated cable tie tighten pistols



### Software MI&Tstat

PC Software for acquisition of measured data, statistical representation and analysis of measured values.

Printout of test reports and archiving of measured values.





## Table of Contents:

<b>General Information</b>		Delivery programme, Model Overview	Page 5
<b>Universal Test Station</b>	Models		
Type series up to 2000 N:	<a href="#">MTM 5/10/25/50/100/200</a>	Multifunctional test stations with motor drive, position sensor and various test programmes	Page 6, 7
Type series up to 10 kN:	<a href="#">MTM 500/1000</a>	Special Test Programmes for MTM	Page 8
<b>Motorized Test Station</b>	Models		
Type series up to 2000 N:	<a href="#">ATM 5/10/25/50/100/200</a>	Motor drive with adjustable test speed and automatic motor drive, Break Stop function and pre-set of test load	Page 9, 10
Type series up to 10 kN:	<a href="#">ATM 500/1000</a>		
<b>Motorized Tester</b>	Models		
Type series up to 2000 N:	<a href="#">FTM 5/10/25/50/100/200</a>	Motorized testers for constant test speed, 3 factory-provided test speeds	Page 11, 12
Type series up to 10 kN:	<a href="#">FTM 500/1000</a>		
<b>Digital Tester</b>	Models		
Type series up to 1000 N:	<a href="#">FTS 5/10/25/50/100</a>	Testers manually operated by hand wheel, self-locking linear drive features hold of test specimen under load	Page 13, 14
<b>Heavy-duty Test Station</b>	Models		
Tester with 50 kN capacity:	<a href="#">STM 50 kN</a>	Motor drive with adjustable test speed; Automatic motor-driven clamping device for cables etc.	Page 15
<b>Pull &amp; Press Tester</b>	Model		
Type series up to 500 N:	<a href="#">FTC 5/10/25/50</a>	Cable Tester, hand lever actuation	Page 16, 17
Type series up to 500 N:	<a href="#">FTH 5/10/25/50</a>	Pull/Press Tester, hand lever actuation	
Tester with 500 N nominal load:	<a href="#">PTC 50</a>	Cable Tester, hand lever actuation	Page 18, 19
Tester with 500 N nominal load:	<a href="#">PTH 50</a>	Pull/Press Tester, hand lever actuation	
<b>Force Measuring System</b>	Models		
Type series up to 50 kN:	<a href="#">CMS 5/10/20/50/100/200</a>	High-precision Force Measuring System with force gauge KMS and load cells SM	Page 20, 21
	<a href="#">CMS 250/500/1000/5000</a>		
<b>Hand Tester</b>	<a href="#">DFG 2/5/10/20/50/100/200/500/1000 N</a>	Ergonomically shaped force gauge with internal load cell	Page 22
<b>Force Gauge</b>	<a href="#">DFGS 1000/2000/5000/10000/20000 N</a>	Force gauge with external load cell	Page 23
<b>Manual Test Stand</b>	<a href="#">TSH, TSHL</a>	Vertical test stand	Page 24
<b>Motorized Test Stands</b>	<a href="#">TSM</a>	Motorized vertical test stands	Page 25
<b>Test Benches</b>	Model		
Type series up to 500 N:	<a href="#">FTB 5/10/25/50</a>	Test Benches for testing the tensioning force of cable tie tighten pistols	Page 26, 27
Test Bench with 500 N capacity:	<a href="#">PTB 50</a>		
<b>Test Device</b>	Model		
Testers with 500 N nominal load:	<a href="#">DFG-KBP 500H</a>	Handy devices for rapid testing of the tensile force of cable tie tighten pistols	Page 28
	<a href="#">DFG-KBP 500V</a>		
<b>Clamping Tools and Test Fixtures</b>			Page 29 to 47
<b>Accessories</b>	DPN 833, CBMS, BMS-2P	Mini Table Printer, Crimp Height Micrometer	Page 48
<b>KeyFast Data Logger</b>	USB data interface	Direct data acquisition of measured values in PC applications (e.g. Excel®)	Page 49
<b>KeySoft Data Logger</b>	Serial data interface		
<b>Software</b>	MI&Tstat	Software for data recording and statistical analysis of measured values	Page 50
<b>Digital Microscopes</b>	DM, DMST	for optical quality check of small parts	Page 51
<b>Application Field</b>			Page 52
<b>Company Data</b>			Page 53

## Product Range:

The **MI&T GmbH** provides a comprehensive range of high-quality test stations, test systems and force measuring gauges for force, force/stroke as well as strain measurement. The versatile **MI&T** measuring instruments and testers in combination with application specific clamping tools and test fixtures provide flexible test systems for diverse test applications in quality control, research, development and production control. **MI&T** measuring instruments and testers can be used for simple force measurements as well as for sophisticated failure mode experiments. All testers are space-saving units with easy handling, providing high accuracy, reliability, convenience and economy and meet the requirements to the data evaluation and documentation of test results.

In addition to the comprehensive range of standard measuring instruments and testers, standard clamping tools and test fixtures the **MI&T** offers customized special test systems as well as customized clamping tools and test fixtures adapted to the respective customer-specific application.

**MI&T** force measuring gauges, testers and test stations as well as standard and customized tools are designed and manufactured in Germany.

Of course the **MI&T GmbH** provides the service, inspection and calibration for the **MI&T** measuring instruments, testers and accessories and in addition also for force testing units of other manufacturers.

The **MI&T GmbH** stands for consequent innovations in the area of high-precision force measurement and industrial controls. We place particular emphasis on precision, easy operation and high reliability of our test equipment.

## Model Overview Test Stations, Testers and Force Gauges:

Model	Type	Indication Range [Newton]	Resolution [Newton]	Max. relative accuracy error, $\pm$ LSD	Model	Type	Indication Range [Newton]	Resolution [Newton]	Max. relative accuracy error, $\pm$ LSD
MTM	5	0-50	0.005	$\pm 0.25\%$ *	STM	50 kN	0-50000	5	$\pm 0.25\%$ *
MTM	10	0-100	0.01	$\pm 0.25\%$ *	PTC	50	0-500	0.5	$\pm 0.5\%$ *
MTM	25	0-250	0.02	$\pm 0.25\%$ *	PTH	50	0-500	0.5	$\pm 0.5\%$ *
MTM	50	0-500	0.05	$\pm 0.25\%$ *	PTB	50	0-500	0.5	$\pm 0.5\%$ *
MTM	100	0-1000	0.1	$\pm 0.25\%$ *	FTB	5	0-50	0.01	$\pm 0.25\%$ *
MTM	200	0-2000	0.2	$\pm 0.25\%$ *	FTB	10	0-100	0.02	$\pm 0.25\%$ *
MTM	500	0-5000	0.5	$\pm 0.25\%$ *	FTB	25	0-250	0.05	$\pm 0.25\%$ *
MTM	1000	0-10000	1	$\pm 0.25\%$ *	FTB	50	0-500	0.1	$\pm 0.25\%$ *
ATM	5	0-50	0.01	$\pm 0.25\%$ *	FTB	100	0-1000	0.2	$\pm 0.25\%$ *
ATM	10	0-100	0.02	$\pm 0.25\%$ *	CMS	5	0-50	0.005	$\pm 0.1\%$ F.S.
ATM	25	0-250	0.05	$\pm 0.25\%$ *	CMS	10	0-100	0.01	$\pm 0.1\%$ F.S.
ATM	50	0-500	0.1	$\pm 0.25\%$ *	CMS	25	0-250	0.01	$\pm 0.1\%$ F.S.
ATM	100	0-1000	0.2	$\pm 0.25\%$ *	CMS	50	0-500	0.05	$\pm 0.1\%$ F.S.
ATM	200	0-2000	0.5	$\pm 0.25\%$ *	CMS	100	0-1000	0.1	$\pm 0.1\%$ F.S.
ATM	500	0-5000	1	$\pm 0.25\%$ *	CMS	200	0-2000	0.1	$\pm 0.1\%$ F.S.
ATM	1000	0-10000	2	$\pm 0.25\%$ *	CMS	500	0-5000	0.5	$\pm 0.1\%$ F.S.
FTM	5	0-50	0.01	$\pm 0.25\%$ *	CMS	1000	0-10000	1	$\pm 0.1\%$ F.S.
FTM	10	0-100	0.02	$\pm 0.25\%$ *	CMS	5000	0-50000	2	$\pm 0.1\%$ F.S.
FTM	25	0-250	0.05	$\pm 0.25\%$ *	DFG	2	0-2	0.0005	$\pm 0.2\%$ F.S.
FTM	50	0-500	0.1	$\pm 0.25\%$ *	DFG	5	0-50	0.001	$\pm 0.2\%$ F.S.
FTM	100	0-1000	0.2	$\pm 0.25\%$ *	DFG	10	0-10	0.002	$\pm 0.2\%$ F.S.
FTM	200	0-2000	0.5	$\pm 0.25\%$ *	DFG	20	0-20	0.005	$\pm 0.2\%$ F.S.
FTM	500	0-5000	1	$\pm 0.25\%$ *	DFG	50	0-50	0.01	$\pm 0.2\%$ F.S.
FTM	1000	0-10000	2	$\pm 0.25\%$ *	DFG	100	0-100	0.02	$\pm 0.2\%$ F.S.
FTS	5	0-50	0.01	$\pm 0.25\%$ *	DFG	200	0-200	0.05	$\pm 0.2\%$ F.S.
FTS	10	0-100	0.02	$\pm 0.25\%$ *	DFG	500	0-500	0.1	$\pm 0.2\%$ F.S.
FTS	25	0-250	0.05	$\pm 0.25\%$ *	DFG	1000	0-1000	0.2	$\pm 0.2\%$ F.S.
FTS	50	0-500	0.1	$\pm 0.25\%$ *	DFGS	1 kN	0-1000	0.2	$\pm 0.2\%$ F.S.
FTS	100	0-1000	0.2	$\pm 0.25\%$ *	DFGS	2 kN	0-2000	0.5	$\pm 0.2\%$ F.S.
FT(C,H)	5	0-50	0.01	$\pm 0.25\%$ *	DFGS	5 kN	0-5000	1	$\pm 0.2\%$ F.S.
FT(C,H)	10	0-100	0.02	$\pm 0.25\%$ *	DFGS	10 kN	0-10000	2	$\pm 0.2\%$ F.S.
FT(C,H)	25	0-250	0.05	$\pm 0.25\%$ *	DFGS	20 kN	0-20000	5	$\pm 0.2\%$ F.S.
FT(C,H)	50	0-500	0.1	$\pm 0.25\%$ *					

\* within the measuring range

### General Information:

- Space-saving, easy to use Test Station with automatic motor drive, built-in precision load cell and distance measurement device.
- For special applications additional test programmes and accessories are available. The units can be adapted to user-specific test situations and specifications as required.
- The test stations enables pull, press, bend, elongation and break tests in all areas of testing as material testing or production control, quality assurance and incoming inspection.
- A wide range of standard fixing and clamping tools as well as specially designed tools for various applications enable customized adaptations to any particular area of testing.
- Sophisticated electronic control that makes operation easy and simple even for less experienced operators.
- High resolution of 10000 increments.
- Internal measuring rate of 10000 Hz provides high accuracy and consistently captures even critical peak force readings.
- Great and good readable touch screen panel.
- Default settings and special data can be entered using the touch screen panel.
- Optional with built-in printer that uses normal paper
- Adjustable test speed
- Preset of test load for non-destructive tests.
- Hold under load function.
- Integrated position sensor
- Graphic display of measured force/distance curves
- Repeat tests
- Measured value memory
- Test programme selection for standard test programmes and if applicable customized special test programmes.
- RS232C, USB and LAN interface ports
- Applicable measuring tools or measuring devices, e. g. for crimp height or strain measurements can be connected over the standard Digimatic port.
- Quick change tool mounting adapters for tool assembly.

### Model Overview MTM

Type	Indication Range [N]	Resolution [N]
5	0- 50	0.005
10	0- 100	0.01
25	0- 250	0.02
50	0- 500	0.05
100	0- 1000	0.1
200	0- 2000	0.2
500	0- 5000	0.5
1000	0- 10000	1



Test Station MTM 1000 with SG 90 and SHA-40W/A



MTM 100 with SG 80 and DKS-20/A

### Clamping Tools and Test Fixtures:

- |                       |  |
|-----------------------|--|
| Turntable             | UDT 100  |
| Clamping Crowns       | SG 80, SG 90, SG 140                                     |
| Quick Action Grippers | KSH-6, KSP-8, SHA-12, SHA-20, SHA-40                     |
| Cable Clamps          | MK-8, DKS-20, KSS25, KSW 25                              |
| Comb Tools            | KW 1, KW 2   |
| Miniature Grips       | FSEL   |
| mm-Bore Gauge         | HLL for cable insulation pull-off testing                |
| Special fixtures      | for tension and peel tests of ultrasonic welded contacts |
| Plug-in Plate         | SL-BAT for battery cable terminals                       |
- Please see our catalogue for additional standard tools and tool specifications.  
Customer-specific special tools and test fixtures on request.



**MTM Control Unit**



**MTM 50 Test Station with KSH-6/A and UDT 100**

### Technical Specifications:

#### **Test Unit MTM:**

<b>Capacities:</b>	0- 50/100/250/500/1000/2000 N
<b>Dimensions:</b>	ca. 116x520x124 mm (WxDxH).
<b>Weight:</b>	ca. 11 kg.
<b>Capacities:</b>	0- 5000/10000 N
<b>Dimensions:</b>	ca. 176x636x190 mm (WxDxH).
<b>Weight:</b>	ca. 40 kg.
<b>Construction:</b>	durable all metal construction.
<b>Housing:</b>	aluminum
<b>Finish:</b>	anodised oxide layer, titanium grey.
<b>Drive:</b>	DC-Motor with precision linear drive
<b>Linear stroke:</b>	150 mm.
<b>Operation:</b>	via touch screen of the measuring system control unit.
<b>Test speed:</b>	Testers 50 to 2000 N: 5 - 600 mm/min.
<b>(adjustable)</b>	Testers 5 and 10 kN: 5 - 300 mm/min.
	max. tolerance: $\pm 3\%$ F.S.
<b>Test load preset:</b>	10-100% of tester's nominal load.
<b>Break Stop function:</b>	Automatic stop and reversal after break of test specimen.
<b>Cycle function:</b>	The load slide drives between two final positions back and forth continuously.
<b>Power supply:</b>	36 V DC, by external mains adapter.

All test stations are equipped with quick-change tool mounting adapters for tool and test fixture assembly.

### Technical Specifications:

#### **Model Designation: MTM**

<b>Indication Ranges:</b>	0 - 50/100/250/500/1000/2000 N 0 - 5000/10000 N.
<b>Resolution:</b>	10000 increments, see overview
<b>Rel. accuracy error:</b>	$\leq \pm 0.25\% \pm \text{LSD}$ (within the measuring range)

#### **Measuring System MTS:**

##### **Force Transducer:**

DMS-load measuring cell type MWM 80108 with integrated gain and serial port, overload protection 200 to 2000%, depending on range .

##### **Distance Measurement Device:**

integrated sensor, 0-150 mm, resolution 0.01 mm.

##### **Control Unit:**

Dimensions: ca. 195x125x40 mm (WxHxD);  
weight: ca. 800 g

##### **Display:**

Touch screen display 7", capacitive;  
LCD Update rate: minimum 5 Hz.

##### **Operation:**

Operation by keys displayed on touch screen panel  
(for measuring system and drive unit)

##### **Evaluation:**

Internal measuring rate: 10000 Hz;  
Operating Modes: Tracking Mode and Peak Point Mode;  
Tare compensation;  
Test load preset;  
Graphic display of measured force/distance curves;  
Measured-value memory for ca. 10000 values;  
Single and listing output of measured values;  
Real Time Clock for printout with date and time;  
Set-up menu for internal parameter selection and adjustment of measuring system;  
Special test programme sequences, e. g. with automatic reverse and printout as well as repeat test.

##### **Interface Ports:**

RS232C	selectable 300-230400 Baud, 8 data bits, 1 data bit, no parity; connection: SUB-D 9;
Ethernet	network interface, RJ45
USB	connection of USB devices

### Optional Accessories:

- V24 connecting cable for PC
- KeyTast Interface
- Acrylic glass stand for display
- Digital Control System CMS
- Special test programmes
- Customer-specific test programmes and adaptations available on request



### General Information:

The **MI&T** offers optional firmware upgrades, special test programmes and customer-specific test software for the MTM Test Stations also. Already integrated in the standard firmware version integrated but not activated firmware upgrades can be purchased afterwards and activated subsequently without sending the test station back to **MI&T**. Firmware upgrades ordered together with the test station are already activated when the test station is consigned from **MI&T**.

Already included in the standard firmware version integrated but not activated firmware upgrades can be activated as a try out version on request but only as long as the test station is remained switched on and at the maximum for 3 days.

### Firmware Upgrade “Graphic Printout of force/distance gradient”:

The optional firmware upgrade for the "GRAPHIC PRINTOUT" of the force/distance gradient enables the user additionally to print out the force/distance graph, determined with test program force/distance measuring and displayed in the main display, with the built-in printer. Using the standard version of the MTM software only the force peak value of the displayed measuring curve can be printed out by the built-in printer in the operating programme for the force/distance measurement. Activating the optional graphic printout function makes it possible to print out the displayed force/distance curve after completion of the test procedure with the built-in printer. With the measured curve additional a record heading inclusive date and time, force peak value of the measured curve with related distance value and the pre-selected values for load slide stroke and set point are printed out.

### Firmware Upgrade “Webserver”:

The optional firmware upgrade "WEBSERVER" facilitates the output of the measured values stored in the measured value memory of the test station via the Ethernet interface to a PC using a browser (i. e. Microsoft Internet Explorer). Measured values downloaded by the browser with the Webserver programme can be easily pasted into user-defined software or can be stored in the CSV format for processing the data e.g. using Microsoft Excel. For downloading the measured values from the internal memory the MTM Test Station must be connected to a PC or to a local network via the Ethernet (LAN) interface using a suitable connection cable. Preliminarily an appropriate IP address for the test station must be set in the set-up of the MTM Test Station. Entering the IP address of the MTM test station in the browser the Webserver programme of the MTM test station loads the Webserver Start Screen into the browser, which controls the data transmission for the download of the measured values stored in the memory of the test station.

### Special Test Programme “Repeat Test Force”:

The standard version of the MTM Test Station provides a test programme for repeat tests during which the load slide moves back and forth between two defined load slide end positions, which are set in the setup of the test programme. During the repeat test the respective force peak values in both directions are determined for each cycle. Using the optional special test programme "REPEAT TEST FORCE" repeat tests can be carried out during which the test specimen is loaded repeatedly with preliminarily selected test loads, i. e. the load slide moves back and forth between two defined force values. Also it is possible to store given test values (for example, the first or hundredth value, or each tenth and hundredth value) in memory and to print out or output these values.

### Special Test Programme “Hold Time”:

Using the firmware upgrade “Hold Time” in the non-destructive test mode the hold time in function “hold under load” can be determined and outputted. The maximum hold time of 180 seconds in the standard programme is extended to a maximum hold time of 2000 seconds with the firmware upgrade. Furthermore after expiration of the pre-selected hold time at the set point force it is possible to load the test specimen automatically with an increasing load up to its breaking point and to determine the peak value.

### Firmware Upgrade “PC Keyboard”:

The firmware upgrade “PC KEYBOARD” allows to operate the MTM Test Station using an external USB PC keyboard. Standard PC keyboards as well as accordingly against pollution protected keyboards and small size keyboards are suitable for the use with MTM Test Station. The USB keyboard is connected to the USB interface of the MTM control unit. All displayed keys can be activated using the keyboard and all inputs in the set-up menus can be inputted using the keyboard. The function keys F1 to F12 of the PC keyboard are assigned in measuring mode to the functions of the keys in the MEASURED VALUE display.



## General Information:

- Compact and space saving Test Station for tension and compression tests with digital indication and automatic motor drive.
- Versatile usable Test Station e.g. for pull-off tests of crimped, pressed, soldered and glued parts as cables with crimped terminals, connectors of cable harnesses as well as for insertion and extraction tests of connectors, cable insulation pull-off testing, testing cable ties and shearing tests.
- 10000 Hz measuring rate captures even critical peak force readings.
- Measuring system with high accuracy and repeatability.
- Motorized drive with adjustable and controlled test speed
- Break Stop function with automatic stop and reversal after break of test specimen.
- Preset of test load for non-destructive tests.
- Autoprint Function
- Hold under load function, selectable 60, 120, 180 s.
- Continuous cycle operation.
- Indication and operation of measuring system via durable infrared sensor screen with dot matrix LCD-display.
- Keypad control unit for operation of drive system
- Tare compensation
- Peak Point Mode with indication of the highest measured force value
- Tracking Mode with indication of current force values.
- Measured-value memory.
- Single and listing output of measured values via serial port.
- Real time clock for printout with date and time.
- Overload indication.
- Mechanical overload protection of load cells.
- Serial port for data output.
- Set-up menu for internal parameter setting and adjustment of measuring system.
- Safety-System with safety stop function
- Rugged all metal construction.
- Quick change tool mounting adapters for tool assembly.

## Model Overview ATM:

Type	Indication Range [N]	Resolution [N]
5	0- 50	0.01
10	0- 100	0.02
25	0- 250	0.05
50	0- 500	0.1
100	0- 1000	0.2
200	0- 2000	0.5
500	0- 5000	1
1000	0- 10000	2



ATM 100 with tools SG 80 and DKS-20/A



ATM 50 with tools UDT 100 and MK-8/A

## Clamping Tools and Test Fixtures:

- |                       |   |
|-----------------------|---|
| Turntable             | UDT 100, UDT 100-v                        |
| Clamping Crowns       | SG 80, SG 90                              |
| Quick Action Grippers | KSH-6, KSP-8, SHA-12, SHA-20, SHA-40      |
| Cable Clamps          | MK-8, DKS-20, KSS 25, KSW 25              |
| Plug-in Plate SL-BAT  | for battery cable terminals               |
| Comb Tool             | KW 1, KW 2                                |
| Miniature Grips       | FSEL                                      |
| mm-Bore Gauge         | ML1 for cable insulation pull-off testing |
| Tool Set KBP          | for testing cable tie pistols             |
| Step Cone KBS         | for testing cable ties                    |
| Tool Set KLH          | for insertion and extraction tests        |
- Please see our catalogue for additional standard tools and tool specifications. Customer-specific special tools and test fixtures on request.



ATM 1000 with tools SG 90 and SHA-40/A

### Technical Specifications:

#### **Test Unit ATM:**

<b>Capacities:</b>	0- 50/100/250/500/1000/2000 N
<b>Dimensions:</b>	ca. 116x520x124 mm (WxDxH).
<b>Weight:</b>	ca. 12 kg.
<b>Capacities:</b>	0- 5000/10000 N
<b>Dimensions:</b>	ca. 176x636x190 mm (WxDxH).
<b>Weight:</b>	ca. 40 kg.
<b>Construction:</b>	durable all metal construction.
<b>Housing:</b>	aluminium
<b>Finish:</b>	anodised oxide layer, titanium grey/silver.
<b>Drive:</b>	DC motor with linear drive
<b>Linear stroke:</b>	150 mm.
<b>Test speed:</b>	testers 50 to 2000 N: 5-600 mm/min.
<b>(adjustable)</b>	testers 5 and 10 kN: 5-300 mm/min.
	controlled test speed,
	max. tolerance: $\pm 3\%$ F.S.
<b>Break Stop</b>	
<b>Function:</b>	automatic stop and reversal after break of test specimen.
<b>Test load preset:</b>	10-100% of tester's rated load.
<b>Cycle function:</b>	the load slide continuously drives between 2 end positions back and forth.
<b>Operation:</b>	keypad control unit with On/Off-switch and 6 keys for functions: Start/Stop, Quick Reverse, Pull, Press, Break Stop and Cycle.
<b>Power supply:</b>	24 (36 V) DC, external mains adapter.
All test stations are equipped with quick-change tool mounting adapters for tool and test fixture assembly.	

### Technical Specifications:

#### **Model Designation: ATM**

<b>Indication Ranges:</b>	0 - 50/100/250/500/1000/2000 N 0 - 5000/10000 N.
<b>Resolution:</b>	4000/5000 increments, see overview
<b>Rel. accuracy error:</b>	$\leq \pm 0.25\% \pm \text{LSD}$ (within the measuring range)

#### **Force Measuring System AMS:**

##### **Force Transducer:**

DMS-load cells type MWM 80108V with integrated AD-converter and RS485 bus. Overload protection 200 to 2000% according to nominal load of load cell.  
 Internal measuring rate: 10000 Hz;

##### **Control Unit:**

**Dimensions:** ca. 125x105x70 mm (WxDxH);

##### **Display:**

Dot matrix LCD display with LED background lighting, 128x64 pixel, 56.3x38.4 mm.  
 LCD update rate: 5 Hz.

##### **Operation:**

Operation of all displayed keys via infrared sensor screen.  
 Test speed adjustment and set point selection for the drive unit also via the measuring system control unit.

##### **Evaluation:**

Operating Modes: Tracking Mode and Peak Point Mode;  
 Tare compensation;  
 Test load preset for non-destructive tests;  
 Hold under load function, selectable 60, 120 or 180 s, optional with following destruction of test specimen.  
 Autoprint function;  
 Measured value memory for 10000 measured values;  
 Single and listing output via serial port;  
 Real time clock for printout with date and time.  
 Language for printout selectable: D, E.  
 Overload indication;  
 Setup Menu internal parameter selection and adjustment of measuring system;

##### **Serial Port:**

RS232C      selectable parameters: 1200-38400 Baud,  
                  7/8 data bits, 1/2 stop bits,  
                  parity: even/none/odd;  
                  Connector: RJ45.

### Optional Accessories:

- Mini Table Printer DPN 833
- Data Transmission Cable for printer connection
- Data Transmission Cable for PC connection
- Keystast Interface
- Protective Covers
- Please see our catalogue for additional accessories.
- Customer-specific test programmes and adaptations available on request

## General Information:

- Force Tester for tension, compression, bend and breaking tests.
- Tester with motorized drive unit for constant test speed for precise and dependable measurements in production line testing, incoming inspection and laboratory tests.
- 3 factory-provided test speeds, selectable by customer between 5 and 600 mm/min (for testers up to 2000 N) respectively 5 to 300 mm/min (for 5 and 10 kN testers).
- Usable for tensile and compression tests on all types of materials.
- 8 types with different measuring ranges are available for selection of highest possible measuring accuracy for the respective application.
- Easy to operate and space-saving tester.
- Indication and operation of the measuring system via durable infrared sensor screen with dot matrix LCD-Display.
- High measuring accuracy and repeatability.
- 10000 Hz internal update rate for exact force readings.
- Peak Point Mode with indication of the highest measured force value.
- Tracking Mode with indication of current force values.
- Tare compensation.
- Set point capability.
- Measured value memory.
- Serial port for data output.
- Optical and acoustic overload indication.
- Set-up menu for internal parameter setting and adjustment.
- Mechanical overload protection of load cell up to 200 to 2000% of nominal load (according to range).
- Maintenance-free and durable all metal construction.
- Quick change tool mounting adapters for tool and test fixture assembly.

## Model Overview FTM:

Type	Indication Range [N]	Resolution [N]
5	0- 50	0.01
10	0- 100	0.02
25	0- 250	0.05
50	0- 500	0.1
100	0- 1000	0.2
200	0- 2000	0.5
500	0- 5000	1
1000	0- 10000	2



FTM 500 with tools SG 90 and SHA-40/A



FTM 50 with tools UDT 100 and KSH-6/A

## Clamping Tools and Test Fixtures:

Turntable	UDT 100, UDT 100-v
Clamping Crowns	SG 80, SG 90
Quick Action Grippers	KSH-6, KSP-8, SHA-12, SHA-20, SHA-40
Cable Clamps	MK-8, DKS-20, KSS 25, KSW 25
Plug-in Plate	SL-BAT for battery cable terminals
Comb Tools	KW 1, KW 2
Miniature Grips	FSEL
mm-Bore Gauge	ML1 for cable insulation pull-off testing
Tool Set	KBP for testing cable tie pistols
Step Cone	KBS for testing cable ties
Tool Set	KLH for insertion and extraction tests

Please see our catalogue for additional standard tools and tool specifications. Customer-specific special test fixtures and tools on request.





FTM 50 with SG 80 and MK-8/A

### Technical Specifications:

#### Test Unit FTM:

Capacities:	0- 50/100/250/500/1000/2000 N
Dimensions:	ca. 116x520x124 mm (WxDxH).
Weight:	ca. 10 kg.
Capacities:	0- 5000/10000 N
Dimensions:	ca. 176x636x190 mm (WxDxH).
Weight:	ca. 40 kg.
Construction:	durable all metal construction.
Housing:	aluminium
Finish:	anodised oxide layer, titanium grey.
Drive:	DC motor with linear drive.
Linear stroke:	150 mm.
Speed:	testers 50 to 2000 N: standard speeds 50, 100 and 300 mm/min (customized speeds between 5 and 600 mm/min on request). testers 5000 and 10000 N: standard speeds: 50, 100 and 300 mm/min. (customized speeds between 5 and 300 mm/min on request).
Speed accuracy:	max. $\pm 3\%$ F.S.
Control unit:	keypad control unit with On/Off-switch and 6 keys for the drive control: each 3 keys per direction for test speed 50, 100 and 300 (500) mm/min
Operating mode:	manual, travel platform drives during drive key actuation, at release of drive key motor drive stops automatically.
Power supply:	24 (36) V DC, external mains adapter.

All testers are equipped with quick-change tool mounting adapters for tool and test fixture assembly.

### Technical Specifications:

#### Model Designation: FTM

Indication Ranges:	0- 50/100/250/500/1000/2000 N 0- 5000/10000 N.
Resolution:	4000/5000 increments, see model overview
Rel. accuracy error:	$\leq \pm 0.25\% \pm \text{LSD}$ (within the measuring range)

#### Force Measuring System FMS:

##### Force Transducer:

DMS-load cells type MWM 80108V with integrated AD-converter and RS485 bus. Overload protection 200 to 2000% according to nominal load of load cell.  
Internal measuring rate: 10000 Hz;

##### Control Unit:

Dimensions:	ca. 125x105x70 mm (WxDxH);
Supply voltage:	12-24 V DC.

##### Display:

Dot matrix LCD display with LED background lighting, 128x64 pixel, 56.3x38.4 mm. LCD update rate: 5 Hz.

##### Operation:

Operation of all displayed keys via infrared sensor screen.

##### Evaluation:

Operating Modes: Tracking Mode and Peak Point Mode;  
Tare compensation; Setpoint capability;  
Measured value memory for 10000 measured values;  
Single and listing output via serial port;  
Real time clock for printout with date and time.  
Language for printout selectable: D, E.  
Overload indication;  
Setup Menu internal parameter selection and adjustment of measuring system.

##### Serial Port:

RS232C	selectable parameters: 300-76800 Baud, 7/8 data bits, 1/2 stop bits, parity: none/even/odd. connector: RJ45.
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### Optional Accessories:

- Mini Table Printer
- Data Transmission Cable for printer connection
- Data Transmission Cable for PC connection
- Keystast Interface
- Please see our catalogue for additional accessories.

## General Information:

- Force Tester for tensile, compression, bend and break tests.
- Manually operated by hand wheel for evenly applied test load.
- Tester for accurate and dependable measurements in all fields of application.
- Usable for tensile and compression tests on all types of materials.
- Self-locking linear drive features good positioning of load slide and holds under load
- High measuring accuracy and repeatability.
- 5 types with different measuring ranges are available for selection of highest possible measuring accuracy for the respective application.
- Easy to operate and space-saving tester.
- Indication and operation of the measuring system via durable infrared sensor screen with dot matrix LCD display.
- 10000 Hz internal update rate ensures exact force readings.
- Tare compensation.
- Peak Point Mode with indication of the highest measured force value
- Tracking Mode with indication of current force values.
- Set point capability.
- Measured value memory for 1000 values.
- Serial port for data output.
- Set-up menu for internal parameter setting and adjustment of measuring system.
- Optical and acoustic overload indication.
- Overload protection of load cell: 700 to 2000% of nominal load (according to range).
- Maintenance-free and durable all metal construction.
- Quick change tool mounting adapters for tool and test fixture assembly.

## Model Overview FTS:

Type	Indication Range [N]	Resolution [N]
5	0- 50	0.01
10	0- 100	0.02
25	0- 250	0.05
50	0- 500	0.1
100	0- 1000	0.2



FTS 50 with UDT 100 and KSH-6/A



FTS Tester with hand wheel

## Clamping Tools and Test Fixtures:

Universal Turntable	UDT 100
Clamping Crown	SG 80
Quick Action Grippers	KSH-6, KSP-8, SHA-12, SHA-20
Cable Clamps	MK-8, DKS-20
Comb Tools	KW 1, KW 2
Miniature Grips	FSEL
Tool Set	KBP for testing cable tie pistols
Step Cone	KBS for testing cable ties
Tool Set	KLH for insertion and extraction tests

Please see our catalogue for additional standard tools and tool specifications.

Customer-specific special test fixtures and tools on request.

### Technical Specifications:

#### **Model Designation: FTS**

Indication Ranges: 0- 50/100/250/500/1000 N

Resolution: 4000/5000 increments, see model overview

Rel. accuracy error:  $\leq \pm 0.25\% \pm \text{LSD}$   
 (within the measuring range)

#### **Test Unit FTS:**

Capacities: 0- 50/100/250/500/1000 N

Dimensions: 116x520x124 mm (WxDxH).

Weight: ca. 10 kg.

Housing: aluminum

Finish: anodised oxide layer, titanium grey.

Linear stroke: 150 mm.

Max. capacity: 1000 N

Precise self-locking linear drive with hand wheel operation, holds rated loads without slip.

feed: 1 mm per turn of hand wheel.

Maintenance-free and durable all metal construction.

All testers are equipped with quick-change tool mounting adapters for tool and test fixture assembly.

#### **Force Measuring System FMS:**

##### **Force Transducer:**

DMS-load cell Type MWM 80108V with integrated 16 bit AD converter and RS485 bus. Overload protection 700 to 2000% (depending on type).

Internal update rate: 10000 Hz;

##### **Control Unit:**

Dimensions: ca. 125x105x70 mm (WxDxH);

Supply voltage: 12-24 V DC by external mains adapter.

##### **Display:**

Dot matrix LCD display with LED background lighting, 128x64 pixel, 56.3x38.4 mm. LCD update rate: 5 Hz.

##### **Operation:**

Operation of all displayed keys via infrared sensor screen.

##### **Evaluation:**

Operating Modes: Tracking Mode and Peak Point Mode;

Tare compensation; Setpoint capability;

Measured value memory for 10000 measured values;

Single and listing output via serial port;

Real time clock for printout with date and time.

Language for printout selectable: D, E.

Overload indication;

Setup Menu internal parameter selection and adjustment of measuring system.

##### **Serial Port:**

RS232C

selectable parameters: 300-76800 Baud,

7/8 data bits, 1/2 stop bits,

parity: none/even/odd.

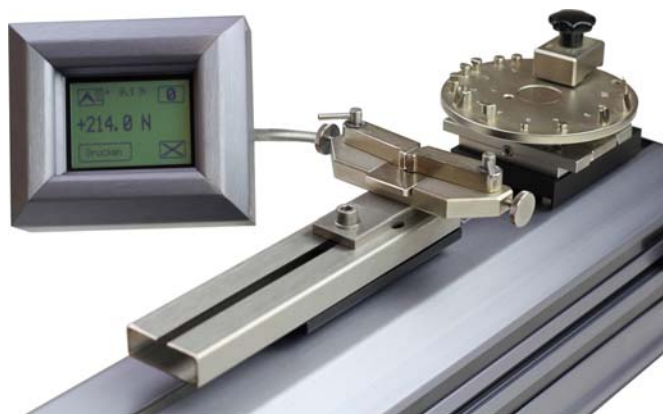
connector: RJ45.



**FTS 50 with MK-8/A and SG 80**

### Optional Accessories:

- Mini Table Printer
- Data Transmission Cable for printer connection
- Data Transmission Cable for PC connection
- Keystast Interface
- Force Measuring System CMS
- Please see our catalogue for additional accessories.

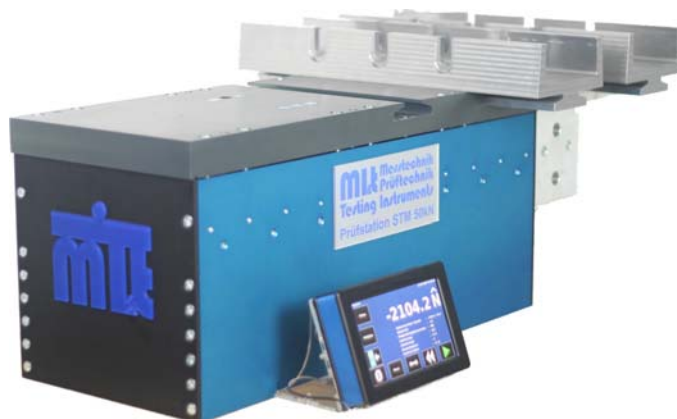


**Detail FTS with KSH-6/A and UDT 100**



### General Information:

- Compact and easy-to-use test station with great touch panel and automatic motor drive for tension and compression tests.
- Versatile usable Test Station e.g. for pull-off tests of crimped, pressed, welded and glued parts as cables with crimped terminals, contact plates, connectors of cable harnesses as well as for tension and compression tests in materials testing.
- Indication range 0 to 50 kN, Resolution 5 N
- Measuring system with high accuracy and repeatability.
- Motorized drive with adjustable and controlled test speed
- Quick change tool mounting adapter for tool assembly
- Peak Point Mode with indication of the highest measured force value
- Tracking Mode with indication of current force values.
- Break Stop function with automatic stop and reversal after break of test specimen.
- Preset of test load for non-destructive tests.
- Operation of measuring system and drive unit via capacitive touch panel.
- Tare compensation
- Overload indication.
- Measured-value memory.
- Single and listing output of measured values via serial port.
- Interfaces: RS232C, USB, Ethernet
- Set-up menu for internal parameter setting and adjustment of measuring system.



STM 50kN in Standardausführung

### Technical Specification:

#### Model Designation: STM 50kN

Indication Range: 0 – 50 kN  
Resolution: 5 N  
Rel. accuracy error:  $\leq \pm 0.25\% \pm \text{LSD}$   
(within the measuring range)

#### Force Measuring System:

##### Force Transducer:

DMS-load cell with integrated 16 bit AD-converter.  
Overload protection up to 150% of nominal load of load cell.

##### Belastungseinrichtung:

Dimensions: ca. 800x300x300 mm (BxTxH);  
Weight: ca. 100 kg (without testing tools);

Construction: durable all metal construction  
mechanical overload protection.

Housing: stainless steel / aluminium  
Finish: silver / blue, anodised oxide layer  
Drive: BLDC motor with linear drive  
Linear stroke: 150 mm.  
Test speed: adjustable 5-300 mm/min.  
controlled test speed,  
max. tolerance:  $\pm 1\%$

Break Stop  
Function: automatic stop and reversal after break of  
test specimen.

#### Operation:

Operation of all displayed keys for measuring system and drive control via capacitive touch panel.

#### Evaluation:

Operating Modes: Tracking Mode and Peak Point Mode;  
Internal update rate 10000 Hz;  
Tare compensation; Overload indication; Test load preset for non-destructive tests; Measured value memory for 10000 measured values;  
Single and listing output via serial port;  
Setup Menu for internal parameter selection and adjustment of measuring system;  
Power supply: 48 V DC, external mains adapter.



### Model Overview STM:

Type	Indication Range	Auflösung [N]
50 kN	0- 50000	5



### General Information:

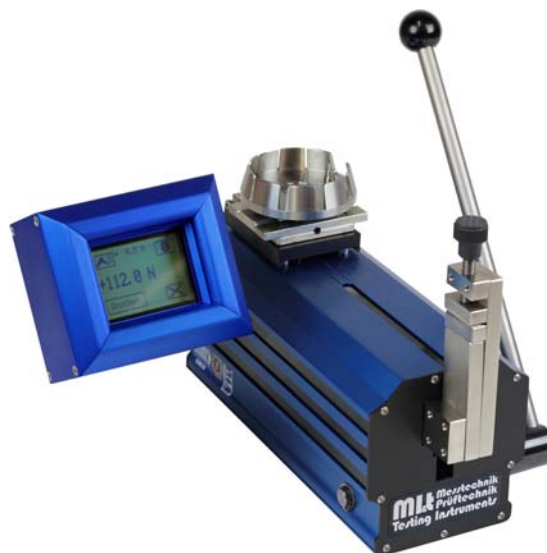
- Force Tester for pull and press force tests in material testing and quality control, e. g. for pull-off test at crimped terminals, connectors, components, etc.
- Easy to operate and space-saving testers.
- Manual operation by hand lever.
- **Model FTC** with hand lever and cable clamping fixture with automatic gripping during hand lever actuation.
- **Model FTH** with hand lever and load slide with precise linear motion, load slide stroke ca. 50 mm, quick change tool fitting on measuring point and load slide for clamping tool and test fixture assembly.
- Maintenance-free and durable all metal construction.
- 4 types with different measuring ranges are available for selection of highest possible measuring accuracy for the respective application.
- Accuracy class 0.25
- Easy to operate and space-saving tester.
- Indication and operation of the measuring system via durable infrared sensor screen with dot matrix LCD-Display.
- High measuring accuracy and repeatability.
- 10000 Hz internal update rate for exact force readings.
- Peak Point Mode with indication of the highest measured force value.
- Tracking Mode with indication of current force values.
- Tare compensation.
- Set point capability.
- Measured value memory and real time clock.
- Optical and acoustic overload indication.
- Serial port for data output of measured values.
- Setup menu for internal parameter setting and adjustment.
- Mechanical overload protection of load cell up to 700 to 2000% of nominal load (according to range).
- Quick change tool mounting adapters for tool and test fixture assembly.

### Model Overview FTC, FTH:

Type	Indication Range [N]	Resolution [N]
5	0- 50	0.01
10	0- 100	0.02
25	0- 250	0.05
50	0- 500	0.1



FTH Tester with SG 80 and MK-8/A



FTC 50 with SG 80 and automatic cable clamping fixture

### Clamping Tools and Test Fixtures:

Turntable	UDT 100
Clamping Crown	SG 80
Quick Action Grippers	KSH-6, KSP-8, SHA-12, SHA-20
Cable Clamps	MK-8, DKS-20
Comb Tools	KW 1, KW 2
Miniature Grips	FSEL
Tool Set	KBP for testing cable tie pistols
Step Cone	KBS for testing cable ties
Tool Set	KLH for insertion and extraction tests

Please see our catalogue for additional standard tools and tool specifications. Customer-specific special test fixtures and tools on request.



**FTH 50 with UDT 100 and DKS-20/A**

### Technical Specifications:

#### **Load device FTC Tester:**

Capacity:	500 N.
Dimensions:	ca. 116x275x124 mm (WxDxH);
Weight:	ca. 8 kg;
Construction:	Maintenance-free all metal construction.
Housing:	Aluminium
Finish:	anodised oxide layer, blue.
Load device	parallel stroke of load slide, precise linear motion, hand lever actuation, cable clamping fixture with automatic gripping during hand lever actuation, quick change tool mounting adapter on measuring point for tool and test fixture assembly.
Load slide stroke:	ca. 50 mm.

#### **Load device FTH Testers:**

Capacity:	500 N.
Dimensions:	ca. 116x275x124 mm (WxDxH);
Weight:	ca. 8 kg;
Construction:	Maintenance-free all metal construction.
Housing:	Aluminium
Finish:	anodised oxide layer, blue.
Load device	Parallel stroke of load slide, precise linear motion, hand lever actuation, load slide with precise linear motion, quick change tool mounting adapters on measuring point and load slide for clamping tool and test fixture assembly.
Load slide stroke:	ca. 50 mm.

### Technical Specifications:

#### **Model Designations: FTC, FTH:**

Indication Ranges:	0- 50/100/250/500 N.
Resolution:	5000 increments, see model overview
Rel. accuracy error:	$\leq \pm 0.25\% \pm \text{LSD}$ (within the measuring range).

#### **Force Measuring System FMS:**

##### **Control Unit:**

Dimensions:	ca. 125x105x70 mm (WxDxH);
Supply voltage:	12-24 V DC.

##### **Force Transducer:**

DMS-load cells type MWM 80108V with integrated AD-converter and RS485 bus. Overload protection 700 to 2000% according to nominal load of load cell.  
Internal measuring rate: 10000 Hz;

##### **Display:**

Dot matrix LCD display with LED background lighting, 128x64 pixel, 56.3x38.4 mm. LCD update rate: 5 Hz.

##### **Operation:**

Operation of all displayed keys via infrared sensor screen.

##### **Evaluation:**

Operating Modes: Tracking Mode and Peak Point Mode;  
Tare compensation; Setpoint capability;  
Measured value memory for 10000 measured values;  
Single and listing output via serial port;  
Real time clock for printout with date and time.  
Language for printout selectable: D, E.  
Overload indication;  
Setup Menu internal parameter selection and adjustment of measuring system.

##### **Serial Port:**

RS232C	selectable parameters: 300-76800 Baud, 7/8 data bits, 1/2 stop bits, parity: none/even/odd. connector: RJ45.
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### Optional Accessories:

- Mini Table Printer
- Data Transmission Cable for printer connection
- Data Transmission Cable for PC connection
- Keystast Interface
- Please see our catalogue for additional accessories.

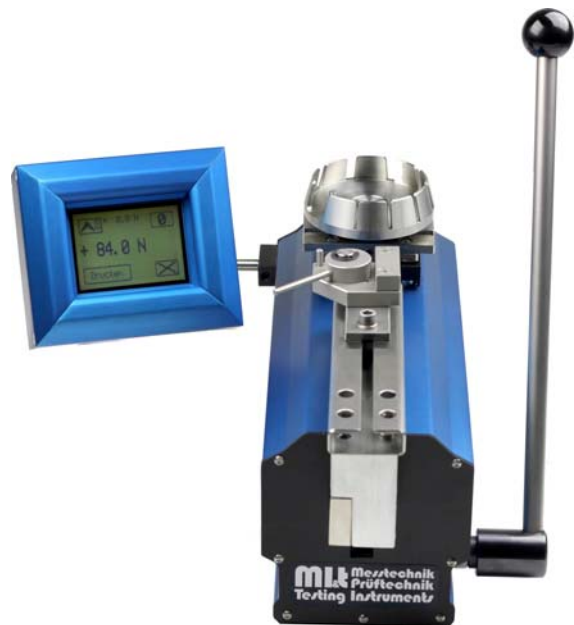


### General Information:

- Force Tester for pull and press force tests in material testing and quality control, e. g. for pull-off test at crimped terminals, connectors, components, etc.
- Indication range: 0 to 500 N
- Resolution: 0.5 N.
- Accuracy class 0.5
- Easy to operate and space-saving testers.
- Manual operation by hand lever.
- **Model PTC 50** with hand lever and cable clamping fixture with automatic gripping during hand lever actuation.
- **Model PTH 50** with hand lever and load slide with precise linear motion, load slide stroke ca. 50 mm, quick change tool fitting on measuring point and load slide for clamping tool and test fixture assembly.
- Indication and operation of the measuring system via durable infrared sensor screen with dot matrix LCD-Display.
- High measuring accuracy and repeatability.
- 10000 Hz internal update rate for exact force readings.
- Peak Point Mode with indication of the highest measured force value.
- Tracking Mode with indication of current force values.
- Tare compensation.
- Optical and acoustic overload indication.
- Serial port for data output of measured value.
- Setup menu for internal parameter setting and adjustment.
- Mechanical overload protection of load cell up to 3500 N.
- Maintenance-free and durable all metal construction.
- Quick change tool mounting adapters for tool and test fixture assembly.



**PTC 50 with SG 80 and automatic cable clamping fixture**



**PTH 50 with SG 80 and MK-8/A**

### Clamping Tools and Test Fixtures:

Turntable	UDT 100
Clamping Crowns	SG 80
Quick Action Grippers	KSH-6, KSP-8, SHA-12, SHA-20
Cable Clamps	MK-8, DKS-20
Comb Tools	KW 1, KW 2
Miniature Grips	FSEL
Tool Set	KBP for testing cable tie pistols
Step Cone	KBS for testing cable ties
Tool Set	KLH for insertion and extraction tests

Please see our catalogue for additional standard tools and tool specifications. Customer-specific special test fixtures and tools on request.



PTH 50 with SG 80 and MK-8/A

### Technical Specifications:

#### Load device PTC 50 Tester:

Capacity:	500 N.
Dimensions:	ca. 116x275x124 mm (WxDxH);
Weight:	ca. 8 kg;
Construction:	Maintenance-free all metal construction.
Housing:	Aluminium
Finish:	Anodised oxide layer, blue.
Load device	Parallel stroke of load slide, precise linear motion, hand lever actuation, cable clamping fixture with automatic gripping during hand lever actuation, quick change tool mounting adapter on measuring point for tool and test fixture assembly.
Load slide stroke:	ca. 50 mm.

#### Load device PTH 50 Tester:

Capacity:	500 N.
Dimensions:	ca. 116x275x124 mm (WxDxH);
Weight:	ca. 8 kg;
Construction:	Maintenance-free all metal construction.
Housing:	Aluminium
Finish:	Anodised oxide layer, blue.
Load device	Parallel stroke of load slide, precise linear motion, hand lever actuation, load slide with precise linear motion, quick change tool mounting adapters on measuring point and load slide for clamping tool and test fixture assembly.
Load slide stroke:	ca. 50 mm.

### Technical Specifications:

#### Model Designations: PTC 50, PTH 50:

Indication Range:	0 to 500 N.
Resolution:	0.5 N
Rel. accuracy error:	$\leq \pm 0,5\% \pm \text{LSD}$ (within the measuring range).

#### Force Measuring System:

##### Control Unit:

Dimensions:	ca. 125x105x70 mm (WxDxH);
Supply voltage:	12-24 V DC.

##### Force Transducer:

DMS-load cells type MWM 80108 with integrated AD-converter and RS485 bus. Overload protection up to 3500 N.

##### Display:

Dot matrix LCD display with LED background lighting, 128x64 pixel, 56.3x38.4 mm. LCD update rate: 5 Hz.

##### Operation:

Operation of all displayed keys via infrared sensor screen.

##### Evaluation:

Internal measuring rate: 10000 Hz;  
 Operating Modes: Tracking Mode and Peak Point Mode;  
 Tare compensation;  
 Single output of measured value via serial port;  
 Overload indication;  
 Setup Menu internal parameter selection and adjustment of measuring system;  
 Language for setup menu selectable: D, E

##### Serial Port:

RS232C	selectable parameters: 300-76800 Baud, 7/8 data bits, 1/2 stop bits, parity: none/even/odd. connector: RJ45.
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### Optional Accessories:

- Mini Table Printer
- Data Transmission Cable for printer connection
- Data Transmission Cable for PC connection
- Keytast Interface
- Please see our catalogue for additional accessories.

## General Information:

- Digital high-precision force measuring system for measurements of tensile and compressive forces.
- Force measuring system consisting of high-precision remote load cell with sensor interface CMS (A/D converter and USB interface) integrated in the connection cable of the load cell and CMS configuration and evaluation software. Optional the force measuring system can be supplied with a tablet display, tablet computer or laptop, each with installed and fully configured software.
- Configuration and evaluation software for analysis and graphical presentation.
- High measuring accuracy, resolution and repeatability.
- Easy operation.
- Rapid internal update rate consistently captures even critical force readings
- Tracking Mode with indication of current force values.
- Minimum and maximum value memory (resettable).
- Variable average determination.
- Tare compensation.
- User settable upper and lower limit (OK/NOK evaluation).
- Graphical presentation of measured values (force/time).
- Manual or automatic storage in a CSV- and BMP-file.
- Scaling function of the input variable to any display value with unit.
- Configuration menu for general parameter setting.
- Load cells with different capacities can be used and operated alternately. After factory parameterization of the CMS interface of the respective load cell, the CMS software recognizes each load cell automatically. Thus, measurement can be started immediately after connection of the load cell through the USB-connector of the interface.
- Ideally suitable for calibration of MI&T test stations and testers.



Measured valued display with force/time graph

## Technical Specifications:

<b>Model Designation:</b>	<b>CMS</b>
Indication Ranges:	depending on load cell model, see e. g. SM load cells.
Resolution:	depending on rated output of load cell per $\pm 1 \text{ mV/V} = \pm 10000$ digits
Accuracy error:	$\leq \pm 0.1\% \text{ F.S.} \pm \text{LSD}$ .
<b>Load Cells:</b>	see specifications of SM load cells
<b>Sensor Interface:</b>	
Interface:	USB
Power Supply:	from USB, 4 V, $\leq 20 \text{ mA}$
Measured Values:	$\pm 3 \text{ mV/V} = \pm 30000$ digits
Resolution:	$1 \text{ mV/V} = 10000$ digits
Zero Point:	0 Digits
Output Format:	16 Bit Signed Int.
Internal update rate:	adjustable, max. 5000 Hz
Accuracy:	$\pm 32 \text{ Bit}$
Cable lengths:	sensor cable 1m USB cable 0.5 m (max. 2 m) with USB-A connector
Dimensions:	25x115 mm ( $\varnothing \times L$ ), weight: 250 g.
Miscellaneous:	Temperature drift: 4 Bit/K Nominal temperature range: $+10 \dots +40 \text{ }^\circ\text{C}$ Service temperature range: $+10 \dots +40 \text{ }^\circ\text{C}$ Storage temperature range: $+10 \dots +70 \text{ }^\circ\text{C}$ Protection class: IP67

## Configuration & Evaluation Software:

Indication of current measuring value (tracking mode), single measurement, graphical presentation of measured values (force/time, automatic scaling of Y-axis), resettable maximum value (peak value) memory, resettable minimum value memory, tare compensation, variable average determination (adjustable), adjustable lower and upper limit for OK/NOK evaluation, automatic and manual storage in a CSV- and BMP-file, operating languages: German, English, French (selectable).

## System requirements:

Windows '00 / '03 / '08 / XP / Vista / 7 32/64 / 8  
Single Core ex 2.0 GHz (without diagram)  
Dual Core ex 1.8 GHz (with diagram)

## Optional Accessories:

- Tablet display with installed and fully configured CMS software.
- Tablet computer with installed and fully configured CMS software.
- Laptop with installed and fully configured CMS software.
- Installation service: upon customer's request MI&T can install and configure the MSC software on a provided, customer-owned computer.
- External control signal excitation in the load cell in order to check the adjustment of the load cell at any time.



Tablet display with presentation of measured values



### General Information:

- The load cells of the model series SM can be used in all fields of application of tensile and compressive force measurements.
- Separate load cells, to be connected by a detachable cable to the force gauge or force measuring system.
- In combination with a CMS force measuring system an efficient measuring system is provided for precise force measurements.
- The aluminium base body of the load cells is characterized by high stability and stiffness.
- If loaded the DMS load cells of S beam type generate a rated output signal, which is exact proportional to the applied load.
- Under load the resulting deflection of the base body is measured by strain gages, which are mounted on the S beam base body. The force measuring gauge/system evaluates whose rated output.
- The precise manufactured internal construction ensures that the applied forces are concentrated into defined areas whereas inaccuracies caused by side forces or bend moments are minimized.
- To obtain measurements with highest possible accuracy it is necessary to ensure that the load path must be through the load axis of the load cell. Loads not being perfectly aligned should be avoided.
- At top and bottom of the load cells there is each one threaded hole to mount in either tension or compression applications.
- During the use and assembly of load cells a suitable overload protection must be installed, especially in case of load cells with small capacities.



Load cell SM 1000 N



Load cell SM 5000 N

### SM with Force Measuring System CMS:

Type	Indication Range [N]	Resolution* [N]
50	0- 50	0.005
100	0- 100	0.01
200	0- 200	0.01
250	0- 250	0.01
500	0- 500	0.05
1000	0- 1000	0.1
2000	0- 2000	0.1
5000	0- 5000	0,5
10000	0- 10000	1

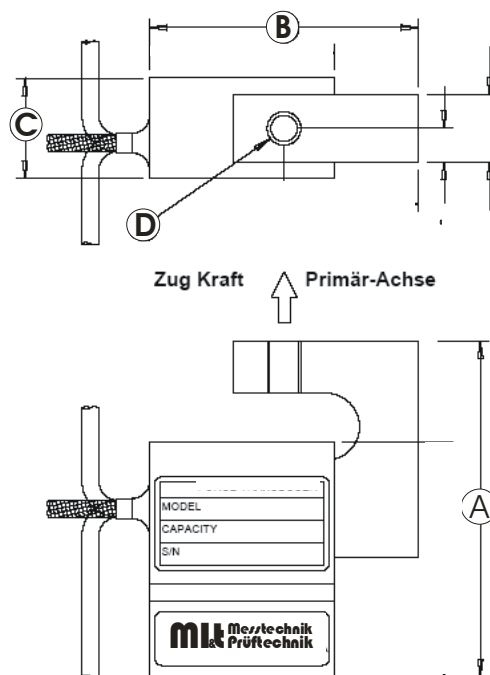
\* recommended setting for the resolution in CMS

### Technical Specifications:

#### Model Designation: SM

Capacity [N]:	accord. to below-mentioned table
Rated Output:	2-3 mV/V
Input Resistance:	350 ± 3,5 Ω
Output Resistance:	350 ± 3,5 Ω
Excitation Voltage:	15 V DC max.
Deflection:	0.076-0.127 mm (according to type)
Weight:	ca. 190-300 g (depend. on model)
Cable:	4-wire cable with shield, 1 m length
Nonlinearity:	±0.03-0.06% FS
Zero Balance:	±1% RO
Insulation Resistance:	5 GΩ (Bridge/Housing)
Safe Overload:	±150% of capacity
Breaking Load:	±500% of capacity

#### Capacities and dimensions:



Model	Capacity [N]	A [mm]	B [mm]	C [mm]	D
SM 50 N	50	64	51	19	M6
SM 100 N	100	64	51	19	M6
SM 200 N	200	64	51	19	M6
SMT 250 N	250	64	59	17	M6
SM 500 N	500	64	51	19	M6
SM 1000 N	1000	64	51	19	M6
SM 2000 N	2000	76	51	19	M12
SM 5000 N	5000	76	51	19	M12
SSM 10000 N	10000	76	51	25	M12

Further load cell models with other force ranges available on request

## General Information:

- Digital force gauge with internal load cell for measurements of tensile and compressive forces.
- Small and handy unit for mobile use and stationary use with test stands.
- Ergonomic and rigid metal housing protects the accurate load cell and electronics when used in rugged environments.
- High measuring accuracy, resolution and repeatability.
- Easy to read LCD Display with LED backlight and automatic 180° switching.
- Easy handling, operation by 5 capacitive touch keys.
- Peak Point Mode with indication of the highest measured force value (Peak and Auto Peak mode selectable).
- Tracking Mode with continuous indication of current force values.
- Tare compensation.
- Programmable low and high set points.
- Measured value memory for 1000 measured values.
- Switchable units: N, gf, kgf, ozf, lbf.
- Set-up menu for general parameter selection.
- Serial and USB Interface.
- Mechanical overload protection and overload display.
- Rechargeable battery and mains operation.
- Auto-Power-Off with user-selectable timing.



180° Display-switching



DFG with Test Stand TSHL

## Model Overview DFG:

Type	Indication Range [N]	Resolution [N]
2	0- 2	0.0005
5	0- 5	0.0005
10	0- 10	0.001
20	0- 20	0.005
50	0- 50	0.005
100	0- 100	0.01
200	0- 200	0.05
500	0- 500	0.05
1000	0- 1000	0.1

## Technical Specifications:

### Model Designation: DFG

Indication Ranges: 0 – 2/5/10/20/50/100/200/500/1000 N  
 Resolution: 10000/4000 increments, see overview.  
 Accuracy error:  $\leq \pm 0.2\%$  F.S.  $\pm$  LSD.  
 Overload capacity: indication range  $\leq 5$  N: 150% F.S.  
 indication range  $\geq 10$  N: 200% F.S.

### Housing:

Dimensions: ca. 160x73x34 mm (HxWxD).  
 Weight: ca. 700 g.  
 Material/Finish: metal / black.  
 Mounting: 6 fixing holes M4

**Sensing Head:** threaded load shaft M6.

**Display:** LCD-Display with LED backlight and with automatic 180° switching

**Sampling rate:** 2000 Hz.

**Units:** switchable N, gf, kgf, ozf, lbf.

**Memory:** 1000 measured values.

**Operation:** 5 capacitive touch keys.

**Interfaces:** RS232C, USB

**Power supply:** external 3.6 V DC 800 mAh (AC adapter /charger) or Ni-MH rechargeable batteries.  
 Universal USB/BM charger

### Standard Accessories:

DFG Force Gauge, power adapter, USB cable, cushioned carrying case. Following accessories are included for performing a variety of measurements: hook, conical tip, flat tip ( $\varnothing$  12 mm), chisel tip, notched tip, extension rod 80 mm.

## General Information:

- Digital force gauge with external load cell for measurements of tensile and compressive forces.
- Small and handy unit for mobile use and stationary use with test stands.
- Ergonomic and rigid metal housing protects the accurate load cell and electronics when used in rugged environments.
- High measuring accuracy, resolution and repeatability.
- Easy handling.
- Easy to read LCD Display with LED backlight and automatic 180° switching.
- Operation by 5 capacitive touch keys.
- Peak Point Mode with indication of the highest measured force value (Peak and Auto Peak mode selectable).
- Tracking Mode with continuous indication of current force values.
- Graphical presentation of measured values (force/time).
- Tare compensation.
- Programmable low and high set points.
- Measured value memory for 1000 measured values.
- Switchable units: N, gf, kgf, ozf, lbf.
- Set-up menu for general parameter selection.
- Serial and USB Interface.
- Mechanical overload protection and overload display.
- Rechargeable battery and mains operation.
- Auto-Power-Off with user-selectable timing.
- Automatic load cell identification.
- Different load cells with varying load ranges can be connected to an DFGS Force Gauge and operated alternately. The DFGS Force Gauge recognizes the connected load cell and loads the programmed individual load cell parameters from the internal memory automatically.



## Technical Specifications:

### Model Designation: DFGS

Force Ranges: 0 – 1000/2000/5000/10000/20000 N  
 Resolution: 10000/4000 increments, see overview.  
 Accuracy error:  $\leq \pm 0.2\%$  F.S.  $\pm$  LSD.  
 Overload capacity: up to 150% of nominal load

### Housing Force Gauge:

Dimensions: ca. 160x73x34 mm (HxWxD).  
 Weight: ca. 700 g.  
 Material/Finish: metal / white.  
 Mounting: 6 fixing holes M4

### Display:

LCD-Display with LED backlight and with automatic 180° switching

### Sampling rate:

1000 Hz.

### Units:

switchable N, gf, kgf, ozf, lbf.

### Memory:

1000 measured values.

### Operation:

5 capacitive touch keys.

### Interfaces:

RS232C, USB

### Power supply:

external 3.6 V DC 800 mAh (AC adapter /charger) or Ni-MH rechargeable batteries.  
 Universal USB/BM charger

### Load Cells:

Dimensions:  
 1/2/5 kN: 51x76.2x19 mm (WxHxD),  
 10 kN: 51x76.2x25.4 mm (WxHxD),  
 connection thread M12  
 20 kN: 76.2x108x25.4 mm (WxHxD)  
 connection thread M18

### Standard Accessories:

DFGS Force Gauge, load cell, power adapter, USB cable.

## Model Overview DFGS Load Cells:

Type	Indication Range	Resolution
1KN	0- 1000 N	0.1 N
2KN	0- 2000 N	0.5 N
5KN	0- 5000 N	1 N
10KN	0-10000 N	1 N
20KN	0- 20 kN	0.005 kN







Test Stand TSH



Test Stand TSHL with digital height scale kit



Test Stand TSHL with Force Gauge DFG in horizontally arrangement

## General Information:

- Handwheel-operated manual test stand for precise force measurements.
- Excellent positional control through handwheel operation.
- Easy handling, compact and portable.
- Rugged design for tensile and compressive force measurements up to 1000 N.
- In combination with **MI&T** force gauges and application specific clamping tools and test fixtures the test stands TSH and TSHL provide flexible test systems for various testing applications.
- Operation in vertically as well as horizontally arrangement.
- Optional with height scale to measure displacement, measuring range 200 mm, resolution 0,01 mm.
- Durable, maintenance-free design.
- Large base plate with versatile fastening possibilities for testing tools.
- Optional quick-change mounting adapter for fixing of force gauges and load cells provide easy and quick replacement of force gauges with differing force ranges for different testing applications.

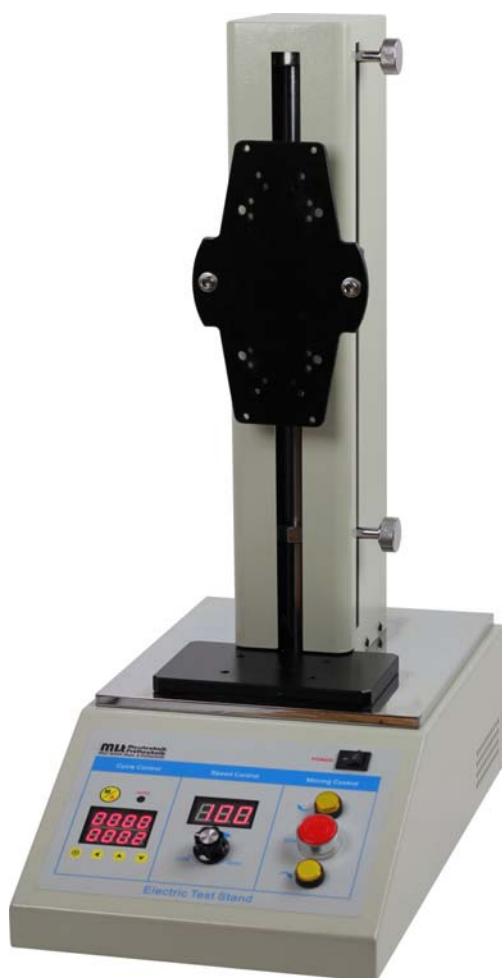
## Technical Specifications:

### Model designation: TSH, TSHL

- Precise spindle drive operated via handwheel.
- Dimensions: ca. 445x196x250 mm (HxWxD).
- Weight: 13 kg
- Crosshead travel: 230 mm
- Load slide feed: 3 mm per turn of handwheel.
- Load slide with mounting plate for force gauges EFG.
- Base plate with threaded bore for fixing of testing tools.

## Optional Accessories:

- Digital Height Scale Kit (TSHL)  
range 200 mm, resolution 0,01 mm.
- Tensile Frame Kit.
- Quick-change mounting adapter for fixing of force gauges and load cells on the load slide.
- Quick-change tool mounting adapter for the base plate for easy and quick replacement of testing tools.



Test Stand TSM 500



TSM 500 with Hand Tester DFG, SG 40 and MK-8



TSM 500 with Hand Tester DFG, SSK and pressure tappet

## General Information:

- Motorized test stand for precise tension and compression measurements, deflection tests, engagement-disengagement tests etc.
- Desktop design with easy handling, compact and portable.
- Individual adjustable end positions for the travel of the load slide.
- Rugged design for tensile and compressive force measurements up to 500 N.
- Manual and automatic operating mode, cycle mode.
- Adjustable test speed, digital display of test speed.
- In combination with **MI&T** force gauges and application specific clamping tools and test fixtures the TSM 500 test stand provide flexible test systems for various testing applications.
- Optional quick-change mounting adapter for fixing of force gauges and load cells provide easy and quick replacement of force gauges with differing force ranges for different testing applications.
- Additional TSM models with capacities up to 1 or 2 kN available on request.

## Technical Specifications:

### **Model designation: TSM 500**

- Vertical test stand with electromotive drive.
- Maximum load capacity: 500 N
- Dimensions: ca. 430x245x600 mm (LxWxH).
- Weight: ca. 24 kg
- Crosshead travel: max. 250 mm
- Test Speed: adjustable 50 to 500 mm/min.
- Load slide with mounting plate for force gauge.
- Base plate with threaded bore for fixing of testing tools.

## Optional Accessories:

- Various testing tools and fixtures.
- Quick-change mounting adapter for fixing of force gauges and load cells on the load slide.
- Quick-change tool mounting adapter for the base plate for easy and quick replacement of testing tools.

## General Information:

- Small and handy Test Benches for testing the tension force of cable tie tighten pistols (tie rap guns)
- Quick change tool mounting adapters for assembly of different fixtures for different models of cable tie pistols and for test fixtures for the cable ties.
- Test benches can be positioned length- and crosswise to the operator because the force gauge can be fixed user-defined at both sides of the test bench's housing and in any orientation.
- **Model PTB 50** with indication range 0-500 N, resolution 0.5 N, accuracy class 0.5
- **Model FTB** available with different measuring ranges:  
FTB 5: range 0-50 N with resolution 0.01 N  
FTB 10: range 0-100 N, with resolution 0.02 N  
FTB 25: range 0-250 N, with resolution 0.05 N  
FTB 50: range 0-500 N, with resolution 0.1 N  
FTB 100: range 0-1000 N, with resolution 0.2 N  
Accuracy class FTB models: 0.25
- Easy to operate and space-saving test benches.
- 10000 Hz internal update rate for exact force readings.
- Indication and operation of the measuring system via durable infrared sensor screen with dot matrix LCD-Display.
- Peak Point Mode with indication of the highest measured force value.
- Tracking Mode with indication of current force values.
- Tare compensation.
- Optical and acoustic overload indication
- High mechanical overload protection of load cell.
- FTB models: Set point capability with optical and acoustic status signal.
- FTB models: Measured value memory.
- FTB models: Real time clock for data output with date and time.
- FTB models: Single and listing output (with statistical evaluation) of measured values.
- Serial port for data output of measured values.
- Setup menu for internal parameter setting and adjustment.
- Language for printout and display selectable: D, E
- Maintenance-free and durable all metal construction.
- Dimensions of basic unit: 275x116x124 mm (LxWxH).  
weight ca. 4 kg
- For a detailed technical description of the measuring system please see the technical data of FT respectively PT testers.



Test Bench FTB  
(lengthwise positioned)



Test Bench FTB  
(crosswise positioned)



Test Bench FTB  
(lengthwise positioned)

## Clamping Tools and Test Fixtures:

for testing cable tie pistols

Special Fixtures	KBP for cable tie pistols
3 pin Plug-in Plate	SL-3P
Quick Action Grippers	KSH-6
Clamping Crown	SG 80

For detailed description of tools and fixtures for testing cable tie pistols please see corresponding tool pages in our catalogue.

## Optional Accessories:

- Mini Table Printer
- Data Transmission Cable for printer connection
- Data Transmission Cable for PC connection
- Keystast Interface
- Please see our catalogue for additional accessories.



### Technical Specifications:

#### **Model Designations: PTB 50**

Indication Range: 0 to 500 N.  
Resolution: 0.5 N  
Rel. accuracy error:  $\leq \pm 0,5\% \pm \text{LSD}$   
(within the measuring range).

#### **Force Measuring System:**

##### **Control Unit:**

Dimensions: ca. 125x105x70 mm (WxDxH);  
Supply voltage: 12-24 V DC.

##### **Force Transducer:**

DMS-load cells type MWM 80108 with integrated AD-converter and RS485 bus. Overload protection up to 3500 N.

##### **Display:**

Dot matrix LCD display with LED background lighting, 128x64 pixel, 56.3x38.4 mm. LCD update rate: 5 Hz.

##### **Operation:**

Operation of all displayed keys via infrared sensor screen.

##### **Evaluation:**

Internal measuring rate: 10000 Hz;  
Operating Modes: Tracking Mode and Peak Point Mode;  
Tare compensation;  
Single output of measured value via serial port;  
Overload indication;  
Setup Menu internal parameter selection and adjustment of measuring system;  
Language for setup menu selectable: D, E

##### **Serial Port:**

RS232C      selectable parameters:  
300-76800 Baud,  
7/8 data bits, 1/2 stop bits,  
parity: none/even/odd.  
connector: RJ45.

##### **Basic Unit:**

Dimensions: ca. 116x275x124 mm (WxDxH);  
Weight: ca. 4 kg;  
Construction: Maintenance-free all metal construction.  
Housing: Aluminium  
Finish: anodised oxide layer, blue



PTB 50 with 3-pin Plug-in Plate and KBP fixture with MK7

### Technical Specifications:

#### **Model Designations: FTB:**

Indication Ranges: 0- 50/100/250/500/1000 N.  
Resolution: 5000 increments, see model overview  
Rel. accuracy error:  $\leq \pm 0.25\% \pm \text{LSD}$   
(within the measuring range).

#### **Force Measuring System FMS:**

##### **Control Unit:**

Dimensions: ca. 125x105x70 mm (WxDxH);  
Supply voltage: 12-24 V DC.

##### **Force Transducer:**

DMS-load cells type MWM 80108V with integrated AD-converter and RS485 bus. Overload protection 700 to 2000% according to nominal load of load cell.  
Internal measuring rate: 10000 Hz;

##### **Display:**

Dot matrix LCD display with LED background lighting, 128x64 pixel, 56.3x38.4 mm. LCD update rate: 5 Hz.

##### **Operation:**

Operation of all displayed keys via infrared sensor screen.

##### **Evaluation:**

Operating Modes: Tracking Mode and Peak Point Mode;  
Tare compensation; Set point capability;  
Measured value memory for 10000 measured values;  
Single and listing output via serial port;  
Real time clock for printout with date and time.  
Language for printout selectable: D, E.  
Overload indication;  
Setup Menu internal parameter selection and adjustment of measuring system.

##### **Serial Port:**

RS232C      selectable parameters:  
300-76800 Baud,  
7/8 data bits, 1/2 stop bits,  
parity: none/even/odd.  
connector: RJ45.

##### **Basic Unit:**

Dimensions: ca. 116x275x124 mm (WxDxH);  
Weight: ca. 4 kg;  
Construction: Maintenance-free all metal construction.  
Housing: Aluminium  
Finish: anodised oxide layer, blue.

### Model Overview FTB:

Type	Indication Range [N]	Resolution [N]
5	0- 50	0.01
10	0- 100	0.02
25	0- 250	0.05
50	0- 500	0.1
100	0- 1000	0.2

## Test Device DFG-KBP 500

Test device for testing the tensile force of cable tie tighten pistols, consisting of a Digital Force Gauge model DFG 500 with special slit fixture for cable tie heads and a carrier plate with slotted panel.

The DFG-KBP test device is universally suitable for all manually and pneumatically operated cable tie pistols.

DFG-KBP 500H with horizontal arrangement of slots.

DFG-KBP 500V with vertical arrangement of slots. The supporting surface of the carrier plate of DFG-KBP 500V in front of the slotted panel facilitates the correct axial alignment of the cable tie tighten pistol during the test.

The test device is well suited for mobile use and for tests to be carried out quickly.

We recommend this cost-effective test device for frequent in-process testing of cable tie pistols in addition to a test device with firmly fixed and exact positioned cable tie tighten pistol (e. g. PTB or FTB test bench).

### Test Device DFG-KBP 500V:

Overall dimensions ca. 245x70x40 mm, weight ca. 1,1 kg

### Test Device DFG-KBP 500H:

Overall dimensions ca. 195x70x40 mm, weight ca. 1 kg

### Digital Force Gauge DFG 500 with range 0-500 N

- Resolution 0.05 N.
- Accuracy error:  $\leq 0.2\%$  F.S.
- Easy to read LCD Display with LED backlight and automatic 180° switching.
- Easy handling, operation by 5 capacitive touch keys.
- Peak Point Mode (Peak and Auto Peak mode selectable).
- Tracking Mode with continuous indication of current force values.
- Tare compensation.
- Programmable low and high set points.
- Measured value memory for 1000 measured values.
- Switchable units: N, gf, kgf, ozf, lbf.
- Set-up menu for general parameter selection.
- Serial and USB Interface.
- Mechanical overload protection up to 200% of rated load and overload display.
- Rechargeable battery and mains operation.
- Auto-Power-Off with user-selectable timing.

The Digital Force Gauge DFG is available with other force ranges also.

### Test procedure with DFG-KBP 500V:

Reset the peak value memory of the DFG force gauge to zero. Lay the cable tie into the slotted special fixture (A) of the DFG force gauge to fix the cable tie head and lay strap of the cable tie through the slit of the slotted panel (B) of the carrier plate. Position the pistol nose (C) down flat onto the supporting surface (D) of the carrier plate with the nose of the tensioning tool flush to the slotted panel. Insert the strap of the cable tie into the tensioning tool and pull the trigger of the tensioning tool continuously until the cable tie is cut off. The tension force achieved at the cut off is determined and indicated on the gauge's display.

Test Device DFG-KBP 500H



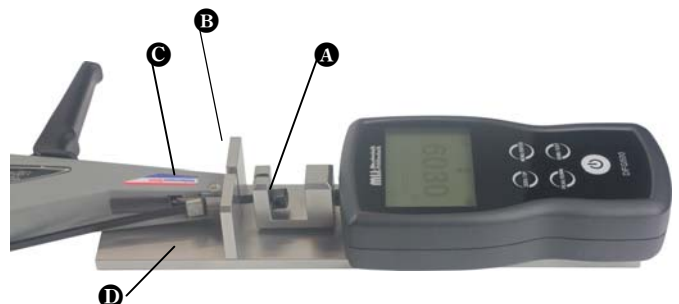
Test Device DFG-KBP 500V  
with positioned cable tie tool MK7



Digital Force Gauge DFG 500



Test setup with DFG-KBP 500H



Test setup with DFG-KBP 500V

## General Information

The **MI&T** offers a wide range of standard tools and test fixtures. The variable design of the **MI&T** testers with the universal tool mounting adaptors in conjunction with the variety of standard fixtures and clamping tools makes it possible to use the **MI&T** testers for manifold applications.

In case of applications where the standard tools of the **MI&T** product range are not suitable it is possible either to adapt the standard tools to the respective application or to design customer-specific special tools and test fixtures, which are suitable to the respective application. The variable design of the testers of model series MTM, ATM, FTM and FTS facilitate custom-designed extensions and reconstruction of the testers also.

Die **MI&T** standard and special tools can be used also with testers of other manufacturers.

## Tool Set HLL/MLH for Cable Insulation Pull-Off Testing

The tool set **HLL/MLH** for cable insulation pull-off tests consists of a holding frame **HLL** for mm bore gauges for assembly on measuring point of **MI&T** test devices, a corresponding suitable bore gauge half shell set with different bore diameters and a suitable cable clamp ( e. g. DKS-20/ or SHA-12/A) for assembly on the load slide of the test device.

The cables to be checked must be prepared for the test in the way that a small section of the cable insulation is cutted out in a pre-determined distance from the cable end. This method avoids that the part of the cable insulation to be tested is prestressed with tension forces what can lead to false measurements.

The standard bore gauge set **MLH 1** consists of 23 bore gauge half shells with bore diameters from 1.0 to 12.0 mm with 0.5 mm graduation. Upon request, customer-specific bore gauges with customized bore diameters are available.

### Specification bore gauge set **MLH 1**:

Bore diameter: 1.0 to 12.0 mm, graduation 0.5 mm.

Material: stainless steel

Max. load capacity: 500 N.

Usable with testers of model series FTM, ATM, MTM



## Testing Tool SPA/ML for Cable Insulation Pull-Off Testing

For cable insulation pull-off tests a mm bore gauge is used, which is inserted in a height adjustable holding frame assembled on the load slide of the tester.

The bore gauge can be moved sideways within the holding frame. On the measuring point of the tester a suitable quick action grippers for cables is assembled.

For the pull-off test stripped test samples must be prepared. The stripped end of the cable is inserted through the respective fitting bore and gripped by the cable grip on measuring point.

### Specification **ML1**:

Bore diameters from 0.1 to 10 mm, graduation 0.1 mm.

Dimensions: ca. 190x76 mm (WxH), material thickness 2.2 mm.

### Specification **ML2**:

Bore diameters from 10 to 20 mm, graduation 0.5 mm.

Dimensions: ca. 190x76 mm (WxH), material thickness 2,2 mm.

Usable with testers of model series FTM, ATM, MPM



Tool set SPA/ML for cable insulation pull-off testing



## Clamping Crowns SG 40, SG 80, SG 90, SG 140

Rotatable Clamping Crowns for fixing of wire terminals, connectors and other end fittings during tensile tests.

### SG 40:

40 mm diameter, 6 slots from 1.2 to 5 mm width;

Max. load capacity: 500 N.

Available for testers of model series EPT 50, CT 50, DFG.



SG 40

### SG 80:

80 mm diameter, 9 slots with 1/1.5/2/2.5/3/4/5/6/8 mm width and a slot with 20 mm width and stepped pin with step diameters 4, 6 and 8 mm.

Max. load capacity: 2000 N;

Available for all tester models.



SG 80

### SG 90:

90 mm diameter, 8 slots with 1,5/2/3/4/7/7,5/10/15 mm width

### SG 90V2:

90 mm diameter, 8 slots with 2/3/5/6/7/8/9/11 mm width

Both versions with stepped pin with step diameters 8, 12 and 16 mm and pivoting protection cover plate.

Customer-specific designs with application-specific slot widths available on request.

Max. load capacity: 10 kN.

Usable with testers with 5 and 10 kN nominal load.



SG 90

### SG 140:

140 mm diameter, incl. pivoting protection cover plate.

Standard version: 8 slots with 10/12/13/14/15/17/19/21mm width,

Customer-specific designs with application-specific slot widths available on request.

Incl. pivoting protection cover plate.

Max. load capacity: 10 or 50 kN (depending on version).

Usable with testers with 5/10 kN or rather 50 kN nominal load (depending on version).



SG 140

## Universal Turntable UDT 100

### Universal Turntable UDT 100:

Turntable with 100 mm diameter

12 gripping and fastening stations for fixing of wire terminals, sleeves, end splices, round plug connectors and other end fittings and a threaded bore M6 for user's individual needs.

Max. capacity: 1000 N;

Reinforced model UDT 101 with max. capacity 2000 N.

Usable with testers of model series PT, FT, FTS, FTM, ATM, MTM.



## Fixture ADE for cable end sleeves

Fixture for testing cable end sleeves.

To avoid measuring errors during the test of end sleeves the fixture must grip between end sleeve and cable insulation in such a way that neither the end sleeve nor the conductor is crushed.

The ADE fixture provides 2 diameter adjustable blades, which can grip between end sleeve and cable insulation. The diameter adjustment for the cable cross section is continuously variable between 0 and 8 mm.

Max. load capacity: 500 N.

Available for all tester model series.



## Quick Action Grippers KSH-6

Quick Action Grippers for clamping cables, wires, fibres and shaped parts.

Clamping range from 0 to 6 mm.

The clamping diameter can be adjusted by the toggle arm action of the eccentric jaw mechanism, which can be released and arrested by locking screws.

Self-tightening toggle arm mechanism with increasing clamping pressure at increasing test loads.

Max. capacity: 500 N. Weight ca. 300 g.

Measuring point arrangement: KSH-6/M, Load slide arrangement: KSH-6/A

Available for testers of all model series.



## Quick Action Grippers SHA-12

Quick Action Grippers for clamping cables, wires, fibres and shaped parts.

Clamping range from 0 to 12 mm.

The clamping diameter can be adjusted by the toggle arm action of the eccentric jaw mechanism, which can be released and arrested by locking screws.

Self-tightening toggle arm mechanism with increasing clamping pressure at increasing test loads.

Max. capacity: 1000 N. Weight ca. 500 g.

Measuring point arrangement: SHA-12/M, Load slide arrangement: SHA-12/A

Usable with testers of model series FT, FTS, FTM, ATM, MTM.



## Quick Action Grippers SHA-20

Quick Action Grippers for clamping cables, wires, fibres and shaped parts.

Clamping range from 0 to 20 mm.

The clamping diameter can be adjusted by a central adjustment spindle, enabling a rapid diameter adjustment.

Self-tightening toggle arm mechanism with increasing clamping pressure at increasing test loads.

Max. capacity: 2000 N. Weight ca. 1.0 kg.

Measuring point arrangement: SHA-20/M, Load slide arrangement: SHA-20/A

Usable with testers of model series FTS, FTM, ATM, MTM.



## Quick Action Grippers SHA-40

Quick Action Grippers for clamping cables, wires, fibres and shaped parts.

Clamping range from 0 to 40 mm.

The clamping diameter can be adjusted by a central adjustment spindle, enabling a rapid diameter adjustment.

Self-tightening toggle arm mechanism with increasing clamping pressure at increasing test loads.

Max. capacity: 10000 N. Weight: ca. 3.4 kg

Measuring point arrangement: SHA-40/M, Load slide arrangement: SHA-40/A

Usable with testers of model series FTM, ATM, MTM with 5 or 10 kN nominal load.



For SHA-40W with exchangeable gripping jaws, please see separate description

### Mini Cable Clamp MK-8

Self-clamping cable clamp for pull-off tests of small cables, wires, strips, etc.  
The test specimen is inserted between the eccentric cam and the static block and is clamped by rotating the cam. The clamping pressure increases automatically during increasing test load. A diameter adjustment of the tool is not necessary.  
Clamping range 0-6 mm.  
Max. capacity: 500 N.  
Available for testers of model series PT, FT, FTS, FTM, ATM, MTM.



### Cable Clamp DKS-20

Self-clamping cable clamp for pull-off tests of cables, wires, strips, etc.  
The test specimen is inserted between the two eccentric cams and is clamped by rotating the cam by its small lever. When the tension load is applied the cams tighten automatically. The clamping pressure increases automatically during increasing test load. The cams adjust symmetrically.  
A diameter adjustment is not necessary.  
Clamping range 0-20 mm.  
Max. capacity: 2000 N.  
Usable with testers of model series PT, FT, FTS, FTM, ATM, MTM.



### Quick Action Grippers KSP-8

Quick Action Grippers with parallel clamping jaws for clamping cables, wires, fibres and shaped parts.  
Clamping range from 0 to 8 mm.  
The jaws can be opened by actuating the lateral small hand lever.  
Self-tightening toggle arm mechanism with increasing clamping pressure at increasing test loads.  
A diameter adjustment is not necessary.  
Max. capacity: 1000 N  
Usable with testers of model series PT, FT, FTS, FTM, ATM, MTM



**Quick Action Grippers KSP-8/Aa with automatic opening and closing mechanism**  
Special version of the KSP-8 for assembly on tester's load slide with additional mechanism for automatic opening and closing. The KSP-8/Aa opens automatically when the load slide drives back into starting position and closes automatically when the load slide drives during the test run.  
Max. capacity: 1000 N  
Usable with testers of model series FTS, FTM, ATM, MTM



### Cam-operated Grip DES-10

Cam-operated grip for testing the tensile strength of wires, stranded wires, enamel wires, cables, etc.  
The specimen is inserted between the parallel holding blocks and is clamped by rotating the cam by its hand lever. The division of the tension blocks with middle gap ensures the clamping of hard and smooth wires without slipping.

Max. capacity: 1000 N.  
Usable with testers of model series FTS, FTM, ATM, MTM.





## Special Cable Clamp KSS-25/A

Cable clamp for clamping cables, wires etc;  
The respective clamping diameter is adjusted using the adjusting spindle of one of the 2 clamping jaws. The cable is clamped using the clamping spindle of the other clamping jaw.  
The V-shaped clamping jaws tightly locks around the clamped cable and ensure an effective clamping.  
Opening width from 0 to 25 mm, infinitely adjustable.  
Clamping jaw length: 100 mm:

Max. capacity: 10000 N  
Material: stainless steel

Complete tool for assembly on the load slide of test stations with 5 or 10 kN nominal load.



## Special Cable Clamp KSW-25/A

Cable clamp for clamping cables, wires etc;  
Cable clamp with 2 complementary interengaging waved clamping jaws;  
The respective clamping diameter is adjusted using the adjusting spindle of one of the 2 clamping jaws. The cable is clamped using the clamping spindle of the other clamping jaw.  
Opening width from 0 to 25 mm, infinitely adjustable.  
Clamping jaw length: 100 mm:

Max. capacity: 10000 N  
Material: stainless steel

Complete tool for assembly on the load slide of test stations with 5 or 10 kN nominal load.



## Eccentric Cam Clamp ESP 20

Self-clamping cable clamp for pull-off tests of cables, wires, etc.  
Eccentric cams arranged in two rows (3+2) with half offset, eccentric cams with knurled surface.  
Simultaneous, even rotation of all cams for optimal clamping;  
rearward cam with hand lever for opening and closing of the eccentric cams.

Opening width from 0 to 18 mm, infinitely adjustable

Max. capacity: 10000 N;

Material: stainless steel

The cable is inserted between the two rows of eccentric cams and is clamped slightly by rotating the cam with the small lever. When the tension load is applied the cams tighten automatically so that the clamping pressure increases during increasing test load. The cams adjust symmetrically.

A diameter adjustment for different cable sizes is not necessary.

For different cable types the ESP 20 is available in different versions with cams with different profiled surfaces.

Complete tool for assembly on the load slide of test stations with 5 or 10 kN nominal load.



## Eccentric Cam Clamp ESV 40

Self-clamping cable clamp for pull-off tests of cables, wires, etc. Eccentric cams arranged in two rows (3+2) with half offset, mounted on 2 moveable plates; lateral hand wheel for simultaneous, even adjustment of the moveable plates and for increasing the clamping force during the test if necessary.

The cable is inserted between the two rows of eccentric cams. Then the eccentric cams are applied to the cable by hand. When the tensile load is applied to the cable the eccentric cams tighten automatically so that the clamping pressure increases during increasing test load. If necessary the clamping force can be increased during the test procedure by pressing the adjustment plates together using the lateral hand wheel.

Eccentric cams with knurled surface.

Height of eccentric cams: 40 mm.

Opening width from 0 to 40 mm, infinitely adjustable.

Diameter of hand wheel: 20 mm (material: steel bronzed).

Max. capacity: 10000 N

Material: stainless steel

Complete tool for assembly on the load slide of test stations with 5 or 10 kN nominal load.



## Quick Action Gripper SHA-40

Quick Action Grippers for clamping cables, wires, fibres and shaped parts.

Clamping range from 0 to 40 mm.

The clamping diameter can be adjusted by a central adjustment spindle, enabling a rapid diameter adjustment.

Self-tightening toggle arm mechanism with increasing clamping pressure at increasing test loads.

Max. capacity: 10000 N. Weight: ca. 3.4 kg

Measuring point arrangement: SHA-40/M, Load slide arrangement: SHA-40/A

Usable with testers of model series FTM, ATM, MTM with 5 or 10 kN nominal load.

## Quick Action Gripper SHA-40W

Special version of quick action gripper SHA-40 with quick change clamping jaws.

The special version SHA-40W makes it possible to change the clamping jaws quickly and easily. Various standard designs of clamping jaws with different profiles are available in order to adapt the gripper to different test specimen.

Measuring point arrangement: SHA-40W/M, Load slide arrangement: SHA-40W/A

Available standard clamping jaws:

S1W: saw tooth profile

S2W: corrugated profile

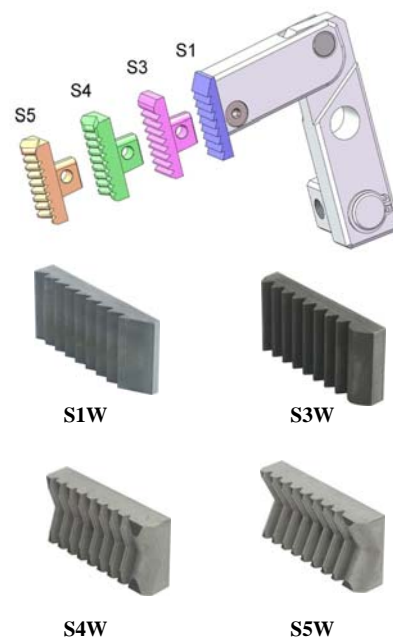
S3W: corrugated profile as jaw S2 but with rounded (spherical) front edge

S4W: V-shaped grip 2 mm with corrugated profile and rounded (spherical) front edge

S5W: V-shaped grip 4 mm with corrugated profile and rounded (spherical) front edge

S6W: fine saw tooth profile for small or sensitive specimens

Of course customer specific clamping jaws, which are adapted to the corresponding application, can be supplied also.



## Plug-in Plate SL-BAT for battery cable terminals

The plug-in plate SL-BAT features 7 standard receptions for battery cable terminals.

For the use of all receptions, which are arranged on both sides of the SL-BAT plate the plate must be reversed in the tool mounting adapter.

Special gripping stations designed according to customer's test samples are available on request.

Max. capacity: 5000 N;

Reinforced model SL-BAT-v: max. load capacity of 10000 N.

Usable with testers of model series FTM, ATM, MTM.



## Pull & Press Tappet STC

Pull and press tappet e. g. for shearing tests of welded joints, for push-out and press-in forces etc.

With quick-release lever on the top side for locking and releasing the tappet

On the front end of the tappet there is a mounting bore on the lower side in order to fix an application specific test pin.

A test pin is not included in the scope of delivery.

Custom-designed test pin according to specifications are available.

Max. capacity: 10000 N

Usable with testers with 5 and 10 kN nominal load..



## Testing Fixtures KU

Testing fixtures for testing the pull force strength of specimen with greater space requirements, e. g. for big cable lugs, wire terminals, welded joints, connectors and other end fittings, test specimen with housings, etc.

According to the respective application the testing fixtures KU can be supplied with customer-specific slot width or specimen-specific receptions with swages

Available for all tester models

Material: stainless steel

Complete testing fixture incl. quick-change tool reception for assembly on MI&T test stations.



**Detail:**  
fixation of crimped terminal

## Clamping Fixtures SW-MAK12 (90°/180°)S and SW-MCON12 (90°/180°)S for peel tests

Special testing fixture for testing the strength of welded joints (peeling tests) at contacts MAK 12 (90°/180°) and MAK 8 (90°/180°) respectively MCON 12 (90°/180°)

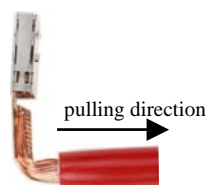
Suitable for angular and axial welded cables on weld pad.

SW-MAK12(90°/180°)S for MAK 8 and MAK 12 contacts (Lear)

SW-MCON12(90°/180°)S for MCON12 contacts (TE connectivity)

Max. capacity: 5000 N

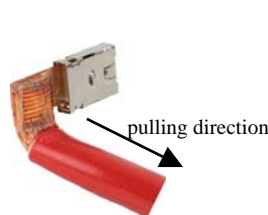
Material: stainless steel



Complete testing fixture incl. quick-change tool reception for assembly on the measuring point of test stations models FTM/ATM/MTM 500/1000 in horizontal orientation.

By request also special receptions for other customer specific test samples can be designed and manufactured.

Usable with testers with 5 and 10 kN nominal load.



## Clamping Fixtures SW-MAK12 180°Z and SW-MCON12 180°Z for pull tests

Special testing fixtures for testing the pull force strength of welded joints at contacts MAK12 180° respectively MCONK12 180° (axial welded cable on weld pad).

SW-MAK12 90°Z for MAK 12 contacts (Lear)

SW-MCON12 180°Z for MCON 12 contacts (TE connectivity)

Max. capacity: 5000 N

Material: stainless steel

Complete testing fixture incl. quick-change tool reception for assembly on the measuring point of test stations models FTM/ATM/MTM 500/1000 in horizontal orientation.

By request also special receptions for other customer specific test samples can be designed and manufactured.

Usable with testers with 5 and 10 kN nominal load.



## Clamping Fixtures SW-MAK12 90°Z and SW-MCON12 90°Z for pull tests

Special testing fixtures for testing the pull force strength of welded joints at contacts MAK 12 90° respectively MCON 12 90° (angular welded cable on weld pad).

SW-MAK12 90°Z for MAK 12 contacts (Lear)

SW-MCON12 90°Z for MCON 12 contacts (TE connectivity)

Max. capacity: 5000 N

Material: stainless steel

Complete testing fixture incl. quick-change tool reception for assembly on the measuring point of test stations models FTM/ATM/MTM 500/1000 in horizontal orientation.

By request also special receptions for other customer specific test samples can be designed and manufactured.

Usable with testers with 5 and 10 kN nominal load.





## Clamping Fixture SW-SK14 90°S for peel test

Special testing fixture for testing the peeling forces of ultrasonic metal welding connections of wires at flat and angled contact plates (with axial welded cable on weld pad).

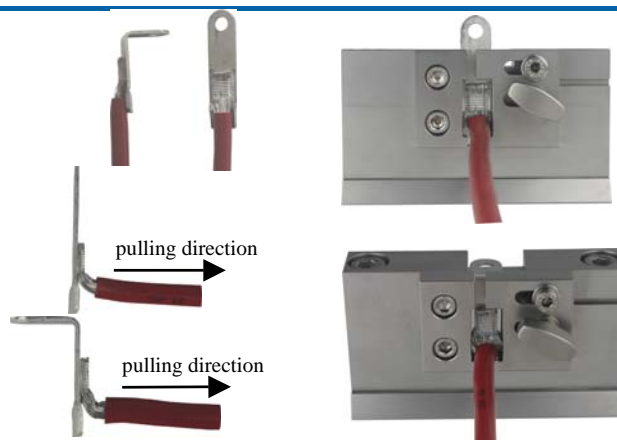
Max. capacity: 5000 N

Material: stainless steel

Complete testing fixture incl. quick-change tool reception for assembly on the measuring point of test stations models FTM/ATM/MTM 500/1000 in horizontal orientation.

By request also special receptions for other customer specific test samples can be designed and manufactured.

Usable with testers with 5 and 10 kN nominal load. Max.



## Clamping Fixture SW-SK14 180°Z for pull test

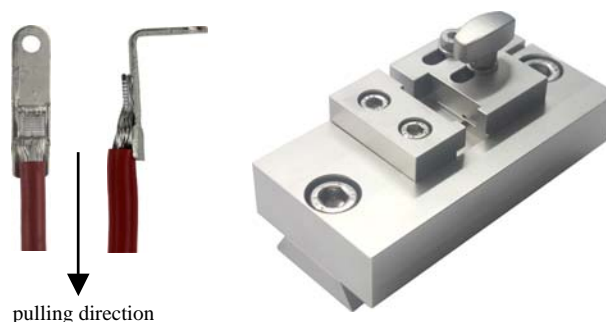
Special testing fixture with swage for testing the pull force strength of ultrasonic metal welding connections of wires at flat and angled contact plates (axial welded cable on weld pad).

Max. capacity: 5000 N

Material: stainless steel

Complete testing fixture incl. quick-change tool reception for assembly on the measuring point of test stations with 5 and 10 kN nominal load in horizontal orientation in horizontal orientation.

By request also special receptions for other customer specific test samples can be designed and manufactured.



## Clamping Fixture SW-WHT 90°S for peel test

Special testing fixture for testing the peeling forces of ultrasonic metal welding connections of wires at contact plates WHT (with axial welded cable on weld pad).

Max. capacity: 5000 N

Material: stainless steel

Complete testing fixture incl. quick-change tool reception for assembly on the measuring point of test stations with 5 and 10 kN nominal load in horizontal orientation.

By request also special receptions for other customer specific test samples can be designed and manufactured.



## Clamping Fixture SW-WHT 180°Z for pull test

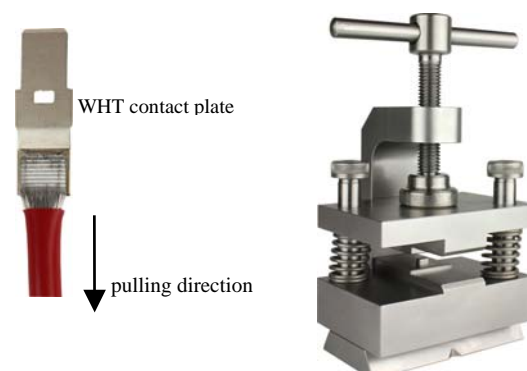
Special testing fixture for testing the pull force strength of ultrasonic metal welding connections of wires at contact plates WHT (with axial welded cable on weld pad).

Max. capacity: 5000 N

Material: stainless steel

Complete testing fixture incl. quick-change tool reception for assembly on the measuring point of test stations with 5 and 10 kN nominal load.

By request also special receptions for other customer specific test samples can be designed and manufactured.



## Clamping Fixture SW-DEL841 90°S for peel test

Special testing fixture for testing the peeling forces of ultrasonic metal welding connections of wires at angled contact plates (DELPHI part no. 15542841 & 15542842 with 18 mm width).

Max. capacity: 5000 N

Material: stainless steel

Complete testing fixture incl. quick-change tool reception for assembly on the measuring point of test stations models FTM/ATM/MTM 500/1000 in horizontal orientation.

By request also special receptions for other customer specific test samples can be designed and manufactured.

Usable with testers with 5 and 10 kN nominal load.Max.



## Clamping Fixture SW-DEL841 180°Z for pull test

Special testing fixture with swage for testing the pull force strength of ultrasonic metal welding connections of wires at angled contact plates (DELPHI part no. 15542841 & 15542842 with 18 mm width).

Max. capacity: 5000 N

Material: stainless steel

Complete testing fixture incl. quick-change tool reception for assembly on the measuring point of test stations with 5 and 10 kN nominal load in horizontal orientation in horizontal orientation.

By request also special receptions for other customer specific test samples can be designed and manufactured.



## Clamping Fixture SW-PIN15 180°Z for pull test

Special testing fixture with swage for testing the pull force strength of ultrasonic metal welding connections of wires on weld pads of contact pins (e. g. of Rosenberger HPK and RKP plugs).

Max. capacity: 5000 N

Material: stainless steel

Complete testing fixture incl. quick-change tool reception for assembly on the measuring point of test stations.

By request also special receptions with swages for other customer specific test samples can be designed and manufactured.

Usable with testers with 5 and 10 kN nominal load.



## Clamping Fixture SW-PIN15 90°SV and SW-PIN15 90°SG for peel test

Special testing fixtures for testing the peel forces (peeling tests) of ultrasonic metal welding connections of wires welded on weld pads of contact pins (e. g. of Rosenberger HPK and RKP plugs).

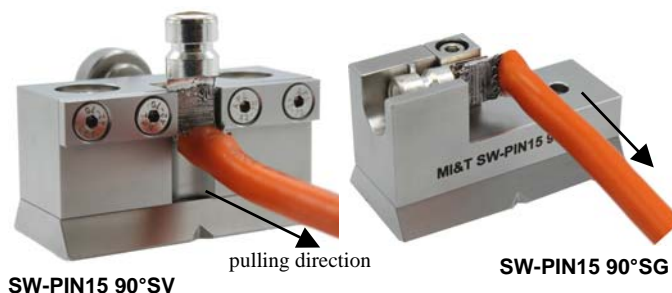
SW-PIN15 90°SV: suitable, if free areas to the right and left of the welded wire of the weld pad are available (according to Rosenberger specification)

SW-PIN15 90°SG: for large cable cross sections, if no sufficiently free edges of the weld pad besides the welded joint are available

Max. capacity: 5000 N;

Complete testing fixture incl. quick-change tool reception for assembly on the measuring point of test stations.

Usable with testers with 5 and 10 kN nominal load.



## Clamping Fixture SW-STO 90°S for peel test

Special testing fixture for testing the peeling forces of ultrasonic metal welding connections of Aluminium wires 10/16/25 mm<sup>2</sup> at cable lugs (e. g. Stocko, with axial welded cable on weld pad).

Max. capacity: 5000 N

Material: stainless steel

Complete testing fixture incl. quick-change tool reception for assembly on the measuring point of test stations models FTM/ATM/MTM 500/1000 in horizontal orientation.

By request also special receptions for other customer specific test samples can be designed and manufactured.

Usable with testers with 5 and 10 kN nominal load. Max.



## Clamping Fixture SW-STO 180°Z for pull test

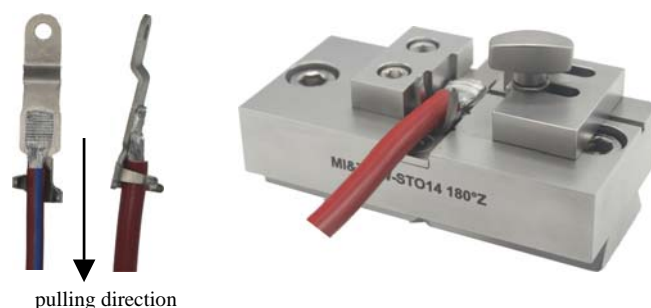
Special testing fixture with swage for testing the pull force strength of ultrasonic metal welding connections of Aluminium wires 10/16/25 mm<sup>2</sup> at Cable lugs (e. g. Stocko, with axial welded cable on weld pad).

Max. capacity: 5000 N

Material: stainless steel

Complete testing fixture incl. quick-change tool reception for assembly on the measuring point of test stations with 5 and 10 kN nominal load in horizontal orientation in horizontal orientation.

By request also special receptions for other customer specific test samples can be designed and manufactured.



## Clamping Fixtures SW-KS0A-Z and SW-KS17W-Z for pull test

Special testing fixture for testing the pull force strength of crimped or ultrasonic metal welding connections of wires at ring terminals

SW-KS0A-Z for non-angled ring terminals with axially crimped or welded cables.

SW-KS17W-Z for angled ringed terminals with 17 degree tilt and axially crimped or welded cables

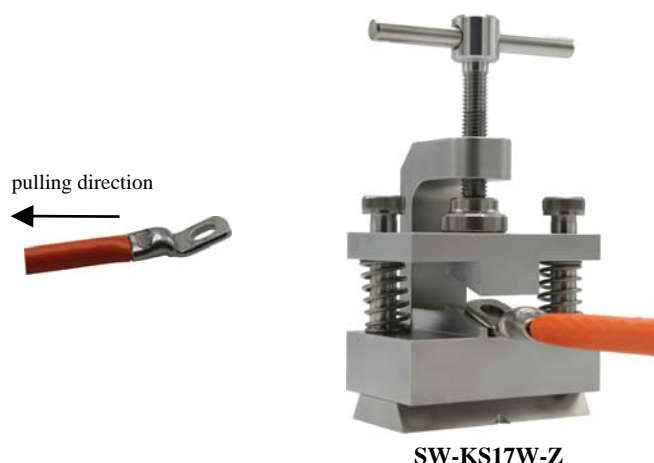
On request, the special fixturess can also be manufactured for customer-specific ring terminals of other dimensions and angles.

Max. capacity: 10000 N

Material: stainless steel

Complete testing fixture incl. quick-change tool reception for assembly on the measuring point of test stations with 5 and 10 kN nominal load.

By request also special receptions for other customer specific test samples can be designed and manufactured.



## Comb Tool KW e.g. for testing carbon brushes

The Comb Tools KW have slits with various widths and are suitable especially for great or bulky test specimen as for example carbon brushes. The comb tool can be lateral adjusted in the tool mounting adapter of the tester to position the needed slit in axial orientation to the grip on the load bar of the tester.

For gripping the connecting conductor of the carbon brushes suitable quick action gripper, cable clamp or miniature grip can be used.

Comb Tool KW 1:

Width: 100 mm, comb height 30 mm,  
6 Slits, width 3/4/5/6/7/8 mm, slit depth: 26 mm.

Comb Tool KW 2:

Width: 100 mm, comb height 20 mm,  
6 Slits, width 1.2/1.6/2/2.5/3/4 mm, slit depth: 19 mm.

Customer-specific versions available on request.

Max. capacity: 2000 N

Available for all tester model series.



Comb Tool KW 1



Comb Tool KW 2

## Slit Fixture AST

Slit fixture with adjustable slit width for testing the pull force strength e. g. of connector tubes, caps, seals or rings etc., which are fixed on cable insulations.

The reversible tool can be used from both sides so that also parts with greater diameter can be fixed with this fixture.

Slit width: continuously adjustable from 0 to 25 mm

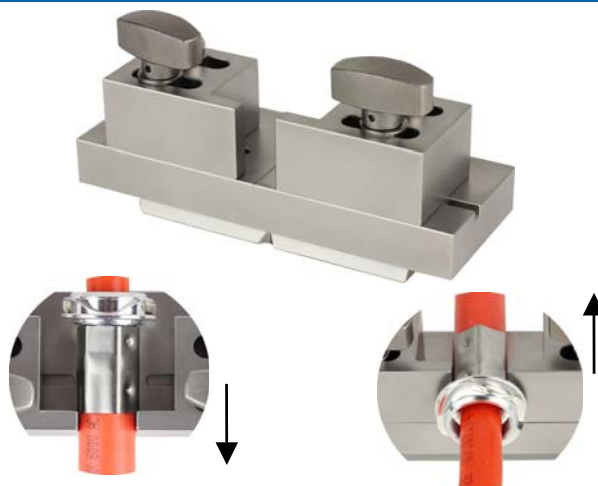
Jaw height: 20 mm

Max. capacity: 2000 N

Material: stainless steel

Complete testing fixture incl. quick-change tool reception for assembly on the measuring point of test stations.

Available for all tester model series



## Special Slit Fixtures SST

Slit fixtures in customized versions, e.g. for peel tests of ultrasonic welded cables on contact plates etc.

MI&T can adapt the slit fixtures SST to customer's individual application (e.g. SST-1, see picture on the right).

Max. capacity: 2000 N

Material: stainless steel

Complete testing fixture incl. quick-change tool reception for assembly on the measuring point of test stations.

Available for all tester model series



Fixture SST-1



## Comb Tool KW-BAT e. g. for accumulators

Comb tool with lateral retainers for testing connector pins and sheets of accumulators, batteries and capacitors.

The lateral retainers prevent that the test specimen turns during the test. The retainers are moveable to adapt the distance between them to specimen's size.

Comb width: 120 mm, comb height: 23 mm.

3 slits, width: 5/8/14 mm, slit depth: 20 mm.

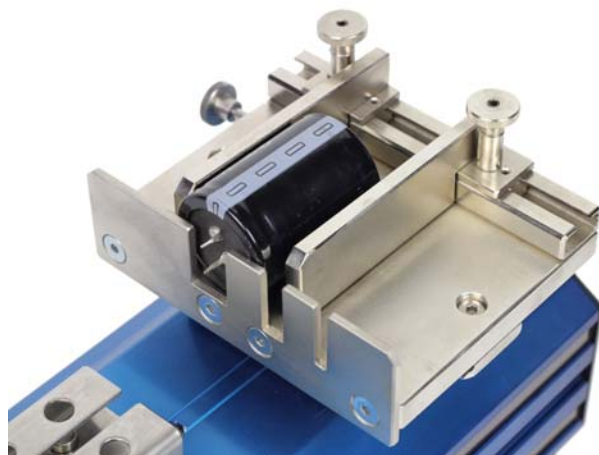
Customer-specific design available on request.

Max. capacity: 1000 N.

Arrangement on measuring point.

Available for testers of model series FTS, FTM, ATM, MTM.

For gripping the contact pins or sheets a height adjustable component grip KSEL-hv can be used.



## Fixture KU10-10S1

Special testing fixture for pull tests e. g. of cables with crimped terminals.

Carrier plate with slotted panel and 2 adjustable supports behind the slotted panel for lateral support of test specimen in order to prevent tilting/twisting of test specimen during test procedure.

The lateral adjustment of the supports facilitates the adaptation to different sizes and shapes of test specimen.

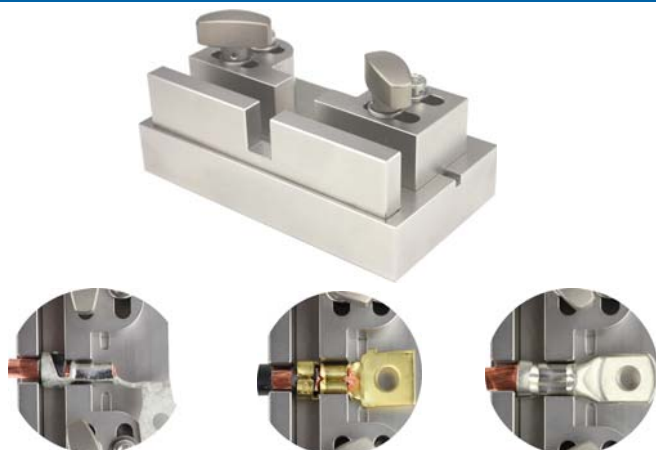
Slot width of standard panel: 10 mm, slit depth: 22 mm

Interchangeable slotted panel, panels with other slot widths (e.g. 12, 14, 16 mm) available on request.

Max. capacity: 10000 N.

Arrangement on measuring point.

Available for testers of model series FTS, FTM, ATM, MTM.



## Testing Tool HLL for retention tests of cable seals, cannulas, pressed joints etc.

The tool set HLL can be used for retention tests e. g. of cables seals, pressed joints, cannulas etc.

The tool set **HLL** consists of a holding frame HLL for mm bore gauges for assembly on measuring point of MI&T test devices, and a matching bore gauge half shell set with different bore diameters. The connected terminals, seals, connectors, cables, tubes etc. can be clamped with corresponding suitable clamping tools ( e. g. SSG, SSK, SHA-12) for assembly on the load slide of the test device.

### Specification bore gauge set MLH 1:

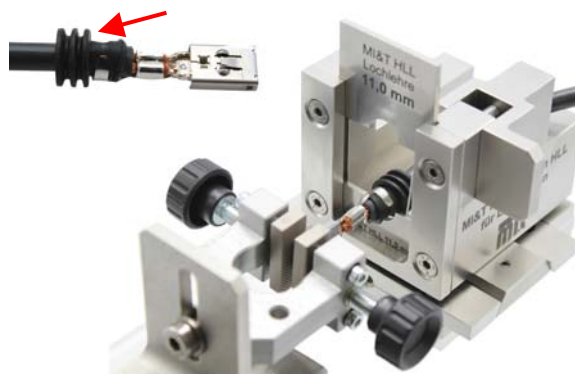
Bore diameter: 1.0 to 12.0 mm, graduation 0.5 mm.

Bore gauges with other diameters available on request.

Material: stainless steel

Max. load capacity: 500 N.

Usable with testers of model series FTM, ATM, MTM



Testing tool HLL for cable seal retention tests  
and Small Vise Grip SSG for clamping small terminals

## Miniature Component Grip FSEL

Narrow faced grip for small and difficult to grip parts as well as for gripping parts at hard to reach areas, e.g. for fine wires or electronic components.

Max. capacity: 500 N.

Measuring point arrangement: FSEL/M

Load slide arrangement: FSEL/A

Available for all tester model series



## Height adjustable Component Grip KSEL-hv

Narrow faced grip with clamping jaw for small and difficult to grip parts such as filaments, small components and other parts. The narrow grip on the jaws makes it ideal for testing on crowded circuit boards and other hard to reach places.

Height adjustable design for testing components or assemblies with different test points. By means of an additional laterally slidable fixture for the assembly to be tested each position on the assembly can be reached with the grip.

Load bar arrangement.

Max. load capacity: 500 N.

Available for all tester model series.



## Fixture ADE for cable end sleeves

Fixture for testing cable end sleeves.

To avoid measuring errors during the test of end sleeves the fixture must grip between end sleeve and cable insulation in such a way that neither the end sleeve nor the conductor is crushed.

The ADE fixture provides 2 diameter adjustable blades, which can grip between end sleeve and cable insulation. The diameter adjustment for the cable cross section is continuously variable between 0 and 8 mm.

Max. load capacity: 500 N.

Material: stainless steel

Available for all tester model series.



## Fixing and Clamping Tool SE 100

Fixing and clamping tool for testing of crimped or welded parts at SCHUKO or EURO connectors.

Plug-in plate with fixtures on both sides of the plate.

Max. capacity: 1000 N.

Available for all tester model series.

Customer-specific gripping stations or brackets designed according to customer's samples of test specimen can be assembled on the tool plate also.



## Self-tightening Grip TF 30

Grip for flat samples suitable for plastics, rubber, fabric, tapes, etc.  
Grip with eccentrically mounted serrated pressure roller for self-tightening of specimen during increasing test load.  
Max. gripping width: 25 mm (standard version).  
Max. capacity: 500 N.  
Customer-specific gripping widths are available on request.  
Available for all tester model series.



## Self-tightening Grip TF 30-50V

Grip in vertical arrangement for flat samples suitable for plastics, rubber, fabric, tapes, etc. with eccentrically mounted serrated pressure roller for self-tightening of specimen during increasing test load.  
Max. gripping width: 50 mm (standard version).  
Max. capacity: 500 N.  
Customer-specific gripping widths are available on request.

Available for all tester model series



## Eccentric Roller Grip TFH 50

Eccentric roller grip for tensile tests of flat specimen such as plastics, rubber, fabric, tapes, paper, packages, foil strips, etc.  
Pyramidal serrated roller  
Clamping width: 50 mm.  
Opening width: 0-7 mm

Max. capacity: 1000 N.

Available for all tester model series.



## Pincer Grip KSZ 10

Small pincer grip for small parts and flat specimen, foils, plastics, packages etc.  
Clamping surface ca. 12x12 mm, serrated  
KSZ 10/M for assembly on measuring point; KSZ 10/A for assembly on load slide  
(in both version the grip is mounted rotatable in the tool holder)  
KSZ 10D with M6 threaded bore for assembly at DFG gauge

Max. capacity: 500 N.  
Available for all tester model series.



## Pincer Grip KSZ 40

Small pincer grip for small parts and flat specimen, foils, plastics, packages etc.  
Clamping surface ca. 40x14 mm, serrated  
KSZ 40/M for assembly on measuring point; KSZ 40/A for assembly on load slide  
(in both version the grip can be used in horizontal and vertical arrangement)  
KSZ 10D with M6 threaded bore for assembly at DFG gauge

Max. capacity: 500 N.  
Available for all tester model series.



### Cam-operated Smooth Face Grip TF 40

Smooth face grip for testing the tensile strength of wires, small cables, films, foil strips, filaments etc.

The specimen is inserted between the gripping jaws and gripped by rotating the cam by the small lever.

In the standard version the gripping jaws have no profiling. Other designs are available on request.

Max. capacity: 500 N.

Available for all tester model series.



### Clamping Jaws TF 50

Clamping Jaws for tensile tests of flat samples such as plastics, paper, packages, cardboard strips, foil strips, etc.

Clamping width: 30 mm (standard version).

In the standard version the gripping jaws have no profiling. Other designs are available on request.

Max. capacity: 500 N.

Available for all tester model series.



### Vise Grip SSK

Vise grips in U-shape for tension tests of flat samples, foils, plastics, tapes, packages, tests at connectors and switches, etc.

SSK-10: Opening width from 0 to 10 mm, max. capacity: 2,5 kN

SSK-20: Opening width from 0 to 20 mm, SSK-30: Opening width from 0 to 30 mm,

SSK-50: Opening width from 0 to 50 mm, each with max. capacity of 1 kN

In standard version with pyramidal serrated jaw faces (pyramids 1,2x45°);

Alternative jaws: V-grooved jaws (for round test specimens), waved jaws (wave 5 mm, for flexible materials), diamond jaws (surface coated with synthetic diamonds), rubber jaws (1 mm rubber coating), blank jaws (steel blanks for your own treatment).

Fixation: threaded bore M6, optionally with quick-change tool mounting adapters



### Small Vise Grip SSG

Small vise grip in U-shape for tension tests of flat samples, foils, plastics, tapes, packages, tests at connectors and switches, etc.

Opening width: 0- 8 mm

In standard version with pyramidal serrated jaw faces (10x25 mm)

Alternative jaws: waved jaws (25x25 mm), diamond jaws (surface coated with synthetic diamonds, 10x25 mm), rubber jaws (10x25 mm), blank jaws (10x25 mm).

Fixation: threaded bore M6, optionally with quick-change tool mounting adapters

Max. capacity: 250 N.



### Test Cone TF 10

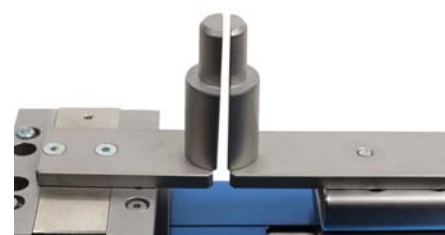
Divided mandrel for rubber, plastics or jewellery rings.

Stepped mandrel, diameter 14/24 mm. Adjusting the width of slit can vary the diameter.

Mandrel with customer-specific diameters available on request.

Max. capacity: 500 N.

Available for all tester model series.





## Insertion and Extraction Tool Set KLH

Tool set for measuring insertion and withdrawal forces of engagement-disengagement tests of crimp terminals, quick-connect terminals, connectors, antenna plugs, etc.

The tool set KLH consists of a moveable tool reception for assembly on the load slide of a force tester, featuring a parallel guidance bar with adjustable force idle facility to avoid pre-loads during change of test load direction, and for assembly on the measuring point of the tester a corresponding height adapted tool reception. The fixtures for the test samples are assembled on these tool receptions.

A fixture set for standard crimp terminals and a fixture set for antenna plugs is available as a standard.

Customer-specific fixtures adapted to customer's test specimen can be designed also.



Max. load capacity: 500 N.

Available for all tester model series.

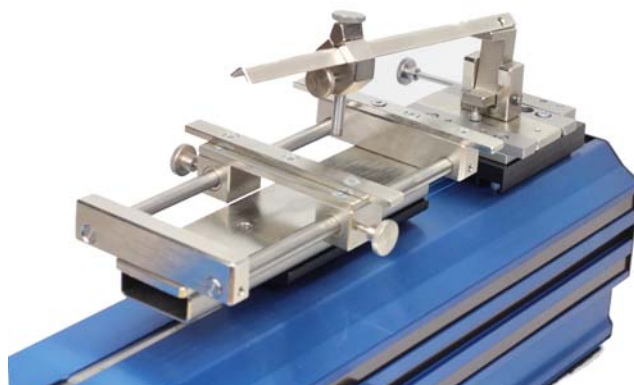
## PCB Holding Frame LSS for shearing tests

Tool set for shearing tests of electronic components on PCBs consisting of PCB Holding Frame and Shearing Mechanism.

The PCB Holding Frame features an adjustable fixing bar for fixing PCB with side lengths of ca. 10 to 125 mm and a material thickness up to 3.5 mm.

Customer-specific holding frames can be designed also.

The shearing mechanism is height adjustable and features a vertical length adjustment of ca. 140 mm. The shearing pin has shearing blades on both sides with 2.5 and 6 mm width and can be reversed in the fastener.



Max. capacity: 500 N.

Available for all tester model series.

## Stepped Cone KBS for testing cable ties

Split stepped mandrel for testing cable ties.

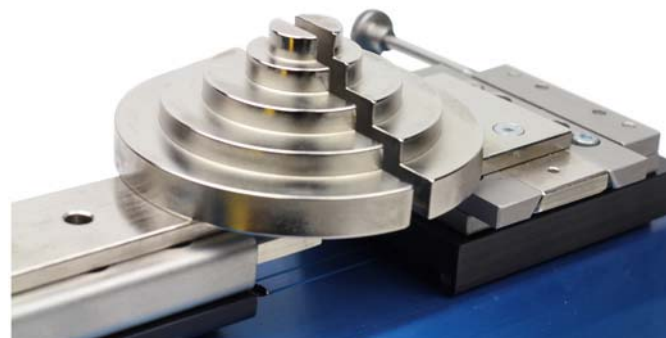
The cable tie is looped around a step of the mandrel with suitable diameter in such a way that the cable tie head is positioned to the side of the mandrel's slit.

During the test the two parts of the mandrel are extended by the testers load slide.

Stepped mandrel with 5 gradations: 18, 38, 48, 68, 86 mm. The diameters can be adapted additionally by the continuously adjustable length adjustment on the tool bar fixing of tester's load slide.

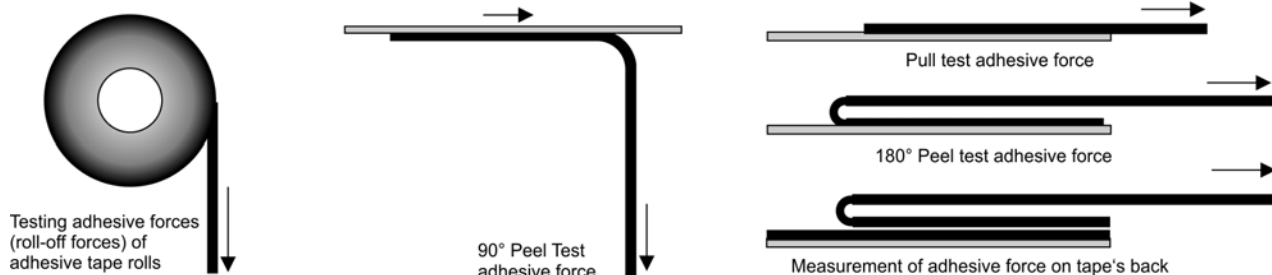
Max. capacity: 1000 N.

Available for all tester model series.



### Testing adhesive forces of adhesive tapes, foils etc.

Adhesive strength is the essential characteristic of adhesive tapes and a measure of the strength of the adhesive bond. For testing the adhesive force of adhesive tapes and foils different kind of tests can be carried out:



### Testing Tool TPT 90°S for 90° peel tests

Tool set for testing the 90° peeling forces of adhesive materials from a carrier plate.

The adhesive material is pasted on a carrier plate and the free end of the specimen is loaded under a right angle (90°).

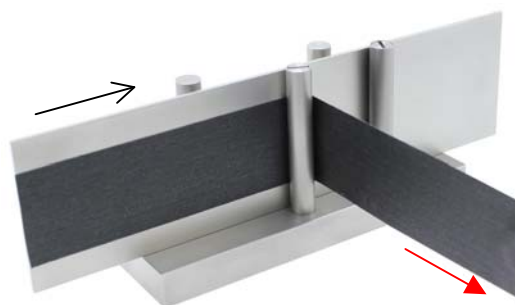
In order to ensure a 90° peel test with low-friction moving carrier plate the plate is inserted in a roller holder.

The free end of the tape can be gripped by a suitable grip, e.g. TFH 50, SSK, SSG, TF 30v or any other suitable grip, so that the tape can be peeled off from the carrier plate by the tester's drive unit.

Max. tape width: 50 mm

Length of carrier plate: 225 mm (max. adhesive length 175 mm)

Max. capacity: 500 N.



### Testing Tool TPT 0Z/180°S for pull (shearing) and 180° peel tests

Tool set for testing the pull (shearing) and 180° peeling forces of adhesive materials from a carrier plate or from tape's back.

The adhesive material is pasted on a carrier plate. For the pull (shearing) force test the adhesive material is loaded linear in the specimens plane. For the 180° peel test the free end of the pasted tape is folded in a 180° angle and is then peeled off from the plate or from tape's back.

The free end of the tape can be gripped by horizontal assembled self-tightening grips TFH 50, TF 30h or any other suitable grip.

Max. tape width: 50 mm

Length of carrier plate: 150 mm (max. adhesive length 150 mm)



### Fixtures TF 70 and TF 71 for adhesive tape rolls

Tool for testing adhesive forces (roll-off forces) of adhesive tape rolls.

The tape rolls are fixed on a rotatable mandrel. The mandrel TF 70 is suitable for tape rollers with inner core diameter of  $38,1 \pm 2$  mm (1,5"), the mandrel TF 71 is suitable for tape rollers with inner core diameter of  $76,2 \pm 2$  mm (3").

The free end of the tape can be gripped by a suitable grip, e.g. TFH 50, SSK, SSG, TF 30v or any other suitable gripping tool so that the tape can be uncoiled from its roll for the test by the tester's drive.

Max. tape width: 30 mm (TF 70), 50 mm (TF 71).

Max. capacity: 500 N.

Available for all tester model series.



TF 30 vertical

Ball Bearing Cone

## General Information

The versatile **MI&T** testers in combination with clamping tools and test fixtures suitable for the respective application provides flexible test systems for varying test applications in production line testing, material testing, incoming inspection and development. The special application presented below for testing cable ties and hand tools is an example for the versatile possible applications.

## Testing cable tie tighten pistols

For testing the tensile force of cable tie hand tools the tool set KBP can be used. The tool set consists of a special fixture for the cable tie pistol for assembly on the load slide of the tester and either of a plug-in plate with 3 pins of diameter 12, 20 and 30 mm or alternatively a suitable clamping tool for assembly on the measuring point of the tester.

For the test the cable tie is looped around one of the 3 pins or clamped by a quick action gripper and the strip end is inserted through the cable tie head. The tie is tightened firmly in such a way that one stroke of the pistol is sufficient to tension and cut-off. The free strip end is inserted into the open side of the cable tie tool head according to manufacturer's instructions. The head of the tool must have a distance of only a few millimetres to the cable tie head. Then the manual lever of the cable tie tool (trigger) is pulled to the stop. As soon as the pre-selected tension force of the pistol is reached, the free tie end is cut-off by the tool automatically. The tension force achieved at cut-off of the cable tie is determined and indicated on tester's display.

The special fixture for the cable tie pistol must be designed for the respective cable tie pistol model. Due to the manifold different shapes and dimensions of the different cable tie pistol models there is no all-purpose fixture, suitable for all pistol models, available. In principle special fixtures for all models of cable tie pistols are available respectively can be designed on request. Our standard delivery programme provides fixtures for cable tie tools model HellermannTyton MK3SP, MK3PNSP, MK 6PN, MK 7, MK 7HT, MK 7P, MK9, MK 9HT as well as Panduit GS2B, GS4H, PPTS and GTS.

The KBP tool sets are available for all tester models up to a nominal load of 1000 N and with tool reception bar on tester's load slide.



## Testing manually operated cable tie tighten pistols: Motor-driven actuation of the pistol trigger

In order to avoid influences to the test procedure by the operator during the tests of manually operated cable tie tighten pistols, for motorized testers of model series FTM, ATM and MTM also a special KBP tool set can be used, which enables to actuate the trigger of manually operated cable tie pistols with a constant actuating speed using the drive unit of the test station. Thus possible influences caused by different ways of actuation of the pistol trigger by the operator can be excluded during the test.

Using test stations ATM and MTM the test procedure can be carried out as an automated test so that after starting the test the test station actuates the trigger of the cable tie pistols with the selected actuation speed until the tension force of the pistol is reached and the cable tie is cut-off. After the cable tie has been cut-off by the pistol the load slide of the test station stops and drives back automatically to the starting position.



For further detailed information on this topic please see our brochure "Testing Cable Tie Tighten Pistols".



### Mobile Table Printer Model TPD58

Small and lightweight printer for printing measured values with DFG Force Gauges; rechargeable battery power unit allows fully mobile application.

Thermal paper printer with serial interface;

- Dimensions: ca. 57x90x36 mm (WxDxH), weight ca. 200 g
- Paper: width 57,0 ±0,5 mm, max. Ø 31 mm
- Interface: RS232C (V.24)
- Printing speed: max. 50 mm/s.
- Power supply: 7,2V DC, NI-MH rechargeable battery pack
- Charging time: approx. 3 hrs.
- Charging unit: input voltage 100-240 V AC, 1000 mA, 1x USB
- Operating elements:  
On/Off key with LED;  
Feed key for paper feed
- Scope of delivery: charging unit with connection cable; serial data transmission cable for connection of DFG force gauges.



Test Report									
001	4.60	N	push	01	17.40	N	push	01	
002	8.60	N	push	01	14.25	N	push	01	
003	17.75	N	push	01	14.25	N	push	01	
Print Date: 2016-07-17 19:15:12					16.40	N	push	01	
List printout with DFG					21.30	N	pull	01	
					Single printout with DFG				

### Digital Crimp Height Micrometer Model CBMS 25

- Micrometer for exact measurement of crimp height
- Anvil/blade and spindle with pointed cone
- Range 0-25 mm
- Resolution 0,001 mm
- Indication switchable mm to inch
- Ratched Stop for constant force
- Thimble and sleeve satin chrome polish, frame enamelled
- Buttons: zero, power on/off, inch/mm
- Serial interface RS232
- Protection IP54
- Power supply: battery SR44
- incl. storage box.



### Digital Micrometer Model BMS-2P

- Pointed spindle and anvil tips to measure the crimp height, crimp width, web thickness of drills, small grooves, keyways.
- Range 0-25 mm
- Resolution 0.001 mm
- Indication switchable mm to inch
- Ratched Stop for constant force
- Thimble and sleeve satin chrome polish, frame enamelled
- Buttons: zero, power on/off, inch/mm
- Serial interface RS232
- Protection IP54
- Power supply: battery SR44
- incl. storage box.



### Stand for micrometer

- Rugged stand for micrometer
- Material: cast iron
- Surface enamelled
- Weight ca. 1,1 kg





## Data logging of measured values in PC programs:

The **MI&T** testers and test stations provide serial ports for the data output. Thus measured values can be send to either a suitable printer or to a PC. **MI&T** offers various hard and software solutions for the data acquisition and evaluation of measured values.

## MI&T KeyTast Interface for direct data logging of measured values in PC programs:

The **MI&T** KeyTast is an interface for data acquisition of measured values recorded by measuring instruments and testers. With the **MI&T** KeyTast measured values from measuring instruments and testers with serial port can be send via an USB port of the PC directly to word processing programs or statistics programs, e. g. MS Excel. When connected to a PC the USB interface is recognised as a keyboard connection and can be used with all programs requiring manual keyboard input (e. g. Word, Excel, statistics programs). The via the RS232C port incoming measurement data are converted into keypad commands by the interface and send via the USB port to the connected PC. A virtual keyboard trigger is send automatically to the program together with the recorded data.

The power supply is provided by the USB port. When used with a PC, no server file is required for USB port operation, allowing a quick start-up of the equipment.

- USB Interface with RS232C input (with pin configuration as with PC COM port).
- No driver file for the USB interface required.
- Power supply by USB port.
- Terminators like Enter or Tab can be selected in the Key-tast set-up menu.
- Additional set-up settings for language, separator and timer.
- Foot switch connector, data-switch and timer for measuring instruments with external data request.
- Usable with various measuring instruments and testers with serial port.
- Dimensions: 55x54x23 mm (WxDxH).
- Weight: ca. 75 g.
- Scope of supply: Keytast Interface, USB connecting cable, manual.
- Other Keytast Interfaces with 4 or 8 RS232C ports or Digimatic ports are available.



Keytast Interface RS232-USB



USB-Interface-Box with 4 RS232 ports

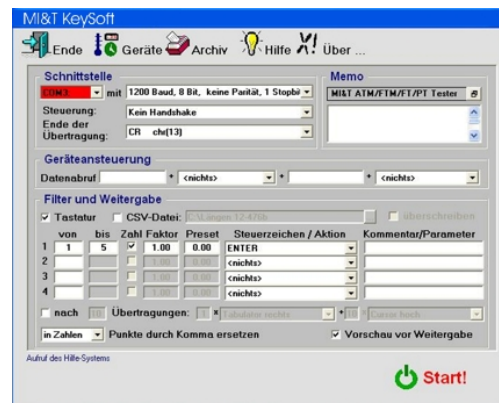
## MI&T KeySoft PC Software for data logging of measured values in PC programs:

The **MI&T** Keysoft PC software enables to transfer data from measuring instruments connected to the PC via a serial port or network directly to any Windows applications. The configuration of the software is flexible configurable along with easy operation.

KeySoft runs in the background of the Windows system. Depending on the settings it's symbol is visible only in the tray. Usually the serial interface is used. However, KeySoft also supports any other interfaces which are available on the PC as COMx ports. With networked measuring instruments KeySoft communicates via the network.

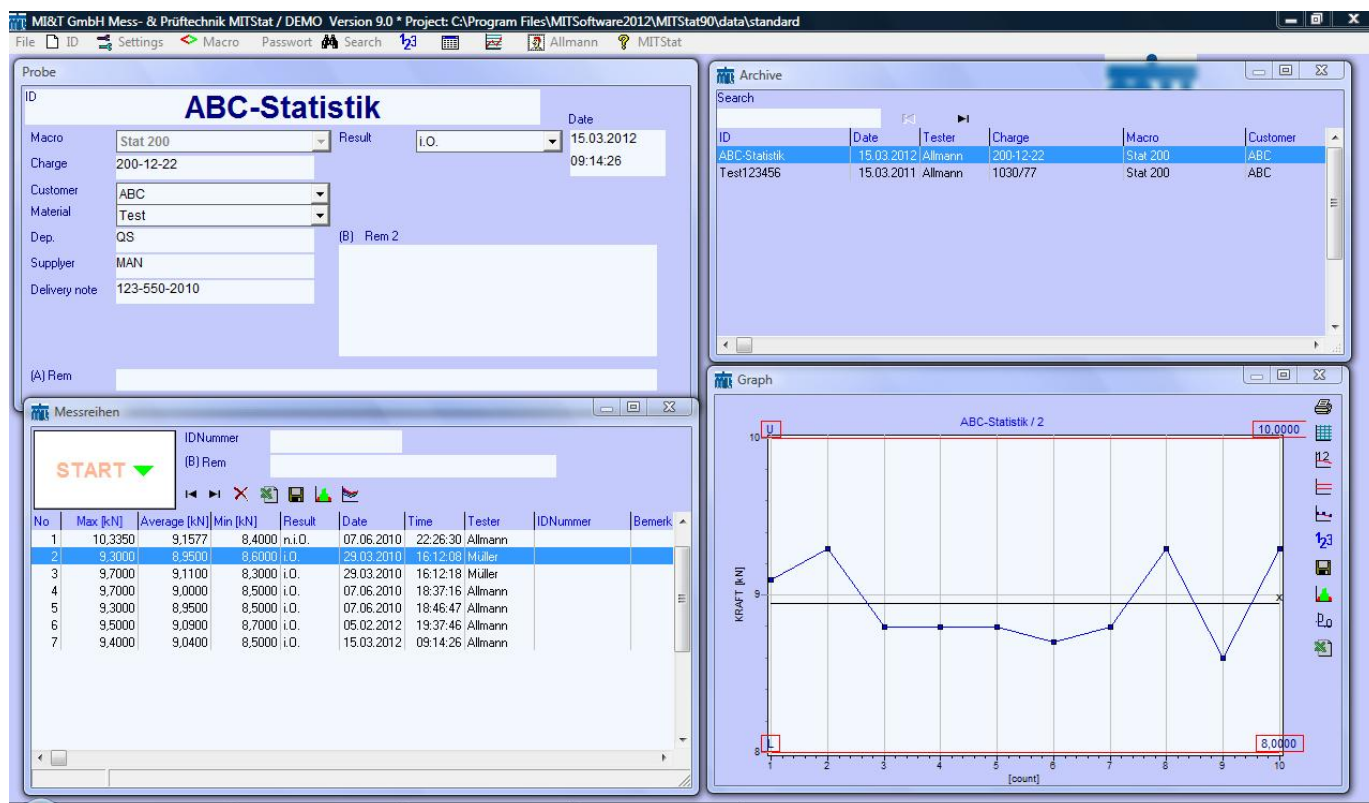
Any Windows programs, for instance MS Excel, Word, Access, OpenOffice, LIMS and QS systems and many other can receive data from KeySoft.

KeySoft can filter corresponding data blocks with the desired data from each line of the transmitted data stream and writes the data together with individual control characters into the keyboard buffer of the PC. Thus the active Windows application running in the foreground receives data either from the KeySoft software or from data input of the user.



## MI&Tstat Software: statistical representation and analysis of measured values:

- PC Software for acquisition of measured data and statistical data analysis.
- Data import of measured values via a serial interface of measuring instruments, force testers and crimp height micrometers of the MI&T GmbH.
- Easy set-up and use.
- Storage of company data, customer data, operators, test plans.
- Statistical representation and analysis of measured values.
- Listing of measured values.
- tolerance limits and tolerance graphs.
- Various graphical representations of measured values.
- Histogram and log term statistics.
- Report printout.
- Data base.
- Archiving of measured data.
- Data export to Excel.
- German programme version.
- Integration of other measuring instruments possible (on request).
- System requirements: standard PC with Windows XP/Vista/W7, display resolution 1280x800, serial interface for connection of measuring instrument.
- Single user licence, incl. dongle.



## General Information:

The progressive miniaturization of components increasingly makes optical quality control difficult. The MI&T microscopes with adjustable focus, high resolution and good illumination in combination with suitable measuring supports allow better visualization of the smallest components. Thus, even the smallest crimp connectors and conductor cross sections for quality control or circuit cards during repair can be displayed with high quality.

- Digital microscopes with display, tripod, lighting, monitor connection and USB interface
- Universally applicable microscopes, e.g. for optical inspection of stripping and crimp quality, visual inspection of welded joints and components, repair of printed circuit boards and small mechanical assemblies
- with LCD display for stand-alone operation.
- magnification up to 560 times
- Monitor connection for external monitor
- PC connection via USB 2.0 in PC camera mode
- Full HD video output
- Real time display
- SD card slot for storing photos/videos on optional Micro SD card
- HDMI display output mode with max. resolution 1920x1080
- USB 2.0 output mode: function as Windows PC camera, storage photo or video, max. Resolution 1080x720p
- Metal tripod with height adjustment and 2 integrated LED lights.
- Optional: various measuring supports, e. g. MHC support for cables with crimped terminals

## Technical Data:

### DMST302:

#### Microscope:

Material:	Metal
Dimensions:	12,5 x Ø3,5 cm
Image sensor:	3 Megapixels HD Sensor
Screen:	13 x 9 x 2 cm with 5" LCD display, tilt adjustable
Opt. magnification:	up to 560 times (HDMI Monitor 22")
Dig. magnification:	1 to 4 times
Focus range:	5 to 12 cm
Video output:	1080p Full HD (HDMI), 720p (PC)
Video format:	real time via HDMI, MJPEG via PC
Photo resolution:	12 M
Photo format:	JPEG
Frame rate:	max. 30 f/s
Data output:	USB 2.0 interface, Video outputs: HDMI, AV
Storage:	SD card slot for Micro SD up to 32 GB
Power supply:	5 V DC
PC systems:	Win XP/7/8/10

#### Tripod:

Dimensions:	ca. 27 x 20 x 12 cm
Material:	Metal
Lighting:	2 integrated LED lights, adjustable.

### DMST301:

smaller version of DMST302

#### Microscope:

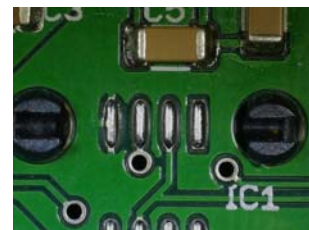
Material:	Metal
Dimensions:	10,5 x Ø 3,5 cm
Screen:	3" LCD display
Opt. magnification:	up to 260 times (HDMI Monitor 22")
PC systems:	Win XP/7/8/10

#### Tripod:

Dimensions:	ca. 21 x 20 x 12 cm
Other data such as DMST302	

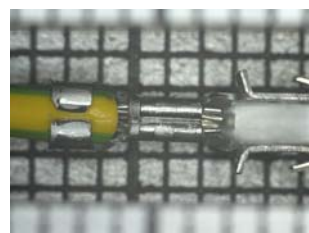


DMST302

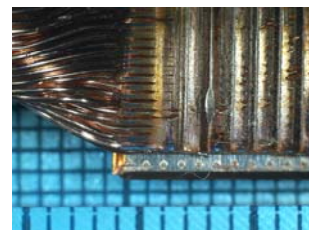


### Specimen holder MHC for cables for DMST microscopes

Stainless steel specimen holder for cables with replaceable prism support (V-groove), clamp bracket, carrier plate with mm grid and guide rails with mm grid.



Crimpverbindung





## Application Field

### Automotive Industry

- Tensile tests at cables and connections.
- Tensile tests at wire ropes and flexible shafts.
- Measure flip force in mechanical snap action switches.
- Test forces required to move linkages and tension cables.
- Evaluate physical efforts (door lock, hood, glove compartment, brake pedal, etc.).
- Test clutch release force.

### Electrical & Electronics Industry

- Tensile tests of crimped terminals.
- Insertion and extraction tests of connectors.
- Cable insulation pull-off testing.
- Test removal force of connector pins in plugs.
- Strain and break tests of copper, silver and steel wires.
- Test spring clip insertion and withdrawal forces.
- Shearing tests e.g. of SMD components.
- Testing cable ties.
- Test force springs and magnets used in various fields.
- Material test of electronic and electrical components.
- Test connection parts e.g. of EURO and SCHUKO connectors
- Test actuating requirements on push buttons and flip switches.

### Chemical & Plastics Industry

- Tensile test of plastics, rubber, fibres and filaments.
- Test peel strength of adhesives.
- Test crush strength of pills (medicine).
- Measure compression of ceramic compounds.
- Testing subcutaneous syringes.

### Machinery & MFG

- Test pull-out force of drive shaft.
- Test force to open cabinet doors.
- Test sprocket chain tension.
- Test load on wire feed mechanism.
- Rate testing of springs in systems.

### Other Industries

- Test tensile strength of materials.
- Test firmness of food.
- Test load to remove pull tab of cans.
- Test pressure of surgical instruments (forceps, scissors).
- Pull test on zippers.
- Test integrity of seals on blister packages and plastic bags.
- Test adhesion strength of labels and stickers
- Measure force to perforate cards.

## Example of application: Tensile strength of crimped connections and end sleeves

AWG	Comparable conductor cross sections [mm <sup>2</sup> ]	Turned and closed contacts DIN EN 60352-2, values in [N]	Open barrel contacts and pre-insulated barrels DIN EN 60352-2, values in [N]	Flat receptacles & flat tabs nominal size 4,8/6,3/9,5 DIN 46249-1, values in [N]	SAE AS7928 table II values in [N]	End sleeves insulated and non-insulated DIN EN 57609 values in [N]
30	0,05	7	6			
28	0,08	12	11			
26	0,14	18	18	20	32	
24	0,2	30	28		45	
23	0,25			40		
22	0,34	40			67	
20	0,5	80	60	80	85	15
18	0,75		90	120	170	20
17	1	140	100	160		30
16	1,25				223	
15	1,5	220	135	200		40
14	1,93				312	
13	2,5	330	190	250		50
12	4			350	490	
11		500	270			50
10	6	700	350	500		60
8	10	900	500			80
6	16					90
4	25					100
2	35					120
1	50					140
2/0	70					160
3/0	95					180
4/0	120					200

Abstracts from a. m. standards, all specifications without guarantee and excluding all liability.

DIN 41611-3 replaced by DIN EN 60352-2; MIL-T-7926 replaced by SAE AS7928 table 2; UL486A and BS5B178 corresponds to IEC 60352-2





## Force Gauges Test Systems Test Stations



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MI&T – Advanced Force Measurement  
High quality test equipment made in Germany

