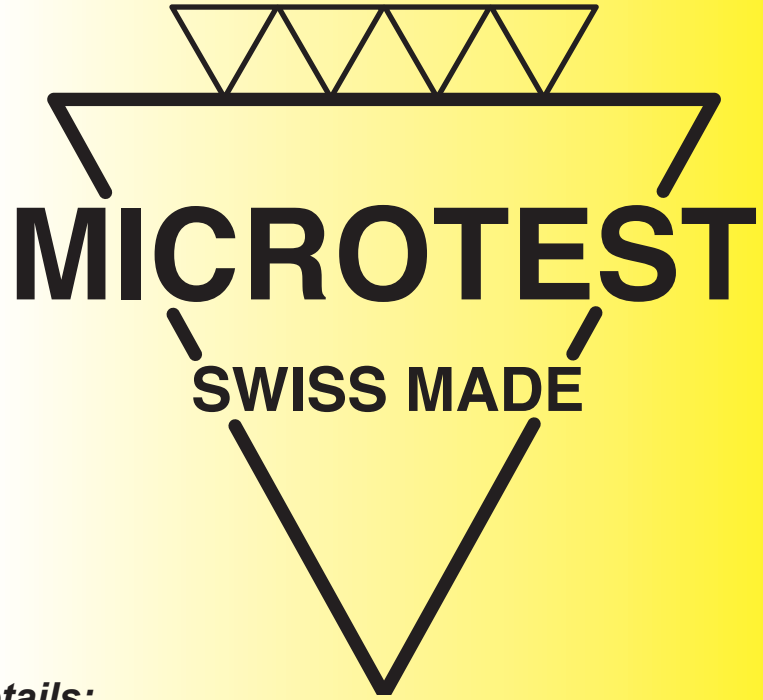
MICROTEST
SWISS MADE

Worldclass Internal Micrometers for more than 50 Years

Precision Worldwide



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About Us:

Microtest AG is for more than 50 years specialising in measurement of internal diameters. Through permanent optimisation, constant further development and improvement, our measuring instruments have reached a very high standard of precision, reliability and universality for the high requirements of our customers.

Our products are in use all over the world and guarantee the highest precision over long periods of time.

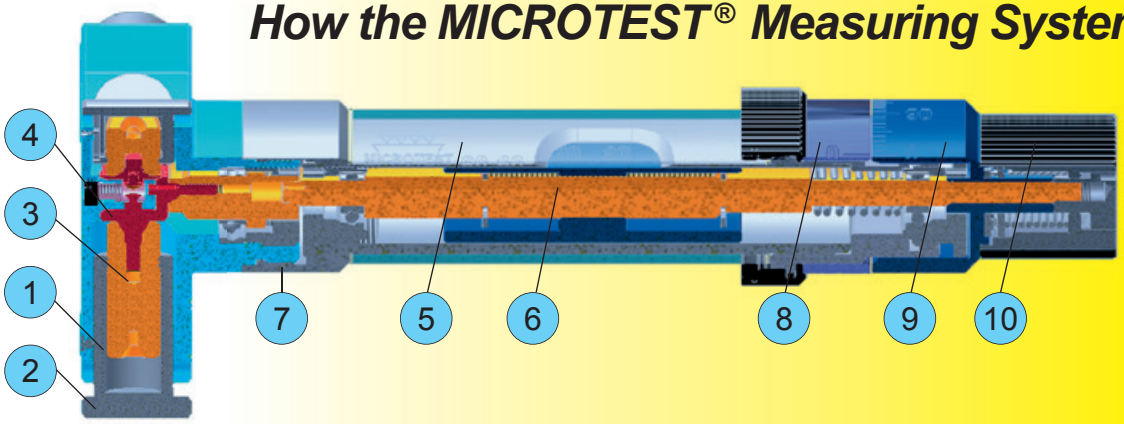
MICROTEST
SWISS MADE

Why to use our System?

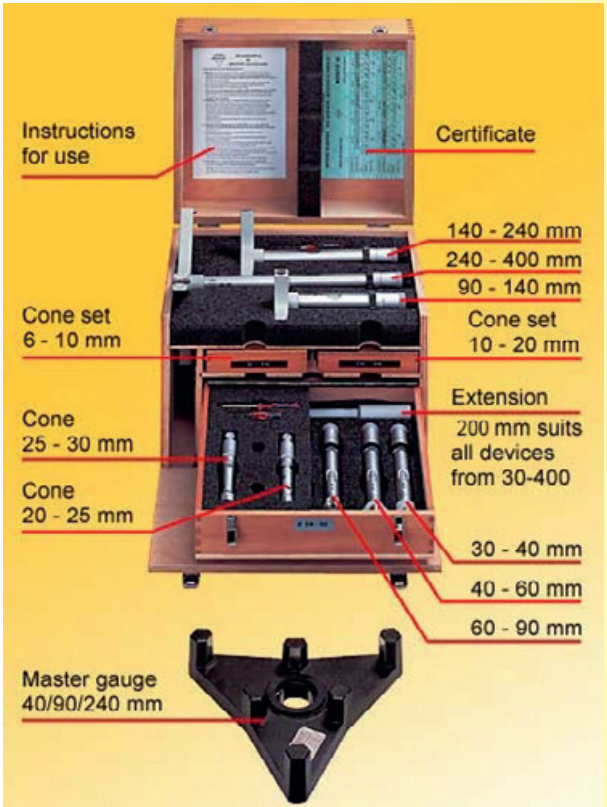
The high precise MICROTEST® Measuring System reachs the high accuracy throughout three measuring spindles which are operating simultaneously together in order to obtain the stop point at which the measurement is taken. Due to a good vibration, generated by the ratchet, transmitted via spindles to the measurement probes, accures the greatest possible accuracy for repeating measurement, independently of the user‘s sense of touch.

The plastic coating protects against spray water, dirt and thermal influence from the users hand. The temperature-compensated design enables highly accurate measurements even if the standard ambient temperature of 20°C is not achieved, since the material expansions of the workpiece and the measuring instrument are almost completely balanced out.
The MICROTEST® system is Maintenance-free!

How the MICROTEST® Measuring System works!



The central shaft (6) is synchronised with the measurement probes (1) via bevel gears (4). These bevel gears transmit the rotation from the ratchet (10) and scale drum (9), to the measuring spindles (3), which extend the extremely well supported probes (1) to obtain a measurement. The greatest possible distance between the outer guide and the pivot in the centre remains unchanged for every measurement orientation. The poly-carbon insulation tube (5) offers protection against spray, dirt and warmth from the hand. Tungsten carbide pins (2) provide low-wear contacts at the points of measurement. The direct full read-out of the measuring result on the parallax free scales (8, 9) is faultless due to 100 divisions per turn which avoids readout errors. The new connection (7) offers the possibility to extend the instrument up to 10 meters, or more, for deep bore holes without loss of accuracy.



The MICROTEST® System

Due to extra large measuring ranges: for diameters from 30 to 400 mm only 6 MICROTEST® Internal Micrometers are needed.
By comparison 13 to 16 conventional devices would be necessary.

The space required for the whole set for diameters from 6 to 400 mm, including calibration gauges, small extensions, necessary tools and certificates, packed in a robust wooden case is surprisingly small, only 395 x 320 x 310 mm.

The MICROTEST® System

MICROTEST® Internal Micrometers are also available as single instrument or as small sets with calibration rings.

To protect your investment in any environment we deliver our MICROTEST® internal micrometers in a stabile wooden case.

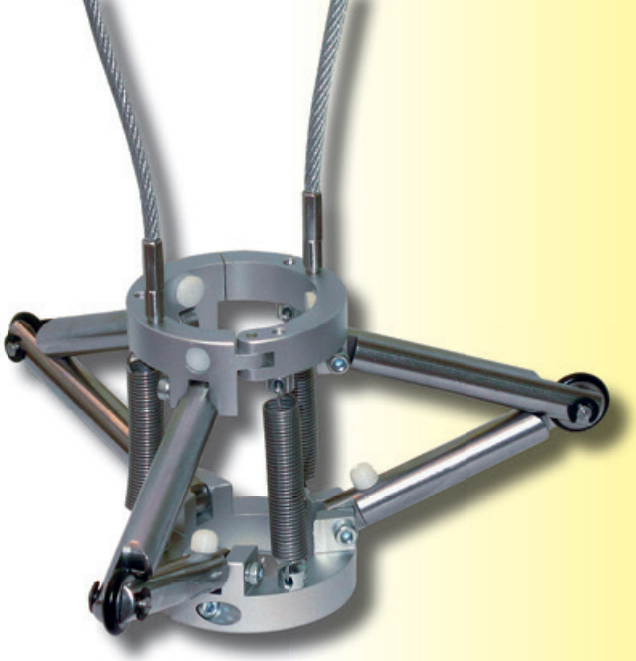
Time-saving: thanks to the wide measuring range, fewer MICROTEST® internal micrometers are required, and as a consequence fewer time-consuming checks and adjustments are necessary.

Elbow and Extensions:

For MICROTEST® Internal Micrometers till Ø 400 mm we offer our clients elbows and extensions. We can combine extensions up to 10 meters or more.

Since the length measurement remains on the axis of the work piece, temperature has no effect on the extension or display. The measurement remains as accurate as in a standard unit.

Available extension lengths are:
50, 100, 200, 350, 500, 750, 1000 and 1500 mm



The MICROTEST®-Tripod:

The MICROTEST®-Tripod supports the internal micrometer with extension to achieve an optimal pre-centring of the whole unit in the deep bore hole. The measurement unit can be introduced on rubber rollers, without scratching the bore.
From 1,5 meter extensions onward it is recommended to use our MICROTEST®-Tripod, similar to Bessel‘s rule. In the case of very long applications further tripods should be fitted for support.
To guide the MICROTEST®-Tripod via radial recesses, we supply appropriate cables for this purpose.

Available: Ø 50–400 mm
According the measuring range.

The MICROTEST®-DIGITAL

MICROTEST® high-precision mechanics are refined with high-tech electronics. As a result of intensive development it has now been possible to implement a digital module that enables even higher accuracies to be achieved than with analogue equipment.

The measurement shaft, supported in two sets of ball bearings, carries a highly accurate sensor that generates 10,000 increments per rotation. The recording of values measured in 100 nm steps improves the accuracy significantly.

The housing is manufactured from a glass fibre reinforced plastic and is fitted with cooling water-resistant seals at all entry points.

The module meets the IP 67 standard of protection, is impact resistant, and can also withstand complete immersion in a swarf trough.

The MICROTEST®-DIGITAL

A high contrast display with large numbers makes readout easier, even under difficult lighting conditions.

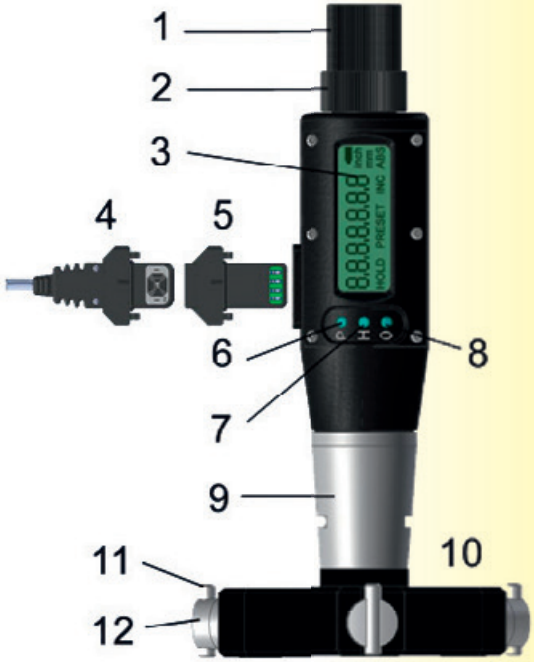
All important functions can be selected directly via one button.

The operation has been kept simple, so that all important functions with only one key press can be reached.

The digital module has a preset memory, where the reference dimension of the calibration ring, can be pre-programmed. This can be read, during the relevant calibration process by pressing the 0-button.

Data transmission, as one of the most used additional functions can also be triggered directly.

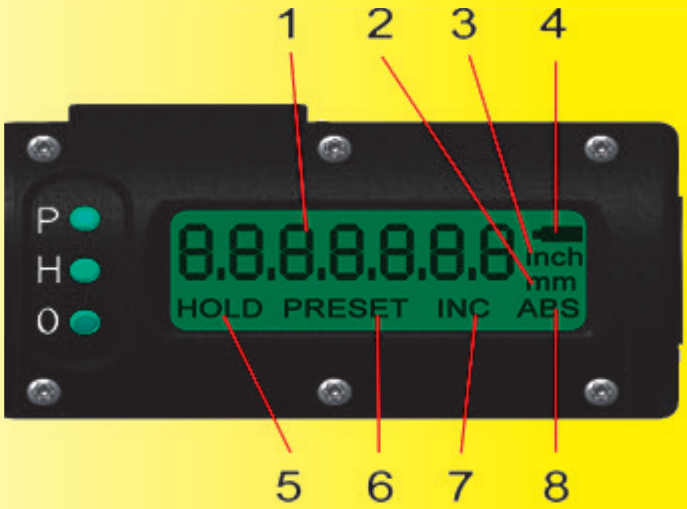
Description of the Digital Internal Micrometer

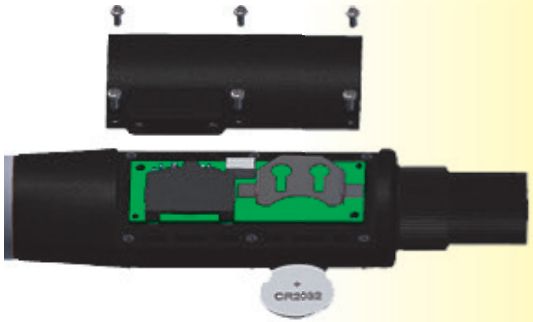


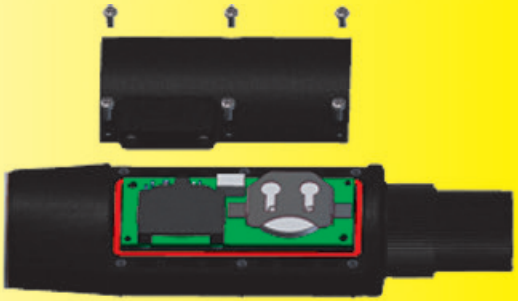
1. Hand wheel with ratchet
2. Forced retreat screw
3. High contrast display
4. Cable interface (optional)
5. Radio module interface (optional)
6. Program button or switch between INC / ABS mode
7. Hold / Send button
8. 0-button in the INC mode Preset acquisition, in ABS mode
9. Connection shaft
10. Measuring head
11. Carbide pin
12. Probe

Display:

1. 7 digits numeric display, reading 0.001 mm
2. Display in mm-mode
3. Display in inch-mode
4. Display-battery change
5. Display in Hold-mode
6. Display in Preset-mode
7. Display the INC.-mode (incremental)
8. Display in ABS-mode (absolute)







Easy battery change. Average life span 1–2 years depending on use.

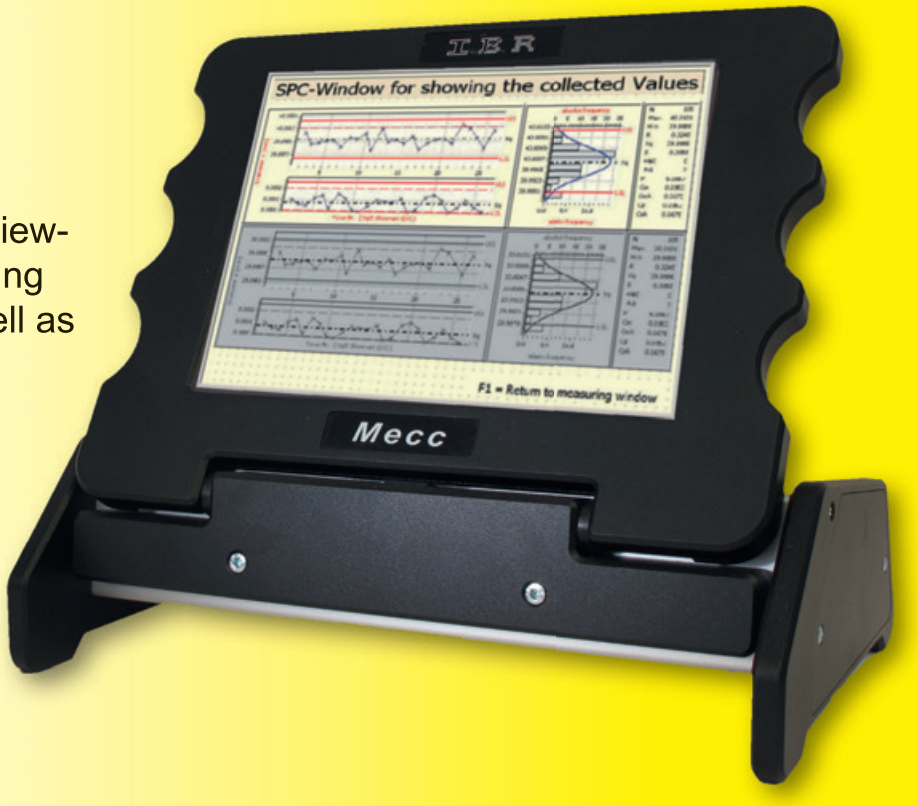
Accessories for Digital Technology:

ComGage

ComGage is a software for the measurement of statistical process control in production.

The software is designed for easy viewing of readings, to complex measuring tasks with control sequences, as well as for testing of components with multiple characteristics in small and large series, with different instruments.

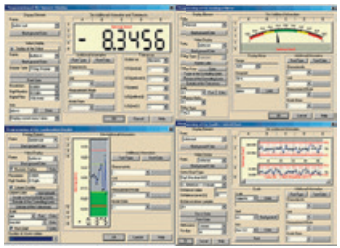
By statistical functions, the software provides information for the control of production processes.

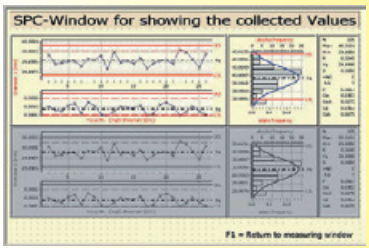


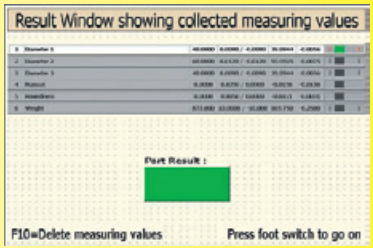
Data Transfer Software:

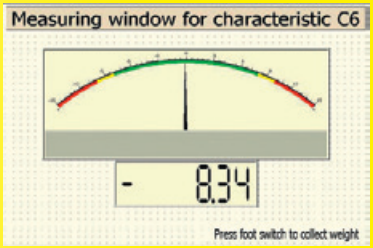
The data can optionally be transmitted through an interface cable or a wireless module up to ~ 100m in factories. A USB receiver, available for laptop and desktop PC, can process up to 120 different instruments. If necessary, several receivers can be connected to a PC. There are radio modules for all interfaces available to the well-known manufacturers to ensure compatibility so that each instrument can be connected easily with interface.

The available software is quite enough in a cheap version for most applications, since this already has all the necessary functions for ISO compliant logging. For higher demands is a version with additional features available. The display and statistics masks can be individually customized by the user to the respective needs.
Print, export and archive functions for the captured data are available.









Accessories for Digital Technology:

Radio module

Fits for all
MICROTEST®-Digital.

Transmission range in factory buildings:
up to ~ 100 m.
Data transfer coded.

USB Receiver

The USB receiver can process up to 120 radio modules.

Interface Cable

The interface cable, with 2 m length, is suitable for stationary applications.
Available as USB2 or RS 232.

Radio modules for various instruments from other manufacturers on request.

Calibration Rings and Gauges:

Our MICROTEST® calibration standard is in accordance with DIN 2250 or better.

We provide you with high-precision, lapped calibration rings for the most demanding applications.

In our range, we provide high-precision calibration rings, lapped, for highest claims, up to max. Ø 900 mm.

An other option is our universal calibration gauge for all Microtest devices from Ø 30 mm – Ø 400 mm with hard-chromed measuring faces.

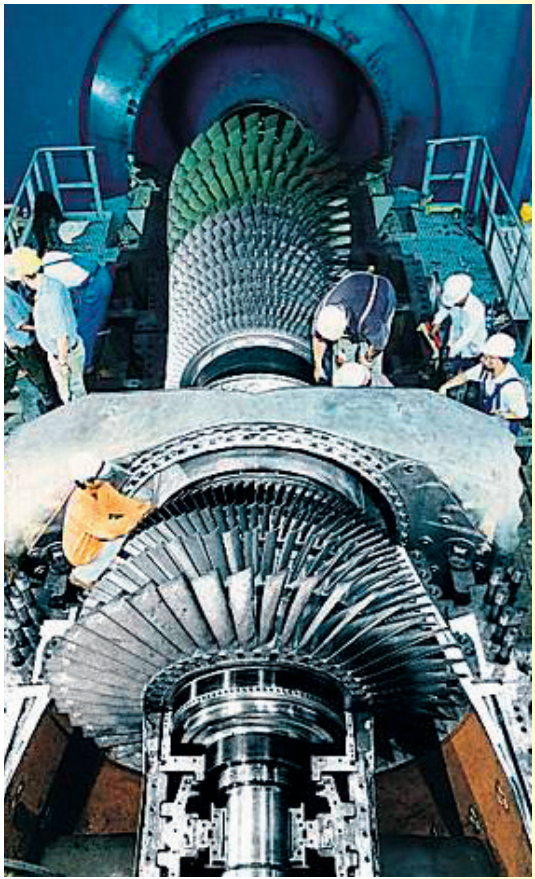
On request different sizes are available!

Unrivalled: The World's Largest Internal Micrometer

Our MICROTEST® system is the only one that can measure bore holes from Ø 400 mm to Ø 1150 mm precise and accurate.
Based on our normal construction we produce an instrument with an unrivalled accuracy. These instruments are very light build and come with extra hard ratchets to achieve perfect self centring in a big bore hole. The instruments are suitable for both vertical and horizontal applications.

Available measuring ranges are:
Ø 400–650, Ø 650–900, Ø 900–1150 mm

Applications of the World's Largest Internal Micrometer:



MICROTEST® internal micrometers are in use worldwide. The products find their applications in machinery, pumps, compressors, automotive, marine and power plant construction, as well as in the oil-conveying, mining, aviation and aerospace. The robust design allows the use of the instruments even under unfavorable conditions in manufacturing, in the field, locally as well as in measurement and testing laboratories.

Custom-Made: Special Instruments

Based on our normal construction we design and manufacture instruments to our customers needs!

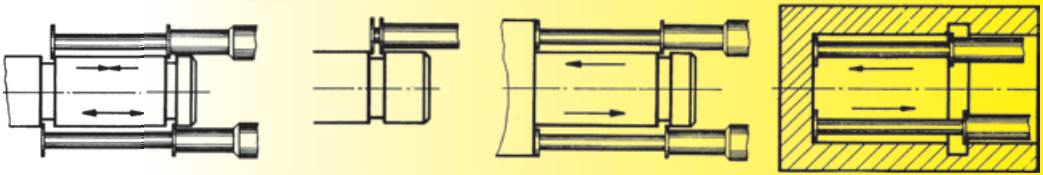
MICROTEST® special micrometers such as ball track micrometers or radial recess micrometers, as well as the 3-point external measuring unit, are unique and unrivalled.

e.g. for turbocharger labyrinth or similar special tasks.
For further information don’t hesitate to call us!

MICROTEST® SLOTMASTER:

Thanks to SLOTMASTER, our new type of slot and groove measuring gauge, you can now measure axial distances of slots and circlip grooves, both internally and externally, without any difficulty.

- Easy, fast, accurate measuring.
- Accuracy ± 0.02 mm
- Readout 0.01 mm by dial gauge
- Shockproof
- Splash water protected
- Measuring range 0/1.2–30 mm/30 – 60 mm
- Interchangeable probes to extend up to 120–150 mm
- Special probes on request



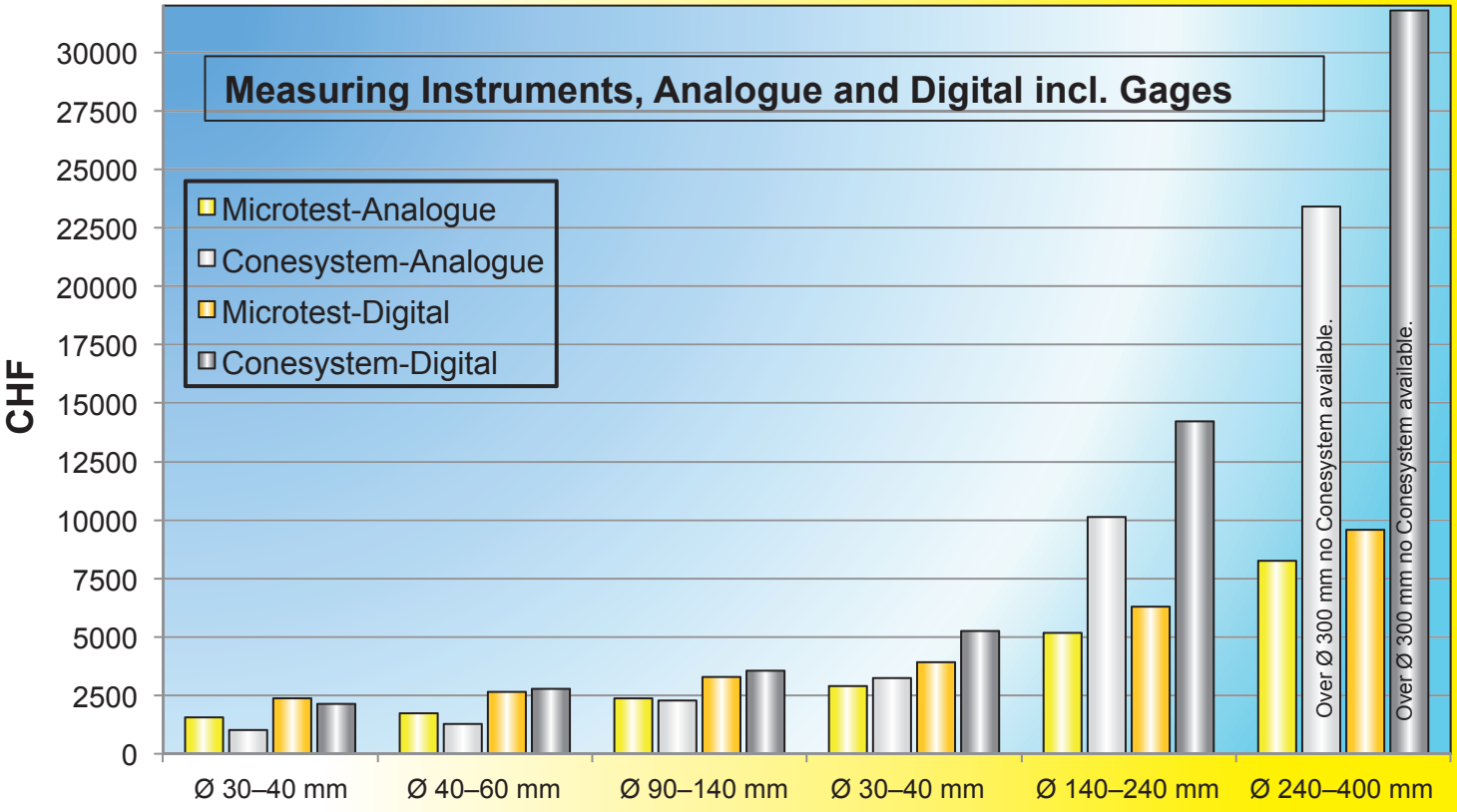
Cost Reduction:

A single MICROTEST® Internal Micrometer may be slightly more expensive than a conventional product, but it can **reduce costs** by up to **50% in a short time.** Depending upon the size of instrument, one MICROTEST® can replace between 2 and 6 conventional devices. Furthermore, only a small number of adjustment rings are required. Regular calibration and certification costs are reduced to a fraction of what they were before.

MICROTEST® internal micrometers are helping to optimise quality standards in a radical manner. Temperature and readout errors are eliminated, and thus expensive wastage is avoided. Additional advantages for you are a functionality that is constant and reliable, a universality of application, and maintenance of a high level of accuracy over a long period of time.

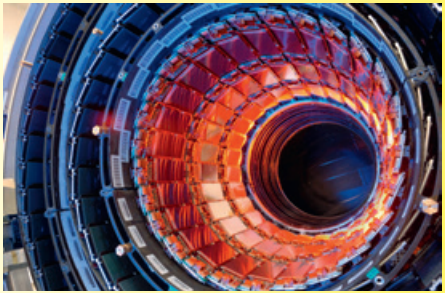
The MICROTEST® will return on investment very quickly!

Overall Cost Comparison:

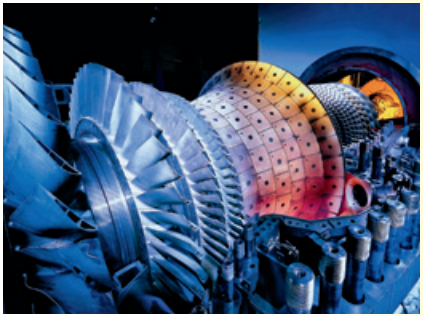


References:

Our products are in use all over the world and guarantee the highest precision over long periods of time. Our robust instruments are suitable even for the rough environment of the production plants as well as for the measurement and test laboratories. MICROTEST® supports many sectors of the industry, like machine, tool, gear, motor, engine, pump, compressor, vehicle, train, turbine and power station construction as well as in oil-field-, mining-, aviation- and aerospace-technology.



References:



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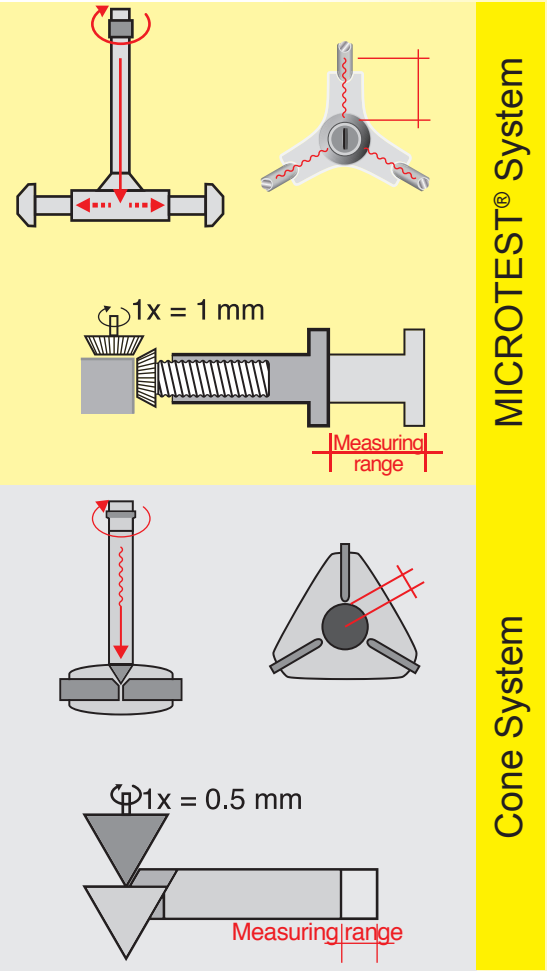
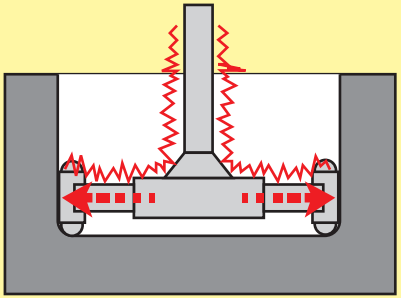


Technical Comparison:

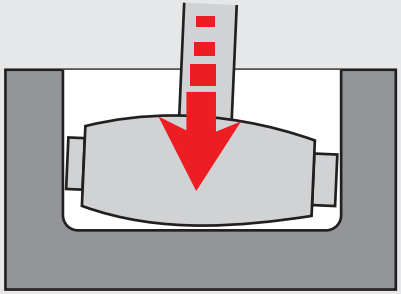
The MICROTEST® Spindle Measuring System is the first which succeeded in combining a high accuracy of measurement with a multiple measuring range. These two qualities were incompatible so far.

The three point internal micrometers currently used are based on cone or similar shaped cone-system.
Those systems are very limited in measuring range and/or accuracy.
A measuring spindle which is positioned at the top of the instrument brings a longitudinal movement via the shaft to the cone which pushes out the measuring probes.

MICROTEST® System



Cone System

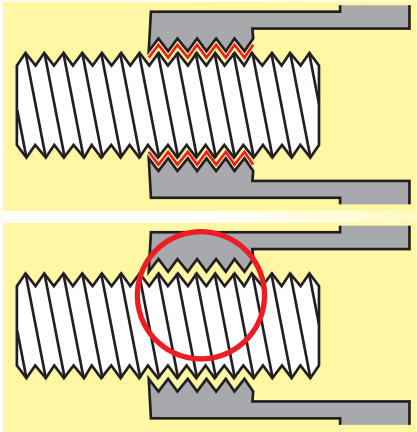


Our Centring System:

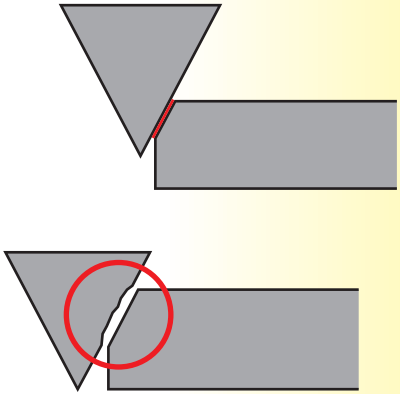
The contact-longline of the probes provides optimal three dimensional centring.The hard ratchet at the scale head creates a vibration that is transmitted to the probe/spindle system. This allows the device to be quickly and correctly centred. Because a constant measuring pressure is developed, the manual «sense» for measurement is not needed. This provides a repetition accuracy of ± 1µm, regardless of who is measuring. (up to Ø 400 µm)

Although the clutch coupling does permit constant measuring pressure, it does not support centring; it makes tilting in the hole. The scatter is approx. ± 3–5 µm. The ratchet permits a better centring, but has certain problems of its own, since repeated ratcheting causes the cone to penetrate too far into the probe system, thus distorting the results and also causes the scatter.

MICROTEST®-System



Cone System

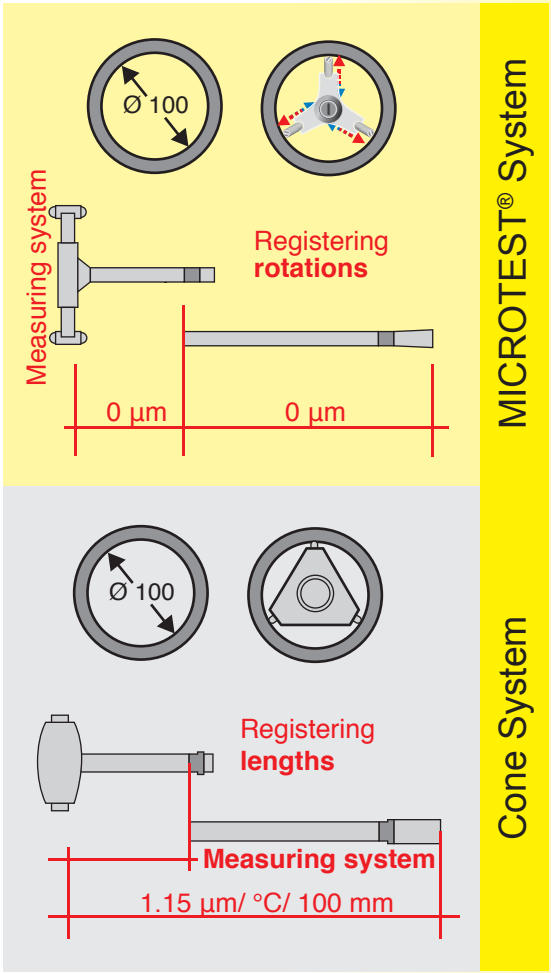


Mechanical Wear:

MICROTEST® System:
In measuring parent thread is a large areal layer on the thread flanks available.
This is ~ 1,000 times larger than the line at the cone system. It can have only minimal wear, which affects over the entire linear range.
This wear is hardly detectable.
compensation at every routine adjustment!

Cone systems: The measuring probes touch the cone by a line which wears quickly, which only applies locally and non-linear.
This problem is often not taken into account in the calibration procedure, since calibration rings are usually only present at the end of the measuring range. This can lead to significant inaccuracies.

Compensation impossible!



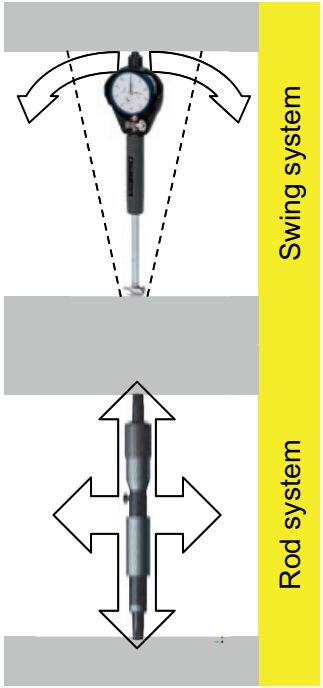
Thermal Influence:

The MICROTEST® system exhibits proportional, linear behaviour. Temperature expansion errors are to a large extent compensated out. In the case of measurements not taken at the standard temperature of 20°C the results achieved are thus approximately of equal accuracy to those taken in the measurement room.
In spite of having a design that is to a large extent temperature-independent our measurement unit is insulated at all points of contact with the user, in order to exclude any **undesirable heat transfer from the user's hands.**

Conventional cone systems behave in an undefined and uncontrolled manner. The behaviour is dependent on the expansion at the time of the measurement of the connecting elements between cone and measurement spindle. Usually no protection against heat transfer from the user's hands is provided.

$$\text{Error} = \frac{L_{[mm]} \times \Delta T_{[°C]} \times 1.15_{[\mu m]}}{100_{[mm]}}$$

Technical Comparison of 2-Point Measuring Device:

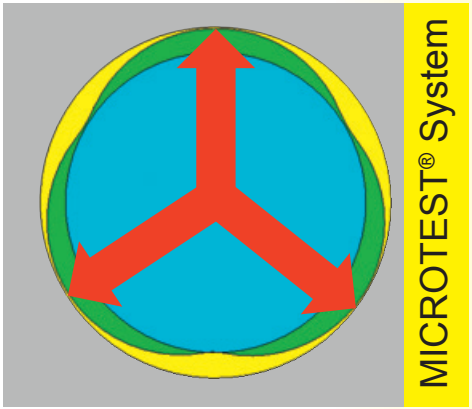


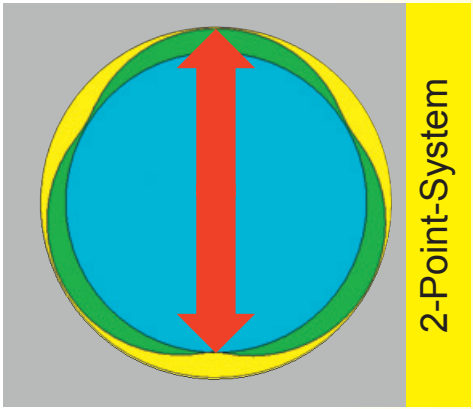
With swivel internal measuring instruments, trough commuting around the solid plunger, the turning point is determined.The minimum value can be recognized by a dial gauge, by the change of direction of the pointer. Usually, only a small measuring range is available. Proper handling requires feeling, usually 2 axes have to be coordinated manually.

Pole systems are particularly difficult to handle, as the built in measuring spindle must be moved by hand, while at the same time, 2 axes must be stabilized manually. The centering process requires knowledge, patience and a lot of feeling. The time consumption is high, therefore we transfer much heat of the hand into the device, what leads to serious measurement errors.

All of these designs have small measurement paths. Therefore they often have to be rebuilt. A calibration is then imperative. This is time consuming and requires a lot of expensive setting gauges. Because of the difficulty of handling and the heat sensitivity, accurate measurements are unrealistic.

Technical Comparison of Shape Error Detection:

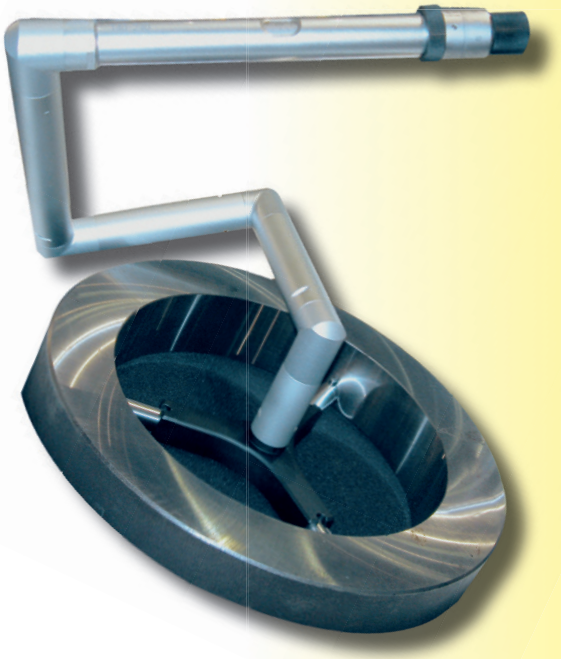




In the machining of bores, very often 3-jaw chuck or collet chucks are used. This has the consequence that the work pieces can be deformed. These polygon-deformations can significantly affect the quality, or even create scrap. An accurate measurement is only possible with 3-point tools, in which the probes are arranged at 120°.
By changing the measurement position, the difference can be determined from the largest to the smallest diameter.

In egg-shapes or undefined forms the 3-point instrument is also an advantage, because the centering is performed automatically. Pure ellipses are very rare.

A 2-point unit can only record the average of the diameter. The 180 ° arrangement of the probes, always detect the highest and the lowest point of the shape, at the same time. Accordingly, the hole appears to be around, even though a considerable polygon error.



Service and Maintenance:

Our precision measuring instruments require basically no servicing.

Nevertheless, to assure a long-service life for your MICROTEST® Internal Micrometer, we recommend that the device is always kept clean. If it becomes soiled by cooling water or particles of dirt, it is enough to just wipe the instrument down with a cloth to prevent unnecessary malfunctions that result if moving parts stick.

Repair or overhaul is only due after between 7 to 15 years.

Overhauling:

Normally, provided no heavy damage has occurred, the instrument can be overhauled for a price that does not exceed 25 % of the initial acquisition price (up to 10 years).

This involves the following work:

– complete dismounting
– cleaning
– replacement of faulty parts
– correction of the accuracy to the original tolerance (up to 10 years)
– factory certification

When your instrument is returned it measures as accurately as a new one.

Repairs:

Repairs where additional parts had to be replaced as a result of the instrument being dropped or other heavy damage will be charged according to quotation.

Because the precise measurement and correction of measured results in particular does take a great deal of time, the turnaround time is about 2 to 4 weeks, depending on the condition of the device.
Express service by agreement.

When your instrument is returned it measures as accurately as a new one.

Calibration:

All the measuring instruments and gauges that we supply are uniquely identifiable through an unique device number, and are examined, recalibrated and certified for a small fee.

Since the company was founded, every one of our instruments has been delivered with a certificate of accuracy, detailing the linearity accuracy at various points along the entire measurement range.

KONTROLLZEUGNIS

CERTIFICAT DE CONTROLE TEST CERTIFICATE CERTIFICATO DI CONTROLLO

INNEN-MICROMETER

MICROTEST AG

ZÜRICH / SCHWEIZ

No. 12345

TEST-ϕ	90	100	110	120	130	140
ERROR- μm	-2	-1	0	0	+1	+2
ERROR-TOTAL	μm 4					

ZÜRICH, 15.03.2000 VISA: W. Pfister

Declaration of Conformity:

Declaration of conformity and confirmation of the traceability of the measurement.

MICROTEST AG confirms that our products have been inspected and that they conform both to the applicable national standards and to our factory standards. The test equipment used for this inspection has a precision that can be traced back to national length standards.

Guarantee:
We provide 2 years guarantee provided the guarantee seal remains undamaged!

Table of Accuracy:

Type	Measuring range	Linear accuracy	Repetition accuracy
Analogue	30–140	± 2 µm	± 1.5 µm
	140–400	± 3 µm	± 1.5 µm
	400–650	± 5 µm	± 2.5 µm
	650–900	± 7 µm	± 3.5 µm
	900–1150	± 8 µm	± 4.5 µm
Digital Standard	30–140	± 2 µm	± 2 µm
	140–400	± 3 µm	± 2 µm
Digital ECO-Line	30–90	± 3 µm	± 3 µm
	90–400	± 4 µm	± 3 µm
Digital Gold Edition	30–140	± 1.5 µm	± 1 µm
	140–400	± 2 µm	± 1 µm

Read-out:
Analog-/ Digital-Standard-/ Digital-ECO-Line-Micrometer:
0,001 mm measurement range from Ø 30 mm up to Ø 1150 mm
Gold Edition-Micrometer
0,0001mm measurement range from Ø 30 mm up to Ø 400 mm

Accuracy:
MICROTEST- Factory standard equal, or better than DIN 863

MICROTEST
SWISS MADE

Analogue Sets Complete with Accessories:

Art. Nr.	Measuring range
IMS001	**Ø 6–10 mm including:** 2 Cone-Internal-Micrometer Ø 6–10 mm*, 1 control ring Ø 8 mm, 1 Extension 100 mm, 1 adjusting tool.
IMS002	**Ø 10–20 mm including:** 4 Cone-Internal-Micrometer Ø 10–20 mm, 2 control rings Ø 12.5/17.5 mm, 1 Extension 100 mm, 1 adjusting tool.
IMS003A	**Ø 20–90 mm including:** 2 Cone-Internal-Micrometer Ø 20–30 mm, 3 MICROTEST-Internal-Micrometer Ø 30–90 mm, 3 control rings Ø 25/40/90 mm, 1 Extension 200 mm, 1 tool set.
IMS003B	**Ø 30–90 mm including:** 3 MICROTEST-Internal-Micrometer Ø 30–90 mm, 2 control rings Ø 40/90 mm, 1 Extension 200 mm, 1 screwdriver.
IMS004	**Ø 90–400 mm including:** 3 MICROTEST-Internal-Micrometer Ø 90–400 mm, 1 Master gauge Ø 40/90/240 mm, 1 Extension 200 mm, 1 screwdriver.
IMS005A	**Ø 20–400 mm including:** 2 Cone-Internal-Micrometer Ø 20–30 mm, 6 MICROTEST-Internal-Micrometer Ø 30–400 mm, 1 control ring Ø 25 mm, 1 Master gauge Ø 40/90/240 mm, 1 Extension 200 mm, 2 screwdriver.
IMS005B	**Ø 30–400 mm including:** 6 MICROTEST-Internal-Micrometer Ø 30–400 mm, 1 Master gauge Ø 40/90/240 mm, 1 Extension 200 mm, 2 screwdriver.
IMS006	**Ø 6–400 mm including:** 8 Cone-Internal-Micrometer Ø 6–30 mm*, 6 MICROTEST-Internal-Micrometer Ø 30–400 mm, 4 control rings Ø 8/12.5/17.5/25 mm 1 Master gauge Ø 40/90/240 mm, 3 Extensions 100/100/200 mm, 3 screwdriver, 3 adjusting tool.

*** Cone – Internal Micrometer Ø 6–10 mm, blind hole measurement only 1.2 mm up of bottom.**

Analogue Single Instruments incl. Wooden Box:

Art. Nr.	Description	Ø in mm	Measuring range	Measuring depth	Linear accuracy	Repetition accuracy	Read-out
IM2001	3-Pt. Internal-Micrometer	30–40	10 mm	110 mm	± 2 µm	± 1,5 µm	0,001 mm
IM2002	3-Pt. Internal-Micrometer	40–60	20 mm	110 mm	± 2 µm	± 1,5 µm	0,001 mm
IM2003	3-Pt. Internal-Micrometer	60–90	30 mm	110 mm	± 2 µm	± 1,5 µm	0,001 mm
IM2004	3-Pt. Internal-Micrometer	90–140	50 mm	140 mm	± 2 µm	± 1,5 µm	0,001 mm
IM2005	3-Pt. Internal-Micrometer	140–240	100 mm	210 mm	± 3 µm	± 1,5 µm	0,001 mm
IM2006	3-Pt. Internal-Micrometer	240–400	160 mm	300 mm	± 3 µm	± 1,5 µm	0,001 mm
IM2007	3-Pt. Internal-Micrometer	400–650	250 mm	520 mm	± 5 µm	± 2,5 µm	0,001 mm
IM2008	3-Pt. Internal-Micrometer	650–900	250 mm	520 mm	± 7 µm	± 3,5 µm	0,001 mm
IM2009	3-Pt. Internal-Micrometer	900–1150	250 mm	520 mm	± 8 µm	± 4,5 µm	0,001 mm

Control Rings for Single Instruments:

Eco-Line

Art. Nr.	Value
KR0040-E	Ø 40
KR0060-E	Ø 60
KR0075-E	Ø 75
KR0090-E	Ø 90
KR0140-E	Ø 140
KR0185-E	Ø 185
KR0240-E	Ø 240

Standard

Art. Nr.	Value
KR0008	Ø 8
KR0012	Ø 12.5
KR0017	Ø 17.5
KR0025	Ø 25
KR0030	Ø 30
KR0040	Ø 40
KR0060	Ø 60
KR0075	Ø 75
KR0090	Ø 90
KR0140	Ø 140
KR0185	Ø 185
KR0240	Ø 240
KR0300	Ø 300
KR0400	Ø 400
KR0650	Ø 650
KR0900	Ø 900

Gold-Edition 0.0001 mm

Art. Nr.	Value
KR0040-G	Ø 40
KR0060-G	Ø 60
KR0075-G	Ø 75
KR0090-G	Ø 90
KR0140-G	Ø 140
KR0185-G	Ø 185
KR0240-G	Ø 240

Master gauges

Art. Nr.	Value
KL0240	Ø 40/90/240
KL0400	Ø 400

Microtest® Digital Technology:

Standard-Edition

Art. Nr.	Description	Ø in mm	Measuring range	Measuring depth	Linear accuracy	Repetition accuracy	Read-out
IE5001	3-Point MICROTEST	30–40	10 mm	50 mm	± 2 µm	± 1,5 µm	0,001 mm
IE5002	3-Point MICROTEST	40–60	20 mm	110 mm	± 2 µm	± 1,5 µm	0,001 mm
IE5003	3-Point MICROTEST	60–90	30 mm	110 mm	± 2 µm	± 1,5 µm	0,001 mm
IE5004	3-Point MICROTEST	90–140	50 mm	140 mm	± 2 µm	± 1,5 µm	0,001 mm
IE5005	3-Point MICROTEST	140–240	100 mm	210 mm	± 3 µm	± 1,5 µm	0,001 mm
IE5006	3-Point MICROTEST	240–400	160 mm	300 mm	± 3 µm	± 1,5 µm	0,001 mm
IE5021	3-Point MICROTEST	50–75	25 mm	110 mm	± 2 µm	± 1,5 µm	0,001 mm
IE5022	3-Point MICROTEST	75–115	40 mm	140 mm	± 2 µm	± 1,5 µm	0,001 mm
IE5023	3-Point MICROTEST	115–185	70 mm	210 mm	± 3 µm	± 1,5 µm	0,001 mm
IE5023	3-Point MICROTEST	185–315	130 mm	300 mm	± 3 µm	± 1,5 µm	0,001 mm

Eco-Line

IE5001-E	3-Point MICROTEST	30–40	10 mm	Head Only! No Display!	± 3 µm	± 3 µm	
IE5002-E	3-Point MICROTEST	40–60	20 mm		± 3 µm	± 3 µm	
IE5003-E	3-Point MICROTEST	60–90	30 mm		± 3 µm	± 3 µm	
IE5004-E	3-Point MICROTEST	90–140	50 mm		± 4 µm	± 3 µm	
IE5005-E	3-Point MICROTEST	140–240	100 mm		± 4 µm	± 3 µm	
IE5006-E	3-Point MICROTEST	240–400	160 mm		± 4 µm	± 3 µm	
IE5021-E	3-Point MICROTEST	50–75	25 mm		± 3 µm	± 3 µm	
IE5022-E	3-Point MICROTEST	75–115	40 mm		± 3 µm	± 3 µm	
IE5023-E	3-Point MICROTEST	115–185	70 mm		± 4 µm	± 3 µm	
IE5023-E	3-Point MICROTEST	185–315	130 mm		± 4 µm	± 3 µm	
IE7000-E	Display Eco-Line						0,001 mm

Gold-Edition

IG5001-G	3-Point MICROTEST	30–40	10 mm	50 mm	± 1.5 µm	± 1 µm	0,0001 mm
IG5002-G	3-Point MICROTEST	40–60	20 mm	110 mm	± 1.5 µm	± 1 µm	0,0001 mm
IG5003-G	3-Point MICROTEST	60–90	30 mm	110 mm	± 1.5 µm	± 1 µm	0,0001 mm
IG5004-G	3-Point MICROTEST	90–140	50 mm	140 mm	± 1.5 µm	± 1 µm	0,0001 mm
IG5005-G	3-Point MICROTEST	140–240	100 mm	210 mm	± 2 µm	± 1 µm	0,0001 mm
IG5006-G	3-Point MICROTEST	240–400	160 mm	300 mm	± 2 µm	± 1 µm	0,0001 mm
IG5021-G	3-Point MICROTEST	50–75	25 mm	110 mm	± 1.5 µm	± 1 µm	0,0001 mm
IG5022-G	3-Point MICROTEST	75–115	40 mm	140 mm	± 1.5 µm	± 1 µm	0,0001 mm
IG5023-G	3-Point MICROTEST	115–185	70 mm	210 mm	± 2 µm	± 1 µm	0,0001 mm
IG5023-G	3-Point MICROTEST	185–315	130 mm	300 mm	± 2 µm	± 1 µm	0,0001 mm

Digital Internal Micrometer Sets with Plastic Cases:

Art. Nr.	Measuring range
IES001	**Ø 10–20 mm including:** 4 Cone-Internal-Micrometer Ø 10–20 mm, 2 control rings Ø 12.5/17.5 mm, 1 Extension 100 mm, 1 tool set.
IES002A	**Ø 6–30 mm including:** 8 Cone-Internal-Micrometer Ø 6–30 mm*, 4 control rings Ø 8/12.5/17.5/25 mm, 2 Extension 100 mm, 1 Extension 150 mm, 1 tool set.
IES002B	**Ø 10–30 mm including:** 6 Cone-Internal-Micrometer Ø 10–30 mm, 3 control rings Ø 12.5/17.5/25 mm, 1 Extension 100 mm, 1 Extension 150 mm, 1 tool set.
IES003	**Ø 30–90 mm including:** 3 MICROTEST-Internal-Micrometer Ø 30–90 mm, 2 control rings Ø 40/90 mm, 1 Extension 200 mm, 1 screwdriver.
IES004	**Ø 90–400 mm including:** 3 MICROTEST-Internal-Micrometer Ø 90–400 mm, 2 control rings Ø 90/240 mm, 1 Extension 200 mm, 1 tool set.
IES005	**Ø 30–400 mm including:** 6 MICROTEST-Internal-Micrometer Ø 30–400 mm, 3 control rings Ø 40/90/240 mm, 1 Extension 200 mm, 2 tool sets.
IES006	**Ø 6–400 mm including:** 8 Cone-Internal-Micrometer Ø 6–30 mm*, 6 MICROTEST-Internal-Micrometer Ø 30–400 mm, 4 control rings Ø 8/12.5/17.5/25, 3 control rings Ø 40/90/240 mm, 4 Extension 100/150/200 mm, 1 tool set.
IES007	**Ø 50–315 mm including:** 4 MICROTEST-Internal-Micrometer Ø 50–315 mm, 2 control rings Ø 75/185 mm, 1 Extension 200 mm, 1 tool set.

*** Cone – Internal Micrometer Ø 6–10 mm, blind hole measurement only 1.2 mm up of bottom.**

Digital ECO-Line Internal Micrometer Sets with Plastic Case:

Art. Nr.	Measuring range
ECO S3	**Ø 30–90 mm including:** 3 MICROTEST ECO-Line-Internal-Micrometer Ø 30–90 mm, 2 control rings ECO-Line Ø 40/60 mm, 1 Display ECO-Line, 1 Extension 100 mm, 1 tool set.
ECO S4	**Ø 90–400 mm including:** 3 MICROTEST ECO-Line-Internal-Micrometer Ø 90–400 mm, 2 control rings ECO-Line Ø 90/240 mm, 1 Display ECO-Line, 1 Extension 100 mm, 1 tool set.
ECO S5	**Ø 30–400 mm including:** 6 MICROTEST ECO-Line-Internal-Micrometer Ø 30–400 mm, 3 control rings ECO-Line Ø 40/90/240 mm, 1 Display ECO-Line, 1 Extension 100 mm, 1 tool set.
ECO S7	**Ø 50–315 mm including:** 4 MICROTEST ECO-Line-Internal-Micrometer Ø 50–315 mm, 2 control rings ECO-Line Ø 75/185 mm, 1 Display ECO-Line, 1 Extension 100 mm, 1 tool set.

Extension and Tripod for MICROTEST® Internal Micrometer
whitout any Case:

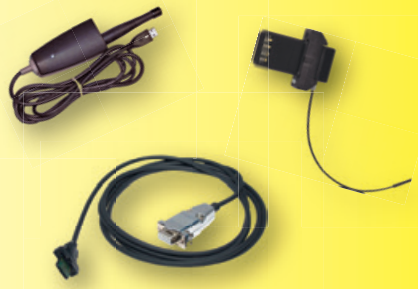
Art. Nr.	Measuring range Ø in mm	Measuring depth
VL3001	30–400	50 mm
VL3002	30–400	100 mm
VL3003	30–400	200 mm
VL3004	30–400	350 mm
VL3005	30–400	500 mm
VL3006	30–400	750 mm
VL3007	30–400	1000 mm
VL3008	30–400	1500 mm
VL3301	400–1150	500 mm
VL3302	400–1150	750 mm
VL3303	400–1150	1000 mm

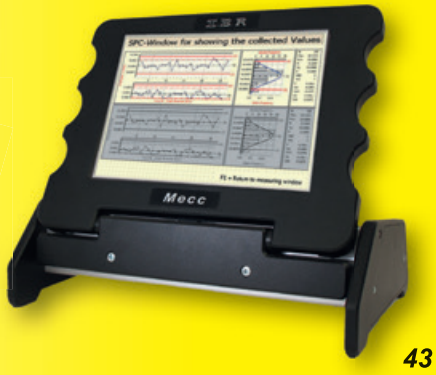
Art. Nr.	Description	Measuring range	Measuring depth
SVL3101	Angle 90°	for Ø 30–400 mm	50 mm

Art. Nr.	Description	Measuring range Ø in mm
VL3203	Tripod	for 60–90 mm
VL3204	Tripod	for 90–140 mm
VL3205	Tripod	for 140–240 mm
VL3206	Tripod	for 240–400 mm
VL3221	Tripod	for 50–75 mm
VL3222	Tripod	for 75–115 mm
VL3323	Tripod	for 115–185 mm
VL3224	Tripod	for 185–315 mm

Accessories for MICROTEST® Digital:

Art. Nr.	Description
IE5101	Radio-Modul for IM50xx
IE5102	USB Receiver for IE 5101
IE5103	Interface Cable 2 m
IE5104	Measuring-PC 8.4 inch
IE5105	Measuring-PC 17 inch
IE5106	ComGage Compact Software
IE5107	ComGage Professional Software





MICROTEST®-SLOTMASTER

Slotmaster metric (mm)

Art. Nr.	Measuring range	Ø – Anvil / Disc
SL1001	Set 0/1.2–60 mm	11 mm
SL1002	Set 0/1.2–30 mm	11 mm
SL1003	Set 30 – 60 mm	11 mm

Slotmaster Standard Anvil (mm)

Art. Nr.	Measuring range	Ø – Anvil / Disc
SL1101 Pos. 11	1.2–30 mm	11 mm
SL1102 Pos. 21	30–60 mm	11 mm
SL1103 Pos. 22	30–60 mm	16 mm
SL1104 Pos. 31	60–90 mm	11 mm
SL1105 Pos. 32	60–90 mm	16 mm
SL1106 Pos. 41	90–120 mm	11 mm
SL1107 Pos. 42	90–120 mm	16 mm
SL1108 Pos. 51	120–150 mm	11 mm
SL1109 Pos. 52	120–150 mm	16 mm

Slotmaster Special–Accessories (mm)

Art. Nr.	Measuring range	Ø – Anvil / Disc
SL2101 Pos. 12	0–30 mm with piston	30/9 mm, 30/30 mm
SL1202 Pos. 12	0–30 mm without piston	30 mm
SL1203 Pos. 13	1.0–30 mm	9 mm
SL1204 Pos. 14	2.0–30 mm	16 mm
SL1205 Pos. 23	30–60 mm	9 mm
SL1206 Pos. 24	30–60 mm	16 mm
SL1207 Pos. 11	0–30 mm only piston	11 mm
SL1208 Pos. 11	0–30 mm only Sleeve	11 mm
SL1209 Pos. 12	0–60 mm only piston	11 mm
SL1210 Pos. 12	0–60 mm only Sleeve	11 mm
SL1301	Multi–Gauge mm, (includes in Set)	
SL1302	Dial Gauge Compact mm	

Slotmaster imperial (Inch)

Art. Nr.	Measuring range	Ø – Anvil / Disc
SZ2001	Set 0–2 Inch	11 mm
SZ2002	Set 0–1 Inch	11 mm
SZ2003	Set 1–2 Inch	11 mm

Slotmaster Standard Anvil (Inch)

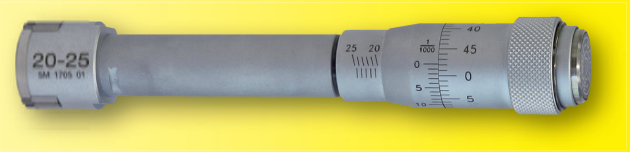
Art. Nr.	Measuring range	Ø – Anvil / Disc
SZ2101	0–1 Inch	11 mm
SZ2102	1–2 Inch	11 mm
SZ2103	1–2 Inch	16 mm
SZ2104	2–3 Inch	11 mm
SZ2105	3–4 Inch	16 mm
SZ2106	4–5 Inch	16 mm
SZ2107	5–6 Inch	16 mm
SZ2108	6–7 Inch	16 mm

Slotmaster Special-Accessories (Inch)

Art. Nr.	Measuring range	Ø – Anvil / Disc
SZ2202 Pos. 12	0–1 Inch without piston	30 mm
SZ2203 Pos. 13	0–1 Inch	9 mm
SZ2204 Pos. 14	0–1 Inch	16 mm
SZ2205 Pos. 23	1–2 Inch	9 mm
SZ2206 Pos. 24	1–2 Inch	16 mm
SZ2251 Pos. 11	0–1 Inch Piston only	11 mm
SZ2252 Pos. 11	0–1 Inch Sleeve only	11 mm
SZ2253 Pos. 12	1–2 Inch Piston only	11 mm
SZ2254 Pos. 12	1–2 Inch Sleeve only	11 mm
SZ2301	Multi-Gauge Inch, (includes in Set)	
SZ2302	Dial Gauge Compact Inch	

Analogue Single Instrument incl. Box, Cone-System (Alesometer):

Art. Nr.	Measuring range Ø in mm	Measuring depth
AL1001	6–8*	54.5 mm
AL1002	8–10*	64.5 mm
AL1003	10–12.5	64.5 mm
AL1004	12.5–15	64.5 mm
AL1005	15–17.5	64.5 mm
AL1006	17.5–20	64.5 mm
AL1007	20–25	70.0 mm
AL1008	25–30	70.0 mm



Digital Single Instrument incl. Box, Cone-System (Alesometer):

Art. Nr.	Measuring range Ø in mm	Measuring depth
AD4001	6–8*	55 mm
AD4002	8–10*	55 mm
AD4003	10–12.5	65 mm
AD4004	12.5–15	65 mm
AD4005	15–17.5	65 mm
AD4006	17.5–20	95 mm
AD4007	20–25	100 mm
AD4008	25–30	100 mm

Extension for Cone-System (Alesometer):

Art. Nr.	Measuring range Ø in mm	Measuring depth
AL1101	6–10	100 mm
AL1102	10–20	100 mm
AL1103	20–30	150 mm

*** Cone – Internal Micrometer Ø 6–10 mm, blind hole measurement only 1.2 mm up of bottom.**

Advantages of our MICROTEST® 3-Point Internal Micrometer:

Analogue Internal Micrometer

Measuring range: Ø 30 – 400 mm in 6 Instruments, Ø 400 – 1150 mm in 3 Instruments!
Linearity **± 2 µm** until Ø 140 mm / **± 3 µm** until Ø 400 mm, repeatability **max. ± 1,5 µm!**

Clearer scale engravings – excellent reading! **1 µm** full direct reading, Parallaxfree!
1 revolution = 1 mm, clear display of **1 mm,** 0.01 (100 divisions / U), 0.001 (vernier)
no reading errors, no count!

Automatic self-centering for safe and easy handling! Blind-hole measurement to the bottom, even for deep holes! Optimized extensions – reinforced pipes, automatic clutch! Extendable up to 10 meters without loss of accuracy (up to 15 m possible)! Thermal protected and compensated design! Automatic, linear wear correction by simple adjustment! Cost reduction through multiple times the measuring range! Savings in calibration and certification costs (recurrent costs are much lower)!

Titanium coated housing – even after years only a few wear occur!
Minimized bevel gear play – no more uncertainties, virtually no return play!
Optimized forced pull-back of the probes
Longer life with even better long-term accuracy!

Advantages of the MICROTEST® Digital:

Digital Internal Micrometer

Measuring range: Ø 30 – 400 mm in 6 Instruments, Ø 50–315 mm in 4 Instruments!
Linearity **± 2 µm** until Ø 140 mm / **± 3 µm** until Ø 400 mm, repeatability **max. ± 2 µm!**

High precision mechanics refined by high-tech electronics, ball bearing guided measuring shaft.

Glass fiber reinforced plastic housing! Water resistant (IP67), shock resistant!
High-contrast display for precise readability even under difficult lighting conditions.
10`000 increments per revolution (1 mm), true measurement in 100 nm steps!

All important functions can be selected directly with one key. Simple programming.

Preset memory in which the reference mass of the calibration ring can be pre-programmed.
Measuring modes: Absolute (ABS) / Incremental (INC). Metric (mm) / Imperial (Inch)

Data transmission directly over one button, radio module (~ 100 m) or RS-232 Cable.
Accessories: radio receiver, measuring PC, software, cable, radio module for IM50xx.

Ideal for extensions, simplified calibration.

Available in 3 variations: **Standard / Eco-Line / Gold Edition!**

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