PRE1436

DIATEST

Mitutoyo

HANDHELD MEASURING INSTRUMENTS

A guide to proper use, maintenance and care

ENGLISH EDITION

Contents

Introduction	02
All Instruments	03
Digital Instruments	08
Outside Micrometers	12
3-Point (line) Internal Micrometers	16
2-Point Internal Measuring Instruments	18
Calipers	22
Height Gauges	24
Indicators	26
Dial Test Indicators	28
Depth Measuring Instruments	30
Auxiliary Equipment Comparator Stands	34
Gauge Blocks	36
WEEE Disposal of Batteries and Measuring Instruments	40
Notes	42

Introduction









High-quality handheld measuring devices are among the most important instruments – both in shopfloor surroundings as well as in laboratories and quality management departments. They are simple to operate and deliver precise and easy to read results.

Although they boast robust design – some models even an IP class – and long life expectancy they require proper treatment and care.

This booklet explains the correct care and maintenance necessary to ensure reliable results and a long lifetime of your handheld length measuring instruments.

All Instruments

Before Use

- ✓ Make sure type, measuring range, graduation – respectively digital step – and other specifications of the measuring instrument are appropriate for your application.

Use of an indicating, self-centering 2-point inside measuring instrument for measuring a bore of a connecting rod

- ✓ According to EN ISO 1, the reference temperature for length measurement is 20°C.
  At other temperatures, according to temperature requirements, countermeasures such as compensation become necessary.
- ✓ Remove dust or dirt from the measuring instrument, especially from the measuring surfaces.
- ✓ To clean the instrument, use a soft cloth soaked in a diluted neutral detergent. Do not use any organic solvent (thinner, benzine etc.). These might damage the instrument.
- ✓ To prevent rust, wipe the moveable parts with a cloth moistened with anti-corrosion oil.

All Instruments

- ✓ Check to see whether the moveable parts move smoothly without any jamming or unevenness by moving it all the way through its range.
- ✓ Do not disassemble or modify the measuring instrument unless you have a profound knowledge.
- ✓ Set the zero point or reference point before starting measurement. That means bring the measuring surfaces close together (e.g. outside micrometer 0-25 mm) or use an appropriate calibrated master gauge.

Reference point setting
in the setting master

- ✓ Reference setting and measuring should be carried out under as similar conditions as possible in order to minimise measurement errors.

Setting rings with different diameters

During Use

- ✓ Do not apply excessive force to the measuring instrument.
- ✓ Make sure to apply constant measuring force during measurement e.g. by using the constant force device of an outside micrometer.
- ✓ Do not use the measuring instrument for other applications than indicated by the specification (e.g. only perform measurement within the measuring range).
- ✓ Perform the measurement in a stable and comfortable measuring position.

2-point internal measuring instrument in action

Indicating, self-centering measuring instruments guarantee by self-centering a precise measurement

- ✓ Leave the measuring instrument and the workpiece in the ambient room temperature long enough to adapt to the environment temperature.
  The ability of a material to conduct heat is specified by the thermal conductivity λ [W/(m · K)]. Thermal conductivity is a matter constant. The higher the value, the higher the thermal transfer in relation to time.

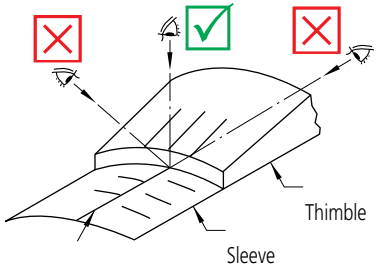
	Steel	Aluminium	Cast Iron	Copper	Ceramic	Brass
Thermal Conductivity λ [W/(m · K)]	47-58	appr. 200	appr. 58	appr. 384	appr. 2,9	appr. 113

Alle Messgeräte

- ✓ The temperature of measuring tools rises when held in a bare hand. Perform the measurement as fast as possible or protect the instrument against body heat e.g. by using heat-insulating plates or wearing gloves.

Outside micrometer with heat-insulating plates.

Outside micrometer standard type.



- ✓ For analog instruments read the scale graduations from directly above the scale to avoid parallax error.

- ✓ If using the instrument in long measuring sessions, regularly check (and if necessary adjust) the zero point or reference point.
- ✓ If the instrument is damaged due to being dropped or struck hard do not use it before checking its function and accuracy.
- ✓ Whenever changing the instrument's configuration, like replacing exchangeable contact points, extension rods or any other parts, repeat reference setting.

Measuring instruments with interchangeable probes require a new reference setting after replacing the probe. This is the case e.g. by the use of setting rings.

After Use

- ✓ Check the measuring instrument for damage. Repair or replace if necessary. Clean the instrument.
- ✓ If the instrument was used at places contaminated by soluble cutting oil, perform rust prevention treatment after cleaning.
- ✓ Store the instrument in a room free of excessive heat and moisture. Protect it from dust and oil mist.
- ✓ Before storing the instrument for a long time, apply anti-corrosive coating for rust prevention.



- ✓ Do not expose measuring instruments to direct sunlight.
- ✓ Store measuring instruments in a case.

Set of 2-Point Inside measuring instruments in a wooden case.

Digital Instruments

Before Use

✓ When the battery symbol appears, replace the battery.

✓ The supplied batteries (standard) are used only for the purpose of checking the functions and performance of the caliper, therefore they may not reach the specified battery life.

✓ Install battery with the positive side up. Use SR44 respectively CR2032 battery type only.

✓ After the battery is replaced, clean the measuring faces and bring them into contact. Then press the ORIGIN/PRESET button to perform the zero point setting or reference point setting.

- ✓ When tightening the output connector cover and battery cap screws, make sure not to squeeze the rubber seal with the cap or cover.

Rubber seal to protect the battery housing respectively output connector against ingress.

- ✓ Do not use electric pens to mark the measuring instrument. These may damage the internal circuitry. Any other types of voltage loads should also be avoided.

During Use

- ✓ If any error occurs or the count is displayed abnormally, remove and reinstall the battery.
- ✓ The operating temperature is between 5°C and 40°C. The electronic components of digital tools are designed to ensure operation within this temperature range. However, reference temperature for accuracy specification is 20°C, conforming to EN ISO1.
- ✓ The maximum temperature gradient is 1,5 °C/min. Significant changes in the ambient temperature not only affect the measuring accuracy. The resulting condensation can damage digital tools, compromise sensor detection and cause corrosion.
- ✓ The relative air humidity must be below 80%. To avoid condensation do not use measuring tools in high relative humidity at length in order to avoid condensation (which compromises sensor detection). It can also cause the parts made from organic materials to swell and have adverse effects to the electric circuits. However, if the ambient air is too dry, static electricity may cause malfunctions.
- ✓ Magnetic or electromagnetic fields generated by a magnetic chuck or a demagnetiser do not state a problem. A demagnetiser can be used on measuring tools. Remove the battery and use the lowest level of the demagnetisation instrument for a short time only.
- ✓ Low pressure (< 1,33322 Pa) can damage the LCD and cause the battery to leak.

Digital Instruments

- ✓ Radioactive radiation will cause deterioration of the ICs and other components.
- ✓ The digital instruments have no explosion prevention and protection.
- ✓ High IP grades (e.g. IP67) should not be misunderstood as a license to careless or even negligent treatment of the equipment. Coolant fluid will eventually cause damage if the instruments are not treated with the proper care throughout their service life.

- ✓ If the data output and a dedicated cable is used, avoid tensile stress, excessive bending and buckling of the connected cable.

Avoid abnormal cable guidance and tensile stress.

✓ A foot switch eases data transfer from a Digimatic handheld measuring instrument to a PC or a data collecting device, minimises operator fatigue and extends the data switch's lifetime.

After Use

✓ The storage temperature must be between -10°C and 60°C. Parts made of different materials are bonded in digital instruments. Under excessively severe temperature conditions, they may be damaged due to the difference in thermal expansion coefficient between them.

✓ Do not expose digital measuring instruments to ultraviolet radiation at length. They deteriorate the plastic parts and the LCD (liquid crystal display).

✓ If the measuring instrument is not in use for more than 3 months, remove the battery from the instrument. The battery might leak and cause damage.

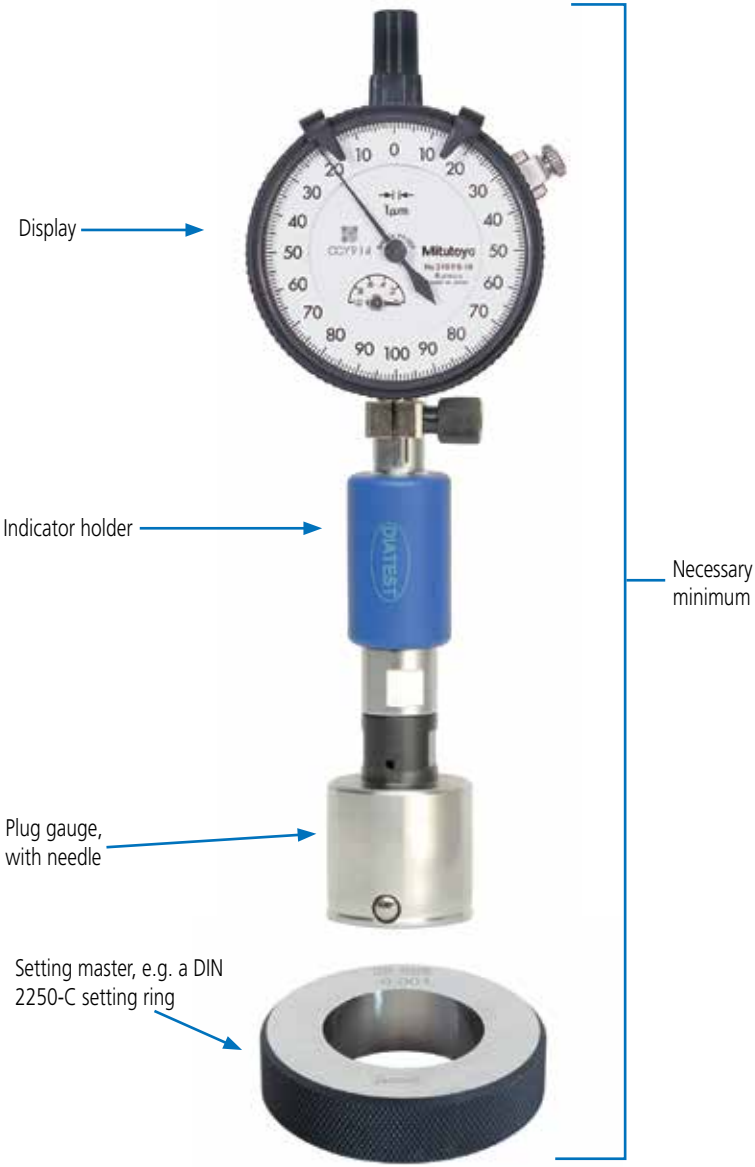
Basic principle of a tactile hand measuring tool

Tactile measuring instruments always work in contact (tactile). Measuring contacts touch the workpiece to be measured

Comparative gauging and checking

- ✓ The measuring instrument is adjusted / zeroed in a setting master, e.g. the diameter (Ø)
- ✓ Then the Ø in the workpiece is measured and checked with reference to the tolerance...
- ✓ ... then the measured value is compared with the setting master!

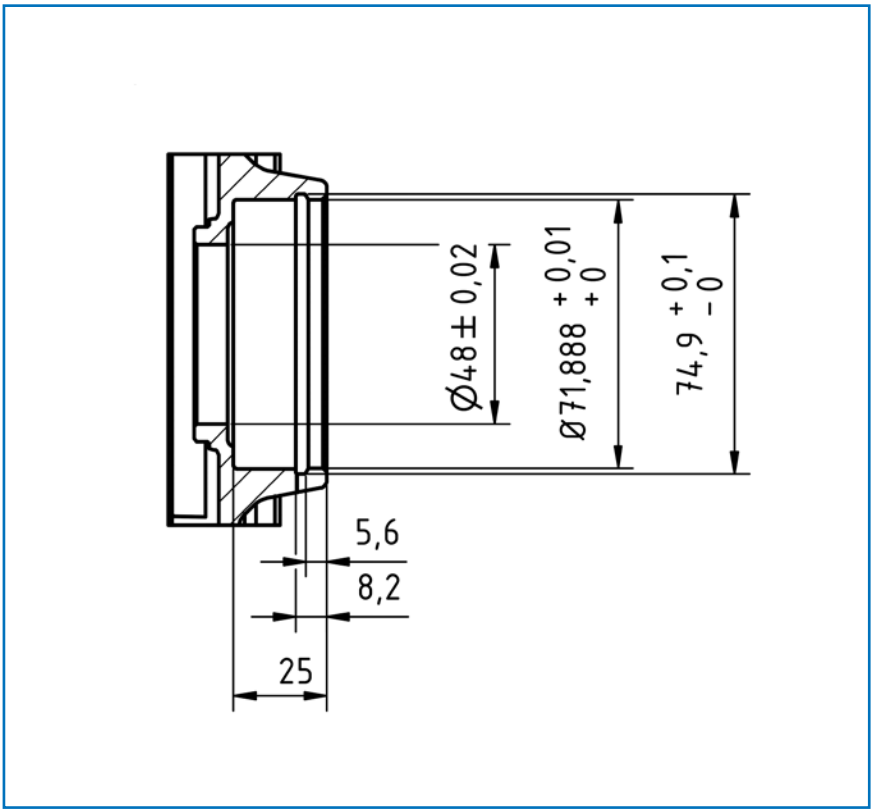
Basic principle of a tactile hand measuring tool



Basic principle of a tactile hand measuring tool

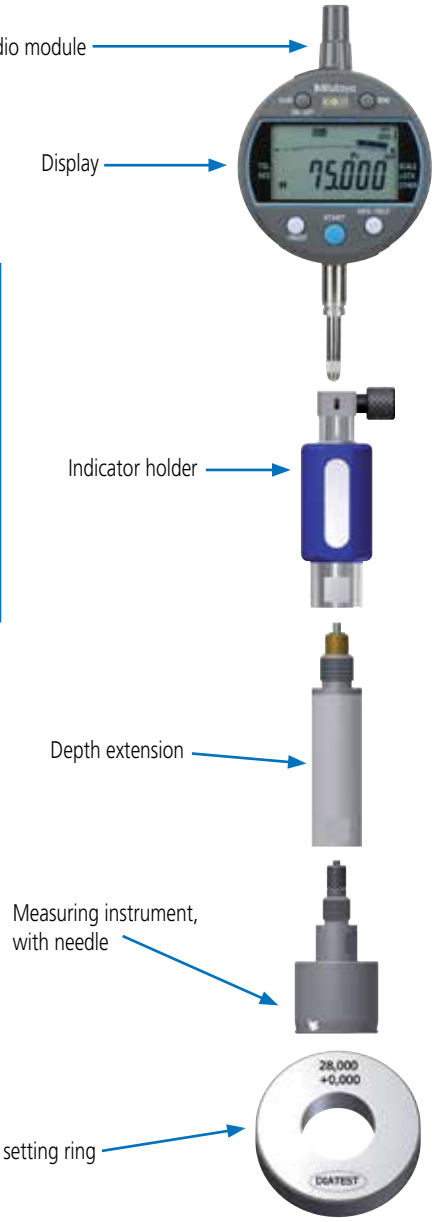
The precondition is therefore always a reference gauge with an optimally designed nominal dimension, which should be achieved as far as possible. This can be a setting ring or a measured sample workpiece

Each workpiece also has defined tolerances, i.e. the deviations must remain within the tolerance limits.



Extended construction of a tactile manual measuring device

Certificate, audit report



Self-centering Inside measuring instrument

Indicating and self-centering measurement instruments are easy-to-use gauges. They are – generally speaking – suitable for both static and dynamic measurements. They can be used for manual detection of dimensional deviations and shape defects in bores in serial measurement at the machine but may also be installed in measuring equipment and automated systems, e.g. robot based measuring.

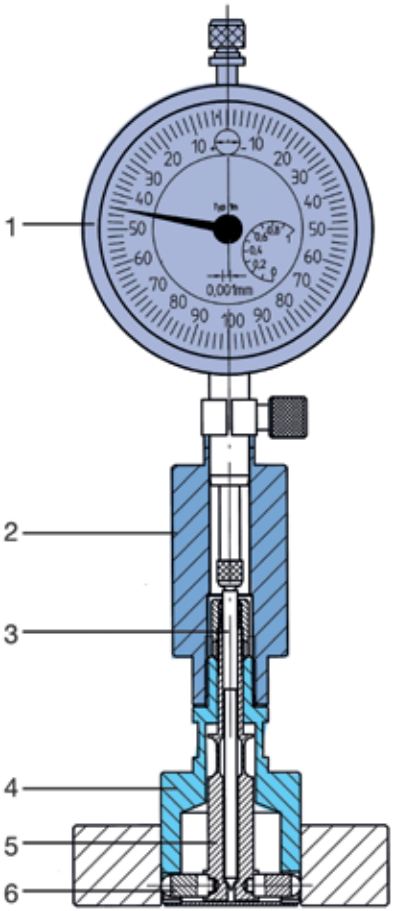
Automatic Measuring Cell: autonomous, robot based measuring with a plug gauge

Self-centering 2-point inside measuring instrument with 7-digits display

Self-centering Inside measuring instrument

Function

The guide cylinder (4) centers the probe gauging contacts (6) fixed to the split ball probe (5) axially and radially in the bore and ensures high repeatability accuracy. The lapped cone of the needle (3) transfers the distance travelled by the gauge contacts 1:1 to the indicator (1) clamped in the holder (2). The guide cylinder positions the gauging radii in the bore.



Self-centering Inside measuring instrument

Zero setting

Zero setting should be performed with the aid of a setting ring that corresponds precisely to the minimum bore size. This ensures that the risk of radial and axial errors is largely eliminated during the calibration process. The most suitable setting rings are those which comply with the specifications of DIN 2250-C. Setting rings with larger dimensions or for minimum, medium and maximum dimensions are generally not required.

Examples for DIN 2250-C setting rings (metric and inch)

Zero setting of a plug gauge in a DIN setting ring

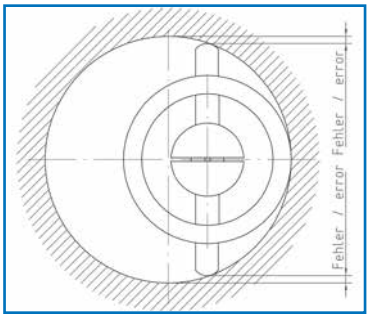
Self-centering Inside measuring instrument

Service life

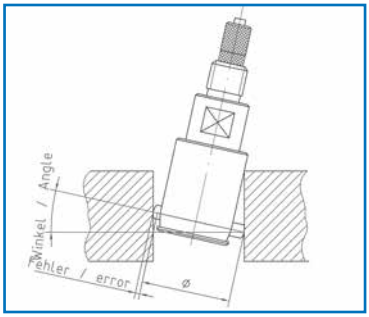
Service life depends upon such conditions as work piece surface quality (roughness, coating), material, length of measured bore, dirt accumulation, gauging pressure etc. Up to several million measurements are possible under optimum conditions.

Maintenance

No special maintenance is required. If cleaning is needed, remove the needle and clean the plug gauge and the needle carefully with compressed air and a cleaning solution. Please note: The needle taper should be greased prior to installation (e.g. Vaseline).



Centering error

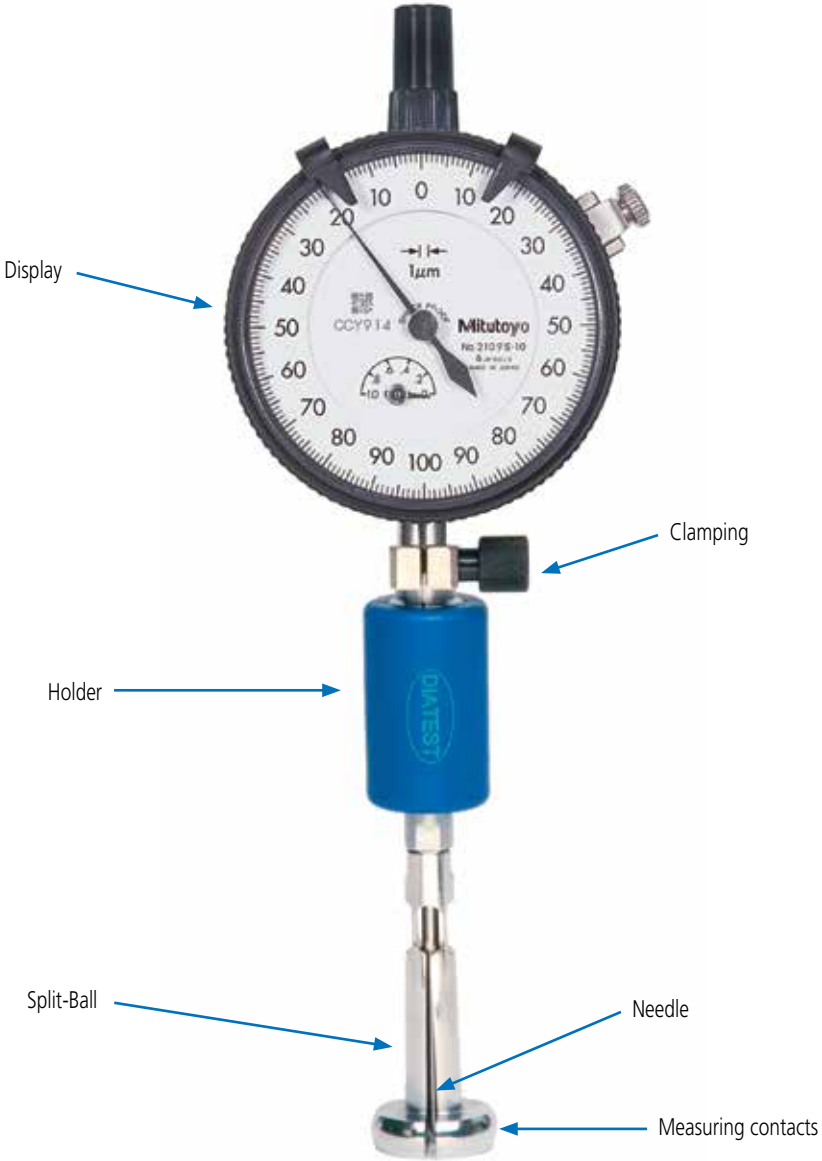


Angle error

Multilevel measuring instrument for 3 levels, with wireless module

2-Point Inside measuring instrument

2-Point Inside measuring instruments are comparative gauges for detecting size deviations and shape defects of bores. The modular design of gauges facilitates the measuring of most common bores.



2-Point Inside measuring instrument

2-Point Inside measuring instrument in action

2-Point Inside measuring instrument

Assembly: Fig. 1

The split-ball probe (4) with needle (3) is screwed in the handle (2) and slightly tightened with a wrench. The indicator (1) is fixed in the clamp of the holder Ø 8 H7 (3/8" H7) and tightened with a knurled screw (8).

Transfer of the travel : Fig. 1a

The lapped taper (5) of the needle (3) is located at the edges (6) of the split-ball probe and transfers the travel of the two contacts (7) in a 1:1 ratio to the indicator (1).

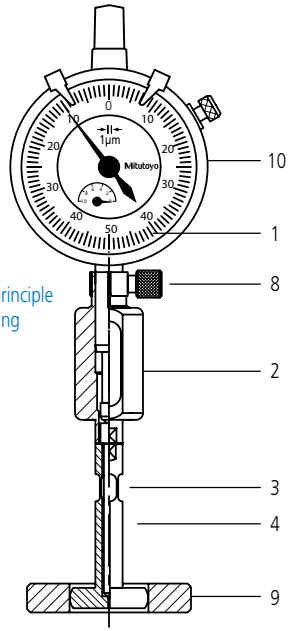
Radial centering: Fig. 1 and 2

Important: The bore diameter must be detected concentric to the bore! The spring force of the indicator spreads the two semicircular contact points via the tapered needle and helps the gauge to center.

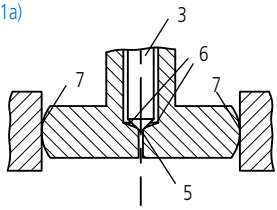
Radial centering errors: Fig. 2 and 3

Avoid a lateral force of the split-ball probe during the measurement in the bore. When measuring horizontally with split-ball probes use the gauges as shown in Fig. 2. The contacts must be vertical, that means the slot must be horizontal.

Split-ball principle of measuring (Fig.1)

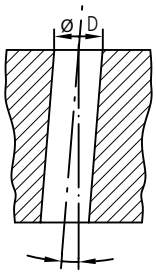


Transfer of the travel (Fig.1a)

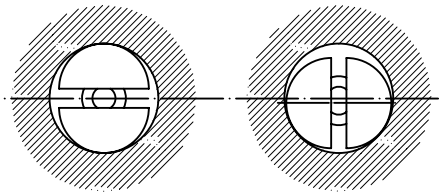


Axial centering errorr (Fig.5)

$$\delta = \frac{\delta}{\cos \alpha D}$$

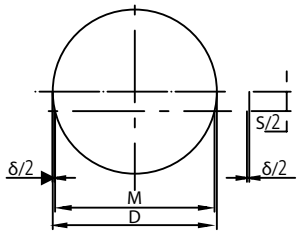


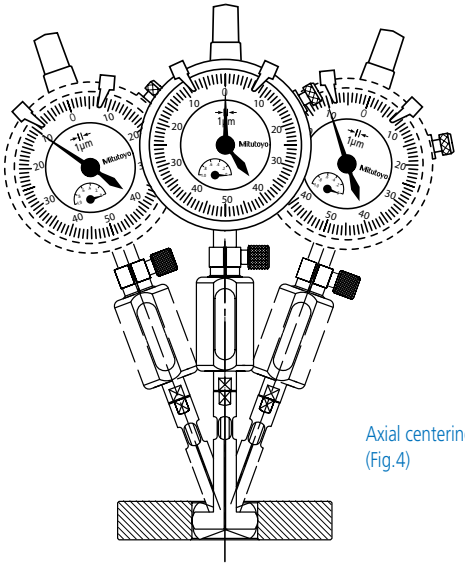
Radial centering (Fig.2)



$$\delta = \frac{S^2}{2xD}$$

Radial centering errorr (Fig.3)





Axial centering (Fig.4)

Axial centering : Fig. 4

Important: The bore diameter has to be detected vertically to the axis of the bore. When gauging by hand the axial centering is made by oscillating the bore gauge through the vertical axis of the bore (Fig. 4). The reversal point of indicator hand shows the vertical axis of the bore. In practice this is generally not significant.

Zero-setting of split-ball probes : Fig. 1

After introducing the split-ball probe in a setting master (9) you can find the reversal point of indicator hand by oscillating (Fig. 4). Then set the indicator to zero by adjusting the indicator in the clamp of the holder or by turning the bezel of indicator (10).

Measuring

Introduce the gauge in the bore. Oscillate as shown in Fig. 4. The reversal point of indicator hand shows the deviation of the bore corresponding to the setting master.

Axial centering error

When measuring with a stand or depth-stop bores with an angle less or more than 90 degrees could cause minor problems. In practice this is not significant in most cases.

2-Point Inside measuring instrument

The measuring accuracy depends on different factors such as:

1. Setting means: dimensional error of the setting means

2. Repeatability (standard split-ball probes)
Usually a better repeatability is achieved with stationary gauging with floating holder

3.Lineartiy error (standard split-ball probes)

Important: For exact bore gauging, bore and setting size should coincide.

4. Influence of temperature

5. Selection of displays

Depends on the precision requirements. For normal use in the workshop: 0.01 mm In case of high demands as to the measuring. Accuracy: 0.001 mm or electronic probes

6. Other factors: Contamination, cleanliness, operator influence, etc...

Important: Pay attention to the measuring pressure of the indicating device

Accuracy of DIATEST - Setting rings		
	0.500 - 1.500	1.750 - 40.000
Max. deviation from nominal size	1 µm	0.9 µm
Max. roundness error	0.3 µm	0.25 µm
Max. surface roughness	0.03 µm	0.02 µm
Hardness	2000 Knoop	62-64 HRC

2-Point Inside measuring instrument

Inside measuring instrument with floating holder in checking stand

2-Point Inside measuring instrument

Maintenance of probes and needles

Special maintenance is not required. If the probes become heavily soiled clean them with a cleansing agent. Then protect the gauges against rust (slightly lubricating, store them in a dry place).
Important: Lubricate the taper of the needle from time to time with grease (e.g. Vaseline).

Setting rings will be protected against rust by greasing or lubricating the bore (Vaseline). Small **Setting rings** 0.500 to 1.500 mm have generally a bore made of synthetic sapphire and thus are non-corrosive.
Dial Indicators flexible shaft - never grease or lubricate!

Repair of split-ball probes

2-Point Inside measuring instruments are largely damage-proof when being treated appropriately. Careless treatment may lead to bending of a probe. From size 1.75 the repair works can be made by yourself as follows:

1. Radial bending (Fig. 6-8)

Testing: press probe slightly together. The measuring jaws will obviously have to be symmetrical (Fig. 6).
Adjusting: When a probe is radially bent (Fig. 7) briefly bend with flat pliers directly behind probe-head to other direction (slightly beyond central point because of resistance (Fig. 8).

2. Axial bending (Fig. 9-12)

a) Distance "A" (Fig. 9) of probe head to probe thread should be as follows when needle is loosely introduced:

- <Size 1.75 - 3.75 ca. 0.3 - 0.4 mm

- Size 4.0 - 40.0 (= 056) c. 0.4 - 0.6 mm

b) Probe legs should obviously be symmetrical to probe axis.

- Fig. 9 and 12 = correct,

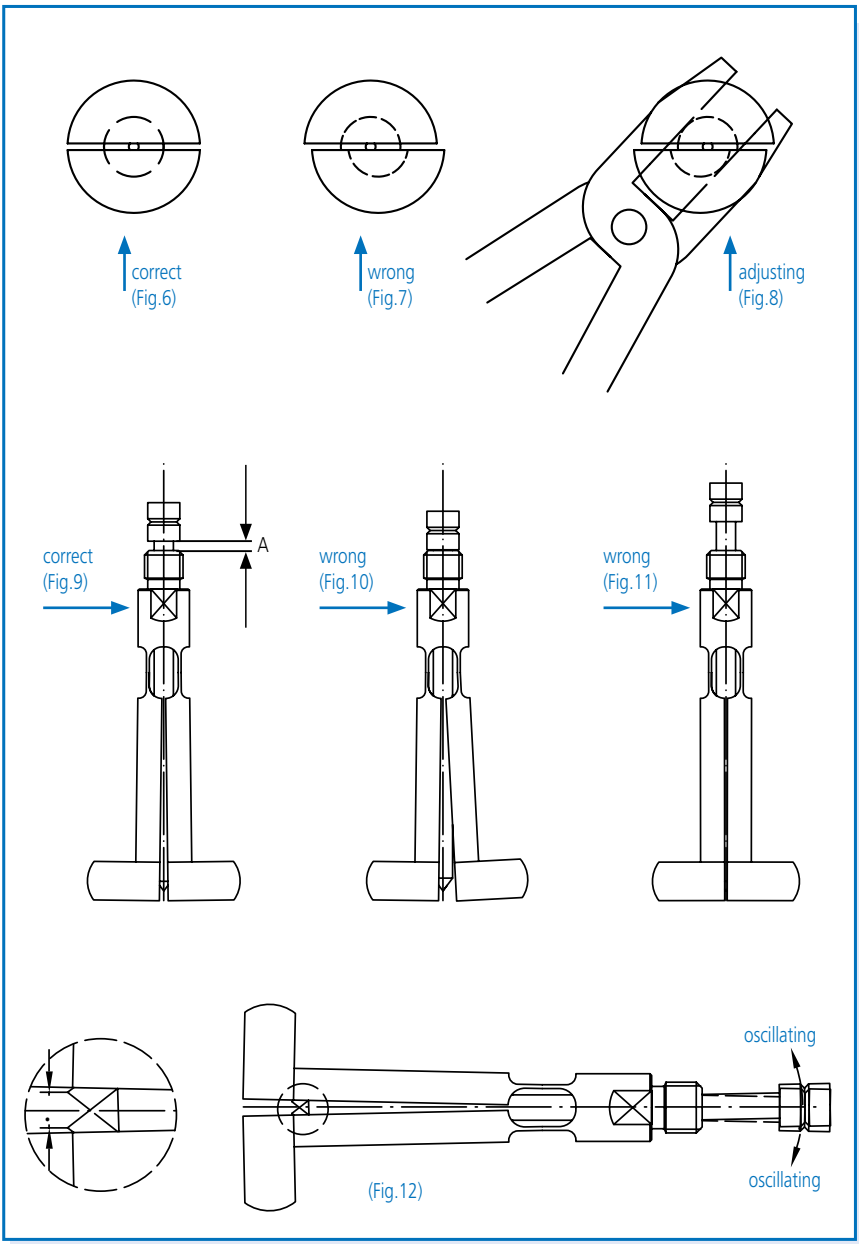
- Fig. 10 = wrong.

Probe legs that are bent (Fig. 10) or bent together (Fig. 11) can be adjusted by careful bending of the legs. For this probe has to be held at threaded piece.

Testing for axial bending

Hold probe at threaded piece – slot horizontal (Fig. 12). Introduce tapered needle by c. 3/4 into the bore of probe. Oscillate. In lower and upper position the taper of the needle should form about the same distances with the edges of the legs as explained in sector (Fig. 12).

2-Point Inside measuring instrument



2-Point Inside measuring instrument

Setting means

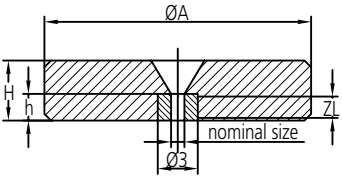
It is recommended to zero-set a split-ball probe with a setting master. This is the fastest and safest method since the test object (bore) and the setting means are equal in shape.

Setting rings are – generally spoken – produced in metric and in inch style without deviation engraved (company standard) since this may easily lead to setting errors because of mistaking of plus- and minus-deviations.

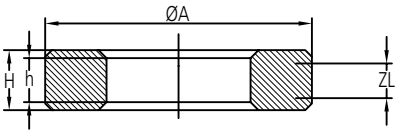
Additional setting means:

Slip gauges, snap gauges: Well suited for zero-setting in stationary gauging. Micrometer: for secondary measuring jobs.

2-Point Inside measuring instrument



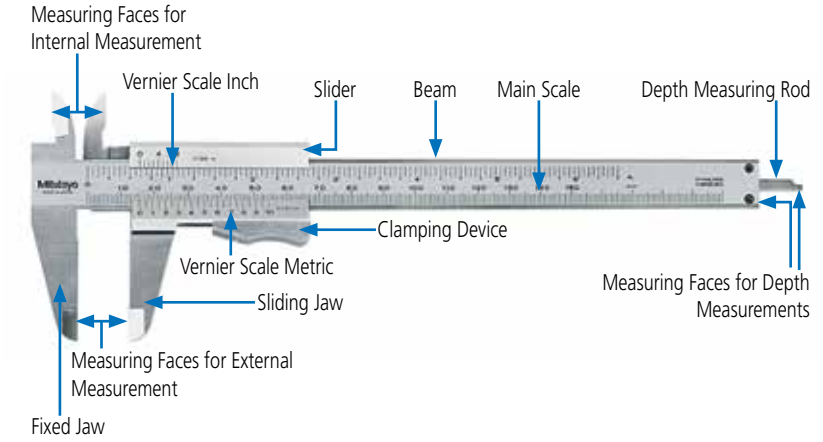
Setting rings 0.500 to 1.500 mm insert made of synthetic sapphire



Setting rings 1.750 to 40.000 mm made of special steel, artificially aged

Size	Ø A	H	h	ZL
0.500 – 0.900 mm	20	4,5	2	1,7
1.000 – 1.500 mm	20	4,5	3	2,7
1.750 – 3.750 mm	20	4,5	4	3,5
4.000 – 9.500 mm	20	4,5	4	3,5
10.000 – 20.000 mm	36	7,5	7	6
21.000 – 30.000 mm	45	10	9	8
31.000 – 40.000 mm	60	12	11	10

Messschieber



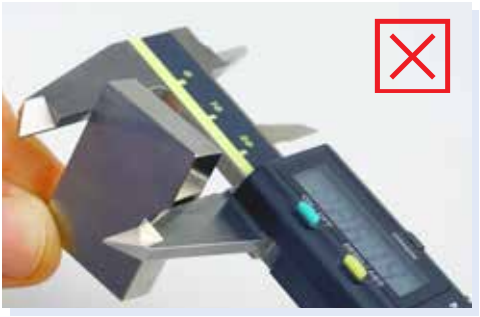
Before Use

✓ Close the measuring faces after cleaning and check the following: Outside measuring faces are in good condition if no light can be seen between them when they are held against a light source. If the faces show contamination or burrs they will not close properly on their full length and light will be seen between them. Inside measuring faces are in good condition if only little light can be seen between them when they are held against a light source.

During Use

✓ Make sure to apply constant force during measurement and measure the workpiece as close to the scale as possible.

✓ Do not measure an object with the measuring faces tilted.

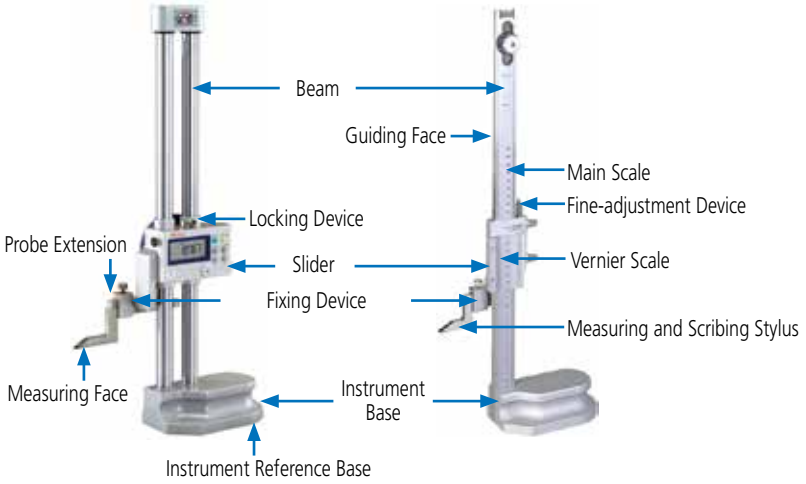


✓ The knife edges for hole measurement should not be used for holes smaller than appr. 3 mm in diameter. Otherwise a relatively big measurement error caused by the inside measuring jaws will occur and have to be compensated.

After Use

✓ Open the outside measuring jaws by approximately 0.2 to 2 mm, leave the locking screw untightened, and then store the instrument in a proper case.

Höhenmessgeräte



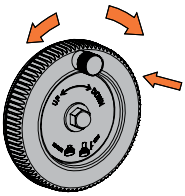
Before Use

- ✓ Set the stylus as close to the main beam as possible.
- ✓ Clean beams, instrument reference base, stylus mounting surface as well as the granite surface plate on which the height gauge will be used.
- ✓ When carrying the instrument, hold it with one hand on the top and the other on the base.

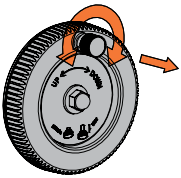
During Use

✓ Rotate the feed wheel slowly when applying a constant measuring force. Coarse feed or fine feed (if available) can be selected by pulling or pushing the handle of the slider feed wheel.

Excessive downwards force lifting the base from the plate



Coarse feed
To use coarse feed push the handle in and rotate the whole wheel.



Fine feed
To use fine feed, pull the handle out and rotate its sleeve.

After Use

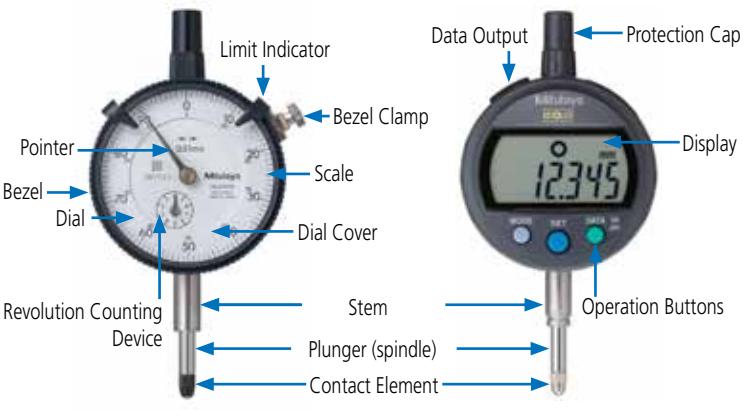
✓ When the height gauge will not be used for some time leave the scriber unclamped and just above, but not touching, the surface plate. This is to avoid injury by accidental contact with the scriber tip.

✓ Be especially careful not to let the scriber protrude over the edge of the surface plate at any time.

✓ If the instrument will not be used for a long time, cover the unit with the supplied dust cover.

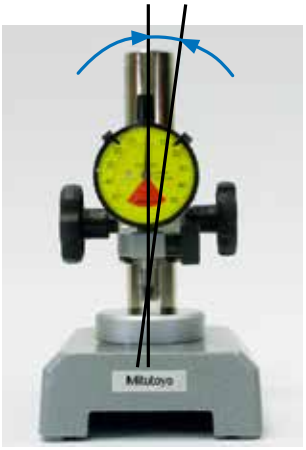
Dust cover

Indicators

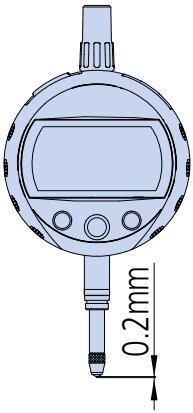


Before Use

- ✓ When setting the zero point, retract the plunger by at least 0.2 mm from the rest position.
- ✓ To avoid measuring error due to non-perpendicular positioning (plunger to table), ensure that the plunger is accurately aligned with the intended direction of measurement. Also note that unevenness of the reference surface may cause measuring errors.



Positioning error



✓ Use the contact point that fits the application best.



✓ Use a holding fixture that will not deflect significantly during normal use.

✓ If the pointer and revolution counter are significantly out of position at the rest point (where the spindle is fully extended), the device may suffer mechanical demage.

During Use

✓ Do not move the plunger rapidly or apply force in transverse direction, otherwise operation and accuracy may be adversely affected.

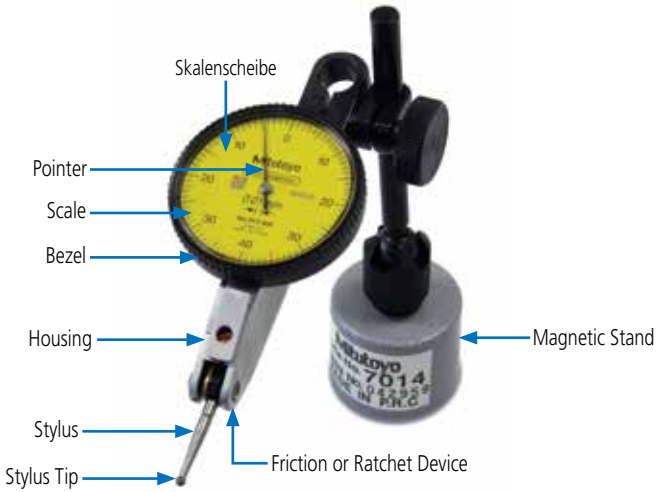
✓ Use a lifting lever, a spindle lifting cable or any other appropriate device to release the plunger from the workpiece.

Application with spindle lifting cable.

After Use

✓ See all instruments, respectively digital instruments.

Dial Test Indicators

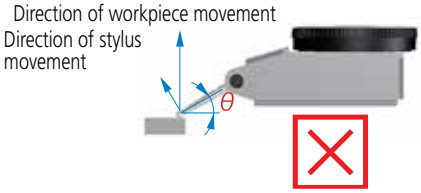


Before Use

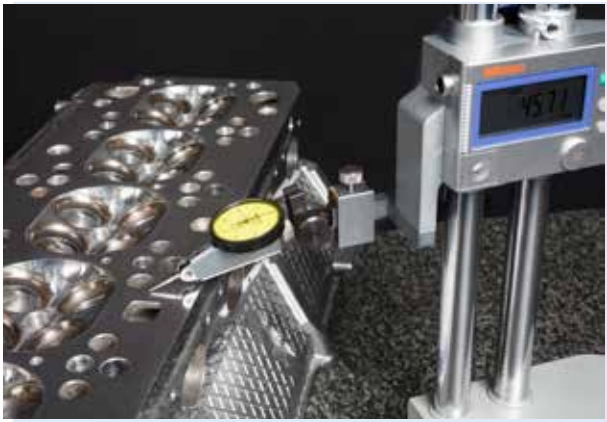
✓ Be sure to use the stylus with standard length matching the indicator model, otherwise a large measuring error may be the result.

✓ Use a holding fixture that will not deflect significantly during normal use.

✓ A Dial Test Indicator's scale factor depends on the angle between the directions of movement of stylus and workpiece. In practice, to avoid significant error, if the angle θ is kept less than 10° during measurement, then the effect can be ignored. If this angle cannot be kept small, the dial reading has to be multiplied by a factor to compensate this so-called cosine effect.



✓ When measuring a rotating or moving workpiece or when moving the dial test indicator, ensure that it rotates or moves away from the contact point.

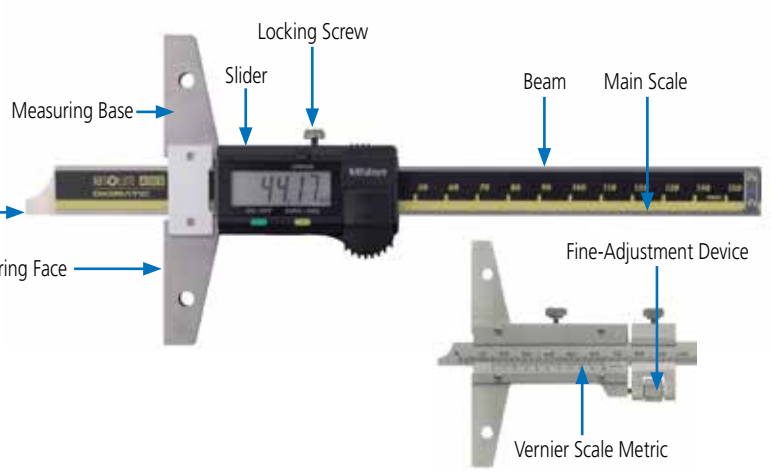


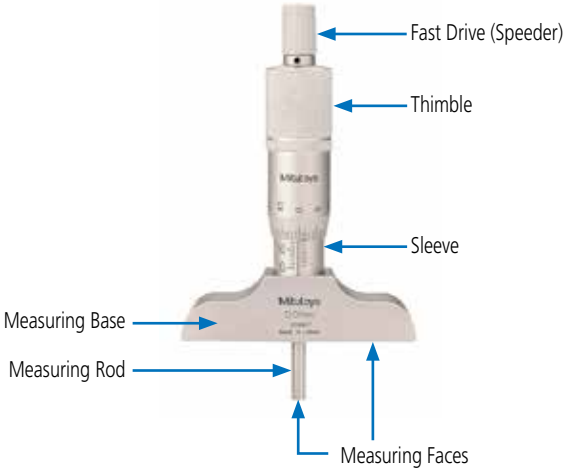
Measurement direction

After Use

✓ See all instruments, respectively digital instruments.

Depth Measuring Instruments





Before Use

✓ Slowly bring the movable measuring face (rod/beam) into contact while pressing the fixed measuring face (base) against a flatness-assured surface such as a precision surface plate. Then setup the reference point, if necessary. Use gauge blocks to check the setting of depth micrometers if the reference point is over 25 mm and of indicator depth gauges with extension rods.

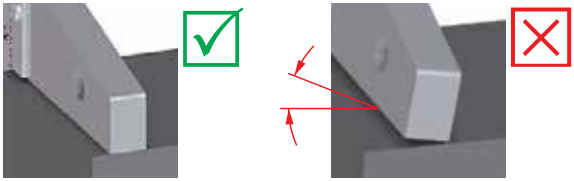
✓ When changing the rods of depth micrometers, remove dust or dirt from the contacting surfaces on the rod collar and spindle end.

Exchangeable rods

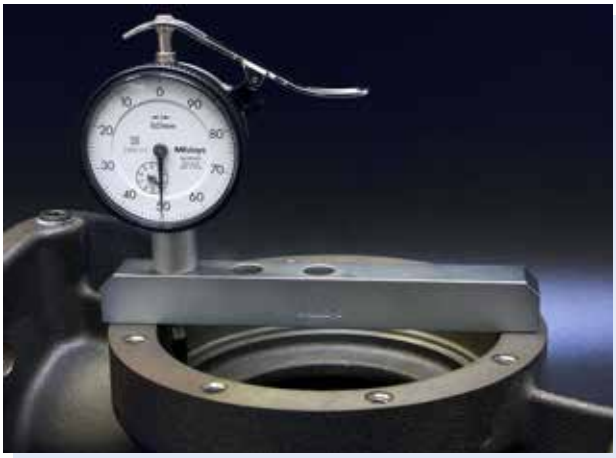
Depth Measuring Instruments

During Use

- ✓ Perform measurement while the reference surface (base surface and measuring surface) is fully in contact with the workpiece.
- ✓ Take care, that the base is always sufficiently pressed down against the workpiece to avoid tilting due to measurement force.



- ✓ If the total length of extension rods used with an indicator depth gauge exceeds 110 mm use the gauge in vertical orientation only.



After Use

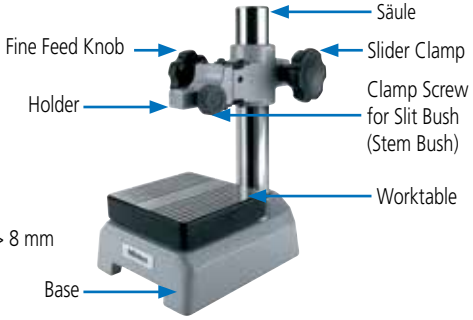
- ✓ See all instruments, respectively digital instruments.


Mitutoyo
Mitutoyo

Auxiliary Equipment Comparator Stands

Stem Bush
20 mm -> 8 mm

Stem Bush
3/8" / **9,53 mm** -> 8 mm



Before Use

- ✓ Clean the worktable using a dry cloth or a cloth moistened with alcohol.
- ✓ Make sure to hold the bracket firmly when moving it up or down.
- ✓ Mount the indicator in the stem mounting hole and tighten the clamp screw. Clamp the indicator firmly. However, the plunger of the indicator must still move smoothly.
- ✓ After adjusting the measuring position, tighten the slider clamp before starting measurement.
- ✓ For reference point adjustment, it is recommended to use a gauge block or a master workpiece.

Reference point setting with a 50 mm Gauge Block.

During Use

✓ Especially for high-accuracy measurements move the plunger of the indicator upwards and downwards using any spindle lifting device such as a spindle lifting cable or a spindle lifting lever to avoid excessive force when changing the measurement equipment.

Lifting cable

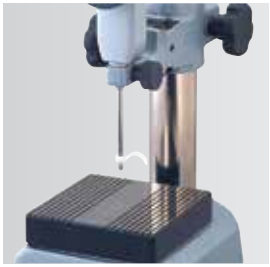
Lifting lever

Lifting knob

✓ To finely adjust the measuring position, use the fine feed knob, if available.

✓ Avoid repeated touching of the worktable with the contact point, or dropping the contact point abruptly.

✓ In the case of scratches on the worktable surface, remove any burrs with a lightly abrasive stone before continuing measurement.

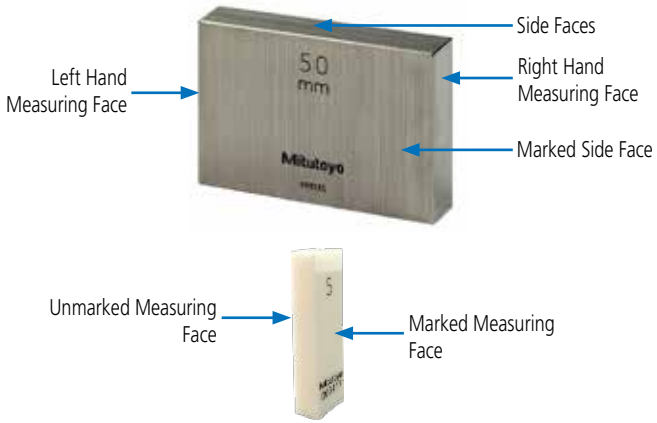


Lifting handle

After Use

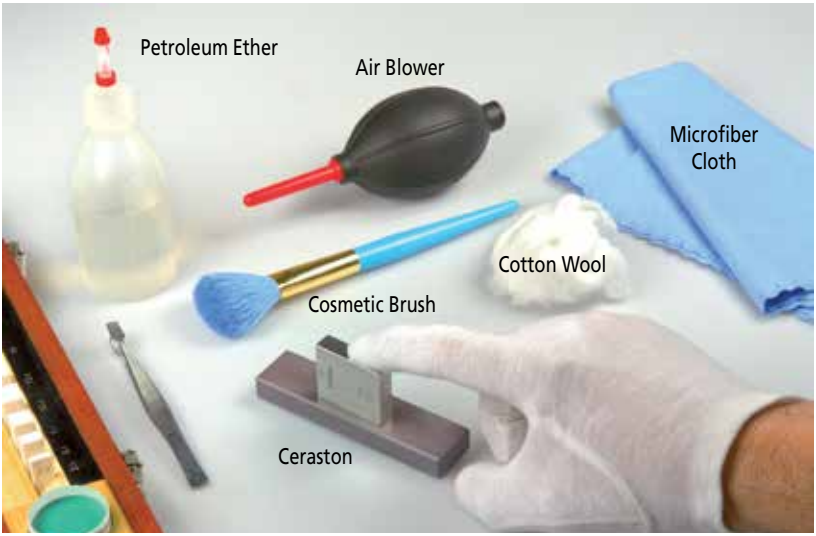
✓ See all instruments, respectively digital instruments.

Gauge Blocks

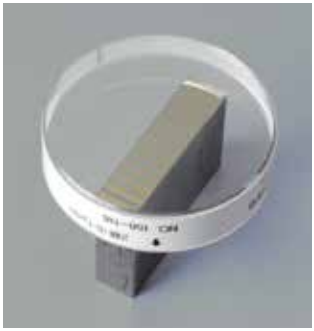


Before Use

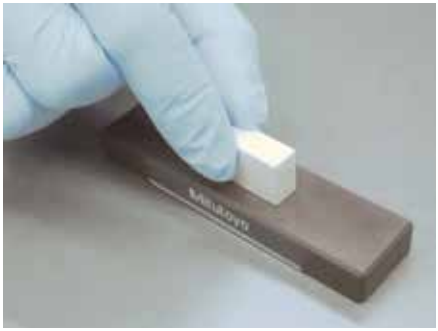
- ✓ To obtain maximum benefit from the extreme accuracy of gauge blocks, use them in a thermally stable environment.
- ✓ Wipe off the oil film from the gauge blocks using a soft cloth and petroleum ether.
- ✓ After wiping, the surfaces are cleaned with a cosmetic brush rinsed with petroleum ether and then blown clean with bellows.
- ✓ Never use alcohol or benzine for cleaning; benzine contains impurities and alcohol always contains aqueous components which may cause corrosion.
- ✓ Best-suited for wiping gauge blocks are microfibre cloths.
- ✓ Check the cleaned gauge blocks for rust and scratches.
- ✓ If there are burrs on the measuring surface remove them carefully using a special Ceraston for gauge blocks. Move the dry gauge block over the Ceraston with very little pressure.



Accessories for Gauge Block preparation



Optical flat to check the measuring face



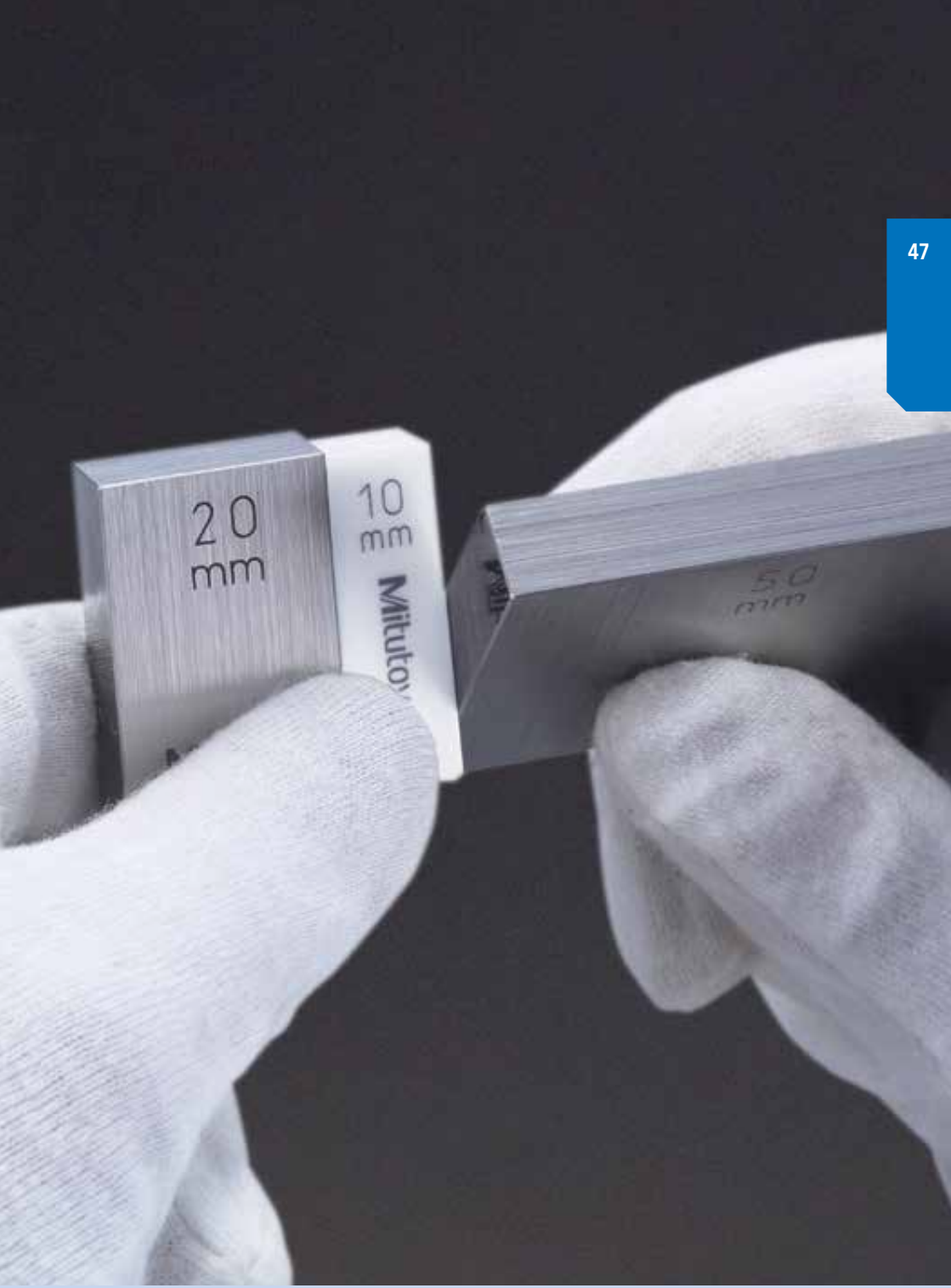
Ceraston

During Use

- ✓ Wringing should always be performed in a clean place on a soft pad – if gauge blocks slip out of your hand, they will not be damaged.
- ✓ In case the measuring surfaces are in good condition, but wringing is still difficult, you may wipe them with medical cotton wool – its oily components will provide a fine film, thus improving the grip of the measuring surfaces.

After Use

- ✓ Check for damage to the blocks and, if found, recondition them by the method described above. If this is ineffective, replace.
- ✓ After using steel gauge blocks, clean and apply rust prevention treatment using a cloth moistened with anti-corrosion oil.


20
mm
10
mm
50
mm

WEEE Disposal of Batteries and Measuring Instruments

Disposal of batteries

- ✓ Batteries contain materials that can harm the environment when treated as conventional waste. On the other hand, most of these materials can be recycled, saving valuable resources. Therefore, for disposing of old batteries you are obliged to hand them to a certified battery collecting point.

Disposal of measuring equipment

- ✓ Disposal of Old Electrical & Electronic Equipment (applicable in the European Union and other European countries with separate collection systems)
- ✓ This symbol on the product or on its packaging indicates that this product shall not be treated as household waste. To reduce the environmental impact of WEEE (Waste Electrical and Electronic Equipment) and minimise the volume of WEEE entering landfills, please reuse and recycle.

- ✓ For further information, please contact your local dealer distributor or your domestic Mitutoyo sales company.

Notes

DIATEST Hermann Költgen GmbH

Schottener Weg 6
64289 Darmstadt

T +49 6151 979 0
F +49 6151 979 111

info@diatest.de
www.diatest.com

Mitutoyo Europe GmbH

Borsigstr. 8 -10
41469 Neuss

T +49 (0) 2137 - 102 - 0
F +49 (0) 2137 - 102 351

info@mitutoyo.eu
www.mitutoyo.eu