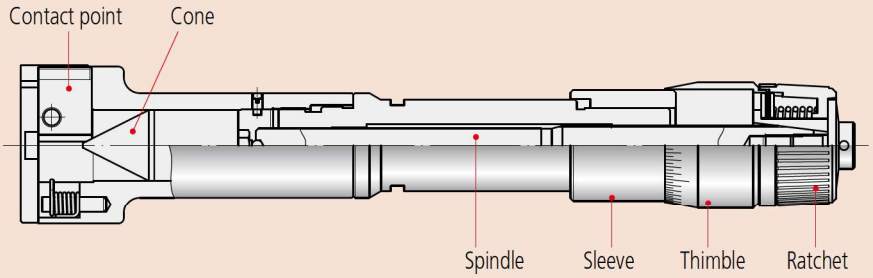
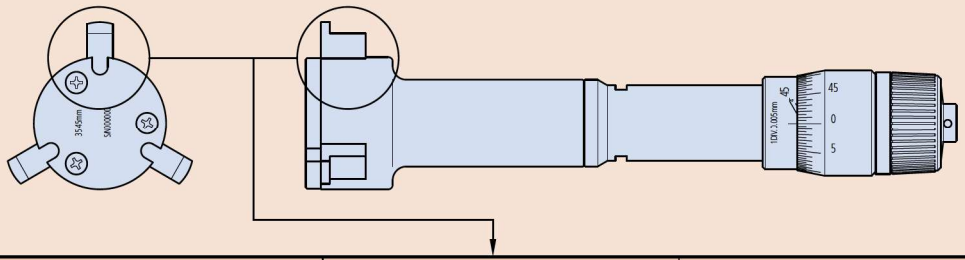
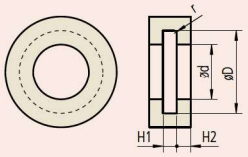
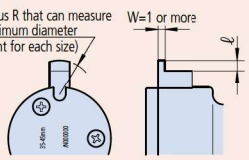
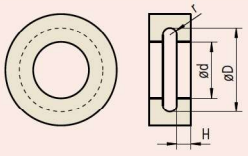
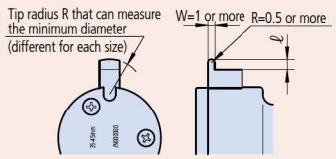
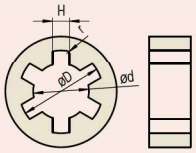
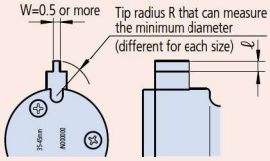
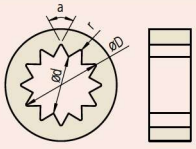
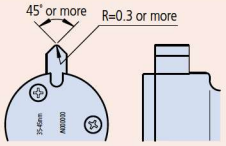
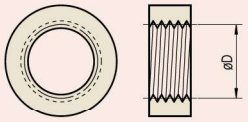
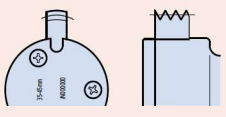
Nomenclature (Holtest)



Custom-ordered Products (Holtest / Boremetic)

Mitutoyo can custom-build an inside micrometer best suited to your special application. Please feel free to contact Mitutoyo about the possibilities - even if only one custom-manufactured piece is required. Please note that, depending on circumstances, such a micrometer will usually need to be used with a master setting ring for accuracy assurance. (A custom-ordered micrometer can be made compatible with a master ring supplied by the customer. Please consult Mitutoyo.)

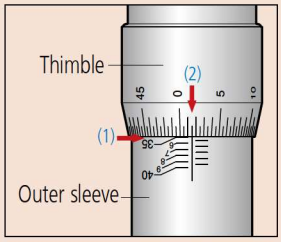


Type of feature	Workpiece profile (example)	Contact point tip profile (example)	Remarks
Square groove			• Allows measurement of the diameter of variously shaped inside grooves and splines. • Minimum measurable groove diameter is approximately 16 mm (differs depending on the workpiece profile.) • Dimension ℓ should be as follows: For W=less than 2 mm: ℓ=less than 2 mm For W=2 mm or more: ℓ=2 mm as the standard value which can be modified according to circumstances. • The number of splines or serrations is limited to a multiple of 3. • Details of the workpiece profile should be provided at the time of placing a custom-order. • If your application needs a measuring range different from that of the standard inside micrometer an additional initial cost for the master ring gage will be required.
Round groove			
Spline			
Serration			
Threaded hole			• Allows measurement of the effective diameter of an internal thread. • Measurable internal threads are restricted according to the type, nominal dimension, and pitch of the thread. Please contact Mitutoyo with the specification of the thread to be measured for advice.

How to Read the Scale

Graduation 0.005 mm

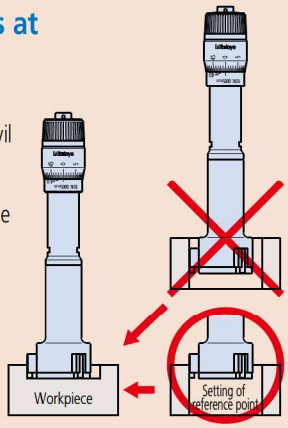
(1) Outer sleeve	35	mm
(2) Thimble	0.015	mm
Reading	35.015	mm



Changes in Measured Values at Different Measuring Points

When Holtest is used, the measured value differs between measurement across the anvil and the measurement only at the tip of the anvil due to the product mechanism. Perform the reference point setting under the same condition before measurement.

When you use the tip of the anvil for measurement, set the reference point by using the tip of the anvil.

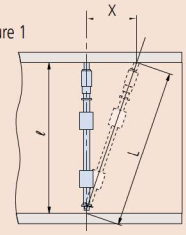


Measurement Error Due to Temperature Variation of Tubular Inside Micrometers

Heat transfer from the operator to the micrometer should be minimized to avoid any significant measuring error due to temperature difference between the workpiece and micrometer. If the micrometer is held directly by hand when measuring, use gloves or hold the heat-insulator (if fitted).

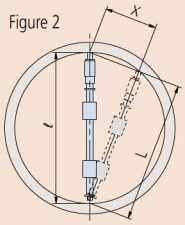
Effect of Misalignment on Accuracy (Inside Micrometer)

Figure 1



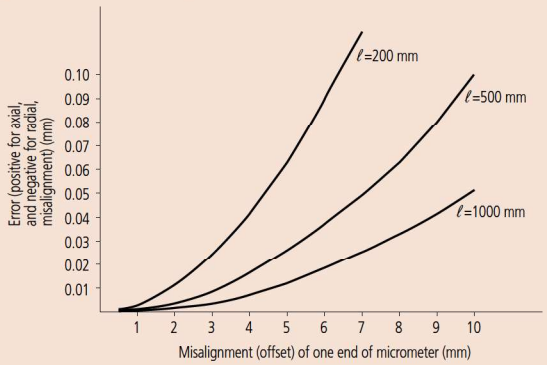
ℓ: Inside diameter to be measured
L: Length measured with axial offset X
X: Offset in axial direction
△ℓ: Error in measurement
△ℓ: $L-\ell=\sqrt{\ell^2+X^2}-\ell$

Figure 2



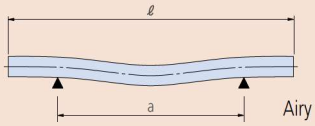
ℓ: Inside diameter to be measured
L: Length measured with radial offset X
X: Offset in radial direction
△ℓ: Error in measurement
△ℓ: $L-\ell=\sqrt{\ell^2-X^2}-\ell$

If the Inside Micrometer is misaligned in the axial or radial direction by an offset distance X when a measurement is taken, as in Figures 1 and 2, then that measurement will be in error as shown in the graph below (constructed from the formulae given above). The error is positive for axial misalignment and negative for radial misalignment.



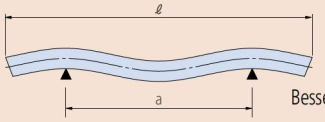
Airy and Bessel Points

When a length standard bar or inside micrometer lies horizontally, supported as simply as possible at two points, it bends under its own weight into a shape that depends on the spacing of those points. There are two distances between the points that control this deformation in useful ways, as shown below.



Airy points (a≒0.577ℓ)

The ends of a bar (or micrometer) can be made exactly horizontal by spacing the two supports symmetrically as shown above. These points are known as the 'Airy Points' and are commonly used to ensure that the ends of a length bar are parallel to one another, so that the length is well defined.

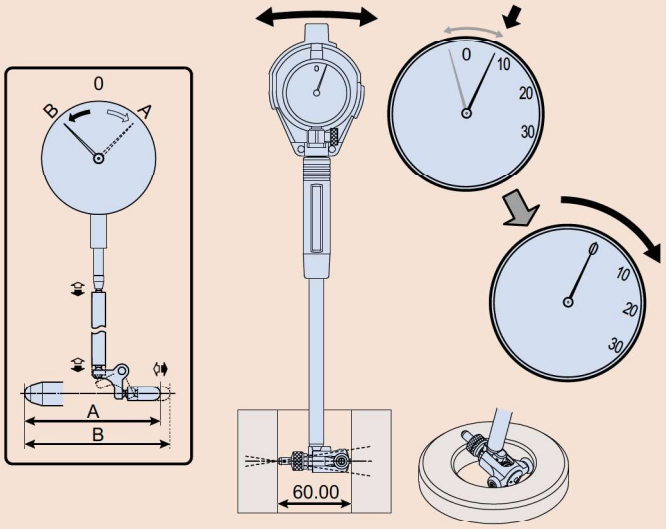


Bessel points (a≒0.559ℓ)

The change in length of a bar (or micrometer) due to bending can be minimized by spacing the two supports symmetrically as shown above. These points are known as the 'Bessel Points' and may be useful when using a long inside micrometer.

Reference Point Setting

- Reference point setting with a setting ring or cylindrical master gage.
  Insert a bore gage into a setting ring or cylindrical master gage. Oscillate the bore gage. The reference point is where the contact point is pished deepest.



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