

Mechanical Measuring Tools

1 Micrometer Gauge

A micrometer gauge (Fig. 1) is used for measuring the (outer) dimensions of physical objects to an accuracy of 0.01 mm. The object (blue in Fig. 1) is positioned between the fixed *anvil* and the adjustable *spindle*. The *thimble* is then rotated clockwise until the object is close to being fixated between the *anvil* and the *spindle*. Finally, the *ratchet stop* is rotated clockwise to close the remaining gap. The ratchet stop should be used for closing the gap, since it limits the pressure applied to the object by slipping at a calibrated torque, thus significantly lowering the risk of causing deformation to the object being measured (same principles as a torque-wrench). Please refer to Fig. 1 and the caption below for details about reading the measured distance¹.

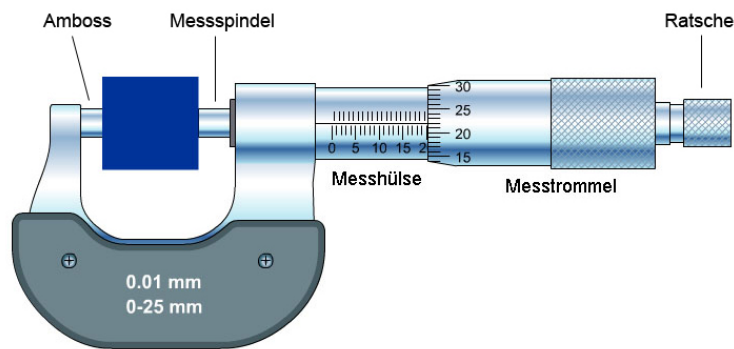


Fig. 1: Micrometer gauge². On the *Messhülse* (*measuring sleeve* with scale ticks vertical) the measured value can be read with a precision of half a millimetre (lower ticks: whole millimetres, upper ticks: half millimetres). This is the value which remains just readable on the scale to the left of the *Messtrommel*. On the *Messtrommel* (scale ticks horizontal) the hundredth millimetres are read. The value lying on the horizontal axis of the *Messhülse* is read. In this example the thickness of the blue cuboid is measured. The measured value is 20.22 mm.

2 Slide Gauge

A slide measuring gauge (Fig. 2) is used for taking inner-, outer-, or depth-measurements of physical objects with a typical accuracy of 0.1 mm or 0.05 mm. For taking the *outer measurement* of a body (blue in Fig. 2), the object is simply placed between the *outside jaws*. The movable jaw is then adjusted, so that the object is touched by both measuring jaws. The *inside jaws* are used to obtain *inner measurements*. The *depth probe* is used to determine the *depth* of an object or a hole by placing the scale of the caliper above the hole and sliding out the depth probe until it reaches the bottom of the hole while the scale touches the surface. Please refer to the caption below fig. 2 for details of reading the measured value³.

¹ See also <http://www.messmittelonline.de/Buegelmessschraube/seite1.htm> (15.10.2016)

² Figure following <http://www.messmittelonline.de/> (15.10.2016)

³ See also <http://www.messmittelonline.de/Messschieber/seite1.htm> (15.10.2016)

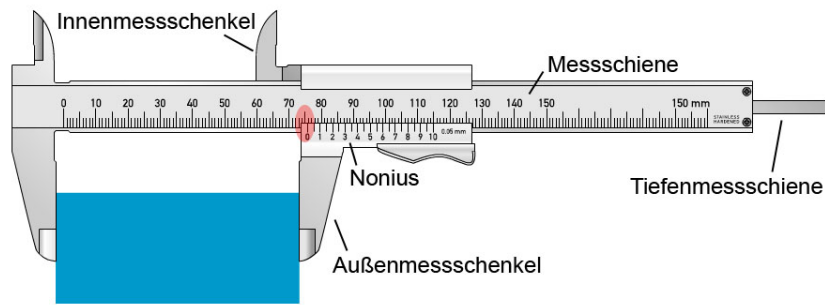


Fig. 2: Slide gauge² for the measurement of outside dimensions (example: blue cuboid), inside dimensions, and depth dimensions. On the *Messschiene* (main scale) the whole millimetres are read (scale value on the left of the „0“ mark of the *Nonius* (vernier scale), here 75 mm). On the *Nonius* the fractional digits are read (Fig. 3).

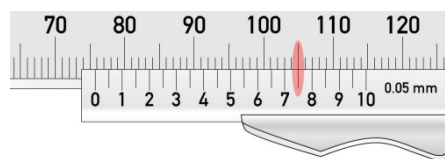


Fig. 3: Enlarged view of the slide gauge shown in Fig. 2. For this model the measuring precision is 0.05 mm. For reading the fractional digits the scale tick on the *Nonius* scale is sought which lies on a scale tick on the *Messschiene*. In the example this is the case at 0.75 mm. Therefore, the combined measurement for the blue cuboid of Fig. 2 is 75.75 mm.