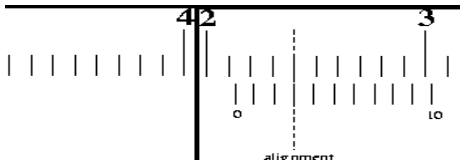
Instructions for metric use

- The Vernier calliper is an extremely precise measuring instrument; the reading error is 1/20 mm = 0.05 mm.
- Close the jaws **lightly** on the object to be measured.
- If you are measuring something with a round cross section, make sure that the axis of the object is perpendicular to the calliper. This is necessary to ensure that you are measuring the full diameter and not merely a chord.
- Ignore the top scale, which is calibrated in inches.
- Use the bottom scale, which is in metric units.
- Notice that there is a fixed scale and a sliding scale.
- The boldface numbers on the fixed scale are centimetres.
- The tick marks on the fixed scale between the boldface numbers are millimetres.
- There are ten tick marks on the sliding scale. The left-most tick mark on the sliding scale will let you read from the fixed scale the number of whole millimetres that the jaws are opened.



- In the example above, the left most tick mark on the sliding scale is between 21 mm and 22 mm, so the number of whole millimetres is 21.
- Next we find the tenths of millimetres. Notice that the ten tick marks on the sliding scale are the same width as nine ticks marks on the fixed scale. This means that at most one of the tick marks on the sliding scale will align with a tick mark on the fixed scale; the others will miss.
- The number of the aligned tick mark on the sliding scale tells you the number of tenths of millimetres. In the example above, the 3rd tick mark on the sliding scale is in coincidence with the one above it, so the calliper reading is (21.30 ± 0.05) mm.
- If two adjacent tick marks on the sliding scale look equally aligned with their counterparts on the fixed scale, then the reading is half way between the two marks. In the example above, if the 3rd and 4th tick marks on the sliding scale looked to be equally aligned, then the reading would be (21.35 ± 0.05) mm.
- On those rare occasions when the reading just happens to be a "nice" number like 2 cm, don't forget to include the zero decimal places showing the precision of the measurement and the reading error. So not 2 cm, but rather (2.000 ± 0.005) cm or (20.00 ± 0.05) mm.

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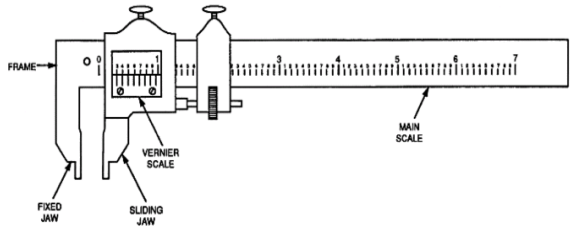
Vernier Calliper

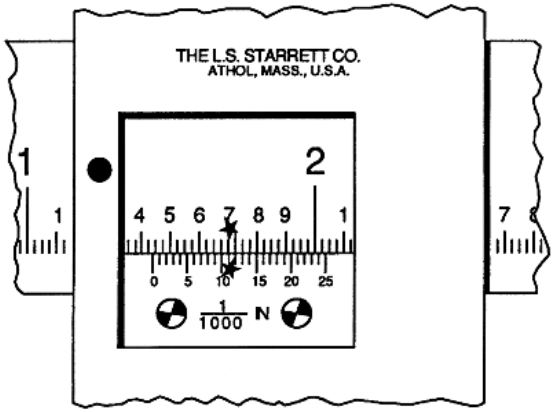


The vernier calliper is a precision instrument that is made to measure in thousandths of an inch. Instead of using a screw, like the micrometer, vernier tools have a sliding scale. The vernier calliper may be used for taking both inside and outside measurements. Graduations on one side are for inside measurements and those on the opposite side are for outside measurements.

The instrument consists of an L-shaped frame with a main scale engraved on the shank. The length of this main scale determines the size of the calliper. Smaller sizes are generally 6 inches. The commonly used ones are 12 and 18 inches, but they may be manufactured in sizes up to 48 inches.

The main scale is divided into inches. Each inch is divided into 40 parts, like the sleeve on the micrometer. Each division is equal to 0.025 inch. Every fourth division is numbered 1, 2, 3 and so on, indicating 0.100, 0.200, 0.300 inch, and so forth.

The vernier scale is attached to a movable jaw that matches the fixed jaw and slides along the main scale bar. The vernier scale has 25 divisions that equal 24 divisions on the main scale. The 24 divisions on the main scale are equal to a distance of 0.600 (24 x 0.025 = 0.600) inch. Thus, the value of one vernier division or space equals 0.600/25 = 0.024. Therefore, the difference between a space on the main scale (0.025) and a space on the vernier scale (0.024) is 0.025 ! 0.024 = 0.001. It is this difference in the spaces between the main scale divisions and the vernier divisions that makes it possible to measure to one-thousandth of an inch.



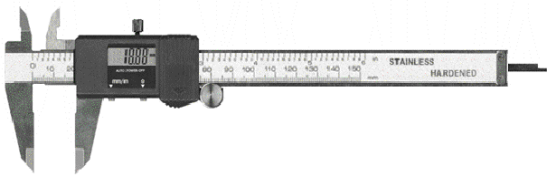
How to read the vernier calliper

Read the number of full inches that show from zero on the main scale to zero on the vernier. In the figure, this would be 1.000 inch.
Read the number of divisions on the main scale beyond the last full inch to the zero of the vernier scale. The figure shows 0.425. Note that the zero line of the vernier is between the 0.425 and 0.450 lines on the main scale.

To read the vernier scale, read along the scale until you find the line on the vernier scale that lines up exactly with a line above on the main scale. In the figure (at right), the eleventh line is correct. This means that 0.011 is to be added to the main scale reading.

The sum of the readings in the paragraphs above is the correct reading of the calliper. In the example in the figure, it would be 1.000 + 0.425 + 0.011 = 1.436 inches.

Vernier callipers are also available with dial indicators and even digital liquid crystal display (LCD) heads which do not require interpolation (direct reading) and some convert to metric at the touch of a button.



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