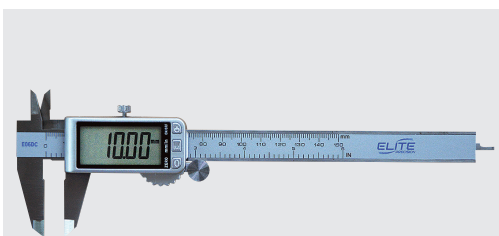


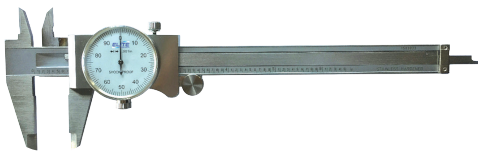
HOW DO I CHOOSE THE RIGHT CALIPER?

Calipers are some of the most versatile quick measuring tools available on the market. The majority of calipers are designed to perform OD (outside diameter), ID (inside diameter) and step measurements, and generally, include a depth rod for measuring deep recesses. This is especially true of those sized 12" (300mm) or below. The three most common types of calipers are digital (also called electronic), dial, and Vernier. Because each of these three choices has distinct advantages and disadvantages, we're often asked which type would be best for a specific job or project. The answer to that question depends on the application environment, budget, what you'll be measuring, and the features you need and want. Some of the strengths and weaknesses of each kind of caliper are explained below.



DIGITAL CALIPERS

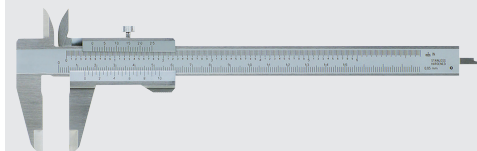
Digital (or electronic) calipers are probably the most common type of caliper used in machine shop environments because they're available in a variety of lengths and sizes to fit almost any budget or project requirement. Digital calipers are the easiest of the three to read, and with the press of a button, they can measure either millimeters or inches and sometimes even fractions. Some of them have data output and memory options among many other features and functions, and they continue to evolve as an increasing number of choices become available. Digital calipers can also measure incrementally by setting the zero point at any place in the caliper's range, so it's possible to measure from one reference point to another location. These calipers are electronic, so they use batteries that will require periodic replacement. Since the quality isn't usually as good in lower-priced tools and considering that the batteries don't usually last as long in them, it's usually best to invest in the better-quality more reliable calipers if possible.



DIAL CALIPERS

When compared to Vernier calipers, dial calipers are used much more often. They feature a dial face which makes them very easy to read, and since no battery is required, they are trouble-free except having to make an occasional calibration.

Dial calipers do have size limitations and are also sensitive to dust and grime that can gum up the slide quickly, hence it's essential to keep them clean. Another challenge is that the dial typically indicates only one type of measurement, so be prepared to do some unit conversions among imperial, metric and fraction units. Also, if dial calipers become damaged, they can usually be fixed, but like digital calipers, you'll probably need to return them to the manufacturer for any repairs.



VERNIER CALIPERS

Vernier calipers are the most basic in construction, featuring two sliding scales that align to yield more accurate measurements than a standard steel ruler can provide. The first scale shows the larger graduations, while the second scale has smaller markings. To use them, place your calipers on what you're measuring, look for the graduations that align with each other, and then do some simple addition to figure out a dimension. Since Vernier calipers are just a set of jaws on two rulers that slide past each other, one of their biggest advantages is that they're quite inexpensive, and there isn't anything to calibrate. In addition, there's nothing that liquids, dust or dirt can negatively affect, so there's no need for coolant or particle resistance.

Though the Vernier style calipers are available in longer lengths than the other two options, they aren't used as often because they tend to be the most difficult of the three to read, particularly for inexperienced machinists. That said, they are extremely functional once you learn how to use them, and very cost-effective and trouble-free when compared to their dial and digital counterparts.

CONCLUSION

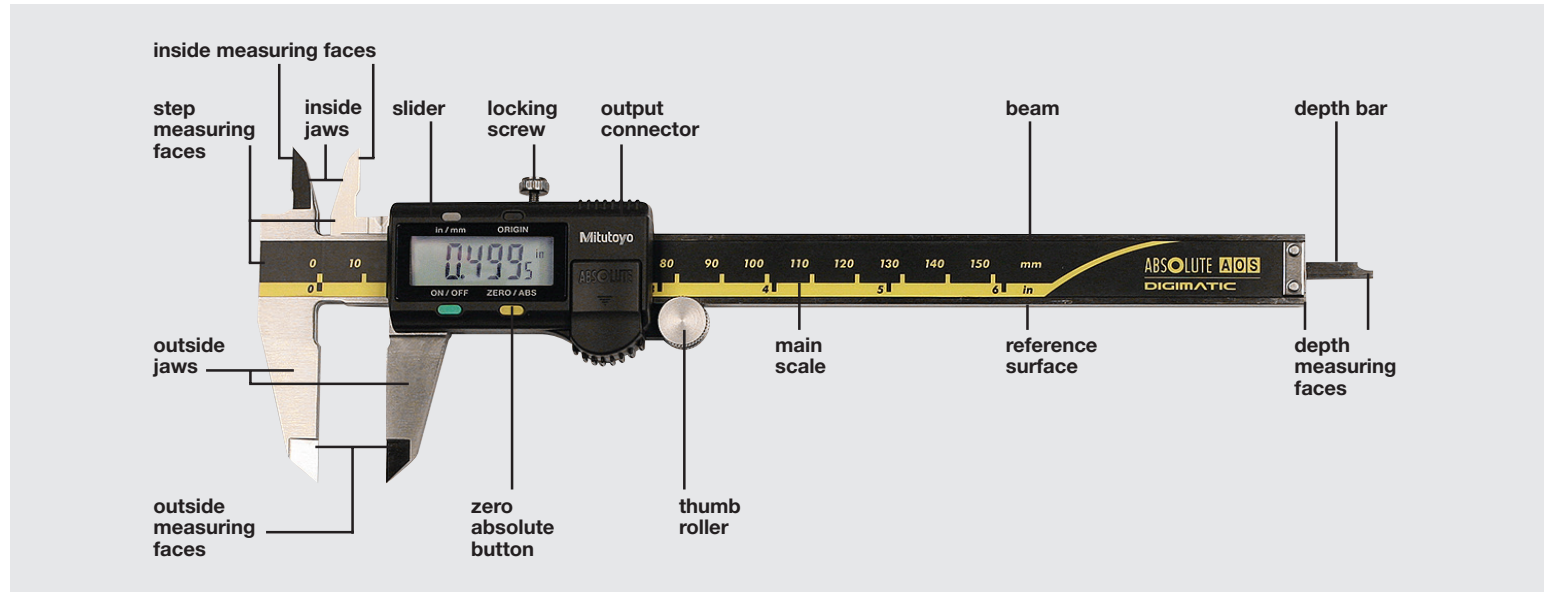
When choosing between digital, dial and Vernier calipers, it primarily depends on how you'll be using them. The more seasoned machinists generally have calipers of varying types, levels of quality, features, and purposes in their measuring tool collection. For those who prioritize ease of use and are willing to invest, we recommend a good set of digital calipers as they offer more extensive features when compared to the dial or Vernier types. You might want to avoid the cheaper digital or dial calipers if a high level of accuracy, as well as good quality and longevity are required, because you do "get what you pay for" with these tools. If you need a tool that will last, the higher quality more expensive calipers are definitely worth the investment. For those who want the absolute least expensive set of calipers money can buy and are comfortable with reading them, Vernier calipers are probably the best choice, and they're accurate enough to get the job done correctly. Dial calipers fall right in the middle in terms of cost and ease of use, and for this reason, they are a good choice if you don't need the features available with digital calipers. Travers Tool's expert technical advisors can assist you with caliper selection and answer your precision measuring questions at **800.234.9985** or at **tech@travers.com**

THE FUNDAMENTALS OF CALIPERS:

Calipers are some of the most versatile measuring tools available. The majority of calipers are designed to perform OD, ID and step measurements, and generally include a depth rod for measuring deep recesses. This is especially true of those sized 12" (300mm) or below.

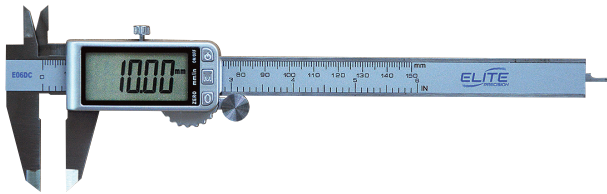
Readings can be found in vernier, dial or electronic display styles. Many are available with plastic, stainless steel or carbide material jaws to match your measurement requirements.

Typical inch dial calipers can be found with .001" graduations with with .100-.200" range per rev. Metric dial calipers typically offer 0.01-0.02mm graduations, and 1.0-2.0mm ranges per rev.



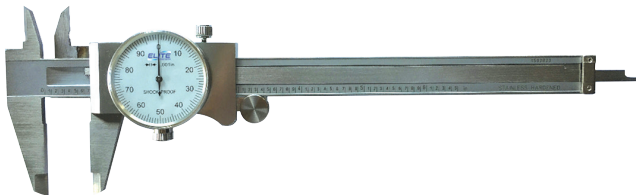
CALIPER TYPES:

STANDARD ELECTRONIC CALIPERS



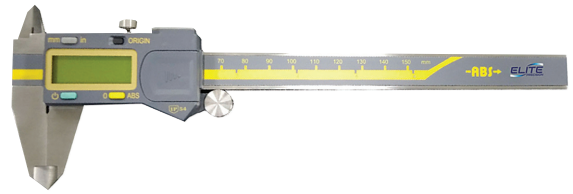
Electronic calipers are typically available with large and easy-to-read LCD screens. Their rugged designs are suitable for industrial environments, and they can also include convenient memory, inch/metric conversion and zero-setting features.

DIAL CALIPERS



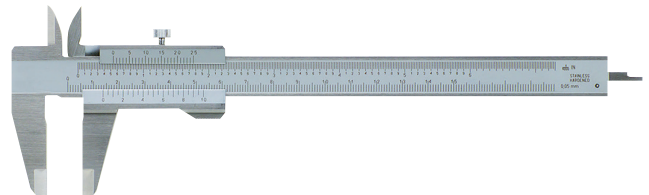
Dial calipers can be easier to read than vernier calipers and even some electronic versions depending on the circumstance. They come in both inch and metric models, and are generally designed with a depth rod to better reach deep recesses. Most offer a wide variety of step, OD and ID measuring options.

WATERPROOF ELECTRONIC CALIPERS



Waterproof electronic calipers are perfect for machining & industrial environments where dirt, coolant and other contaminants are prevalent. Typical protections range from IP65 to IP67 ratings, with the latter offering increased fluid resistance. Some can offer digital output for users looking to export the data.

VERNIER CALIPERS



Vernier designs are the simplest caliper option. Easily slide the scale across your rule to position your external jaws. They are readily available in both inch and metric options, though many users tend to prefer dial and electronic calipers over smaller vernier options.

CALIBRATION OF YOUR CALIPERS

Before some precision tools are placed in service, and periodically thereafter, they need to be calibrated. Calibration is the process that ensures that the measurements obtained by a measuring tool are within allowable specifications and tolerances. These calipers are calibrated by measuring a reference standard, like a gage block. Traceability, an essential part of the calibration process, allows the reference standard used to calibrate a precision measuring tool to be traced directly back to the international definition of length. This assures that all measurements are calibrated using the same international standard.

Calibrated calipers are exactly the same as their non-calibrated counterparts, but they include a traceable certificate of calibration. The most important purpose of the calibration of a caliper is to verify conformance with stated accuracy specifications in accordance with the ASME B89.1.14 standard.

Calipers should be calibrated annually; however, as new products stored in our warehouse, the first 'annual' calibration is not required until one year after purchase—not a year after its original calibration date. If your business requires calibration records, simply attach the invoice showing date of purchase to your certificate of calibration, which will indicate the 'clock starts ticking' on calibration from purchase date, not calibration date.



Look for the icon pictured at left throughout our master catalog to locate **calibrated calipers** that come complete with a calibration certificate.

We can also calibrate your existing measuring tools. Simply contact our sales department at **800.221.0270** and then ship your items to us. Within a week of arriving at our facility, your tools will be calibrated, a certificate will be created, and your tools will be sent back to you.



INGRESS PROTECTION (OR IP) RATING

Liquid and dust resistant digital calipers offer Ingress Protection (or IP) ratings that refer to levels of protection for tools and equipment against damage caused by solids and liquids infiltrating the device.

The letters 'IP' are followed by two numbers which indicate the degree of protection offered. The first number refers to protection from solid objects:

- 0** = No protection
- 1** = Protection from objects greater than 50mm diameter
- 2** = Protection from objects greater than 12.5mm diameter, such as a finger
- 3** = Protection from objects greater than 2.5mm
- 4** = Protection from objects greater than 1.0mm, such as wire, large chips and shavings, etc.
- 5** = Ingress of dust is not totally prevented, but it doesn't enter in harmful quantities that would interfere with safe and accurate operation
- 6** = No ingress of dust permitted

The second number refers to protection from liquids:

- 0** = No protection
- 1** = Protection from falling drops of water
- 2** = Protection from drops of water falling at an angle of 15° in 4 fixed positions
- 3** = Protection from low pressure spray at an angle of up to 60° from vertical
- 4** = Protection from low pressure spray at an angle of up to 180° for 10 minutes
- 5** = Protection from medium pressure jet – 6.3mm diameter, from any angle for 3 minutes at a distance of 2.5-3 meters
- 6** = Protection from high pressure jet – 12.5mm diameter, from any angle for 3 minutes at a distance of 2.5-3 meters
- 7** = Protection from temporary immersion in water under set conditions – 1 meter for 30 minutes
- 8** = Protection from the effects of continuous immersion in water, ingress of water in quantities causing harmful effects shall not be possible
- 9** = Protection from steam cleaning, high pressure, or high temperature jet wash

The first number listed after the letters IP= the level of protection against solid objects. In this case, the number '6' indicates no ingress of dust is permitted.



The second number listed after the letters IP= the level of protection against liquids. In this case, the number '7' indicates protection from temporary immersion in water of up to 1 meter for up to 30 minutes at a time.