

Just How Important is Calibration?

When and Why You Should Calibrate Your Balance

The answer is simple: if you use your balance at all, regular external calibration is critical. This question frequently comes up when a customer purchases a balance and dutifully reads the operator's manual, which recommends calibration before use.



There are many reasons a balance may need to be calibrated. The simple process of shipping can cause small changes to the mechanics of the balance. Some users may have weights that are slightly different from those used at the factory. These small changes can mean big differences in your measuring results.

If this balance is moved to a place where the gravitational pull is greater or less, it will display a different value, as the force will vary. This is what happens as you move around the world.

Gravity is not the same everywhere on Earth. That's because our planet is not a perfect orb. Your location might have a different gravitational force than the location of the factory producing the balance. Every place in the world is positioned differently to "magnetic north." That means that gravity everywhere is slightly different, depending on the particular location's altitude compared to sea level.

If you stand at either of the Earth's poles, you are slightly closer to the center of the Earth than if you stand on the equator. As you move closer to the center of the Earth, the force due to gravity will be slightly greater. As you move away from the center it will be less. Therefore, if you climb a mountain, you move farther from the Earth's center and the force is less.

Different balances will react differently to a change in location. A less-sensitive balance, for example, one that is readable to 1.0g, may not be able to measure a change in gravity when it is moved to a different location. More sensitive balances, such as those found in laboratories, will more readily display the difference in gravitational forces. On the most sensitive laboratory balances, it is possible that a very small difference in location can cause large changes to the

balance's calibration. For example an analytical laboratory balance capable of weighing 100g readable to 0.0001g can detect very miniscule changes in gravity.

If the balance is calibrated with a 100g mass and then moved upstairs three floors, the change in gravity will cause the balance to measure the 100g mass as 99.9970g, or 0.0030g less because it is farther away from the center of the Earth.

If the balance moves north by 1,000 meters (1km), it will measure the same 100g mass as 100.0007g, an increase of 0.0007g, because it has moved closer to the North Pole. If it moves south by 1,000 meters, it would be measured 0.0007g less. And if it moves east or west it would stay the same as it is the same distance to the center of the Earth.

This is important because balances measure the force of gravity pulling the mass towards the center of the Earth. Combine this with variation in barometric pressure and you have a recipe for disaster if you don't calibrate your balance.

Some balances are equipped with internal motorized calibration, and while it might cost more, it's a handy feature to have. But most balances with internal calibration also offer external calibration. External calibration is a fairly simple process; anyone can do it. It's just a matter of disciplining yourself to do it on a regular basis.

During calibration, a previously determined weight is always used to set the balance's parameters, guaranteeing its accuracy. For example, when a one-kilogram mass (the standard) is placed on a balance, its force will always read as 1000g. Any other weight that is placed on the balance will be measured against this standard.

For the best accuracy, the balance should be calibrated regularly or if the local ambient temperature changes more than two degrees Celsius and you are making high-accuracy measurements.

About Adam Equipment

Adam Equipment manufactures and distributes a full selection of precision balances and scales for the lab, education, industrial, retail, medical and jewelry markets. The company, founded in 1972, is headquartered in England and has offices in the United States, South Africa, Australia and China. For more information about the company and its products, go to www.adamequipment.com.