

Selecting the Right Laboratory Balance & Scale:

Due to the precise and sensitive nature of scientific work, balances and scales have become staple laboratory instruments. Precise measurements are extremely critical in ensuring accurate lab results especially in analytical testing and quantitative research. With a large chunk of time dedicated to sample preparation of high-value chemicals and reagents, inconsistent measurements will only lead to time-consuming and costly mistakes.

Selecting the correct weighing instrument is only the first step in good research practices and will increase chances of delivering reliable results. However, a lot goes into choosing the laboratory balance or scale capable of meeting your application demands. With a multitude of selections available in the medtech and laboratory market, finding a balance & scale suitable for your lab needs is rather challenging.

To help you decide on which [laboratory balance and scale](#) to get, and save your valuable time, Laboratory App has put together this comprehensive guide detailing useful features, capacities and applications which to serve as your selection criteria in lab balance and scale shopping.

Balance & Scale Features To Look For

Used in a multitude of applications, laboratory balances and scales range from basic units to more complex ones. To give you an overview on the functionalities and capabilities offered by standard lab balances and scales, below are the important features you need to find out before acquiring a unit:

Required Capacity. In general, laboratory scales and balances measure substances weighing up to a few kilograms, while others can only measure grams. In choosing a weighing instrument, you need to make sure that your balance or scale is able to accommodate even your heaviest samples. Make it a rule of thumb to select an instrument that does not reach maximum capacities even when a couple of your heaviest samples are loaded.

Specific Weighing Units. Many balances and scales are capable of measuring weight in different units. However, scientific and laboratory applications usually require specific weighing units such as grams, pounds, and ounces. More advanced models typically offer several selectable units or unit conversion features. Go with a lab balance & scale which can work with the units specified in your analyses.

Minimum Readability. Some laboratory procedures might require minute amounts of samples to be measured. It is necessary to know your weighing instrument's readability and to make sure that it is capable of displaying the smallest unit requirements in your analyses. Lab balances and scales with high readability are commonly used in applications where high accuracy is crucial. Standard analytical balances usually have a readability of 0.1mg, 0.01mg or 0.001mg but higher-end lab balances and scales can read even up to 0.0000001g.

Mechanical vs Digital Scale. Depending on your precision requirements, you can choose between a mechanical or digital scale. Mechanical laboratory scales tend to be robust and more affordable. This type of scale is more suitable for use in fieldwork or in cases where extreme precision is not necessary. Alternatively, high-performing balances employed in industrial and research applications are usually digital/electronic. Digital balances are very sensitive and easily weighs substances to the milligram level. These balances can also come with more advanced features like parts counting, checkweighing, percentage weighing, and many more.

Pan/Weighing Platform Size. Samples and objects that are loaded onto the lab balance or scale must be fully supported by the pan or weighing platform. Samples that go beyond the platform may cause the weighing instrument to return inaccurate results. Thus, it is important to consider the platform size when shopping for a weighing instrument. In choosing a laboratory balance or scale, you also need to think about the available lab space, as well as the sizes of the samples you intend to measure.

Special Features. Some laboratory balances and scales are built for applications which require weighing instruments to have enhanced or special features not commonly included in standard models. Before purchasing, think about your procedural demands and the features that would be most beneficial to your application.

1. Weigh-Below Capacity

Some laboratory scales come with a hook as an additional feature. This is suitable for use when you need to weigh a sample in suspension in order to determine its density and gravity.

2. Overload Protection

Repetitively exceeding weighing limits can deteriorate or even cause permanent damage to your lab balance's or scale's weighing mechanism. To prevent this, some weighing instruments are secured by an overload protection feature which triggers an error signal when a sample over the instrument's weighing capacity is loaded.

3. Elemental Protection

Some laboratory balances and scales are designed for use in more extreme conditions which would expose them to external factors like dust or liquids. More heavy-duty models like these come with a moisture and dust protection and typically have a longer operating life.

4. Portability

Compact units are commonly offered and are ideal for field sampling. These type of lab balances or scales are easier to carry and are usually marketed as a portable version of a particular model. Many portable balances and scales are battery powered and are designed to be easy and quick to use.

5. Data Collection

Some digital lab balances and scales also come with data collection and storage capabilities. This feature makes it easier to transfer measurement results into external devices like computers or flash drives, or through other applications. This way, your weighing data would be easier to track and analyze.

Which Lab Balance and Scale Type Should You Get?

There are a few types of balances and scales commonly used for laboratory applications. These include:

[Analytical Balances](#) are widely used during chemical analysis and are designed for procedures requiring high degrees of precision. These balances are equipped with a readability ranging from 0.1mg up to 0.001 mg. Capable of detecting very small increments, slight disturbances and even a light breeze can affect weighing results. Thus, analytical balances like the [Radwag AS 82/220.R2](#), [Ohaus Pioneer PA84C](#), and [Accuris W3100-12](#) tend to have a draft shield or weighing chamber that prevents air current from influencing the measurements.

[Precision Balances](#) are generally less precise when compared to analytical balances. However, models of this balance type are usually built with higher capacity ranges and are able to accommodate several hundred grams to a few kilograms. While these instruments have a lower readability, it is quicker and simpler to use, making it more convenient when exact measurements are not necessary. Precision balances used in laboratory, medical, and industrial industries such as the [Radwag PS 4500.R2.M](#) and [Ohaus Scout SPX421](#) may also come with enhanced features such as a USB port or an RS-232 interface.

[Microbalances and Ultra Microbalances](#) offer the highest precision and readability. These balance like the [Radwag XA 6.4Y.M](#), [Aczet CM 21](#), and [A&D Weighing BM-22](#) are designed for measuring very small sample quantities, with capacities up to 10.1 g and a readability reaching up to (0.0000001g). A microbalance with full resolution and a readability between 1 μg to 0.000001g is categorized as an ultra microbalance. This highly sensitive weighing device detects the smallest increments and is applicable for incineration, coating measurement, spillage quantity checking procedures, and similar applications.

There are other types of balances and scales which may also be found in a laboratory setting, although it might be less common.

- a. *Trip Balance* - Created with two pans placed on opposite sides, this weighing instrument is suitable for comparative measurement of two objects. As a mechanical lab balance/scale, Trip balances have a built-in sliding mass for quick and simple weighing procedures.
- b. *Portable Balance* - Manufactured to be compact, these balances are the preferred choice for fieldwork in limited-space laboratory environments. One of its most defining feature is its durability and user-friendly design. While this balance may not be as sensitive as an analytical or micro balance, oftentimes they also carry similar features like piece counting, dynamic weighing, and unit conversion.
- c. *Moisture Balance* - Unlike the previously discussed types, moisture balances are more often used in industrial and professional sectors, such as food processing laboratories. This balance type determines the moisture content in a sample before and after the drying process.

Checking Your Unit's Accuracy

Precision and accuracy in weighing procedures are crucial especially in highly controlled environments like laboratories. Guaranteed accuracy is a must for all weighing procedures. Thus, regular evaluation, checking, and calibration must be performed on lab weighing instruments. To test the precision of a lab balance or scale, we need to take a look at these 4 components:

Reproducibility

This testing method is carried out by repeatedly weighing a certain object, recording the measures, and interpreting the results to determine if there are variances or instability. A common way to test reproducibility is to take twenty pairs of readings with 2 data sets, a full-scale reading and a 'zero reading'. Once the data set is complete, you can use a program to calculate the standard deviation and coefficient of variation. The calculated results should be within the specifications declared by the manufacturer.

Linearity

A linearity test measures the accuracy level of a balance or scale throughout its weighing range. To check your weighing instrument's linearity, you must use 2 weights which when combined, approximately totals your balance's weighing capacity. These weights may not be interchanged. Record the weight of both then return the scale/balance to zero and weigh each object on its own. Repeat the procedure one more time and observe if the numbers add up correctly. The difference or inaccuracy level must be within the specified limits.

Calibration

Since this is one of the most common ways to check and maintain your weighing instrument's accuracy, many lab balances or scales come with features that make calibration more convenient. Some analytical or precision balances only takes a push of a button to commence calibration. Generally, manufacturer manuals and guides that come along with your instrument will have a section explaining how calibration is performed on a particular model. For balances and scales that utilize internal calibration, the only way to know if your instrument correctly measures weight is through having an external standard for comparison. Depending on your instrument's readability, you may use different ASTM weight classes for calibration.

- ASTM Class 1 weights - for calibrating balances with readabilities of 0.01 to 0.1 mg
- ASTM Class 2 weights - for calibrating top-loading balances with readabilities from 0.001 to 0.01 g
- ASTM Class 3 weights - for calibrating moderate precision balances, from 0.01 to 0.1 g.

Cornerload

Testing the cornerload of your weighing instrument is carried out to guarantee that your measurement results are the same regardless of where on the weighing pan the sample is loaded. Logically, a given object should result to the same reading despite its position. Cornerload testing procedures typically include using a single object as a test weight and



moving it to different areas of the weighing pan, including the rears and edges to test if the weight measurement changes. Cornerload tolerances are often not declared on product guides since it is a standard for numerous laboratory balances and scales to have a well-built, stable, and leveled weighing instrument that does not change measurement results despite the load's position or external environmental factors such as temperature.

Getting A Balance & Scale at a Reasonable Price

If price is not an issue in making a purchase, getting a brand new unit is most ideal. This ensures that your lab balance and scale is in peak condition and that you will be able to utilize your weighing instrument's full service life. Brand new units are easy to return in case it malfunctions and are usually offered with both a store and manufacturer warranty.

For any assistance needed on potential new [lab balance and scale](#) purchase, feel free to reach us at **1-888-699-7245** or email us at john@laboratoryapp.com today.