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How to Achieve Optimal Weighing Performance

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How to Achieve Optimal Weighing Performance

With full-resolution 1 µg readability up to 61 g, the new Sartorius high-capacity micro balances are pushing back the limits of what is possible in weighing technology: they set a new record in accuracy with 60 million divisions. Their exceptional weighing performance and the impressive quality of their weighing results are clearly revealed when they are checked with certified weights.

But perfect measurement of weights is not the application this balance was designed for. Sartorius high-capacity micro balances enable optimal minimum weights within the USP 41 operating range to be measured in heavy glass vessels, such as long-necked, volumetric flasks.

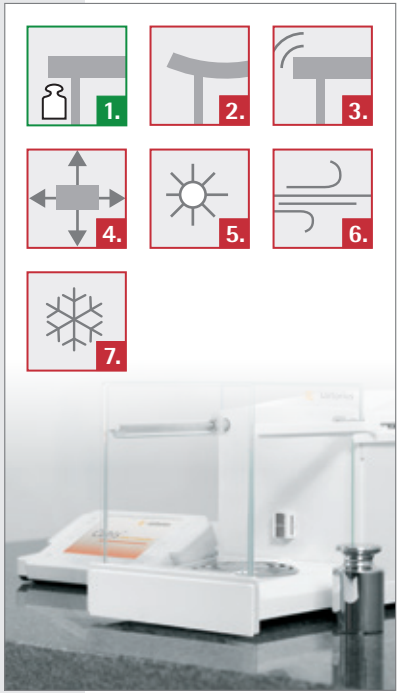
Direct weighing of even the smallest quantities of a substance in large glass flasks enables straightforward, accurate and efficient preparation of stock solutions and reference standards, e.g., for HPLC analysis. This eliminates the need for transferring a micro sample from a weighing boat into a volumetric flask, which can result in errors. Weighing directly in a large container reduces both sample loss and contamination.

This application requirement that a balance needs to meet poses an even greater challenge to its weighing technology. The reason is that the the smaller the sample quantities used, the greater the relative measuring errors become, and the larger the tare container size employed, the higher the influence of environmental conditions will be on weighing accuracy. To ensure high accuracy during weight measurements and excellent repeatability of the results, you need to observe certain basic rules and requirements.

External environmental influences or improper handling can lead to inaccurate results or poor weighing performance, which are not caused by the balance.


0.002019 g
50 ml

1 Choose a Stable Weighing Table in a Quiet Place to Set Up Your Balance.

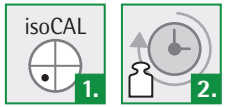


1. The table should be solid-built and, whenever possible, be made of stone or synthetic stone.
2. Avoid causing the tabletop to sag or deflect even slightly; for example, never use it to prop up your arm.
3. Set up the balance in a vibration-free location. Ensure that there are no machines or engines that generate vibrations or electromagnetic fields near the balance. Magnetism must be ruled out (e.g., tables may not be made of stainless steel).
4. Do not position the table in the middle of the room, but near a wall or, even better, in the corner of a room, as this is where the vibration amplitudes are generally at their lowest.
5. Avoid exposing your balance to sunlight and infrared radiation emitted by lamps or heaters.
6. The location may only be slightly ventilated. Exposure to drafts needs to be avoided, and the air flow rate should be below 0.2 m/s.
7. Cold air currents from air conditioners may not pass directly across or over the draft shield, as this can result in an inversion layer of air inside the draft shield. This, in turn, can cause unstable weight readouts.

2 Work in the Lab under Consistently Constant Climate Conditions.

1. Avoid significant temperature changes or spikes.
2. Keep the relative humidity as constant as possible. Prevent the relative humidity from dropping below 40%, as this will significantly increase interference by static electricity.
3. Use the Sartorius climate sensor option (temperature, barometric pressure and relative humidity) to monitor climate conditions.
4. Use the Sartorius ionizer option to eliminate electrostatic influences. Electrostatic charges on glass vessels dissipate only very slowly, particularly when these vessels have very clean surfaces, especially when they are used freshly from a laboratory glassware washer. Electrostatic influences are easy to detect by the continuous drift of weight readouts. Increase the air humidity to levels up to 60%, and use an ionizer to reduce these effects on the resulting weight readings.

3 Ensure That the Balance Is Leveled and Calibrated.



1. Sartorius high-capacity micro balances will support you in using the calibration | adjustment function isoCAL, and the Q-Level function implemented in the balance for leveling continuously maintains the accuracy of the weighing results within a narrow tolerance range.
2. Moreover, routinely check the balance using an external, certified weight.

4 During the Measuring Sequence, Ensure That …

1. … the vessels used are acclimatized next to your balance; i.e., have adapted to the temperature conditions in the same room.
2. … you do not touch the container with your hands when positioning it on the weighing pan or in a sample holder. Touching the sample vessel with your hand usually increases the temperature of the vessel. Buoyancy and air current effects influence weighing results. Remember that it takes ten minutes for these effects to subside. Use a pair of tweezers or forceps to position the vessel.
3. Avoid placing your hand inside the draft shield to ensure that no unnecessary interchange of air outside and inside the draft shield takes place and that no heat is transferred into the draft shield.
4. Avoid touching a vessel with your bare fingers at all times, as a single fingerprint can weigh up to 50 µg and therefore have a major impact on the accuracy of your weight measurement result.
5. When weighing, ensure that no powder falls onto the weighing pan next to the vessel, as this will mean that the displayed sample weight is not what is actually in the vessel.
6. Avoid the complete interchange of air when opening the draft shield by opening only one door, where possible. Opt for using the draft shield learning capability to open the door only as far as actually necessary.
7. Carefully place the tare container on the weighing pan or in the sample holder. Avoid applying any excessive force.
8. Do not lean on or against the weighing table or rest your arm arm on it during the weighing procedure.

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