

## Factors in the Environment

To be able to conduct more precise measurements, it is necessary to minimize the factors that contribute to measurement errors. There are a great variety of such error-inducing factors, which can be linked to machine error and performance of the balance itself, as well as the properties and condition of sample being measured, and the measuring environment (e.g., vibration, temperature/humidity). These factors can readily affect the results of measurement on a balance.

This material includes some precautionary notes that the user should bear in mind to eliminate error factors and ensure accurate measurement results.

## 1. Precautions in the Measuring Room

### 1.1 Temperature/Humidity

- Try to maintain constant room temperature as much as possible to prevent condensation and unstable indications due to fluctuations in temperature.
- Low relative humidity tends to induce static electricity. (Relative humidity of about 60% is considered ideal).

### 1.2 Vibration/Shaking

- The measuring room should preferably be located on the ground floor or in the basement. Higher floors are more susceptible to heavy vibration and shaking, which make such locations less suitable for measurement. A room facing a railway or road with heavy traffic should also be avoided as much as possible.

### 1.3 Drafts

- Avoid choosing a location subject to a direct draft of airflow from an air-conditioning unit or exposed to direct sunlight, which may cause abrupt fluctuation in temperature.
- Avoid a room subject to a heavy flow of people, since fluctuations in drafts and temperature are likely to occur in such a location.

### 1.4 Gravity

- The gravity acting on a sample varies depending on the latitude or height of the location where measurement is being conducted. For this reason, the same sample may show different weight indications from one place to another. Therefore, make it a rule to calibrate the balance every time it is relocated.

### 1.5 Electromagnetic Waves

- When the balance is located near an object that generates intense electromagnetic waves, it may be hindered from showing accurate weight due to the effects of such waves.

## 2. Precautions on the Measuring Bench

### 2.1 Vibration/Shaking

- If the balance is subjected to vibration during measurement, its indications will become unstable, thus preventing accurate measurement from being conducted. To avoid this situation,

select a solid measuring bench that is less susceptible to vibration. (A bench in vibration-proof structure or one made of concrete or stonework will be suitable). Moreover, do not conduct measurement with a soft cloth or paper placed under the balance, since the balance may be rocked out of precise level positioning.

- Place the measuring bench in a location free from vibration as much as possible. It is a good idea to install the measuring bench in a corner of the measuring room, where less vibration is likely to occur than in the center of the room.

### 2.2 Magnetism/Static Electricity

- Avoid operating the balance on a bench that is susceptible to the effects of magnetism or static electricity.

## 3. Precautions on the Samples

### 3.1 Static Electricity

- Generally speaking, objects made of synthetic resin and glass have high electric insulating properties and, therefore, are apt to be electrically charged. Measuring a charged sample may cause unstable indications. With this in mind, be sure to discharge samples before measurement.

### 3.2 Magnetism

- A sample affected by magnetism indicates different weight values depending on where it is located on the measuring pan, along with poor reproducibility of the results.

When a magnetized sample must be measured, first demagnetize it or place an appropriate pedestal on the measuring pan to adequately separate the mechanism part of the balance from the magnetized sample to avoid the effects of magnetism.

### 3.3 Absorption/Evaporation of Moisture

- Measuring a sample with moisture absorbed or evaporated (volatilized) continuously increases or decreases the values indicated. In such case, measure the sample in a container with a small opening and sealed airtight with a cap.

### 3.4 Sample Temperature

- A difference in temperature between a sample and the interior of a windshield may cause convection to occur inside the windshield, resulting in erroneous measurement.

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## Factors in the Environment (continued)

Therefore, measure a very hot or cold sample only after allowing time for its temperature to acclimatize to room temperature. Moreover, to prevent convection inside the windshield, allow time for the interior of the windshield to acclimatize to room temperature.

- The body heat of a person conducting measurement can also affect measurement results. Avoid holding the sample with bare hands, and use long tweezers or a similar tool instead. Also refrain from putting your hands inside the windshields while measurement is in progress.

## 4. Precautions on the Main Unit of the Balance

### 4.1 Precautions on Use

- The balance is protected with a transparent dust cover. The dust cover may be statically charged immediately after removal from the packing box or under low humidity conditions. Unstable indications by the balance may be due to a statically charge dust cover. Wipe the dust cover with a damp cloth or use a commercial antistatic agent. Simply operate the balance with the dust cover removed to assist with this problem.
- To achieve more accurate weighing, wait at least 30 minutes after switching on the balance, then use the balance only after loading it several times with an object of weight equal to the weighing capacity.

### 4.2 Calibration

- Periodically calibrate the balance to ensure accurate measurement at all times.

- For more precise calibration, use an external calibration weight that approximates the weighing capacity. Moreover, calibrate the balance only after allowing time for proper acclimation to ambient temperature following power-up.
- Wait at least 30 minutes after switching on the balance, then perform calibration only after loading the balance several times with an object of weight equal to the weighing capacity.

Calibration is also required in the following cases:

- When operating the balance for the first time
- When the balance has not been used for a long time
- When relocating the balance
- When there is wide fluctuation in temperature, humidity or atmospheric pressure

### 4.3 Maintenance

- When the measuring pan or pan base is contaminated with powder or liquid, erroneous weight values may result or indications may remain unstable. Therefore, be sure to frequently clean the balance. When cleaning the balance, be very careful not to allow dirt or liquid to penetrate inside the mechanism.

