

Ozarks Environmental and Water Resources Institute (OEWRI)
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Standard Operating Procedure for:

Operation of Sartorius Entris (64-1S) 90mm Analytical Balance

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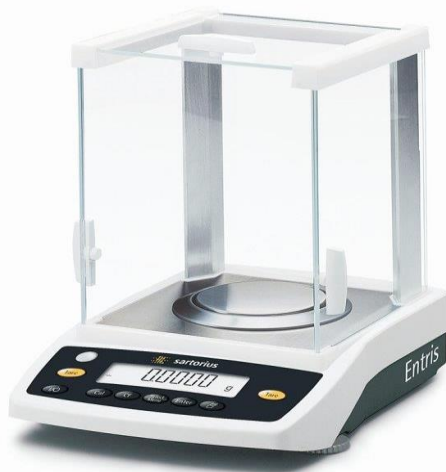


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Identification of the method

Operation of Sartorius Entris 90mm Analytical Balance (Model ENTRIS-64-1SUS)



Sartorius Instruments, 2017

Detection Limit

The Sartorius Entris-64 Analytical Balance has a readability value of 0.1 mg, a linearity deviation of 0.2 mg, and a maximum weighing capacity of 60 g.

Scope of the method

This standard operating procedure provides OEWR laboratory personnel with guidance on the procedure for leveling, calibrating, and operating analytical balances.

Summary of method

The procedures follow guidelines provided by the manufacturer (Sartorius Instruments, 2017). Leveling of the balance is achieved by adjusting the feet of the balance to center the bubble in the spirit level. Calibration requires the use of a certified 50 g weight to allow the balance to calibrate itself. Operation of the balance includes an understanding of the laboratory procedure, the importance of zeroing (taring), and an awareness of other factors within the laboratory.

Interferences

1. Temperature fluctuations, air drafts, vibrations, and unstable surfaces within the lab may interfere with the accuracy of measurements. Ensure that the balance is allowed to warm up for 30 minutes to allow internal mechanisms to reach operating temperature, draft doors on balance are closed, and the surface on which the balance sits is still and stable.
2. Any debris present within the weighing pan area may also interfere with measurements. Ensure the balance is clean before obtaining measurements.

Health and safety

Operation of an analytical balance has no unusual risks beyond normal considerations involved in handling electrical equipment. Because the balances are in laboratories where other analyses are being conducted, routine laboratory safety practices must be followed when using these instruments.

Personnel qualifications

Laboratory personnel shall have a working knowledge of the analytical procedures and will have received training from an MSU employee knowledgeable of the proper balance operation and calibration procedures.

Equipment and supplies

1. Analytical Balance: Sartorius Entris (90mm pan and 60 g weighing capacity).
2. Small brush: for clearing the balance pan of particles/debris.

Reagents and Standards

1. Certified 50 g standard test weight: for calibration check.
2. Certified 5 g standard test weight: for measured mass. Other test weights may be used if available.

Quality Control

1. Calibrate balance before each use using the 50g standard weight to check calibration.
2. Tare the balance between each measurement.
3. As a daily check before measuring samples, weigh 2 or 3 weights that span the range of possible masses to be checked (for example: 50.000g, 1.000g, and 0.050g). Ensure the measured mass is within 0.2 mg of the stated standard weight value.

Calibration and Standardization

1. Check that the balance is level.
2. The instrument must be powered on and allowed to warm up for 30 minutes prior to use to obtain accurate results.
3. Calibrating the balance requires the use of certified 50 g weight. The calibration weight must be handled with tongs.
4. With the balance pan empty and clean, tare the balance by pressing the "Tare" button. The scale should read "0.0 g".
5. Press the "Cal" button. The scale should read "CAL.EXT."

6. The balance should flash “50.0 g” and the 50 g calibration weight should be applied. Close the balance door.
7. The display screen should stop flashing when the weight value is within the defined limit.
8. After a few seconds, the balance should read “CAL.END”.
9. Remove the calibration weight.
10. The balance is now calibrated and ready to use.
11. Return the calibration weight to its holder.

Laboratory Procedure

1. Leveling Procedure:

- 1) The balance should be powered on and allowed to warm-up for 30 minutes to reach the required operating temperature before calibration or sample measurements.
- 2) For optimum accuracy, ensure the balance is leveled prior to calibration or use.
- 3) A spirit level on the front of the balance indicates whether the balance is level. The bubble should be well centered in the circle of the spirit level.
- 4) If the balance is not level, turn the adjustable feet located at the front of the balance.
- 5) Do not place any heavy objects or lean on the balance bench. (This may interfere with the balance’s level.)
- 6) Make sure the balance pan is clean. Use a small brush to gently whisk away any particles.

2. Balance Operation

- 1) Check the balance’s calibration by weighing a 5 g standard mass. The measured mass should be within 0.2 mg of the stated value. Recalibrate if measurement varies from stated mass by more than 0.2 mg.
- 2) Vibrations in the balance area should be minimal. Make all measurements with the balance doors shut.
- 3) The total load on the balance pan should never exceed 60 g.
- 4) Just prior to measurement, open the balance’s doors and press the Tare button to zero its reading.
 - a. If a weighing dish or similar item is to be used, it may be placed on the balance pan prior to zeroing the reading.
 - b. The balance should read 0.0000 g after taring.
- 5) Gently place the sample to be weighed onto the balance pan or tared weighing dish using tongs.
- 6) Close all doors on the balance and allow the measurement to stabilize.

- 7) Once the reading has stabilized, record the measurement and repeat for the remaining samples.

3. Routine Care

- 1) Clean any spills around the balance as quickly as practical.
- 2) Ensure no liquid enters the balance housing beneath the weigh pan.
- 3) Keep balance doors closed when not in use.
- 4) Avoid activities around the balance that would cause vibrations or jarring.
- 5) Replace the plastic covering over the scale after every use.

Corrective actions for out-of-control or unacceptable data

1. Measurements of standard weights that exceed 0.2 mg deviation from the stated value requires recalibration of the balance.
2. If the measurement is unable to stabilize, ensure that there is no debris on the weigh pan, the balance doors are closed, there is no air flow within the lab, and the balance is level.

References

Sartorius Instruments. Sartorius Entris Laboratory Balance Operating Instructions. 2017.
<https://www.nist.gov/system/files/documents/2022/04/05/Sartorius%2BEntris-1S%2BManual.pdf>

Tables, diagrams, and flowcharts

There are no tables, diagrams, or flowcharts for this method.