

## INSTRUMENT OPERATING PROCEDURE

**INSTRUMENT:** Balance

**MODEL:** R200D

**MANUFACTURER:** Sartorius

**SERIAL NUMBERS:** 20903620, 20903676,  
and 39020006

**USGS ID NUMBERS:** 385274, 385275, and 373245    **CALIBRATION FREQUENCY:** Daily when  
in use

### PRECAUTIONS

#### A. Potential Interferences

1. The balance is adversely affected by electromagnetic fields, temperature extremes, air currents, and vibrations. It must be set up where the effects of these factors are minimized.

#### B. Safety

1. Follow Material Safety Data Sheet precautions for chemicals used.

### PROCEDURE

#### A. Start-up

1. Level the balance by adjusting the leveling feet so that the air bubble is centered within the circle of the level indicator.
2. If the balance has been connected to a power source for at least 2 hours, it is ready for operation. If it is disconnected from a power source, reconnect it and allow it to warm up for at least 2 hours.
3. When the balance is in the "STANDBY" mode, press the ON/OFF button on the tare bar to activate the display and perform an automatic test of the circuitry. A "0.00000 g" weight display indicates successful completion of the test.
4. The balance has two weight ranges: 0-42 and 0-205 g. The 0-42 g range gives weights to five decimal places. The 0-205 g range gives weights to four decimal places. Push the "42 g/205 g" button on the key pad to select the desired weight range.

#### B. Calibration

1. External calibration (resets the internal calibration value). The balance must be externally calibrated every time it is moved to a new location, or as required by SOP No. GEN 013.
  - a. External calibration of the balance requires an accurate calibration weight of 100 g. National Institute of Standards and Technology (NIST) Class S standard weights or American Society

of Testing Materials (ASTM) Class 2 standard weights can be used for external balance calibration.

- b. Press the tare key on the balance for at least 3 seconds until the calibration weight appears in the display (100.0000 g).
  - c. Place the calibration weight in the center of the pan. The weight symbol “g” should appear and a short acoustic signal indicates the end of the calibration.
2. Internal calibration (calibrates the balance using the saved external calibration setting). The balance must be internally calibrated on each day it will be used and after the balance is bumped, jarred, maintenance has been performed, or room temperature has changed by  $\pm 5^{\circ}\text{C}$ .
    - a. Tare the empty balance. As soon as the display shows a zero readout, press the CAL key. A “C” will appear in the display.
    - b. The display will change to “CC” followed by a zero readout after a short wait. A beep indicates a successful calibration.
  3. If the display continues to show “CC” (internal calibration) or if g does not appear (external calibration), refer to the Calibration section of the Sartorius R200D Operation Manual to correct the problem.
  4. Calibration verification (verifies the precision of the internal calibration)
    - a. Press the tare sensor “t” to zero the balance.
    - b. Place a test weight from a set of Class 2 calibration weights in the center of the weigh pan.

**Note:** NIST Class S standard weights can be substituted for any ASTM Class 2 standard weights mentioned in this SOP.

- c. The reading on the scale must correspond to the weight of the standard within the accepted tolerance interval stated in the Instrument Use, Calibration, and Maintenance Log (Form AEH 214.4a).
- d. If any standard is outside the accepted tolerance interval, repeat internal calibration (step B.2) and then repeat the calibration verification.
- e. If the instrument still fails the calibration verification, the balance needs to be externally calibrated (step B.1) and then repeat the calibration verification.
- f. If the instrument is still not in calibration, discontinue use and tag the balance with a label marked “INOPERABLE,” the date, and the operator's initials. Report the problem to the Study Director immediately and contact the proper service personnel. Describe the problem as well as any action taken in the Instrument Use, Calibration, and Maintenance Log (Form AEH 214.4a).

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C. Routine Operation

1. Non-tared weighing

- a. Press tare sensor “t” to zero balance.
- b. Place sample on balance and read weight after stability indicator “g” is illuminated.

2. Tared weighing

- a. Place weigh container on balance pan and press sensor “t” to zero balance.
- b. Place sample in container and read net weight directly.

D. Record Keeping (recording calibrations)

1. Record results of all calibrations in the Instrument Use, Calibration, and Maintenance Log (Form AEH 214.4a).
2. Items to be recorded in the log include the date of calibration, weight set serial number, weights reported by the instrument for the Class 2 weights, initials of the operator, and any maintenance performed.

**MAINTENANCE**

A. Routine

1. After each use, clean weigh pan of the balance and the balance table area by wiping with a lint-free tissue dampened with methanol.

B. Service Agreements (see SOP No. GEN 013)

1. A record of service on the instrument, name of service representative, the service company, and the date of service must be recorded in the Instrument Use, Calibration, and Maintenance Log (Form AEH 214.4a).

C. Malfunction/Repairs (see Calibration section, step B.3)

1. Describe the problem and any action taken in the Instrument Use, Calibration, and Maintenance Log (Form AEH 214.4a).

D. Record Keeping

1. Record in the Instrument Use, Calibration, and Maintenance Log (Form AEH 214.4a) the description and part number of instrument parts that are replaced.

ORIGINAL

JAN 13 2008

SOP No. AEH 214.4  
Page 4 of 5

REFERENCE

- A. Sartorius Research R200D, R180D-\*F1 Operations Manual. Sartorius Instruments, 1430 Waukegan Road, PO Box 770, McGraw Park, Illinois 60085-6787.

REVIEWED BY: David M. Kennedy  
Quality Assurance Officer

DATE: 29 July 08

APPROVED BY: [Signature]  
Branch Chief, Aquatic Ecosystem Health

DATE: 30 JUL 08

