

Standard Operating Procedure

SOP018

Title: Use and Maintenance of Analytical Weighing Balances

Location: CBE Laboratories

1. PURPOSE

This procedure describes the requirements for the use; maintenance and calibration of the Analytical weighing balances.

2. SCOPE

This SOP describes the operation, calibration and maintenance of the following weighing balances located in the CBE and T208b Wolfson School.:

- i) APX-100 Denver Balance (up to 100g) (H34)
- ii) PK-401 Denver Balance (up to 400g) (H22)
- iii) Balance adventurer Pro, Ohaus (T208b)
- iv) Balance Ohaus (T208b)
- v) Ohaus Balance (H29)
- vi) Mettler Toledo Analytical Balance (H34)
- vii) Mettler Toledo AT261 Delta range analytical balance (H34)
- viii) Arlyn Balance x 2 (CTMF)
- ix) Ohaus Balance (CTMF)

3. REFERENCES

- 1. Operating Instructions Manuals. Please refer to these for specific display and key functions.
- 3. SOP004; General Laboratory Housekeeping.

4. SPECIAL NOTES – HEALTH & SAFETY

- The AC adaptor on the balances must be protected from contact with liquids.
- Operators should ensure they are familiar with the COSHH assessment for the substance being weighed and associated spill handling procedures.
- Operators must also be familiar with the risk assessment for the process being conducted.

5. RESPONSIBILITIES

- (i) Operators are responsible for cleaning the balances after use.
- (ii) Operators are responsible for correct use of the balances and safe use of associated reagents.

- (iii) Operators are responsible for ensuring they have calibrated the weighing balances prior to each use depending on accuracy required. Regular calibration is required for good laboratory

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practice.

- (iv) The lab manager/ responsible person is responsible for ensuring the correct maintenance of the equipment as well as adequate personnel training.

6. EQUIPMENT AND MATERIALS

- (i) APX-100 Model: Weighs up to 100g, reads to 0.1 mg accuracy with linearity of +/-0.2 mg (Manufacturer claims). It is used to measure the weight of general reagents from 10 mg up to 100 g requiring stated accuracy (Maximum error at minimum 10 mg weight is 1%).
- (ii) PK-401 Model: Weighs up to 400 g, reads to 100 mg accuracy with repeatability within 100 mg (Manufacturer claims). It is used to measure the weight of general reagents from 10 g up to 400 g requiring stated accuracy (maximum error at minimum 10 g weight is 1%).
- (iii) Balance adventurer Pro, Ohaus (T208b)
- (iv) Balance Ohaus (T208b)
- (v) Ohaus Balance (H29)
- (vi) Mettler Toledo Analytical Balance (H34)
- (vii) Mettler Toledo AT261 Delta range analytical balance (H34)
- (viii) Certified weights - 100g (EZ), Serial No: G0608504. Certified by DKD – Calibration Laboratory (Tolerance = +/- 0.15 mg) - 200g (M2), Tolerance = +/- 1.0 mg, Denver, Meets or exceeds the Standards of the American Society of Testing and Materials.

7. PROCEDURE

7.1 General Rules

These are general guidelines for the analytical balances. Please refer to individual operators manuals for more details.

- Avoid lengthy exposure to extreme heat or cold. The balances work best when operated within the temperature limits listed in the specifications (see Operator Manual).

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- Allow at least 30 minutes to warm up before starting the weighing operation or calibration to give internal components sufficient time to stabilise.
- Keep the operating environment as clean as possible. Electrostatic fields, dust, dirt, moisture, vibration, air currents and proximity to other electronic equipment can have an adverse effect on reliability and accuracy of the units. If the balance has enclosed sides ensure these are closed.
- Handle with care. Gently apply all items to be weighed in the centre of the pan. Avoid rough treatment as this may permanently damage the internal sensors.
- Calibration of the weighing scales should be done before each use depending on accuracy required. However, the balances should be calibrated on a regular basis for good laboratory practice.

7.2. Installation of Analytical Balances

When it has been moved or disconnected from the power supply the installation procedure detailed in the Operating Manual must be followed.

7.3. Operating the Analytical Balances

- (i) Press I/O to switch the balance on. Switch the balance on half an hour before use to allow it to warm up to room temperature.
- (ii) Refer to individual operator manuals for display and keypad functions.

NOTE: If the balance has been moved or disconnected from AC power (the only way to turn power completely off is by disconnecting the AC adaptor from the balance), it must be calibrated before weighing.

NOTE: Ensure that the balance is level - this is accomplished using the adjustable feet and in-built spirit level. The balance must be calibrated before use after levelling.

- (iii) A brief self-test is performed, followed by “—” shown on the display, indicating that the balance is being zeroed.
- (iv) Place a container (weighing boat) on the weighing pan (the balance registers the weight of the container).
- (v) Press the ZERO key.
- (vi) The display shows “—” to indicate the balance is being zeroed.
- (vii) The balance read out shows 0.0000 grams (or other selected weight unit) after successful taring.

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- (viii) The balance is now ready for use. Use spatula to carefully place material to be weighed into weighing boat.
- (ix) When the read out is stable, the balance displays the unit of measurement (see operating manual to toggle and select the desired weight unit).
- (x) After use, clean the balance with a soft brush. If required, clean the balance pans using a damp towel after each use. Allow the balance to dry before next use. **NOTE:** Balances are inspected and cleaned during scheduled lab cleaning sessions (SOP004).

7.4. Calibration/Adjustment of the balance.

Calibration of the balance should be performed after it has been (1) disconnected from the power, (2) leveled, (3) moved to a new location, (4) subject to extreme change in temperature (5) periodically for good laboratory practice or (6) each time the balance is used if accuracy is paramount to work.

NOTE: Calibration can be performed only when there is no weight on the balance, the balance is tared and the internal signal is stable. If any of these conditions are not met, an error message is displayed on the screen. The weight for calibration or adjustment is prompted on the display.

NOTE: Refer to individual operators manuals for display and key functions.

General procedure:

- (i) Press I/O to switch the balance on. Switch the balance on half an hour before use to allow it to warm up to room temperature.
- (ii) A brief self-test is performed, followed by “—“on the display, indicating that the balance is being zeroed.
- (iii) Remove all items from the pan and press the ZERO key to tare the balance.
- (iv) Press and hold the PRINT/MENU or CAL MODE key for three seconds or until “Unit” is displayed.
- (v) Press the PRINT/MENU or CAL MODE key again; “CAL” is displayed.
- (vi) Press the arrow key to activate the calibration mode.
- (vii) Choose required calibration weight for the balance.
- (viii) Place the prompted calibration weight on the pan.
- (ix) Wait for the balance to perform the calibration. When the readout has stabilised a beep-tone is emitted, the “—“ sign flashes on the display and the readout returns to the display of the

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calibration weight. Correct calibration weight value will disappear for one second then reappear as an active weight value.

- (x) The balance is now calibrated and ready to use.
- (xi) Remove the calibration weight and press the TARE button to reset the zero point.
- (xii) **NOTE: If the calibration weight value remains in the LCD display, an improper calibration weight has been used. Remove the improper weight and repeat the calibration procedure with the correct weight**
- (xiii) If the LCD display does not show correct weight report to the laboratory manager.

7.5 Care and Maintenance Procedures

7.5.1 Troubleshooting

Refer to operator instruction manual.

7.5.2 Servicing/Repair

- (i) Should the balances require repair or servicing, they must be decontaminated and certificate of decontamination provided. Refer to Section 8.1 for template.
- (ii) All balances should be serviced or repaired by qualified factory-trained personnel only. NOTE: the units contain no serviceable parts. All replacement parts should be obtained from the manufacturer. Refer to Operator Manual for contact numbers.
- (v) Upon return to the laboratory, the units should be examined to ensure there is no damage following transport.
- (vi) All calibration/service certificates should be retained in the specified Equipment folder.
- (vii) Prior to use, the balance units should be calibrated.
- (viii) Any maintenance should be recorded on the equipment maintenance record on the door to the respective laboratory.

7.5.3. Cleaning the Equipment

- (i) **CAUTION:** Disconnect the balance AC adaptor from the power source prior to cleaning. Make sure that no liquids enter the balance housing.

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- (ii) Do not use aggressive or abrasive cleaning agents such as cleansers. A mild detergent is recommended.
- (iii) Refer to the Operator Manual for specific instructions on disassembly of the unit.
- (iv) Recalibrate the balance after cleaning.
- (v) Any cleaning should be recorded on the equipment maintenance record on the door to the respective laboratory.

7.6. Equipment Malfunction

- (i) If any part of the equipment fails or malfunctions, the user should contact the Laboratory Manager. With permission of the Lab Manager the user should consult the Operator Instruction Manuals to access fault finding, error displays and troubleshooting procedures.
- (ii) All problems and corrective actions should be recorded in the Equipment Maintenance record located on the door of the respective laboratory.
- (iii) If the equipment fails to work or malfunctions and cannot be rectified according to troubleshooting procedures detailed in the Operator and Users Manuals the Laboratory Manager must be informed and a "Do Not Use" notice should be posted on the equipment. Contact the manufacturer for advice and coordinate with the Lab Manager for external maintenance and servicing.
- (iv) External maintenance and servicing of the equipment can only be performed after it has been suitably disinfected (refer to SOP003 for further details) and a 'Decontamination Certificate' has been issued by the School/Building/Unit Safety Co-ordinator. A generic decontamination certificate is available on the CBE LEARN page under forms.

8. DOCUMENTATION

The following documents are products of this SOP:

- 8.1 Decontamination certificate (QS-Form-009).
- 8.2 Equipment Maintenance Record

All forms will be kept in equipment files.

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SOP Version History

Version Reviewed	Date Revised/ Reviewed	Revision Summary	New Version Number
1.0	14.04.10 M. Win Naing & C. Kavanagh	Annual Review – Minor editorial revisions. New version issue not required.	Not Issued
1.0	23.08.12 K.Sikand	Review - Minor editorial revisions. Change in format to fit the lean SOP template. Will be reviewed in 2 years to fit in with lean SOP system.	2.0
2.0	June 2020 C. Kavanagh	Review to include additional weighing scales.	3.0

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