



Laboratory balance cleaning

5Y ELLIPSIS Series

A vertical digital display with a blue background and white text. It features three product models with their respective icons and specifications:

- 5Y ELLIPSY Ultra Workstation**
Icon: A workstation with a large screen and a mouse.
Specs: 16.1" x 18.1" x 18.1" / 16.1" x 18.1" x 18.1"
- 5Y ELLIPSY Workstation**
Icon: A workstation with a screen and a mouse.
Specs: 16.1" x 18.1" x 18.1" / 16.1" x 18.1" x 18.1"
- 5Y ELLIPSY Precision Workstation**
Icon: A workstation with a screen and a mouse.
Specs: 16.1" x 18.1" x 18.1" / 16.1" x 18.1" x 18.1"

At the bottom of the display, there are navigation icons for back, home, and forward.



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1. Cleaning is easy

Keeping balances and measuring equipment clean is a guarantee of precise and accurate measurements, reliable analyses and user security. It is of paramount importance in the field of pharmacy, biotechnology, chemical and food industries, as well as in any R&D laboratory. It is necessary to keep measuring instruments clean in view of the following quality management system requirements:

- **ISO 9001:2015**, Quality Management Systems – Requirements,
- **ISO 17025**, General Requirements for the Competence of Testing and Calibration Laboratories,
- **HACCP**, Hazard Analysis and Critical Control Points System,
- **ISO 22716**, Cosmetics – Good Manufacturing Practices,
- **21 CFR 58**, Good Laboratory Practice for Nonclinical Laboratory Studies,
- **21 CFR 211**, Current Good Manufacturing Practice for Finished Pharmaceuticals.

It must be noted that balance cleaning activities are not periodical operations but serve as an essential part of the measuring instrument life cycle.

Generally speaking every measuring instrument life cycle is composed of the following processes:

- IQ, OQ, PQ validation RADWAG procedure,
- calibration RADWAG service – calibration laboratory (accreditation no.: AP 069)
- adjustment Automatic/manual with mass standards,
- periodical check RADWAG procedure,
- daily verification Quality management system,
- cleaning RADWAG procedure,
- technical reviews RADWAG service,
- withdrawal from service RADWAG expert opinion.

At every life stage of the measuring instrument (balance), the technical support can be obtained in an authorised RADWAG service centre – through the Export Department or remote assistance that is provided by RADWAG to all product users. Remember that keeping the balance clean minimises the contamination risk during various analyses and limits the balance failure frequency.

The purpose of this publication is to emphasise practical aspects related to:

- methods of cleaning balance components,
- use of suitable cleaning agents,
- verification of correct operation of balances in the aftermath of maintenance works.

Before we get to the point, let's define basic terms related to balance cleaning:

- **STERILISATION** – elimination of microorganisms (vegetative and endospore) with the use of chemicals, steam, temperature and through radiation.
- **DISINFECTION** – elimination of bacteria and fungi (their vegetative forms) and viruses residing on the surface by means of disinfectants, such as chlorine and alcohol. As a rule disinfection is intended for microorganisms that transmit specific diseases.
- **DECONTAMINATION** – limitation of the number of microorganisms (bacteria, viruses and fungi).
- **CLEANING** – removal of all visible pollutants, such as dust, dirt, spilt liquids or food particles through washing, wiping or brushing. Cleaning agents are for example soaps, detergents and degreasers.



2. Methods and chemicals used to clean balances

The scope and method of cleaning depends on two factors:

1. **workplace,**
2. **balance load (large number of weighing cycles).**

Remember that chemicals weighing always entails a risk of the sample part being left on the balance structure. For this reason the balance cleaning procedure must be carefully planned, especially if the substance is highly active and dangerous to the user's health. It applies to pharmaceutical and chemical laboratories as well as R&D centres.

On the other hand you have to protect the user and workplace against biological pollution that may be harmful to the personnel's health. Obviously you must avoid cleaning agents that cause damage to the balance or affect its correct operation.

Please read below for a list of control procedures. You must be sure that the balance is still operational after cleaning.

SUGGESTION

To make sure the balance works properly, you can use mass standards (recommended) or adopt your own internal procedure.

REMEMBER!

Save the verification result as you need to document your actions for safety reasons.



3. Methods of cleaning laboratory balances

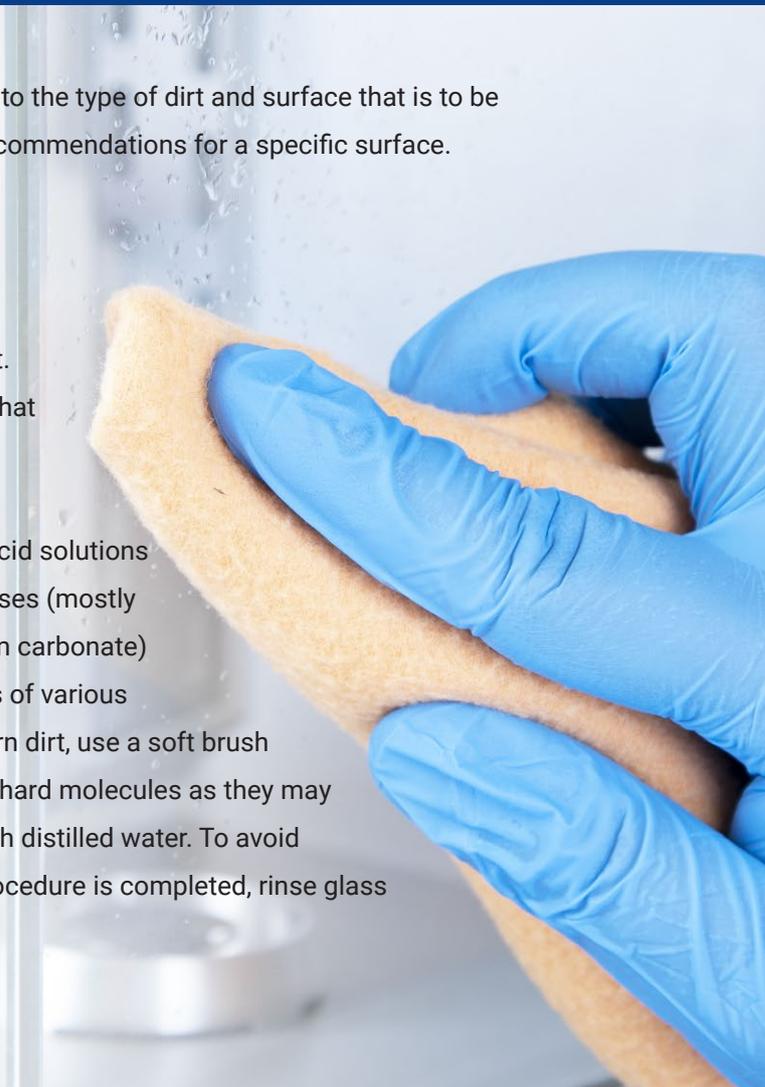
The method and cleaning agents must be adapted to the type of dirt and surface that is to be cleaned. Before using the cleaning agent, check recommendations for a specific surface.

3.1. Glass cleaning

Choose a solvent that is suitable for the type of dirt.

Do not immerse glass in strong alkaline solutions that may damage it. For organic remains, use acetone in the first place, and then water and detergent.

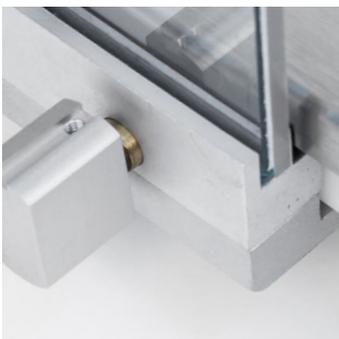
With respect to non-organic residues, use diluted acid solutions (soluble hydrochloric acid or nitric acid salts) or bases (mostly sodium or ammonium). Use basic solvents (sodium carbonate) to remove acids, and acidic solvents (mineral acids of various concentration) to remove bases. In case of stubborn dirt, use a soft brush and detergent, but avoid detergents with large and hard molecules as they may scratch the glass. Next carefully rinse the glass with distilled water. To avoid scratching, use soft brushes. Once the cleaning procedure is completed, rinse glass elements with distilled water and let them dry off.



3.2. Powder-coated element cleaning

You have to secure the user and workplace against biological pollutants that may be harmful to the personnel's health. Obviously avoid cleaning agents that cause damage to the balance or affect its correct operation.





3.3. Aluminium cleaning

Please read below for methods of disassembling balances and inspection procedures. You must be sure the balance is operational after cleaning.



3.4. ABS cleaning

Clean the surface with the use of cellulose or cotton cloths moistened with water solution and cleaning agent (soap, dishwashing liquid or window cleaner). After cleaning, dry the surface. Repeat the cleaning procedure if it is necessary. To clean stubborn dirt, such as adhesive, rubber, tar, polyurethane foam residues, etc., you can use special cleaning agents based on aliphatic hydrocarbon mixtures that do not dissolve the material. Regardless of the type of surface, before you use the cleaning agent, carry out the usability test and do not use abrasive products.



3.5. Stainless steel cleaning

Tip: the stainless steel elements in RADWAG balances are usually weighing pans and lower covers of the weighing (drying) chamber. Before cleaning, take them out of the balance. If you fail to dismount them before cleaning, you may damage the balance. In the case of moisture analysers, a weighing pan is a single-use piece that is not subject to cleaning.

NOTE!

Mechanical and chemical damage of the surface in the form of scratches, bending, and discoloration of balance elements, such as covers and housings, usually do not result in wrong operation of balances and moisture analysers. Most of these elements are replaced with brand new models – all you need to do is contact the manufacturer's authorised service centre.

**Type of contamination
of stainless steel**

Cleaning method

Fingerprints

Clean with a spirit or solvent, rinse with pure water and wipe it dry.

Oils, fats and greases

Clean with organic solvents and then warm water with soap or soft detergent. Rinse with pure water and wipe it dry.

Stains and heat tints

Wash with a soft scouring detergent, gently clean, follow the direction of the surface structure. Rinse with pure water and wipe it dry.

Strong discolouration

Gently clean as per the direction of the surface structure. Rinse with pure water and wipe it dry.

Rust traces

Moisten with an oxalic acid solution and leave it for about 15-20 minutes, and then wash with warm water and soap or soft detergent. Rinse with pure water and wipe it dry.

Paints

Wash with a paint solvent and then warm water with soap or soft detergent. Rinse with pure water and wipe it dry.

Surface scratches

Gently polish with unwoven cloth without iron, follow the direction of the surface structure, and then wash with a soft scouring detergent. Rinse with pure water and wipe it dry.

4. Laboratory balance cleaning

4.1. Indispensable equipment:

- A balance operating manual (it will tell you how to disassemble and reassemble moving components of the balance). You can use the manual on a CD supplied or download it from our website (radwag.com, „Customer support“ tab),
- SOP for balance cleaning,
- personal protective equipment, gloves, goggles, apron, etc.,
- chemicals adapted to the scope of operations.

4.2. General principles

1. Unplug the balance.
2. Assure a free access to components that are to be cleaned.
3. Clean the work stand using a microfibre cloth.
4. Plan further balance cleaning steps:
 - a. clean the balance housing. Use a microfibre cloth and soft cleaning agent. Do not spray or spill any liquids straight onto the balance in order not to damage the weighing chamber and other components of the device. To remove powder and dust, use a tissue. Do not try to blow the dust away in order not to transmit contaminants inside or near the balance,
 - b. to remove viscous substances, use a wet microfibre cloth and soft solvent (for example isopropyl alcohol or ethanol with a concentration of 70%). Avoid abrasive materials,
 - c. dismount all moving components of the balance. Moving components of the balance differ, depending on the model. See SOP or manual for more details,
 - d. clean all moving components of the balance. Adapt the cleaning method to the type of dirt that you need to remove. It is not advisable to sterilise moving components of the balance in the autoclave,
 - e. after cleaning, reassemble all components of the balance. Make sure the location of these components is correct (see the manual),
 - f. level the balance and supply it with power. After stabilisation, make sure the device is operating correctly.

5. Balance components

5.1. UYA 5Y ultra-microbalances and MYA 5Y microbalances



Key

1. Outer cover (powder-coated steel)
2. Chamber cover (glass and antistatic coating)
3. Chamber cover (stainless steel or glass and antistatic coating)
4. Operator's panel (plastic)
5. Weighing chamber elements (aluminium)
6. Weighing pan (aluminium)

1. Disassemble weighing chamber elements, if necessary. The procedure can be found in the balance operating manual.
2. Remove dirt from elements and interior of the weighing chamber.
 - a. gently remove powders and dust using a microfibre, and use a minivacuum cleaner for hard-to-access areas.
 - b. remove other dirt as per guidelines (see point 3).
3. Reassemble structural elements of the weighing chamber.
4. Make sure the balance is operating properly.

5.2. XA 5Y microbalances and analytical balances



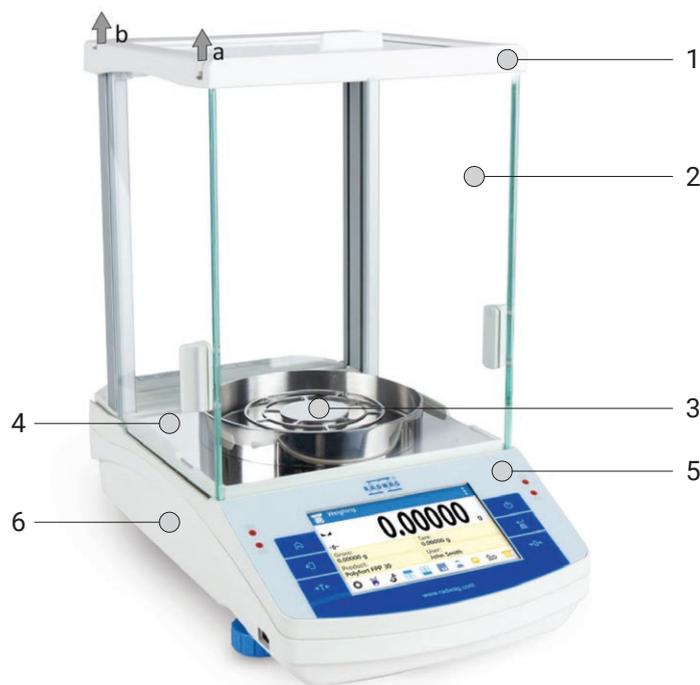
Key

1. Frame (plastic)
2. Weighing pan (stainless steel)
3. Weighing pan cover (aluminium)
4. Operator's panel (plastic)
5. Lower cover of weighing chamber (stainless steel)
6. Balance cover (powder-coated steel)

Depending on the scope of cleaning, follow the guidelines below:

1. Gently remove the weighing pan and then lower cover of the weighing chamber (does not apply to 5Y.A PLUS variant)
 - a. clean elements (see point 3).
2. Glass draft shield washing
 - a. disassemble the weighing pan and its cover,
 - b. unfasten and remove the upper draft shield protection, and then pull out the upper draft shield from guides (fig. 1),
 - c. draw protection back (fig. 2) and pull out side draft shields (applies to 5Y.A variant)
Note: side draft shields are not interchangeable,
 - d. unfasten the upper frame protection and disassemble the upper frame of the cabinet (fig. 3),
 - e. remove the frontal glass draft shield,
 - f. wash elements (see point 3).

5.3. AS X2 and AS R2 analytical balances



Key

1. Frame (plastic)
2. Weighing chamber glass draft shield
3. Weighing pan (stainless steel)
4. Weighing chamber cover (stainless steel)
5. Operator's panel (plastic)
6. Balance housing (plastic)

Depending on the scope of cleaning, follow the guidelines below:

1. Gently remove the weighing pan and then lower cover of the weighing chamber
 - a. clean elements (see point 3).
2. Glass draft shield washing
 - a. disassemble the weighing pan and its cover,
 - b. unfasten and remove the frontal protection of the upper draft shield (a), and then pull out the frontal draft shield,
 - c. unfasten and remove the rear protection of the upper draft shield (b), pull out the upper draft shield and then remove the rear draft shield of the weighing chamber,
 - d. pull out side draft shields forward,
 - e. wash elements (see point 3).

5.4. PS X2, PS R2, PM, WLY, WLC and WTC precise balances



Key

1. Weighing pan (stainless steel)
2. Weighing pan cover (plastic)
3. Operator's panel (plastic)
4. Balance housing (plastic)



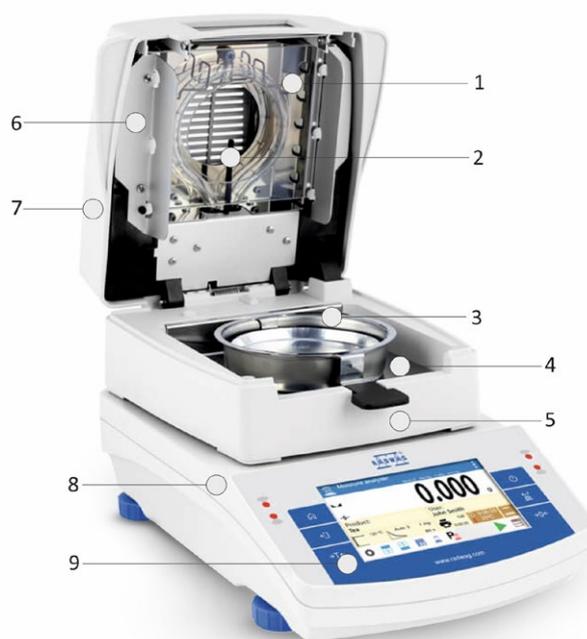
Key

1. Weighing pan
2. Balance housing (plastic)
3. Operator's panel (plastic)

Depending on the scope of cleaning, follow the guidelines below:

1. Gently remove the weighing pan (1) and its cover (2).
2. Remove shock absorbers of the weighing pan.
3. Clean the balance housing and weighing pan (see point 3).

5.5. MA X2 and MA R moisture analysers



Key

- | | |
|---|---|
| 1. IR lamp cover (glass) | 6. Thermal shield of drying chamber (aluminium) |
| 2. Temperature sensor | 7. Drying chamber (plastic) |
| 3. Weighing pan cover (stainless steel) | 8. Balance housing (plastic) |
| 4. Drying chamber cover (stainless steel) | 9. Operator's panel (plastic) |
| 5. Drying chamber (plastic) | |

Depending on the scope of cleaning, follow the guidelines below:

1. Gently remove the single-use weighing pan and lower cover of the weighing pan.
2. Remove the weighing pan bracket and then remove the lower cover of the drying chamber.
3. Clean elements and interior of the drying chamber.

Glass draft shield cleaning (1)

1. Disassemble the aluminium cover (6).
2. Gently pull out the draft shield from holders.
3. Wash the draft shield (see point 3).

6. Questions and recommendations

1. How often should a balance be cleaned?

The frequency of balance cleaning depends on several factors, such as the type of substance weighed (toxic substances), frequency of weighing and records in the quality management system. Generally speaking the balance must be cleaned when the process requires so.

2. How to avoid balance contamination?

A proper preparation of the weighing method and process-related equipment allow limiting the balance contamination and saving some substances weighed. While weighing, it is necessary to use replaceable covers for the operator's panel – this is how you can avoid pollution of essential elements used to control the balance operation. For atypical elements, use dedicated holders that assure stable weighing and prevent the substance from entering the interior of the balance. Once the operation is finished, use the outer fabric covers of the balance.



Outer fabric cover of the balance



Cover of the operator's panel



Dedicated holders for weighing atypical elements

3. How to improve work ergonomics?

In most balances, you can use functions that support weighing, such as checkweighing, dosing and filling. Their operation is supported by a graphic load indicator, checkweighing threshold indicator and filling tolerance indicator. You can activate numerous processes through non-contact infrared sensors (IR sensors) as this is how you can limit contact with the balance. It is important for determining the mass of viscous and semi-fluid substances (paints, lacquers, some pharmaceutical and food products).



A good idea of sending data in places that require sterile working conditions is communication with peripherals via Wi-Fi®. All RADWAG laboratory balances let you communicate with peripherals via Wi-Fi®.

To be able to quickly and precisely measure out the amounts, you are required to prepare a suitable method that you can improve through dedicated holders for flasks and laboratory microvessels. Stable weighing and pipette dosing are keys to success, and therefore assure savings and minimise risk. Thanks to holders, you can dose the sample straight into the container for elimination of sample losses while handling and prevention of spilling them as well as contaminating the balance.



Dedicated holder for flasks and microvessels used in XA 5Y.M.A microbalance

Wi-Fi® is a registered trademark owned by Wi-Fi Alliance®.

7. Verification

After cleaning the balance, check and document correct operation of the device. It is necessary in view of requirements of the quality management systems and safety in the production system.

7.1. Adjustment

Adjustment

The operations that are aimed at making the measuring instrument operate in accordance with its intended use. With regard to electronic balances, this procedure is concerned with correcting the balance sensitivity through comparing the sample weighing result with its reference value. Such comparisons are made in automatic cycles, that is controlled via temperature and time changes, or semi-automatic cycles, that is controlled by the balance operator.

Automatic adjustment

The operations that do not require the intervention of the balance operator and are aimed at establishing relationships between the value displayed by the balance and mass standard (adjustment mass) being the load of the balance and correcting the value, if necessary. The automatic adjustment can be activated as a result of temperature fluctuations or after expiration of a specific time interval.

7.2. Mass standards

You can use mass standards dedicated to your balance and adapted to the scope of weighing you opt for. Mass standards are used to verify, calibrate and check balances, and to calibrate mass standards of lower precision classes.

RADWAG offers a wide range of mass standards in the following classes: E1, E2, F1, F2 and M1. These classes differ in terms of standard design, density, magnetism, manufacture material, surface structure and permissible limiting errors.

All mass standards we offer meet metrology and technical requirements stipulated in the international OIML R 111:2004 recommendation.

7.3. Reporting

Every RADWAG laboratory balance allows you to generate reports and adapt their content to your working system.

With our laboratory balances, you can print reports out in the form of standard and non-standard printouts. Standard printouts are divided into three fully configurable sections: heading, GLP printout and footer. A unique function of designing non-standard printouts lets you generate any printout in which, thanks to changing variables (over 500), you can place any information related to the ongoing process. Using databases, you can create a large number of non-standard printouts that can be easily generated directly through the balance terminal or imported from the pendrive from text files (.txt).

Thanks to such interfaces as RS 232, USB, Wi-Fi® and Ethernet, RADWAG balances cooperate with numerous printers, including the ones that support PCL protocol/language.

7.4. Check

RADWAG laboratory balances are supplied with an 'audit certificate'.

The aforesaid document informs you about inspection procedures, that is repeatability, non-centricity, sensitivity and linearity tests as well as short description of each of them.

Thanks to information provided in the document, it is easy to adopt these procedures for further device tests in your company and additionally compare own test results with the ones recorded at the manufacturer's.

Besides we provide comprehensive technical support supplied with calibration, validation and qualification services.

