

Description of the Weighing profiles for the Cubis® MCA Balance

This document describes how the weighing behavior and functionality in weighing can be individually adapted for a wide variety of weighing tasks with your application. Examples are given to illustrate how to set up and use the balance in practice.



Executive Summary

The Cubis® MCA Premium laboratory balance allows you to create a profile with specific weighing characteristics and functions for each weighing task in the laboratory. Together with comprehensive functions for reliable weighing, this guarantees reliable weighing results.

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1 Weighing characteristics and weighing function

For each task i.e., the weighing task with its special application, the necessary weighing characteristics and the required weighing functionality is defined through a weighing profile.

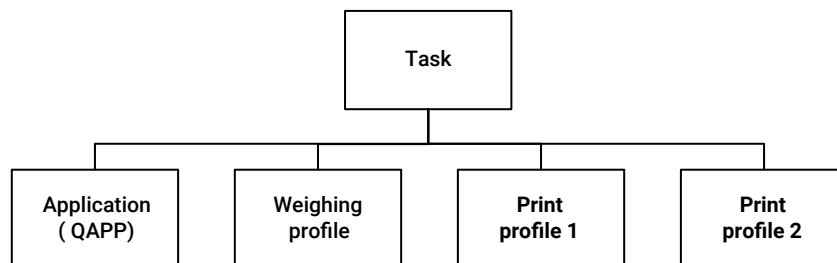


Figure 1: Weighing profile, component of a task

Upon starting the respective task, the settings for weighing stored in the weighing profile are loaded and activated correspondingly for the weighing task and application.

Along with the specific settings for the task through the weighing profile, there are also general settings for the weighing in the device settings.

2 Weighing profiles for the tasks

2.1 Specified weighing profiles

Various weighing profiles have been factory set for the balance. The weighing profiles can be modified, deleted, or newly created. Once the weighing profiles have been set up, they can be used for various tasks.

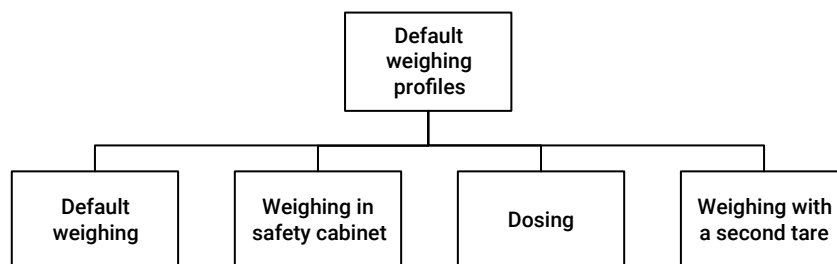


Figure 2: Specified weighing profiles

The [Default weighing] weighing profile is used for the factory-set [Weighing] and [Internal adjustment] tasks.

For the newly created tasks, these specified weighing profiles can be selected directly, or else new weighing profiles must be created beforehand in accordance with the requirement.

2.2 Settings in the weighing profiles

The settings for the balance are divided in three groups. The first group defines the weighing behavior depending upon the installation site of the balance and the application. The second group determines the functionality of the zeroing and taring functions for weighing. And the third group defines the available units and resolutions which can be set for weighing at the start of the application.

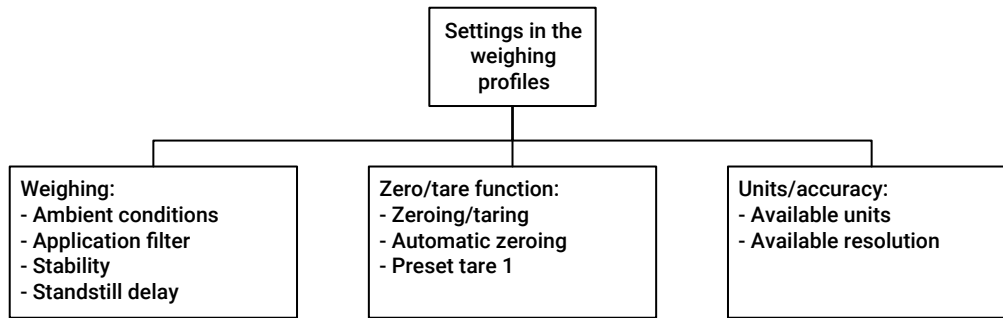


Figure 3: Settings in the weighing profiles

Depending upon the national legislation, not all settings and functions can be selected for conformity-evaluated (calibrated) balances.

Each weighing profile has a unique profile name and also a profile description, making the profile easier to recognize and use for the necessary tasks.

2.2.1 Ambient conditions

For adjusting the balance to different environmental conditions, such as building unrest, vibrations and, to a lesser extent, also movements of air.

The settling time of the balance, the standstill determination and the display or output rate of the weight values are adjusted to increasingly difficult conditions.

Settings for the ambient conditions are:

- **Very stable:** Ideal conditions, (weighing mode 1: weak filter, fast output). Very stable table near the wall, closed and calm room, no drafts. Fastest tracking of weight values during load changes with high output rate. Display sequence e.g., 20 times per second. The display sequence can also be lower in case of high-resolution balances.
- **Stable:** Normal laboratory conditions, (weighing mode 2: normal filter, default setting). Stable table, low movement in the room, less draft. Quick succession of weighing values. Display sequence e.g., 10 times per second.
- **Unstable:** E.g.: Production / less safe conditions, (weighing mode 3: strong filter, slower output). Simple office desk, room with moving machinery or personnel, slight drafts. Delayed succession of the weighed values with reduced output rate e.g., 5 times per second.
- **Very unstable:** Noticeable and slow underground vibrations, (weighing mode 4: very strong filter, very slow output). Noticeable building fluctuations / moving sample, very strong air movements. Very delayed succession of weighed values and long wait for standstill with further reduced output rate e.g., 2.5 times per second.

2.2.2 Application filter

For customizing the filters to the type of weighing or application.

- **Weighing (final readout):** Static weighing / checkweighing, (default setting). Activates a filter that enables a fast change in the display for very fast load changes. Display changes with only minimal load changes (in the digit range) occur more slowly.
- **Dosing (filling mode):** Filling of vessels / dosing. Activates a filter that enables a very fast display succession with minimal load changes, e.g., when dosing or filling vessels).
- **Sensor mode low filter:** Activates a weak but fast filter that always behaves in the same way for load changes (e.g., when dosing automated systems). Filter option depends on balance dataset.
- **Dynamic mode without filter:** Deactivates the active application filter. The filtering is reduced to a minimum. Filter option depends on balance dataset.

2.2.3 Stability

Standstill sets the criterion, starting from which the weighed value is to be displayed again as stable after a change. The unit of the weighed value is the icon for standstill. The unit is displayed as soon as the weighed value is constant within a defined range.

- Very high accuracy: Highest criterion for stability and for display of standstill.
- High accuracy: High criterion for standstill.
- Medium accuracy: Normal criterion for standstill (default setting).
- Fast: Criterion for stability is low, the standstill is displayed fast.
- Very fast: Criterion even lower, the standstill comes very fast.
- Maximum fast: Criterion the lowest, the standstill comes maximum fast.

2.2.4 Stability delay

In addition to the standstill criterion, the display of standstill can also be customized by a delay. This setting, for instance, lets you compensate for slowly abating disturbances.

- Very short: Very short delay, standstill is also displayed very soon after reaching the standstill criterion.
- Short: Short delay for normal conditions (default setting).
- Medium: Medium delay e.g., for bridging turbulences in the weighing room, which (in case of analysis balances) are caused by the door closing.
- Long: Long delay, for longer lasting disturbances and more unrest.

2.2.5 Zeroing / taring

This setting defines the behavior of the zeroing and taring function.

- Without stability: The function of the [Zeroing] or [Taring] button is executed immediately when the button is pressed; there is no check for standstill.
- After stability: The function of the [Zeroing] or [Taring] button is only executed only after standstill is reached. The function can be aborted in the case no standstill is reached. (Default setting)
- At stability: The function of the [Zeroing] or [Taring] button is executed only when the button is pressed when standstill is present; otherwise, there is no function.

Depending upon the national legislation, not all settings can be selected for conformity-evaluated (calibrated) balances.

2.2.6 Automatic zeroing

Enable or disable automatic zero setting of the balance. If the function is activated, the display is automatically kept at the value zero, if the deviation from zero is less than e.g., one digit. If the function is deactivated, the zero setting of the display must be done with the button. The default setting is set to switched [On].

2.2.7 Second tare memory / Preset tare 1

A second tare memory can be activated in addition to the tare function. Not just the weighed values can be taken over in this tare memory; instead, the value of the tare weight can also be entered as [Preset tare 1]. This memory can also be deleted by using the button. The default setting is [Off] for this function.

2.2.8 Available units

This defines which unit(s) should be available in the task and can be set at the beginning of the application.

The units [Milligr.] and [Grams] or [Grams] and [Kilogr.] are set by default.

Starting from the base unit [Grams], the conversion into the other unit is carried out via the factor; a decimal point shift and a scale interval ensure that the resolution in this unit is not greater than that in the base unit.

Unit	Factor	Display
Milligrams	1000,0	mg
Grams	1,0	g
Kilograms	0,001	kg
Carats	5,0	ct
Pounds	0.00220462262184878	lb

Ounces	0.0352739619495804	oz
Troy ounces	0,032150747	ozt
Hong Kong tael	0,02671725	tlh
Singapore tael	0,02645544638	tls
Taiwanese tael	0,02666666	tlt
Chinese tael	0,02645547175	tlc
Grains	15,43235835	GN
Pennyweights	0,643014931	dwt
Momme	0.2666666666666667	mom
Tola	0,0857333381	tol
Baht	0.06578947436	bat
Mesghal	0,217	MS
Newton	0,00980665	N

The units that can be selected here depend upon the model of the balance (load range) and upon the national legislation in case of conformity-evaluated (calibrated) balances.

2.2.9 Available resolutions

For the application in the task, the resolution(s) to be available for the weighing can be defined here and can be set in the beginning.

- All digits on: All decimal places are always shown in the display. (Default setting)
- Last digit off at load change: The last decimal place on the display is switched off after a load change until standstill is achieved.
- Last digit scale interval 1: The last decimal place always shows the 1st division. In other units this may result in a reduction of one display position.
- Last digit off: The last digit in the display is generally switched off.

Depending upon the national legislation, not all resolutions can be selected for conformity-evaluated (calibrated) balances.

2.3 Overview of settings in the specified weighing profiles

Weighing profile/ Default settings	Default weighing	Weighing in safety cabinet	Dosing	Weighing with a second tare
Ambient conditions	Stable	Unstable	Stable	Stable
Application filter	Weighing (final readout)	Weighing (final readout)	Dosing (filling mode)	Weighing (final readout)
Stability	Medium accuracy	High accuracy	Medium accuracy	Medium accuracy
Stability delay	Short	Medium	Short	Short
Zeroing / taring	After stability	After stability	After stability	After stability
Autom. zeroing	On	On	On	On
Preset tare 1	Off	Off	Off	On
Available units	(mg), g, (kg)	(mg), g, (kg)	(mg), g, (kg)	(mg), g, (kg)
Available resolutions	All digits on	All digits on	All digits on	All digits on

The differences from the profile [Default weighing] are highlighted in bold. Depending upon the model, the specified units are [mg] and [g] or [g] and [mg].

3 General settings for the weighing

3.1 Safe Weighing

3.1.1 isoCAL execution mode

The isoCAL function is a fully automatic internal adjustment function of the balance, which is carried out after certain time intervals or temperature changes, as well as after a successful leveling.

The execution mode of the isoCAL function can be set depending upon the requirement.

- **Off:** The isoCAL function is deactivated. Depending upon the national legislation, this setting is not possible in conformity-evaluated (calibrated) balances or else the balance may only be operated in a restricted temperature range.
- **Display status field, manual start:** The flashing [isoCAL] button displays the adjustment request based on time, temperature or leveling. The isoCAL function must be started manually by using this button.
- **On, automatic execution:** The isoCAL function is started automatically if the adjustment request based on time, temperature or leveling is present and specific preconditions are fulfilled. (Default setting)

Following are the prerequisites for an automatic execution of isoCAL:

- The balance is loaded with less than 2 % of the maximum load (Max).
- The balance has not been used for more than 2 minutes, i.e., there has been no load change and no operation of the balance.

The automatic execution is announced with a message. If the balance is used during this time, then there is no execution and the prerequisites are checked again.

The function can also be started manually by using the flashing [isoCAL] button.

The time intervals and temperature changes to the last adjustment, which lead to resolution of isoCAL, depend upon the model.

Series: Cubis®	isoCAL temperature range	isoCAL time criterion	Accuracy class	Number of steps that can be calibrated
Models	[K]	[h]		
MCx524S *1 MCx524P *1 MCx5203S *1 MCx5203P *1 MCx14202S MCx14202P MCx10202S	1.5	6	1	
MCx2.7S MCx10.6S MCx6.6S MCx3.6P MCx225S MCx225P MCx125S MCx125P MCx324S MCx324P MCx224S MCx124S MCx3203S MCx2203S MCx2203P MCx1203S	1.5	12	1	
MCx5202S	2	12	1	
MCx623S MCx623P MCx323S MCx8202S MCx6202S MCx6202P MCx4202S MCx2202S MCx1202S MCx32202P *3 MCx70201S MCx50201S MCx70200	2	12	2	> 40000 *2
MCx12201S MCx8201S MCx5201S MCx36201S MCx36201P MCx20201S MCx11201S MCx36200S	4	12	2	< 40000

*1 isoCAL cannot be switched off.

*2 Some models also < 40000. (Caused by higher-level module device.)

*3 Not as calibrated model.

3.1.2 isoCAL limit rule

The limit rule determines the threshold for warning the user about deviations in calibration/adjustment. It can refer to an established guideline or a user-defined limit. The warning can be dismissed if the deviation is considered to be acceptable.

- European Pharmacopoeia (Ph.Eur.): Use a warning limit of 0.05 %.
- USP: Use a warning limit of 0.10 %.
- User-defined warning limit: Use the user-defined warning limit configured below.

3.1.3 Enforced user calibration

As an electronic measuring instrument, the balance must also be tested and calibrated using test weights for use in quality-relevant processes. To ensure that the balance has been calibrated by the user before use, the following modes can be selected:

- Off: no check
- Daily: checks if user calibration has been executed the same day
- Weekly: checks whether a user calibration has been performed in the last seven days
- Monthly: checks whether a user calibration was performed in the same month

Before starting a task, the scale checks whether a user calibration has been carried out according to the selected time setting. User calibration can only be carried out with the QAPP "User Calibration" from the "Pharma" package. Please make sure that the QAPP is licensed and available as a task. If user calibration is required, a message appears when the task is started.

3.1.4 Safety level

The safety level determines how the message for leveling or executing isoCAL should be handled. For conformity-rated (calibrated) balances, the safety level is automatically at the highest level and cannot be reduced using these settings.

- Off: The message for leveling or executing isoCAL is not considered at the start of the task. The execution of the Leveling or isoCAL function can be triggered manually via the respective button in the display.
- Warning: If a message for leveling or executing isoCAL is present at the start of the task, a jump is made automatically to the respective execution of the function. The message remains intact in the event of an abort. The execution of the Leveling or isoCAL function can be triggered manually via the respective button in the display. (Default setting)
- Strict: If a message for leveling or executing isoCAL is present at the start of the task, a jump is made automatically to the respective execution of the function. Upon aborting the function, the task is not started; the function for the message must be executed. If a message appears while executing the task, the weighed value is marked as invalid. The takeover of this weighed value is blocked automatically. The weighed value can be taken over again only when the function for message has been executed.

3.2 Preload

Technical equipment that should be permanently on the balance, such as a density determination set, can thus be taken into account, enabling calibration and adjustment functions, such as isoCAL, despite the presence of a load.

This function is blocked in conformity-rated (calibrated) balances.

3.2.1 Set preload

The load present on the balance is set as a preload and thus taken into account for the zero point of the balance. The weighing range is reduced by the set preload.

3.2.2 Delete preload

Deletes the set preload; it is then no longer considered. The zero point and weighing range are again as they were before the preload was set.

3.3 Minimum weight

The minimum weight function extension for monitoring the permissible working range can only be used after it has been activated via the QAPP Center.

It is a QAPP from the [Pharma] package and can be used free of charge for 30 days, after which a license must be purchased.

3.3.1 minUSP function extension

This minUSP function extension monitors compliance of the permitted working range as per US Pharmacopeia (USP) Section 41 and alerts the user when weighing values fall below the working range.

The minUSP function can be activated/deactivated in the Settings menu under Device Settings.

The starting point of the working range must be entered as the parameter in line with US Pharmacopeia (USP) Section 41. To calculate the valid starting point, you can either use QAPP USP Advanced or contact Sartorius Service.

The minUSP function is also able to mark measuring values outside the working range as invalid, thus preventing impermissible values from being transferred.

The minUSP function can also be used to monitor working ranges in line with other regulations by calculating and entering the starting point accordingly.

3.3.2 Pharma QAPP: USP Advanced

The USP Advanced application determines the value for the starting point of the permitted working range according to US Pharmacopeia (USP), Chapter 41. The procedure starts with the repeatability test where 10 weight values of the same weight are measured and the balance is zeroed/tared automatically between the measurements. The second test segment is the accuracy test, which uses an OIML or ASTM weight or a calibrated weight to acquire one weight value.

The USP Advanced application calculates the standard deviation, minimum operating range (ORmin), maximum operating range (ORmax) and determines if the result of the repeatability and accuracy test meets the requirements of USP Chapter 41.

3.4 Measurement uncertainty

The dynamic display of the uncertainty of measurement in relation to the weight value is a function extension that must first be activated by the QAPP Center.

It can be used free of charge for 30 days before a license has to be acquired.

3.4.1 Dynamic display of the measurement uncertainty function extension

The function extension offers a direct calculation and display of the measurement uncertainty for a weighed value based on the guideline EURAMET cg-18 according to the data documented by Sartorius in the calibration certificate. The activation is done in the Settings menu in the Device settings sub-menu with the values given in the calibration certificate.

The display of the uncertainty can optionally be done as relative value (U), absolute value (U*) or as process accuracy (PA).

If the function is activated, the measurement uncertainty is displayed in the Weighing screen dynamically to the actual weighing value and can, in addition, be documented in printouts.

Details about the background and calculation can be taken from a separate white paper.

3.5 Start-up behavior

3.5.1 Initial zeroing / taring

Automatic zeroing or taring after the balance is switched on can be switched on or off independent of the weighing profiles in the device settings under the power-on behavior in the [Initial zeroing/taring] menu item.

4 Application Examples

The application examples relate to the MCA version from package 09-03-04.01.xx onwards, along with the settings options and functionalities it contains. Appropriate user rights are required for setting up weighing profiles and tasks.

4.1 Weighing with the available weighing profile

This example describes the setup and application of a weighing task using an existing weighing profile e.g., [Weighing in safety cabinet].

4.1.1 Setting up

Configuration steps:

1. Assign the [Weighing in safety cabinet] weighing profile to your task e.g., [My weighing in safety cabinet].
 - a. Open the [Task management] menu.
 - b. Use the [+] button to activate the creation of a new task.
 - c. Select the [Weighing] application.
 - d. If necessary, specify the number of identifiers for the lot (batch) and the samples. Everything else is described in the application examples for printing.
 - e. Select the [Weighing in safety cabinet] weighing profile and then select a suitable print profile for your application.
 - f. Thereafter, enter the name and description of the task, select user roles and save the task.

Note: In the same way, further weighing tasks can be created with the preset [Dosing] or [2nd tare memory] weighing profiles.

4.1.2 Application

User steps:

1. Start the task e.g., [My weighing in safety cabinet] with the assigned [Weighing in safety cabinet] weighing profile.
2. If you have selected identifiers for the batch, these must now be entered or scanned.
3. The [Weighing] application is then activated with the settings defined in the weighing profile and thus with adapted weighing behavior.

4.2 Weighing with new weighing profile

This example describes how to set up a new weighing profile e.g., by using more units, and how to apply it in a new [Weighing with the units g, ct, lb] task.

4.2.1 Setting up

Configuration steps:

1. Configure a weighing profile, for example, [Weighing with the units g, ct, lb].
 - a. Open the [Settings] menu.
 - b. Navigate to [Weighing and print profiles] -> [Weighing].
 - c. Use the [+] button to activate the creation of a new weighing profile.
 - d. The settings for the weighing behavior by installation site and application are displayed. If these settings match your application, you can go over to the next group. Otherwise, select the required settings for your installation site and application.
 - e. The next group contains the zeroing and taring function. Switch to the next group if the predefined functions are suitable for your application, otherwise select the required function.
 - f. Next, the available units and resolutions are displayed.
 - g. Open the selection of available units and select the units you want to have available in your application, e.g. the unit g, ct, and lb. Depending upon the model and national legislation, not all units can be selected for conformity-rated (calibrated) balances.
 - h. Open the selection of available resolutions and select the resolutions you want to have available in your application. Depending upon the national legislation, not all resolutions can be selected for conformity-evaluated (calibrated) balances.
 - i. Next, assign a unique name and description to the weighing profile. This is important if you wish to use this profile for other applications.
2. Assign the [Weighing with units g, ct, lb] weighing profile to your task e.g., [My weighing with the units g, ct, lb].
 - a. Open the [Task management] menu.
 - b. Use the [+] button to activate the creation of a new task.
 - c. Select the [Weighing] application.
 - d. If necessary, specify the number of identifiers for the lot (batch) and the samples. Everything else is described in the application examples for printing.
 - e. Select the [Weighing with units g, ct, lb] weighing profile and then select a suitable print profile for your application.
 - f. Thereafter, enter the name and description of the task, select user roles and save the task.

Note: In the same way, additional weighing profiles can be created with specific settings, which can then be used for

new or existing tasks.

4.2.2 Application

User steps:

1. For example, start the task [My weighing with the unit g, ct, lb] with the weighing profile [Weighing with the unit g, ct, lb] assigned to it.
2. If you have selected identifiers for the batch, these must now be entered or scanned.
3. The [Weighing] application is then activated with the settings defined in the weighing profile for the weighing behavior.
4. Press the button with the displayed unit, the released units and resolutions are displayed in a list.
5. Select the unit and resolution you want to work with in the application.