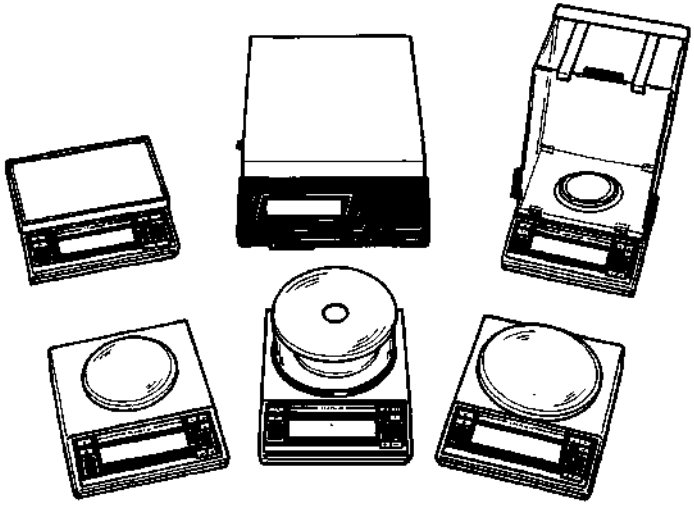
98648-004-03

6600-96-05

Sartorius Master Series

Electronic Weighing Instruments
Accuracy Class (I) or (II)
Analytical and Precision Balances

Installation and Operating Instructions
for Standard Models
and EC-Approved Models Acceptable
for Legal Metrological Verification



sartorius

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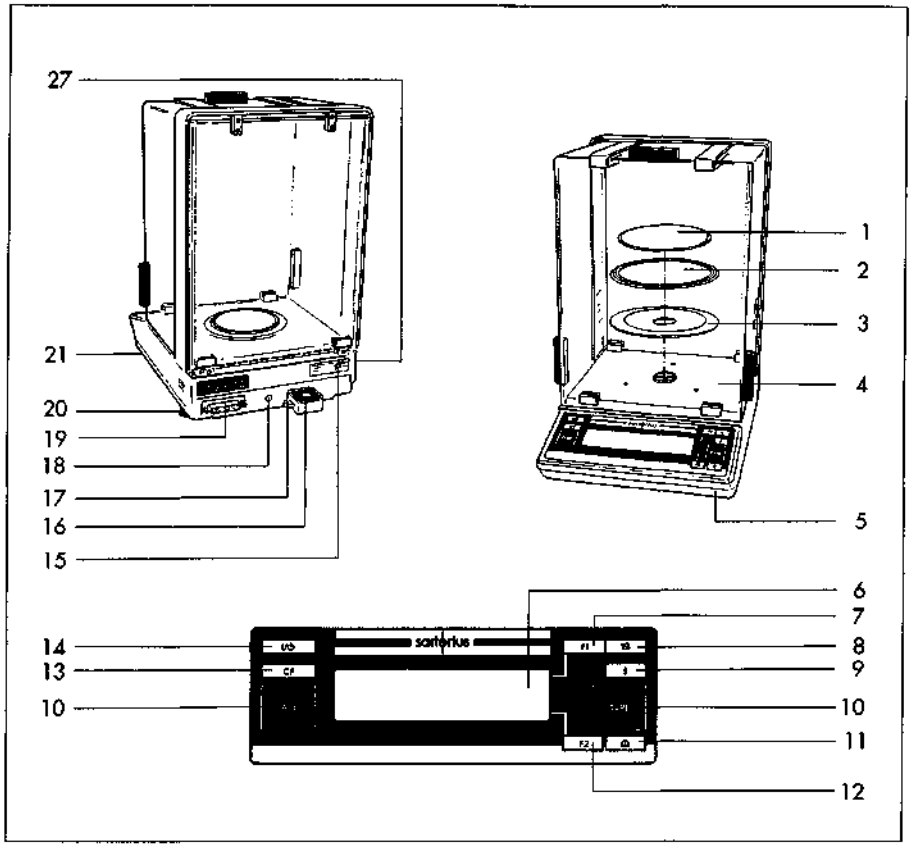
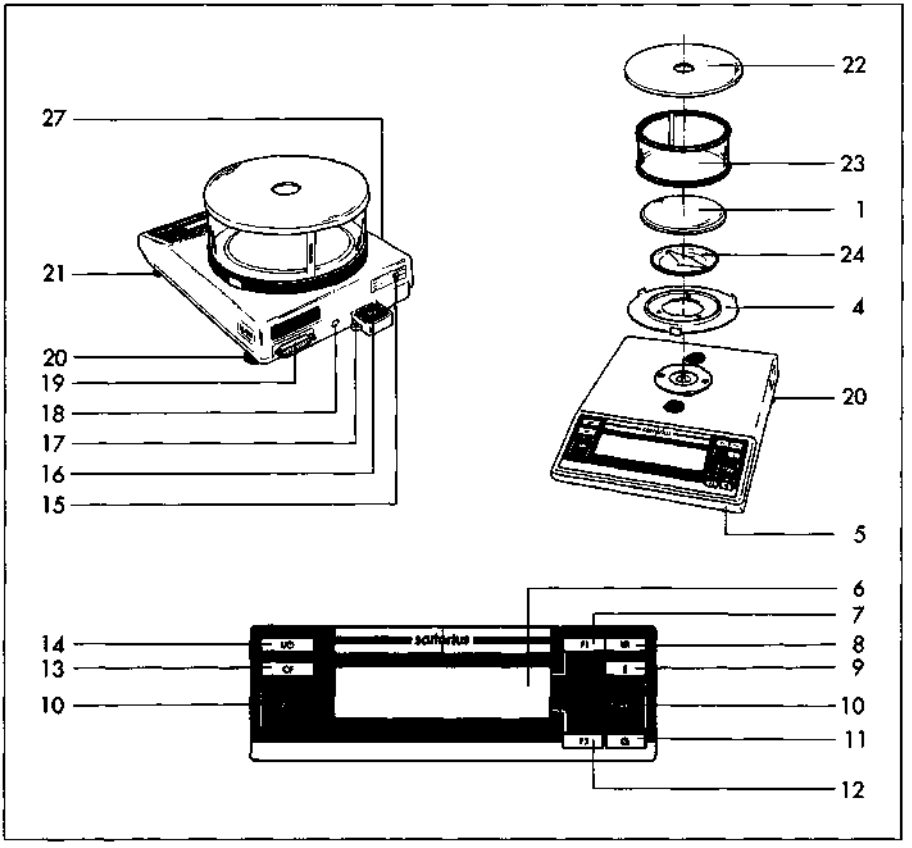
Supplement:
Brief Instructions

AC Series Balances with an Analytical Draft Shield Chamber



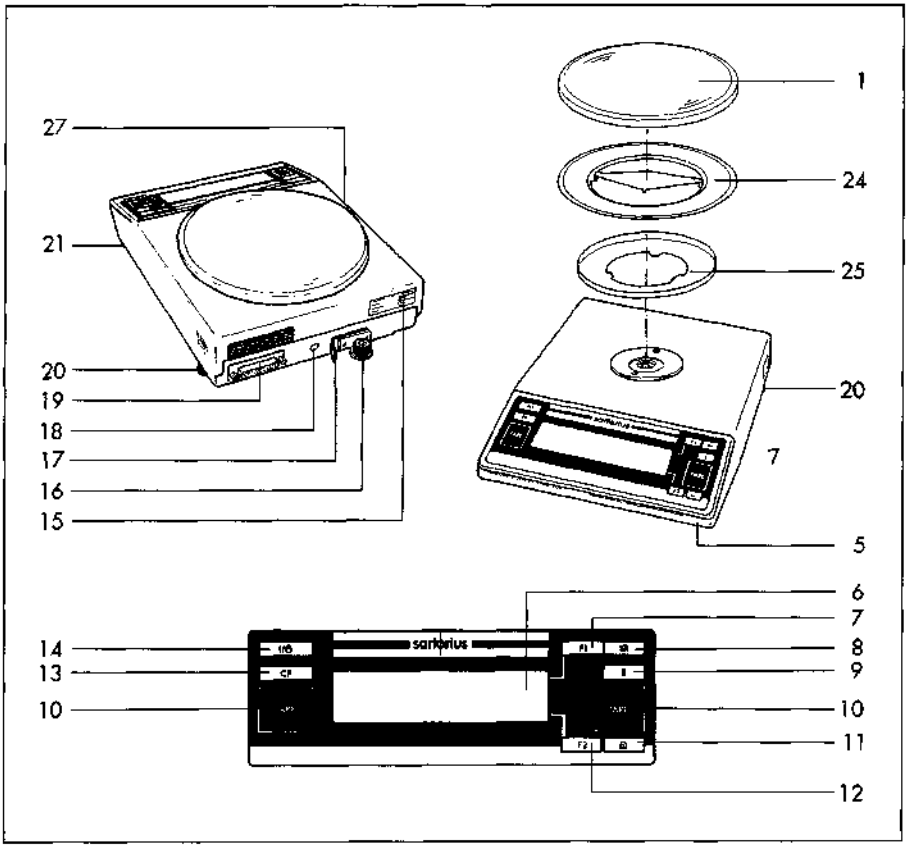
1 Weighing pan
2 Protective ring
3 Shield plate
4 Draft shield base plate
5 Menu access switch
6 Weight display
7 F1 function key
8 ⇆ toggle key
9 Info key
10 Tare key
11 Print key
12 F2 function key
13 CF key
14 ON/OFF key
15 Manufacturer's label
16 Level indicator
17 Lug for attaching an antitheft locking device
18 AC jack/power receptacle
19 Data interface port
20 Leveling foot
21 Auxiliary foot
27 Metrological ID label (only for models acceptable for legal metrological verification)

LC Series Balances with a Round Glass Draft Shield



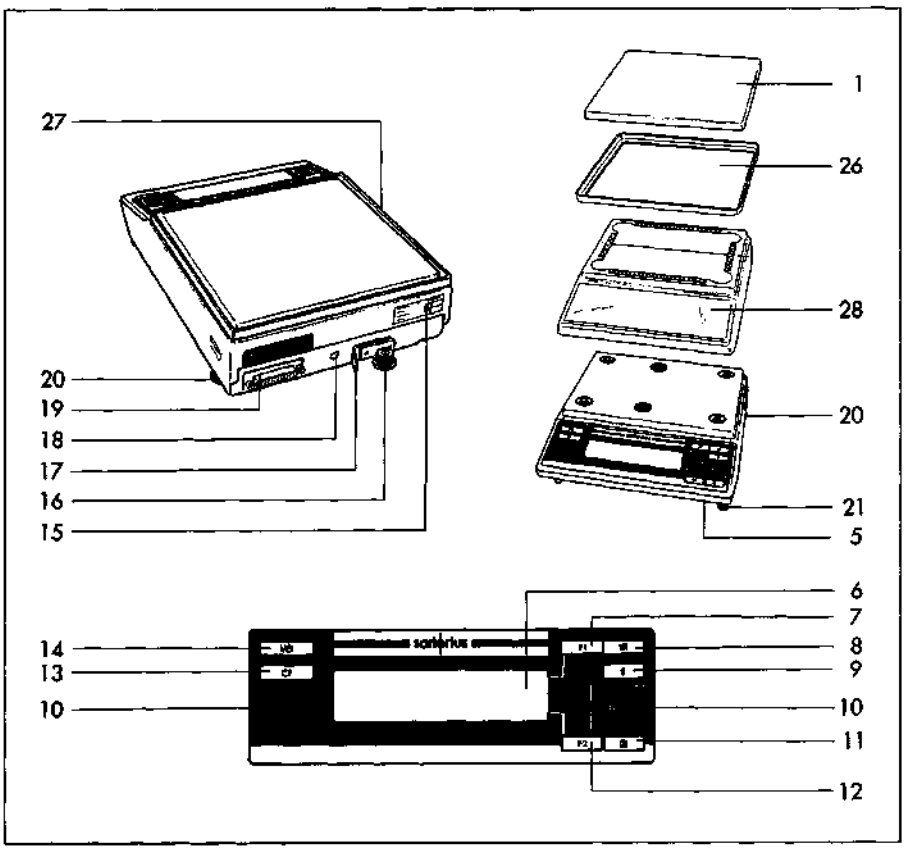
1 Weighing pan
4 Draft shield base plate
5 Menu access switch
6 Weight display
7 F1 function key
8 [S] toggle key
9 Info key
10 Tare key
11 Print key
12 F2 function key
13 CF key
14 ON/OFF key
15 Manufacturer's label
16 Level indicator
17 Lug for attaching an antitheft locking device
18 AC jack/power receptacle
19 Data interface port
20 Leveling foot
21 Auxiliary foot
22 Draft shield lid
23 Glass draft shield cylinder
24 Pan support disk
27 Metrological ID label (only for models acceptable for legal metrological verification)

LC Series Balances with a Round Pan/GC 1201-G



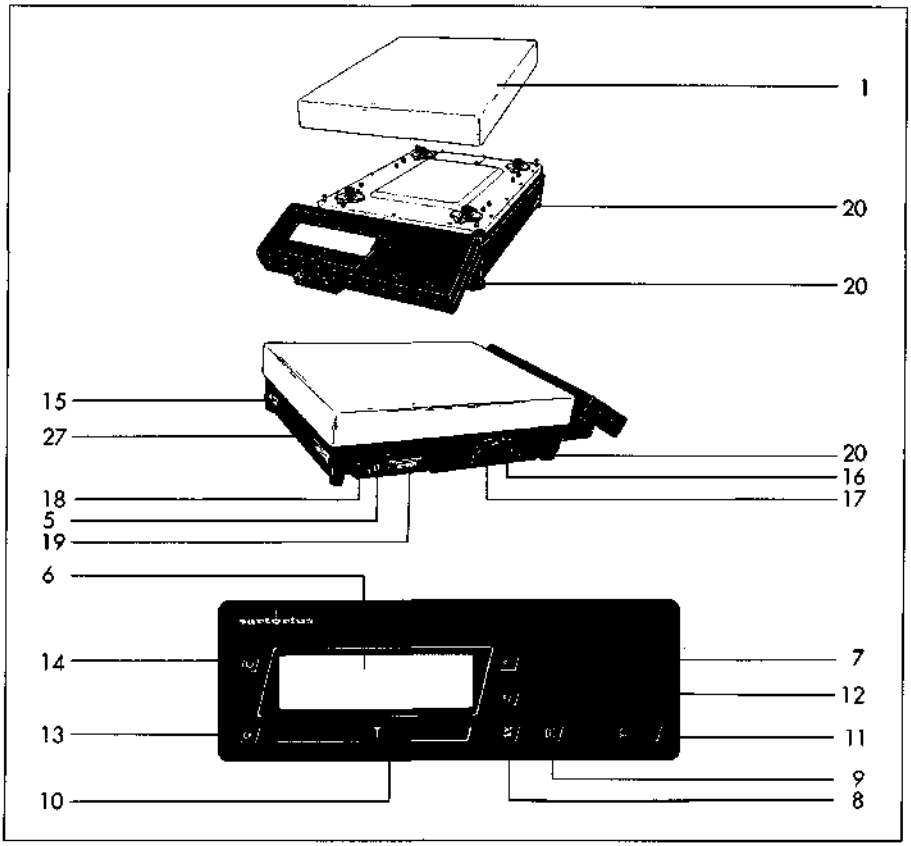
1 Weighing pan
5 Menu access switch
6 Weight display
7 F1 function key
8 ⇆ toggle key
9 Info key
10 Tare key
11 Print key
12 F2 function key
13 CF key
14 ON/OFF key
15 Manufacturer's label
16 Level indicator
17 Lug for attaching an antitheft locking device
18 AC jack/power receptacle
19 Data interface port
20 Leveling foot
21 Auxiliary foot
24 Pan support disk
25 Centering disk
27 Metrological ID label (only for models acceptable for legal metrological verification)

LC Series Balances with a Rectangular Pan and a Capacity Less Than 12 kg



1 Weighing pan
5 Menu access switch
6 Weight display
7 F1 function key
8 ⇆ toggle key
9 Info key
10 Tare key
11 Print key
12 F2 function key
13 CF key
14 ON/OFF key
15 Manufacturer's label
16 Level indicator
17 Lug for attaching an antitheft locking device
18 AC jack/power receptacle
19 Data interface port
20 Leveling foot
21 Auxiliary foot
26 Pan draft shield (metal frame, depending on the model)
27 Metrological ID label (only for models acceptable for legal metrological verification)
28 Dust cover

LC Series Balances with a Capacity Greater Than 12 kg



1 Weighing pan
5 Menu access switch
6 Weight display
7 F1 function key
8 ▣ toggle key
9 Info key
10 Tare key (labeled "TARE" on balance models acceptable for verification)
11 Print key
12 F2 function key
13 CF key
14 ON/OFF key
15 Manufacturer's label
16 Level indicator
17 Lug for attaching an antitheft locking device
18 AC jack/power receptacle
19 Data interface port
20 Leveling foot
27 Metrological ID label (only for models acceptable for legal metrological verification)

With this Sartorius balance, you have acquired a high-quality electronic weighing instrument that will ease your daily workload.

Please read through these installation and operating instructions carefully before operating your new balance.

In the first part of these installation and operating instructions, it is assumed that you are using the factory-set menu codes.

Warranty

Do not miss out on the benefits of our full warranty. Please complete the warranty registration card, indicating the date of installation, and return the card to your Sartorius office or dealer.

Storage and Shipping Conditions

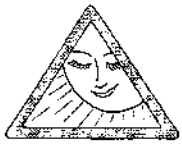
Allowable storage temperature:
+5 °C ... +40 °C
+41 °F ...+104 °F

The packaging has been designed to ensure that the balance will not get damaged even if it is dropped from a height of 80 cm max. (about 32 inches).

Carefully unpack the balance and check the equipment immediately for any visible damage as a result of rough handling during shipment. If this is the case, proceed as directed in the section entitled "Safety Inspection."

Save the box and all parts of the packaging in case you need to ship your balance. For shipping your balance, disconnect all cables before packing. Use only the complete original standard packaging to prevent damage to the equipment during shipment.

Do not expose the balance unnecessarily to extreme temperatures, moisture, shocks, blows or vibrations.



Ambient Conditions

Your Sartorius balance will provide accurate readouts even when it is exposed to unfavorable conditions.

Please choose a suitable place to set up your balance. It should not be exposed to the following:

– extreme heat radiation

– drafts

– extreme vibrations

– aggressive chemical atmospheres

The balance may not be used in hazardous areas/locations where there is danger of explosion.

Do not expose the balance to extreme moisture over long periods. Moisture in the air can condense on the surfaces of a cold balance whenever it is brought to a substantially warmer place. If you transfer the balance to a warmer area, make sure to condition it for about 2 hours at room temperature, leaving it unplugged. Afterwards, if you keep the balance connected to AC power, the continuous positive difference in temperature between the inside of the balance and the outside will practically rule out the effects of moisture condensation.

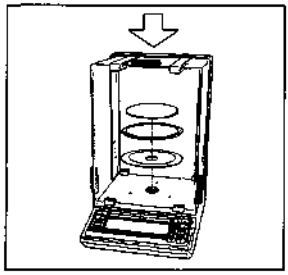
You can adapt the balance to your requirements simply by changing the code settings in the balance operating menu. For more information, please see Part 2, "Balance Operating Menu."

Use of EC-Approved Balances/Scales Acceptable for Verification as Legal Measuring Instruments in Europe

A Sartorius balance/scale of this type may not be used for direct selling to the public or as a legal measuring instrument (legal for trade) until it has been verified* by Sartorius or inspected and stamp approved by a weights and measures office.

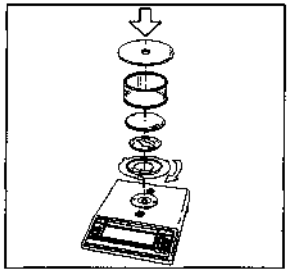
For balances/scales of accuracy class (I), suitable thermometers and barometers are recommended for monitoring the ambient conditions.

* = Legal metrological verification, or verification for short, is also commonly known as "stamp approval" in the U.K.. Initial verification involves checking, for the first time, the metrological specifications of a balance/scale for compliance with the corresponding requirements. If found to be compliant, the balance/scale is then stamped with a verification mark or label.



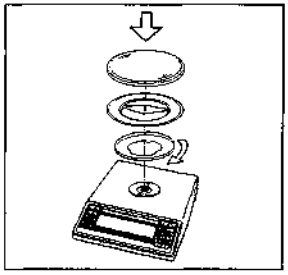
Preparing the AC Series Balance

In the following order, install the draft shield base plate **(4)**, the shield plate **(3)**, the protective ring **(2)** and the weighing pan **(1)** one at a time in the weighing chamber.



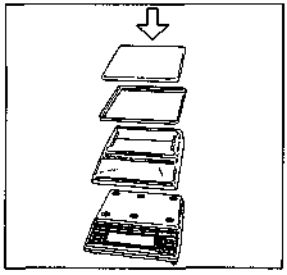
Preparing the LC Series Balance with a Round Glass Draft Shield

Place the draft shield base plate **(4)** on the balance. Turn the plate clockwise until it snaps into place (this procedure is necessary for preparing the balance for operation with or without a dust cover). Mount the pan support disk **(24)**, the weighing pan **(1)**, the glass draft shield cylinder **(23)** and the draft shield lid **(22)** one at a time on the balance.



Preparing the LC Series Balance with a Round Weighing Pan/GC 1201-G

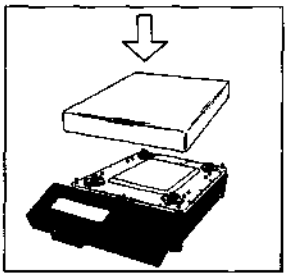
Place the centering disk **(25)** on the balance. Turn the disk clockwise until it snaps into place (this procedure is necessary for preparing the balance for operation with or without a dust cover). Then mount the pan support disk **(24)** and the weighing pan **(1)** one at a time on the balance in the order given.



Preparing the LC Series Balance with a Rectangular Pan and a Capacity Less Than 12 kg

Remove the white backing from the adhesive strips on the dust cover. Attach the dust cover to the base of the balance by gently pressing down on the adhesive strips. Place the pan draft shield **(26) (depending on the model)** and the weighing pan **(1)** on the balance.

Important Note:
Double check to make sure that the base dust cover does not touch the weighing pan.



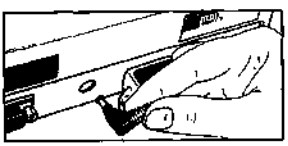
Preparing an LC Series Balance with a Capacity Greater Than 12 kg

Place the weighing pan **(1)** on the balance.

Connecting the Balance to AC Power

The balance is powered by an AC adapter.
Make sure that the voltage rating printed on this unit is identical to that of your local voltage.
If the voltage specified on the label or the plug design of the AC adapter does not match the rating or standard you use, please contact your Sartorius office or dealer.
Use only original Sartorius AC Adapters. Use of AC adapters from other manufacturers, even if these units have an approval identification marking from a national testing laboratory, requires the consent of a certified Sartorius service technician.

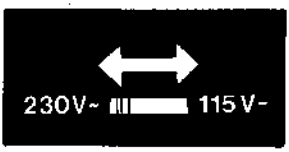
Plug the cord of the AC adapter into the balance. Then insert the plug of the AC adapter in a wall outlet. Follow this procedure for the following balances:



AC and LC series balances with a capacity less than 12 kg

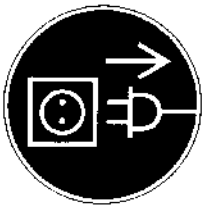
LC series balances with a capacity greater than 12 kg:
Insert the right-angle plug in the power receptacle **(18)** as shown, then tighten the slotted screw with a screwdriver.

Now plug the AC adapter into a wall outlet.



Voltage Selection

(does not apply to balances with a capacity greater than 12 kg)
You can select the voltage only if you use our portable power supply (6971172) that has a European-type plug (rounded prongs).



Connecting Electronic Devices (Peripherals)

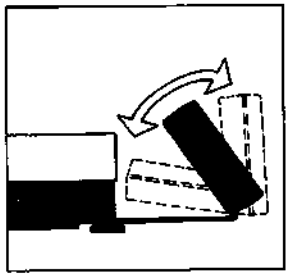
Make sure to unplug the AC adapter from the wall outlet before you connect or disconnect a peripheral device (printer or PC) to or from the interface port of the balance.

Safety Precautions

The AC adapter, rated to Class 2 (double insulation), can be plugged into a wall outlet without taking any additional safety precautions. The pole of the output voltage is connected to the balance housing, which can be grounded for operation.
The interface (see "Interfacing Devices" on page 1–24 in addition) is also electrically connected to the balance housing (ground).

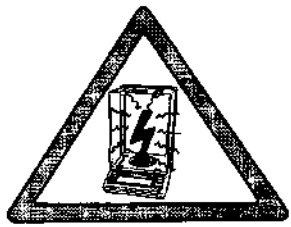
Information on Radio Frequency Interference

Warning!
This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference, when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference.



Adjusting the Display Unit of an LC Series Balance with a Capacity Greater Than 12 kg

Tilt the display unit to adjust it to the position you desire.



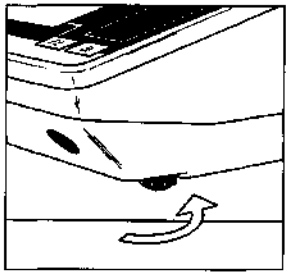
Information on Weighing Electrostatically Charged Samples

Problems with static electricity can occur in environments with low humidity. To avoid these problems when you use your balance in such an area, wipe down the entire draft shield on both the inside and outside with a commercially available antistatic agent.

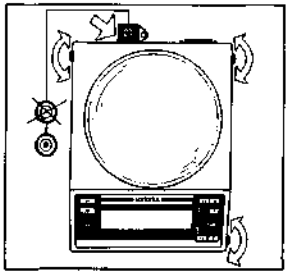
If you need to use electrostatically charged glass or plastic containers that have a relatively large diameter with balances that have a readability of 0.1 mg, you should utilize our antistatic pan (155 mm Ø – see "Accessories" in Part 6) instead of the standard weighing pan.

Leveling the Balance Using the Level Indicator

At the point of use, level the balance using the leveling feet **(20)** as follows so that the air bubble is centered within the circle of the level indicator **(16)**:

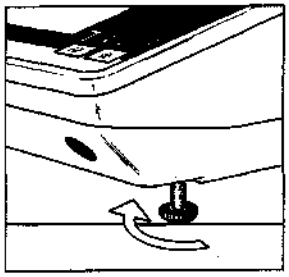


Screw in the auxiliary foot **(21)** located on the front, right-hand side of the balance.

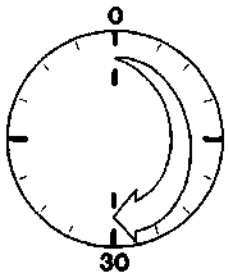


To level the balance using the level indicator as a guide:

Extend the leveling feet (turn clockwise) to lift the balance.
Retract the feet (turn counterclockwise) to lower the balance.



Afterwards, extend the auxiliary foot **(21)** until it touches the surface on which the balance is resting.



Warmup Time
After initially connecting the balance to AC power (or after a relatively long power outage), the balance will need to warm up for at least 30 minutes.

Note to Users of EC-Approved Balances/Scales in Europe

Preparing balances/scales acceptable for verification for initial stamp approval: After initially connecting the balance/scale to AC power (or after a relatively long power outage), **allow for at least 24 hours' warm up** before a Sartorius customer service technician or a local government officer of legal metrology arrives to inspect the balance/scale.

The weight display shows the following special codes for your information:

OFF
The balance was disconnected from AC power (i.e., power failure or outage; the balance was disconntected, then reconnected to AC power).

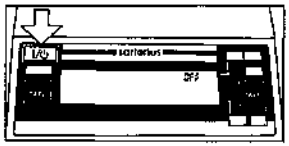
O (STANDBY)
The display has been turned off using the ⏻ key **(14)**, and the balance is now in the ready-to-operate mode and does not require warmup.

◈ (BUSY)
Once you have turned on the balance, the ◈ symbol will remain displayed until you press a key. During operation, this symbol indicates that the balance processor is still busy processing a given function and will not accept another command to perform any other function at this time.

R1 or R2
The number in the R code identifies the particular weighing range you have selected.

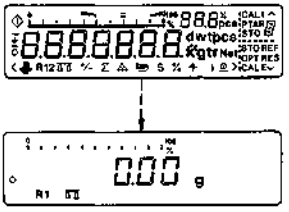
⚖
Symbol for the selected application (in this case, the weighing mode).

CAL!
The balance has an internal calibration weight.



Turning the Display On and Off (Standby Mode)

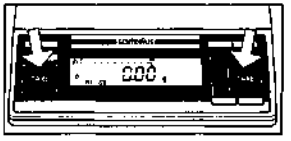
Press the ⏻ key **(14)** to turn the display on and off.



Self-Test

After the balance has been turned on, an automatic self-test of the electronic circuitry will be performed. The self-test ends with a zero readout; the balance is then ready to operate.

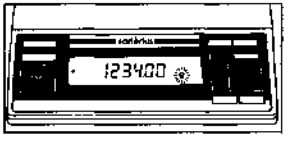
Important Note for Balance/Scale Models Acceptable for Verification in Europe:
On balances/scales that are acceptable for verification and have a verification scale interval (e) which is greater than the number of scale intervals (d) (display increments), the last numeral displayed is identified by hatching.



Taring

A weight can be accurately measured only from a defined zero point. Press one of the two TARE keys **(10)** to zero the display. You can tare the display within the entire weighing range.

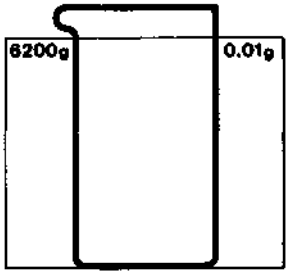
Important Note for Balance/Scale Models Acceptable for Verification in Europe:
The small circle on the left in the weight display shows that the balance/scale has been exactly tared to "0" (±0.25 of a scale interval).



Weighing

Place your sample on the weighing pan **(1)** to determine the weight. Read off the weight indicated in the display **(6)** only once the weight unit/stability symbol ("**g**", "**kg**" or a different unit as selected – see Part 2, "Balance Operating Menu") is indicated.

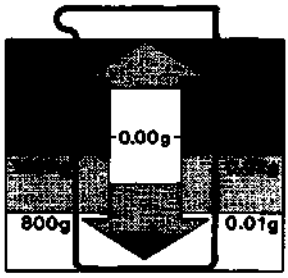
Weighing Range Structure



SuperRange
(identified by S in the model designation AC/LC.....S)

"Single wide-range balance"

SuperRange models have an extraordinarily high resolution; i.e., the weighing range has a resolution ranging from 100,000 to a few million digits. There is one level of fine readability for the entire weighing range (for example: 0.01 g).



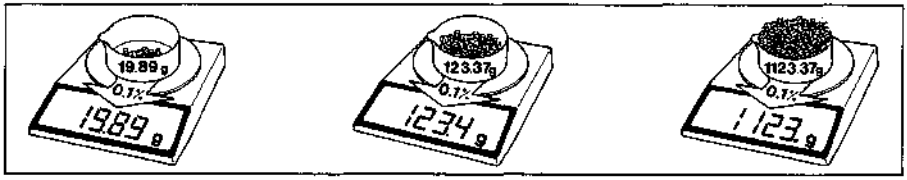
PolyRange
(identified by P in the model designation AC/LC.....P)

PolyRange models have a wide weighing range with multiple levels of accuracy that change as the load increases or decreases.

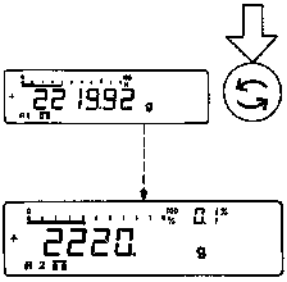
The PolyRange function divides the weighing range into as many as 4 ranges, each with a different readability. In the various ranges, the readability will adjust so that the last numeral of a weight readout is displayed with a resolution of 1, 2, 5 or 10 digits (10 = only the next to the last numeral displayed changes; the last numeral is blanked).
After you press the tare key **(10)**, you will obtain the highest possible resolution, even when the balance is loaded.

Weighing in the IQ-Mode*

(Load-Dependent Readability)



In the IQ-mode, weighing is done with a load-dependent readability of 0.1% (for different settings, see part 2, "Balance Operating Menu") throughout the entire weighing range of the balance. The display resolution of the last digit changes in increments of 1, 2, 5, 10, 20, etc., in proportion to the weight of a sample.



Oftentimes, a display accuracy of 2 grams is sufficient for a load of approx. 2 kg. In this case, it makes sense to select **weighing range R 2 with an accuracy of 0.1% by pressing the ⇆ key (8)**. While you are filling up to a target weight, it is certainly easier to work with a target of 2220 g than with an absolutely accurate readout of 2219.92 g.

By selecting the IQ-mode for automatic adaption of the display accuracy, you will obtain stable weight readouts even faster.
In daily laboratory routines, analyses must often be performed with a certain accuracy. The IQ-mode meets this requirement – on an analytical balance, it gives you the full accuracy of all 4 decimal places for initial sample weights below 1 g, whereas for heavier samples (of 100 g or more), it provides a lower readability, which is sufficient:

Initial sample weight		Readout
Below 1 g	→	0.9876 g
Above 100 g	→	123.4 g

For other readabilities (0.01% – 1%) see page 2–11 of the "Balance Operating Menu."

*** = not on models acceptable for verification; on GC 1201 G scales, menu code 3 2 9 must be set**

Calibration

During calibration, the balance is adapted to changes in ambient conditions.
You should recalibrate your balance each time you set it up in a different area or when the ambient conditions (such as the temperature or the barometric pressure) have changed.

Independent of such changes, you should calibrate balances acceptable for legal metrological verification at least once a day (i.e., even when the ambient conditions remain constant). To meet the highest requirements for accurate weighing, we recommend that you calibrate the balance before each weighing series.

The balance offers you various calibration functions. The function you select is indicated in the display by one of the following codes:

"**CAL**" : calibration function is activated

"**C–i**" : internal calibration

"**C–E**" : external calibration

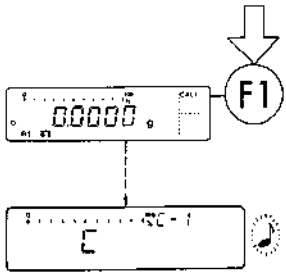
"**C–t**" : sensitivity test

"**CAL i**": the balance has an internal calibration weight

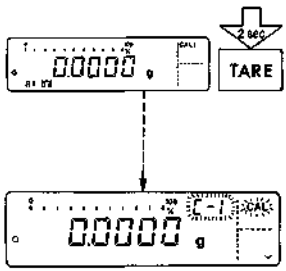
You can use the CF key **(13)** to interrupt any calibration process.

The balance may or may not have an internal calibration weight:
- On standard balances, it depends on the model (see Part 6, "Specifications")
- Balances acceptable for verification generally have an internal calibration weight

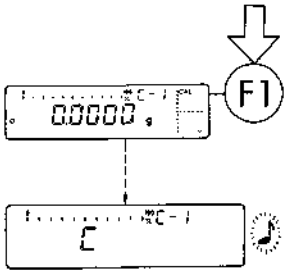
INTERNAL CALIBRATION



Quick-CAL Function Using the F1 Key:
Unload the pan and tare.
Once the display indicates a zero readout, press the F1 key **(7)**.
"C" will now be displayed. The built-in calibration weight is internally applied by servomotor and removed at the end of calibration.
If external interference affects the calibration procedure, you may obtain a brief display of the error message "**Err 02**."
In this case, tare the display; then press the F1 key again once a zero readout is indicated.
An acoustic signal indicates the end of calibration.



Internal Calibration Using the Tare Key:
Calibrate the balance using the tare control if an application program (such as "tare memory") is assigned to the F1 key by menu code in the balance operating menu (see parts 2 and 4).
Press the tare key **(10)** for at least 2 seconds until "**C–t**" and "**CAL**" are displayed (next to the F1 key).



Unload the pan and tare.
Once the display indicates a zero readout, press the F1 key **(7)**.
"C" will now be displayed. The built-in calibration weight is internally applied by servomotor and removed at the end of calibration.
If external interference affects the calibration procedure, you may obtain a brief display of the error message "**Err 02**."
In this case, tare the display; then press the F1 key again once a zero readout is indicated.
An acoustic signal will indicate the end of the calibration process.

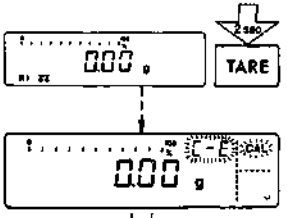
Important Note:
The weighing pan must be left unloaded when using the internal calibration function.

EXTERNAL CALIBRATION*

Use only calibration weights with the same or better accuracy than that of the readability of your particular balance.

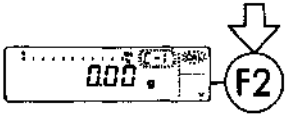
Unlocking the access switch for balance/scale models acceptable for verification:

- on balances with a capacity less than 12 kg, remove the protective cap **(5)** on the front, right-hand side of the unit
- on balances with a capacity greater than 12 kg, remove the large screw **(5)** located on the left-hand side of the rear panel
- move the switch **(5)** in the direction of the arrow



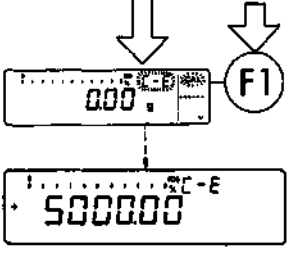
Press the tare key **(10)** for at least 2 seconds until "**C–E**" or "**C–I**" (only for balances with an internal calibration weight) and "**CAL**" are displayed (next to the F1 key).

Important Note:
If you press the F1 key **(7)** while "**C–I**" is displayed, this will activate the internal calibration function.

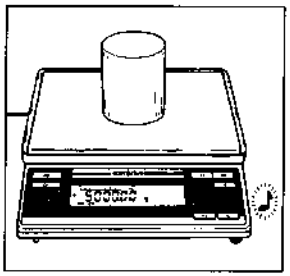


For **external calibration** of balances with an **internal calibration weight**, press the F2 key **(12)**.

"**C–E**" stands for "**external calibration.**"
Unload the balance and tare.
Press the F1 key **(7)** once a zero readout is indicated. Afterwards, the calibration weight readout will be indicated.
If external interference affects the calibration procedure, you may obtain a brief display of the error message "**Err 02.**"
In this case, tare the display; then press the F1 key again once a zero readout is indicated.



* = For accuracy class (II) precision balances/scales acceptable for verification, this function is allowed to be used only if the balance is not being operated as a legal measuring instrument (legal for trade).



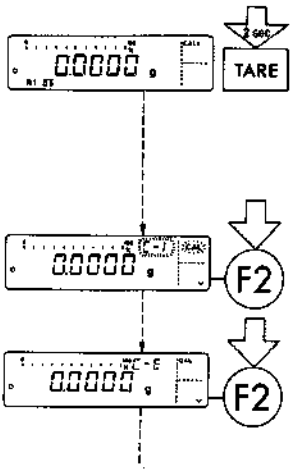
Center the calibration weight on the weighing pan.

An acoustic signal will indicate the end of the calibration process.

Important Note for Accuracy Class (II) Precision Balances/Scales Acceptable for Verification in Europe:
After verification, the "external calibration" function is blocked by the access switch **(5)** (adjusted to the left and secured against alteration of the switch setting).

SENSITIVITY TEST (special function for balances with a built-in calibration weight)*

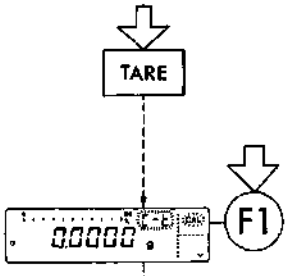
Rather substantial changes in barometric pressure and temperature may affect the display response of these highly accurate balances. To ensure that you obtain the full accuracy of these balances, even when you use the entire weighing range, we have implemented a sensitivity test function. It will help you decide quickly whether or not you need to recalibrate your balance (for example, to maintain the same accuracy during long-term weighing series).



Press the tare key **(10)** for at least 2 seconds until "**C–I**" and "**CAL**" are displayed (next to the F1 key).

Select the **sensitivity test** by pressing the F2 key **(12) twice**.

* = Not on LC balances acceptable for verification



Unload the balance and tare.

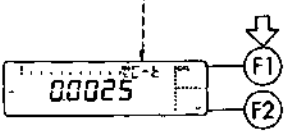
"C–t" stands for **"sensitivity test."**

Once the display indicates a zero readout, press the F1 key (7). The built-in calibration weight will now be internally applied by servomotor. Then the deviation of the current readout from the target weight (displayed in grams only) will be indicated.

If external interference affects the calibration test, you may obtain a brief display of the error message **"Err 02."**
In this case, tare the display; then press the F1 key again once a zero readout is indicated.

Important Note:

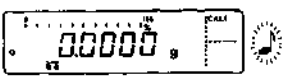
The balance/scale should be calibrated if the deviation of the readout from zero is more than the reproducibility specified for standard balances and more than the verification scale interval specified for balances/scales acceptable for verification. For reproducibilities and verification scale intervals, see the "Specifications" that apply to your balance/scale in Part 6.



F1 **key:** The balance is automatically calibrated by the built-in weight (see also page 1–19).

or

F2 **key:** Quits the sensitivity test



An acoustic signal will indicate the end of the sensitivity test.

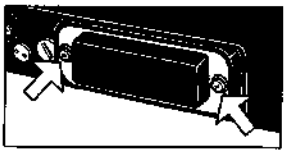
Important Note:

For information on the setting for "Quick-CAL sensitivity test using F1," see Part 2, "Balance Operating Menu."

Data Interface

If you wish to record your weighing results using a Sartorius Data Printer, plug the printer connector into the interface port **(19)** of the balance. You do not need to adjust any settings.

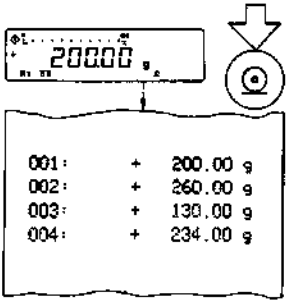
Important Note for Balance/Scale Models Verified for Use as Legal Measuring Instruments:
When using the balance/scale as a legal measuring instrument (legal for trade), you are allowed to connect to it only peripherals authorized by law. However, if you are not using the balance/scale as a legal measuring instrument, you may connect to it any peripherals you wish, e.g., additional displays, personal computer, etc. Such peripherals must be marked to indicate that they are not allowed to be used when the balance/scale is being used as a legal measuring instrument.



Remove the protective cap from the data interface port.

Caution:

Make sure to unplug the AC adapter from the wall outlet before you connect or disconnect any peripherals (printer or PC) to or from the interface port of the balance.



To print data on hard copy or have them output on-screen on an on-line computer, press the ⎙ key **(11)**.

For information on special data output parameters, see "Utilities" in Part 2.

For details on the data interface (such as the data output or input formats, pin assignment, etc.) or on interfacing a remote display, see Part 5, "Interface Description."

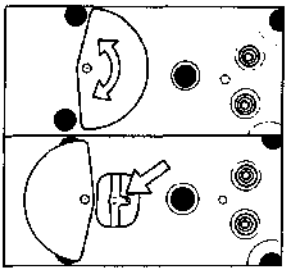
Important Note for Balance/Scale Models Acceptable for Verification in Europe:
Please notify your Sartorius Service Center if you wish to prepare a balance/scale acceptable for verification to be officially stamp-approved for use with an on-line Sartorius Data Printer (e.g., the YDP 02-0CEV2). To have the balance/scale inspected and tested to verify its metrological specifications, please notify your local weights and measures office.

Interfacing Devices with the Balance

Please note that the interface port is electrically connected to the protective grounding conductor of the balance housing. The interface cables supplied as standard equipment are shielded, and both ends of each cable are electrically connected to the connector cases. This connection may result in interference caused by ground loops or by transient currents if you have grounded the housing or connected the protective grounding conductor for line power. If necessary, connect an equipotential bonding conductor to the balance.

Below-Balance Weighing

A port for a below-balance weighing hanger is located on the bottom of the balance (for LC balances with a capacity greater than 12 kg, see "Accessories" in Part 6).



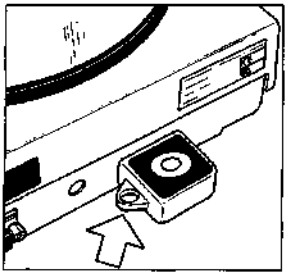
To fasten the hanger, open the below-balance port by turning the cover plate.

Now you can attach a sample to the hook using a suspension wire, for example. Common applications for below-balance weighing include density determination or immersing a sample in a special atmosphere (medium for reaction).

When you use such below-balance weighing hangers, you must install a draft shield (especially on analytical balances).

Important Note for Balances/Scales Acceptable for Verification in Europe:
When a verified balance/scale is being used as a legal measuring instrument, the below-balance weighing port may not be opened.

How to Fasten an Antitheft Locking Device



To fasten an antitheft locking device, use the lug **(17)** on the level indicator case of the balance.

Set up your balance at the point of use, and secure it using a chain or lock.

Troubleshooting Guide

Problem ...	Causes ...	Solution
No segments are indicated in the weight display **(6)**	– No AC power is available – The AC adapter is not plugged in – The balance was disconnected from AC power while in the standby mode "**o**" or turned "**off**" (display backlighting turned off) and was reconnected to AC power <2 minutes later	– Check the AC power supply – Plug in the AC adapter – Press the [I/O] key **(14)**
The display indicates "L"	– The weighing pan **(1)** is not in place	– Position the pan
The display indicates "**H**"	– The load exceeds the capacity of the balance	– Unload the balance
The display briefly indicates "**Err 02**"	– A zero readout was not indicated when the [F1] key **(7)** was pressed to calibrate – The balance is loaded	– Press the tare key **(10)**; then press the [F1] key again – Unload the balance
The special code "**C**" displayed does not go out	– The balance is not ready to calibrate or is in the warmup phase – The weighing system is affected by drafts or vibrations – The draft shield is not closed	– After connecting the balance to AC power via the AC adapter, let the balance warm up for at least 30 min. – Access the menu to select the appropriate code to adapt the balance to the particular weighing environment (see Part 2) – Check the draft shield (place the lid **(22)** on the shield or close the doors of the draft shield chamber)
The weight readout is obviously wrong	– The balance has not been calibrated – The balance was not tared before weighing – The air bubble of the level indicator **(16)** is not centered within the circle	– Calibrate (see pages 1–18 to 1–22) – Tare before weighing – Level the balance (see page 1–13)

Problem ...	Causes ...	Solution
The special code "◈" displayed does not go out	– No keys have been pressed since the balance was turned on	– Press any key
The weight readout changes constantly	– Unstable ambient conditions	– Set up the balance in another area
	– Too much vibration or the balance is exposed to a draft	– Access the menu to select the appropriate code to adapte the balance to the particular weighing environment (see Part 2)
	– A door of the draft shield chamber is not completely closed (only applies to draft shields with sliding doors)	– Make sure that all draft shield doors are closed
	– The round glass draft shield is not in place	– Position the round draft shield
	– The draft shield base plate **(4)** or the centering disk **(25)** is not mounted correctly	– To mount these components, see "Getting Started" on page 1–9
	– The dust cover for balances with a rectangular pan is not attached correctly and is touching the weighing pan	– Press down on the adhesive strips to attach the dust cover
	– A foreign object is caught between the pan and the housing of the balance	– Remove foreign object
	– The cover plate for the port for the below-balance weighing hanger has not been closed	– Turn the cover plate to close the port for below-balance weighing
	– The sample does not have a stable weight (absorbs moisture or evaporates)	

Care and Maintenance

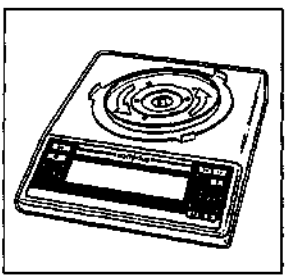
Servicing

Regular servicing by a Sartorius service technician will extend the service life of your balance. Sartorius can offer you service contracts with your choice of regular maintenance intervals ranging from 1 month to 2 years.

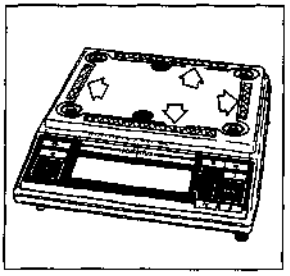
Cleaning

Before cleaning the balance, unplug the AC adapter from the wall outlet.
Please do not use any aggressive cleaning agents (solvents or similar agents). Instead, use a piece of cloth which has been wet with a mild detergent (soap).
If your balance has a round glass draft shield, avoid generating static electricity by wiping and rubbing the glass. After cleaning, decharge the round glass draft shield to eliminate static electricity, for example, by wiping off all surfaces with a damp and grounded piece of cloth.
Make sure that no liquid enters the balance housing. After cleaning, wipe down the balance with a soft, dry piece of cloth.

Changing the Dust Cover for LC Series Balances



If the dust cover is dirty, change it as follows:
– for round weighing pans (with or without a round glass draft shield)
Remove the following parts from the balance:
– Draft shield lid **(22)**
– Glass cylinder **(23)**
– Weighing pan **(1)**
– Pan support disk **(24)**
Turn the centering disk **(25)** or the draft shield base plate **(4)** until it snaps out of place and lift it off.
Then exchange the old dust cover for the new one.
Place the centering disk or the draft shield base plate on the balance. Turn the disk or plate clockwise until it snaps into place.



– for rectangular weighing pans with a capacity <12 kg
Remove the following parts from the balance:
– Weighing pan **(1)**
– Pan draft shield **(26)** (depending on the model)
Detach the dust cover by peeling it off at the adhesive strips. Remove all traces of adhesive.
Then remove the white backing from the adhesive strips on the new dust cover. Attach the dust cover by gently pressing down on the adhesive strips.

Safety Inspection
If there is any indication that safe operation of the balance with the AC adapter is no longer warranted, turn off the power and disconnect the equipment from AC power immediately. Lock the equipment in a secure place to ensure that it cannot be used for the time being.

Safe operation of the balance with the AC adapter is no longer ensured when
– there is visible damage to the AC adapter
– the AC adapter no longer functions properly
– the AC adapter has been stored for relatively long periods under unfavorable conditions.

In this case, notify your nearest Sartorius Service Center or the International Technical Support Department based in Goettingen, Germany. Only service technicians who are authorized by Sartorius and have access to the required maintenance manuals are allowed to perform maintenance and repairwork on the equipment.
We recommend that the AC adapter be regularly inspected by a qualified Sartorius service technician according to the following checklist:
– Insulation resistance >7 megohms measured with a constant voltage of at least 500 V at a 500 kohm load
– Equivalent leakage current <0.05 mA measured by a properly calibrated multimeter

The electrical and electronic components used in the balance are rated to at least Class KSF according to DIN 40040.

sartorius

Manufacturer's Declaration

Electronic Balances and Scales (Series):	AC.....-....	BA.....-.....	BP.....-.....	C.....-.....
	CM.....-.....	F.....-....	GA.....-.....	GC.....-.....
	I.....-.....	IC.....-.....	L.....-.....	LC.....-....
	MC.....-.....	PMA.....-.....	PT.....-....	QS.....-....
	RC.....-.....	S.....-.....	TS.....-.....	XX.....-.....
Remote Displays:	737101A	737102A		
Data Printers:	YDP01PT	YDP02-0DV1	YDP02-0CEV2	YDP02-0CEV3
Rechargeable Batteries:	YRB01PT YRB04Z	YRB01Z YRB05Z	YRB02Z	YRB03Z
T-Connector:	7258			
Foot, Hand Switches:	YPE01RC	YPE01Z	7226	7252

Pursuant to the European Directive 73/23/EEC, particularly to Article 10, we declare that the above listed equipment is manufactured and tested in accordance with the following European Standards in force at the date of manufacturing.

Standards:

EN 60742	Isolating transformers and safety isolating transformers; Requirements
EN 60950	Safety of information technology equipment including electrical business equipment

If you use electrical equipment in installations and under ambient conditions requiring higher safety standards, you must comply with the provisions as specified in the applicable regulations for installation in your country.

Warranty and liability claims under civil law are not covered by this declaration.

Sartorius AG
D-37070 Goettingen, Germany
March 3, 1994

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OA 113-8/12.93

Balance Operating Menu

This Sartorius balance can do much more than "just weigh."
It can "think" in various units of measure, adapt to unfavorable conditions and process weight data for a variety of applications.

In the operating menu, you can define how your balance will adapt to ambient conditions, and also how it will work to meet your special requirements.

For your convenience, the menu codes have been factory-set so that you normally do not have to make any changes. If you have special operating conditions, adjust the balance to your individual requirements by setting the menu codes of your choice.

The factory-set menu codes are identified by an "*." You can select the functions not identified by an "*" by setting the respective menu code.

Don't worry!

Even if you've selected the "wildest" codes and totally thrown off all the code settings you need, all you have to do is press a key to set things straight again. Your balance will work just like it did when it left the factory – with the original factory-set menu codes.

Important Note for EC-Approved Balances/Scales Acceptable for Verification in Europe:

The balance/scale operating menu can also be changed when the balance/scale is being used as a legal measuring instrument (legal for trade). As a rule, codes that are not permitted for operation of the balance/scale as a legal measuring instrument are blocked or not displayed. After verification, the balance/scale operating menu cannot be locked using the menu access switch (-L- not displayed).

Changing a Menu Code Setting

To select specific functions, you will need to set the respective menu code.

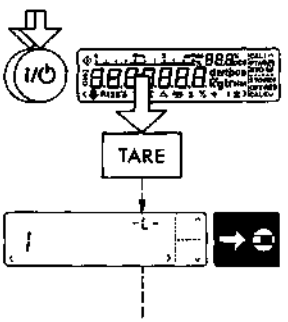
There are three steps to changing a code setting:

– Accessing the menu
– Setting a code
– Confirming and storing the code

The keys have special for setting a menu code, functions. To set a code, use the four keys which are defined on the display as arrow points to indicate the direction:

< [⇦] and > [⇨] = to move to the left and right
∧ [F1] and v [F2] = to increase and decrease a number by one with each press
[TARE]* = to confirm a code setting
[CF] = to store a code setting and leave the menu

Now try changing the weight unit in the second weighing range from grams to "kg," code **3 1 3**.



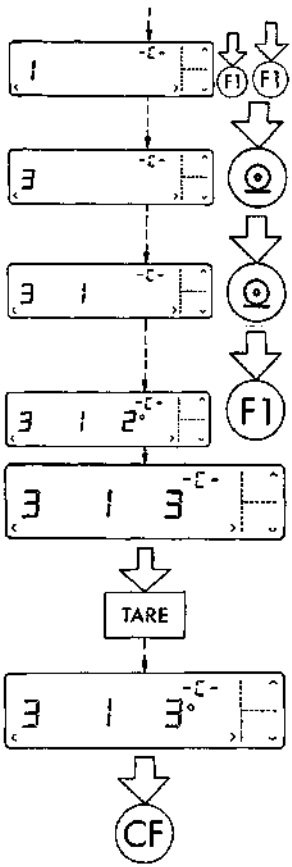
Accessing the menu

– Turn the balance off
– Turn it back on again

– While all segments are displayed, briefly press the tare key* **(10)**

– If -L- is displayed, unlock the menu as follows:
– on balances with a weighing range less than 12 kg, remove the protective cap on the front, right-hand side of the unit
– on balances with a weighing range greater than 12 kg, remove the large screw located on the left-hand side of the rear panel to expose the menu access switch **(5)**
– Move the switch **(5)** in the direction of the arrow.

* = Labeled "T" on standard LC series balances with a capacity greater than 12 kg



Press the F1 key to change the left-hand number to "3"

– Press the ⊙ key to move to the middle number

– Now move from "1" to the right-hand number (When you move to the right-hand number, the previously set numeric code will be indicated).

– Press the F1 key to change the right-hand number to "3"

– Press "TARE" to confirm the code setting

Important Note:
You must press the tare key in order to **confirm the code** you have just set. This is indicated by the "o" after the code.

– Press CF to **store the new menu code setting**

The current code setting in the balance operating menu is identified by a small **"o"** after the last number. When you access the operating menu, the previously set numeric code will be displayed after selecting the left-hand and middle numbers, which means the entire menu code setting is displayed. This makes it easy for you to check the previously set menu codes.

If you would like to change several menu code settings, you do not have to press CF after each change to leave the balance operating menu.

Important Note for Standard Balance Models:

Please do not forget to relock the balance operating menu. The "-L-" indicates that it is currently locked:

You can lock the menu anytime you wish once you have accessed it. However, it is best if you wait until you have changed the last code setting.
To use the locking function, make sure code **8 1 2** is set in the balance operating menu.
If code **8 1 1** is set, the menu access switch will not lock.
In this case, "-C-" will be displayed whenever you access the menu:

How to Undo All Menu Code Changes:
Reset Function

To reset function lets you undo all menu code changes, which means that you will obtain the original factory-set menu codes indicated by an "*" so that your balance will operate according to them.

To use this function, you will need to select code **9 - - 1**°. See the previous pages for information on confirming and storing a menu code setting.

The charts on the next pages give just a small sampling of the code options available for the balance operating menu. These options involve standard balance operation, utilities for printouts or data transfer, and additional functions.

Balance Operating Parameters

Adapting the Balance to Ambient Conditions

To adapt your balance to ambient conditions, you may need to change the response time (see "Product Data Sheets").

		Code		
Very stable conditions	*	1	1	1
Stable conditions	*	1	1	2
Unstable conditions		1	1	3
Very unstable conditions		1	1	4

Standard Weighing Mode – Manual Filling Mode

You can optimally adapt your balance to meet either of these requirements. In the manual filling mode, the display compensates for fluctuations of the load on the balance so that you obtain a steadier readout.

		Code		
Standard weighing mode	*	1	2	1
Manual filling mode		1	2	2

Stability Range

The stability range in digits works together with the readout of the stability symbol (unit symbol) when the load changes. When the stability symbol is displayed, the weight readout is stable within the defined range.

Readout is stable within +/–		Code		
0.25 digit		1	3	1
0.5 digit	*	1	3	2
1 digit**		1	3	3
2 digits**	*	1	3	4
4 digits**		1	3	5
8 digits**		1	3	6

* = factory setting; depends on the balance model in some cases
** = does not apply to balance/scale models acceptable for legal metrological verification

Stability Symbol Delay

This setting allows your balance to compensate for individual interfering factors which slowly subside, such as turbulent air currents generated within the weighing chamber of an analytical balance. You can therefore choose to have the stability symbol displayed later.

		Code		
No delay		1	4	1
Short delay	*	1	4	2
Long delay		1	4	3
Extremely long delay		1	4	4

Tare Parameter

You can define when the balance will perform the taring operation:

		Code		
At any time**		1	5	1
Not until the readout is stable	*	1	5	2
Only at stability		1	5	3

Auto Zero Function

When this zero tracking function is activated, any changes off the zero readout that are equal to a defined fraction of digits per second are automatically tared. In other words, it ensures a stable zero.

		Code		
Auto Zero on	*	1	6	1
Auto Zero off		1	6	2

* = factory setting
** = does not apply to balance/scale models acceptable for legal metrological verification

Weighing in Three Ranges on Standard Balances

The toggle key, labeled ⇆, lets you switch back and forth between two weighing ranges, R1 and R2, provided you are using the factory-set menu code.

When the menu code for "three ranges is set," press the ⇆ key each time to select a different range.

Selecting the Number of Ranges

		Code		
Block the ⇆ key/one weighing range		2	1	1
Two weighing ranges	*	2	1	2
Three weighing ranges[1)]		2	1	3

For codes 2 1 4 "counting" and 2 1 5 "weighing in percent," see part 4, "Application Programs."

Any range that you select by pressing the toggle key will always be indicated by an ID code in the display. This ID depends on the menu code setting.

	ID code		
	1st range	2nd range	3rd range
Two weighing ranges	R1	R2	
Three weighing ranges	--- **	R1	R2

Weight Units

The "initial weight unit" is the unit in which your balance will weigh the moment you turn it on. This unit is defined in the 1st range.
You can select a different unit for each weighing range by setting the appropriate menu code.
Choose any weight unit you'd like, well almost any that's reasonable for the balance model you are using. For example, if you set the menu code for "kg" on a 0.1 mg balance, you'll obtain a readout sure enough, but the display resolution might be slightly off.

* = factory setting
** = The standard weighing range automatically displayed when you turn on the balance is identified by the scale pictogram in the display only.
1) = factory setting on GC 1201-G scales only

Overview of the Weight Units

	Symbol	Code								
		1st range			2nd range			3rd range		
Grams	o	1	7	1	3	1	1	3	3	1
Grams*	g	1	7	2	3	1	2	3	3	2
Kilograms*	kg	1	7	3	3	1	3	3	3	3
Carats	ct	1	7	4	3	1	4	3	3	4
Pounds	lb	1	7	5	3	1	5	3	3	5
Ounces	oz	1	7	6	3	1	6	3	3	6
Troy ounces	ozt	1	7	7	3	1	7[1]	3	3	7
Hong Kong taels	tl	1	7	8	3	1	8	3	3	8
Singapore taels	tl	1	7	9	3	1	9	3	3	9
Taiwanese taels	tl	1	7	10	3	1	10	3	3	10
Grains	gr	1	7	11	3	1	11	3	3	11
Pennyweights	dwt	1	7	12	3	1	12	3	3	12[1]
Milligrams	o	1	7	13	3	1	13	3	3	13

Codes 1 7 1, 3 1 1 and 3 3 1 are reserved for programming special units to meet the needs of customized applications. The standard, factory-set unit is grams. The "o" symbol will be indicated in the display as the stability symbol for a stable readout, just as for milligrams.

Some unit symbols printed on hard copy or output on a computer screen will differ from the way they are indicated in the balance display:

This applies to code numbers ending with	
	8 = tlh
	9 = tls
	10 = tlt
	13 = mg

* = factory setting
[1] = factory setting on GC 1201-G scales only

Weighing in Two Ranges on Balances Acceptable for Verification

The toggle key, labeled ⇆, lets you switch back and forth between two weighing ranges, R1 and R2, provided you are using the factory-set menu code.

Selecting the Number of Ranges

		Code		
Block the ⇆ key/one weighing range		2	1	1
Two weighing ranges	*	2	1	2

For codes 2 1 4 "Counting" and 2 1 5 "weighing in percent," see part 4, "Application Programs."

Weight Units

The "initial weight unit" is the unit in which your balance will weigh the moment you turn it on. This unit is defined in the 1st range.
You can select a different unit for each weighing range by setting the appropriate menu code.
Choose any weight unit you'd like, well almost any that's reasonable for the balance model you are using. For example, if you set the menu code for "kg" on a 0.1 mg balance, you'll obtain a readout sure enough, but the display resolution might be slightly off.

Overview of the Weight Units

	Symbol	Code					
		1st range			2nd range		
Grams	g	1	7	2*	3	1	2*
Kilograms**	kg	1	7	3*	3	1	3
Carats***	ct				3	1	4

* = factory setting; depends on the balance model in some cases
** = on LC balances only
*** = on AC balances only

Display Modes on Standard Balances

You can select the display mode that best meets your individual requirements. The factory-set menu code is defined for the highest possible accuracy in the 1st weighing range. The menu code settings for all weighing ranges are listed on the next page.

Final Readout Mode
If you are interested in the final readout only, you can select this mode by setting code 2 5 1. A special symbol, "– –," will be displayed in any weighing range until the final stable readout is indicated. For the standard readout mode, set code 2 5 2 (all readouts).

Special readout mode "– –"		Code		
Special symbol "– –" for unstable readings when load changes		2	5	1
Standard digital readout mode	*	2	5	2

Last Numeral Blanked When the Load Changes
As the load on your balance changes, the display resolution is reduced by a factor of 10 so that you will obtain a faster and more stable readout.
In the process, the last numeral is blanked until the load stabilizes. Once the load has stabilized, the readout is indicated again with the full display accuracy, which means the last numeral is displayed.

Round-Off Function
You can define the level of accuracy by changing the display increments, also called "scale intervals" (of the last numeral). The display increments possible are as follows: 1, 2, 5, 10, 20, 50, etc.
Starting with the basic increments of a weight unit, the display accuracy can be reduced by as many as three levels so that you will obtain a faster readout with a reduced display accuracy. Display accuracy is reduced in relation to the selected basic increment of the weight unit. Example: weight unit "ct" for carats (5 increments) with code setting 1 8 3 → 10 increments.
To make this concept easier to understand, the three levels are designated as "rounding factors" in the tables summarizing the various menu code settings.

IQ-Mode
(Load-Dependent Readability)

In the IQ-mode, weighing is done with a menu-definable, load-dependent readability throughout the entire weighing range of your balance. In the process, the display resolution of the last digit of the weight value changes in increments of 1, 2, 5, 10, 20, etc., in proportion to the weight of the sample.

* = factory setting

This mode for adapting the display accuracy enables you to weigh with a constant relative accuracy between 1% and 0.01% over the entire weighing range of your balance. Select the load-dependent display accuracy independently for each of the three weighing ranges. The accuracy selected is shown in the top right-hand corner of the application display field.

PolyRange Function (application for single-range balances)

The PolyRange function divides a single weighing range into as many as 4 ranges, each with a different readability. In the various ranges, the readability will adjust so that the last numeral of a weight readout is displayed with a resolution of 1, 2, 5 or 10 digits (10 digits = only the next to the last numeral of the readout will change; the last numeral is blanked).
The PolyRange function makes filling easier because the readability becomes slightly coarser as the load increases and you will not immediately lose an entire place of readability.
Press the tare control at any range level to restore the full resolution of the first range, even when the balance is loaded.

Display mode	Code 1st range			2nd range			3rd range		
Highest possible accuracy	*1	8	1	3	2	1[1]	3	4	1[1]
Last numeral blanked when load changes	1	8	2	3	2	2	3	4	2
Rounding factor 2	1	8	3	3	2	3	3	4	3
Rounding factor 5	1	8	4	3	2	4	3	4	4
Rounding factor 10	1	8	5	3	2	5	3	4	5
1% accuracy	1	8	6	3	2	6	*3	4	6
0.5% accuracy	1	8	7	3	2	7	3	4	7
0.2% accuracy	1	8	8	3	2	8	3	4	8
0.1% accuracy	1	8	9	*3	2	9	3	4	9
0.05% accuracy	1	8	10	3	2	10	3	4	10
0.02% accuracy	1	8	11	3	2	11	3	4	11
0.01% accuracy	1	8	12	3	2	12	3	4	12
PolyRange function	1	8	13	3	2	13	3	4	13

* = factory setting
[1] = factory setting on GC 1201-G scales only

Display Modes on Balances Acceptable for Verification

You can select the display mode that best meets your individual requirements.

Final Readout Mode

If you are interested in the final readout only, you can select this mode by setting code 2 5 1. A special symbol, "– –", will be displayed in any weighing range until the final stable readout is indicated. For the standard readout mode, set code 2 5 2 (all readouts).

Special readout mode "– –"		Code		
Special symbol "– –" for unstable readings when load changes		2	5	1
Standard digital readout mode	*	2	5	2

Last Numeral Blanked When the Load Changes

As the load on your balance changes, the display resolution is reduced by a factor of 10 so you will obtain a faster and more stable readout.
In the process, the last numeral is blanked until the load stabilizes. Once the load has stabilized, the readout is shown again with the full display accuracy, which means the last numeral is displayed.

	Code					
Display mode	1st range			2nd range		
Highest possible accuracy	* 1	8	1	* 3	2	1
Last numeral blanked when load changes	1	8	2	3	2	2

IQ-Mode
(Load-Dependent Readability)

The IQ-Mode does not apply to EC-approved balances acceptable for verification.

* = factory setting

Calibration Functions on Standard Balances

Select the appropriate menu code to define the access status for each of the following calibration functions, which are activated by holding down the tare key for a few seconds:

– External calibration **C-E**
– Internal calibration **C-I**
– Sensitivity test **C-t**

If the menu access switch is unlocked ("accessible" status indicated by **-C-** after you have accessed the balance operating menu), the "external calibration" function will be accessible even though you have set the menu code 1 9 2 for "access denied."

External calibration		Code		
Accessible	*	1	9	1
Access denied		1	9	2

Internal calibration		Code		
Accessible	*	1	10	1
Access denied		1	10	2

Sensitivity test		Code		
Accessible	*	1	11	1
Access denied		1	11	2

Quick CAL Using F1
If your balance has a built-in calibration weight, you can select the "internal calibration" function at any time by a touch of the F1 key (factory setting: accessible). That's why we call it "Quick CAL" for short.
You can also set a different menu code to change the function of the F1 key from "internal calibration" to "sensitivity test."
Both functions are accessible even if you select code 1 10 2 or 1 11 2, respectively.

Function of the F1 key		Code		
No function	*	2	2	1
Internal calibration ("CAL I")	*	2	2	5
Sensitivity test ("CAL T")		2	2	6

For codes 2 2 2 to 2 2 4, see Part 4, "Application Programs."
* = factory setting; depends on the balance model in some cases

Calibration Functions on Balances Acceptable for Verification

Select the appropriate menu code to define the access status for each of the following calibration functions, which are activated by holding down the tare control for a few seconds:

- External calibration **C-E**
- Internal calibration **C-I**
- Sensitivity test **C-t**

External Calibration

Use the access switch to block or release the external calibration function.

External calibration		Switch set to
Accessible		right
Access denied	*	left

On precision balances of accuracy class (II) that are acceptable for verification, the "external calibration" function is blocked by the access switch (adjusted to the left and secured against alteration of the switch setting) after verification.

Quick CAL Using F1

You can select the "internal calibration" function at any time by a touch of the F1 key (factory setting: accessible). That's why we call it "Quick CAL" for short. On AC balances, you can also set a different menu code to change the function of the F1 key from "internal calibration" to "sensitivity test."

Function of the F1 key		Code
No function	*	2 2 1
Internal calibration	*	2 2 5
Sensitivity test on AC balances		2 2 6

For codes 2 2 2 to 2 2 4, see Part 4, "Application Programs."

* = factory setting

Utilities for Printouts or Data Transfer

Sartorius balances come standard with an interface. You can plug a Sartorius printer or a computer into this interface port to print data on hard copy or have them transferred to your computer. Moreover, you can choose to output data from your balance to this on-line device either automatically or by pressing the print key on the balance.
The balance operating menu lets you define the various parameters for data output. For information on the data formats and for interfacing a computer or other peripherals, see Part 5, "Interface Description."

Data Output Parameter

This parameter is coupled with the stability parameter =
stable readout or
no motion is detected
Print on request = data is output only when the print key is pressed or a software command is received
Auto print = continuous, automatic data output

		Code		
Print on request regardless of stability		6	1	1
Print on request after stability with storage of the function	*	6	1	2
Print on request at stability without storage of the function		6	1	3
Auto print regardless of stability		6	1	4
Auto print at stability		6	1	5

Automatic Data Output

You can stop and start automatic data output by pressing the print key.
To avoid operating errors or to ensure that data will be output continuously in the automatic mode, you can block this function.

		Code		
Start/stop auto print using the ⎙ key		6	2	1
Auto print not stoppable	*	6	2	2

* = factory setting

Data Output at Defined Intervals

You can reduce the volume of data in the "auto print" mode by defining the interval at which data will be output automatically. This auto print interval is based on the number of display updates.

Auto print interval		Code		
1 display update	*	6	3	1
2 display updates		6	3	2
5 display updates		6	3	3
10 display updates		6	3	4
20 display updates		6	3	5
50 display updates		6	3	6
100 display updates		6	3	7

Automatic Taring after Data Output

This convenient setting lets you checkweigh a series of samples or products without having to unload the balance after each weighing procedure. This means less work for you:

- the sample remains on the pan after the weight readout has been printed or transferred to an on-line computer
- the balance is tared automatically after the weight readout has been printed or transferred to an on-line computer
- you simply load the next sample or part

		Code		
Data output without automatic taring	*	6	4	1
Data output with automatic taring		6	4	2

* = factory setting

Data ID Codes

To help you identify weights, piece counts, percentages, etc., a code letter is printed or displayed in front of these values. For example, an "N" printed or displayed in front of a weight value identifies it as a net weight. If you set the code for "without data ID code," only net weights, results in percent and counting results will be output. You will find the data ID codes of a particular application program listed in the corresponding description. The ID code increases the data output format for each weight readout from 16 to 22 characters.

ID code for data output		Code		
Without	*	7	2	1
With	**	7	2	2

* = factory setting
** = factory setting for the IAC version

Additional Functions

A number of additional menu codes enable you to assign or deny access to various functions.

Menu Access Function on Standard Balances

You can define the function of the menu access switch on standard balances by setting the code for the balance operating menu to "accessible." In this setting, -C- (change) will be displayed on your balance whenever you access the menu. This means that you can change the menu codes at any time regardless of the setting of the menu access switch.

Access to the balance operating menu with standard balances		Code		
Accessible		8	1	1
Depends on the setting of the menu access switch	*	8	1	2

Function of the Menu Access Switch on Balances Acceptable for Verification in Europe

The balance operating menu can also be changed when the balance is being used as a legal measuring instrument. As a rule, codes that are not permitted for operation of the balance as a legal measuring instrument are blocked or not displayed. The balance operating menu **cannot** be locked using the access switch (-C- not displayed).
On accuracy class (II) precision balances acceptable for verification, the "external calibration" function is blocked by the access switch (adjusted to the left and secured against alteration of the switch setting) after verification.

Beep Tone (Acoustic Signal)

If you wish, you can turn off the beep tone (i.e., acoustic signal)

Acoustic signal		Code		
On	*	8	2	1
Off		8	2	2

Blocking the Keys

You can block all keys on the balance (except for [I/Ö]) by setting the respective code.

Key functions		Code		
Accessible	*	8	3	1
Blocked		8	3	2

* = factory setting

Universal Switch for Remote Control

You can connect an external universal switch to the interface of your balance for remote control of certain functions (listed below). Set the appropriate menu code to define the function of this switch.

Functions		Code		
Print	*	8	4	1
Tare		8	4	2
F1 key		8	4	3
F2 key		8	4	4

Analog Display: Bar Graph/Marker

In the factory setting, the analog display works as a bar graph. By changing the menu code, you can turn the analog display completely off or have it appear as a marker. When the marker is selected, two individual segments will move within the display scale range to indicate the loading status of your balance.

Analog display		Code		
Off		8	5	1
Bar graph	*	8	5	2
Marker		8	5	3

Power-On Mode

Depending on the operating mode, line current, battery operation or continuous operation, you can change the power-on mode of your balance.
The factory setting is: (power) off –> on <–> standby.

In the setting "toggle between on and (power) off," the balance remains off after a power failure has occurred or after the balance has been disconnected from AC power. After the balance has been turned off, power for the "standby" mode is not available. In this setting, the balance can be turned on and off using the ⏻ key.

* = factory setting

In the setting "toggle between on and standby," the balance power will turn back on automatically after a power failure has occurred or after you have disconnected your balance temporarily from AC power.

In the setting "automatic power-on," the balance will turn back on automatically after a power failure has occurred; after the balance has been disconnected, then reconnected to AC power; or after the ⏻ key has been pressed. In this setting, the balance can no longer be turned off using the ⏻ key.

Power-on mode		Code		
(Power) off –> on <–> standby	*	8	6	1
On <–> (power) off		8	6	2
On <–> standby		8	6	3
Automatic power-on		8	6	4

Automatic Shutoff (Battery Saver) for Use with Code 8 6 2 or the Rechargeable Battery Option**

If you are using the rechargeable battery option, turn the automatic shutoff function on to increase the hours of battery operation so that you do not need to recharge the batteries that often. Here is how the battery saver function works: If there has not been a change in a weight readout for at least 2 minutes or you have not pressed any keys during this time, "⏻" will be displayed. After another 2 minutes, the balance will shut off if it has not been used in the meantime.

Automatic shutoff		Code		
On		8	7	1
Off	*	8	7	2

Display Backlighting

Depending on your individual workplace requirements, you can turn the display backlighting on or off accordingly.

Display backlighting		Code		
On	*	8	8	1
Off		8	8	2

* = factory setting
** = does not apply to balance/scale models acceptable for legal metrological verification

Reset Function

This function enables you to reset all menu codes back to the original factory settings, which are indicated by an "*" throughout part 2.

To activate this special function, set menu code **9 – – 1*** and confirm by pressing [TARE]; press the [C.F] key to store the code and leave the menu.

Reset function	Code
Activated	9 – – 1
Off	9 – – 2

"isoCAL" Self-Calibrating Function* on AC/LC...-00MS/-0CEMS Models

Range of Performance Features

The AC/LC...-00MS/-0CEMS models have standard features which are not offered by other balances and scales of the MGT product line:

- Built-in servomotor for application of the internal calibration weight(s)
- Self-calibrating function – "isoCAL"
- ISO/GLP-compliant printout/record
- Integrated Applications Computer "IAC" for the application programs:
  tare memory; formulation;
  statistics; weighing in percent; counting; clock and timer for time-controlled measurements/weighing; calculation of weight values; totalling of weights; averaging/animal weighing; density determination; over/under checkweighing; ID number for identification of data

Important Note for EC-Approved Balances/Scales (...-0CEMS):
These models are allowed to be used in the extended ambient temperature range of 0°C to +40°C.

* = Balances of the MGT product line cannot be upgraded with this function

"isoCAL" Self-Calibrating Function

A balance of the Master Series can self-calibrate.

The self-calibrating function is activated based on the following parameters:

Model	When the temperature changes	After a calibration interval of
AC 211 S-00MS, AC 211 P-00MS, AC 121 S-00MS	1.5 kelvin	4 h
LC 3201 D-00MS, LC 1201 S-00MS	1.5 kelvin	4 h
LC 621 S-00MS, LC 621 P-00MS, LC 6201 S-00MS, LC 4201 S-00MS, LC 4801 P-00MS	2 kelvin	6 h
LC 221 S-00MS, LC 2201 S-00MS, LC 2201 P-00MS, LC 34000 P-00MS	4 kelvin	12 h
LC 821-00MS, LC 421-00MS, LC 16000 S-00MS, LC 12001 S-00MS, LC 6201-00MS, LC 4201-00MS, LC 34-00MS	4 kelvin	24 h

These parameters are the same for the corresponding balance/scale models that have been verified or are acceptable for legal metrological verification (models AC/LC...-0CEMS).
In addition, the self-calibrating function is activated after an hour has passed since the balance was connected to AC power (power on) and after an hour has passed since the time was set.
If the balance self-calibrates due to a change in temperature, the timer for the calibration interval is set back to zero. The timer for the calibration interval is also active when the balance is in the standby mode. After the balance has been turned on, a check is run to see if a calibration time was exceeded while the balance was in the standby mode.

Flashing ⚖ Symbol

If the "⚖" symbol flashes, the balance wants to self-calibrate. You do not need to interrupt your weighing series, because the balance will wait until you have unloaded the weighing pan (at least to approx. 2% of maximum capacity) and have not used the balance for two minutes. Then the balance will self-calibrate. The ⚖ symbol flashes until the balance begins self-calibration or until you activate the calibration function manually (see also "Calibration" in Part 1).
You can interrupt the calibration process at any time by pressing the CF key.
If an external disturbance affects self-calibration, the error code "Err 03" will be displayed, and the procedure will be interrupted by two beep tones. After two minutes, the self-calibrating function will restart.

Important Note for EC-Approved Balances/Scales Acceptable for Legal Metrological Verification (...-0CEMS):

If "C" is indicated in the display or "STAT C" is output via the interface, the balance/scale must not be loaded.

The balance/scale initiales self-calibration 15 seconds after "C" is indicated in the display. Changing loads during these 15 seconds will interrupt the internal preparation cycle for calibration.

You can select the following menu codes:

Self-calibrating function – "isoCAL"	Code
OFF[1]	1 15 1
Calibration symbol " ΔΔ " in the display only[1] [2]	1 15 2
ON – "isoCAL" with clearing of values determined for application programs[3]	1 15 3
ON – "isoCAL" without clearing of values determined for application programs	*1 15 5

[1] Not applicable for EC-Approved Balances/Scales Acceptable for Legal Metrological Verification (...-0CEMS)

[2] When code 1 15 2 is set, the " ΔΔ " symbol will flash in the display until you activate the calibration function manually.

[3] Reference values for the application programs have to be stored once again after self-calibration has been performed (e.g., for counting or weighing in percent). Measured values calculated for statistics or totalling will be deleted after the calibration process has been performed.

Activating Internal Calibration Manually

The "Quick-CAL" key functions and "Internal Calibration Using the Tare Key" are described Part 1.

*= factory setting

Automated Processes

Delays in production may occur when the "isoCAL" function is used in automated processes. You can avoid such delays by setting menu code 1 15 2 "Calibration symbol " ⚖ " in the display only." In this case, you have to press the key to activate calibration.

Printout or Record of Calibration Processes

The balance, interfaced with a data printer or a computer, creates a document that records the date, time, serial number and model number which makes it possible to clearly trace data to the balance that generated it. For more information, see the section entitled "ISO/GLP-compliant Printout or Record" in the IAC instruction manual.

Calibrating Balances When Using YDK 01, YWP 01, YWP 01 U or YWP 02 Accessories

When you use the YDK 01 density determination kit or one of the special weighing pans, YWP 01, YWP 01 U or YWP 02, the balance cannot self-calibrate.
If the " ⚖ " symbol flashes, place the standard weighing pan on the balance and activate the calibration function manually.

Self-Calibration with the MC1-MP8 Interface (Binary Converter)

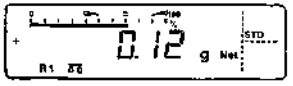
EC-approved balance/scale models (...-0CEMS) can self-calibrate also when menu code 9 2 3 for the MC1-MP8 interface (binary converter) has been set.

On all other models, if you select the MC1-MP8 interface, the balance cannot self-calibrate. If this is the case, activate the calibration functions manually.

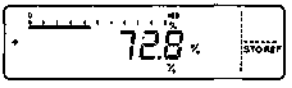
Application Programs for Balances of the MC1 Product Line

In addition to the functions implemented strictly for weighing, Sartorius balances of the MC1 product line offer you a variety of application programs to handle tough daily routine work in the laboratory as well as in industrial plants. If you have not yet experienced how fast and accurately a Sartorius balance can count parts or convert weights into percentages, now is a good opportunity to try it out.

In this description, you'll find a few simple examples for the following applications:



Tare memory



Weighing in percent

Over/under checkweighing

Counting

You can also use "tare memory" and "over/under checkweighing" in combination with "weighing in percent" or "counting."

If your balance has a numeric keypad, please use the instructions entitled "IAC" or "Backweigher" supplied with the balance.

To select an application program or a specific function, set the appropriate code in the menu. Part 2 describes in detail how to set menu codes.

Additional settings for running the particular program and displaying or printing the data on hard copy are listed in a table of codes.

One thing you should do when you want to set the code for a different program, or when someone else has already operated the balance is:
Select the reset function – code 9 – –1° – to change all menu codes back to the original factory settings.

Use of EC-Approved Balances/Scales Acceptable for Verification as Legal Measuring Instruments in Europe

All application programs can be used on balances/scales approved for use as legal measuring instruments. Non-metric weight values are indicated as follows:

Percent	= %
Piece count (counting)	= pcs
Computed value	= o

Functions Common to All Programs

The [F1], [F2] and [⇆] keys are assigned different functions by the individual programs. In each case, the functions currently assigned to the [F1] and [F2] keys are always identified in the display next to each key.

[CF] Key

[CF] clears the program function and resets the program.

Clear function		Code		
Global – clears functions of all keys	*	2	4	1
Selective clearing in the order of [F1] → [F2]		2	4	2

Use the **selective** code if you intend to run two different programs at the same time. Select **code 2 4 2** if you would like to clear the program assigned to the [F1] key before you clear the program assigned to the [F2] key.

* = factory setting

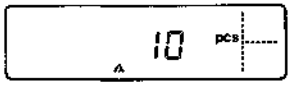
Information and Printouts or Data Transfer

The info key ([1]) has two functions:

– one brief press: displays information and prints/transfers stored data
– one long press: recalls the reference percentage or reference sample quantity for weighing in percent or counting (for more information, see the descriptions of these programs)

Briefly press the [i] key to select the information function: an "i" will appear in the display.

If you press [F1] or [F2] now, the data stored in the memory will be retrieved and displayed. What is displayed depends on the program selected.



Example: Counting
Readout: Reference sample quantity

Readout: Reference sample weight

nRef + xxxxxxx pcs
wRef + xxxxxxx g

Data output only for Code 7 2 2

These data will also be output via the interface (printed or transferred) if you press the [2] key after pressing the info key. In this case, the print symbol will be displayed next to the "i" until you press a function key.

Info + function key → displays data stored in the memory

Info + print + function key → displays and prints data stored

For information on printouts or data transfer, see "Utilities" in Part 2. In the examples in Part 4, the data that are output via the interface are printed on hard copy.

Tare Memory

Press the [F1] key (identified by "TAR" in the display) to store the tare weight.

Symbol displayed when a value is stored: **Net**

The balance will be tared automatically so you can weigh again starting with a zero readout.

Display/Print Tare – Net – Gross Weights **Code 222**

Menu codes used in the example:

Function	Code
Tare Memory	2 2 2
With data ID code	7 2 2
Automatic data output	7 1 2
Tare memory contents	7 3 2

As an alternative, you can select this output parameter:

Data output – manual mode	*7 1 1

Application: for obtaining printouts of tare, net and gross weights or outputting these data to a computer

Step/(key ID)/key		Readout	Data output/printout		
[CF], [TARE]		0.00 g			
Place the container on the pan	+	22.65 g			
Tare: (TAR) [F1]		0.00 g Net	**T1**	+	**22.65 g**
Fill container with sample; [⊙]	+	250.24 g Net	**N1**	+	**250.24 g**
[CF], [⊙]	+	272.89 g	**N**	+	**272.89 g**

The data ID codes			mean:
T1	+	**22.65 g**	tare weight stored in the memory
N1	+	**250.24 g**	net weight when tare weight is stored
N	+	**272.89 g**	weight without stored tare weight = gross

* = factory setting

Net Total — Code 222

Press [F1] (identified by "TAR" in the display) to store each component that you weigh-in. The balance is tared automatically each time you store a weight. Therefore, you can weigh-in the components one after the other starting with a zero readout.

Menu codes used in the example:

Function	Code
Tare memory	2 2 2
With data ID code	7 2 2
Automatic data output	7 1 2
Printout of individual components/tare weights	*7 3 1

As an alternative, you can select this output parameter:

Printout of net total weight/ total tare weight	7 3 2

Application: simple compounding and formulating in the lab or in production

Step/(key ID)/key		Readout	Data output/printout		
Place container on the pan	+	22.65 g			
[CF], [TARE]		0.00 g			
Weigh-in 1st component	+	4.61 g			
Store: (TAR) [F1]		0.00 g Net	**N1**	**+**	**4.61 g**
Weigh-in 2nd component	+	60.33 g			
Store: (TAR) [F1]		0.00 g Net	**N1**	**+**	**60.33 g**
Weigh-in and store additional components	+	xxx.xx g Net	**N1**	**+**	**xxx.xx g**
Finish weighing-in procedure and output the total weight [CF], [⊙]	+	272.89 g	**N**	**+**	**272.89 g**

The data ID codes			mean:
N1	**+**	**60.33 g**	net weight of stored component
N	**+**	**272.89 g**	net total weight

* = factory setting

Weighing in Percent

This application program enables you to obtain weight readouts in percent, which are based on a reference weight.
The reference weight readout is stored as a menu-defined percentage (factory setting: 100%). To change this percentage, see the description on page 4–8. (The reference percentage will be displayed as long as the reference sample weight has not yet been stored.)

Determination of the Residual Weight in Percent Code 2 1 5

Menu codes used in the example:

Function	Code
Weighing in percent	2 1 5
With data ID code	7 2 2
Reference % and weight	7 1 2

As an alternative, you can select this output parameter:

Reference weight	7 1 3

Application: quick determination of the dry weight of a sample

Step/(key ID)/key		Readout	Data output/printout		
Place container on the pan	+	22.65 g			
CF, TARE		0.00 g			
Add prepared sample to the container	+	4.61 g			
Store ref. wt. as 100%: (STO REF) F2	+	100.0 %	pRef Wxx%	+ +	100 % 4.61 g
For moisture analysis, press TARE at this point					
Remove container with sample; dry sample		xx.x %			
Reweigh sample in the container	+	72.5 %			
⊙	+	72.5 %	Prc	+	72.5 g
Residual weight readout: ⇄	+	3.34 g			
⊙	+	3.34 g	N	+	3.34 g

The data ID codes				mean:
pRef	+	100	%	reference percentage
Wxx%	+	4.61	g	net reference weight xx%
Prc	+	72.5	g	calculated percentage
N	+	3.34	g	net residual weight

Sieve Analysis — Code 215

Menu codes used in the example:

Function	Code
Weighing in percent	2 1 5
With data ID code	7 2 2
Reference % and weight	7 1 2
Tare memory	2 2 2
Output individual tare weight	*7 3 1

As an alternative, you can select this output parameter:

Reference weight	7 1 3

Application: sieve analysis of granular substances

Step/(key ID)/key		Readout	Data output/printout		
Place set of sieves on pan	+	505.18 g			
[CF], [TARE]		0.00 g			
Add sample to top sieve on the stack	+	160.58 g			
Store wt. as 100%: STO REF [F2]	+	100.0 %	pRef Wxx%	+ +	100 % 160.58 g
Remove stack of sieves; shake		xx.x %			
Place empty container on the pan and press [TARE]		0.0 %			
Pour contents of sieve 1	+	12.6 %			
into container: (TAR) [F1]	+	0.0 %	Prc1	+	12.6 %
Add contents of sieve 2:	+	34.8 %			
(TAR) [F1]	+	0.0 %	Prc1	+	34.8 %

Add and store contents of remaining sieves

The data ID codes			mean:
pRef	+	100 %	reference percentage
Wxx%	+	160.58 g	net reference weight xx%
Prc1	+	12.6 %	percentage of the sample

* = factory setting

Weighing in Percent with Additional Requirements

Changing the Reference Percentage

You can change the reference percentage to meet your individual requirements. The reference percentage setting will be displayed above the unit symbol after you press [CF].

To select the change function: Hold down [i] for more than 2 seconds

To change the setting: Use [F1] identified by – ∧ –

If you enter a wrong number, press [CF] to clear it.

To store the percentage:
- temporarily until you turn off the power: briefly press [F2]
- permanently after you turn off the power (in the non-volatile memory): press [F2] for more than 2 seconds

Note: This setting is not canceled by the reset code 9– –1°.

Changing the reference percentage		Code		
No change		2	3	1
In cycles: 5, 10, 20, 50, 100, 5, 10, ...	*	2	3	2
In increments of one		2	3	3

Storage Parameter for the Reference Weight

The reference weight is stored		Code		
with full accuracy according to the internal resolution		3	5	1
according to the display accuracy	*	3	5	2

Display Parameter for Readouts in Percent

The readout in percent is displayed		Code		
without a decimal place		3	6	1
with one decimal place	*	3	6	2
with two decimal places		3	6	3
with three decimal places		3	6	4

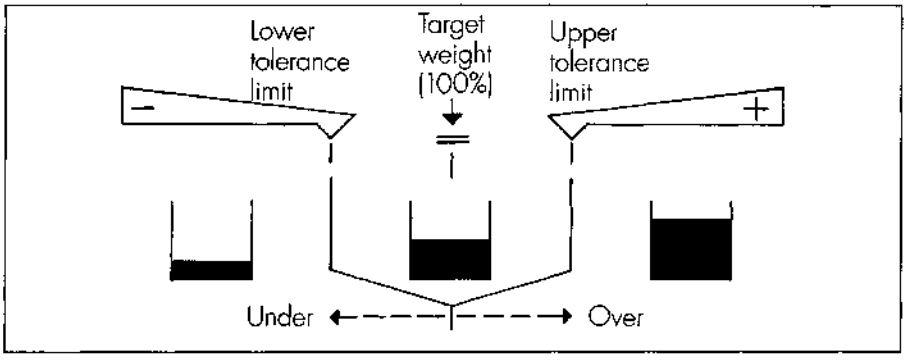
Use in Combination with Other Programs

Program	Code		
Tare memory	2	2	2
Over/under checkweighing (net weight)	2	2	3
Over/under checkweighing (difference in weight)	2	2	4

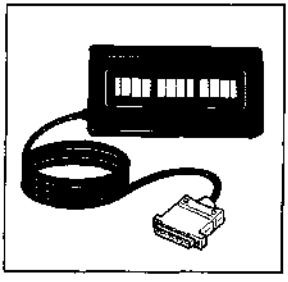
* = factory setting

Over/Under Checkweighing

This program is used to check whether products are within a specific tolerance range, to sort and classify items, and to fill and batch products. Symbols are displayed above the bar graph as visual aids for this type of program: the equal sign indicates the target weight; the minus sign, the underweight limit; and the plus sign, the overweight limit. Within the tolerance range, the response sensitivity of the bar graph is increased. You can define the tolerance limits between 0.1% and 10% as required. To find these setting options, see the chart on page 4–12. The factory setting is for tolerance limits of +/– 1.0%.



For checkweighing, you can choose between two programs:
– checking net weights (code 2 2 3)
– checking variations in weight (code 2 2 4)
These programs enable you to checkweigh in any range that can be selected using the toggle key labeled ⇆. Instead of weights, you can use piece counts or percentages for checkweighing if you have selected the corresponding application program by menu code. Both programs provide four control lines via the balance interface, which are called data output port lines. This means you can interface a remote display unit that has color-coded indicators, which are activated by the lines depending on the target weight and the tolerance limits selected.
For more information, see the "Interface Description" in Part 5.



You can use the Sartorius Three-Segment Checkweighing Display Unit, model YRD10Z, as a visual aid during checkweighing.

Checking Net Weights – Weight Readout – Code 223

To store a weight readout as the target weight, press [F1].

The target weight is indicated in the analog display as a bar graph. The last segment of this bar graph ends exactly below the equal sign of the checkweighing indication.

If the weight of a product is "acceptable," the last segment of the bar graph will be within the tolerance range of the checkweighing indication. You can also read the actual weight in digits.

Menu codes used in the example:

Function	Code
Checking net weights	2 2 3
With data ID code	7 2 2
Tolerance + target weight	7 1 2

As an alternative, you can select this output parameter:

Target weight only	7 1 3

Application: weighing in the same amounts of sample

Step/[key ID]/key	Readout	Data output/printout
[CF]; place sample container on the pan; [TARE]	0.00 g	
Weigh-in required sample amount	+ 235.18 g	
Store: [STO] [F1]	+ 1.0 %	Lim + 1.0 %
		Setp + 235.18 g
	+ 235.18 g	
Remove container + ideal sample; place another container on the pan; [TARE]	0.00 g	
Weigh-in sample using the analog display as a guide	Checkweighing indication + 235.55 g	
[⊙]	+ 235.55 g	N + 235.55 g

Continue as directed above

The data ID codes			mean:
Lim	+	1.0 %	over/under limits in percent
Setp	+	235.18 g	target weight stored
N	+	235.55 g	net sample weight

Checking Variations in Weight – Readout in Percent –

Code 224
and Code 215

To store a readout – displayed as a weight or a percent – as the target value, press [F1]. The target value is indicated in the analog display as a bar graph. The last segment of this bar graph ends exactly below the equal sign of the checkweighing indication. If the weight of a product is "acceptable," the last segment of the bar graph will be within the tolerance range of the checkweighing indication. You can also read the difference in weight in digits or as a percent.

Menu codes used in the example:

Function	Code
Checking variations in weight	2 2 4
Weighing in percent	2 1 5
With data ID code	7 2 2
Tolerance + target weight	7 1 2
Reference % + ref. weight	
Automatic output	4 2 1

As an alternative, you can select this output parameter:

Target wt. and ref. wt. only	7 1 3

Application: checkweighing finished products with automatic output of the variations within the tolerance limits

Step/{key ID}/key	Readout	Data output/printout
[CF], [TARE]	0.00 g	
Load part that has the "target weight"	+ 235.09 g	
Press {STO REF} [F2]	+ 100.0 %	pRef + 100 % Wxx% + 235.09 g
To store the limit for checking tolerances: press {STO} [F1]	0.0 % Net	Lim + 1.0 % Setp + 235.09 g
Remove part with ideal target weight		
Checkweigh parts	Checkweighing indication	
Example:	+ 0.7 %<T>	Prc1 + 0.7 %

The data ID codes			mean:
Lim	+	1.0 %	over/under limits in percent
Setp	+	235.09 g	target weight stored
pRef	+	100 %	reference percentage
Wxx%	+	235.09 g	reference weight
Prc1	+	0.7 %	calculated variation in percent

Over/Under Checkweighing with Additional Requirements

Changing the Tolerance Limits

You can change the over/under tolerances between 0.1% and 10%.

Tolerance limits		Code		
0.1% over/under deviation from the target		4	1	1
0.2% over/under deviation from the target		4	1	2
0.5% over/under deviation from the target		4	1	3
1.0% over/under deviation from the target	*	4	1	4
1.5% over/under deviation from the target		4	1	5
2.0% over/under deviation from the target		4	1	6
2.5% over/under deviation from the target		4	1	7
3.0% over/under deviation from the target		4	1	8
5.0% over/under deviation from the target		4	1	9
10.0% over/under deviation from the target		4	1	10

Analog Display

You can use an analog marker (two segments) instead of the bar graph located below the checkweighing indication.

Analog display		Code		
Off		8	5	1
Bar graph	*	8	5	2
Analog marker		8	5	3

* = factory setting

Automatic Data Output

"Acceptable" values can be printed out or transferred automatically. Data are output once the readout has stabilized within the tolerance limits selected. Following data output, this function will be blocked until the balance has been completely unloaded.

Automatic data output		Code		
On		4	2	1
Off	*	4	2	2

Use in Combination with Other Programs

Program		Code		
Weighing in two ranges	*	2	1	2
Weighing in three ranges		2	1	3
Counting		2	1	4
Weighing in percent		2	1	5

* = factory setting

Counting

A weight readout is stored as a reference sample quantity (factory setting: 10 pcs). To change this value, see the description on page 4–15. (The reference sample quantity is displayed as long as the reference sample weight has not yet been stored for counting.) While counting (piece count readout), you can press F2 to update the reference sample for optimizing the accuracy (approx. double the reference sample quantity). In the process, the reference weight is recalculated based on the total reference sample weight and the piece count displayed.

Counting Small Parts — Code 214

Menu codes used in the example:

Function	Code
Counting	2 1 4
With data ID code	7 2 2
Ref. quantity + ref. weight	7 1 2

As an alternative, you can select this output parameter:

Reference weight	7 1 3

Application: counting of bulk quantities of items with the same weight

Step/(key ID)/key		Readout	Data output/printout		
Place container on the pan	+	22.65 g			
CF, TARE		0.00 g			
Add 10 sample parts	+	58.55 g			
Store: (STO REF) F2	+	10 pcs	nRef	+	10 pcs
			wRef	+	5.8550 g
Fill container with desired quantity	+	286 pcs			
⊙	+	286 pcs	Qnt	+	286 pcs
To obtain weight readout: press ⇆	+	1676.66 g			
⊙	+	1676.66 g	N	+	1676.66 g
⇆					
To update ref. sample, add more parts (approx. 2x nRef)	+	20 pcs			
press (OPT) F2	+	5.8544 g	wRef	+	5.8544 g

The data ID codes		mean:
nRef	+ 10 pcs	reference sample quantity (piece count)
wRef	+ 5.8550 g	reference weight
Qnt	+ 286 pcs	calculated piece count
N	+1676.66 g	net weight

Counting with Additional Requirements

Changing the Reference Sample Quantity

You can change the reference sample quantity as required. The reference sample quantity will be displayed above the unit symbol after you press [CF].

To select the change function: Hold down [i] for more than 2 seconds
To change the setting: Use [F1] identified by – ∧ –
If you enter a wrong number, press [CF] to clear it.
To store the ref. quantity:
– temporarily until you turn off the power: briefly press [F2]
– permanently after you turn off the power (in the non-volatile memory): press [F2] for more than 2 seconds

Note: This setting is not canceled by the reset code 9 – –1°.

Changing the reference sample quantity		Code		
No change		2	3	1
In cycles: 5, 10, 20, 50, 100, 5, 10, ...	*	2	3	2
In increments of one		2	3	3

Storage Parameter for the Reference Sample Weight

The weight is stored		Code		
with full accuracy according to the internal resolution		3	5	1
according to the display accuracy	*	3	5	2

Reference Sample Updating

While counting (piece count readout), you can press [F2] to update the reference sample for optimizing the accuracy (identified by – OPT – in the display next to the key). In the process, the reference weight is recalculated based on the total reference sample weight and the piece count displayed. It makes sense to use the reference sample updating function when the weight of a reference sample quantity is lighter than 100 digits. In this case, you should about double the reference sample quantity. You can repeat reference sample updating several times.

Use in Combination with Other Programs

Program	Code		
Tare memory	2	2	2
Over/under checkweighing (net weight)	2	2	3
Over/under checkweighing (difference in weight)	2	2	4

* = factory setting

Interface Description

This description has been written for users who wish to connect their Sartorius balance of the MC1 Series to a computer or other peripherals using a V24/V28-RS-232C(-S)*)/423 interface.
By using an on-line computer, you can change, activate and monitor the functions of the balance and the application programs.
This data interface also provides data output port lines for controlling a remote display unit for over/under checkweighing. In addition, a universal switch for remote control of various functions can be connected to the data interface port.
If you interface an original Sartorius accessory, such as a Sartorius Data Printer or a similar unit, with a balance that has the factory-set menu codes, you do not need to change any settings.

General Specifications

Type of interface	Serial point-to-point connector
Operating mode	Asynchronous, full duplex
Standard	V28, RS-232C
Handshake**)	2-wire interface: via software (XON/XOFF) 4-wire interface: via hardware handshake lines Clear To Send (CTS) and Data Terminal Ready (DTR)
Transmission rate**)	150; 300; 600; 1,200; 2,400; 4,800; 9,600; 19,200 baud
Character coding	7-bit ASCII
Parity**)	Mark***), space***), odd, even
Synchronization	1 start bit; 1 or 2 stop bits**)
Data output format**) of the balance	16 or 22 characters
Character format**)	– 1 start bit – 7-bit ASCII – 1 parity bit – 1 or 2 stop bits

*) = Sartorius pin assignment
**) = can be changed by the user
***) = blocked on balances acceptable for verification

Data Output Formats

Depending on the menu code setting: 7 2 1 = without data ID code
or 7 2 2 = with data ID code

data will be output with either 16 (menu code setting 7 2 1) or 22 (menu code setting 7 2 2) characters.

For a data output of 22 characters, a 6-character ID, as defined in the application program selected, precedes the 16 characters reserved for the weight or other value.

Data Output Format with 16 Characters

Display segments that are not activated ("+" or "–" sign, stability symbol or numerals) are output as spaces.

The following data block format is output according to what is indicated in the display:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
		*	*	*	*	*	*								
+		10^6	10^5	10^4	10^3	10^2	10^1	10^0			*	*	*		
		0	0	0	0	0	0	0							
*	*									*				CR	LF
			.	.	.	.	.	.	.						
											E	E	E		
–				10^5	10^4	10^3	10^2	10^1	10^0						
				0	0	0	0	0	0						
				*	*	*	*	*	*						

* = space, E = unit

When data are output without decimals, the decimal point is suppressed (except when a certain display mode is selected).

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
+			*	*	*	*	*	*							
*	*	*	10^6	10^5	10^4	10^3	10^2	10^1	10^0	*	* E	* E	* E	CR	LF
−				0	0	0	0	0	0						

Data output example: +1255.7 g

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
+	*	*	*	1	2	5	5	.	7	*	g	*	*	CR	LF

Characters:

1st	Plus or minus sign or space
2nd	Space
3rd – 10th	Weight with a decimal point; leading zeros = space
11th	Space
12th – 14th	Unit symbol or space
15th	Carriage return (CR)
16th	Line feed (LF)

If the weighing system has not stabilized (stability symbol is not displayed), no unit symbol will be output.

For the display format parameter "last numeral off or only at stability" (blank last numeral by a rounding factor of 10 or display last numeral when the readout is stable), the 10th character in the string is a space. The reason: the last numeral without a decimal point is not blanked. Instead, it is given a definite zero; otherwise, the display would go completely blank when the balance is unloaded. In this case, you will obtain the standard display format.

* = space, E = unit

Unit symbols (standard balance):

* * *	No stability parameter	t l s	Singapore taels
g * *	Grams	t l t	Taiwanese taels
k g *	Kilograms	g r *	Grains
c t *	Carats	d w t	Pennyweights
l b *	Pounds	m g *	Milligrams
o z *	Ounces	% * *	Percent
o z t	Troy ounces	p c s	Pieces (parts)
t l h	Hong Kong taels		

Additional unit symbols (for balance models with an IAC):

/ l b	Parts/lb	K * *	Austrian karats
t l c	Chinese taels	t o l	Tola
m o m	Mommes	b a t	Baht

Special Codes

Special codes are output only if menu code 611, 614 or 615 is set (see "Data Output Parameters" in part 2).

Special status-dependent codes

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
*	*	*	*	*	*	A	B	*	*	*	*	*	*	CR	LF

The following status codes are output for "A B":

* * :	Tare	H * :	Overload
C * :	Calibrate*)	L * :	Underload
– – :	All numerals shown in stable readout		

If the balance is equipped with an **IAC**, the additional status codes can be output.

Special error-dependent codes

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
*	*	*	E	R	R	*	X	Y	Z	*	*	*	*	CR	LF

X = *, 0, 1, 2 as a one-place error code
Y Z = two-place error index code

* = space
*) = On balances with a built-in, motorized calibration weight, the displayed status code "C" will also be output when a print command is received.

Data Output with ID Code

When data with an ID code is output, the ID code consisting of 6 characters precedes the data with a 16-character format.

During data output, all characters are shifted to the right by 6 characters.

1st 7th 22nd character

K	K	K	K	K	K	V	x	x	x	x	x	x	x	x	*	E	E	E	CR	LF
	*	*	*	*	*	*	*	*	.	.	.	.	.	.			*	*	*		

V = Plus or minus sign
* = Space
x = Digit
E = Unit
. = Decimal point
K = Letter for an ID comment
CR = Carriage return
LF = Line feed

When special codes are output, the letters "Stat" for status code are assigned to the 1st through the 4th characters of the data string.

Status-dependent string:

1st 7th 13th14th 22nd character

S	t	a	t	*	*	*	*	*	*	*	*	A	B	*	*	*	*	*	*	CR	LF

Error-dependent string:

1st 7th 10th – 12th 14th – 16th 22nd character

S	t	a	t	*	*	*	*	*	E	R	R	*	X	Y	Z	*	*	*	*	CR	LF

A, B = status codes

Data Input Formats

Commands can be input via the balance interface port to control balance and application program functions.

Control commands are distinguished according to those with upper-case letters or special characters and those with lower-case letters.

Format for Control Commands

Control commands can include up to 13 characters.

Each character must be transmitted with a start bit, a 7-bit ASCII-coded character, a parity bit and one or two stop bits.

You can define the parity, baud rate and handshake mode, including the number of stop bits, by programming the respective codes in the balance operating menu (see page 5–13).

Formats:

ESC	K	CR	LF

ESC	K	X	_	CR	LF

ESC	K	X	X	X	X	X	X	X	X	_	CR	LF
		.	.	.	.	.	.	.				

ESC = Escape
K = Control letter
X = Number
. = Decimal point
_ = Underline
CR = Carriage return
LF = Line feed

The characters CR and LF do not have to be transmitted in the data string.

Control Commands with Upper-Case Letters or Special Characters

ESC	P	CR	LF	Print
ESC	Q	CR	LF	Acoustic signal
ESC	S	CR	LF	Self-test
ESC	T	CR	LF	Tare
ESC	Z	CR	LF	Internal calibration*

The P, Q, T and Z commands do not affect the code settings of the balance operating menu. The S command causes the processor to reinitialize (turns the balance off and back on again).

The balance will operate according to the commands available up until the processor is reinitialized. Once the balance has been turned on, the processor will always recognize the codes entered by the user in the balance operating menu.

ESC	O	CR	LF	Block keypad
ESC	R	CR	LF	Release keypad

Adaptation to Ambient Conditions

ESC	K	CR	LF	Very stable
ESC	L	CR	LF	Stable
ESC	M	CR	LF	Unstable
ESC	N	CR	LF	Very unstable

* = only on balances with a built-in, motorized calibration weight

Control Commands with Lower-Case Letters

All functions of the application programs that can be selected by pressing the respective keys on the balance can also be activated by commands.

Standard:

ESC	f	0	_	CR	LF	⮌ function key
ESC	f	1	_	CR	LF	F1 function key
ESC	f	2	_	CR	LF	F2 function key

For applications:

ESC	f	3	_	CR	LF	F3 function key
ESC	f	4	_	CR	LF	F4 function key
ESC	f	5	_	CR	LF	F5 function key
ESC	f	6	_	CR	LF	F6 function key
ESC	s	0	_	CR	LF	Info function i
ESC	s	1	_	CR	LF	Special function
ESC	s	2	_	CR	LF	Special function
ESC	s	3	_	CR	LF	Clear function CF
ESC	x	0	_	CR	LF	Sensitivity test*

In addition, the commands s4_ through s9_ can be defined in the same format.

A function for increasing the time that a key remains pressed can be activated by inserting an "l" before the control command for the corresponding function key.

ESC	l	f/s	x	_	CR	LF

l = lower-case "l"
f/s = Lower-case "f" or "s"
x = Any number from 0 to 9

* = only on balances with a built-in, motorized calibration weight (except LC balances/scales acceptable for legal metrological verification)

Numeric input (only on balances with a built-in IAC):

ESC	t	x	x	x	x	x	x	x	x	_	CR	LF
			.	.	.	.	.	.				

x = Any number which may include a plus or minus sign; can have anywhere from 1 to 7 places
. = Decimal point: "." or ","
_ = Underline (ASCII = 95)

The numeric value may not have more than 7 digits (excluding the decimal point).

Each control command with the lower-case letters f, s, t and x must be terminated by an underline (ASCII = 95).

Table of ASCII Characters for Decimals 000 through 127

The characters listed under the column "Char" can be generated by entering the decimals input under the column "Dec."

Char	Dec	Char	Dec	Char	Dec	Char	Dec	Char	Dec	Char	Dec	Char	Dec
NULL	000	DC3	019	°	038	9	057	L	076	_	095	r	114
SOH	001	DC4	020	'	039	:	058	M	077	`	096	s	115
STX	002	NAK	021	(	040	;	059	N	078	a	097	t	116
ETX	003	SYNC	022	)	041	<	060	O	079	b	098	u	117
EOT	004	ETB	023	*	042	=	061	P	080	c	099	v	118
ENQ	005	CAN	024	+	043	>	062	Q	081	d	100	w	119
ACK	006	EM	025	,	044	?	063	R	082	e	101	x	120
BELL	007	SUB	026	-	045	@	064	S	083	f	102	y	121
BS	008	ESC	027	.	046	A	065	T	084	g	103	z	122
HT	009	FS	028	/	047	B	066	U	085	h	104	{	123
LF	010	GS	029	0	048	C	067	V	086	i	105	|	124
VT	011	RS	030	1	049	D	068	W	087	j	106	}	125
FF	012	OS	031	2	050	E	069	X	088	k	107	~	126
CR	013		032	3	051	F	070	Y	089	l	108	Δ	127
SO	014	!	033	4	052	G	071	Z	090	m	109		
SI	015	"	034	5	053	H	072	[	091	n	110		
DLE	016	#	035	6	054	I	073	\	092	o	111		
DC1	017	$	036	7	055	J	074	]	093	p	112		
DC2	018	%	037	8	056	K	075	^	094	q	113		

In addition, you can also use the ASCII characters of the decimal equivalents 128 through 255.

Synchronization and Data Output Parameters

Definition

During data communication between the balance and an on-line device (computer), "telegram-style" information consisting of ASCII characters is transmitted by the interface.

For error-free data communication, the interface parameters including the baud rate, parity and handshake mode, as well as the character format, must be the same for both units.

You can change these parameters in the balance operating menu so that they match those of the on-line device.
In addition to these parameter settings, you can define the data output parameter of the balance so that data are transmitted depending on various conditions – for more information, see "Utilities" in Part 2.

If you do not plug a peripheral into the interface port on the balance, this will not generate an error message. In this case, data will be output but not received.

Handshake

The balance interface (Sartorius Balance Interface = SBI) has a 23-byte transmit buffer and a 40-byte receive buffer.

You can access the balance operating menu to define various handshake parameters:

Software handshake: controlled by "XOFF" and "XON"

Hardware handshake: – send 2 characters after "CTS"
– send 1 character after "CTS"

What happens when you define a software handshake?

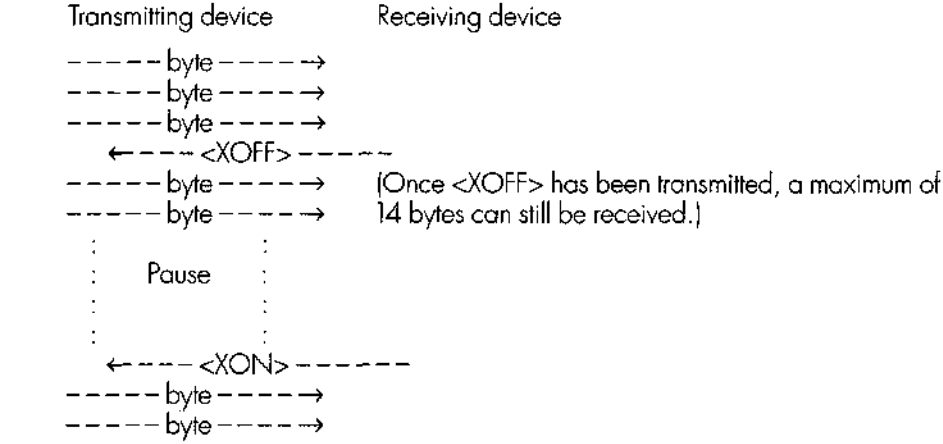
Receiving device:

"XOFF" will not be transmitted until the receive buffer has stored the 26th character. The enable command "XON" is given after the buffer has transmitted all characters up to the 14th character.

If the device addressed does not understand the control command, the SBI receiving device continues to operate additionally with a hardware handshake after it has received another 6 characters.

For data communication with a software handshake, "XON" must be sent by a device when it is turned on in order to enable another on-line device to exchange data.

Sequence:



Transmitting device:

The importance of such handshake control for data transmission becomes especially apparent
– when the continuous automatic data output parameter is defined
– when data output is controlled by application programs.

Once <XOFF> has been received, it prevents further transmission of characters. When <XON> is received, it re-enables the transmitting device to send data. The transmitting device is always enabled for sending data after it has been switched on.

If data transmission is interrupted by the control line (CTS) or the command <XOFF> while a data block is being output from an application program (only for printing a section of text with several lines of data), the readout will be locked into the display at the same time.
Data output will be blocked until the interface receives an enabling signal.

Activating a Data Output Process

You can define the data output parameter so that output is activated when a print command is received, or is activated automatically. You have two options for the automatic mode: data output can be either synchronous with the balance display update or activated at defined intervals (to select the parameter, see "Utilities" in Part 2).

Data Output by Print Command

The print command can be transmitted by a software command or by pressing the print key.

You can connect an external universal switch for remote control to the balance interface port (for the print function, see Part 2) in addition to an interface cable for a different device. For the switch, use pins 8 and 15 of this port and a cable up to 1.5 m or 5 ft long.

If data output is requested by a software command (see the section on "Data Input Formats"), you can install a 15 m (50 ft) cable for the RS-232C or a 300 m (984 ft) cable for the RS-423.

Automatic Data Output

In the "auto print" operating mode, the data are output to the interface port without requiring a print command. You can choose to have data output automatically at defined print intervals with or without the stability parameter. Whichever parameter you choose, the data will be output as the readouts are indicated in the balance display.

If you select the auto print setting, data will be transmitted immediately the moment you turn on the balance. Automatic data output can be stopped and restarted either when you press the print key, or when an external print command is received, if you have set menu code 6 2 1.

These data output functions are described in Part 2, "Utilities."

Settings for the Interface Parameters

Baud rate	Code	Changes
150 baud	5 1 1	
300 baud	5 1 2	
600 baud	5 1 3	
1,200 baud	5 1 4	*
2,400 baud	5 1 5	
4,800 baud	5 1 6	
9,600 baud	5 1 7	
19,200 baud	5 1 8	

Parity	Code	Changes
Mark parity	5 2 1	(*)
Space parity	5 2 2	(*)
Odd parity	5 2 3	*
Even parity	5 2 4	

No. of stop bits	Code	Changes
1 stop bit	5 3 1	*
2 stop bits	5 3 2	

Handshake mode	Code	Changes
Software handshake	5 4 1	
Hardware handshake with 2 characters after CTS	5 4 2	*
Hardware handshake with 1 character after CTS	5 4 3	

Utilities

Data output parameter		Changes
W/o stability	6 1 1	
After stability	6 1 2	*
At stability	6 1 3	
Auto w/o stability	6 1 4	
Auto after stabil.	6 1 5	

Data ID codes	Code	Changes
Without	7 2 1	*
With	7 2 2	

Automatic data output		Changes
Press key to stop	6 2 1	*
Not stoppable	6 2 2	

Print interval after:	Code	Changes
1 disp.update	6 3 1	*
2 disp.updates	6 3 2	
5 disp.updates	6 3 3	
10 disp.updates	6 3 4	
20 disp.updates	6 3 5	
50 disp.updates	6 3 6	
100 disp.updates	6 3 7	

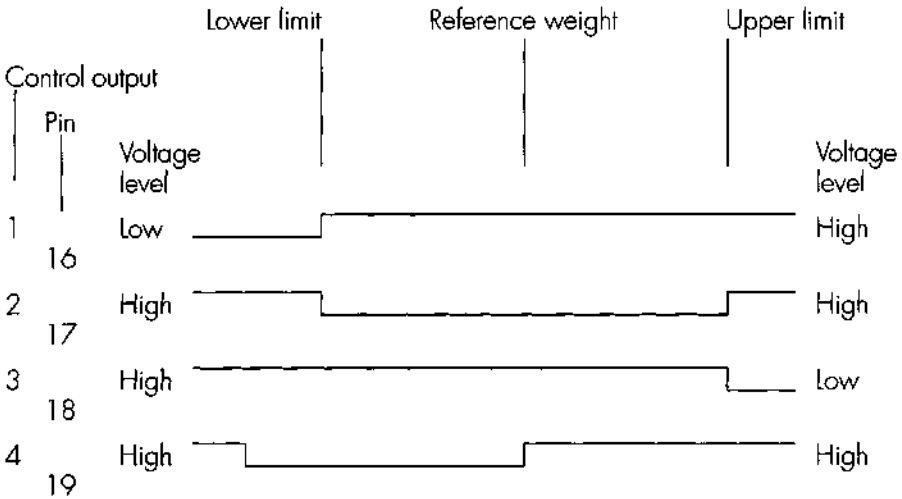
Auto taring after data output		Changes
Off	6 4 1	*
On	6 4 2	

* = factory setting
(*) = inaccessible on balances/scales acceptable for legal metrological verification

Control Lines

For classification or filling in the "over/under checkweighing" application program, you can use the voltage levels of four data output port lines to control an external on-line display or control instrument.

The voltage levels of the data output ports will change according to various patterns, depending on the reference weight and on the lower and upper weight limits.



Control output 1: lighter
Control output 2: equal
Control output 3: heavier
Control output 4: "set"

Pin Assignment Chart

Female Interface Connector:

25-position D-submini, DB25S with screw lock hardware for cable gland

Male Connector Used: (please use connectors with the same specifications)

25-pin D-submini, DB25S, with integrated shielded cable clamp assembly (Amp type 826 985-1 C) and fastening screws (mate screws for female screw lock, Amp type 164 868-1)

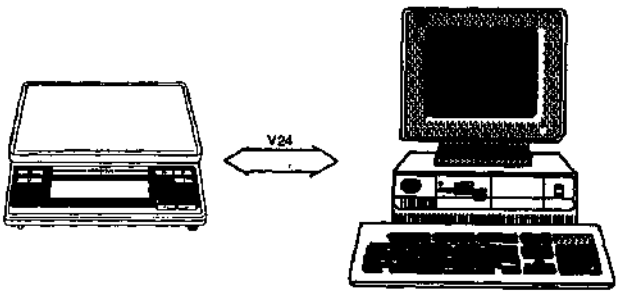
Pin Assignment:

Pin 1: Signal Ground
Pin 2: Data Output (TxD)
Pin 3: Data Input (RxD)
Pin 4: "Signal Return" (TxD/RxD)
Pin 5: Clear to Send (CTS)
Pin 6: Internally Connected
Pin 7: Internal Ground
Pin 8: Internal Ground
Pin 9: Reset_In*)
Pin 10: –12 V
Pin 11: +12 V
Pin 12: Reset_Out*)
Pin 13: +5 V
Pin 14: Internal Ground
Pin 15: Universal Switch
Pin 16: Over/Under Checkweighing: Lighter
Pin 17: Over/Under Checkweighing: Equal
Pin 18: Over/Under Checkweighing: Heavier
Pin 19: Over/Under Checkweighing: "Set"
Pin 20: Data Terminal Ready (DTR)
Pin 21: Supply Voltage Ground "COM"
Pin 22: Not Connected
Pin 23: Not Connected
Pin 24: Supply Voltage Input +15..25 V
Pin 25: +5 V

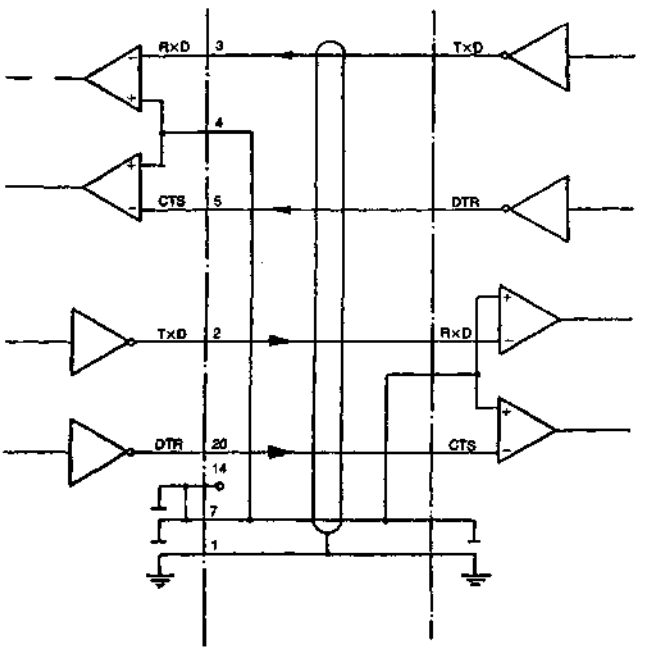
*) = hardware restart

Cabling Diagram

Diagram for interfacing a computer or other peripheral to the balance using the RS-232C/V24 standard and interface cables up to 15 m (50 ft) long



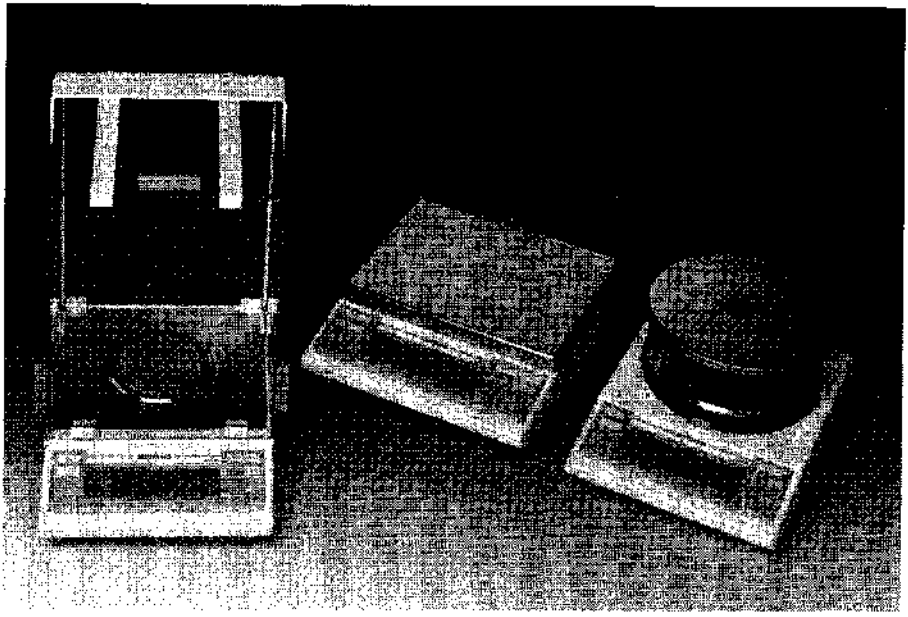
Balance/Scale **Peripheral**



Type of cable: AWG 24 specification

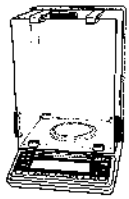
Sartorius Master Series

Product Data Sheets



Specifications: Master Series

Model	
Weighing range structure	
Capacity/weighing range levels	g
Readability	g
Tare range (by subtraction)	g
Reproducibility (standard deviation)	g
Linearity	g
Response time (average)	s
Shortest response time in the IQ-mode	s
Adaptation to ambient conditions and application requirements	
Display update (depends on the filter level selected)	s
Sensitivity drift within 283–303 K	/K
Ambient temperature range	K
Moisture-proof rating acc. to DIN 40040	
Pan size	mm/in
Weighing chamber (WxDxH)	mm/in
Clearance above the weighing pan	mm/in
Net weight, approx.	kg/lb
AC power source/power requirements	V~
Frequency	Hz
Power consumption	VA
Selectable weight units	
Application programs	
Automatic zero tracking function (can be turned off by menu code)	
Built-in interface	
Standard features/equipment supplied	
Dust cover	
Analytical draft shield chamber	
AC adapter	
Hanger for below-balance weighing	
"isoCAL" self-calibration function	
ISO/GLP-compliant record/printout	
Numeric keypad	



AC 211 S-00MS	AC 211 P-00MS	AC 121 S-00MS
SuperRange	PolyRange	SuperRange
210	60/120/210	120
0.0001	0.0001/0.0002/0.0005	0.0001
–210	–210	–120
≤±0.0001	≤±0.0001/0.0002/0.0005	≤±0.0001
≤±0.0002	≤±0.0002/0.0004/0.0005	≤±0.0002
≤2.5		
1.5		
by selection of 1 of 4 optimized filter levels		
0.1–0.4		
$\leq \pm 2 \cdot 10^{-6}$		
283–303 (+10°C...+30°C; +50°F...+86°F)		
Class F, non-condensing		
90 Ø/3.5 Ø		
200x180x260/8x7.1x10.2		
254/10		
7.5/16.5		
via AC adapter, 230 or 115, +15%...–20%		
48–60		
max.: 16; average: 8		
g, kg, ct, lb, oz, ozt, tlh, tls, tlt, gr, dwt, mg, /lb, tlc, mom, K, tol and bat		
formulation; statistics; averaging; real-time clock with timer function for time-controlled measurements/ weighing; calculation of weights; totalling of weights; density determination; ID no. for identification of data; mass unit conversion by toggling; tare memory; net total; weighing in percent; over/under checkweighing; counting		
standard feature		
RS-232C-S/V24-V28; 7-bit; parity: even, mark, odd, space; transmission rate: 150...19,200 baud; 1 or 2 stop bits; software/hardware handshake		
x	x	x
x	x	x
x	x	x
x	x	x
x	x	x
x	x	x
x	x	x

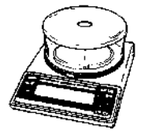
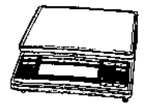
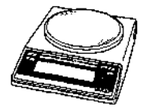
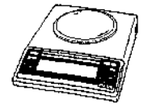
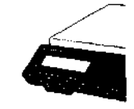
Specifications: MC1 Product Line[1]

Model	
Weighing range structure	
Capacity/weighing range levels	g
Readability	g
Tare range (by subtraction)	g
Reproducibility (standard deviation)	g
Linearity	g
Response time (average)	s
Shortest response time in the IQ-mode	s
Adaptation to ambient conditions and application requirements	
Display update (depends on the filter level selected)	s
Sensitivity drift within 283–303 K	/K
Ambient temperature range	K
Moisture-proof rating acc. to DIN 40040	
Pan size	mm/in
Weighing chamber (WxDxH)	mm/in
Clearance above the weighing pan	mm/in
Net weight, approx.	kg/lb
AC power source/power requirements	V~
Frequency	Hz
Power consumption	VA
Selectable weight units	
Application programs	
Automatic zero tracking function (can be turned off by menu code)	
Built-in interface	

Standard features/equipment supplied
Dust cover
Analytical draft shield chamber
AC adapter
Hanger for below-balance weighing
Built-in, motorized calibration weight

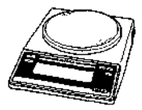
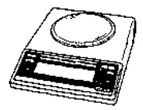
[1] Balances of the MC1 Product Line cannot be upgraded to Master series balances but can be retrofitted with a (Integrated Applications Computer) for complex applications.

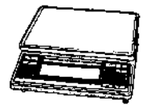
Specifications: MC1 Product Line[1)]

Model		LC 3201 D	LC 1201 S	LC 621 S	LC 621 P	LC 221 S	LC 6201 S	LC 4801 P	LC 4201 S	LC 2201 S	LC 2201 P	LC 821	LC 421	LC 34000 P
Weighing range structure		DualRange	SuperRange	SuperRange	PolyRange	SuperRange	SuperRange	PolyRange	SuperRange	SuperRange	PolyRange			PolyRange
Capacity/weighing range levels	g	1,000/3,200	1,200	620	120/240/620	220	6,200	800/1,600/3,000/4,800	4,200	2,200	400/800/2,200	820	420	8,000/16,000/34,000
Readability	g	0.001/0.01	0.001	0.001	0.001/0.002/0.005	0.001	0.01	0.01/0.02/0.05/0.1	0.01	0.01	0.01/0.02/0.05	0.01	0.01	0.1/0.2/0.5
Tare range (by subtraction)	g	–3,200	–1,200	–620	–620	–220	–6,200	–4,800	–4,200	–2,200	–2,200	–820	–420	–34,000
Reproducibility (standard deviation)	g	≤±0.001/0.01	≤±0.001	≤±0.001	≤±0.001/0.001/0.003	≤±0.001	≤±0.01	≤±0.01/0.02/0.05/0.1	≤±0.01	≤±0.005	≤±0.01/0.01/0.03	≤±0.005	≤±0.005	≤±0.1/0.2/0.5
Linearity	g	≤±0.002/0.01	≤±0.002	≤±0.002	≤±0.002/0.002/0.005	≤±0.002	≤±0.02	≤±0.02/0.02/0.03/0.05	≤±0.02	≤±0.02	≤±0.02/0.02/0.05	≤±0.01	≤±0.01	≤±0.2/0.2/0.5
Response time (average)	s	←							≤1.5					→
Shortest response time in the IQ-Mode	s	←			1			→			0.8			→
Adaptation to ambient conditions and application requirements		←									by selection of 1 of 4 optimized filter levels			→
Display update (depends on the filter level selected)	s	←									0.1–0.4			→
Sensitivity drift within 283–303 K	/K	←					≤± 2 · 10⁻⁶						≤± 4 · 10⁻⁶	→
Ambient temperature range	K	←									273–313 (0°C...+40°C; +32°F – +104°F)			→
Moisture-proof rating acc. to DIN 40040		←									class F, non-condensing			→
Pan size	mm/in	←			130 Ø/5.1 Ø			→	235x180/9.3x7.1		→	170 Ø/6.7 Ø	130 Ø/5.1 Ø	→ 417x307/16.5
Net weight, approx.	kg/lb	← 6.5		→	5.5		← 6.5	→	5.5		→	3.6		→ 15
AC power source/power requirements	V~	←									via AC adapter, 230 or 115, –20%...+15%			→
Frequency	Hz	←									48–60			→
Power consumption	VA	←						max.: 16; average: 8						→ max.: 18; aver
Selectable weight units		←									g, kg, ct, lb, oz, ozt, tlh, tls, tlt, gr, dwt and mg			→
Application programs		←									mass unit conversion by toggling; tare memory; net total; weighing in percent; over/under checkweighing (classification and filling); counting			→
Automatic zero tracking function (can be turned off by menu code)		←									standard feature			→
Built-in interface		←									RS-232C-S/V24-V28; 7-bit; parity: even, mark, odd, space; transmission rate: 150...19,200 baud; 1 or 2 stop bits; software/hardware handshake			→
Standard features/equipment supplied														
Dust cover		x	x	x	x	x	x	x	x	x	x	x	x	
Draft shield		x	x	x	x	x	x							
AC adapter		x	x	x	x	x	x	x	x	x	x	x	x	x
Hanger for below-balance weighing		x	x	x	x	x	x	x	x	x	x	x	x	
Built-in, motorized calibration weight		x	x				x							

[1)] Balances of the MC1 Product Line cannot be upgraded to Master series balances but can be retrofitted with an IAC (Integrated Applications Computer) for complex applications.

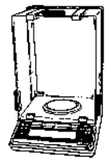


2201 S	LC 2201 P	LC 821	LC 421	LC 34000 P	LC 16000 S	LC 12001 S	LC 12001 P	LC 6201	LC 4201	LC 34
erRange	PolyRange			PolyRange	SuperRange	SuperRange	PolyRange			
00	400/800/2,200	820	420	8,000/16,000/34,000	16,000	12,000	3,000/6,000/12,000	6,200	4,200	34,000
1	0.01/0.02/0.05	0.01	0.01	0.1/0.2/0.5	0.1	0.1	0.1/0.2/0.5	0.1	0.1	1
200	–2,200	–820	–420	–34,000	–16,000	–12,000	–12,000	–6,200	–4,200	–34,000
.005	≤±0.01/0.01/0.03	≤±0.005	≤±0.005	≤±0.1/0.2/0.5	≤±0.1	≤±0.1	≤±0.1/0.1/0.2	≤±0.1	≤±0.1	≤±0.5
.02	≤±0.02/0.02/0.05	≤±0.01	≤±0.01	≤±0.2/0.2/0.5	≤±0.2	≤±0.1	≤±0.1/0.2/0.5	≤±0.1	≤±0.1	≤±1
						≤1				
0.8						0.7				
by selection of 1 of 4 optimized filter levels										
0.1–0.4										
			≤± 4 · 10⁻⁶		≤± 2.5 · 10⁻⁶		≤± 4 · 10⁻⁶			≤± 10 · 10⁻⁶
273–313 (0°C...+40°C; +32°F – +104°F)										
class F, non-condensing										
170 Ø/6.7 Ø		130 Ø/5.1 Ø		417x307/16.5x12.1			235x180/9.3x7.1			417x307/16.5x12.1
3.6				15			4			15
via AC adapter, 230 or 115, –20%...+15%										
48–60										
				max.: 18; average: 10			max.: 16; average: 8			m: 18; avg: 10
g, kg, ct, lb, oz, ozt, ilh, tls, tlt, gr, dwt and mg										
nory; net total; weighing in percent; over/under checkweighing (classification and filling); counting										
standard feature										
k, odd, space; transmission rate: 150...19,200 baud; 1 or 2 stop bits; software/hardware handshake										
	x	x	x			x	x	x	x	
	x	x	x	x	x	x	x	x	x	x
	x	x	x			x	x	x	x	

Specifications – Gold Series[1]

Model	
Capacity/readability	Grams Troy ounces Pennyweights
Tare range (by subtraction)	g
Reproducibility (Standard deviation)	g
Linearity	g
Response time (average)	s
Shortest response time in the IQ-Mode	s
Adaptation to ambient conditions and application requirements	
Display update (depends on the filter level selected)	s
Sensitivity drift within 283...303 K	/K
Ambient temperature range	K
Moisture-proof rating acc. to DIN 40040	
Pan size	mm/in
Net weight, approx.	kg
AC power source/power requirements	V~
Frequency	Hz
Power consumption	VA
Selectable weight units	
Application programs	
Automatic zero tracking function (can be turned off by menu code)	
Built-in interface	
Standard features/equipment supplied	
Dust cover	
AC adapter	
Hanger for below-scale weighing	

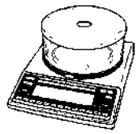
[1] Cannot be upgraded to Master series balances but can be retrofitted with an IAC (Integrated Applications Computer) for complex applications.



AC 211 S	AC 211 P	AC 121 S
SuperRange	PolyRange	SuperRange
210	60/120/210	120
0.0001	0.0001/0.0002/0.0005	0.0001
–210	–210	–120
≤±0.0001	≤±0.0001/0.0002/0.0005	≤±0.0001
≤±0.0002	≤±0.0002/0.0004/0.0005	≤±0.0002
≤2.5		
1.5		
by selection of 1 of 4 optimized filter levels		
0.1–0.4		
$\leq \pm 2 \cdot 10^{-6}$		
283–303 (+10°C...+30°C; +50°F...+86°F)		
Class F, non-condensing		
90 Ø/3.5 Ø		
200x180x260/8x7.1x10.2		
254/10		
7.5/16.5		
via AC adapter, 230 or 115, +15%...–20%		
48–60		
max.: 16; average: 8		
g, kg, ct, lb, oz, ozt, tlh, tls, tlt, gr, dwt and mg		
mass unit conversion by toggling; tare memory; net total; weighing in percent; over/under checkweighing (classification and filling); counting		
standard feature		
RS-232C-S/V24-V28; 7-bit; parity: even, mark, odd, space; *transmission rate:* 150...19,200 baud; 1 or 2 *stop bits; software/hardware handshake*		
x	x	x
x	x	x
x	x	x
x	x	x
x	x	x

6-5

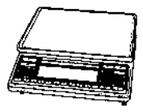
Specifications: Master Series

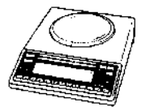
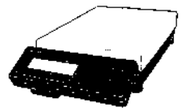
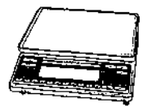
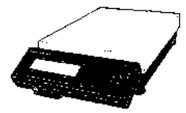


Model		LC 3201 D-00MS	LC 1201 S-00MS	LC 621 S-00MS	LC 621 P-00MS	LC 221 S-00MS	LC 6201 S-00MS	LC 4801 P-00MS	LC 4201 S-00MS
Weighing range structure		DualRange	SuperRange	SuperRange	PolyRange	SuperRange	SuperRange	PolyRange	SuperRange
Capacity/weighing range levels	g	1,000/3,200	1,200	620	120/240/620	220	6,200	800/1,600/3,000/4,800	4,200
Readability	g	0.001/0.01	0.001	0.001	0.001/0.002/0.005	0.001	0.01	0.01/0.02/0.05/0.1	0.01
Tare range (by subtraction)	g	–3,200	–1,200	–620	–620	–220	–6,200	–4,800	–4,200
Reproducibility (standard deviation)	g	≤±0.001/0.01	≤±0.001	≤±0.001	≤±0.001/0.001/0.003	≤±0.001	≤±0.01	≤±0.01/0.02/0.05/0.1	≤±0.01
Linearity	g	≤±0.002/0.01	≤±0.002	≤±0.002	≤±0.002/0.002/0.005	≤±0.002	≤±0.02	≤±0.02/0.02/0.03/0.05	≤±0.02
Response time (average)	s	←							≤1.5 →
Shortest response time in the IQ-Mode	s	←			1				→
Adaptation to ambient conditions and application requirements		←							→
Display update (depends on the filter level selected)	s	←							→
Sensitivity drift within 283–303 K	/K	←					$\leq \pm 2 \cdot 10^{-6}$		→
Ambient temperature range	K	←							→
Moisture-proof rating acc. to DIN 40040		←							→
Pan size	mm/in	←		130 Ø/5.1 Ø				235x180/9.3x7.1	→
Net weight, approx.	kg/lb	← 6.5		→	5.5		→ 6.5	→	5.5 →
AC power source/power requirements	V~	←							→
Frequency	Hz	←							→
Power consumption	VA	←						max.: 16; average: 8	→
Selectable weight units		←							g →
Application programs		←			formulation; statistics; real-time clock with timer function for time-controlled measurements/weighing; calculation of weights; totalling				→
Automatic zero tracking function (can be turned off by menu code)		←							→
Built-in interface		←							RS-232C-S/V24-V28; 7-bit; parity: even →
Standard features/equipment supplied									
Dust cover		x	x	x	x	x	x	x	x
Draft shield		x	x	x	x	x	x	x	x
AC adapter		x	x	x	x	x	x	x	x
Hanger for below-balance weighing		x	x	x	x	x	x	x	x
"isoCAL" self-calibration function		x	x	x	x	x	x	x	x
ISO/GLP-compliant record/printout		x	x	x	x	x	x	x	x
Numeric keypad		x	x	x	x	x	x	x	x

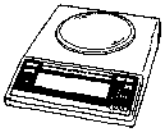
6-6

6-7



›MS	LC 221 S-00MS	LC 6201 S-00MS	LC 4801 P-00MS	LC 4201 S-00MS	LC 2201 S-00MS	LC 2201 P-00MS	LC 821-00MS	LC 421-00MS	LC 34000 P-00MS	LC 16000 S-00MS	LC 12001 S-00MS	LC 12001 P-00MS	LC 6201-00MS	LC 4201-00MS	LC 34-00MS
	SuperRange	SuperRange	PolyRange	SuperRange	SuperRange	PolyRange			PolyRange	SuperRange	SuperRange	PolyRange			
620	220	6,200	800/1,600/3,000/4,800	4,200	2,200	400/800/2,200	820	420	8,000/16,000/34,000	16,000	12,000	3,000/6,000/12,000	6,200	4,200	34,000
02/0.005	0.001	0.01	0.01/0.02/0.05/0.1	0.01	0.01	0.01/0.02/0.05	0.01	0.01	0.1/0.2/0.5	0.1	0.1	0.1/0.2/0.5	0.1	0.1	1
	–220	–6,200	–4,800	–4,200	–2,200	–2,200	–820	–420	–34,000	–16,000	–12,000	–12,000	–6,200	–4,200	–34,000
.001/0.003	≤±0.001	≤±0.01	≤±0.01/0.02/0.05/0.1	≤±0.01	≤±0.005	≤±0.01/0.01/0.03	≤±0.005	≤±0.005	≤±0.1/0.2/0.5	≤±0.1	≤±0.1	≤±0.1/0.1/0.2	≤±0.1	≤±0.1	≤±0.5
.002/0.005	≤±0.002	≤±0.02	≤±0.02/0.02/0.03/0.05	≤±0.02	≤±0.02	≤±0.02/0.02/0.05	≤±0.01	≤±0.01	≤±0.2/0.2/0.5	≤±0.2	≤±0.1	≤±0.1/0.2/0.5	≤±0.1	≤±0.1	≤±1
	≤1.5										≤1				
	0.8										0.7				
	by selection of 1 of 4 optimized filter levels														
	0.1–0.4														
	≤± 2 · 10⁻⁶							≤± 4 · 10⁻⁶		≤± 2.5 ·10⁻⁶		≤± 4 · 10⁻⁶			≤± 10 · 10⁻⁶
	273–313 (0°C...+40°C; +32 °F – +104 °F)														
	class F, non-condensing														
	235x180/9.3x7.1			170 Ø/6.7 Ø				130 Ø/5.1 Ø		417x307/16.5x12.1		235x180/9.3x7.1			417x307/16.5x12.1
5.5	6.5		5.5	3.6					15			4			15
	via AC adapter, 230 or 115, –20%...+15%														
	48–60														
	max.: 16; average: 8								max.: 18; average: 10			max.: 16; average: 8			m: 18; avg: 10
	g, kg, ct, lb, oz, ozt, ilh, tls, tll, gr, dwt, mg, /lb, tlc, mom, K, tol and bat														
; real-time clock with timer function for time-controlled measurements/weighing; calculation of weights; totalling of weights; ID no. for identification of data; density determination; animal weighing; mass unit conversion by toggling; tare memory; net total; weighing in percent; over/under checkweighing; counting															
	standard feature														
	RS-232C-S/V24-V28; 7-bit; parity: even, mark, odd, space; transmission rate: 150...19,200 baud; 1 or 2 stop bits; software/hardware handshake														
	x	x	x	x	x	x	x	x			x	x	x	x	
	x	x	x	x											
	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	x	x	x	x	x	x	x	x			x	x	x	x	
	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x



GC 1201-G
1,200 g/0.01 g 38.5 ozt/0.0005 ozt 771 dwt/0.005 dwt
–1,200
≤±0.005
≤±0.02
≤1.5
0.8
by selection of 1 of 4 optimized filter levels
0.1–0.4
$\leq \pm 2 \cdot 10^{-6}$
273...313 (0°C...+40°C; 32°F...104°F)
Class F, non-condensing
130/5.1 Ø
3.6
via AC adapter, 230 or 115, +15%...–20%
48–60
max.: 16; average: 8
g, kg, ct, lb, oz, ozt, tlh, tls, tlt, gr, dwt and mg
mass unit conversion by toggling; weighing in percent; tare memory; net total, over/under checkweighing (classification and filling); counting
standard feature
RS-232C-S/V24-V28; 7-bit; parity: even, mark, odd, space; transmission rate: 150...19,200 baud, 1 or 2 stop bits, software/hardware handshake
x
x
x

Specifications: Master Series – EC-Approved Models Acceptable for Verification

Model	
Pattern/type designation	
Accuracy class*	
Weighing range structure	
Max. capacity*	g
Scale interval d*	g
Verification scale interval e*	g
Minimum capacity*	g
Tare range (by subtraction)	%
Range of use acc. to Directive No. 90/384/EEC*	g
Range of use acc. to the Directive for Prepackaged Products**	g
Response time (average)	s
Adaptation to ambient conditions and application requirements	
Display update (depends on the filter level selected)	s
Range of use (temperature)	°C/°F
Moisture-proof rating acc. to DIN 40040	
Pan size	mm/in
Weighing chamber (WxDxH)	mm/in
Clearance above the weighing pan	mm/in
Net weight, approx.	kg/lb
AC power source/power requirements	V~
Frequency	Hz
Power consumption	VA
Selectable weight units	
Application programs	
Automatic zero tracking function (can be turned off by menu code)	
Built-in interface	
Standard features/equipment supplied	
Dust cover	
Analytical draft shield chamber	
AC adapter	
"isoCAL" self-calibration function	
ISO/GLP-compliant record/printout	
Numeric keypad	

* EC Directive No. 90/384/EEC for Non-Automatic Weighing Instruments applicable in the EC/EU member states

** Directive for Prepackaged Products applicable in Germany

AC 211 S-0CEMS	AC 211 P-0CEMS	AC 121 S-0CEMS
MC BA 100		
(I)		
SuperRange	PolyRange	SuperRange
210	60/120/210	120
0.0001	0.0001/0.0002/0.0005	0.0001
0.001		
0.01		
up to 105 of maximum capacity		
0.01–210	0.01–210	0.01–120
0.01–210	0.01–210	0.01–120
≤2.5		
by selection of 1 of 4 optimized filter levels		
0.1–0.4		
0 to +40/+32 – +104		
Class F, non-condensing		
90 Ø/3.5 Ø		
200×180×260/8×7.1×10.2		
254/10		
7.5/16.5		
via AC adapter, 230 or 115, +15%...–20%		
48–60		
max.: 16; average: 8		
g, ct		
formulation; statistics; real-time clock with timer function for time-controlled measurements/weighing; tare memory; animal weighing/averaging; ID no. for identification of data; mass unit conversion by toggling; net total; weighing in percent; over/under checkweighing; counting		
standard feature		
RS-232C-S/V24-V28; 7-bit; parity: even, odd; transmission rate: 150...19,200 baud; 1 or 2 stop bits; software/hardware handshake		
x	x	x
x	x	x
x	x	x
x	x	x
x	x	x
x	x	x

Specifications: MC1 Product Line[1] – EC-Approved Models Acceptable for Verification

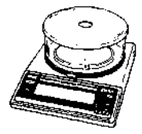
Model	
Pattern/type designation	
Accuracy class*	
Weighing range structure	
Max. capacity*	g
Scale interval d*	g
Verification scale interval e*	g
Minimum capacity*	g
Tare range (by subtraction)	%
Range of use acc. to Directive No. 90/384/EEC*	g
Range of use acc. to the Directive for Prepackaged Products**	g
Response time (average)	s
Adaptation to ambient conditions and application requirements	
Display update (depends on the filter level selected)	s
Range of use (temperature)	
Moisture-proof rating acc. to DIN 40040	
Pan size	mm/in
Weighing chamber (WxDxH)	mm/in
Clearance above the weighing pan	mm/in
Net weight, approx.	kg/lb
AC power source/power requirements	V~
Frequency	Hz
Power consumption	VA
Selectable weight units	
Application programs	
Automatic zero tracking function (can be turned off by menu code)	
Built-in interface	
Standard features/equipment supplied	
Dust cover	
Analytical draft shield chamber	
AC adapter	
Built-in, motorized calibration weight	

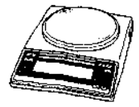
* EC Directive No. 90/384/EEC for Non-Automatic Weighing Instruments applicable in the EC/EU member states

** Directive for Prepackaged Products applicable in Germany

[1] Balances of the MC1 Product Line cannot be upgraded to Master series balances but can be retrofitted with c (Integrated Applications Computer) for complex applications.

Specifications: MC1 Product Line[1] – EC-Approved Models Acceptable for Verification

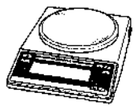
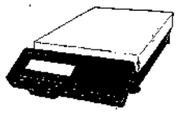




Model		LC 1201 S-0CE	LC 621 S-0CE	LC 621 P-0CE	LC 221 S-0CE	LC 6201 S-0CE	LC 4801 P-0CE	LC 4201 S-0CE	LC 2201 S-0CE	LC 2201 P-0CE	LC 821-0CE	LC 34000 P-0CE
Pattern/type designation		MD BA 100	MD BA 200				MA BA 200		BA BA 200			Bl
Accuracy class*		(I)							(II)			
Weighing range structure		SuperRange	SuperRange	PolyRange	SuperRange	SuperRange	PolyRange	SuperRange	SuperRange	PolyRange		PolyRange
Max. capacity*	g	1,200	620	120/240/620	220	6,200	800/1,600/3,000/4,800	4,200	2,200	400/800/2,200	820	8,000/16,000/34,0(
Scale interval d*	g	0.001	0.001	0.001/0.002/0.005	0.001	0.01	0.01/0.02/0.05/0.1	0.01	0.01	0.01/0.02/0.05	0.01	0.1/0.2/0.5
Verification scale interval e*	g	0.01	0.01	0.01	0.01	0.1	0.1	0.1	0.1	0.1	0.1	1
Minimum capacity*	g	0.1	0.02	0.02	0.02	0.5	0.5	0.5	0.5	0.5	0.5	5
Tare range (by subtraction)	%	≤ 105 von Max.										
Range of use acc. to Directive No. 90/384/EEC*	g	0.1–1,200	0.02–620	0.02–620	0.02–220	0.5–620	0.5–4,800	0.5–4,200	0.5–2,200	0.5–2,200	0.5–820	5–34,000
Range of use acc. to the Directive for Prepackaged Products**	g	0.1–1,200	0.02–620	0.02–620	0.02–220	0.5–620	0.5–4,800	0.5–4,200	0.5–2,200	0.5–2,200	0.5–820	150–34,000
Response time (average)	s	≤ 1.5										
Adaptation to ambient conditions and application requirements		by selection of 1 of 4 optimized filter levels										
Display update (depends on the filter level selected)	s	0.1–0.4										
Range of use (temperature)	°C	+18 to +25[2]							+10 – +30 (+50°F…+86°F)			
Moisture-proof rating acc. DIN 40040		Class F, non condensing										
Pan size	mm	130 Ø/5.1 Ø					235x180/9.3x7.1		170 Ø/6.7 Ø			417x3(
Net weight, approx.	kg/lb	6.5							4.5			
AC power source/power requirements	V~	via AC adapter, 230 or 115, +15%…20%										
Frequency	Hz	48–60										
Power consumption	VA	max.: 16; average: 8										max.: 1
Selectable weight units		g, kg										
Application programs		mass unit conversion by toggling; tare memory; net total; weighing in percent; over/under checkweighing (classification and filling); counting										
Automatic zero tracking function (can be turned off by menu code)		standard feature										
Built-in interface		RS-232C-S/V24-V28; 7-bit; parity: even, odd; transmission rate: 150…19,200 baud; 1 or 2 stop bits; software/hardware handshake										
Standard features/equipment supplied												
Dust cover		x	x	x	x	x	x	x	x	x	x	
Draft shield		x	x	x	x	x	x	x				
AC adapter		x	x	x	x	x	x	x	x	x	x	x
Built-in, motorized calibration weight		x	x	x	x	x	x	x	x	x	x	x

* EC Directive No. 90/384/EEC for Non-Automatic Weighing Instruments applicable in the EC/EU member states
** Directive for Prepackaged Products applicable in Germany

[1] Balances of the MC1 Product Line cannot be upgraded to Master series balances but can be retrofitted with an IAC (Integrated Applications Computer) for complex applications.
[2] 5°C within the range of +18 to +25°C

LC 2201 S-0CE	LC 2201 P-0CE	LC 821-0CE	LC 34000 P-0CE	LC 16000 S-0CE	LC 12001 S-0CE	LC 12001 P-0CE	LC 6201-0CE	LC 34-0CE
←	BA BA 200		←	BB BA 200	←	BA BA 200		← BB BA 200 →
	(II)							
SuperRange	PolyRange		PolyRange	SuperRange	SuperRange	PolyRange		
2,200	400/800/2,200	820	8,000/16,000/34,000	16,000	12,000	3,000/6,000/12,000	6,200	34,000
0.01	0.01/0.02/0.05	0.01	0.1/0.2/0.5	0.1	0.1	0.1/0.2/0.5	0.1	1
0.1	0.1	0.1	1	1	1	1	1	1
0.5	0.5	0.5	5	5	5	5	5	50
←	≤ 105 von Max.							→
0.5–2,200	0.5–2,200	0.5–820	5–34,000	5–16,000	5–12,000	5–12,000	5–6,200	50–34,000
0.5–2,200	0.5–2,200	0.5–820	150–34,000	150–16,000	150–12,000	150–12,000	150–6,200	150–34,000
			←	≤ 1				→
←	by selection of 1 of 4 optimized filter levels							→
←	0.1–0.4							→
←	+10 – +30 (+50°F...+86°F)							→
←	Class F, non condensing							→
←	170 Ø/6.7 Ø		←	417x307/16.5x12.1	←	235x180/9.3x7.1		← 417x307/16.5x12.1 →
←	4.5		←	15	←	4,5		← 15 →
←	via AC adapter, 230 or 115, +15%...20%							→
←	48–60							→
			←	max.: 18; average: 10	←	max.: 16; average: 8		← max.: 18; avg.: 10 →
←	g, kg							→
nory; net total; weighing in percent; over/under checkweighing (classification and filling); counting								→
←	standard feature							→
en, odd; transmission rate: 150...19,200 baud; 1 or 2 stop bits; software/hardware handshake								→
x	x	x			x	x	x	
x	x	x	x	x	x	x	x	x
x	x	x	x	x	x	x	x	x

English translation of the original EC Pattern Approval in German

Physikalisch-Technische Bundesanstalt

(German Federal Institute of Physics and Metrology)

EC Pattern Approval

Approval Certificate No. D93-09-148

Non-Automatic Weighing Instruments
Types KB BA 100, KC BA 100, MC BA 100, MC BB 100 and MD BA 100

Issued by	Physikalisch-Technische Bundesanstalt
in compliance with	Section 13 of the German Weights and Measures Act ("Eichgesetz") of March 23, 1992 (German Federal Law Gazette "BGBl." I p. 711), and Section 7c (2) of the German Weights and Measures Regulations ("Eichordnung") as amended on September 24, 1992 (BGBl. I p. 1653), which conform to the Council Directive 90/384/EEC on Non-Automatic Weighing Instruments.
Applicant	Sartorius AG Weender Landstrasse 94–108 D-37075 Goettingen Federal Republic of Germany
Instrument certified hereunder	A non-automatic electromechanical weighing instrument, Accuracy class (II) Max: 1 g to 1,210 g Number of verification scale intervals: $n_e \leq 250{,}000$
Valid through	October 18, 2003

The major features, approval requirements and conditions are contained in the Annex hereto, which is an integral part of this Approval Certificate and comprises 6 pages.

By order of
(signature)
Brandes

Braunschweig, 19 Oct. 1993
Reference No. 1.13-92.131

Name and address of the office issuing the certificate:

Physikalisch-Technische Bundesanstalt
Bundesallee 100
D-38116 Braunschweig
Federal Republic of Germany

Seal of the Physikalisch-Technische Bundesanstalt

– See the next page for information and directions on available legal remedies. –
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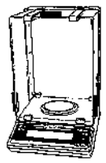
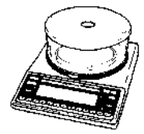
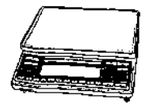
Only unchanged approval certificates may be reproduced and distributed.
Excerpts and changes must be approved by the Physikalisch-Technische Bundesanstalt



AC 211 S-0CE	AC 211 P-0CE	AC 121 S-0CE
← MC BA 100 →		
← (I) →		
SuperRange	PolyRange	SuperRange
210	60/120/210	120
0.0001	0.0001/0.0002/0.0005	0.0001
← 0.001 →		
← 0.01 →		
← up to 105 of maximum capacity →		
0.01–210	0.01–210	0.01–120
0.01–210	0.01–210	0.01–120
← ≤2.5 →		
← by selection of 1 of 4 optimized filter levels →		
← 0.1–0.4 →		
← 5°C between +15°C to +25°C →		
← Class F, non-condensing →		
← 90 Ø/3.5 Ø →		
← 200x180x260/8x7.1x10.2 →		
← 254/10 →		
← 7.5/16.5 →		
← via AC adapter, 230 or 115, +15%...–20% →		
← 48–60 →		
← max.: 16; average: 8 →		
← g, ct →		
← mass unit conversion by toggling; tare memory; net total; weighing in percent; over/under checkweighing (classification and filling); counting →		
← standard feature →		
← RS-232C-S/V24-V28; 7-bit; parity: even, odd; transmission rate: 150...19,200 baud; 1 or 2 stop bits; software/hardware handshake →		
x	x	x
x	x	x
x	x	x
x	x	x

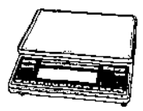
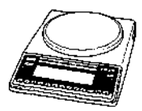
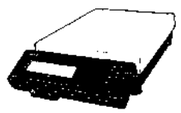
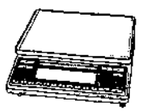
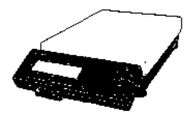
Specifications: Master Series – EC-Approved Models Acceptable for Verification





Model		LC 1201 S-0CEMS	LC 621 S-0CEMS	LC 621 P-0CEMS	LC 221 S-0CEMS	LC 6201 S-0CEMS	LC 4801 P-0CEMS	LC 4201 S-0CEM
Pattern/type designation		← MD BA 100 →		← MD BA 200 →			← MA BA 200 →	
Accuracy class*		← (I) →						
Weighing range structure		SuperRange	SuperRange	PolyRange	SuperRange	SuperRange	PolyRange	SuperRange
Max. capacity*	g	1,200	620	120/240/620	220	6,200	800/1,600/3,000/4,800	4,200
Scale interval d*	g	0.001	0.001	0.001/0.002/0.005	0.001	0.01	0.01/0.02/0.05/0.1	0.01
Verification scale interval e*	g	0.01	0.01	0.01	0.01	0.1	0.1	0.1
Minimum capacity*	g	0.1	0.02	0.02	0.02	0.5	0.5	0.5
Tare range (by subtraction)	%	←						
Range of use acc. to Directive No. 90/384/EEC*	g	0.1–1,200	0.02–620	0.02–620	0.02–220	0.5–620	0.5–4,800	0.5–4,200
Range of use acc. to the Directive for Prepackaged Products**	g	0.1–1,200	0.02–620	0.02–620	0.02–220	0.5–620	0.5–4,800	0.5–4,200
Response time (average)	s	←					≤1.5	
Adaptation to ambient conditions and application requirements		←						
Display update (depends on the filter level selected)	s	←						
Range of use (temperature)	°C/°F	←						
Moisture-proof rating acc. DIN 40040		←						
Pan size	mm	←		130 Ø/5.1 Ø			235x180/9.3x7.1	
Net weight, approx.	kg/lb	←			6.5			
AC power source/power requirements	V~	←						
Frequency	Hz	←						
Power consumption	VA	←					max.: 16; average: 8	
Selectable weight units		←						
Application programs		←					formulation; statistics; weighing in percent; real-time clock with timer function for time-controlled measurements/weig	
Automatic zero tracking function (can be turned off by menu code)		←						
Built-in interface		←						RS-232C-S/V24-V28; 7-bit; parity: ev
Standard features/equipment supplied								
Dust cover		x	x	x	x	x	x	x
Draft shield		x	x	x	x	x	x	x
AC adapter		x	x	x	x	x	x	x
"isoCAL" self-calibration function		x	x	x	x	x	x	x
ISO/GLP-compliant record/printout		x	x	x	x	x	x	x
Numeric keypad		x	x	x	x	x	x	x

* EC Directive No. 90/384/EEC for Non-Automatic Weighing Instruments applicable in the EC/EU member states
** Directive for Prepackaged Products applicable in Germany

	LC 221 S-0CEMS	LC 6201 S-0CEMS	LC 4801 P-0CEMS	LC 4201 S-0CEMS	LC 2201 S-0CEMS	LC 2201 P-0CEMS	LC 821-0CEMS	LC 34000 P-0CEMS	LC 16000 S-0CEMS	LC 12001 S-0CEMS	LC 12001 P-0CEMS	LC 6201-0CEMS	LC 34-0CEMS
200			MA BA 200			BA BA 200		BB BA 200			BA BA 200		BB BA 200
						(II)							
	SuperRange	SuperRange	PolyRange	SuperRange	SuperRange	PolyRange		PolyRange	SuperRange	SuperRange	PolyRange		
	220	6,200	800/1,600/3,000/4,800	4,200	2,200	400/800/2,200	820	8,000/16,000/34,000	16,000	12,000	3,000/6,000/12,000	6,200	34,000
.005	0.001	0.01	0.01/0.02/0.05/0.1	0.01	0.01	0.01/0.02/0.05	0.01	0.1/0.2/0.5	0.1	0.1	0.1/0.2/0.5	0.1	1
	0.01	0.1	0.1	0.1	0.1	0.1	0.1	1	1	1	1	1	1
	0.02	0.5	0.5	0.5	0.5	0.5	0.5	5	5	5	5	5	50
					up to 105 of maximum capacity								
	0.02–220	0.5–620	0.5–4,800	0.5–4,200	0.5–2,200	0.5–2,200	0.5–820	5–34,000	5–16,000	5–12,000	5–12,000	5–6,200	50–34,000
	0.02–220	0.5–620	0.5–4,800	0.5–4,200	0.5–2,200	0.5–2,200	0.5–820	150–34,000	150–16,000	150–12,000	150–12,000	150–6,200	150–34,000
			≤1.5								≤1		
					by selection of 1 of 4 optimized filter levels								
					0.1–0.4								
					0 – +40/+32 – +104								
					Class F, non condensing								
			235x180/9.3x7.1			170 Ø/6.7 Ø		417x307/16.5x12.1			235x180/9.3x7.1		417x307/16.5x12.1
	6.5					4.5		15			4,5		15
					via AC adapter, 230 or 115, +15%...20%								
					48–60								
			max.: 16; average: 8					max.: 18; average: 10			max.: 16; average: 8		max.: 18; avg.: 10
					g, kg								
ormulation; statistics; weighing in percent; real-time clock with timer function for time-controlled measurements/weighing; tare memory; animal weighing/averaging; ID no. for identification of data; mass unit conversion by toggling; tare memory; net total; over/under checkweighing; counting													
					standard feature								
					RS-232C-S/V24-V28; 7-bit; parity: even, odd; transmission rate: 150...19,200 baud; 1 or 2 stop bits; software/hardware handshake								
	x	x	x	x	x	x	x			x	x	x	
	x	x	x	x									
	x	x	x	x	x	x	x	x	x	x	x	x	x
	x	x	x	x	x	x	x	x	x	x	x	x	x
	x	x	x	x	x	x	x	x	x	x	x	x	x
	x	x	x	x	x	x	x	x	x	x	x	x	x

Physikalisch-Technische Bundesanstalt

EG-Bauartzulassung

Zulassungsschein Nr. D93-09-148

Nichtselbsttätige Waage
Typen KB BA 100, KC BA 100, MC BA 100, MC BB 100 und MD BA 100

ausgestellt von	Physikalisch-Technische Bundesanstalt
gemäß	§ 13 des Eichgesetzes vom 23.März 1992 (BGBl. I S. 711) und § 7c (2) der Eichordnung in der Fassung vom 24.September 1992 (BGBl. I S. 1653), die der Richtlinie 90/384/EWG entsprechen
ausgestellt für	Sartorius AG Weender Landstraße 94-108 37075 Göttingen Bundesrepublik Deutschland
für	Nichtselbsttätige elektromechanische Waage, Genauigkeitklasse (I) Max 1 g bis 1210 g Anzahl der Eichwerte: $n_e \leq 250000$
Gültig bis	18. Oktober 2003

Die Hauptmerkmale, Zulassungsbedingungen und Auflagen sind in der Anlage enthalten, die Bestandteil der Zulassung ist und 6 Seiten umfaßt.

Im Auftrag

Braunschweig, 19.10.1993
Geschäfts-Zeichen: 1.13-92.131

(Brandes)

Name und Anschrift der benannten Stelle:

Physikalisch-Technische Bundesanstalt
Bundesallee 100
D 38116 Braunschweig
Bundesrepublik Deutschland

Dienststempel

PHYSIKALISCH-TECHNISCHE BUNDESANSTALT 40

- Hinweise und Rechtsbehelfsbelehrung auf der Rückseite -
Zulassungsscheine ohne Unterschrift und ohne Dienststempel haben keine Gültigkeit.
Die Zulassungsscheine dürfen nur unverändert weiterverbreitet werden.
Auszüge oder Änderungen bedürfen der Genehmigung der Physikalisch-Technischen Bundesanstalt.

Physikalisch-Technische Bundesanstalt

(German Federal Institute of Physics and Metrology)

EC Pattern Approval

Approval Certificate No. D93-09-149

Non-Automatic Weighing Instruments
Types MA BA 200 and MA BB 200

Issued by	Physikalisch-Technische Bundesanstalt
in compliance with	Section 13 of the German Weights and Measures Act ("Eichgesetz") of March 23, 1992 (German Federal Law Gazette "BGBl." I p. 711), and Section 7c (2) of the German Weights and Measures Regulations ("Eichordnung") as amended on September 24, 1992 (BGBl. I p. 1653), which conform to the Council Directive 90/384/EEC on Non-Automatic Weighing Instruments.
Applicant	Sartorius AG Weender Landstrasse 94–108 D-37075 Goettingen Federal Republic of Germany
Instrument certified hereunder	A non-automatic electromechanical weighing instrument, Accuracy class (II) Max: 500 g to 6,200 g Number of verification scale intervals: n ≤ 62,000
Valid through	October 13, 2003

The major features, approval requirements and conditions are contained in the Annex hereto, which is an integral part of this Approval Certificate and comprises 6 pages.

By order of
(signature)
Brandes

Braunschweig, 14 Oct. 1993
Reference No. 1.13-92.135

Name and address of the office issuing the certificate:

Physikalisch-Technische Bundesanstalt
Bundesallee 100
D-38116 Braunschweig
Federal Republic of Germany

Seal of the Physikalisch-Technische Bundesanstalt

– See the next page for information and directions on available legal remedies. –
Approval certificates without a signature and official stamp are not valid.
Only unchanged approval certificates may be reproduced and distributed.
Excerpts and changes must be approved by the Physikalisch-Technische Bundesanstalt.

Physikalisch-Technische Bundesanstalt

EG-Bauartzulassung

Zulassungsschein Nr. D93-09-149

Nichtselbsttätige Waage, Typen MA BA 200 und MA BB 200

ausgestellt von	Physikalisch-Technische Bundesanstalt
gemäß	§ 13 des Eichgesetzes vom 23.März 1992 (BGBl. I S. 711) und § 7c (2) der Eichordnung in der Fassung vom 24.September 1992 (BGBl. I S. 1653), die der Richtlinie 90/384/EWG entsprechen
ausgestellt für	Sartorius AG Weender Landstraße 94-108 37075 Göttingen Bundesrepublik Deutschland
für	Nichtselbsttätige elektromechanische Waage, Genauigkeitklasse (II) Max 500 g bis 6200 g Anzahl der Eichwerte: n ≤ 62000
Gültig bis	13. Oktober 2003

Die Hauptmerkmale, Zulassungsbedingungen und Auflagen sind in der Anlage enthalten, die Bestandteil der Zulassung ist und 6 Seiten umfaßt.

Im Auftrag

Brandes

Braunschweig, 14.10.1993
Geschäfts-Zeichen: 1.13-92.135

(Brandes)

Name und Anschrift der benannten Stelle:

Physikalisch-Technische Bundesanstalt
Bundesallee 100
D 38116 Braunschweig
Bundesrepublik Deutschland

- Hinweise und Rechtsbehelfsbelehrung auf der Rückseite -
Zulassungsscheine ohne Unterschrift und ohne Dienststempel haben keine Gültigkeit.
Die Zulassungsscheine dürfen nur unverändert weiterverbreitet werden.
Auszüge oder Änderungen bedürfen der Genehmigung der Physikalisch-Technischen Bundesanstalt.

Physikalisch-Technische Bundesanstalt

(German Federal Institute of Physics and Metrology)

EC Pattern Approval

Approval Certificate No. D93-09-122

Non-Automatic Weighing Instruments
Types BA BA 200, BA BB 200, MD BA 200, MD BB 200, and MB BB 200

Issued by	Physikalisch-Technische Bundesanstalt
in compliance with	Section 13 of the German Weights and Measures Act ("Eichgesetz") of March 23, 1992 (German Federal Law Gazette "BGBl." I p. 711), and Section 7c (2) of the German Weights and Measures Regulations ("Eichordnung") as amended on September 24, 1992 (BGBl. I p. 1653), which conform to the Council Directive 90/384/EEC on Non-Automatic Weighing Instruments.
Applicant	Sartorius AG Weender Landstrasse 94–108 D-37075 Goettingen Federal Republic of Germany
Instrument certified hereunder	A non-automatic electromechanical weighing instrument, Accuracy class (II) Max: 10 g to 12.2 kg or 50 Kt to 61,000 Kt Number of verification scale intervals: n ≤ 62,000
Valid through	May 23, 2003

The major features, approval requirements and conditions are contained in the Annex hereto, which is an integral part of this Approval Certificate and comprises 7 pages.

By order of

(signature)

Braunschweig, 24 May, 1993
Reference No. 1.13-92.129

Brandes

Name and address of the office issuing the certificate:

Physikalisch-Technische Bundesanstalt
Bundesallee 100
D-38116 Braunschweig
Federal Republic of Germany

Seal of the Physikalisch-Technische Bundesanstalt

– See the next page for information and directions on available legal remedies. –
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Physikalisch-Technische Bundesanstalt

EG-Bauartzulassung

Zulassungsschein Nr. D93-09-122

Nichtselbsttätige Waage
Typen BA BA 200, BA BB 200, MD BA 200, MD BB 200 und MB BB 200

ausgestellt von	Physikalisch-Technische Bundesanstalt
gemäß	§ 13 des Eichgesetzes vom 23.März 1992 (BGBl. I S. 711) und § 7c (2) der Eichordnung in der Fassung vom 24.September 1992 (BGBl. I S. 1653), die der Richtlinie 90/384/EWG entsprechen
ausgestellt für	Sartorius AG Weender Landstraße 94-108 3400 Göttingen Bundesrepublik Deutschland
für	Nichtselbsttätige elektromechanische Waage, Genauigkeitsklasse (D) Max 10 g bis 12,2 kg oder 50 Kt bis 61000 Kt Anzahl der Eichwerte: $n \leq 62000$
Gültig bis	23.05.2003

Die Hauptmerkmale, Zulassungsbedingungen und Auflagen sind in der Anlage enthalten, die Bestandteil der Zulassung ist und 7 Seiten umfaßt.

Im Auftrag

Braunschweig, 24.05.1993
Geschäfts-Zeichen: 1.13-92.129

(Brandes)

Name und Anschrift der benannten Stelle:

Physikalisch-Technische Bundesanstalt
Bundesallee 100
D 3300 Braunschweig
Bundesrepublik Deutschland

Dienststempel

PHYSIKALISCH-TECHNISCHE BUNDESANSTALT 25

- Hinweise und Rechtsbehelfsbelehrung auf der Rückseite -
Zulassungsscheine ohne Unterschrift und ohne Dienststempel haben keine Gültigkeit.
Die Zulassungsscheine dürfen nur unverändert weiterverbreitet werden.
Auszüge oder Änderungen bedürfen der Genehmigung der Physikalisch-Technischen Bundesanstalt.

V15-320026 12.91

Physikalisch-Technische Bundesanstalt

(German Federal Institute of Physics and Metrology)

EC Pattern Approval

Approval Certificate No. D93-09-114

Non-Automatic Weighing Instruments
Types BB BA 200 and BB BB 200

Issued by	Physikalisch-Technische Bundesanstalt
in compliance with	Section 13 of the German Weights and Measures Act ("Eichgesetz") of March 23, 1992 (German Federal Law Gazette "BGBl." I p. 711), and Section 7c (2) of the German Weights and Measures Regulations ("Eichordnung") as amended on September 24, 1992 (BGBl. I p. 1653), which conform to the Council Directive 90/384/EEC on Non-Automatic Weighing Instruments.
Applicant	Sartorius AG Weender Landstrasse 94–108 D-37075 Goettingen Federal Republic of Germany
Instrument certified hereunder	A non-automatic electromechanical weighing instrument, Accuracy class (II) Max: 5 kg to 68 kg or 25,000 Kt to 340,000 Kt Number of verification scale intervals: $n \leq 34{,}000$
Valid through	April 28, 2003

The major features, approval requirements and conditions are contained in the Annex hereto, which is an integral part of this Approval Certificate and comprises 7 pages.

By order of
(signature)
Brandes

Braunschweig, 29 April, 1993
Reference No. 1.13-92.388

Name and address of the office issuing the certificate:

Physikalisch-Technische Bundesanstalt
Bundesallee 100
D-38116 Braunschweig
Federal Republic of Germany

Seal of the Physikalisch-Technische Bundesanstalt

– See the next page for information and directions on available legal remedies. –
Approval certificates without a signature and official stamp are not valid.
Only unchanged approval certificates may be reproduced and distributed.
Excerpts and changes must be approved by the Physikalisch-Technische Bundesanstalt.

Physikalisch-Technische Bundesanstalt

EG-Bauartzulassung

Zulassungsschein Nr. D93-09-114

Nichtselbsttätige Waage, Typen BB BA 200 und BB BB 200

ausgestellt von	Physikalisch-Technische Bundesanstalt
gemäß	§ 13 des Eichgesetzes vom 23.März 1992 (BGBl. I S. 711) und § 7c (2) der Eichordnung in der Fassung vom 24.September 1992 (BGBl. I S. 1653), die der Richtlinie 90/384/EWG entsprechen
ausgestellt für	Sartorius AG Weender Landstraße 94-108 3400 Göttingen Bundesrepublik Deutschland
für	Nichtselbsttätige elektromechanische Waage, Genauigkeitsklasse (II) Max 5 kg bis 68 kg oder 25000 Kt bis 340000 Kt Anzahl der Eichwerte: $n \leq 34000$
Gültig bis	28.04.2003

Die Hauptmerkmale, Zulassungsbedingungen und Auflagen sind in der Anlage enthalten, die Bestandteil der Zulassung ist und 7 Seiten umfaßt.

Im Auftrag

Brandes

Braunschweig, 29.04.1993
Geschäfts-Zeichen: 1.13-92.388

(Brandes)

Name und Anschrift der benannten Stelle:

Physikalisch-Technische Bundesanstalt
Bundesallee 100
D 3300 Braunschweig
Bundesrepublik Deutschland

Dienststempel

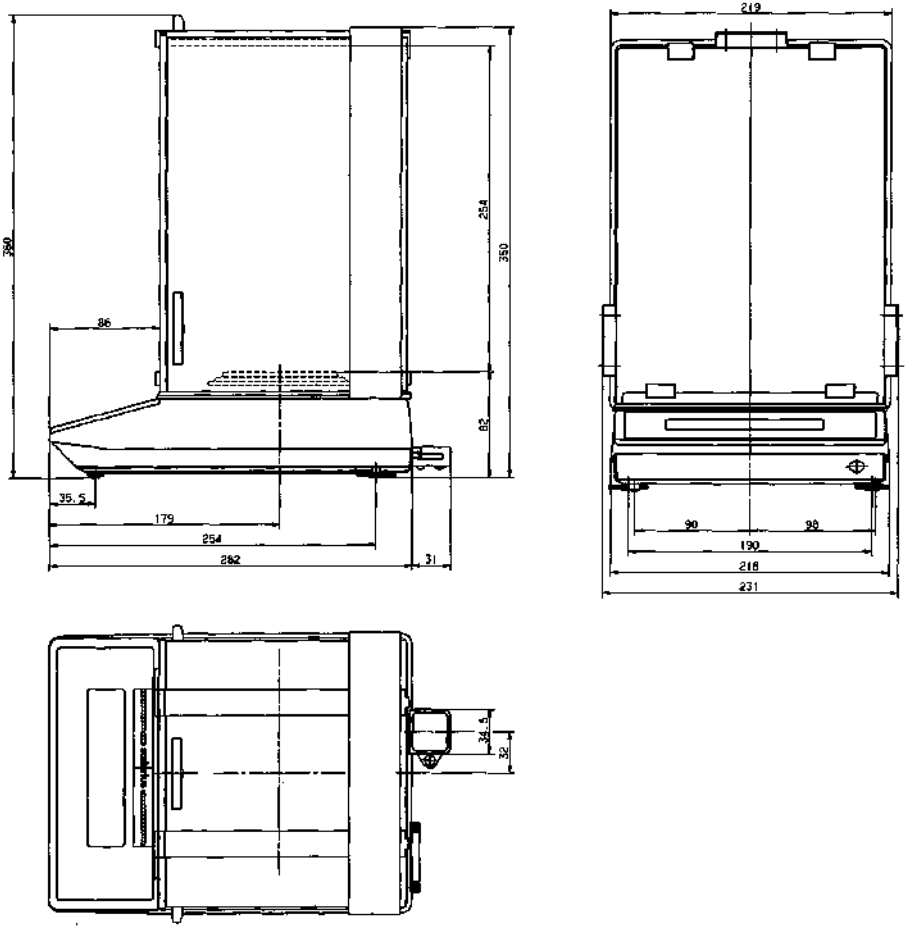
PHYSIKALISCH-TECHNISCHE BUNDESANSTALT 25

- Hinweise und Rechtsbehelfsbelehrung auf der Rückseite -
Zulassungsscheine ohne Unterschrift und ohne Dienststempel haben keine Gültigkeit.
Die Zulassungsscheine dürfen nur unverändert weiterverbreitet werden.
Auszüge oder Änderungen bedürfen der Genehmigung der Physikalisch-Technischen Bundesanstalt.

V 13-755 320 34-9.88

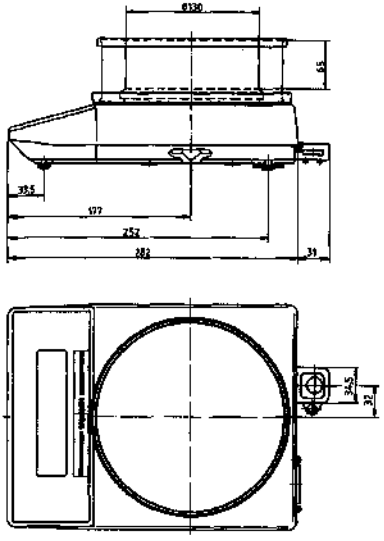
Dimensions (Scale Drawings)

AC 211 S, AC 211 P, AC 121 S (-0CE)

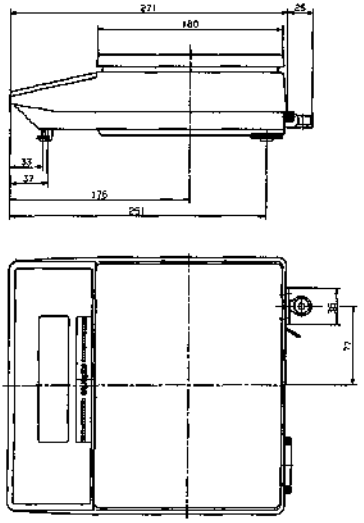


Note: All dimensions are given in millimeters.

LC 3201 D, LC 1201 S, LC 621 S, LC 621 P, LC 221 S (-0CE)

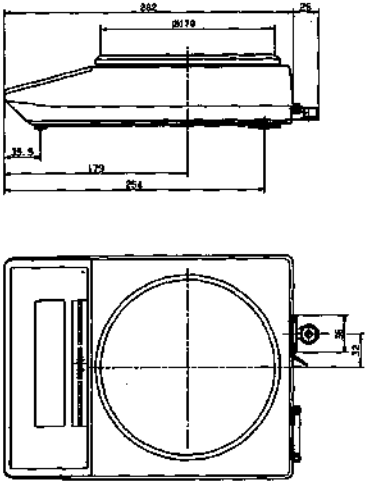


LC 6201 S, LC 4801 P, LC 4201 S, LC 12001 S, LC 12001 P, LC 6201, LC 4201 (-0CE)

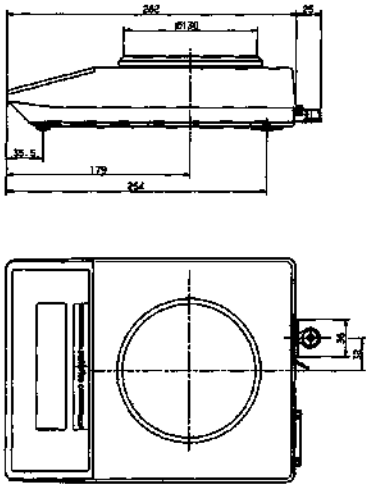


Note: All dimensions are given in millimeters.

LC 2201 S, LC 2201 P, LC 821 (-0CE)

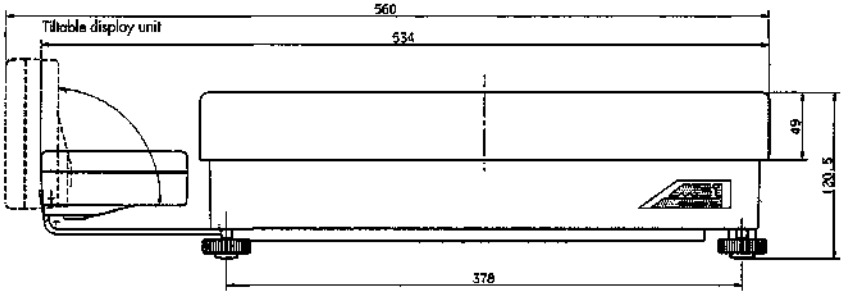


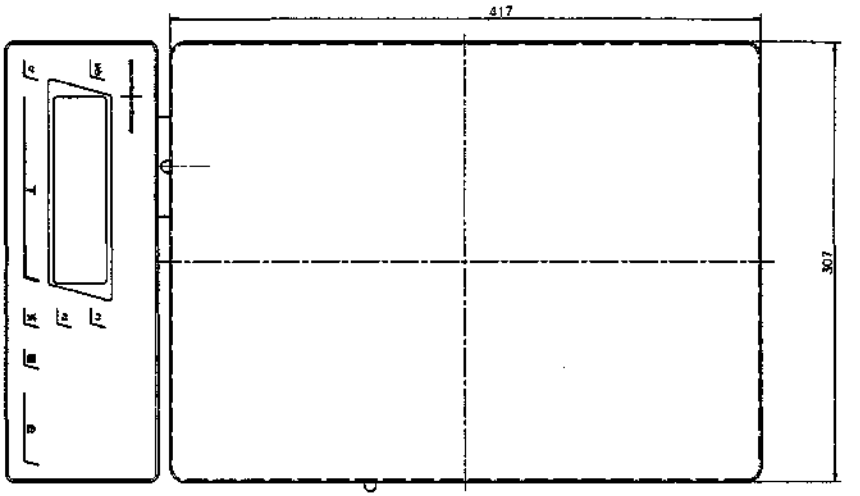
LC 421, GC 1201-G



Note: All dimensions are given in millimeters.

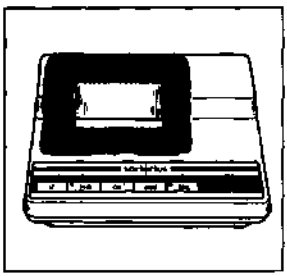
LC 16000 S, LC 34000 P, LC 34 (-0CE)





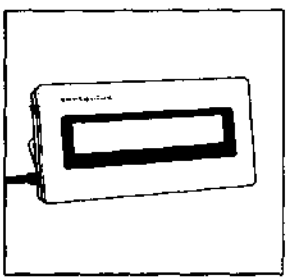
Note: All dimensions are given in millimeters.

Accessories (Options)



Data printer **YDP 02-0CEV2**
with date/time
and statistics functions

Print speed approx. lines/sec.	1.5
Printer housing (WxDxH)	
in mm	150x138x43
in inches	5.9x5.4x1.7



Remote display
(*can* be plugged into the interface port of the balance)
- LCD, reflective **737101 A**
- LCD for overhead projectors, transmissive **737102 A**

Important Note for Balance/ Scale Models Acceptable for Verification:
The remote display may not be used when the balance is being used as a legal measuring instrument (legal for trade).

External rechargeable battery pack
- for balances with a capacity less than 12 kg **YRB 05 Z**
- for balances with a capacity greater than 12 kg **YRB 06 Z**

Models of the AXIS Product Line with an Integratable Applications Computer – "IAC" – for Application Programs:

Formulation; statistics; timer function for time-controlled measurements/ weighing; calculation of weights (addition, multiplication, subtraction, division); density determination; animal weighing/averaging; checkweighing; ID number for identification of data; counting; weighing in percent; ISO/GLP-compliant printouts/records. All programs can be configured according to your individual requirements using the numeric keypad.

- for AC and LC series balances with a round pan **YAC 011**
- for LC series balances with a rectangular pan and a capacity less than 12 kg **YAC 021**
- for LC series balances with a rectangular pan and a capacity greater than 12 kg **YAC 03**

Integratable Backweighing Program:

Ideal for moisture analysis, backweighing and differential weighing

- for AC and LC series balances with a round pan **YDC 011**
- for LC series balances with a rectangular pan and a capacity less than 12 kg **YDC 021**

External calibration weights:

for balance model	Accuracy class (OIML)	Weight in g	Order no.
LC 221 S	E2	1x200	**YCW 5228**
LC 421	F1	1x200	**YCW 5238**
LC 621 S, LC 621 P	E2	1x500	**YCW 5528**
LC 821	F2	1x500	**YCW 5548**
GC 1201-G	F1	1x1,000	**YCW 6138**
LC 4201 S	E2	1x2,000	**YCW 6228**
LC 4801 P, LC 2201 S, LC 2201 P, LC 4201	F1	1x2,000	**YCW 6238**
LC 12001 S, LC 12001 P, LC 6201	F1	1x5,000	**YCW 6538**
LC 34000 P, LC 16000 S, LC 34	F1	1x10,000	**YCW 7138**

3-segment checkweighing display (red/green/red) **YRD 10 Z**
The checkweighing display conveniently shows you whether a sample (amount filled) is within the tolerance limits

Analytical draft shield chamber
– for balances with a 130 mm/5.1" Ø pan **YDS 011**
– for balances with a 170 mm/6.7" Ø pan **YDS 041**

Pan draft shield for balances with a rectangular pan and a capacity less than 12 kg **YDS 02**

Density determination kit
– for standard balances with a readability ≤0.001 g **YDK 01**
– for balances acceptable for verification with a readability ≤0.001 g **YDK 01-0D**

Universal remote control switches with menu-definable print, tare, F1 key or F2 key functions (function selectable in the balance operating menu):

Foot switch **7223**
Foot switch with T-connector **YPE 01 Z**
Hand switch **7226**
T-connector **7258**

Vibrating spatula **6025**

Hanger for below-balance weighing **YSH 01 IB**
(for balances with a capacity greater than 12 kg)

Data interface (overvoltage protection from ±60 V max.)	YDO05
BalanceReader software for collecting data that are transmitted by your Sartorius balance to a commercially available personal computer. These data are read into spreadsheets and stored. The stored spreadsheets can be further processed using commercially available standard software (Excel, Lotus 1-2-3, etc.).	YAK 10 PC-0002
"SartoWedge" data transfer software	6289280
Antistatic pan	YWP 01
Special weighing pan for AC balances; device for magnetic samples	YWP 02
Dust covers	
– for AC balances	69 60AC01
– for LC balances with a round pan	69 60LC01
– for LC balances with a rectangular pan and a capacity less than 12 kg	69 60LC02
– for LC balances with a capacity greater than 12 kg	YDC 01 IC
Carrying cases	
– for AC balances	YDB 01 AC
– for LC balances with a round pan	YDB 01 LC
– for LC balances with a rectangular pan and a capacity less than 12 kg	YDB 02 LC

Declarations of Conformity

The CE Mark of Conformity on Sartorius Equipment

In 1985, the Council of the European Community approved a draft for the technical harmonization and standardization of national regulations. The organization for monitoring compliance with the directives and standards concerning the issue of the **CE** mark of conformity is governed in the individual EC member states through the implementation of the EC directives adopted by the respective national laws.

Sartorius complies with the EC directives and European Standards in order to supply its international customers with weighing instruments that feature the latest advanced technology and provide long years of trouble-free service.
The **CE** mark of conformity may be affixed only to weighing instruments and associated equipment that comply with the following directive:

Directive 89/336/EEC "Electromagnetic Compatibility (EMC)"

This directive regulates the use of equipment that can cause electromagnetic interference or whose functioning can be influenced by such interference.
The safety requirements are:
– limitation of emissions
– defined immunity to interference

The respective Declaration of Conformity is enclosed.

Additional Directive for Weighing Instruments Used in Legal Metrology: Directive 90/384/EEC "Non-Automatic Weighing Instruments"

This directive regulates mass determination in legal metrological applications, e.g., in the manufacture of
- pharmaceuticals
- medicine and health care
- calculation of fees
- and price calculation.

For the respective Declaration of Conformity for weighing instruments approved for use as legal measuring instruments (legal for trade) with EC Pattern Approval, see page 7-5.

This directive also regulates the performance of the EC verification by the manufacturer, provided that an EC Pattern Approval has been issued (see page 6-20) and the manufacturer has been accredited by an officer of a regulatory body notified by the Commission of the European Community for performing such verification. On February 15, 1993, Sartorius AG received accreditation for performing verification.
For the respective accreditation documents in German, please see page 7-6.

For information on the CE mark of conformity on Sartorius equipment please ask your local Sartorius office, dealer or service center.

"EC Verification" – A Service Offered by Sartorius

Our service technicians authorized to perform the verification* of your balances/scales which are acceptable for legal metrological verification can inspect and verify the metrological specifications on-site within the member states of the European Union.

"New Installation" Service
Initial verification is covered in our "New Installation" service package. In addition to initial verification, this package provides you with a series of important services which will guarantee you optimal results in working with your balance/scale:

- Installation
- Startup
- Inspection
- Training
- Initial verification

If you would like Sartorius to perform initial verification of your balance/scale, please contact your local Sartorius office, dealer or service center. Please refer to the Sartorius Service Center Addresses on page 7–4.

Preparing the Balance/Scale for Initial Verification
- Unpack the balance/scale.
- Plug the cord of the AC adapter into the power receptacle on the balance/scale, and plug the AC adapter into a wall outlet.
- **Let the balance/scale warm up for at least 24 hours** after initially connecting it to AC power (or after a relatively long power failure or outage).

Subsequent Verifications within the European Union
The validity of the verification will become void in accordance with the national regulations of the country in which the balance/scale is used.
For information on verification and legal regulations currently applicable in your country, and to obtain the names of the persons to contact, please contact your local Sartorius office, dealer or service center as indicated on the following page.

* = pursuant to accreditation for Sartorius AG

Sartorius European Service Center Addresses

Part of supplying you with an excellent product is providing qualified customer service. Sartorius has an effective, worldwide service organization on hand for you whenever you need help or advice:

Austria
SARTORIUS GmbH
Leberstraße 108, A-1110 Vienna
Tel.: (0222) 743707
Fax.: (0222) 74438224

Belgium
Ets. van der Heyden S.A.
Sartorius Division, Rue du Marais 49-55
1000 Bruxelles
Tel.: (02) 2120611
Fax.: (02) 2186979

Denmark
Bie & Berntsen A/S
Sandbaikvej 7, 2610 Rodovre
Tel.: (44) 948822
Fax.: (44) 942709

Finland
Oriola Oy Prolab
Orionintie 5, P.O. Box 8
02101 Espoo 10
Tel.: (0) 4291
Fax.: (0) 4293117

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Sartorius S.A.
11 Avenue du 1er Mai
91127 Palaiseau-Cedex
Tel.: (1) 69192100
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1 Kalfati Street
17671 Athens
Tel.: (01) 9373172
Fax.: (01) 9516281

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Carl Zeiss S.p.A.
via Caldera, 21/C3
20153 Milano
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Fax.: (2) 48212319

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Tel.: (3402) 53001
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Postboks 45 Kalbakken
0901 Oslo
Tel.: (22) 900000
Fax.: (22) 900040

Portugal
Sartorius Portugal Balanças LDA.
Avenida Ventura Terra No. 15-1
1600 Lisboa
Tel.: (1) 7599505
Fax.: (1) 7599529

Spain
Sartorius S.A.
Aragoneses, 13
Polígono Industrial Alcobendas
28100 Madrid
Tel.: (1) 6611869
Fax.: (1) 6620958

Sweden
Tillquist Analys AB
Box 1100, Skalholtsgatan 6
16422 Kista (Stockholm)
Tel.: (46) 8-632-3200
Fax.: (46) 8-752-7091

United Kingdom
Sartorius Ltd.
Longmead Business Centre
Blenheim Road
Epsom, Surrey KT19 9QN
Tel.: (372) 745811
Fax.: (372) 720799

Sartorius AG, Goettingen, Federal Republic of Germany

Declaration of Conformity to Directive No. 90/384/EEC

This declaration is valid for non-automatic electromechanical weighing instruments for use in legal metrology. The weighing instruments accepted for legal metrological verification have an EC Pattern Approval Certificate. The model(s) concerned is/are listed below along with the respective pattern/type designation (design), Accuracy Class, and Approval Certificate number:

Model	Pattern/Type Designation	Accuracy Class	Approval Certificate No.
AC ... -0CE	MC BA 100	(I)	D93-09-148
LC ... -0CE	MD BA 100	(I)	D93-09-148
LC ... -0CE	MA BA 200	(II)	D93-09-149
MC ... -0CE	KC BA 100	(I)	D93-09-148
LC ... -0CE	MD BA 200	(II)	D93-09-122
IC ... -0CE, LC ... -0CE	BB BA 200	(II)	D93-09-114
LC ... -0CE	BA BA 200	(II)	D93-09-122
RC ... -0CE	KB BA 100	(I)	D93-09-148

Sartorius AG declares, at its sole responsibility, that the design of its balances/scales complies with the regulations of the Council Directive for Non-Automatic Weighing Instruments No. 90/384/EEC of June 20, 1990; the associated European Standard of Metrological Aspects for Non-Automatic Weighing Instruments No. EN 45501; as well as the amended version of the EC member states' national laws and decrees ["Verordnungen"] concerning legal metrology and verification, in which this Directive has been adopted in their currently valid versions; and with the requirements stipulated on the Pattern Approval for legal metrological verification.
This Declaration of Conformity is valid only if the verification ID label has the **CE** mark of conformity and the green mark with the stamped letter "M" (numbers in large print stand for the year in which the initial verification was performed).

If these marks are not on the verification ID label, this Declaration of Conformity is not valid. Validity can be obtained by submitting the balance/scale for metrological testing and inspection by an authorized representative of Sartorius AG.

The period of validity of this Declaration of Conformity is governed by the national regulations in effect in the individual EC member states. Following any modifications or repair to the balance/scale, the said conformity thereof must be redeclared by the persons performing such modifications/repairs.

Provided that the validity of the verification is limited pursuant to the national regulations of the EC member states, the operator of the balance/scale is personally responsible for obtaining an authorized renewal of the verification of the balance/scale for use as a legal measuring instrument (legal for trade).

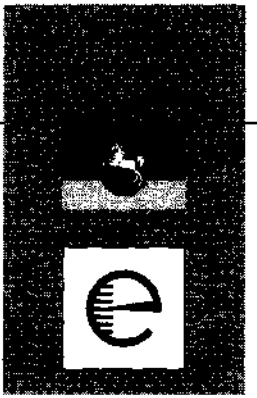
Signed in Goettingen on this day of January 4, 1994

SARTORIUS AG
37070 Goettingen
Germany

Board of Management

Board of Management

OA-113:2/12.93



Niedersächsisches Landesverwaltungsamt
– Eichwesen –

Anerkennung des Qualitätssicherungssystems

Das Niedersächsische Landesverwaltungsamt – Eichwesen – anerkennt mit dieser Urkunde das Qualitätssicherungssystem der Firma

[illegible]

Die Übereinstimmung mit den Anforderungen der EG-Richtlinie 90/384/EWG, umgesetzt in der Anlage 9 der Eichordnung, wurde durch ein Audit festgestellt.

Die Firma ist damit berechtigt, an ihren **nichtselbsttätigen Waagen EG-Eichungen** gemäß der Eichordnung vorzunehmen.
Das Qualitätssicherungssystem der Firma unterliegt der ständigen EG-Überwachung durch das Niedersächsische Landesverwaltungsamt – Eichwesen.

Bestandteil dieser Anerkennung (Reg.-Nr. S4-3363-01/92) ist die Anlage.

Niedersächsisches Landesverwaltungsamt –Eichwesen– Goethestraße 44 3000 Hannover 1 Benannte Stelle der Kommission der Europäischen Gemeinschaften Nr. 0111

Hannover, den 15. Februar 1993

Leiter des Eichwesens

Auditteilung

– Mehrfertigung –

Declaration of Conformity to Directive 89/336/EEC

Sartorius AG declares, at its sole responsibility, that its balances and scales of the series

AC, GC, IC, LC, MC, RC

including the associated power supplies, conform to the requirements of the EC Council Directive on Electromagnetic Compatibility (EMC) 89/336/EEC, provided that the balances/scales have the **CE** mark of conformity as shown below.

For accessories and equipment to be connected, see the respective Declaration of Conformity.

The mark of conformity consists of the **CE** symbol (see below) and the year in which the mark of conformity was affixed to the equipment.

CE

Test standards

1. Source: EC Official Bulletin Nos. C90/2 and C44/12

2. Generic standards:

2.1 Generic Emission Standard:

EN 50081-1	Residential, commercial, and light industry
EN 50081-2	Industrial environment

2.2 Generic Immunity Standard:

EN 50082-1	Residential, commercial, and light industry
pr EN 50082-2	Industrial environment

Signed in Goettingen on this day of January 4, 1994

SARTORIUS AG
37070 Goettingen
Germany

Board of Management Board of Management

OA-1134/07.93

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The status of the information, specifications and illustrations in this manual is indicated by the date given below. Sartorius AG reserves the right to make changes to the technology, features, specifications, and design of the equipment without notice.

Status: August 1994, Sartorius AG, Goettingen

Printed in Germany on paper that has been bleached without any use of chlorine · W394.54 · M
Publication No. WAC6042-e94081

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Specifications Master-Series
EC Approved Models Acceptable for Verification

Model		MC1 Product Line[1]) LC2201-0CE	Master-Series LC2201-0CEMS
Type designation		BA BA 200	BA BA 200
Accuracy class*		(III)	(II)
Max. capacity*	g	2,200	2,200
Scale interval d*	g	0.1	0.1
Verification scale interval e*	g	0.1	0.1
Minimum capacity*	g	5	5
Tare range (by subtraction)	%	up to 105 of Max.	
Range of use acc. to Directive No 90/384/EEC*	g	5–2,200	5–2,200
Range of use acc. to Regulations for Prepackaged Products**	g	5–2,200	5–2,200
Response time (average))	s	≤1	≤1
Adaptation to ambient conditions and application requirements		by selection of 1 of 4 optimized fillers	
Display update (depends on the filter level selected)	s	0.1–0.4	0.1–0.4
Range of use (temperature)	°C	+10 – +30 (+50°F...+86°F)	0 – +40 (+32°F...+104°F)
Pan size	mm	Ø 170	Ø 170
Net weight, approx.	kg	4.5	4.5
AC power source/power requirements	V~	via AC adapter; STNG6 230 VAC or 115 VAC, –20%. .+15%	
Frequency	Hz	48–60	48–60
Power consumption	VA	max: 16; average: 8	max: 16; average 8
Selectable weight units		g, kg	g, kg
Application programs		mass unit conversion by toggling; tare memory; over/under checkweighing (classification, filling); counting; weighing in percent; net total	mass unit conversion by toggling; tare memory, over/under checkweighing (classification, filling); counting; weighing in percent; net total; formulation, statistics; real-time clock with timer function for time-controlled measurements; animal weighing/ averaging; density determination; ID no. for identification of data
Automatic zero tracking function (can be turned off by menu code)		standard feature	standard feature
Built-in interface		RS-232-C-S/V24-V28; 7-bit, parity: odd, even; transmission rates: 150...19,200 baud; 1 or 2 stop bits; software/hardware handshake	
Standard features/equipment supplied			
Dust cover		x	x
AC adapter		x	x
"isoCAL" self-calibration function			x
Built-in, motorized calibration weight		x	x
ISO-/GLP-compliant record/printout			x
Numeric keys			x

* = EC Directive No 90/384/EEC for Non-Automatic Weighing Instruments applicable in the EC/EU member states

** = Regulation on Prepackaged Products applicable in Germany only

1 = Balances of the MC1 Product Line cannot be upgraded to Master-Series balances but can be retrofitted with an IAC (Integrated Applications Computer) for complex applications

Specifications: Master-Series

Model		MC 1 Product Line[1]) LC2201	Master-Series LC2201-00MS
Capacity/weighing range level (max.)	g	2,200	2,200
Readability	mg	0.1	0.1
Tare range (by subtraction)	mg	−2,200	−2,200
Reproducibility (standard deviation)	g	≤±0.05	≤±0.05
Linearity	g	≤±0.1	≤±0.1
Response time (average)	s	≤1	≤1
Fastest response time in the IQ-Mode	s	0.7	0.7
Adaptation to ambient conditions and application requirements		by selection of 1 of 4 optimized filter levels	
Display update (depends on the filter level selected)	s	0.1–0.4	0.1–0.4
Sensitivity drift within 283–303 K	/K	$\leq \pm 4 \cdot 10^{-6}$	$\leq \pm 4 \cdot 10^{-6}$
Ambient temperature range	K	273...313 (0°C...+40°C, 32°F...104°F)	
Pan size	mm	Ø 170	Ø 170
Net weight, approx.	kg	3.6	4.5
AC power source/power requirements	V~	via AC adapter: STNG 6, 230 VAC or 115 VAC, −20%...+15%	
Frequency	Hz	48–60	48–60
Power consumption	VA	max: 16; average: 8	max: 16; average: 8
Selectable weight units		g, kg, ct, lb, oz, ozt, ilh, tls, tlt, gr, dwt, mg	g, kg, ct, lb, oz, ozt, ilh, tls, tlt, gr, dwt, mg, /lb, tlc, mom, K, tol, bal
Application programs		mass unit conversion by toggling; tare memory; over/under checkweighing (classification, filling); counting; weighing in percent; net total	mass unit conversion by toggling; tare memory; over/under checkweighing (classification, filling); counting; weighing in percent; net total; formulation; statistics; real-time clock with timer function for time-controlled measurements/weighing; calculation of weights; totalling of weights; ID no. for identification of data; density determination; animal weighing
Automatic zero tracking function (can be turned off by menu code)		standard feature	standard feature
Built-in interface		RS-232C-S/V24-V28; 7-bit; parity: mark, space odd, even; transmission rates: 150 ... 19,200 baud; 1 or 2 stop bits; software/hardware handshake	
Standard features/equipment supplied			
Dust cover		x	x
AC adapter		x	x
Hanger for below-balance weighing		x	x
"isoCAL" self-calibration function			x
ISO-/GLP-compliant printout			x
Numeric keys			x

[1]) Balances of the MC1 Product Line cannot be upgraded to Master-Series balances but can be retrofitted with an IAC (Integrated Applications Computer) for complex applications.