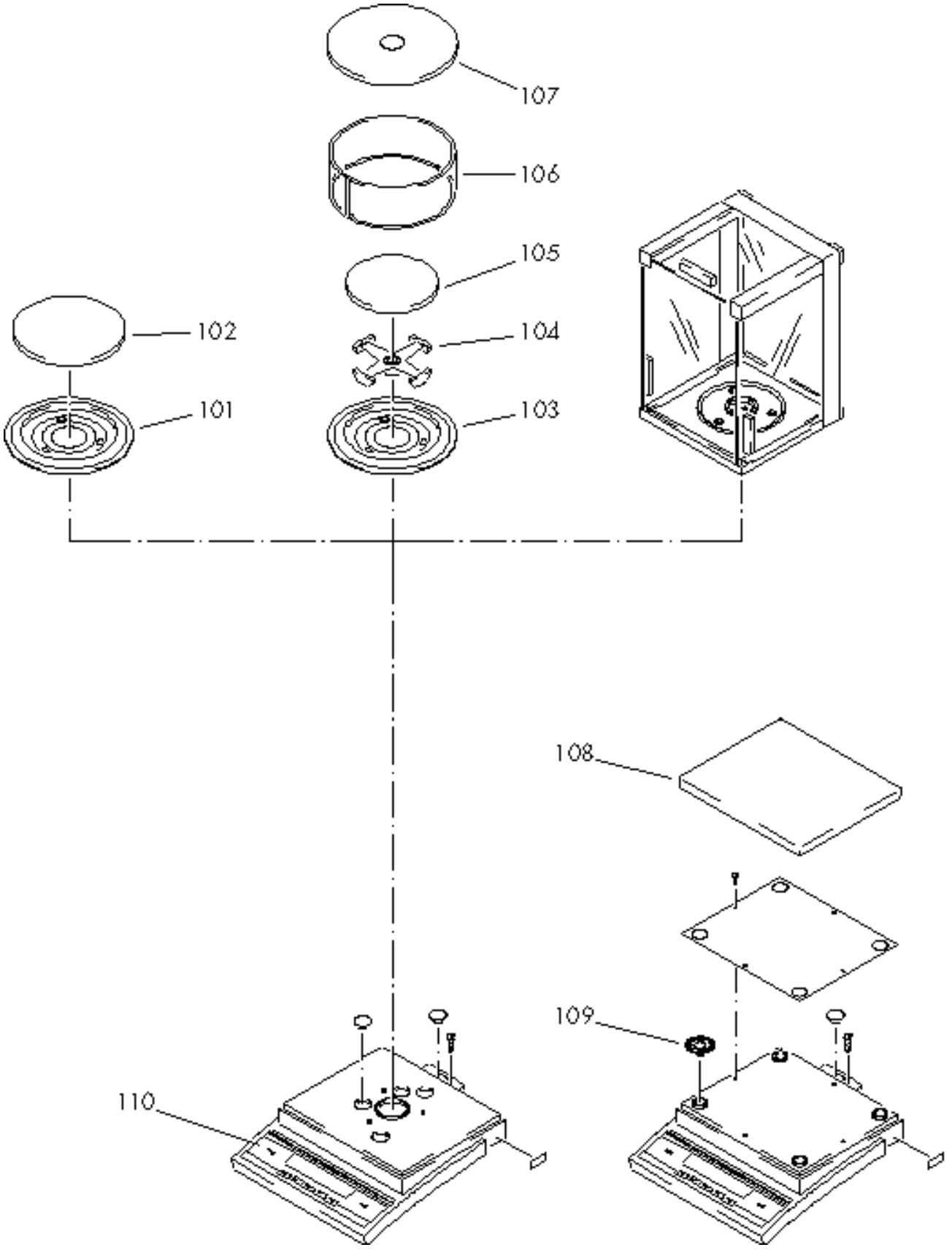
Sartorius Basic^{plus}
Service Manual

sartorius

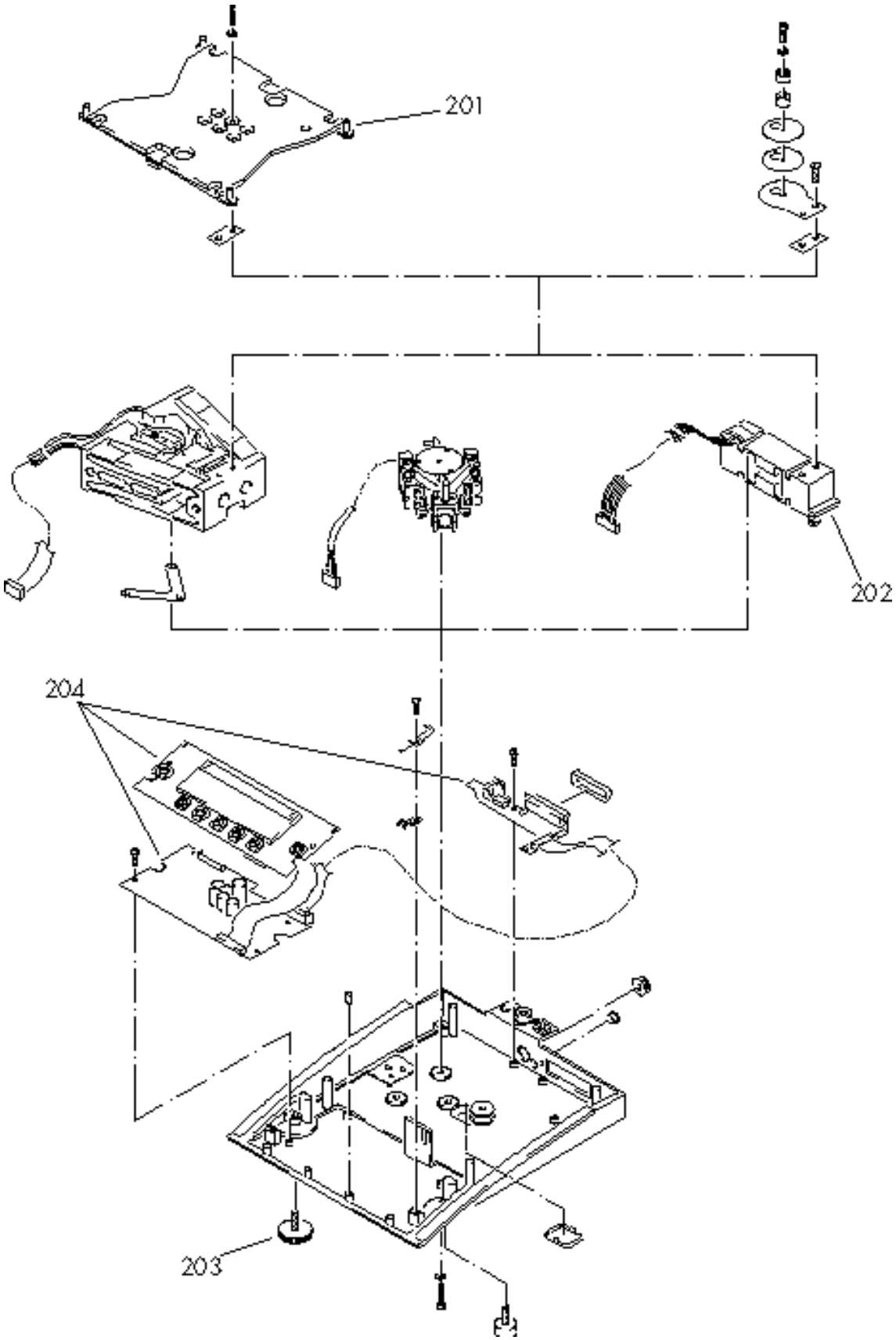
Contents

Exploded-View Diagram 1



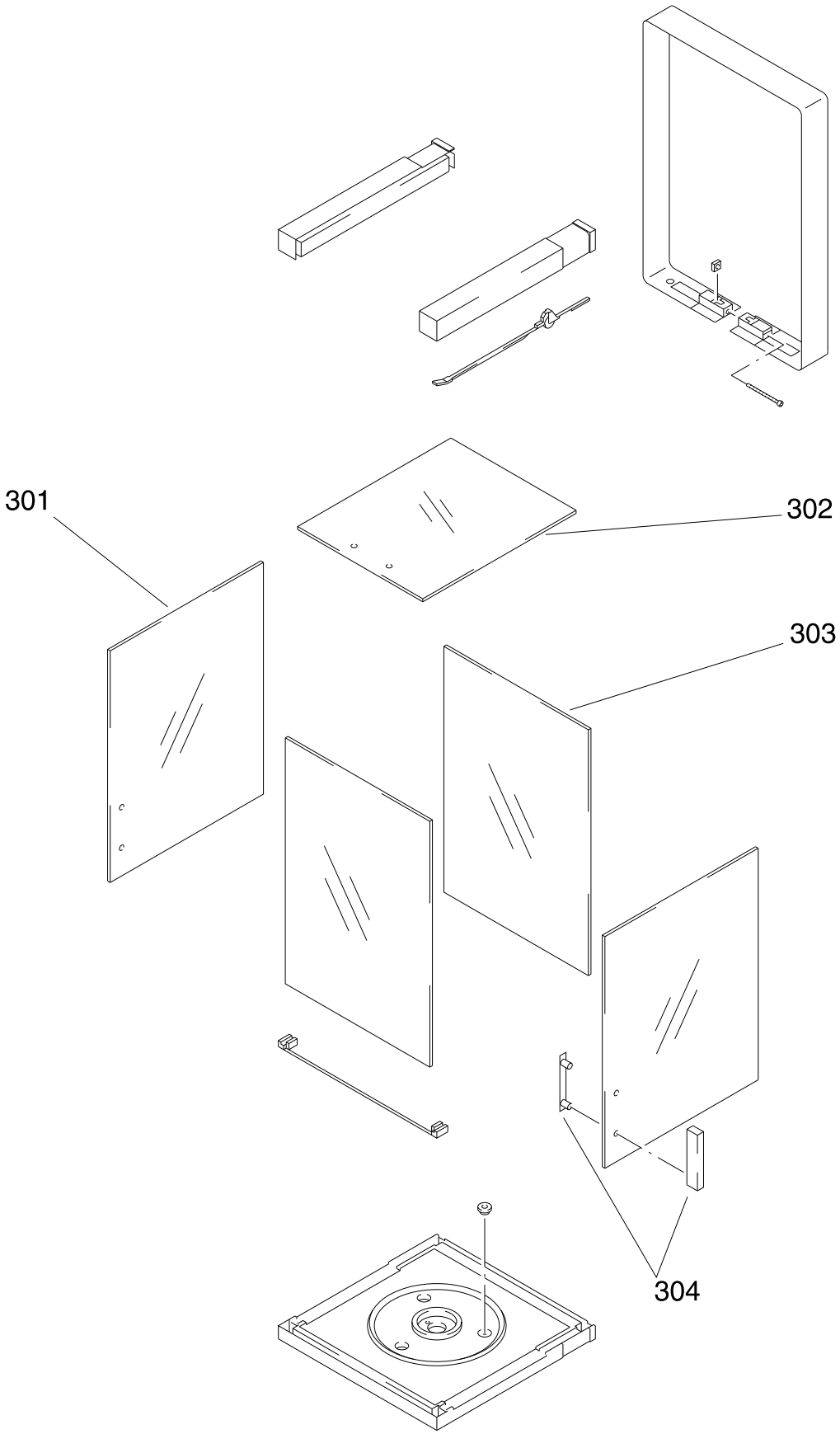
Index	Designation
101	Draft shield base plate
102	Weighing pan
103	Draft shield base plate
104	Supporting pan
105	Pan
106	Glass draft shield cylinder
107	Draft shield cover
108	Pan
109	Pan flexures for auto-centering
110	Display unit

Exploded-View Diagram 2



Index	Designation
201	Supporting pan
202	Strain gauge
203	Leveling foot
204	PCB set

Exploded-View Diagram 3
- Single-Casting Block System



Index	Designation
301	Side glass
302	Glass
303	Top glass
304	Post grip

Auxiliary Service Tools and Equipment

Caution:

Any persons servicing or working on Sartorius Basic^{plus} Balances should possess the necessary skills and experience, have completed a Service Course at the headquarters in Goettingen, and use the auxiliary service tools and equipment described below. Please do not attempt or permit any unauthorized repair work!

Important note:

If you remove the seals (warranty stickers), you will forfeit all warranty claims.

Make sure to use the proper tools and equipment when servicing or repairing the balance. Also make sure that the balance is set up on a solid, level surface and in a clean work area that is free of vibrations and drafts.
In addition to the tools you regularly use, you will need the following weight sets to work on the Sartorius Basic^{plus} Balances:

Weights required:

Qty./Set.	Designation			Order No.
1	Service weight set	Class	F1	YSS 3138-6538
1	Service weight set	Class	F1	YSS 5128-6528
1	Analysis weight set	Class	E2	YCS 01-522

General Handling and Operation of Basic^{plus} Balances in Service

Accompanying Literature

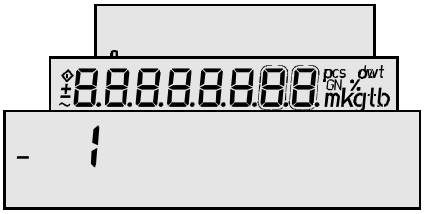
Spare Parts List for Sartorius Basic^{plus}
Adjustment/Calibration data sheets for Basic^{plus} Balances
Sartorius Tools List
General Handling Instructions for the Sartorius MC1 Server
Interface Description for the Sartorius Basic^{plus}

Function of the Keys

I/⏻	ON-OFF key
CF	Key for deletion, or for interruption of prog. sequences
CAL	Adjustment/calibration key
F	Function key - calls the selected application program
⊙	Print key
TARE	Tare key

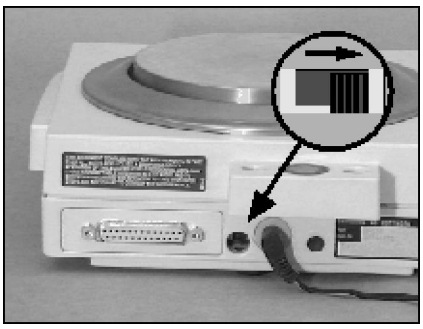
Balance Operating Menu

Accessing the Balance Operating Menu and Changing the Settings



Access the Menu » I/⏻ « » TARE «

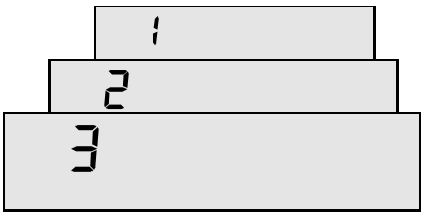
- Switch the balance off and back on again by pressing I/⏻.
- While all segments are lighted in the display, briefly press TARE.
- "1" is displayed.



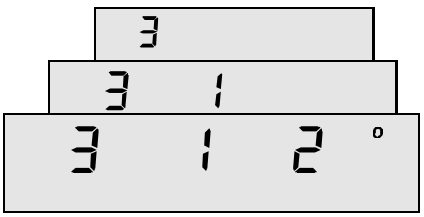
Note:

If " -1" is displayed, this indicates that the operating menu is blocked by the menu access switch.
The menu access switch is located at the back of the balance (see figure at the left).
In order to make changes in the menu code settings, move the switch to the right.

Selecting a Code Setting » CAL « » ⊙ «:

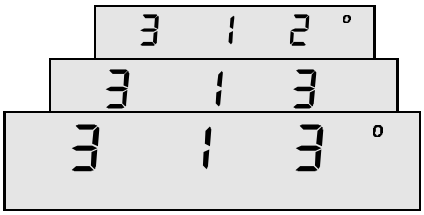


- Press CAL to select the desired number. Numbers increase by one with each press and go from 9 back to 1 again (1, 2, 3 ... 8, 9, 1 .2..).



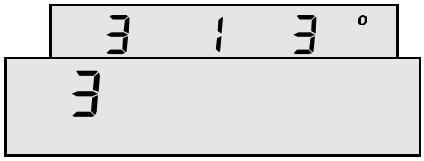
- Press ⊙ to move from the first code number to the second and third numbers (1st - 2nd - 3rd - 1st etc.).

Changing a Setting » TARE «:



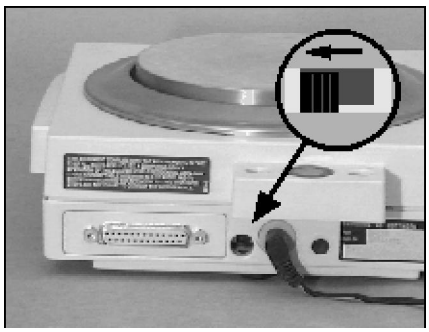
- Press TARE to confirm the new setting. A " ° " appears after the new setting, e.g., " 3-1-3° ".

Save Setting and Quit, »TARE« »⊙« »TARE« and Quitting without Saving »I/⏻«:

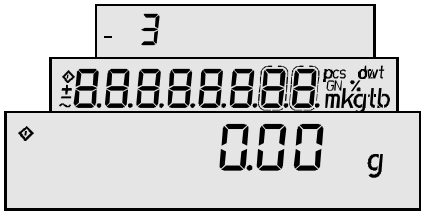


- When you are ready to exit the operating menu, press TARE. This returns you to the first position in the balance operating menu.

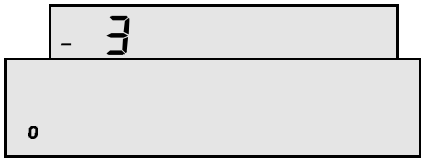
Note:



Once you have quit the the operating menu, you should always block access to the menu with the menu access switch. Move the switch to the left and replace the cover plate.



- Press TARE to store the new settings and exit the menu.



- Press I/⏻ to exit without storing the changes.

Balance Operating Parameters

REL 8.02			REL 13.01			Version Basic^{plus}	
1			**1**			**Weighing Mode**	
1	**1**		**1**	**1**		**Adapting the Balance to Ambient Conditions**	
1	1	1	1	1	1	Very stable conditions	
1	1	2	1	1	2	Stable conditions	
1	1	3	1	1	3	Unstable conditions	
1	1	4	1	1	4	Very unstable conditions	
1	**2**		**1**	**2**		**Standard Weighing Mode - Manual Filling Mode**	
1	2	1	1	2	1	Standard weighing mode	
1	2	2	1	2	2	Manual filling mode	
1	**3**		**1**	**3**		**Stability Range**	
1	3	1	1	3	1	¼ digit	
1	3	2	1	3	2	½ digit	
1	3	3	1	3	3	1 digit	
1	3	4	1	3	4	2 digits	
1	3	5	1	3	5	4 digits	
1	3	6	1	3	6	8 digits	
1	**5**		**1**	**5**		**Tare Parameter**	
1	5	1	1	5	1	Without stability	
1	5	2	1	5	2	With stability	
1	**6**		**1**	**6**		**Auto Zero Function**	
1	6	1	1	6	1	ON	
1	6	2	1	6	2	OFF	
1	**7**		**1**	**7**		**1st Weight Unit**	
1	7	1	1	7	1	User-definable	o
1	7	2	1	7	2	Grams	g
1	7	3	1	7	3	Kilograms	kg
1	7	4	1	7	4	Carats	ct
1	7	5	1	7	5	Pounds	lb
1	7	6	1	7	6	Ounces	oz
1	7	7	1	7	7	Troy ounces	ozt
1	7	8	1	7	8	Hong Kong taels	tl
1	7	9	1	7	9	Singapore taels	tl
1	7	10	1	7	10	Taiwanese taels	tl
1	7	11	1	7	11	Grains	GN
1	7	12	1	7	12	Pennyweights	dwt
1	7	13	1	7	13	Milligrams	mg
1	7	14	1	7	14	Parts per pound	o
1	7	15	1	7	15	Chinese taels	tl
1	7	16	1	7	16	Mommes	m
1	7	17	1	7	17	Austrian carat	k
1	7	18	1	7	18	Tola	t
1	7	19	1	7	19	Baht	b
1	7	20	1	7	20	Mesghal	m
			1	**8**		**2 Display Mode Selection**	
			1	8	1	Highest accuracy	
			1	8	2	Last numeral blanked when load changes	
			1	8	3	Rounding factor 2	
			1	8	4	Rounding factor 5	
			1	8	5	Rounding factor 10	
1	**9**		**1**	**9**		Adjustment/Calibration Functions	
1	9	1	1	9	1	External calibration	
1	9	2				External calibration with recognition of the calibration weights	
1	9	3	1	9	3	Internal calibration	
1	9	4	1	9	4	Checking the internal calibration weights	
			1	9	5	ext. Linearisieren	
			1	9	6	int. Linearisieren	
1	9	5	1	9	7	Function blocked	
2			**2**			**Applications**	
2	**1**		**2**	**1**		**F** Application	
2	1	1	2	1	1	No application	

Balance Operating Parameters

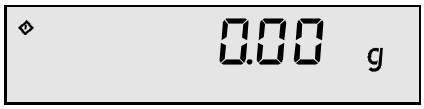
REL 8.02			REL 13.01			Version Basic[plus]	
2	1	2	2	1	2	Toggle between weight units	
2	1	4	2	1	4	Counting	
2	1	5	2	1	5	Weighing in percent	
2	1	6	2	1	6	Tare memory	
			2	1	7	Animal weighing	
2	**5**		**2**	**5**		Display Mode	
2	5	1	2	5	1	-- without stability	
2	5	2	2	5	2	Normal display	
3			**3**			**F Application Parameters**	
3	**1**		**3**	**1**		2nd Weight Unit	
3	1	1	3	1	1	User-definable	o
3	1	2	3	1	2	Grams	g
3	1	3	3	1	3	Kilograms	kg
3	1	4	3	1	4	Carats	ct
3	1	5	3	1	5	Pounds	lb
3	1	6	3	1	6	Ounces	oz
3	1	7	3	1	7	Troy ounces	ozt
3	1	8	3	1	8	Hong Kong taels	tl
3	1	9	3	1	9	Singapore taels	tl
3	1	10	3	1	10	Taiwanese taels	tl
3	1	11	3	1	11	Grains	GN
3	1	12	3	1	12	Pennyweights	dwt
3	1	13	3	1	13	Milligrams	mg
3	1	14	3	1	14	Parts per pound	o
3	1	15	3	1	15	Chinese taels	tl
3	1	16	3	1	16	Mommes	m
3	1	17	3	1	17	Austrian carat	k
3	1	18	3	1	18	Tola	t
3	1	19	3	1	19	Baht	b
3	1	20	3	1	20	Mesghal	m
			3	**2**		2 Display Mode Selection	
			3	2	1	Highest accuracy	
			3	2	2	Last numeral blanked when load changes	
			3	2	3	Rounding factor 2	
			3	2	4	Rounding factor 5	
			3	2	5	Rounding factor 10	
3	**5**		**3**	**5**		Wertübernahme	
3	5	1	3	5	1	with display accuracy	
3	5	2	3	5	2	with full accuracy	
3	**6**		**3**	**6**		Display Parameter for Readouts in Percent	
3	6	1	3	6	1	without a decimal place	
3	6	2	3	6	2	with one decimal place	
3	6	3	3	6	3	with two decimal places	
3	6	4	3	6	4	with three decimal places	
			3	**7**		Delayed Start Mode Animal Weighing	
			3	7	1	slightklein	
			3	7	2	average	
			3	7	3	considerable	
			3	**8**		Start Animal Weighing	
			3	8	1	Manual mode	
			3	8	2	Automatic mode	
5			**5**			Interface Parameters	
5	**1**		**5**	**1**		Baud rate	
5	1	1	5	1	1	150 baud	
5	1	2	5	1	2	300 baud	
5	1	3	5	1	3	600 baud	
5	1	4	5	1	4	1200 Baud	
5	1	5	5	1	5	2400 baud	
5	1	6	5	1	6	4800 baud	
5	1	7	5	1	7	9600 baud	
5	1	8	5	1	8	19200 baud	
5	**2**		**5**	**2**		Parity	
5	2	1	5	2	1	Mark Parity	
5	2	2	5	2	2	Space Parity	

Balance Operating Parameters

REL 8.02			REL 13.01			Version Basic^{plus}
5	2	3	5	2	3	Odd Parity
5	2	4	5	2	4	Even Parity
5	**3**		**5**	**3**		**Number of Stop Bits**
5	3	1	5	3	1	1 Stop bit
5	3	2	5	3	2	2 Stop bits
5	**4**		**5**	**4**		**Handshake**
5	4	1	5	4	1	Software handshake
5	4	2	5	4	2	Hardware handshake 2 char. after CTS
5	4	3	5	4	3	Hardware handshake 1 char. after CTS
6			**6**			**Utilities**
6	**1**		**6**	**1**		**Data Output Parameter**
6	1	1	6	1	1	Individual printout without stability
6	1	2	6	1	2	Individual printout after stability
6	1	3	6	1	3	Individual printout at stability
6	1	4	6	1	4	Autoprint without stability
6	1	5	6	1	5	Autoprint after stability
6	**2**		**6**	**2**		**Automatic Data Output**
6	2	1	6	2	1	Autoprint by pressing key stoppable
6	2	2	6	2	2	Autoprint not stoppable
6	**3**		**6**	**3**		**Automatic Data Output at Defined Intervals**
6	3	1	6	3	1	After 1 display update
6	3	2	6	3	2	After 2 display updates
			6	**4**		**Auto Tare after Data Output**
			6	4	1	off
			6	4	2	on
7			**7**			**Additional Utilities**
7	**1**		**7**	**1**		**Automatic Output of Application Program Parameters**
7	1	1	7	1	1	OFF
7	1	2	7	1	2	ON
7	**2**		**7**	**2**		**Data output Format**
7	2	1	7	2	1	Without data ID code
7	2	2	7	2	2	With data ID code
7	**3**		**7**	**3**		**Auto Tara Output/Printing**
7	3	1	7	3	1	Last net weight
7	3	2	7	3	2	Total tare weight
8			**8**			**Additional Functions**
8	**1**		**8**	**1**		**Access to Menu**
8	1	1	8	1	1	Accessible
8	1	2	8	1	2	Readable
8	**3**		**8**	**3**		**Key Function**
8	3	1	8	3	1	Accessible
8	3	2	8	3	2	Blocked
8	**4**		**8**	**4**		**Universal Switch for Remote Control**
8	4	1	8	4	1	Print
8	4	2	8	4	2	Tare
8	4	3	8	4	3	Adjustment/Calibration
8	4	4	8	4	4	F Key
			8	4	5	CF Key
			8	**5**		**Power-On Mode**
			8	5	1	off - on - standby
			8	5	3	on - standby
			8	5	4	auto. power on (remote control)
8	**6**					**Power-On Mode**
8	6	1				off - on - standby
8	6	3				on - standby
8	6	4				auto. power on (remote control)
8	**14**		**8**	**10**		**GLP/GMP Printout**
8	14	1	8	10	1	OFF
8	14	2	8	10	2	automatic power-on
			8	10	3	ON
9			**9**			**Reset Function**
9	**– –**	**1**	**9**	**– –**	**1**	on
9	**– –**	**2**	**9**	**– –**	**2**	**off**

Displaying the Hardware and Software Versions

- Switch the balance off and back on again using the I/⏻ key.
- While all display segments are lit, briefly press the ⊙ key; the display is now as indicated in the figure at the left.
- This display remains for about 3 seconds.
- The first two numbers show the hardware generation; the last two, the software version.

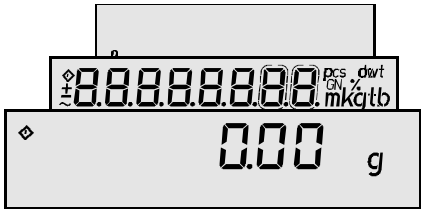


- The display then returns to the normal mode.

Activating the BPI Mode

Note:

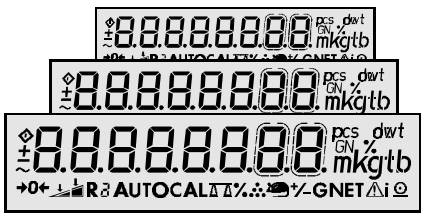
In order to use the CAS programs with the Sartorius MC1 Server (version 4.4 and later), the balance must be set to the BPI mode (**B**inary **P**rotocol **I**nterface mode) (e.g., for linearization or when replacing the PCB).



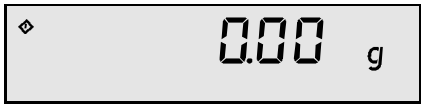
- Switch the balance on using the I/⏻ key and wait for the self-test to run, i.e. until "0.00 g" (depending on the balance used) is displayed.

- Remove the cover stopper from the back of the balance, located to the right of the power jack (see the figure at the left).

- The BPI switch is now accessible. Press the BPI switch once, e.g. with a ball-point pen, and hold it in.
- With this button pressed, a 12 volt current is applied to the balance processor, which deactivates the write-protect on the EEPROM.



- The segment check is now displayed periodically.
- Wait until the segment check has lit up at least 3 times; now the balance electronics are in the BPI mode.



- Release the BPI switch; the display now returns to the normal mode.

- Close the back of the balance with the cover stopper.
- You can now use the balance together with the Sartorius MC1 Server or the CAS Program for Personal Computers.

Caution:

After working in the BPI Mode, **make sure** to set the write-protect again (with the CAS Program for the Sartorius MC1 Server (version 4.4 and later)), so that the Basic^{plus} balance returns to the standard data record output mode (SBI = **S**artorius **B**alance **I**nterface).
If the balance is in the BPI mode when you press the ⊙ key, the error code ERR 30 will be displayed. You cannot run the peripheral devices until you set the balance back to the SBI mode.

Adjusting/Calibrating the Balance

Preparation:
Place the balance on a stable surface. e.g. a stone table, level it using the level indicator, and allow at least 4 hours warm-up time. Adjust the balance at this location.

Adjusting Sequence

You will need to check and, if necessary, adjust the following factors, in the order given, any time the balance is moved to a new location and after any servicing or repair work:

Basic^{plus} Balances with the Strain Gauge System

1. Overload stops
2. Zero point offset value
3. Off-center load
4. External linearity
5. External adjustment/calibration

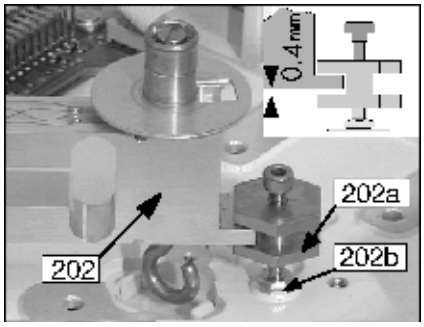
Basic^{plus} Balances With Electromagnetic Force Compensation Systems

1. Null Indicator
2. Preload
3. Off-center load
4. External linearity
5. External adjustment/calibration
6. Overwriting the internal calibration weight

Adjustment of overload Stop

The overload stop only needs to be checked after the strain gauge system is replaced.

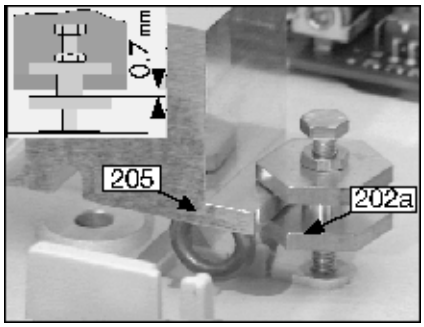
Checking the Overload Stop



- Open the balance (see page 27).
- The gap between the overload stop (202a) and the lower end position on a non-loaded system can be up to (202,205):

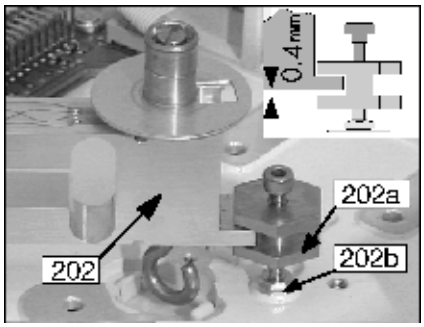
0,1g strain gauge system (202) (e.g. BP 610) **0,4mm** to **(maximum 0,5mm)**

1g strain gauge system (205) (e.g. BP 4100) **0,7mm** to **(maximum 0,8mm)**



- Check this gap with the appropriate gauge.
- If the gap exceeds the given tolerance range, adjust it as described below.
- If the position of the overload stop is correct, proceed with the following adjustments:
  Zero point offset value (see page 20),
  Off-center load (see page 22),
  Linearity (see page 25) and
  External adjustment/calibration (see page 25).

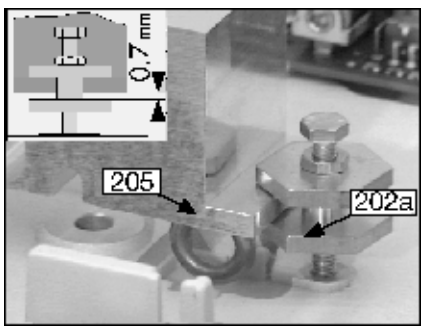
Adjusting the Overload Stop



- Open the balance (see page 27).
- Loosen the nut (202b) for the overload stop so that the overload stop can be moved.
- With the balance unloaded, move the overload stop (202a) so that the gap between the overload stop (202a) and the lower end position is:

0,1g strain gauge system (202) (e.g. BP 610) **0,4mm** to **(maximum 0,5mm)**

1g strain gauge system (205) (e.g. BP 4100) **0,7mm** to **(maximum 0,8mm)**



- Check this gap while adjusting, using the appropriate gauge.
- Once the gap is correct, fix the overload stop (202a) in this position by tightening the nut (202b).
- Then check the overload stop (202a) again as described above.
- If the position of the overload stop is correct, proceed with the following adjustments:
  Zero point offset value (see page 20),
  Off-center load (see page 22),
  Linearity (see page 25) and
  External adjustment/calibration (see page 25).

Null Indicator

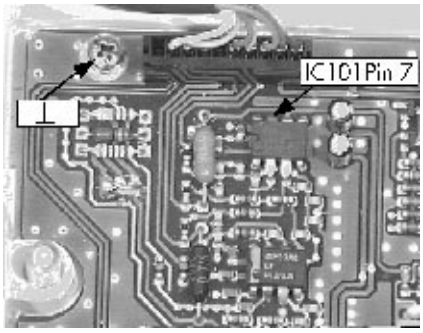
Checking the Null Indicator

Important note:

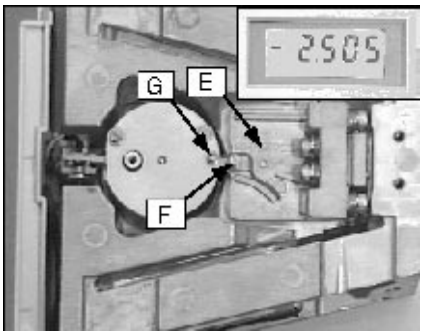
Never change the position of the null indicator! Even when the lever is removed, the null indicator does not require adjustment.

Procedure:

- Open the balance (see page 27).



- Connect the digital voltmeter between pin 7 of the IC 101 on the analog PCB (204b) and the ground (⊥).
- Set the measuring range of the digital voltmeter to 20 V DC.
- Switch the balance back on.



- The lever (E) must be able to move freely between the upper and lower stops (F, G).
- Carefully move the lever (E) against the lower and upper stops (F, G).

- The following voltages should be read at the null indicator output port: approx. - 2.5 V when the level stabilizes, and approx. ± 1 V (relative to the voltage at the stabilization point) when the lever reaches the stops.
  Example: - 1.63 V ... - 2.47 V ... - 3.58 V

If the difference in voltage at the upper and lower stops is not symmetric, or if the lever pulls toward the upper or lower stop when the balance is switched on, this might indicate a mechanical or electrical error.

- If the voltage readings at the stabilization point and at the upper and lower stops are correct, we recommend checking (and, if necessary, adjusting) the preload (see page 25) before you close the balance (see page 27).

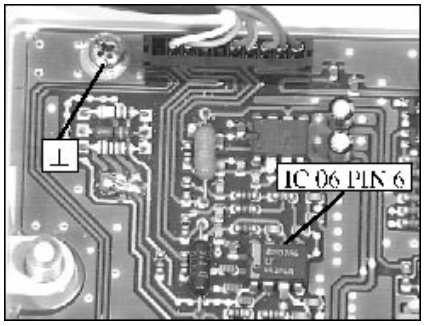
Zero Point Offset Value
(Strain Gauge System)

Checking the Zero Point Offset Value

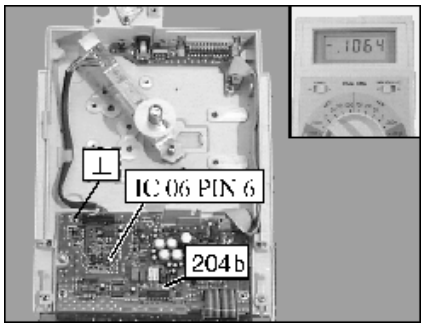
Always check the zero point offset value after installing a new strain gauge system (see page 25) or when the zero point offset changes as a result of mechanical influences.

- The data for zero point offset tests weights and zero point offset voltage are contained in the "Adjustment/Calibration Data Sheet for Basic^{plus} Balances".
- Open the balance (see page 27).
- Set the overload stops (see page 18).

Procedure:



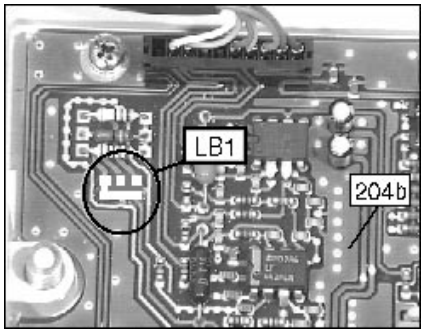
- Connect the digital voltmeter between pin 6 of the IC 106 on the analog PCB (204b) and the ground (⊥).



- Set the measuring range of the digital voltmeter to 2 V DC; remove the weighing pan and, if necessary, the pan support (104 or 201).
- Switch the balance on.
- Compare the values displayed on the digital voltmeter with those given in the "Adjustment/Calibration Data Sheet for Basic^{plus} Balances" for zero point offset values.

If the values shown are different from those given in the "Adjustment/ Calibration Data Sheet for Basic^{plus} Balances", the zero point offset value must be readjusted.

- If the values shown are within the tolerance range given, close the balance before proceeding with the other adjustments (off-center load, linearity, adjustment/calibration) (see page 27).

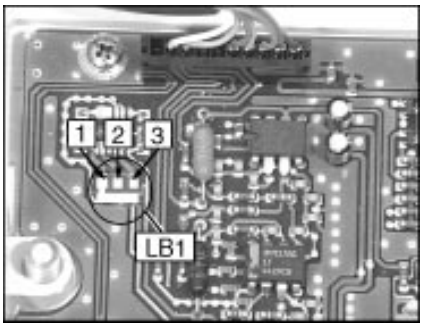


Adjusting the Zero Point Offset Value

This adjustment is necessary after a new strain gauge system is installed, or when the zero point offset changes as a result of mechanical influences.

- Switch off the balance and disconnect it from the power supply.
- The test procedure is the same as for checking the zero point offset value.
- Close the LB1,3 solder bridge and open LB1,1 and LB1,2 on the analog PCB (204b) (see page 25).

- Connect the balance to the power supply and switch it on.
- Compare the values displayed on the digital voltmeter with those in the "Adjustment/Calibration Data Sheet for Basic^{plus} Balances".
- If the preload voltage exceeds the tolerance range, adjust the voltage by opening or closing the solder bridges as necessary, in accordance with the following table.



Preload voltage	Solder bridge LB1		
	3	2	1
- 0,951 V .. - 1.540 V	open	close	open
- 1,541 V .. - 2.200 V	close	open	close

- Then check the zero point offset value again.
- If the values shown are within the tolerance range given, close the balance before proceeding with the other adjustments (off-center load, linearity, adjustment/calibration) (see page 27).

Preload

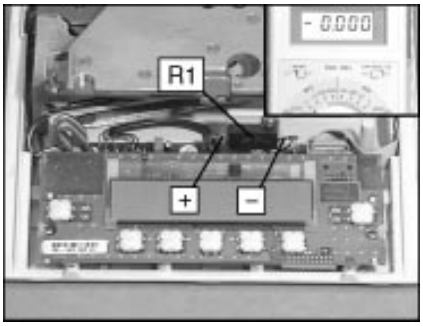
Checking the Preload

Note:

Extreme changes in the preload indicate a mechanical or electrical error. The data for preload test weights and preload voltage are contained in the "Adjustment/Calibration Data Sheet for Basic^{plus} Balances".

- Open the balance (see page 27).

Test procedure:

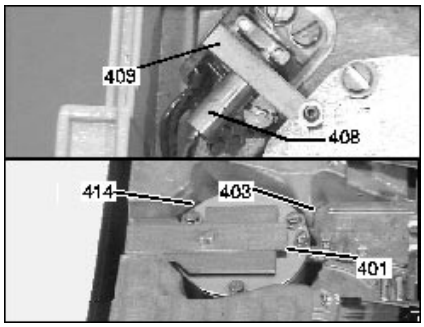


- Connect the digital voltmeter parallel to the multiplier resistor R1 on the analog PCB (204b).
- Set the measuring range of the digital voltmeter to 20 V DC; place the weighing pan and, with balances that have a rectangular weighing pan, the base plate on the balance.
- Switch on the balance and place the required preload test weight on the weighing pan (102, 105, 108).
- Compare the voltage displayed on the digital voltmeter with the preload voltage given in the "Adjustment/Calibration Data Sheet for Basic^{plus} Balances". If necessary, switch the voltmeter to a lower measuring range (e.g. 2 V DC, or. 200 mV DC).

If the preload voltage measured is different from that given in the "Adjustment/ Calibration Data Sheet for Basic^{plus} Balances", then you will need to adjust the preload.

- If the preload voltage measured is within the tolerance range given, close the balance (see page 22) before continuing with the following adjustments:
  Off-center load (see page 25),
  Linearity (see page 25)
  External adjustment/calibration (see page 27)

Adjusting the Preload



- The test procedure is similar to that described under "Checking the Preload" on the previous page.
- Use the one of the following procedures to change the preload:

- Basic^{plus} Balances with brass-system (small): Remove preload weights (408) from the preload spindle (409), or add weights to the spindle; fine adjustments are made by moving the preload weights (408) that are on the spindle (409).

- Basic^{plus} Balances with single-casting block system (small): Remove preload weights (401) from the lever (403) via the magnets (414) or add weights to the lever.

- During the adjustment, the preload weights remain on the balance.
- Check the display on the digital voltmeter after each change and compare the voltage display to that given in the data sheet.
- If the preload voltage measured is within the tolerance range given, close the balance (see page 27) before continuing with the following adjustments:
  Off-center load (see page 22),
  Linearity (see page 25)
  External adjustment/calibration (see page 25)

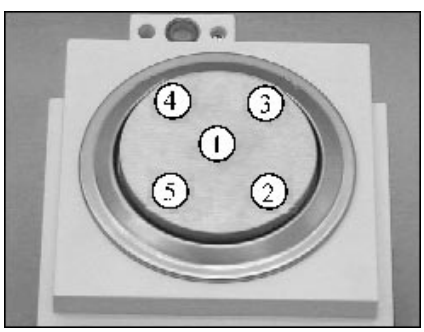
Off-Center Load

Checking the Off-Center Load

Note:

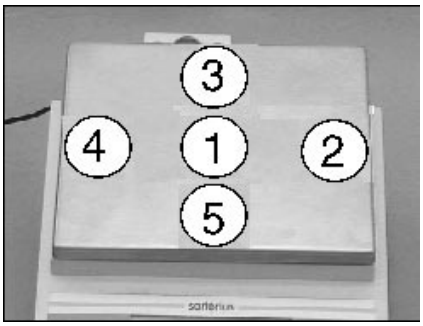
The procedure described in the following for checking the off-center load is based on the Sartorius in-house standard no. 1-150, point 1.5.1 "Checking the Off-Center Load Using 5 Test Positions". All off-center load values given in the "Adjustment/Calibration Data Sheets for Basic^{plus} Balances" are also based on this standard.

- The data for off-center load checkweights, diameter, off-center-load test area and tolerance values are contained in the "Adjustment/Calibration Data Sheets for Basic^{plus} Balances".
- Place the test weight on position 1 on the weighing pan; if the balance has a draft shield, close the draft shield. Press »TARE« to tare the balance.
- Place the test weight on positions 2 through 5 in sequence and write down the values, with plus or minus sign, displayed at stability and with the draft shield (if present) closed.



Basic^{plus} Balances with diagonally installed weighing systems (brass-system (small) and strain gauge system): The diagram at the left applies to Basic^{plus} balances with rectangular weighing pans.

Example (BP 210 S):	Pos. 1 »TARE«	0.0000 g
	Pos. 2	+ 0.0015 g
	Pos. 3	+ 0.0022 g
	Pos. 4	- 0.0012 g
	Pos. 5	- 0.0018 g



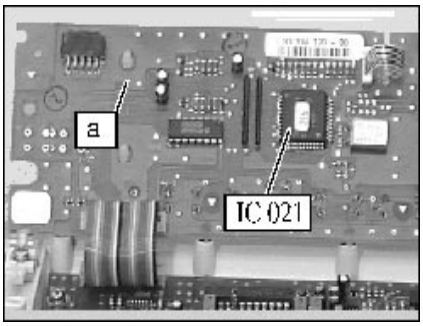
Basic^{plus} Balances with laterally installed weighing systems (strain gauge 0,1g resolution) and single-casting block systems (small): The diagram at the left applies to Basic^{plus} balances with rectangular weighing pans.

Example (BP 3100 S):	Pos. 1 »TARE«	0.00 g
	Pos. 2	+ 0.12 g
	Pos. 3	+ 0.15 g
	Pos. 4	- 0.08 g
	Pos. 5	- 0.10 g

- Compare off-center load deviations with the tolerance values given in the "Adjustment/Calibration Data Sheets for Basic^{plus} Balances".
- If the values measured exceed the tolerance ranges, you will need to adjust the off-center load.

Adjusting the Off-Center Load

Basic^{plus} Balances with strain gauge system or single-casting block system (small):



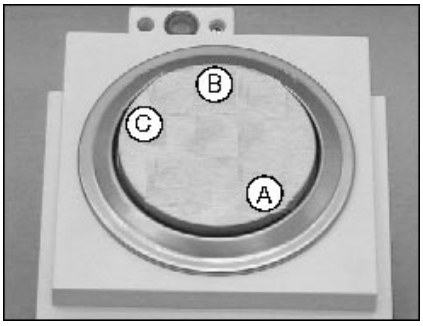
Adjusting the off-center load requires special knowledge of the strain gauge system, or of the single-casting block system (small) which cannot be described in detail in this service manual. However, you can acquire the required knowledge by attending the corresponding service training course on this topic. For more information, please contact Sartorius AG in Goettingen, Germany, or the Sartorius Training Center.

Basic^{plus} Balances with Brass-System (small):

- Remove the two stoppers (112) from the upper part of the balance housing (110) (Basic^{plus} Balance with brass-system (standard), with brass-system (analytical), or with brass-system (small)).

3-Point Adjustment (rough)

- Place the test weight on **position A** on the weighing pan; if the balance has a draft shield, close the draft shield. Press »TARE« to tare the balance.
- Place the test weight on **positions B** through **C** in sequence and write down the values, with plus or minus sign, displayed at stability and with the draft shield (if present) closed.



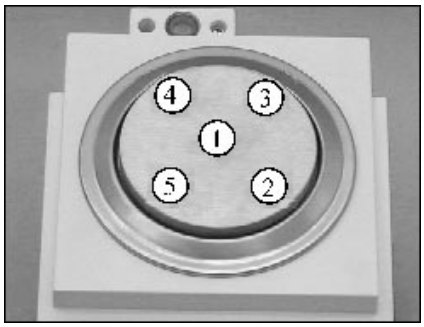
Basic^{plus} Balances with diagonally installed weighing systems (brass-system (small):

Example (BP 210 S):	Pos. A »TARE«	0.0000 g
	Pos. B	+ 0.0018 g
	Pos. C	- 0.0015 g

- Perform the adjustment only on the side with the greater deviation; in the example given, this is "position B", corresponding to the off-center load screw on the right.
- Change the setting of the screw in small increments; then check the off-center load again at **positions A, B and C**. If necessary, re-adjust the position of one of the off-center load screws.

5-Point Adjustment (fine)

- Place the test weight on **position 1** on the weighing pan; if the balance has a draft shield, close the draft shield. Press »TARE« to tare the balance.
- Place the test weight on **positions 2** through **3** in sequence and write down the values, with plus or minus sign, displayed at stability and with the draft shield (if present) closed.



Basic^{plus} Balances with diagonally installed weighing systems (brass-system (small):

Example (BP 210 S):	Pos. 1 »TARE«	0.0000 g
	Pos. 2	+ 0.0008 g
	Pos. 3	- 0.0005 g

- Perform the adjustment only on the side with the greater deviation; in the example given, this is "**position 2**," corresponding to the off-center load screw on the right.
- Change the setting of the screw in small increments; then check the off-center load again at **positions 1, 2** and **3**. If necessary, re-adjust the position of one of the off-center load screws.
- If the off-center load on the sides (**pos. 2** and **3**) is within the tolerance range, then the off-center load at the front and back (**pos. 4** and **5**) must be adjusted.
- Place the test weight on **position 1** on the weighing pan; if the balance has a draft shield, close the draft shield. Press »TARE« to tare the balance.
- Place the test weight on **positions 4** and **5** in sequence and write down the values, with plus or minus sign, displayed at stability and with the draft shield (if present) closed.

Basic^{plus} Balances with diagonally installed weighing systems (brass-system (small):

Example (BP 210 S):	Pos. 1 »TARE«	0.0000 g
	Pos. 4	+ 0.0006 g
	Pos. 5	- 0.0004 g

- Perform each adjust on both sides, i.e. change the positions of both of the off-center load screws by the same amount and in the same direction.
- Change the setting of the screw in small increments; then check the off-center load again at **positions 1, 4** and **5**. If necessary, re-adjust the position of one of the off-center load screws.
- If the measured values now lie within the tolerance range, please check the off-center load at all 5 positions one more time, just to be certain.
- After completing the off-center load adjustment, replace the stoppers (112) in the upper part of the balance housing (110) (Basic^{plus} Balances with brass-system (standard), with brass-system (analytical), or with brass system (small)).

Linearity

Note:

You can only adjust the linearity in these balances using the Sartorius MC1 Server (version 4.4 and later).

Checking the Linearity

- Check the linearity for the entire weighing range in 5 steps.
- Compare the values displayed with the tolerance ranges given in the "Adjustment/Calibration Data Sheets for Basic^{plus} Balances".
- If the deviations exceed the tolerance ranges, the linearity must be adjusted.

Adjusting the Linearity

Important note:

You can only adjust the linearity in these balances using the Sartorius MC1 Server (version 4.4 and later).

- Activate the BPI mode (see page 16).
- Adjust the linearity using the Sartorius MC1 Server (version 4.4 and later). (Please see the program description for the MC1 for instructions).

Important note:

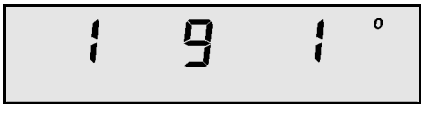
After working in the BPI mode, do not forget to set the write-protect so that the Basic^{plus} balance returns to the standard data output mode (SBI Mode) and it is possible to attach peripherals.

Adjusting the Sensitivity

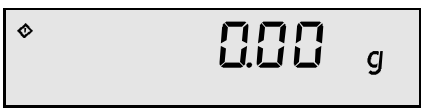
External Adjustment

Note:

There are two different procedures for this adjustment:
1. As described in this manual, or
2. Using the Sartorius MC1 Server (version 4.4 and later).



- Make sure that the menu code "1 9 1 - external adjustment/calibration accessible" is set.

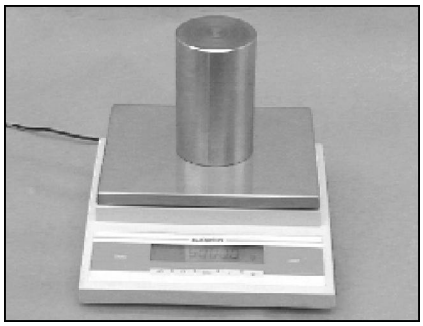


- Tare the balance by pressing BP-T-TA.WMF; then press CAL to initiate the adjustment/calibration function.

- The calibration weight required appears in the display.

Note:

The balance only accepts weight values within a tolerance range of approx. 2% of the nominal value. Deviations exceeding this tolerance range can only be compensated using the Sartorius MC1-Server (tolerance approx. 50% of the nominal value).



- Place the required weight in the middle of the weighing pan and, if you are using a balance with a draft shield, close the draft shield.
- After the calibration weight is stored, the balance returns to the standard weighing mode.
- After completing the adjustment, reset the "1 9" code setting in the balance operating menu.

Overwriting the Internal Calibration Weight

Caution:

The factory setting of the internal calibration weight is performed very accurately:

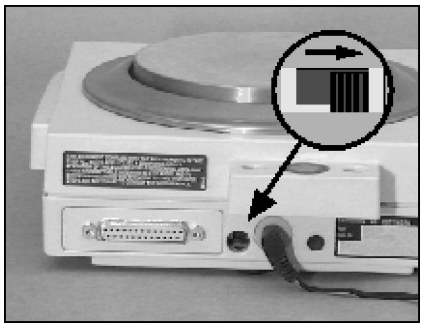
- If overwriting becomes necessary, this indicates a mechanical or electrical error !
- The balance must be allowed to warm-up (at least 4 hours) !
- The weights must be sufficiently accurate (check the calibration certificate !).

Note:

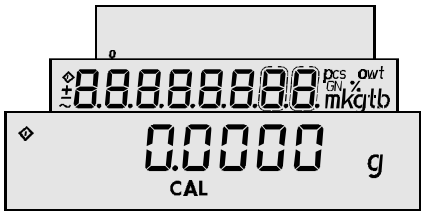
There are various ways of overwriting the internal calibration weight on Basic^{plus} balances with brass-system (small).

1. As described in this manual, or
2. Using the Sartorius MC1 Server (version 4.4 and later).

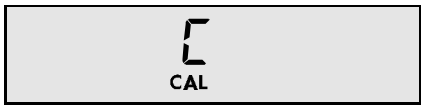
- Make sure that the menu code "1 9 3 - internal adjustment/calibration accessible" is set (see page 13, "Balance Operating Menu Settings").



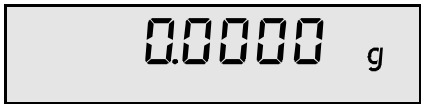
- Open the menu access switch, located at the back of the balance.
- If you have not done so already, perform the external adjustment/ calibration as described on page 25.
- Switch the balance off by pressing the » I/⏻ « key.



- Hold down the » CAL « key and switch on the balance by pressing » I/⏻ « key; hold down the » CAL « key until the display pictured at the left appears.

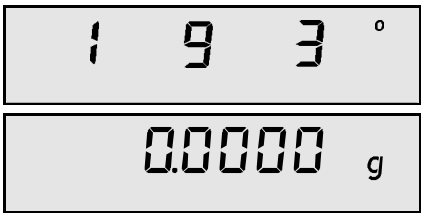


- Tare the balance by pressing » TARE «; then press » CAL « to initiate the adjustment/calibration function.

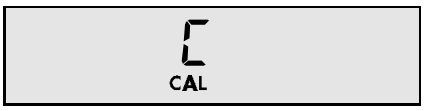


- The built-in, motorized adjustment/calibration weight is applied and then removed automatically, the weight value is stored, and the balance then returns to the standard weighing mode.

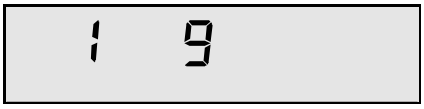
Internal Adjustment/Calibration



- Make sure that the menu code "1 9 3 - internal adjustment/calibration accessible" is set (see page 13, "Balance Operating Menu Settings)".
- Tare the balance by pressing »TARE«; then press »CAL« to initiate the adjustment/calibration function.



- The built-in, motorized adjustment/calibration weight is applied and then removed automatically, the weight value is stored, and the balance then returns to the standard weighing mode.



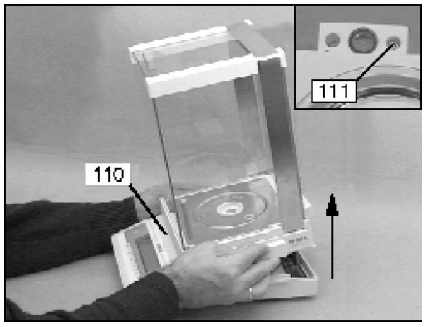
- After completing the adjustment, reset the "1 9" code setting in the balance operating menu.

Opening and Closing the Balance

Opening the Balance

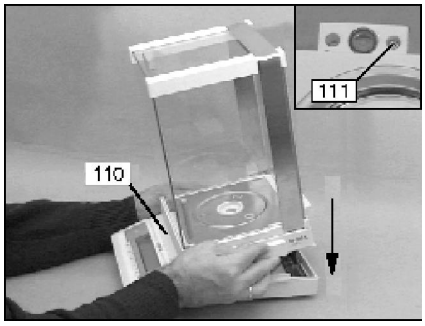
Important note:

If you remove the seal (warranty sticker), your balance is no longer covered under the warranty.



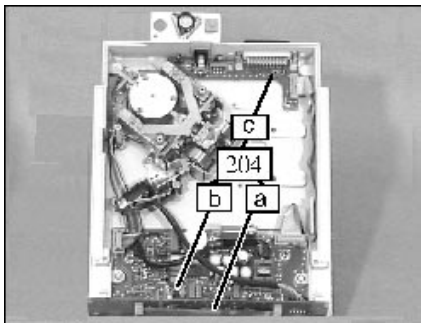
- Disconnect the balance from the power supply.
- Remove all movable parts from the balance, depending on the model, e.g. weighing pan (102,107,108), pan support, (104) glass draft shield cylinder (106), etc.
- Remove the screw (111) from the base plate.
- Carefully lift the upper part of the housing (110) from the back, push it forward and lift it off.

Closing the Balance

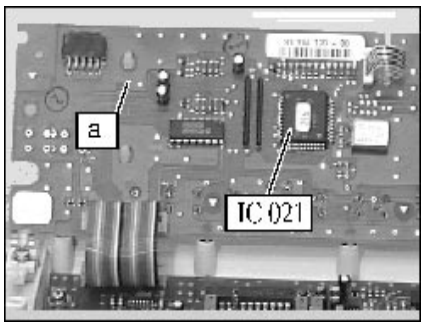


- Place the upper part of the housing (110) on the balance and fasten it with the screw (111).
- With balances that have a round weighing pan (102,105,108), position the centering ring (101,103) on the pan retaining pin (409).
- Place the movable parts on the balance, depending on the model, e.g. weighing pan (102,107,108), pan support (104), glass draft shield cylinder (106), etc.
- The balance is now ready to operate.

Electronics



Should there be any defect in the electronics of your Basic^{plus} balance, you should not attempt to repair individual components, but rather exchange the entire PCB set (204). The three PCBs together (A,B,C) form a complete unit.



The PCB set (204) is factory-programmed and the PCB-specific data are written onto the AOC (IC 021). Any attempted repair of the PCB would ruin these data.
In addition, the 3 PCBs (A,B,C) are installed as SMD (surface mounted devices). Replacing one of these parts would require special tools.

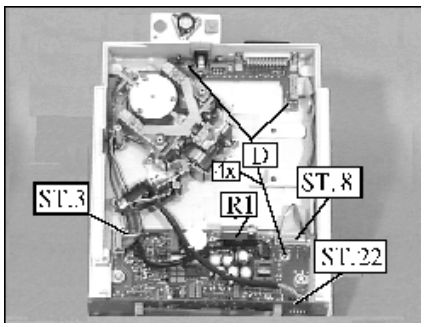
Exchanging the PCB Set

Important note:

The PCB set (204) (3 PCBs) (a,b,c) can only be exchanged as a complete unit at an authorized repair center.

Note:
In order to replace the PCBs set, you need to order a pre-programmed replacement PCB. Always include the balance model and serial number with your order.

After installation, perform the function: SAVE / LIN / CAL / CLOSE with a PSION and the Sartorius MC1 Server (version 4.4 and later).



- Open the balance (see page 27).

- Disconnect all plugs (e.g. system connector- (ST.3), weight application sub-assembly plug, etc.) from the PCB (204b).
- Remove the locking screws (204c) from the data out put port.
- Remove the fastening screws (D) that fasten the analog PCB (204b); the data output PCB (204c) and, if present, the multiplier resistor, from the base plate (110).
- Remove the PCB set (204) from the base plate (110).

Note:

- When installing the new PCB set, follow the instructions enclosed with the PCBs (204) (33194-121-10) (33199-121-10) (33514-121-10) (33518-121-10).

- See the board diagram for the position of the components and the solder bridges.

- Place the new PCB set (204) in the base plate, position the PCBs, and fasten the analog PCB (204b) and the data output PCB (204c) with the fastening screws (D).
- Refasten the locking screws on the data output port.
- Reconnect all plugs (e.g. system connector- (ST.3), weight transapplication sub-assembly plug, etc.) in the corresponding jacks on the analog PCB (204b).

Note:

Having installed a new PCB set (204) with the basic data set, you must read in the basic data set into the balance, using the Sartorius MC1 Server (version 4.4 and later). See the program description of the MC1 for instructions on this procedure. You can then conclude the procedure for replacing the PCB set.

- Close the balance housing (see page 27).

- You must now perform the following adjustments (if you have not already done so with the Sartorius MC1 Server (version 4.4 and later):
  Linearity adjustment (see page 25),
  External adjustment/calibration (see page 25),
  Overwriting the internal calibration weight (see page 26).

- The balance is now ready to operate.

Error code	Explanation	Remedial measures
Err 01	Display overflow, i.e. the value to be output cannot be shown in the display.	Reset the balance operating menu with menu code 9-1 (see page 13 , "Accessing the Balance Operating Menu and Changing the Settings").
Err 02	Zero point error when starting adjustment/ - calibration function; caused by operating error (balance not tared, or load not removed), or stability was not reached, or by deviation in the zero point (see page 20 "Zero Point Offset Value").	First make sure there was no operating error. If the balance still cannot be adjusted/calibrated, you must perform the "Zero Point Offset Value" adjustment (see page 20), and then perform the "External Adjustment/ Calibration" (see page 25).
Err 06	Internal calibration weight defective or not present.	Check the calibration weight application sub-assembly (motor, plug connections, limit switch, etc.) and the ana analog PCB; replace any defective components. With balances that do not have a weight application sub-assembly, check the menu code settings; the codes 1 9 3 and 1 9 4 should be blanked out, otherwise, overwrite these codes with the Sartorius MC1 Server 4.4.
Err 10	Tare key is blocked, with data in the tare memory.	The tare functions are mutually exclusive; once the data in the memory is deleted, the tare key becomes accessible again.
Err 11	Invalid data; cannot be stored in the tare memory.	The value displayed was negative when the command to store was given. Check the load on the balance (tare container).
Err 21	Parameter cannot be changed in the parameter mode.	The code 2 1 1 is set in the balance operating menu.
Err 22	Reference value in the Counting or Weighing in Percent application not permissible; cannot be stored.	The weight of the reference sample is too low, or the displayed value is negative. Check the load on the balance (reference sample).
Err 30	The print key was pressed, or an external print command ("<ESC> P") was given, while the balance was in the BPI mode.	Set the balance back to the SBI mode; this can be done via the Sartorius MC1 Server 4.4
Err 31	No entry in the EEPROM key table (OEM) ; data set has not been adapted to the hardware.	The balance must be returned to the factory.
Err 50	Temperature compensation (TC) converter error; value measured by the TC switch the tolerance range.	Perform TC compensation via the Sartorius MC1 Server. If this does not suffice, proceed as described exceeds under "Err 53."
Err 53	Temperature compensation (TC) converter not functioning; no value passed to the balance processor (AOC / IC 021) from the TC switch.	Check the TC sensor, the analog PCB (204b), and the connection between the two. If necessary, replace the PCB set (see page 28), or the TC sensor.
Err 54	The level control of the A/D converter is below the lower limit; the value measured by the A/D converter is too low, or no value is measured.	Check the weighing system, the analog PCB (204b), connection between the two. If necessary, replace the PCB set (see page 28), or see "Repairing the Weighing System".

Err 55	The level control of the A/D converter is above the upper limit; the value measured by the A/D converter is too high.	Check the weighing system, the analog PCB (204b), and the connection between the two. If necessary, replace the PCB set (see page 28).
Err 220	ROM checksum error; the data in the internal ROM of the balance processor (AOC / IC 021) are faulty.	Replace the PCB set (see page 28).
Err 230	RAM read/write error; access to the internal RAM of the balance processor (AOC / IC 021) is faulty, or is not possible.	Replace the PCB set (see page 28).
Err 237	EEPROM checksum error in the linearity range;- the balance has not yet been linearized, or the data in the internal EEPROM of the balance processor (AOC / IC 021) are faulty.	Overwrite the faulty data set using the Sartorius MC1 Server 4.4. Then perform the linearity adjustment (see page 25) and the external adjustment/calibration (see page 25).
Err 239	EEPROM checksum error in the linearity range; the factor stored for the internal linearity weight exceeds the tolerance range, or is faulty.	Overwrite the internal linearity weight value weight (see page 26).
Err 241	EEPROM checksum error in the fixed range, the data for the balance operating menu in the internal EEPROM of the balance processor	Overwrite the faulty data set using the Sartorius MC1 Server 4.4. If the error remains, then exchange the PCB set (see page 22).
Err 243	EEPROM checksum error in the menu range; fixed data in the internal EEPROM of the balance processor (AOC / IC 021) are faulty.	Check the settings in the in the balance operating the menu; change the settings, e.g., by setting the code 9 1 (Reset) (see page 11).
Err 245	EEPROM checksum error in the adjustment/ calibration range (zero point); the balance has not yet been calibrated, or the data in the internal EEPROM of the balance processor (AOC/ IC 021) are faulty.	Perform the „ External Adjustment/Calibration“ (see page 25).
Err 247	EEPROM checksum error in the adjustment/ calibration range (sensitivity); the balance has not yet been calibrated, or the data in the internal EEPROM of the balance processor (AOC/ IC 021) are faulty.	Perform the „ External Adjustment/Calibration“ (see page 25).
Err 249	EEPROM checksum error in the calibration weight; the factor stored for the internal weight exceeds the tolerance range, or is faulty.	Overwrite the internal calibration weight (see page 26).
L	Load is below the weighing range; the weighing pan (102,107) is not on the balance, the balance was incorrectly adjusted/ calibrated; or the preload or zero point offset was incorrectly adjusted.	Make sure there was no operating error. If the error remains, perform the “External Adjustment/Calibration” (see page 25); should the error persist, perform the “Zero Point Offset Adjustment“ (see page 26).
H	Load exceeds the weighing range; the weight on the balance is too heavy; the balance was incorrectly adjusted/calibrated; or the pre-load or zero point offset was incorrectly adjusted.	Make sure there was no operating error. If the error remains, perform the “External Adjustment/Calibration” (see page 25); should the error persist, perform the “Zero Point Offset Adjustment“ (see page 20).

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Status: February 1995, Sartorius AG, Goettingen, Germany

Specifications subject to change without notice.
Printed in Germany on paper that has been bleached without any use of chlorine · M
Publication No.: WBP5007-e95021

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