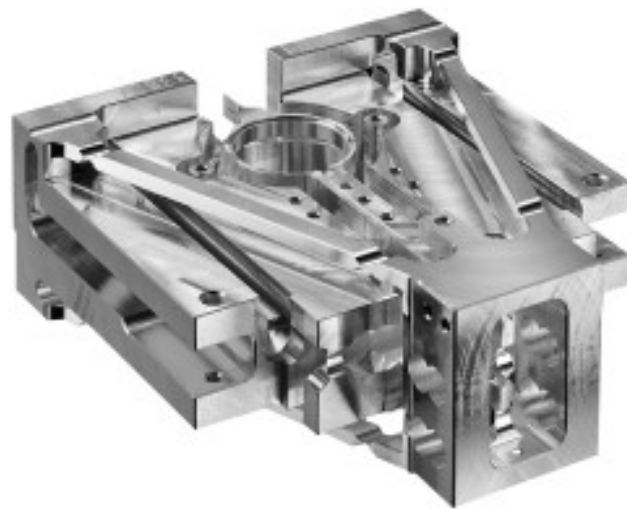


# Sartorius Analytical Balances

with the Monolithic Weighing System  
Service Manual for BP, GP, and LA Models

including Service Specifications



Sartorius AG, Weighing Technology

sartorius



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
## General Information

Service and repair work on monolithic weighing systems requires experience in working with analytical balances. Mechanical pressure on the spring elements (linkage, springs and guides) must be avoided, as it could cause mechanical defects. Mechanical defects are not covered under the warranty. Repair work should be limited to:

- repair of the draft shield;
- adjustment of the off-center load and the linearity, including overwriting the internal weight values if necessary;
- repair of the motorized calibration weight, and
- replacement of the PCBs.

If there is a defect in the weighing system, replace the entire weighing system and notify the Sartorius Service Center in Goettingen.

### General Instructions

- Always use the  key to turn off the balance; then **wait** approximately **5 seconds** before disconnecting the balance from power.
- Make sure that the balance is **not** disconnected and moved during an internal adjustment operation (such as the isoCAL function); otherwise, the internal weights may slip from the guides and damage the weighing system.
- Do not connect or disconnect cable while the balance is carrying current; always disconnect the balance from power (after turning it off; see above) before connecting or disconnecting cables to or from the balance.

### Overview of Balance Models

The monolithic weighing system is installed in the following Sartorius balance models (as of January 1999):

<b>LA</b>	120S	<b>BP</b>	61S	<b>GP</b>	603S
	130S-F		121S		603P
	230S		161P		1503S
	230P		200S		1503P
	310S		221S		
			301S		
			211D (Semi-microbalance)		

### Accompanying Literature

Service Manual for BP/GP balances  
Service Manual for LP/LA balances

### Auxiliary Service Tools and Equipment

In addition to standard tools, you will need the following special tools and equipment to work on Sartorius monolithic balances:

Qty.	Designation	Order no.
2	Lifting screws, 3x25 mm (or longer) (see illustration on page 8)	

For performing adjustments:

1	Sartorius service software for PCs (SARTOCAS)	6740-33
1	RS-232 connecting cable, balance <-> PC	7357312
or	PSION Server with CAS program, version 4.7 or later	

## Opening the Balance

### BP/GP Balances

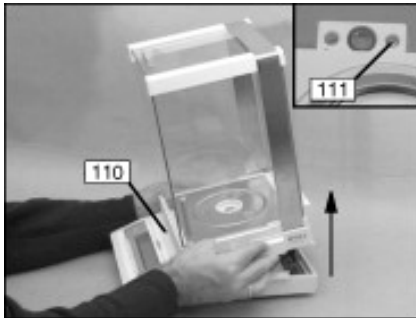
- Disconnect the balance from power
- Remove the weighing pan and shield disk and place them to one side

Note:

When removing the weighing pan, make sure to lift it off in a straight upward motion.

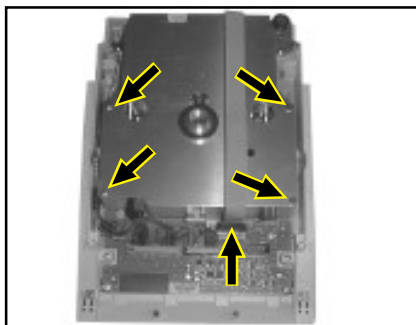
Otherwise the pan adapters may break off of the weighing system.

- Remove the warranty seal.
- Remove the Phillips screw (111) located beneath the warranty seal. Carefully tip the upper part of the housing (110) forward (toward the display unit) and lift it off.



BP\_F\_18a.TIF

**Important:** Before placing the upper part of the housing to one side, disconnect the cable that connects the main PCB to the display PCB.



BPM\_01.TIF

- To gain access to the weighing system, you need to remove the shield plate. To do this:
- Disconnect the ribbon cable from the data output port on the main PCB
- Remove the 4 screws.
- You can now access the monolithic weighing system and the motorized calibration weight.
- Follow the above instructions in the opposite order to close the balance.

### LA Balances

- Disconnect the balance from power
- Remove the weighing pan, shield disks and shield plate.
- Carefully tip the balance until it is resting on one side and remove the 3 Phillips screws from the bottom of the balance. Then position the balance upright again.
- Carefully lift off the hood with the draft shield and place them to one side.
- Remove the 4 slotted screws and carefully remove the weighing system enclosure.
- You can now access the weighing system and motorized calibration weight.
- Follow the above instructions in the opposite order to close the balance.



Aui1312a.JPG

Note:

When replacing the hood, make sure the seals are in the correct position.

## Motorized Calibration Weight

The built-in Motorized Calibration Weight is calibrated at the factory. As a rule, it will not be necessary to perform any further adjustment on this system. Depending on the place of installation and the ambient conditions, it may become necessary to clean the weights.

The built-in calibration weights can be removed for cleaning. The weights should only be handled using cloth gloves or a piece of leather or cloth.

Make sure you replace each weight in its correct position.

Do not use aggressive agents to clean the weights.

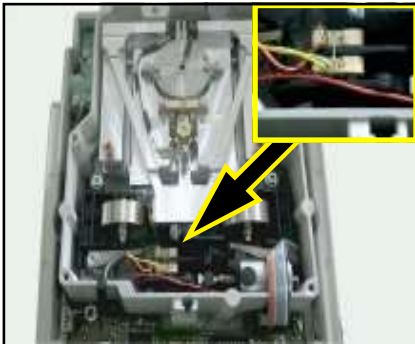
Do not touch a weight after it has been cleaned. Use only leather or lint-free cloth to handle weights.

You can check the motorized calibration weight while the balance housing is open. If you wish to do so:

- Make sure all required cables are connected before re-connecting the balance to power.

### Important:

**Do not connect the main PCB to the display PCB while the balance is carrying current, as this may result in irreparable damage to balance components.**



AUT1305a.JPG; AUT1304b.JPG

- Reconnect the balance to power.
- Use a pair of tweezers or forceps to carefully bridge the contact points at the front end of the weight application system (use caution not to close any other circuits). The weight application system switches on. You can now check for proper functioning (for instance, to make sure that the weight is applied and removed without any disturbance).

## Replacing the Motorized Calibration Weight

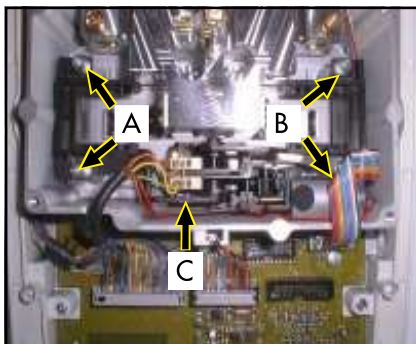
The calibration weight application system can be ordered as a complete unit for replacement (excluding internal weights).

Procedure:

- Disconnect the balance from power
- Open the balance (see page 5)
- Use a lint-free cloth or piece of leather when handling the internal weights; remove them carefully from the weight application system and place them to one side.

**Important:**

**Do not confuse the positions of the weights (right and left); it may be advisable to make a note of the correct positions when you remove them.**



PIC00010.JPG

- Unplug the cable that connects the motorized calibration weight to the main PCB.
- Remove the 2 Allen screws (A), then remove the first part of the weight application system and place it to one side.
- Remove the next 2 Allen screws (B), then remove the second part of the weight application system and place it to one side.
- Remove the last Allen screw (C) and then remove the third part of the weight application system (C), including the motor, and place it to one side.
- Follow the above instructions in the opposite order to install the new weight application system.

**Note:**

Check that the motorized calibration weight is positioned correctly; adjust if necessary. Make sure that

- the weights are applied without disturbance, and
  - no pressure is exerted on the weighing system.
- Then the balance housing can be closed again.

**Important:**

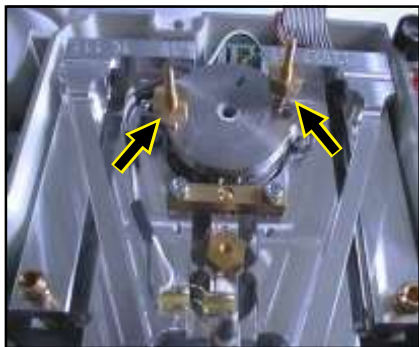
Once the balance has warmed up to the operating temperature, check the internal linearization and span adjustment; if necessary, overwrite the weights values.

## Cleaning the Magnet

In the highly unlikely event that foreign bodies enter the magnet, you can clean the gap between magnet and coil.

### Important:

**Work performed on the weighing system should only be carried out by service technicians who have extensive experience in this area.**



PIC00008.JPG

- Disconnect the balance from power and open the housing.
- Remove the 3 screws on the bottom of the balance that fasten the weighing system, remove the weighing system very carefully and secure it in a vice for safekeeping.
- Remove the 2 fastening screws (the 2 inner screws; not visible in this illustration) from the magnet.  
Position the 2 lifting screws (3x25 mm) in the threaded bore holes from which the fastening screws were removed (see above and arrows, left).
- Turn both lifting screws evenly to lift the bottom of the magnet; then you can remove the magnet.  
You can now clean the magnet gap using a piece of adhesive tape.

### Important:

**Do not use compressed air to clean the gap, as this could cause a foreign body to become jammed in the gap, which could make it impossible to remove.**

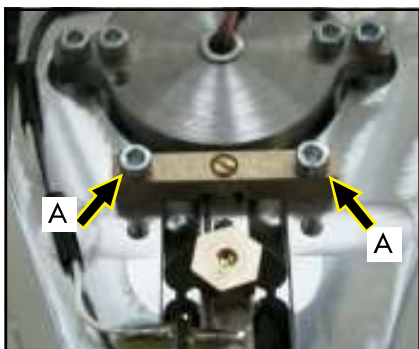
- After cleaning, carefully replace the bottom of the magnet in the balance (caution: strong magnetic pull!).
- Carefully press the bushing with the temperature sensor into the guide.
- Replace the 2 fastening screws and tighten them down.

### Note:

The 2 fastening screws and the bushing on the temperature sensor will automatically center the magnet; no further efforts at centering are required.

- Then the balance housing can be closed again.
- Once the balance has warmed up to the operating temperature, check the specifications and adjust the balance if necessary.

## Cleaning the Pan Stop



AUT1307a.JPG

### Note:

- Remove the 2 Allen screws (A) and carefully remove the brass block.
- Use a lint-free cloth dipped in alcohol to clean both the pan stop screw and the bore hole in the brass block.
- Carefully replace the brass block, center it and refasten it using the 2 screws.

Make sure there is no mechanical contact between the pan stop screw and the brass block, as this can have a negative effect on the repeatability of weighing results.

## Replacing the Pan Adapter

- Disconnect the balance from power and open the housing (see page 5).
- Use a 7-mm open-end wrench to carefully remove the defective pan adapter.
- Install the new pan adapter and carefully tighten it down (hand-tight).

Note:

At this point, the entire weighing system is no longer mechanically secured. If the wrench slips or the new pan adapter is installed too tight, the weighing system may be irreparably damaged or thrown out of adjustment.

- Reconnect the balance to power.
- Check the specifications and adjust the balance if necessary.

## Adjusting the Off-center Load

The off-center load is adjusted by turning the 2 adjustment screws (A).



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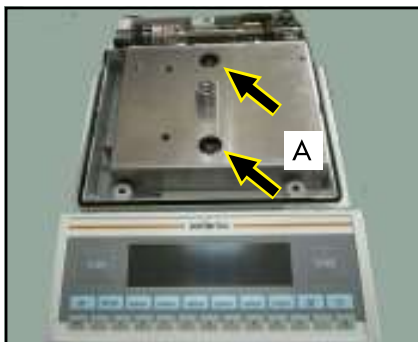
### BP/GP Balances

The adjustment screws are accessible without opening the balance housing; you only need to remove the draft shield. To do this:

- Carefully remove the weighing pan and pan support.
- Remove the 3 Allen or slotted screws, then remove the entire draft shield and place it to one side.
- The adjustment screws are now accessible.

### LA Balances

Open the balance housing (see page 5) to gain access to the off-center load adjustment screws.



AUT1312a.JPG

# Service Specifications

## Specifications Sheet 1

Model	Weighing capacity	Readability	Repeatability		Off-center load Eccentricity		TCS ppm/K
			Test weight	Permissible tolerances	Test weight	Permissible tolerance (±)	
LA120S	120 g	0,1 mg	100 g	0,1 mg	100 g	0,3 mg	1
LA130S-F	150 g	0,1 mg	100 g	0,2 mg	100 g	0,3 mg	1
LA230P	60 120 g 210	0,1 0,2 mg 0,5	50 g	0,1 mg	100 g	0,4 mg	1
LA230S	210 g	0,1 mg	200 g	0,1 mg	100 g	0,3 mg	1
LA310S	310 g	0,1 mg	200 g	0,1 mg	100 g	0,3 mg	1
BP61S	61 g	0,1 mg	50 g	0,1 mg	50 g	0,4 mg	1,2
BP121S	121 g	0,1 mg	100 g	0,1 mg	100 g	0,4 mg	1,2
BP161P	30 60 110 g 160	0,1 0,2 0,5 1,0 mg	20 g	0,1 mg	100 g	0,5 mg	1,2
BP200S	200 g	0,1 mg	200 g	0,1 mg	100 g	0,3 mg	1
BP211D	40 80 g 210	0,01 0,01 mg 0,1	20 g	0,02 mg	100 g	0,2 mg	1
BP221S	220 g	0,1 mg	200 g	0,1 mg	100 g	0,3 mg	1,2
BP301S	300 g	0,1 mg	200 g	0,2 mg	200 g	0,4 mg	1
GP603P	200 600 ct	0,001 0,01 ct	30 g	0,001 ct	100 g	0,003 ct	1,2
GP603S	600 ct	0,001 ct	100 g	0,001 ct	100 g	0,003 ct	1,2
GP1503P	600 1500 ct	0,001 0,01 ct	100 g	0,001 ct	200 g	0,002 ct	1

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## Specifications Sheet 2

Model	Class	Span			Linearity		
		Adjustm. weight	Test weight	Permissible tolerance (±)	Tareweight <i>Attention: italics only Germany</i>	Testweight <i>Attention: italics only Germany</i>	Permissible tolerance (±)
LA120S	E2	intern	100 g	0,2 mg	30/60/100 g	20 g	0,2 mg
LA130S-F	E2	intern	100 g	0,2 mg	30/60/100 g	20 g	0,2 mg
LA230P	E2	intern	200 g	0,5 mg	50 100 g 150	50 g	0,2 mg
LA230S	E2	intern	200 g	0,4 mg	50/100/150 g	50 g	0,2 mg
LA310S	E2	intern	300 g	0,5 mg	50/150/250 g	50 g	0,2 mg
BP61S	E2	intern	60 g	0,3 mg	--- (20) g	15/30/40/60 g	0,2 mg
BP121S	E2	intern	100 g	0,3 mg	30/60/100 g	20 g	0,2 mg
BP161P	E2	intern	150 g	1 mg	30 60 g 100	20 g	0,2 mg
BP200S	E2	200 g	200 g	0,3 mg	50/100/150 g	50 g	0,2 mg
BP211D	E2	intern	70 200 g	0,15 0,4 mg	10/20/30 50/100/150 g	10 50 g	0,03 0,2 mg
BP221S	E2	intern	200 g	0,4 mg	50/100/150 g	50 g	0,2 mg
BP301S	E2	intern	300 g	0,4 mg	70/150/230 g	70 g	0,3 mg
GP603P	E2	intern	100 g	0,01 ct	30/60/100 g	20 g	0,001 ct
GP603S	E2	intern	100 g	0,002 ct	--- (50) g	30/50/80/120 g	0,001 ct
GP1503P	E2	intern	300 g	0,002 ct	70/150/230 g	70 g	0,002 ct

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# Spare part list

## GP Models

Index	Description	Spare Part No.	GP1503P	GP1503S-OCE	GP603P	GP603S
	<b>Power supplies</b>					
	Connecting power supply, 240V, ZA	6971410	1	1	1	1
	Connecting power supply, 240V, AUS	6971411	1	1	1	1
	Connector power supply (230V) Europe	6971412	1	1	1	1
	Connector power supply 120V USA/CDN	6971413	1	1	1	1
	Connector power supply, 240V, GB	6971414	1	1	1	1
	Protecting cover	6960GP02	1	1	1	1
	Levelling screw	69B20005	1	1	1	1
	Level indicator	69B20120	1	1	1	1
	Overlay	69B20007	1	1	1	1
	plate, transparent (display)	69B20119	1	1	1	1
	Set of key caps	69B20024	1	1	1	1
	Set of caps (small parts, external)	69B20009	1	1	1	1
	Hood	69B20111	1	1	1	1
	Weighing pan	69B20116	1	1	1	1
	Pan	69GP0003	1	1	1	1
	Shieldring	69B20117	1	1	1	1
	Display-pcb.	69B20128	1	1	1	1
	Main PCB	69B20123	1	1	1	1
	Data output, compl.	69B20113	1	1	1	1
	Below-balance weighing hook	69B20114	1	1	1	1
	Weight switching (without weights)	69B20115	1	1	1	1
	Weight 150g	69B20124	1	1		
	Weight 100g	69B20125			1	1
	Guide rail for glasdoor, left	69B20130	1	1	1	1
	Guide rail for glasdoor, right	69B20131	1	1	1	1
	Cover glass plate	69B20033	1	1	1	1
	Glass plate	69GP0001	1	1	1	1
	Lateral slide	69GP0002	1	1	1	1
	Knob	69AC0053	1	1	1	1

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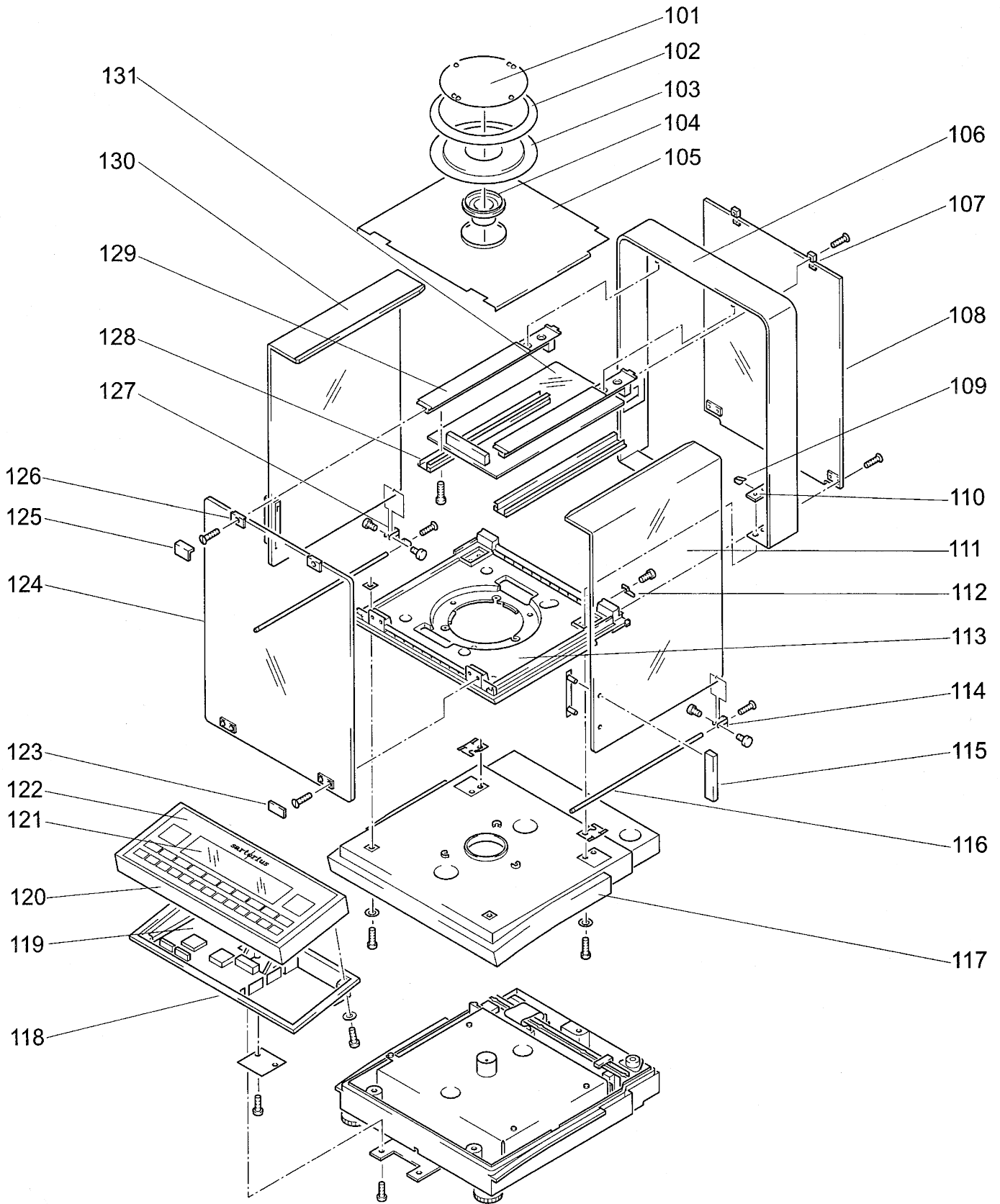
## Spare part list

## BP Models

Index	Description	Spare Part No.	BP121S	BP161P	BP200S	BP221S	BP301S	BP61S	BP211D
	<b>Power supplies</b>								
	Connecting power supply, 240V, ZA	6971410	1	1	1	1	1	1	1
	Connecting power supply, 240V, AUS	6971411	1	1	1	1	1	1	1
	Connector power supply (230V) Europe	6971412	1	1	1	1	1	1	1
	Connector power supply 120V USA/CDN	6971413	1	1	1	1	1	1	1
	Connector power supply, 240V, GB	6971414	1	1	1	1	1	1	1
	Protecting cover	6960BP07	1	1	1	1	1	1	1
	Levelling screw	69B20005	1	1	1	1	1	1	1
	Level indicator	69B20120	1	1	1	1	1	1	1
	Overlay	69B20007	1	1	1	1	1	1	1
	Plate, transparent (display)	69B20119	1	1	1	1	1	1	1
	Set of key caps	69B20024	1	1	1	1	1	1	1
	Set of caps (small parts, external)	69B20009	1	1	1	1	1	1	1
	Hood	69B20111	1	1	1	1	1	1	1
	Weighing pan	69B20116	1	1	1	1	1	1	1
	Shieldring	69B20117	1	1	1	1	1	1	1
	Profiled joint	69LP0019							1
	Cable (weighing cell > junction box)	69B20121							1
	Display-pcb.	69B20128	1	1	1	1	1	1	1
	Main PCB	69B20122							1
	Main PCB	69B20123	1	1	1	1	1	1	
	Data output, compl.	69B20113	1	1	1	1	1	1	1
	Load cell pcb	69B20112							1
	Scale pivot	69B20132							1
	Below-balance weighing hook	69B20114	1	1	1	1	1	1	1
	Weight switching (without weights)	69B20115	1	1		1	1	1	1
	Weight 150g	69B20124					1		
	Weight 100g	69B20125	1	1		1		1	1
	Guide rail for glasdoor, left	69B20130	1	1	1	1	1	1	1
	Guide rail for glasdoor, right	69B20131	1	1	1	1	1	1	1
	Cover glass plate	69B20033	1	1	1	1	1	1	1
	Glass plate	69B20032	1	1	1	1	1	1	1
	Lateral slide	69B20034	1	1	1	1	1	1	1
	Knob	69AC0053	1	1	1	1	1	1	1

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# LA - Exploded-View Diagram 1

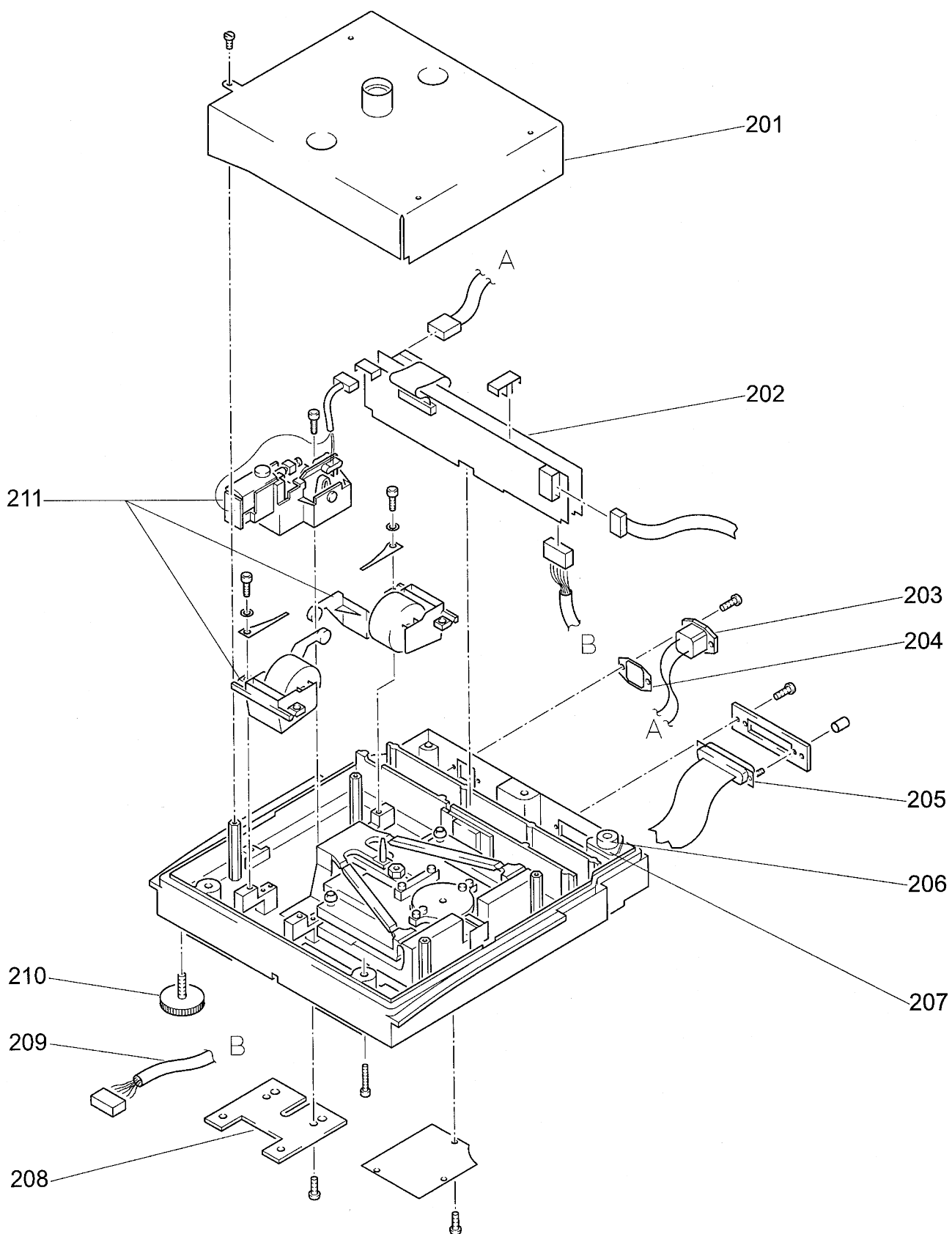


## LA Models 1xx

Index	Description	LA120S	LA230P	LA230S	LA310S	LA130S-F
	<b>Power supplies</b>					
	AC-DC adapter EURO 230V	1	1	1	1	1
	AC-DC adapter USA 120V	1	1	1	1	1
	AC-DC adapter GB 230V	1	1	1	1	1
	Plastic dust cover					1
	Protecting cover	1	1	1	1	
	Operating program	2	2	2	2	2
	Cable (loadcell - display)	1	1	1	1	1
101	Pan	1	1	1	1	
102	Ring	1	1	1	1	
103	Shield plate	1	1	1	1	
104	Bushing with collar	1	1	1	1	
105	Base plate	1	1	1	1	
106	Bow	1	1	1	1	
107	Set of fixing plates	1	1	1	1	
108	Rear glass panel	1	1	1	1	
109	Leaf contact spring	1	1	1	1	
110	Plate with threaded holes	1	1	1	1	
111	Lateral slide, right	1	1	1	1	
112	Plate	1	1	1	1	
113	Bottom palte (draft shield)	1	1	1	1	
114	Forked head, right	1	1	1	1	
115	Knob	1	1	1	1	
116	Guide rod	1	1	1	1	
117	Top part of the housing	1	1	1	1	
118	Rear panel for display unit	1	1	1	1	1
118	Bottom Part Display Head white	1	1	1	1	1
119	Display pcb.	1	1	1	1	1
120	Hood compl.	1	1	1	1	1
120	Front panel (Overlay, LCD, Backlight)	1	1	1	1	1
121	Glass plate (display)	1	1	1	1	1
122	Membrane switch	1	1	1	1	1
122	Membrane-tactile control panel	1	1	1	1	1
123	Cap	1	1	1	1	
124	Front glass plate	1	1	1	1	
124	Lateral slide, left	1	1	1	1	
125	Angular cap	1	1	1	1	
126	Fixing plate	1	1	1	1	
127	Forked head, left	1	1	1	1	
128	Post	1	1	1	1	
129	Post	1	1	1	1	
131	Cover disque	1	1	1	1	
151	Display module	1	1	1	1	1
152	Bushing	1	1	1	1	
153	Profiled joint (2 m)	1	1	1	1	1
155	Collapsible box	1	1	1	1	
156	Packaging, complete	1	1	1	1	

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# LA - Exploded-View Diagram 2



## LA Models 2xx

Index	Description	LA120S	LA230P	LA230S	LA310S	LA130S-F
201	Box for load cell	1	1	1	1	1
202	Main PCB	1	1	1	1	1
203	Power socket, compl.	1	1	1	1	1
204	Sealing (Power socket)	1	1	1	1	1
205	Bushing (D-SUB)	1	1	1	1	1
206	Level indicator	1	1	1	1	1
207	Pressure plate	1	1	1	1	1
208	Plate	1	1	1	1	
210	Levelling screw	1	1	1	1	1
211	Weight switching (without weights)	1	1	1	1	1
251	Below-balance weighing hook	1	1	1	1	1
	Pan					1
	Cap					1
	Cone					1
	Bushing with collar					1

Lam-neu.XLS

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