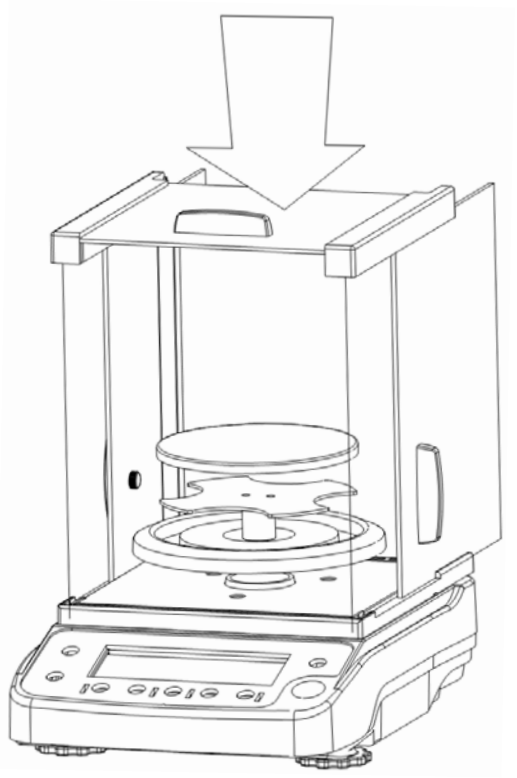
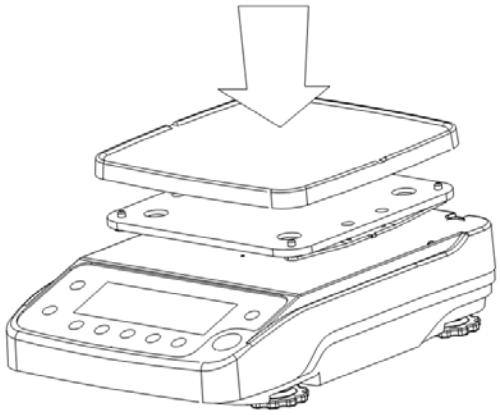
Operation Instruction

BSM Series
Electronic Precision Balances





Contents

Application

BSM Series Electronic balance could weigh from 120g to 6200g.

BSM Electronic balance could ensure the accuracy and trustiness of the weighing result with the splendid performance:

- Could eliminate the influence of bad circumstance like vibration and airflow effectively
- With reliable and nice repeatability
- With firm structure

BSM Series Electronic balance：fast weighing, simple operation, to predigest and accelerate the normal weighing process greatly.

In order to ease your weighing work, BSM series also with the following function to meet your work needs:

- Weighing unit transfer
- Counting
- Percentage
- Animal weighing(Average)

Safety Precautions

Safety Instructions

● Please read these operating instructions carefully before using your balance to prevent damage to the equipment.

△ Do not use this equipment in hazardous areas/locations.

△ The balance housing may be opened only by authorized technicians who have been properly trained at the factory.

△ Make sure you disconnect the balance from power before connecting or disconnecting peripheral devices to or from the balance.

△ If you operate the equipment under ambient conditions that require higher safety standards, you must comply with the installation regulations applicable in you country.

△ When cleaning your balance, make sure that no liquid enters the balance housing; use only a slightly moistened cloth to clean the balance.

Installation:

△ Make sure the voltage rating printed on the AC adapter is identical to your local line voltage.

– Proceed with extreme caution when using pre-wired RS-232 connecting cables, as the pin assignments may not be compatible with our company's equipment. Check all pin assignments against the cabling diagrams and disconnect any lines that do not match.

△ If there is visible damage to the equipment or power cord, disconnect the equipment from power and lock it in a secure place to ensure that it cannot be used for the time being..

– Connect only our company's accessories and options, as these are optimally designed for use with your balance. The operator shall be responsible for any modifications to the equipment and for any connection of cables or equipment not supplied by us and must check and, if necessary, correct these modifications and connections. On request, we will be happy to provide information on operating specifications(in accordance with the Standards for defined immunity to interference).

– The only way to cut off the electrical source completely is disconnect the power cord.

– Keep the power cord away from the liquid.

o Do not open the balance. If the seal is broken, this will result in forfeiture of all claims under the manufacturer's warranty.

o If you have any problems with your balance, please contact our local office, dealer or service center.

Packing list

– Balance

– pan

– pan support (just for BSM-120.4，BSM-220.4，BSM-220.3，BSM-320.3，BSM-420.3，BSM-520.3，BSM-620.3)

– Shield ring (just for BSM-120.4，BSM-220.4，BSM-220.3，BSM-320.3，BSM-420.3，BSM-520.3，BSM-620.3)

– AC adapter

– Operation instruction

Getting Started

Storage and Shipping Conditions

- Do not expose the balance to extreme temperatures, moisture, shocks, blows or vibration.

Unpacking the Balance

- After unpacking the equipment, please check it immediately for any external damage.
- If damage is evident, refer to the instructions under “Safety Inspection" in the chapter entitled “Care and Maintenance."
- Save the box and all parts of the packaging for any future transport.

Disconnect all cables before packing the balance for shipping!

Installation

BSM Electric balance could provide a more reliable weighing result with normal circumstance. Choose a location that is not subject to the following negative influences:

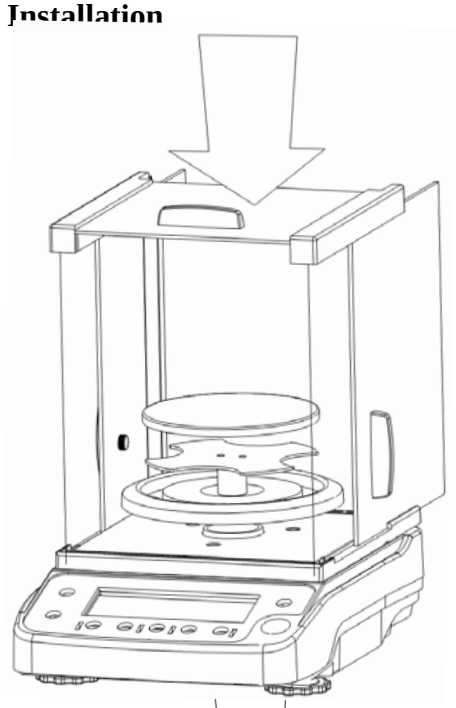
- Put on a stable and flat top
- Heat (heater or direct sunlight)
- Drafts from open windows and doors
- Extreme vibrations during weighing
- Avoid corrosive gas with certain protection
- Excessive moisture

Conditioning the Balance:

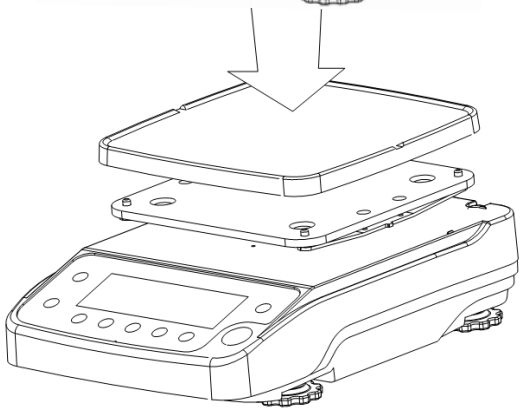
Moisture in the air can condense on the surfaces of a cold balance whenever it is brought into a substantially warmer place. If you transfer the balance to a warmer area, make sure to condition it for about 2 hours at room temperature, leaving it unplugged from AC power.

Getting Started

Installation



- Place components inside the chamber in the following order:
  - Shield ring
  - Pan support
  - Weighing pan



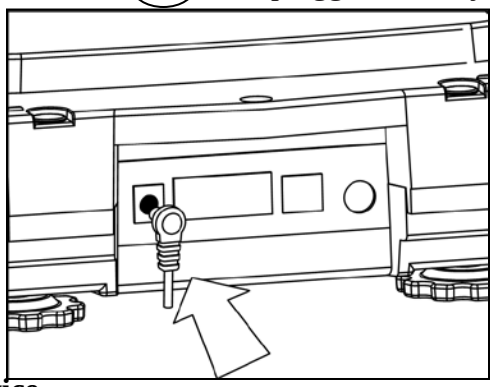
- Place components inside the chamber in the following order:
  - Weighing pan

Getting Started

Connecting the Balance to AC Power/Safety Precautions

Use only original BSM power adapter.

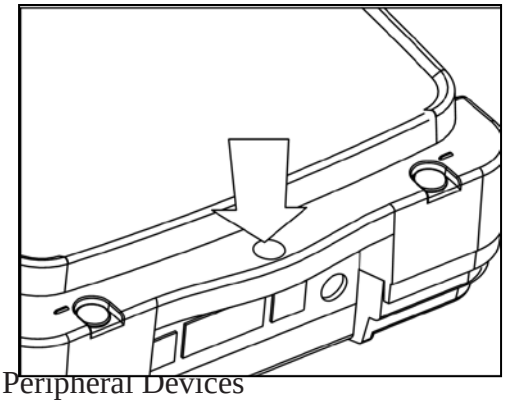
- Insert the right-angle plug from the AC adapter into the jack on the balance.
- The AC adapter rated to Class II can be plugged into any wall outlet without additional safety precautions.



Antitheft Locking Device

You can use the security device on the back of the balance to avoid the steal behavior.

- You can use chain or lock to insert into the security device, and connect with a fix point.



Connecting Electronic Peripheral Devices

- Make sure to unplug the balance from AC power before you connect or disconnect a peripheral device(printer or PC) to or from the interface port.

Warm up Time

To deliver exact results, the balance must warm up as list below after initial connection to AC power or after a relatively long power outage.

– All models: at least 30 minutes

Only after this time will the balance have reached the required operating temperature.

Using Verified Balances in Legal Metrology:

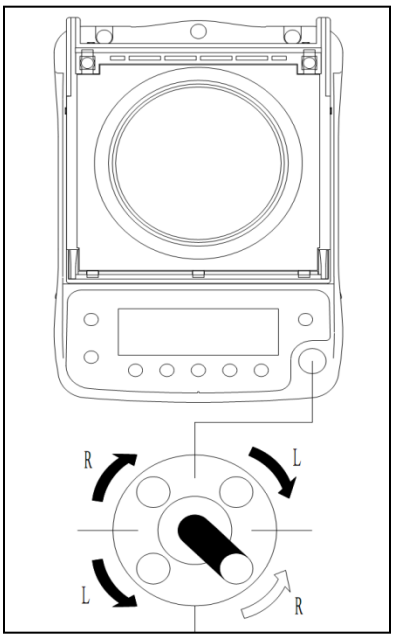
o Allow the equipment to warm up for at least 24 hours after initial connection to AC power.

Getting Started

Leveling the Balance

Purpose:

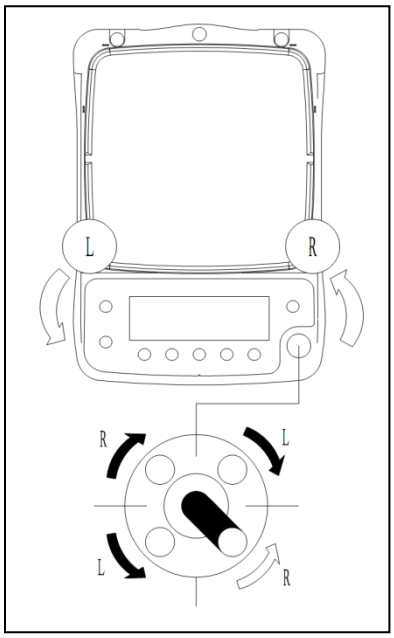
– To compensate for unevenness at the place of installation



Only the 2 front feet are adjusted to level the balance whose weighing capacity is below 2kg.

● Turn the 2 front feet as shown in the diagram until the air bubble is centered within the circle of the level indicator.

is centered within the

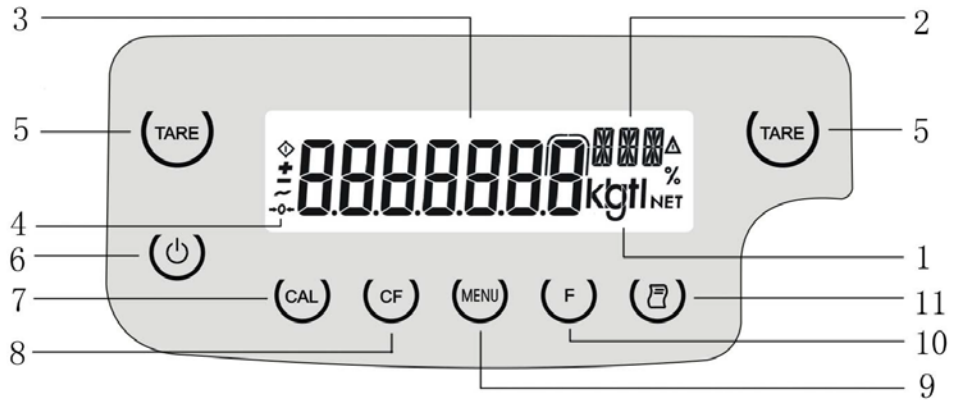


● Adjust the Leveling feet until the air bubble circle on the level indicator.

> In most cases this will require several adjustment steps.

Function Instruction

Overview of Display and Operating Elements



Display/Panel instruction

Position Designation

1. Weight units display.
2. Weight units display; additional information display.
3. Weight digits display.
4. Symbol for stand-by mode.
5. Tare/Zero key.
6. On /off key.
7. Calibration key. Start calibration/adjustment routine.
8. Clear Function key. This key is generally used to cancel functions.

-Quit application program

-Cancel calibration/adjustment routine

9. Menu Key.
10. Function key. Start application program
11. Data output. Press this key to output readout values to the built-in data interface.

Operation

Basic weighing function

Purpose

The basic weighing function can be used alone or in combination with an application program(counting, weighing in percent, etc.).

Features

– Taring the balance
– Printing weights

- Before using the balance at the first time, calibrate and adjust it at the place of use; For details, see "Calibration and Adjustment" in the next chapter.
- The temperature range (℃) indicated on the verification label may not be exceeded during operation.

Working with BSM-120.4,BSM-220.4,BSM-220.3, BSM-320.4,BSM-420.4,BSM-520.3, BSM-620.3 Models:

Working with the microbalance requires a steady hand and a smooth, uninterrupted technique.
Use forceps or other suitable utensil to place the sample on the weighing pan.
Perform a number of test measurements before you begin weighing, to allow the temperature inside the weighing chamber to adjust to the ambient temperature outside the chamber. Otherwise, if the chamber door was closed for a longer period of time prior to beginning weighing, the sudden change in temperature inside the chamber when you open the door might affect the weighing result. This is why a series of test measurements is recommended; the repeated opening and closing of the weighing chamber door, at the same rate of speed as well be used during the actual weighing sequence, will both compensate this difference in temperature to some extent and help you develop a smooth working rhythm.
Place the sample gently on the weighing pan. The weight result should stabilize within 3 to 5 seconds. The degree of precision attained increases in proportion as the weighing operations become more consistent.

Preparation

Blank display indicates that the balance was disconnected from power. For example, the first time the balances is put into operation, or after a power outage.

- Switch on the balance: Press [⏻]

All symbols on the display light up briefly.

- When you turn on the balance, the symbol is display until the balance is ready to work.If the symbol is displayed during operation, this indicate that the processor is performing a function and cannot receive further commands at the moment.

- Taring the balance ：press [**TARE**] key

Additional Functions

- Switching off the balance: Press [⏻]

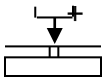
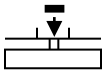
A circle in the lower left-hand corner of the display indicates that the balance has been switched off and is in stand-by mode.

Operation

Example

Simple Weighing

Settings: Application program: 2.1.1 (default setting)

Step	Key(or instruction)	Display/Data output
1. Switch on the balance. Self-test is performed, followed by automatic initial tare function.	[⏻]	+ 0.000 **g**
2. Place container on the balance (in this example,52 g).		 + 52.000 **g**
3. Tare the balance.	[**TARE**]	+ 0.000 **g**
4. Place sample in container on balance(in this example, 150.2 g).		 150.200 **g**

Operation

Calibration and Adjustment

Purpose

Calibration is the determination of the difference between the weight result and the true weight(mass) of a sample. Calibration does not entail making any changes within the balance.

Adjustment is the correction if any difference between the measured value display and the true weight(mass) of the sample, or the reduction of the difference to allowable level within the maximum permissible error limits.

Features

Calibration/adjustment can be performed only when:

- there is no load on the balance,
- the balance is tared, and
- the internal signal is stable.

If these conditions are not met, an error message is displayed.(refer to the Error information)

- The weight displayed for the sample on the balance must not differ from the nominal weight by more than 2%.
- You can only use g as unit to make calibration.

External Calibration/Adjustment in Verified Balances of Accuracy class II

- When the balance is used in legal metrology, external calibration/Adjustment is blocked by a seal over the menu access switch.

△ Important note for calibration/adjustment of the BSM-120.4,BSM-220.4,BSM-220.3,BSM-320.3, BSM-420.3, BSM-520.3, BSM-620.3 model: Close the chamber before calibration/ adjustment to get collect result.

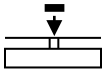
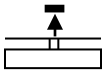
The permitted operating temperature range for balances used in applications subject to legal metrology (legal for trade) is restricted as follows:

Balance of accuracy class I
+15℃ to 35℃ (+59 to +95°F)
Balance of accuracy class II
+15℃ to 35℃ (+59 to +95°F)

Operation

External Calibration

The weight required for calibration/adjustment is defined in the factory settings (see “Specifications”).

Step	Key (or instruction)	Display/Data output
1. Zero the balance	［TARE］	0.000 g
2. Start calibration The balance will show “PLEASE WAIT”, after stable it will Display the prompted calibration weight (In this sample, 200g)	[CAL]	**PLEASE WAIT** + 200.000g CAL
4. Apply the prompted calibration weight		+ 200.000g CAL
5.Calibrate Weight The balance will show the weighing value and blink. After stable, the balance will beep a sound and return to the normal weighing mode to finish the calibration	[CAL]	+ 200.000g
6. Remove the calibration weight.		0.000 g

Application Programs

Application Programs

Function Keys

[F]key: Start application program/store component

Toggle between units

press and hold for 2 seconds

change reference quantity (counting),
reference percentage (weighing in percent)
or number of measurements (animal weighing)

[CF] key: End application program; delete

Calculated values are alternately indicated with the following symbols:

Percent = %

Piece count (Counting) = pcs

Computed value = o, 

Application Programs

Counting
Menu code:2.1.4

Display symbol: pcs

Purpose
With the Counting program you can determine the number of parts that each have approximately equal weight. To do this, a known number of parts (the reference sample quantity) is weighed first, and the individual piece weight (reference weight) is calculated from this result. Thus the number
of parts subsequently placed on the balance can be determined from their weight.

Features
- The minimum load is equal to one digit defined according to the resolution of the active weight unit.
- Long-term storage of the last reference sample quantity “nRef" entered.
- Toggling between piece count and weight by pressing [F].

Function Keys
[F]: Begin determination of piece weight

> Application program initialized with predefined reference sample quantity.

[CF]:
End application program; clear initialization data

Default/Initial parameter
Reference piece:10 (Menu code:3.3.2)

Preparation
- Set parameters for the Counting program: reference Balance setting

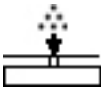
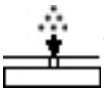
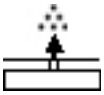
Select the application program : Menu code:2.1.4 Counting
- Set the following parameters:

Code 3.3.1 5 pieces
Code 3.3.2 10 pieces
Code 3.3.3 20 pieces
Code 3.3.4 50 pieces
Code 3.3.5 100 pieces
Please reference ***Balance setting***

Application Programs

Example

Counting parts of equal weight
Settings:
Menu: Counting program (menu code:2.1.4)
Reference pieces：20 pieces(code 3.3.3)

Step	Key (or instruction)	Display/Data output
1.switch on the balance	[⏻]	8.8.8.8.8.8.8 kg net
2. Tare the balance.	[TARE]	0.000 g
3. Display reference pieces (in this sample is 20 pieces)	[F] >2 sec	20 (briefly) EF
4. Add reference sample quantity to container(in this example: 20 pcs,66g).		+ 66.000 g
5. Print piece count, if desired.	[F]	+ 20 pcs
		wRef+3.300 g
6. Add uncounted parts as desired. (in this example: 40pcs)		+ 40 pcs
7. Display weight.	[F]	+ 132.000 g
8. Display piece count.	[F]	+ 40 pcs
9. Unload the balance.		pcs

10. Delete reference sample quantity [CF]>2 sec
11. Repeat as necessary, starting from Step 6.

Application Programs

Weighing in Percent: (Menu code:2.1.5)

Purpose

This application program allows you to obtain weight readouts in percent which are in proportion to a reference weight.

Features

– Storage parameter (rounding-off factor) for storing the reference weight to calculate the percentage can be configured.
– Changing the reference sample percentage in the menu: reference the chapter Balance ***setting.***
– Optional automatic output of the reference weight to the data interface port when print application parameters is set.
– Press and hold the (F) key (2 seconds) to set the reference percentage
– Toggling between percentage and weight by pressing (F).

Default/Initial parameter

Reference percentage：10(code:3.3.2)

Preparation

● Set parameters for the Weighing in percent program: reference Balance setting

Select the application program : Menu code:2.1.5 weighing in percent

● Set the following parameters:

Code 3.3.1 5%
Code 3.3.2 10%
Code 3.3.3 20%
Code 3.3.4 50%
Code 3.3.5 100%

Please reference ***Balance setting***

Application Programs

Example: Determining residual weight in percent

Settings:

Menu: Weighing in percent program (menu code:2.1.5),

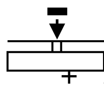
Reference percentage: ref 100% (Code:3.3.5)

Step Key (or instruction) Display/Data output

1.Switch on balance. ［⏻］ 

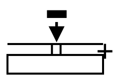
2. Tare the balance. ［TARE］ 0.000 g

3.Dislay refrence percentage. ［F］>2 sec 100 rEF

4.Place on the weight,
as reference percentage  + 222.500 g
(in this sample is 222.5g）

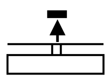
5. Optional: print percentage. ［F］ + 100.00%

WXX%+222.500 g

6. Place the residual weight
（in this example is 322.5g）  + 144.94%

7. Display weight ［F］ + 322.500 g

8. Display percentage ［F］ + 144.94%

9. Unload the balance.  0.00%

10.Delete reference percentage ［CF］>2 sec

11. Repeat as necessary, starting from Step 6.

Application Programs

Animal Weighing/Averaging(Menu code:2.1.6)

Purpose

weights of unstable samples (e.g., live animals) or to determine weights under unstable ambient conditions. With this program, the balance calculates the weight as the average of a defined number of individual weighing operations (also referred to as “subweighing operations").

Features

- Arithmetic average displayed as a result in the pre-set weight unit (identified by triangle signal).
- Set parameters for the Weighing in average program: reference Balance setting
- Press and hold (F) (2 sec.) Current number of subweighing operations is displayed.
- Toggling between weighed and calculated results by pressing (F) (after initialization)

Default setting

Average times： 10(3.3.2)

Preparation

● Settings:

Menu: Animal weighing program (menu code:2.1.6),

- Average weighing times

3.3.1 weighing 5 times

3.3.2 weighing 10 times

3.3.3 weighing 20 times

3.3.4 weighing 50 times

3.3.5 weighing 100 times

Please reference ***Balance setting***

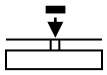
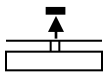
Application Programs

Example

Determining animal weight with automatic start of 10 subweighing operations

Settings:

Menu: Animal weighing program (menu code:2.1.6),

Step	Key (or instruction)	Display/Data output
1. Switch on the balance.	[⏻]	8.8.8.8.8.8.8 kg t NET
2. Tare the balance.	[TARE]	0.000 g
3. Disaplay weighing times (in this example is 10 times)	[F]>2 sec	rEF 10 (briefly)
4. Place the first animal(weight), (the displayed weight data is not stable, in this example is 275g)	+ 	8888
5. Start automatic animal weighing .	[F]	+ 8888 10 9 8 ... 1
After 10 subweighing operations, the result will print out if set with printing option		+ 275.500 g
6. Unload the balance.		RES+275.500 g + 275.500 g ⚠ (display stable)
7. Delete weighing result	[CF]>2 sec	
8. Repeat as necessary, starting from Step 4.		

Application Programs

Toggling between weight units (Menu code:2.1.2)

With this application program you can switch the display of a weight value back and forth between two weight units.
Configure the “Toggle Weight Units" application in the Setup menu:
see “Configuration" Menu code:2.1.2

Menu code		Unit	Conversion	Display
1.7.1o	3.1.1o	Grams	1.00000000000	g
1.7.2	3.1.2	Kilograms**	0.00100000000	kg
1.7.3	3.1.3	Carats	5.00000000000	ct
1.7.4	3.1.4	Pounds	0.00220462260	lb
1.7.5	3.1.5	Ounces	0.03527396200	oz
1.7.6	3.1.6	Troy ounces*	0.03215074700	ozt
1.7.7	3.1.7	Hong Kong taels	0.02671725000	tlh
1.7.8	3.1.8	Singapore taels	0.02645544638	tls
1.7.9	3.1.9	Taiwanese taels	0.02666666000	tlt
1.7.10	3.1.10	Grains	15.43235835000	GN
1.7.11	3.1.11	Pennyweights	0.64301493100	dwt
1.7.12	3.1.12	Milligrams*	1000.00000000000	Mg
1.7.13	3.1.13	Parts per pound	1.12876677120	/lb
1.7.14	3.1.14	Chinese taels	0.02645547175	tlc
1.7.15	3.1.15	Mommes	0.26670000000	mom
1.7.16	3.1.16	Tola	0.08573333810	tol
1.7.17	3.1.17	Baht	0.06578947437	bat
1.7.18	3.1.18	Mesghal	0.21700000000	MS

o = Factory setting, depends on model

Function

- Press (F) to toggle between weight unit 1 and weight unit 2

* Not available in BSM2200.2,BSM3200.2,BSM4200.2, BSM5200.2,BSM6200.2

** For BSM120.4,BSM220.4,this unit is 0.001ct

Balance Setting

Setting the Parameters (Menu Codes)

Example: Adapting the balance to “very unstable" ambient conditions (menu code:1.1.4).

Step	Key (or instruction)	Display/Data output
1. Switch off the balance.	[⏻]	
2. Switch the balance on.	[⏻]	
3. Tare the balance.	［TARE］	0.000 g
	［MENU］> 2 sec	1.
○Scroll upward within a menu level; after the last menu code, the first repeatedly code is displayed again.	［MENU］	2. … 1.
3. Select menu level 2(scroll to the right).	[F]	1.1
4. Select menu level 3(scroll to the right).	[F]	1.1.2o
5. Menu level 3: Scroll until the desired number is shown.	［MENU］ repeatedly	1.1.4
6. Confirm change; “o” on display indicates active setting.	[F]	1.1.4
○Return to higher menu level Return to higher menu level	[CF]	1.
○Set other codes as desired.	[MENU], [F], [CF]	
7. Save changes and exit the menu.	Press and hold ［MENU］> 2 sec.	
or ○Exit menu without saving changes.	[⏻]	
>Restart again		0.000 g

Balance Setting

Parameter Settings (Overview)

o Factory setting

√ User-defined setting

Menu level 1 Menu level 2 Menu level 3 Menu level 4

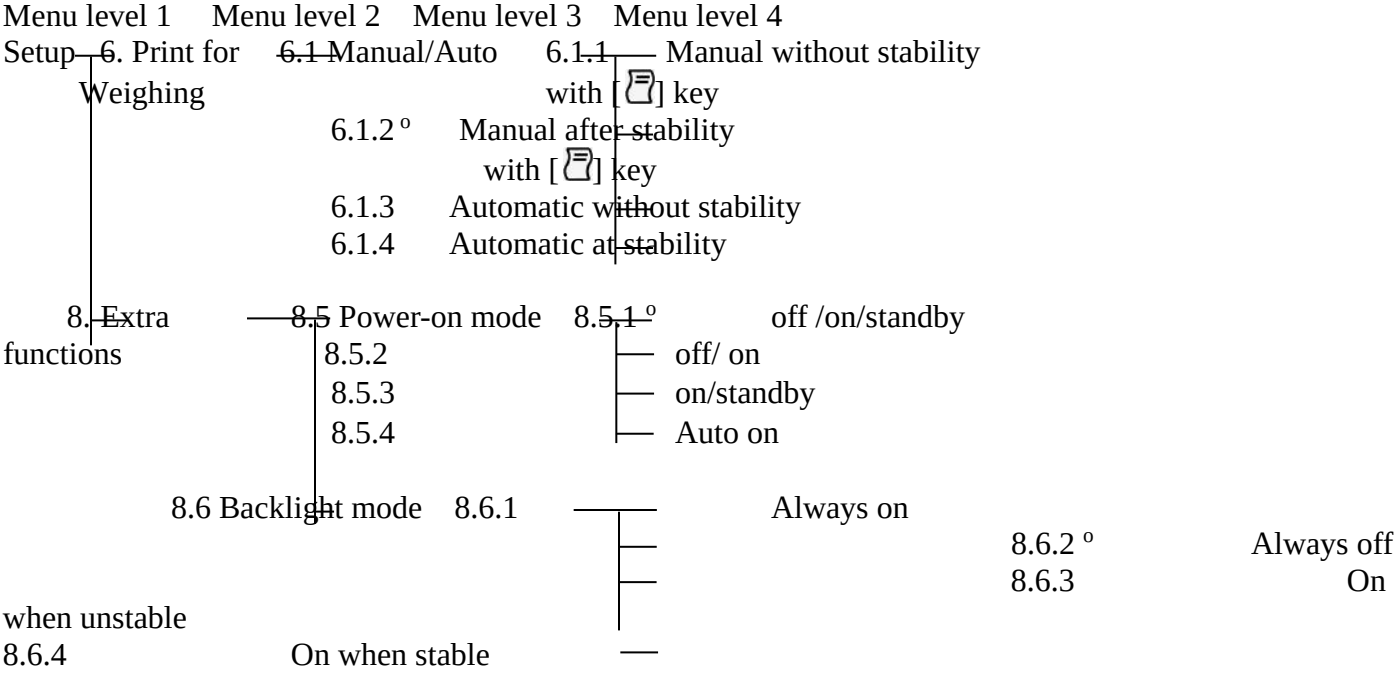
Setup
- 1. Weighing
  - 1.1 Adapt filter
    - 1.1.1 Very stable conditions
    - 1.1.2 o Stable conditions
    - 1.1.3 Unstable conditions
    - 1.1.4 Very unstable conditions
  - 1.3 Application Filter
    - 1.3.1 1/4 digit
    - 1.3.2 1/2 digit
    - 1.3.3 1 digit
    - 1.3.4 o 2 digit
    - 1.3.5 4 digit
  - 1.6 Auto zero
    - 1.6.1 o On
    - 1.6.2 Off
  - 1.7 Weight unit 1 reference ***Toggling between Weight Units***
- 2. Application programs
  - 2.1 Program selection reference ***relevant application programs***
- 3. Application parameters
  - 3.1 Weight unit 2 reference ***Toggling between Weight Units***
  - 3.3 Storage parameter reference ***relevant application programs*** for Counting and Weighing in Percent
- 5. Data interface
  - 5.1 Baud rate
    - 5.1.1 150 baud
    - 5.1.2 300 baud
    - 5.1.3 600 baud
    - 5.1.4 o 1200 baud
    - 5.1.5 2400 baud
    - 5.1.6 4800 baud
    - 5.1.7 9600 baud
  - 5.2 Parity
    - 5.2.1 Mark
    - 5.2.2 Space
    - 5.2.3 o Odd
    - 5.2.4 Even

Balance Setting

Parameter Settings (Overview)

o Factory setting

√ User-defined setting



Troubleshooting Guide

Troubleshooting Guide

Error codes are shown on the main display for 2 seconds. The program then returns automatically to the weighing mode

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Display	**Cause**	**Solution**
No segments appear on the display	No AC power is available The power supply is not plugged in	Check the AC power supply Plug in the power supply
H	The load exceeds the balance capacity	Unload the balance
L	Something is touching the weighing pan	Move the object that is touching the weighing pan
E11	Calibrate weight is wrong	Load on poise to recalibrate
E12	Calibrate weight is unstable	Eliminate the unstable factor, then recalibrate
E22	poise weight not enough	Load on enough poise to weighing
The maximum capacity less than the data list in the ***Technical specification***	Switch on the balance without the weighing pan on	Place the weighing pan and then restart the balance with press [⏻]
The weight readout Is obviously wrong	The balance was not calibrated/ adjusted before weighing The balance was not zeroed before weighing	Calibrate/adjust the balance Zero the balance before weighing

Care and Maintenance

Repairs

Repair work must be performed by trained service technicians. Any attempt by untrained persons to perform repairs may lead to hazards for the user.

Cleaning

⚠ Unplug the AC adapter from the wall outlet (mains supply). If you have an interface cable connected to the balance port, unplug it from the port.

⚠ Make sure that no liquid or other foreign objects or dust (powder) enters the balance housing.

⚠ Do not use any aggressive cleaning agents (solvents or similar agents).

- Clean the balance using a piece of cloth which has been wet with a mild detergent (soap).
- After cleaning, wipe down the balance with a soft, dry cloth.

Clean with take away the weighing pan

- You should take away the shield ring and pan support together with the weighing pan to avoid the weighing system damage.

Cleaning Stainless Steel Surfaces

Clean all stainless steel parts regularly. Remove the stainless steel weighing pan and thoroughly clean it separately. Use a damp cloth or sponge to clean any stainless steel parts on the balance by wiping them down. You can use any commercially available household cleaning agent that is suitable for use on stainless steel. Then wipe down the equipment to rinse thoroughly, making sure to remove all residues. Afterwards, allow the balance to dry. If desired, you can apply oil to the cleaned surfaces as additional protection. Solvents are permitted for use only on stainless steel parts.

Safety Inspection

If there is any indication that safe operation of the balance is no longer warranted:

- Turn off the power and disconnect the equipmentfrom AC power immediately.

> Lock the equipment in a secure place to ensure that it cannot be used for the time being.

Notify your nearest Service Center. Repair work must be performed by trained service technicians.