Micro Analytical Balances

BM

Series

ISO 9000 CERTIFIED

Built-in Fanless Ionizer!

A&D Company, Ltd.

Discover Precision

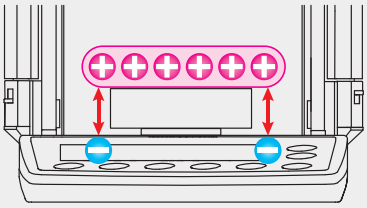
How to Eliminate the Greatest Enemy of Precision Weighing

The performance of micro analytical balances can be worsened by even the slightest of disturbances, and among others, static electricity is known to be especially troubling for many users. The BM series from A&D provides various means to help you perform such sensitive measurements with simplicity and accuracy, including a built-in fanless ionizer for quick and easy removal of static electricity.

Problems due to static electricity

An electrostatically charged object induces the opposite charge in nearby objects. The resulting attraction will make stable measurement extremely difficult.

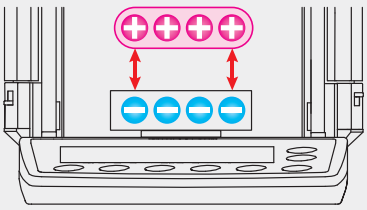
1



Error when weighing a charged object

The object will appear heavier. The value then changes as static is dissipated into the air or via the weighing pan.

2



Error when a charged object approaches

Static attraction can pull the weighing pan in the opposite direction and cause values to drift.

Filter papers, disposable weigh boats, and plastic centrifuge containers can all become charged just from normal handling. Charged powders can be displaced, causing cross-contamination.

Built-in fanless ionizer◆

◆ Patented

Simply hold the sample in front of the ionizer for a second or two to make sure that it is free of static before starting measurement.

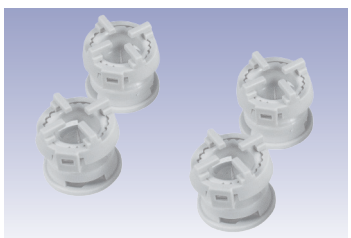
■ **Direct-current (DC) method**

The ionizer of the BM series doesn't use a fan to deliver ions and thus causes no breeze, which allows for neutralization of even extremely fine powders without disturbance.

■ **Long life and high maintainability**

The discharge electrode pins of the ionizer can be used continuously for approx. 10,000 hours. Each pin also has a protector for safe cleaning or replacement.

Built-in fanless ionizer



Discharge electrode units

The green LED is lit while the ionizer is ON.

Antistatic glass panes
Coated with transparent evaporated metal to block static from outside, such as charged clothing in dry winter conditions

Just press the ION key to switch on the ionizer. The "ION" mark blinks on the display.

The plate in the middle can be removed to create a larger space (not advisable for 0.001 mg readability models).

Making the world of micrograms accessible to all users

The BM series includes four models that display weight values with a readability of 0.001 mg; namely, BM-5, BM-5D, BM-20 and BM-22. These models are ideally suited for weighing samples for componential (quantitative, elemental, etc.) analyses, environmental analyses, or other applications that similarly require extremely fine weight measurements.

BM-5 5.2 g × 0.001 mg (σ = 0.0012 mg*1)

Of the four models, the BM-5 features the highest stability and repeatability, and is therefore recommended for most users. With an adequate installation environment and operation, it can realize the minimum weight of no more than 2 mg in accordance with the United States Pharmacopeia (USP), Chapter 41. The AD-1676 tabletop breeze break (medium) is provided as standard.

BM-5

BM-20 22 g × 0.001 mg (σ = 0.0025 mg*1)

The BM-20 is suitable for users who require a larger capacity for weighing samples directly into heavy receptacles. Its stability and repeatability are also excellent, though not as high as those of the BM-5.

*1 Repeatability specification for 1 g weight

BM-22 5.1 g/22 g × 0.001 mg/0.01 mg (σ = 0.004 mg*1)

The BM-22 is a smart range model.*2 While being slightly lower in stability and repeatability (and therefore more affordable) than the BM-20, it still provides sufficient room for tare.

BM-22

BM-5D 2.1 g/5.2 g × 0.001 mg/0.01 mg (σ = 0.004 mg*1)

The BM-5D, another smart range model,*2 has the same repeatability specification as the BM-22, but a smaller capacity. Accordingly, it is the most budget-friendly model of the four.

∗1 Repeatability specification for 1 g weight

∗2 The readability will switch to 0.01 mg automatically when the display value exceeds 2.1 g (BM-5D) or 5.1 g (BM-22) but returns to 0.001 mg by pressing the RE-ZERO key.

Ensuring accuracy and precision

Motor-driven internal calibration weight

All the models in the BM series are equipped with an internal calibration weight, which allows for any user to make certain that the balance always stays accurate and precise without any hassles.

■ **One touch calibration**

You can perform calibration (sensitivity adjustment) quickly and correctly any time with just one key press. For the 0.001 mg readability models, it can also be useful for a simple check of the environmental conditions at the time.*3

■ **Automatic self calibration**

The balance can be set to start calibration automatically when it detects a change in ambient temperature to prevent errors due to sensitivity drift.

■ **Calibration test report**

For daily accuracy checks and documentation, the balance is capable of testing for errors (without making any sensitivity adjustment) using its internal calibration weight, and outputting the result.

■ **Internal weight value correction**

In cases such as where the internal weight value varied over time, it can be corrected using an external weight that you have as a reference.

■ **Automatic repeatability test**

It is possible to have the balance measure the mass of its internal calibration weight 10 times and calculate the standard deviation to show repeatability under the given environment. This can also be easily included in your balance management SOPs for daily precision check.

∗3 If internal calibration takes longer than usual, it is a sign that there is something wrong with the measurement environment, and it would be best to delay the measurement until a later time.

Automatic response characteristics adjustment

The BM series automatically selects and sets the optimal combination of weighing speed and stability*4 (FAST, MID or SLOW) by analyzing the influence of external disturbances such as drafts and vibrations on the stability of the display value at the location. Alternatively, the setting can be configured manually.

∗4 The weighing speed and stability are in a trade-off relationship. The slower the weighing speed, the more stable the display becomes.

Managing data and compliance

User access control (UAC) and key lock to prevent misusage

The balance can be password-protected in two ways: The first way is to limit use to authorized individuals (up to 11 including one administrator—the administrator can perform all operations while other users are limited to measurements and calibration*5 only) by setting a password for each user. The second way is to set a password just for the administrator and anyone else can use the balance without entering a password but for measurements and calibration*5 only.

Moreover, upon receiving a command to disable its keys, the balance becomes operable only by sending commands from an external device such as a PC.

∗5 The administrator can inhibit calibration also so that others can perform measurements only.

GLP/GMP/GCP/ISO compliant output

For documentation requirements, the balance manufacturer, model, serial number, ID number (eight alphanumeric characters set by the user), date + time,*6 space for signature for calibration report, calibration test report, and title & end blocks for a series of weighing results can be output.

∗6 When the AD-8127 compact printer is used, it is possible to use its clock & calendar function instead of the balance's to print date + time. This allows you to prevent falsification of the timestamp using the password lock function on the printer side as you prefer.

Data memory

The BM series can store up to 200 weighing results (or 100 with timestamp) or the 50 latest calibration/calibration test results without requiring external memory devices such as a PC. The stored data can be output to a printer or PC in one batch.

Quick USB and RS-232C as standard interfaces

Quick USB enables readily sending data to Microsoft Excel, Word, Notepad, etc., in the same manner as keyboard input, requiring no driver software installation.*7 RS-232C allows for bi-directional serial communication (i.e. sending data and receiving commands) with a PC,*8 printer or other peripheral device. Via these interfaces, two different devices (e.g. PC and remote controller) can be connected simultaneously.

Further, an Ethernet interface (BM-08) is available as an option and can be installed in place of Quick USB.

∗7 The communication is from the balance to the PC only. A USB cable (approx. 1.8 m) is also provided as standard.

∗8 For connection to a USB port, a serial/USB converter with cable (AX-USB-9P) is separately available.

Providing simple but practical solutions for usability

Reverse backlit LCD display

The contrast of the black and white display provides excellent visibility even in dim light and prevents eye fatigue.

Interlockable sliding doors

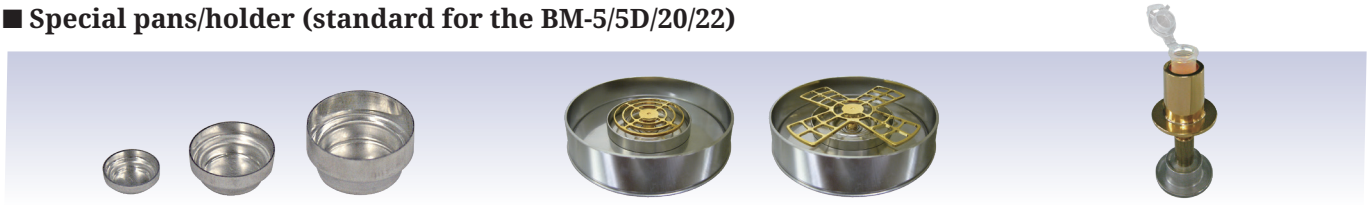
It is possible to slide a door open using the handle on the opposite side. Effective use of both hands lets you perform weighing more efficiently.

The “door” sign will not disappear until the two side doors are completely closed.

Standard & highly recommended accessories

The BM series comes standard with various accessories that facilitate your workflows. There are also optional accessories that greatly help improve the stability of microgram weighing and are therefore suggested especially for the BM-5/5D/20/22.

■ Special pans/holder (standard for the BM-5/5D/20/22)



Aluminum analytical pans (10 pcs each)*9
Ø8 mm (0.05 ml) / Ø12 mm (0.3 ml) / Ø15 mm (0.8 ml)

Weighing pans for particulate matter (PM) filters
Ø50 mm / Ø95 mm

AX-BM-032 microtube holder*10
Ø12 mm

*9 Each size can also be purchased separately (in a set of 100).

*10 The weight of this holder is heavier than the standard weighing pan by approx. 2 g, leaving only approx. 3 g for weighing (including both the microfuge tube and sample) with the BM-5/5D. For the BM-252/200/300/500, please use the separately-sold AX-BM-034.

■ AD-1689 tweezers for calibration weight (standard for all models)

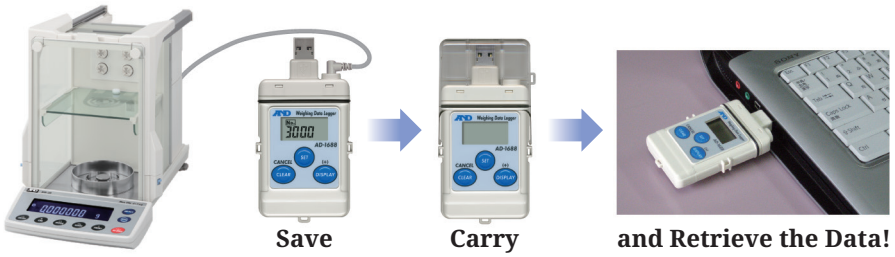
■ AX-BM-033 dust cover for storage (standard for all models)

AD-1689

AX-BM-033

■ AD-1688 weighing data logger (standard for all models)

The AD-1688 is a handheld device (55 × 103 × 16.5 mm) that stores up to 5,000 weighing results with date and time in CSV format.

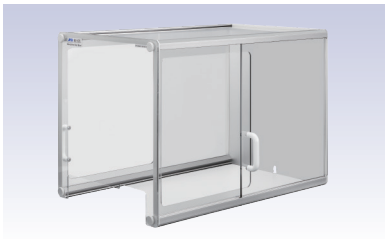


Save **Carry** **and Retrieve the Data!**

AD-1688

■ AD-1676 tabletop breeze break (medium) (standard for the BM-5/5D)

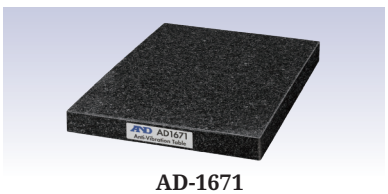
The AD-1676 shields the balance from air and/or temperature disturbances caused by air conditioning, people passing by, the operator's breath, body heat, etc. The panes are made of antistatic acrylic. Strongly recommended for the 0.001 mg or even 0.01 mg readability models.



AD-1676
368 (W) × 514 (D) × 350 (H) mm (incl. the handles)

■ AD-1671 anti-vibration table for balances (sold separately)

The AD-1671 isolates the balance from minute vibrations caused by nearby traffic, movement of people, handcarts, etc., which are often imperceptible to humans but can seriously destabilize measurements.



AD-1671
460 (W) × 400 (D) × 71 (H) mm

■ AX-SW137-PRINT/REZERO foot switches (sold separately)

These foot switches enable use of the PRINT or RE-ZERO command*11 by depressing them, and are convenient when you can't or don't want to press the key on the balance directly by hand.

*11 The BM series has one jack socket, and only one of them can be connected. It is also possible to control the built-in ionizer with a footswitch by changing the internal setting.

Foot switches

Specifications

Models		BM-5	BM-5D	BM-20	BM-22
Capacity		5.2 g	2.1 g / 5.2 g*i	22 g	5.1 g / 22 g*i
Readability		0.001 mg	0.001 mg / 0.01 mg	0.001 mg	0.001 mg / 0.01 mg
Repeatability (standard deviation)		0.0012 mg (for 1 g)	0.004 mg (for 1 g)/ 0.01 mg	0.0025 mg (for 1 g)	0.004 mg (for 1 g)/ 0.01 mg
Minimum weight*ii (typical)		2.0 mg	5.0 mg	3.0 mg	5.0 mg
Linearity		±0.010 mg	±0.010 mg / ±0.02 mg	±0.010 mg	±0.010 mg / ±0.02 mg
Stabilization time (typical when set to FAST)		Approx. 10 secs	Approx. 10 secs / 8 secs	Approx. 10 secs	Approx. 10 secs / 8 secs
Sensitivity drift		±2 ppm/°C (10 to 30 °C/50 to 86 °F, when automatic self calibration is OFF)			
Operating environment		5 to 40 °C (41 to 104 °F), 85%RH or less (no condensation)			
Display refresh rate		5 times/sec or 10 times/sec			
Units of measure*iii		mg (milligram), g (gram), oz (ounce), ozt (troy ounce), ct (metric carat), mom (momme), dwt (pennyweight), gr (grain), pcs (counting mode), % (percent mode), and SG (density mode)			
Counting mode	Minimum unit mass	0.1 mg			
	Number of samples	10, 25, 50 or 100 pieces			
Percent mode	Minimum 100% reference mass	10.0 mg			
	% readability	0.01%, 0.1%, 1% (depends on the reference mass stored)			
Communication interface		RS-232C and Quick USB			
Applicable calibration weight value		5 g 2 g 1 g	5 g 2 g 1 g	20 g 10 g 5 g 2 g 1 g	20 g 10 g 5 g 2 g 1 g
Weighing pan size		Ø25 mm			
External dimensions		259 (W) × 466 (D) × 326 (H) mm			
Net weight		Approx. 10 kg			
Power supply / consumption		AC adapter / approx. 30 VA			
Standard accessories		AD-1676 tabletop breeze break (medium) × 1*iv, Special pans (Ø50 mm and Ø95 mm) for weighing PM filters × 1 each, Three sizes of aluminum analytical pans × 10 each, AX-BM-032 microtube holder × 1, AD-1688 weighing data logger × 1, AD-1689 tweezers for calibration weight × 1, AX-BM-033 dust cover for storage × 1			

Models		BM-252	BM-200	BM-300	BM-500
Capacity		250 g	220 g	320 g	520 g
Readability		0.01 mg	0.1 mg		
Repeatability (standard deviation)		0.03 mg (for 100 g)	0.1 mg	0.2 mg	
Minimum weight*ii (typical)		20 mg	120 mg		
Linearity		±0.10 mg	±0.2 mg	±0.3 mg	±0.5 mg
Stabilization time (typical when set to FAST)		Approx. 8 secs	Approx. 3.5 secs		
Sensitivity drift		±2 ppm/°C (10 to 30 °C/50 to 86 °F, when automatic self calibration is OFF)			
Operating environment		5 to 40 °C (41 to 104 °F), 85%RH or less (no condensation)			
Display refresh rate		5 times/sec or 10 times/sec			
Units of measure*iii		mg (milligram), g (gram), oz (ounce), ozt (troy ounce), ct (metric carat), mom (momme), dwt (pennyweight), gr (grain), pcs (counting mode), % (percent mode), and SG (density mode)			
Counting mode	Minimum unit mass	0.1 mg			
	Number of samples	10, 25, 50 or 100 pieces			
Percent mode	Minimum 100% reference mass	10.0 mg			
	% readability	0.01%, 0.1%, 1% (depends on the reference mass stored)			
Communication interface		RS-232C and Quick USB			
Applicable calibration weight value		200 g 100 g 50 g 20 g 10 g	200 g 100 g 50 g	300 g 200 g 100 g 50 g	500 g 300 g 200 g 100 g 50 g
Weighing pan size		Ø90 mm			
External dimensions		259 (W) × 466 (D) × 326 (H) mm			
Net weight		Approx. 10 kg			
Power supply / consumption		AC adapter / approx. 30 VA			
Standard accessories		AD-1688 weighing data logger × 1, AD-1689 tweezers for calibration weight × 1, AX-BM-033 dust cover for storage × 1			

***i** Smart range function: The readability will switch to 0.01 mg automatically when the display value exceeds 2.1 g (BM-5D) or 5.1 g (BM-22) but returns to 0.001 mg by pressing the RE-ZERO key.

***ii** Pursuant to the United States Pharmacopeia (USP), Chapter 41

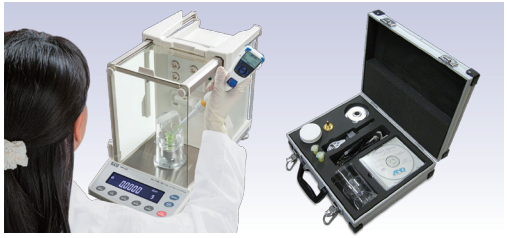
***iii** Either tael (Singapore/HK jewelry/Taiwan/China) or tola can be added upon request.

***iv** For the BM-5/5D only

Options

BM-08	Ethernet interface with WinCT-Plus software*v
BM-014	Pipette accuracy testing kit*vi

*v BM-08 and Quick USB (standard) cannot be used at the same time.
*vi Cannot be used with the BM-5/5D.



BM-014 pipette accuracy testing kit

The kit includes everything required for testing pipette accuracy (systematic error) and reproducibility (random error) quickly and easily by yourself.

Accessories

AD-1653	Density determination kit (for the BM-252/200/300/500 only)
AD-1671	Anti-vibration table for balances
AD-1672/AD-1672A	Tabletop breeze break (large)
AD-1676	Tabletop breeze break (medium)
AD-1682	Rechargeable battery unit
AD-1684A	Electrostatic field meter
AD-1687	Weighing environment logger
AD-1688	Weighing data logger
AD-1689	Tweezers for calibration weight
AD-1691	Weighing environment analyzer
AD-8127	Compact printer
AD-8526	Serial/Ethernet converter
AD-8529PC-W	Bluetooth® converter for PC
AD-8529PR-W	Bluetooth® converter for printer
AD-8920A	Remote display
AD-8922A	Remote controller
AX-BM-031	Display covers (5 pcs)
AX-BM-032	Microtube holder for the BM-5/5D/20/22*vii
AX-BM-033	Dust cover for storage
AX-BM-034	Microtube holder for the BM-252/200/300/500
AX-BM-035	Slide breeze break (for the BM-5/5D/20/22 only)
AX-BM-NEEDLESET	Discharge electrode units for the ionizer (a set of 4 pcs)
AX-HOLDER-SET	Sample cup holder set
AX-KO2466-200	RS-232C cable (9P-9P)
AX-ROUND-PAN-L	Round aluminum analytical pans (Ø15 mm, 0.8 ml, 100 pcs)
AX-ROUND-PAN-M	Round aluminum analytical pans (Ø12 mm, 0.3 ml, 100 pcs)
AX-ROUND-PAN-S	Round aluminum analytical pans (Ø8 mm, 0.05 ml, 100 pcs)
AX-SW137-PRINT	Foot switch for PRINT (with connector)
AX-SW137-REZERO	Foot switch for RE-ZERO (with connector)
AX-USB-9P	Serial/USB converter with cable

*vii The weight of this holder is heavier than the standard weighing pan by approx. 2 g, leaving only approx. 3 g for weighing (including both the microfuge tube and sample) with the BM-5/5D.

AD-1687 weighing environment logger

The AD-1687 simultaneously logs temperature, humidity, barometric pressure, and vibration with weighing data from the balance.

BM-5D/22

A&D Company, Ltd.

Discover Precision

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