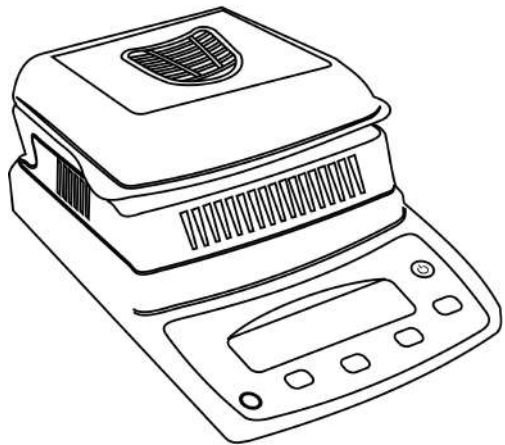


MMB Series moisture analyzer

Operation Manual



METRIA

Reminder:

Please preheat the machine for 60 minutes before the first calibration.
Every time the machine is turned on or off, please give 5 seconds interval.
If conducting continuous testing, please conduct a new experiment when the temperature drops below 40℃。
When covering the heater, do not leave the weight on the scale, otherwise it will crush the halogen lamp.
Be sure to cut off the power when leaving from the moisture meter.
Do not let the moisture meter operate without monitoring.

CONTENTS

1、 Overview and characteristics	1
1.1 Overview	1
1.2 Security Precautions	2
2、 Installation	3
3、 Operation and Application.....	4
3.1 Display Screen Symbol.....	4
3.2 Control Panel.....	5
4、 Parameter Setting	6
4.1 Parameter Group Selection	6
4.2 Temperature Setting	7
4.3 Working Mode Selection	7
4.4 Selection Of Heating Mode	8
4.5 Timing Mode - Time Setting	8
4.6 Custom Mode - Stop Condition	9
5、 Calibration	9
6、 Test steps	10
7、 Optimization Of Testing	11
7.1 Heating Temperature	11
7.2 Heating Time	11
7.3 Sample Weight.....	12
7.4 Sample Preparation	12
7.5 Sample Types	12
8、 Clock Setting:.....	13
9、 RS-232 Interface.....	13
10、 Test Data Storage	14
11、 Maintenance And Troubleshooting	15
12、 Warranty	15

1、 Overview and characteristics

1.1 Overview

A moisture meter is a moisture measurement instrument equipped with high-precision sensors and an efficient secondary thermal radiation device on the basis of an electronic balance, achieving fast and accurate moisture measurement. The moisture meter is based on the principle of thermodynamics, and obtains the percentage of moisture content and other results by comparing the mass and wet weight of a substance after drying.

The moisture analyzer can prestore various methods for measuring moisture in different samples, making the testing process fast and simple. The instrument is easy to operate, accurate in testing, and can display clear and visible values of moisture content, dry matter content, initial and final values of samples, measurement time, temperature, and other data. And it has the function of connecting with computers and printers. This moisture meter can be widely used in all industries that require rapid determination of moisture, meeting the application requirements of various industries, such as production and experimental processes in plastics, rubber, chemical, pharmaceutical, food and other industries.

Technical parameters:

Model	MMB Series Halogen Moisture Meter
Max. weighing Value	MMB100A 120g
Division	0.001g
Moisture readability (Sample > 10g)	0.01%
Heating source	Halogen lamp
Temperature setting	50- 160℃
Weight calibration	100g
Pan size	φ110 (mm)
Dimensions	(D*W*H) 330*205*165(mm)
Package	(D*W*H) 410*315*335 (mm)
Net weight	3.2kg
Gross weight	4.6kg

1.2 Security precautions

To use the moisture meter safely and reliably, please make sure to comply with the following terms:



1.2.1 This instrument is suitable for measuring the moisture content of samples, and any improper operation may cause personal injury and damage to the instrument.

1.2.2 Please connect the 220V AC power supply according to the requirements specified in the manual. The instrument should use a 3-pin grounding plug, and it is strictly prohibited to disconnect the grounding plug.



1.2.3 The power cord should not interfere with normal human activities and avoid human touch or tripping.

1.2.4 Do not operate this instrument in hazardous, humid, and unstable environments.

1.2.5 When cleaning the moisture meter, the power should be unplugged.

1.2.6 During use, it should be ensured that there is sufficient space around the instrument, with a minimum of 1 meter above it.

1.2.7 The instrument must be operated by professional personnel and equipped with corresponding protective equipment, such as safety glasses, protective clothing, gloves, and masks.

1.2.8 Please do not arbitrarily modify the components and other aspects of the instrument. The maintenance of this instrument is carried out by professional personnel authorized by the factory.

The moisture meter works by heating.



★ No flammable materials should be placed around the instrument.

★ During use, the sample, heated halogen lamp, and surrounding components may be very hot. Extra care should be taken when moving the sample to prevent burns.

Pay special attention to the hazards of some samples.

★ For certain sample substances with safety hazards, please carefully conduct hazard analysis and prevention work before testing.



★ Fire/explosion: Flammable and explosive materials, as well as samples containing solvents, can generate flammable and explosive gases or vapors when heated. Therefore, they must be carried out in a dry and low temperature environment to prevent fire or explosion.

Toxic/Corrosive: Samples with toxic or corrosive components should be tested in a well ventilated environment. Such substances will release toxic and corrosive gases during heating. It is recommended to test as few samples as possible.

Note: If any damage is caused by testing the above types of samples, the user shall bear the responsibility on their own.

2、Installation

2.1 Standard packing list

Open the packaging and remove the host and accessories, and check if they are complete by comparing them with the packing list.

Standard configuration	Quantity	Remarks
Moisture meter host	1	
Windproof plate	1	
Sample tray bracket	1	
Power cord	1	
Sample tray	1	5 aluminum plates
Calibration weight	1	F1 level
Operation manual	1	

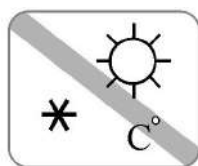
2.2 Requirements for placement of moisture meter



The operating table should be stable

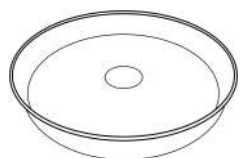


Stable ambient temperature, dry, without strong vibration or magnetic field interference

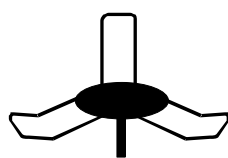


The environmental ventilation is good, and special attention should be paid to toxic and corrosive samples

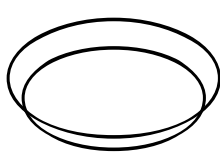
2.3 Installation of accessories



Placing windproof plate



Place sample tray holder



Place the sample tray on the holder

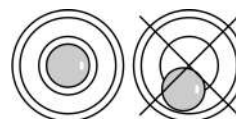
2.4 Connecting the power supply

Connect one end of the power cord to moisture meter, and then connect the other end to the 220V/50HZ power output socket.

Note: For best results, please use or calibrate after at least 60 minutes of power on.

2.5 Level adjustment

To compensate for the impact caused by the tilting symmetry of the placement position during the weighing process, two leveling feet can be adjusted until the leveling bubble moves to the center of the inner circle.

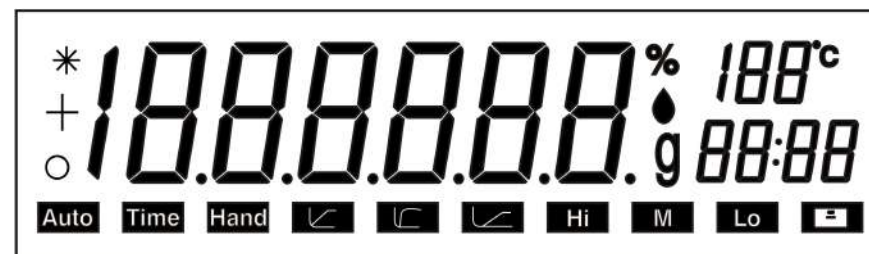


Attention: Every time the position changes, the level must be readjusted.

3、Operation and Application

3.1. Display screen symbols

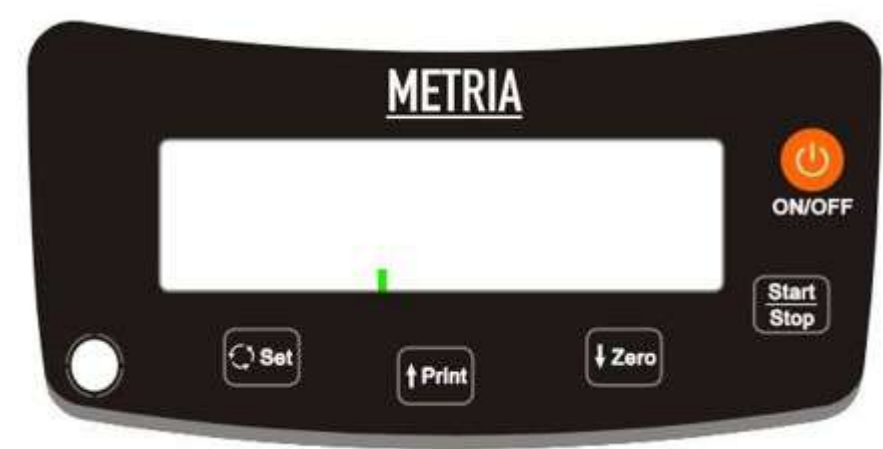
Display screen



Identification Description:

100℃		Temperature	10:00	Time setting	
g		Mass: gram	Heating method		Fast
 %		Moisture content			Standard
%		Solid content			Slow
Mode	Auto	Autometic	Auto	Hi	High
	Time	Timing	Accuracy	M	Medium
	Hand	Manual	testing	Lo	Low

3.2 Control panel



Control panel function description

Button	Key	operating	Features
	Settin g	Hold	Set heating parameters
		Press	Confirm and proceed to the next parameter setting; Test data conversion
	Print	Hold	View and save test record data
		Press	Print function key after testing Parameter indicator icon change or increase button
	Tare	Press	Tare function key in weighing state; Return to measurement mode; Parameter indicator icon change or decrease button
	start/st op	Hold	Test start/stop
		Press	Enter calibration function in weighing stage
	On/off	Press	On/off

4、Parameter Setting

Moisture meter measurement mode

Automatic measurement **Auto**

High precision **Hi**, medium precision **M**, low precision **Lo**

The moisture meter measures automatically, and the measurement is considered complete when the moisture change is less than a certain value with in a certain period of time.

Manual measurement **Hand**

Users can set the measurement accuracy manually based on the characteristics of the sample through button operation.

Timed measurement **Time**

The user sets the measurement time.and the measurement will stop automatically when the measurement finished.

Heating method for moisture determination.

Fast heating reach the set temperature in a short amount of time

Standard heating reach the set temperature within normal time

Slow heating reach the set temperature for a longer period of time

4.1 Parameter group selection:

The system can save 16 sets of measurement modes and parameters, and users can save different measurement parameters for 1-15 sets according to different samples for convenient measurement. **The 16th group is the warm-up parameters, which are preheated according to the set working mode. The temperature and time of the warm-up can be adjusted**

This function can heat without weighing. The use of the warm-up function before testing is to ensure that the instrument reaches its optimal working state and evaporates the free water attached to the sample disk, in order to obtain the best measurement results. Press [Settings] and [Start] continuously when power on, to start the warm-up function of the instrument automatically

The following data settings take M\$31 as an example

Button(command)	Step description	Screen display
	Power on	0.000 g

Long press [Set] About 3 seconds

Display flashing group serial number (last used group serial number)

Press“↑”Or“↓”keys to select one group of paremeters from group 1-15.

If do not change other parameters

Long press [Set] 3 seconds, save and return to measurement status

4.2 Temperature Setting.

Button(command)	Step description	Screen display
	Power on	0.000 g

Long press [Set] About 3 seconds

Display flashing group serial number (last used group serial number)

Short press [Set] Temperature value flash

Press“↑” or “↓”keys to adjust the required value, short press to change

1 °C, long press to change 5 °C;

If do not change other parameters

Long press [Set] 3 seconds, save and return to measurement status

4.3 Working mode selection:

Button(command)	Step description	Screen display
	Power on	0.000 g

Long press [Set] About 3 seconds

Display flashing group serial number (last used group serial number)

Short press [Set] Temperature value is flashing

Short press [Set] current working mode is flashing

Auto	Hi	Automatic high precision mode
Auto	M	Automatic medium precision mode
Auto	Lo	Automatic low precision mode
Time		Timing mode
Hand		Manual Customization Mode

Press “↑” or “↓”or “√” keys to select the required working mode

If do not change other parameters

Long press [Set] 3 seconds, save and return to measurement status

4.4 Selection Of Heating Mode

Button(command)	Step description	Screen display
	Power on	0.000 g

Long press [Set] About 3 seconds

Display flashing group serial number (last used group serial number)

Short press [Set] Temperature value is flashing

Short press [Set] current working mode is flashing

Short press [Set] current heating mode is flashing

	Fast heating
	Standard heating
	Slow heating

Press “↑” or “↓”or “√” keys to select the required heating mode

If do not change other parameters

Long press [Set] 3 seconds, save and return to measurement status

4.5 Timing Mode - Time Setting

Button(command)	Step description	Screen display
	Power on	0.000 g

Long press [Set] About 3 seconds

Display flashing group serial number (last used group serial number)

Short press [Set] Temperature value is flashing

Short press [Set] current working mode is flashing

Press “↑” or “↓” to select

Time (Timing mode)

Short press [Set] Second value is flashing 10:00

Short press [Set] Minute value is flashing 10:00

Press“↑” or “↓”keys to set the required time, short press to change 1,

longpress to change 5.

Max 99:00 minutes

If do not change other parameters
Long press [Set] 3 seconds, save and return to measurement status

4.6 Custom Mode - Stop Condition

Button(command)	Step description	Screen display
	Power on	0.000 g
Long press [Set]	About 3 seconds	
Display flashing group serial number (last used group serial number)		
Short press [Set]	Temperature value is flashing	
Short press [Set]	current working mode is flashing	
	Press “↑” or “↓” to select	
	Hand Custom mode	
Short press [Set]	Hand Custom mode heating mode	
Short press [Set]	Hand Custom mode stop condition	0.005g
Press“↑” or “↓”keys to set the required minimum detection change value		
Short press [Set]	Display flashing group serial number (last used group serial number)	
Short press [Set]	Temperature value is flashing	
(In custom mode, the temperature value represents the testing time)		
Press“↑” or “↓”keys to set the testing time for drying conditions		
If do not change other parameters		
Long press [Set] 3 seconds, save and return to measurement status		

5、Calibration

5.1 Preparation

- 1, Place the moisture meter on a solid surface and adjust it horizontally
- 2, Power on, preheating time for at least 30 minutes

5.2 Calibration/adjustment can only be carried out under the following circumstances:

【To ensure the accuracy of weighing, please perform the calibration operation after obtaining sufficient preheating】

※ The balance is unloaded, has been peeled off, and the internal weighing signal is stable

If these prerequisites are not met, error messages will appear.
If these prerequisites are met, the required weight values for calibration will be displayed.

Button(command)	Step description	Screen display
Short press [Zero]	1.Zero the balance	0.000 g
Long press [Start]	2. About 3 seconds	CAL 0
	Release	-----
	About 3 minutes, weight value is flashing	〔 100.000 〕
	3、 Put correspondent weight	
	After 5 seconds, display the calibration weight value	100.000 g
	4、 Remove the weight, complete the single point calibration	0.000 g

6、Test Steps

Note: Follow "4" to set the heating mode and temperature

- 6.1 Press the tare button to ensure that the sample is placed on the sample tray properly in a state of 0.000.
- 6.2 Cover the heating chamber cover and press the [Start] button to start testing once the displayed data is stable.
(Left side of screen  flashing, indicates it's under heating status)
- 6.3 After testing, the screen displays the moisture content of the sample directly. Press the [Settings] button to switch to other test result data, **then press the [Zero] key again to return to the stand by state for the next sample test.**

Note: 1,During the testing, can press [Stop] key to stop the testing

2, During the testing, do not open the heating chamber cover

 %	Moisture content%	 g	Initial weight
%	Solid content	g	Real-time weight

After the testing, press the [Set] button to view the above data.

Tip: The test results may have slightly difference due to sample weight or weighing errors. Please refer to Chapter 7 for testing

optimization.

7、Optimization Of Testing

During the heating and drying process, the moisture content is determined by the weight loss of the sample.

The speed and mass during the measurement process can refer to the following parameters. The following parameters can also be determined by several trial experiments to determine the optimal settings. The best test results depend on the following settings:

1,heating temperature 2,heating time 3,Sample weight

4,Sample preparation 5,Sample type

7.1 Heating temperature

The heating temperature plays a controlling role in the testing time. (For example, if the temperature is too low, it will prolong the drying time) Choose a suitable heating temperature that neither decomposes nor changes the chemical structure of the sample. It is generally set at 105 °C, except for special requirements from the sample and industry.

Some samples will have different moisture content measured at different heating temperatures. In this case, you can try adjusting the heating temperature to compensate for measurement deviation.

7.2 Heating time

The MMB series moisture analyzer provides three simple ways:

Automatic Auto mode (recommended) - When the moisture analyzer detects changes in the weighing results and the sample loses less than the set fixed value within the specified time (usually one minute), it will automatically stop.

Manual mode - The moisture meter will automatically stop according to the weight loss value and detection time value set by the user through 4.6

custom mode - stop condition, When the set condition value is met, the moisture analyzer will stop automatically.

Timing mode - Set the heating time manually, that is, stop heating

automatically after reaching the set time, and end this test.

Setting range: (0-99 minutes)

7.3 Sample weight

★The weight of the sample affects the measurement time and the repeatability of the results(maximum sample weight 100g).

★There are more samples, more water is evaporated, and the testing process will be prolonged.

✖It is recommended that the sample weight be around 5-10g. 2g sample can get faster results, but there is a lack of measurement accuracy. 20g sample can usually get consistent results, but it takes longer time to test. Another way to determine sample weight is to use the association between sample weight and moisture resolution, as shown in the following table. For example, if the moisture resolution result needs to reach + 0.3%, the table indicates that the sample weight should be at least 2g. (The following test data is for reference only)

Sample weight	Resolution	Sample weight	Resolution
0.5g	±1.0%	5g	±0.1%
1g	±0.5%	10g	±0.05%
2g	±0.2%	20g	±0.02%

7.4 Sample preparation

The sample needs to have test representativeness in order to obtain accurate and repeated measurement results. When preparing samples, ensure that they are evenly placed on the sample tray to avoid stacking and excessive quantity.

7.5 Sample Types

★Pasty and fat soluble substances

Use fiberglass filter membranes to increase the surface area of the sample, such as butter. The moisture in these substances is distributed more evenly through suction cups. Increasing the surface area of the sample will cause faster and more complete evaporation of water.

★Liquid substances

The liquid will form water droplets on the sample tray, which will prevent

rapid drying. In this case, glass fiber filter membranes can be used to evenly distribute the liquid sample over a larger surface area, which can shorten the drying time.

★ Substances that are prone to crusting and temperature sensitive Samples that form shells on the surface will completely hinder the measurement of moisture. At this point, covering the sample with a glass fiber filter membrane and using a milder and more suitable heat can improve the repeatability of the sample.

★ Sugar containing substances

Samples containing a large amount of sugar are prone to charring. Please ensure that the sample is evenly distributed into a thin layer and choose an appropriate temperature. Fiberglass suction cups can also be covered on the sample to improve its repeatability.

8、Clock Setting

Button(command)	Step description	Screen display
Standby		OFF
Long press [Set]	About 3 seconds	T-set
	Display : year, month, day, hour, minute	
	The flashing bit is the set bit	
Short press [Set]	flash and shift, press ↑ to increase, press ↓ to decrease	
	Press and hold to quickly increase or decrease numerical values	
	After setting all dates and times	
Long press [Set]	About 3 seconds	TE-End
	Save Successful	

9、RS-232 interface

Baud rate setting:

Button(command)	Step description	Screen display
Standby		OFF
Long press [Zero]	About 3 seconds	b9600
	Display: Current baud rate	
Short press[↑]	Select the required baud rate	
	b9600=baud rate 9600, corresponding to its value	

Short press[On/Off] Save the selected parameters and return

1. Serial port working mode: asynchronous communication

Baud rate: 9600* (1200、2400、4800、9600、19200)

Starting position: 1

Date bits: 8

Parity bits: None

Stop bits: 1

2.Data transmission method: Print key output

3.Wiring diagram of moisture meter with computer and serial port printer

M	C	M	S
9 pins	9 holes	9 pins	25 holes
2 -----	2	2 -----	3
3 -----	3	3 -----	2
5 -----	5	5 -----	7

M: moisture meter, C: Computer, S: Serial port printer

4.Data format:

INITIAL WEIGHT:

13.804 g

FINAL WEIGHT:

6.606 g

MOISTURE CONTENT:

S 52.14 %

G 47.86 %

DATE TIME:

2021/01/01 09:00:00

REMARKS:

10、Test Data Storage

This machine can save test data after each test automatically, retaining only the last 20 sets of test data for easy access, viewing, printing, etc.

Button(command)	Step description	Screen display
	Power on	0.000 g
Long press [Set]	About 3 seconds	NOTES
	Display the last flashing set of test storage numbers and test data	
Short press[↓]	Display the next set of test data	
Short press[↑]	Display the previous set of test data	
Long press[Print]	Print the current serial number test data	PRINT
Long press[On/Off]	Return to weighing status	

11、Maintenance And Troubleshooting

11.1 Information Instruction Symbols

O Err	Test running, instrument cover not covered prompt
T Err	temperature doesn't increase after the instrument is running prompt
Lo	test sample weight is less than the minimum limited sample weight
CAL 0	Instrument zero calibration
C 100	Instrument loaded with 100 grams weight to calibration
C EnD	Full calibration successful
C Err	Full calibration failed

11.2 Maintenance Of Instruments

Cleaning: To obtain accurate measurement results, it is recommended to clean the temperature sensor and heating chamber regularly. Before cleaning, it is necessary to pull out the power plug and be careful to avoid damaging the instrument. Please use a lint free soft cloth and neutral cleaning agent for cleaning, and never use corrosive cleaning agent for cleaning. Do not allow cleaning agents to flow into the interior of the instrument.

Friendly reminder:

Please preheat the machine for 60 minutes before performing the first calibration;

Every time the machine is turned on or off, please interval 5 seconds;

If conduct continuous testing, please conduct a new experiment when the temperature drops below 40℃;

When covering the heater, do not leave the weight on the scale pan, otherwise it will crush the halogen lamp;

Be sure to cut off the power when leaving the moisture meter;

Do not let the moisture meter operate without human monitoring;

12、Warranty

Our company's product warranty period is 2 year (from the date of sale).

Remarque importante pour les appareils électroniques vendus en France

Informations sur la protection du milieu environnemental et élimination des déchets électroniques :



Les appareils électriques et électroniques portant ce symbole ne peuvent pas être jetés dans les décharges.
En réponse à la réglementation, Labbox remplit ses obligations relatives à la fin de vie des équipements électriques de laboratoire qu'il met sur le marché en finançant la filière de recyclage de ecosystem dédiée aux DEEE Pro qui les reprend gratuitement (plus d'informations sur www.ecosystem.eco).
L'élimination illégale d'appareils électriques et électroniques est punie d'amende administrative.