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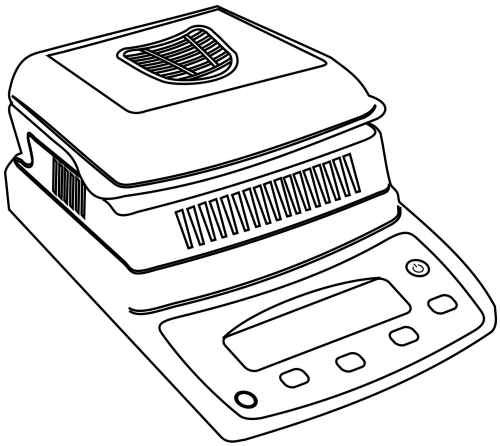
INSTRUMENTOS DE MEDICIÓN INDUSTRIAL

Analizador de humedad Fuzhou
FZ-MA100C

Moisture Analyzer
Operation Manual



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1.1 **About moisture analyzer**

Moisture analyzer is a water measurement instrument equipped with high-precision sensors and high-efficiency secondary thermal radiation device on the basis of electronic balance to achieve rapid and accurate moisture determination. Moisture analyzer

The Moisture analyzer is based on the thermodynamic principle, which obtains the moisture percentage content and other results by the ratio of mass to wet weight after material drying.

Moisture analyzers can pre-store a variety of different sample moisture determination methods, making testing work fast and simple. Multiply productivity and accuracy of measurement results compared to mechanical products. The average sample can be measured in just a few minutes. The instrument is simple to operate, accurate to test, the display part of the value is clearly visible, and can display the moisture content value, dry matter content value, sample initial value, final value, measurement time, temperature and other data. And has the function of connecting with the computer and printer.

The Moisture analyzer can be widely used in all industries that need to quickly analyze the moisture, to reach the requirements of various industries, such as plastics, rubber, chemicals, medicine, food, and other industries in the production and experimental process.

1.2 Safety precaution

In order to use the moisture analyzer safely and reliably, be sure to comply with the following terms:

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

1.2.2. Please confirm that the input voltage and plug type indicated on the label match the AC power used in your area.

1.2.3 The power plug of this instrument is equipped with a grounding terminal. It is forbidden to disconnect the grounding plug of the instrument. Do not switch the size and frequency of the input supply voltage during the test.

1.2.4 Do not operate the moisture analyzer in a dangerous, humid or unstable environment.

1.2.5 Unplug the power supply when cleaning the moisture analyzer.

1.2.6 Make sure there is enough space around the moisture analyzer and at least 1 meter above it.

1.2.7 The moisture analyzer must be operated only by trained personnel who are familiar with the performance of the tested sample and the operation of the equipment.

Please use the relevant safety things to operate the moisture analyzer, such as safety glasses, gloves, protective clothing and protective masks.

1.2.8 After-sales service should only be provided by authorized personnel from the factory.

The moisture analyzer works by heating!

★ Do not place any flammable materials above, below or next to the moisture analyzer.

★ When using the moisture analyzer, the samples, heating halogen lamps and surrounding components can be very hot. Extra care should be taken when moving samples to prevent burns.

★ **Some samples require special care**

★ Carefully analyze the possible dangerous consequences for any sample material with safety hazards.

★ Fire/Explosion: Flammable and explosive sample heating with solvents produces flammable and explosive gases or vapors, so they need to be carried out in dry, low-temperature environments to prevent fire or explosion.

★ Toxic/combustible: Samples of toxic or corrosive components should be carried out in a well-ventilated environment, and such samples will release toxic and corrosive gases during heating, so it is recommended to use as few samples as possible.

★ **Note: The user is should take all responsibilities for any damage caused by testing the above types of samples.**

Specification of moisture analyzer

Max weighing	100g	100g	100g
Display division	0.001g	0.005g	0.01g
Readability (sample > 10g)	0.01%	0.05%	0.1%
Heating source	Halogen lamp		
Temperature setting	45℃ - 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		

2. Installation

2.1 Unpack carefully and check the machine and accessories against the below packing list.

Standard configuration	Quantity	Remarks
Moisture analyzer	1	
Windshield	1	
Sample tray holder	1	
Power cable	1	
Sample tray	1 box	5 aluminum pans per box
100g weight	1	F2 Level
operation manual	1	

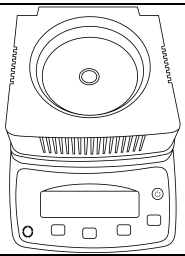
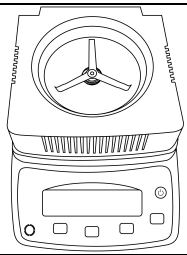
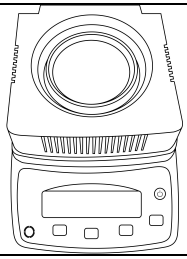
2.2 Placement selection

★ The moisture analyzer should be placed on a stable, level surface console.

★ Choose a safe and well ventilated location. Samples with corrosive or toxic fumes and other hazardous materials need to be specially prepared for placement.

★ Please try to avoid placing the moisture analyzer in places with extreme temperature fluctuations, excessive humidity, airflow, vibration, electromagnetic fields, heat sources or direct sunlight.

2.3 Component installation

		
（1）Place the windshield.	（2）Place the sample tray holder.	（3）Place the sample tray flat on the sample tray holder.

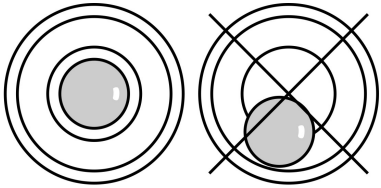
2.4 Connect the power supply

Plug the correct end of the supplied power cord into the power input slot on the back of the moisture analyzer, and connect the other end to the power outlet.

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

2.5 Adjustment level

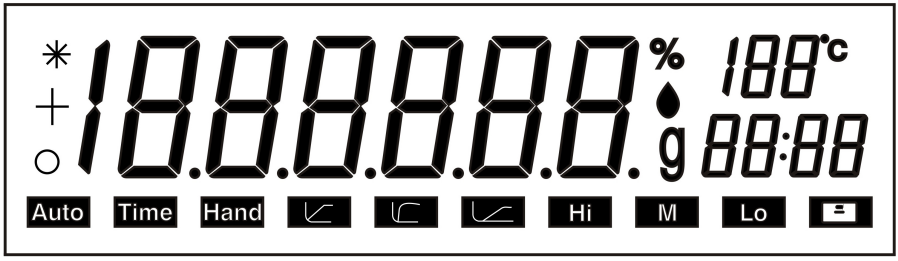
The moisture analyzer has a horizontal bubble and two horizontal adjustment feet. To compensate for the effect of the tilting symmetry of the placement position during the weighing process, the horizontal foot can be adjusted until the horizontal bubble is at the center position.



Note: The level must be re-adjusted each time the position changes.

3. Operating

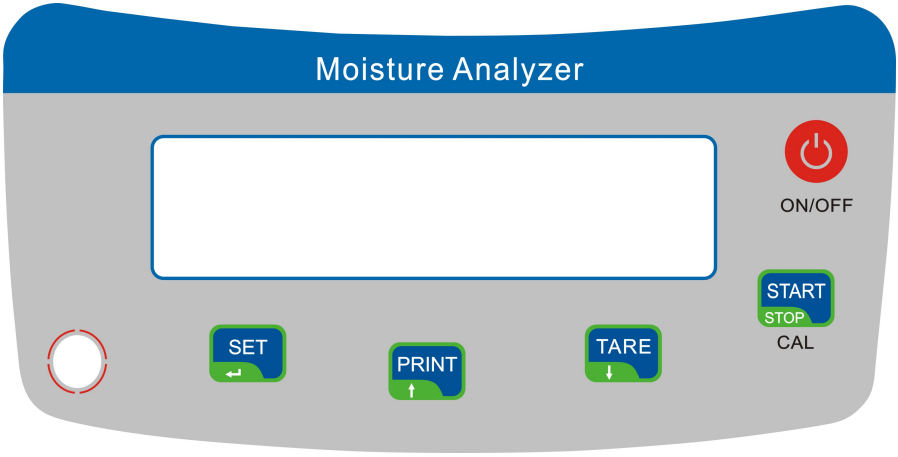
The machine's display



3.1 Display signal description:

g		Weigh:grams	Automatic mode test accuracy	Hi	High precision
%		Moisture content%		M	Medium precision
●g		weightlessness		Lo	Low accuracy
100℃		Temperature (degrees Celsius)		Hand	Manual customization
10:00		Time setting (minutes: seconds)	heating method		fast
Operating mode	Auto	Auto			standard
	Time	Time			slow

3.2 Control panel / keypad



Control panel function description

Button	Function key	operating	Features
	Setting	Hold	Set heating parameters
		Press	End of test: switch water content, solid content and other parameters
	Print	Hold	Date time setting
		Press	Print function key after the test is completed; Parameter indicator icon change or numeric increase button

	Tare	Hold	Tare function key in weighing state； Parameter indicator icon change or number reduction button
		Press	Enter calibration function
	start/stop	Press	Return function after testing
			Test start/stop
	On/off	Press	On/off

4. Parameter settings

★Select the appropriate working mode

1. Analyze the moisture automatically Auto

When machine under auto mode, it will stop the analyzing automatically if sample's moisture changing within very small value.

2. Analyze the sample's moisture manually Hand

Use operating keypad manually to measure the sample's moisture according to its character

3. Timed analyzation Time

User set the analyze time, when time out, the machine will stop the analyzing automatically.

4. High Precision Hi、Medium Precision M、Low Precision Lo

5. The moisture analyzer heating method

Fast heating Heat to a set temperature in short time

Standard heating Heat to a set temperature in normal time

Slow heating Heat to a set temperature in long time

6.Make sure to display the zero value before each test；

7. The sample to be tested is evenly distributed on the surface of the sample tray, and the upper cover of the heating unit is placed down to check whether the sample weight is stable. After the indication is stable, press the “Start/Stop” button to test；

8. When the time is not used or the humidity is large, the relative deviation of the test is large, and the heat engine can be properly used, and the data is not used as a reference. When the substance having a low moisture content is repeatedly tested, it is preferred that the temperature is lowered to normal temperature or 40 degrees or less.

4.1 Parameter settings

The machine can save 16 groups of measuring method and parameters.

User can store 15 groups (from 1-15) of different measuring method and parameters base on different samples, for easy to use.

Group 16 is the warm up parameter. User can set the machine warm up way base on working mode , time, and temperature.

Machine warm up can without weighing or samples.

Warm up machine before use can let machine has best working status, can evaporate the water which attached on the pan or tray, to have best measure results. When machine on standby status, short press [SET] and [START] quickly will let machine start to warm up automatically.

Parameter settings

Button (command)	Step description	Display
	Turn on machine and standby	0.000 g
Long press [Set]	Press 3 seconds	parameter number is blinking
Short press [↑] / [↓]	Adjust parameter group number from 1 to 15	
	If you do not change the data of other parameter items	
Long press [SET]	Return to standby mode	

4.2 Temperature setting

Button (command)	Step description	Display
	Turn on machine and standby	0.000 g
Long press [Set]	Press 3 seconds	parameter number is blinking
Short press [Set]	**Temperature number blinking**	xxxx℃
Short press [↑] / [↓]	Adjust the temperature	

(Short press [↑] / [↓] will add or decrease the value 1℃ , long press will be 5℃)

If you do not change the data of other parameter items

Long press [SET] Three seconds, save and return to standby mode

4.3 Working mode setting

Button (command)	Step description	Display
	Working mode selection	0.000 g
Long press [Set]	Press 3 seconds	parameter number is blinking
Short press [Set]	Temperature number blinking	xxxx℃
Short press [Set]	**The working mode setting is bilinking**	
	High precision with automatically working mode	Auto Hi
	Medium precision with automatically working mode	Auto M
	Low precision with automatically working mode	Auto Lo
	Timed working mode	Time
	Manually working model	Hand

Short press [↑] / [↓] to choose the working mode which you need and Short press [Set] to save the setting and exit.

If you do not change the data of other parameter items

Long press [SET] Three seconds, save and return to standby mode

4.4 Heating method setting

Button (command)	Step description	Display
	Working mode selection	0.000 g
Long press [Set]	Press 3 seconds	parameter number is blinking
Short press [Set]	Temperature number blinking	xxxx℃
Short press [Set]	The working mode setting is bilinking	
Short press [Set]	**The heating method setting is blinking**	

	Fast heating
	Standard heating
	Slow heating

Short press [↑] / [↓] to choose the heating method which you need and Short press [Set] to save the setting and exit.

If you do not change the data of other parameter items

Long press [SET] Three seconds, save and return to standby mode

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4.5 Timed mode – Time setting

Button (command)	Step description	Display
	Working mode selection	0.000 g
Long press [Set]	Press 3 seconds	parameter number is blinking
Short press [Set]	Temperature number blinking	xxxx℃
Short press [Set]	The working mode setting is blinking	
Short press [↑] / [↓]	Circle to timed mode and start to set time	Time
Short press [Set]	The flashing position is second	10:**00**
Short press [Set]	The flashing position is minute	**10**:00

Short press [↑] / [↓] to increase or decrease the number of second and minute.

Short press [↑] / [↓] is increase or decrease 1 and long press is 5.

The maximum number of time setting can be 99:00 minutes.

If you do not change the data of other parameter items

Long press [SET] Three seconds, save and return to standby mode

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4.6 Customize mode – The condition of stop measuring

Button (command)	Step description	Display
	Working mode selection	0.000 g
Long press [Set]	Press 3 seconds	parameter number is blinking
Short press [Set]	Temperature number blinking	xxxx℃
Short press [Set]	The working mode setting is blinking	
Short press [↑] / [↓]	Circle to customize mode and set	Hand
Short press [Set]	Customize mode with heating method setting	
Short press [Set]	Customize mode with condition of stop measuring	0.005g
Short press [↑] / [↓] to set the minimum changing value which need to be measured		
Short press [Set]	parameter number is blinking	
Short press [Set]	Temperature number blinking	
Short press [↑] / [↓] to set the measure time of drying condition		
	If you do not change the data of other parameter items	
Long press [SET]	Three seconds, save and return to standby mode	

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5. Moisture analyzer calibration

The moisture analyzer uses the relative weight to measure the result, so a small deviation from the absolute weight has less influence on the accuracy of the measurement. The moisture analyzer is stable in weighing performance and has a small temperature influence, which can maintain the calibration result for a long time, so weight calibration is not necessary. Before calibration, confirm that the Moisture analyzer is empty in the weighing mode, and there is no any other things on the weighing pan.

Preparation

1. Place the machine on a solid, horizontally position, table or platform and then adjust the level.
2. Turn on and warm up the machine at least 30 minutes.

The calibration/adjustment only can be make in the following situation

The machine will show the calibration weight only if reach below requests

※ The machine must be warm up in advance.

※ The machine is not overload, already tare the weight, inner signal stable

3. External calibration

Button (command)	Step description	Display
Short press [TARE]	To tare the machine	0.000g
Long press [START]	Press 3 seconds	CAL 0
	The display will flash the calibration weight	〖100.000〗
	Put the standard weight mass on pan as display show (example 100g	
	After 5 seconds , display will show 100.000g	
	Remove the weight and the calibration is over.	

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6. Step of measurement

Note: Please set the heating method and temperature refer to the menu 4.

6.1 Press Tare key, make sure that machine display 0.000g and then put the sample evenly on the weighing tray.

6.2 Close the heating compartment lid, press [START] key to start the measurement when machine display stable.

On the left of display, flash means machine are under heating condition.

6.3 After finishing, the display will show the sample's moisture value.

Press [Set] can switch to check the other testing result. Press [TARE] key can exit and return to standby mode and wait for a new testing.

Note: 1. During measuring, user can press [STOP] to call off the testing.

2. DO NOT open the lid (cover of heating compartment) during testing.

%|	% of water content		g	Initial Weight
%	% of solid material content		g	Current weight

After finish the test , user can press SET key to check each data of above.

Note: the test results may vary slightly depending on the weight of the sample or the weighing error.

User can optimize the machine and result according to menu 7.

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7. Optimize the testing

During the heat drying process, the moisture is determined by the weight loss of the sample. The speed and quality during the measurement can be referred to the following parameters. The following parameters can also be determined by several trial experiments to determine the best settings. The best test results depend on the following settings:

Heating temperature

Heating time

Sample weight

Sample preparation

Sample species

7.1 Heating temperature

The heating temperature control the measure time long or short. Example, heating temperature low will longer the sample dried time. Set an appropriate heating temperature and make sure that the chemical structure of the sample can neither be decomposed nor changed. It is generally set to 105 ℃, except if the sample and user have special requirements.

Some samples have different moisture content at different heating temperatures. In this case, try to adjust the heating temperature to compensate for the measurement deviation.

7.2 Heating time

The moisture analyzer provide three simple way

Auto mode (recommend mode) --- When machine detect a change in weighing results, it automatically stops when the sample weight loss is less than the set value for a specified period of time (usually one minute).

Hand mode --- Moisture analyzer in accordance with the user through menu 4.6 customize mode - stop conditions set weightless values and detection time values, to meet the set condition values when the machine automatically stop.

Timed mode --- The heating time is set manually, i.e. the heating is automatically stopped after the set time, ending the measurement.

Setting range: 0 to 99 minutes.

7.3 Sample's weight

★The weight of the sample affects the measurement time and the repeatability of the results, with a maximum sample weight of 50g.

★The more samples on tray , the more water is evaporated and the testing process is prolonged.

★Sample weight is recommended at around 5-10g. Samples of 2g get faster results, but lack of accuracy. Samples of 20g usually get consistent results, but take longer to test.

★Another way to measure sample weight is to use the relationship between sample weight and moisture resolution, as below list:

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

For example, if the moisture resolution result need to reach ±0.3%, in the table, mention that the sample weight should be at least 2g. (The following test data is for informational purposes only)

7.4 Sample preparation

Samples need to be representative of the test in order to obtain accurate and repeatable measurements.

When preparing samples, ensure that the samples are placed evenly on the sample tray to avoid build-up and excessive quantities

7.5

★Pasty, fat-containing soluble samples

Use fiberglass membranes to increase the surface area of the sample, for example, butter. The water in these substances is distributed more evenly through suction cups. Increasing the surface area of the sample causes water to evaporate faster and more completely

★Liquid samples

Liquids form droplets on the sample tray, which prevents quick drying. In this case, the glass fiber membrane can be used to distribute the liquid sample evenly in a large surface area, which can shorten the drying time.

★Easily crusted, temperature-sensitive samples

Samples that form shells on the surface can completely hinder the measurement of moisture. At this time, use fiberglass membrane covering the sample, and with a milder and more suitable heat, can improve the repeatability of the sample.

★Sugary samples

Samples containing a lot of sugar are easily burn. Make sure that the sample is evenly distributed into a thin layer and set a moderate temperature. Glass fiber suction cups can also be covered in samples to improve their repeatability.

8. Time Setting

Button (command)	Step description	Display
Standby status		OFF
Long press [Set]	Press 3 seconds	T-SET
	Later, display will show and flash: year, month, day, hour, minute	
Short press [Set]	move the flash position to set	
Short press [↑] / [↓]	to increase or decrease the setting value	
Long press [↑] / [↓]	to quickly increase or decrease the setting value	
Long press [Set]	Press 3 seconds if all setting finish Save and exit	TE-End

9. RS-232 Data communication

Baud rate setting

Button (command)	Step description	Display
Standby status		OFF
Long press [TARE]	Press 3 seconds	b9600
Display the current baud rate and short press [↑] to circle and set the rate		
Display show: b9600 means the baud rate is 9600		
Short press [ON/OFF]	Save the setting and exit	

9.1 RS232 Data communication settings (factory default settings)

Baud rate：9600 (default) （1200、2400、4800、9600、19200 available）

Data bit：8

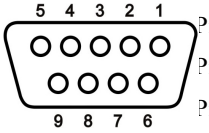
Parity：N

Stop bit1

Data output way : Press PRINT key to output data

9.2 RS232 pin connection

Port DB9 Connector



Pin 2：TxD，send

Pin 3：RxD，receive

Pin 5：GND，ground

Machine		Computer	Machine		Serial port printer
9male		9female	9male		25female
2	----------	2	2	----------	3
3	----------	3	3	----------	2
5	----------	5	5	----------	7

9 Data communication：

After the test completes a set of moisture values, the moisture value remains until the [Start/Stop] key is pressed. During this period, you can press the [Print] key to output the test value, dry weight of the material, print time, etc. To an external device.

RS232 Output format：

INITIAL WEIGHT:7.909g

FINAL WEIGHT:7.821g

MOISTURE CONTENT:1.11%

DATE TIME:

2015/12/20 11：03：30

REMARKS:

Test successfully printed end

10. The measurement Data Storage

At the end of each test, the test data can be automatically saved by machine, and only the last 20 sets of test data are retained for easy access to view, print, etc.

Button (command)	Step description	Display
	Standby	0.000 g
Long press [PRINT]	Press 3 seconds	NOTES
The flash save number and data is the last time of moisture measurement		
Short press [↓]	To display the next group of measure data	
Short press [↑]	To display the last group of measure data	
Long press [PRINT]	To print the current data	PRINT
Long press [ON/OFF]	Return to weighing status	

11. Maintenance and troubleshooting

11.1 Meaning of signal

O Err	This signal remind user that machine was not covered
T Err	Remind user that temperature not increase after start to heat
Lo	Remind that the test sample weight is less than the minimum of required sample weight
CAL 0	Remind that machine will calibrate on zero (no need to put any weight mass on pan)
C 100	Remind user to put 100g weight mass on pan for calibration
C EnD	The calibration was successful
C Err	The calibration failed

If the fault message cannot be resolved or does not describe the problem with your moisture analyzer, please call our customer service department or your local authorized service agent or company.

11.2 Maintenance of machine

Cleaning: For accurate measurement results, it is recommended to clean the temperature sensor and heating silo regularly.

Before cleaning, machine must be unplugged, clean carefully, so as not to damage the instrument, please use a hairless (velvet) soft cloth and neutral detergent cleaning, and never use corrosive detergent. Do not allow the detergent to flow into the inside of the instrument.

Tips: Please turn on and warm up machine for 60 minutes and then calibrate for the first time use.

Every time you turn it on and off, please have an interval of 5 seconds.

If the continuous measurement, please do a new experiment when the temperature is below 40 ℃.

When covering the heater, do not leave the weight on the scale, otherwise the halogen lamp will be crushed.

When you leave the moisture meter, be sure to cut off the power supply.

Do not let the moisture meter work without monitoring.

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12. Warranty

The product has a one-year warranty (from the date of sale). During the warranty period, products with quality problems for replacement or free repair.

Except in one of the following cases:

1. The warranty period has passed.
2. Damage to the moisture meter due to the user's own fault.
3. The user did not operate according to the instructions and caused damage to the moisture meter.
4. Damage to the water meter due to exposure to radioactive or corrosive substances.
5. The user disassembles the machine or repairs caused by maintenance personnel who have not been appointed by our company.

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