C054-E067B

SHIMADZU
Excellence in Science

Uni Bloc
SINCE 1987

UniBloc Moisture Analyzer

MOC63u

MOC63u

Trust the MOC63u for Both Speedy and Accurate Measurements

Moisture ratio measurements are indispensable for quality control and as checks of raw materials in a variety of industries including food products, chemistry, and pharmaceuticals.
The MOC63u electronic moisture analyzer is capable of accurate, quick and easy moisture ratio measurements.
Just place the sample in the sample pan and close the cover to start the measurement.
This instrument can accommodate virtually any sample, and will contribute to enhanced user productivity.

Main Applications

Customers in the Food Product Industry

- Research and development of food products, drinks, and food additives
- Inspections of food products manufacturing processes and products
- Measurements of raw materials (such as rice, malt, tea leaves, and corn starch)

Customers in the Pharmaceuticals and Cosmetics Industries

- Pharmaceuticals research and development (pills, granules, capsules, and ointments)
- Cosmetics research and development (such as hair products, face lotions, and soap)
- Inspections of pharmaceutical and cosmetic manufacturing processes and products

Customers in Water Supply and Environmental Fields

- Moisture ratio measurements and inspections of sludge
- Moisture ratio measurements and inspections of soil
- Moisture ratio measurements and inspections of waste matter

Customers in the Chemical Industry

- Research and development of samples, and inspection of products (solids, powders, pellets, films, and liquid samples)
- Moisture ratio measurements for plastics, rubbers, paints, pesticides, and functional materials

Customers in Metals and Raw Materials Industries

- Moisture ratio measurements of raw materials (such as iron ore)
- Moisture ratio measurements of metals (such as metal powders)
- Moisture ratio measurements of lumber, paper, fiber, and lime

Customers in the Automotive and Electrical Machinery Industries

- Moisture ratio measurements of plastic pellets and plastic parts
- Moisture ratio measurements of toner
- Moisture ratio measurements of foundry sand

Main Features

Simple Operation

Select the automatic starting mode, place the sample, and close the heater cover to start the measurements. The preparation for measurement is so simple that you do not even have to press the start key.

The Sample Pan Size Is a Spacious 95 mm Dia.

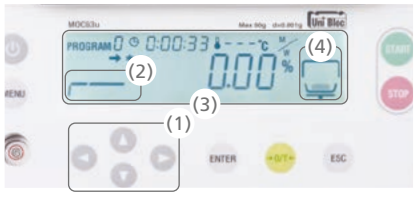
Generally, the wider, thinner, and more uniformly the sample is spread, the more precise the measurement. Uniform heating is provided by adopting a cleverly shaped reflector (patent pending).

A Wealth of PC Connection Functions

A USB connector is built in as standard for connecting to a PC.
It can also be used in conjunction with the WindowsDirect function (patented).
Note)For Windows Vista, Windows 7, and USB port connections, check the Shimadzu website, or contact your Shimadzu representative.

- Equipped with the UniBloc aluminum block, to provide accurate moisture measurements.
- Equipped with a high output halogen heater capable of rapid heating.
- Wide observation window to allow checks of sample status during heating.
- 60 g capacity/0.001 g minimum display
- The temperature on the pan can be set between 50 ˚C and 200 ˚C.
- Can store 10 sets of measurement conditions and 100 data items.
- Cleaning and maintenance are easy.
- Liquid and paste samples can also be measured using fiberglass sheets.
- Energy saving design (32 % reduction in comparison to previous Shimadzu models)

Simple Operating Panel and Excellent Expandability



(1) A cross-shaped key layout has been adopted for excellent operability.

(2) A real time indicator has been adopted, which blinks to show the measurement status.

(3) An LCD with backlight has been adopted for excellent visibility.

(4) Graphics are provided to let you confirm the pan status in real time.

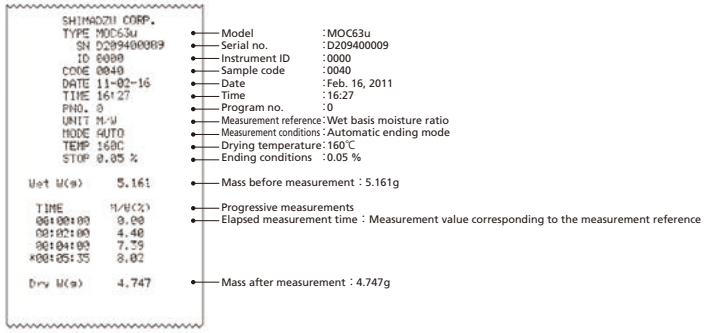
(1) Compatible with the EP-80 printer. Equipped with I/O port.

(2) Built-in RS-232C interface is standard.

(3) Equipped with USB interface. Importing data to a PC is easy.

Sample Printout

◆Sample measurement results output



EP-80 Used

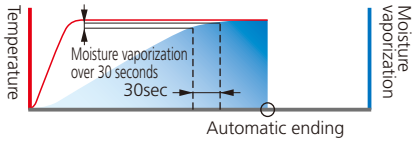
Accommodating a Range of Samples with a Variety of Measurement Modes

A Total of Five Modes Makes This Balance Compatible with a Variety of Sample Measurements

Ending modes

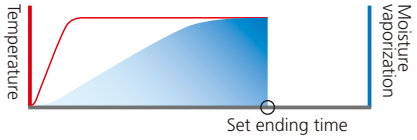
•Automatic ending mode

Automatically ends measurement when moisture loss over the previous 30 seconds becomes smaller than specified percentage.



•Timed ending mode

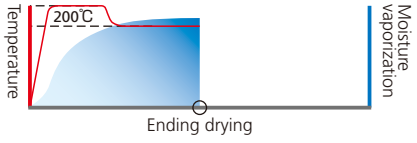
Automatically ends measurement when the specified amount of time has elapsed.



Alternate drying modes

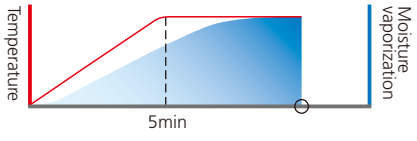
•Rapid drying mode

First dries with the highest temperature for the specified period, then shifts to the specified temperature shortening measurement time.



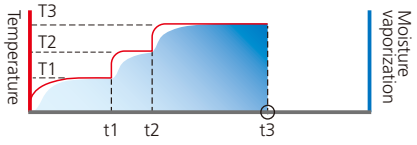
•Slow drying mode

Gently heats samples that might solidify at the surface or samples that reduce under high temperature.



•Step drying mode

Allows step-by-step changes in drying conditions. This feature is useful when measuring samples that contain a large amount of water.



This product conforms to Shimadzu's Eco-labeled designation.

* Energy savings: 32% reduction as compared to the previous model

Sample Applications

Food Product Industry

Measurement of Milk

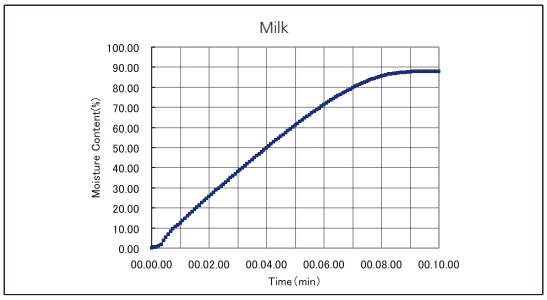
- Fiberglass sheets for liquid measurement were used to promote liquid evaporation.
- Two measurement conditions were used, timed ending and automatic ending modes. Essentially the same average values were obtained. With samples whose principal component has a relatively high evaporation temperature and also contains moisture, the same results will be obtained regardless of the mode used.

Measurement of Milk

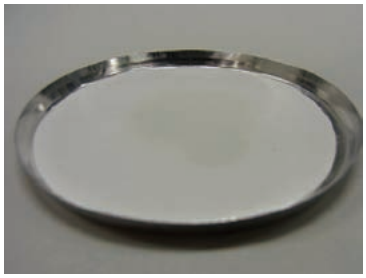
Measurement conditions: 140 ˚C/TIME 10 min.

	MOC63u	
	Sample mass (g)	Moisture ratio (%)
1st	1.081	87.70
2nd	1.025	87.61
3rd	1.031	87.68
Average		87.66
Standard deviation		0.047
CV (%)		0.05

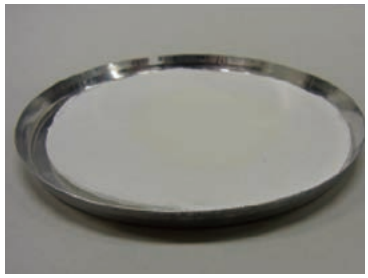
The drying curve for milk in timed ending mode is shown below.



Photos of the milk before and after drying are shown below.



(Before measurement) 1 g of milk was dripped on to a fiberglass sheet for liquid measurements.



(After measurement) The moisture has evaporated from the milk, and the remaining fats have yellowed slightly.

Food Product Industry

Measurement of Instant Coffee

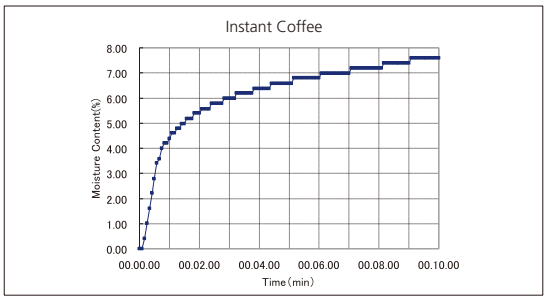
- Commercially available powdered instant coffee was measured. A sample of approximately 1 g was placed in the pan, and the pan was shaken to spread the sample over the entire pan.
- Essentially no difference in the moisture ratio was evident in timed ending mode or automatic ending mode. When a high drying temperature is set to shorten the drying time, the radiant heat from the halogen lamp becomes significant, and sample surfaces are sometimes scorched. Accordingly, with colored samples and samples prone to degradation, it is better to set as low a drying temperature as possible.

Measurement of Instant Coffee

Measurement conditions: 120 ˚C/TIME 10 min.

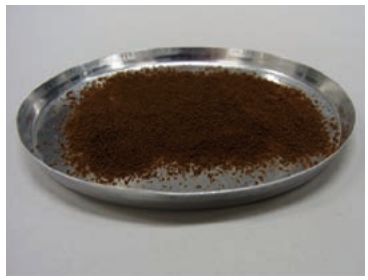
	MOC63u	
	Sample mass (g)	Moisture ratio (%)
1st	0.994	7.33
2nd	1.079	7.50
3rd	0.980	7.45
Average		7.43
Standard deviation		0.087
CV (%)		1.18

The drying curve for instant coffee in timed ending mode is shown below.



Photos of the instant coffee before and after drying are shown below.

(Before measurement) The sample was spread evenly over the pan.



(After measurement) There was basically no discoloration.

Food Product Industry

Measurement of White Rice

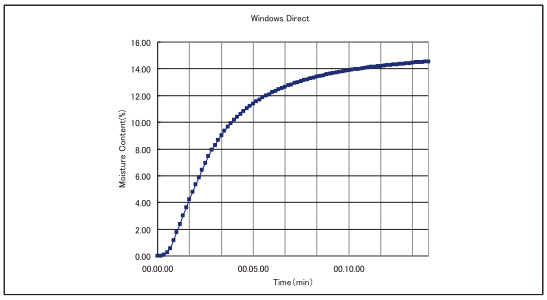
- Polished *koshihikari* rice was used as the sample. The grains were measured as is, without pulverization.
- Almost no rice bran remained, so it was assumed that any lost weight would be due solely to moisture evaporation. There were few volatile components aside from moisture, so favorable repeatability was obtained.
- The entire sample turned yellow after drying. This was likely due to surface scorching.

Measurement of White Rice

Measurement conditions: 200 ˚C/AUTO 0.05 %

MOC63u			
	Measurement time	Sample mass (g)	Moisture ratio (%)
1st	14:19	5.938	14.55
2nd	13:40	5.942	14.47
3rd	13:45	5.979	14.43
Average			14.48
Standard deviation			0.061
CV (%)			0.42

The drying curve for white rice in automatic ending mode is shown below.



Photos of the white rice before and after drying are shown below.

(Before measurement) The white rice was spread evenly over the pan.

(After measurement) The entire sample turned yellow.

Food Product Industry

Pharmaceuticals and Cosmetics Industries

Sample Measurement of Corn Starch

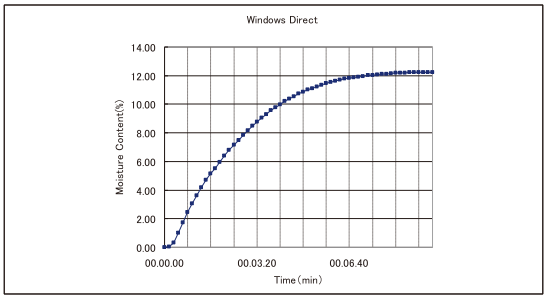
- Approx. 5 g of corn starch was added to the pan, and was spread over the entire surface using the tip of a spoon.
- No change in appearance was evident after drying.
- Favorable repeatability of 1 % max. was obtained.

Measurement of Corn Starch

Measurement conditions: 180 ˚C/AUTO 0.02 %

MOC63u			
	Measurement time	Sample mass (g)	Moisture ratio (%)
1st	9:49	5.133	12.27
2nd	9:14	4.910	12.10
3rd	9:12	5.097	12.14
Average			12.17
Standard deviation			0.09
CV (%)			0.73

The drying curve for corn starch in automatic ending mode is shown below.



Photos of the corn starch before and after drying are shown below.

(Before measurement) The corn starch was spread evenly over the pan.

(After measurement) There was basically no change in appearance.

Water Supply and Environmental Fields

Chemical Industry

Measurement of Sludge Cake

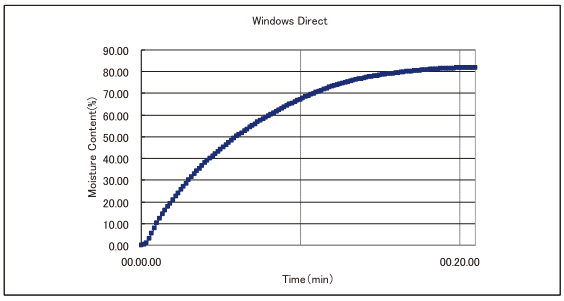
- A sludge cake is created by drying sediments extracted from a sewage treatment plant. It is later incinerated. It is important to measure the moisture ratio, because the incineration energy will be excessive if there is too much moisture.
- A sludge cake is a moisture-containing solid, and may also contain fiber. This was placed on the pan, and pulverized to a diameter of about 10 mm or less. Because of the bad odor, taking the time to thoroughly pulverize it was impossible.
- The moisture ratio was 81 %, with good repeatability. This is likely because the sample contains essentially no volatile components aside from water.

Measurement of Sludge Cake

Measurement conditions: 200 ˚C/AUTO 0.05 %

	MOC63u		
	Measurement time	Sample mass (g)	Moisture ratio (%)
1st	21:03	2.170	81.84
2nd	21:34	2.074	81.20
3rd	21:57	2.231	81.62
Average			81.55
Standard deviation			0.325
CV (%)			0.40

The drying curve for the sludge cake in automatic ending mode is shown below.



Photos of the sludge cake before and after drying are shown below.

(Before measurement) The consistency was lumpy, so it was broken up using the tip of a spatula.

(After measurement) It whitened slightly, and the volume decreased from the drying.

Chemical Industry

Automotive and Electrical Machinery Industries

Measurement of Plastic Pellets

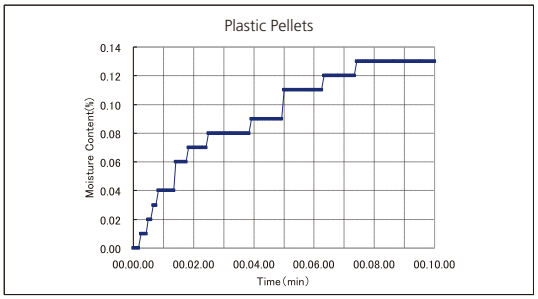
- Plastic pellets consist almost entirely of polymeric materials, but there can be volatile components inside. The objective was to measure moisture adhering to the surface, so the drying temperature was set to 100 ˚C.
- Since the drying temperature was low, drying did not proceed easily. In timed ending mode, evaporation from the inside of the sample proceeded little by little, so an increase in the moisture ratio was evident over an extended period.
- In automatic ending mode, measurements will end if the change in the rate of decrease over 30 seconds falls below a set value. Accordingly, when samples with a low moisture ratio are analyzed at 0.05 % setting, the measurements will inadvertently end before the moisture is removed.

Measurement of Plastic Pellets

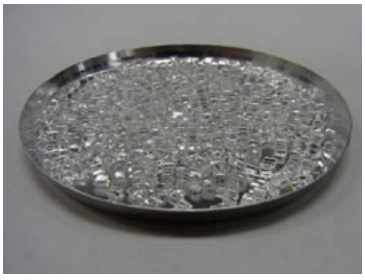
Measurement conditions: 100 ˚C/TIME 25 min.

	MOC63u	
	Sample mass (g)	Moisture ratio (%)
1st	10.080	0.12
2nd	10.016	0.13
3rd	10.290	0.13
Average		0.13
Standard deviation		0.006
CV (%)		4.56

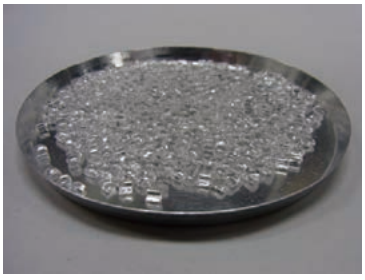
The drying curve for plastic pellets in timed ending mode is shown below.



Photos of the plastic pellets before and after drying are shown below.



(Before measurement) The sample was spread evenly over the pan.



(After measurement) There was basically no change in appearance.

Moisture Ratio Measurements for Various Samples

The table below summarizes moisture ratio measurements for various samples using the moisture analyzer. For details, refer to the Shimadzu website.

Sample	Sample Quantity	Measurement Mode		Set Temperature (°C)	Measurement Time (min)	Moisture Ratio (%)	CV (%)
		Ending Conditions	Finishing Conditions (% or min)				
Dog food	1g	AUTO	0.05%	160	5:48	6.45	3.17
Table salt	5g	TIME	10 minutes	200	10:00	0.08	6.93
Instant coffee	1g	TIME	10 minutes	120	10:00	7.43	1.18
Coffee beans (raw)	5g	AUTO	0.05%	140	17:30	9.32	1.68
Coffee beans (roasted)	3g	AUTO	0.05%	140	7:06	2.68	3.73
Green tea	5g	AUTO	0.05%	120	9:05	3.76	0.41
Corn starch	5g	AUTO	0.02%	180	9:25	12.17	0.73
Sugar (granulated sugar)	5g	AUTO	0.05%	160	1:02	0.13	0.01
White rice	6g	AUTO	0.05%	200	13:55	14.48	0.42
Mayonnaise	1g	TIME	10 minutes	160	10:00	20.61	0.46
Orange juice	1g	AUTO	0.05%	140	10:09	88.89	0.09
Milk	1g	AUTO	0.05%	140	7:30	87.36	0.04
Chocolate	3g	AUTO	0.01%	140	6:18	2.36	1.49
Rolled oats	6g	AUTO	0.05%	200	10:05	12.65	0.14
Tomato ketchup	2.5g	AUTO	0.1%	140	19:47	69.40	0.16
Frozen sweets	2.5g	TIME	12 minutes	140	12:00	84.53	0.22
Dried mangoes	5g	AUTO	0.05%	120	28:27	6.62	12.10
Palm oil	2.5g	TIME	5 minutes	120	5:00	0.41	3.70
Hand soap	1g	AUTO	0.05%	200	21:36	88.89	0.39
Lipstick	1g	TIME	3 minutes	100	3:00	0.73	9.37
Plastic (PMMA pellet)	10g	TIME	25 minutes	100	25:00	0.13	4.56
Photocopier paper	1g	AUTO	0.05%	200	1:50	7.84	0.71
Sodium tartrate dihydrate	5g	TIME	15 minutes	160	15:00	15.80	0.04
Detergent (powdered)	5g	AUTO	0.05%	160	13:08	9.79	1.59
Solid soap	3g	TIME	16 minutes	200	16:00	9.09	1.66
Water-based paint	1g	AUTO	0.05%	200	9:27	52.39	0.75
Sludge cake	2g	AUTO	0.05%	200	21:31	81.55	0.40
Potting soil	5g	AUTO	0.05%	120	15:30	33.40	2.16
Sawdust	4g	AUTO	0.05%	160	8:27	34.38	0.91

Note 1: Measurement times, moisture ratios, and CV (%) values are aggregated from three data cycles.
Note 2: The CV (%) is the standard deviation divided by the average value, multiplied by 100 to represent it as a percent.

MOC63u Specifications

Capacity	**Max**	60 g
	Min	0.02g
Minimum readability		0.001g
		0.01/0.1% (Selectable)
Repeatability (*1)		0.15% (2g)
		0.05% (5g)
		0.02% (10g)
Drying Heater		Straight type halogen heater
Power		400W
Temperature range setting		50-200°C (1°C increments) (There is a time restriction when exceeding 180°C.)
Display		LCD with backlight
Pan size		Φ95mm
Dimensions (W×D×H) mm		202 × 336 × 157
Weight		Approx 4.2kg
Operational temperature and humidity range		5 to 40°C, 85%RH or lower

(*1) The repeatability (standard deviation) value is from a standard measurement (sample: sodium tartrate dihydrate). This value is not guaranteed for all samples, environments, and measurement conditions.

Measurement modes	Standard (Easy start/Automatic end/Timed end)
	Rapid drying (Easy start/Automatic end/Timed end)
	Slow drying (Easy start/Automatic end/Timed end)
	Step drying (Easy start/Automatic end/Timed end)
Timer setting	1-240 minutes or continuous (max 12 hours)
Interface	RS-232C (9-pin connector) I/O port
	USB port
Measurement conditions data memory	10
Data memory	100
Temperature calibration kit	Option
Standard accessories	Sample pans (3 aluminum pans), pan supporter, windbreak, Heater insulation plate, aluminum pans (50 disposable pans), Sample pan handler, power cable, spare fuses (2), protective display cover, hexagonal wrench

Accessories list

Standard accessories	
1	Sample pan
2	Aluminum sheet
3	Sample pan handler
4	In use protection cover
5	Fuse

Optional accessories	
1	Printer EP-80
2	Printer EP-90
3	In-use protection cover for display (5 pieces)
4	Aluminum sheet
5	Fiberglass sheet
6	Temperature calibration kit (*2)
7	Sample pan (SUS)
8	RS-232C cable
9	USB connection cable
10	Halogen heater for replacement (*3)

(*2) Calibration is performed at one temperature (100 °C). Contact your Shimadzu representative if you would like to perform calibration at two or more temperatures, or to change the calibration temperature.
(*3) The halogen heater can be removed and replaced by the user.

⚠ Safety Precautions

Read instruction manual before using this instrument.
- Use this instrument for measurements in which water vaporizes from the sample under heating.
- The temperature of the heater installed in this instrument becomes higher than the set heating temperature for the sample.
- Any sample that is explosive, inflammable or may cause hazardous reaction under heating must not be measured with this instrument.

SHIMADZU

Shimadzu Corporation

www.shimadzu.com/an/

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