MS-74A / MX-53A / MF-53A / ML-53A

INSTRUCTION MANUAL

Heat Drying Moisture Analyzer

MS-74A

MX-53A

MF-53A

ML-53A

A&D

A&D Company, Ltd.

Notation for Precautions

Meaning of Warning Signs

⚠WARNING	Indicates information where incorrectly handling the product may lead to death or serious injury.
⚠CAUTION	Indicates information where incorrectly handling the product may lead to injury or damage to property.

Meaning of Symbols

❗	The ❗ symbol indicates an action that is required. Details on the action are indicated inside the ❗ or in nearby documents or pictures.

Other

CAUTION	Indicates cautionary information regarding the correct use of the product.
ADVICE	Indicates general advice regarding the use of the product and what to do when a mistake is made.
⚠	Indicates a high temperature caution.

CAUTION

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Contents

1. Cautions Regarding Handling

Safety Information ⓘ

This product is a moisture analyzer based on the principles of thermal mass analysis. It measures properties such as the moisture content and solids in a sample based on changes in mass caused by heating and drying the sample with a halogen lamp to vaporize the moisture. Do not use it for other purposes.

This manual contains basic information on handling the product. Read it thoroughly before using the product.

The product is designed to be used by an experienced operator.
Using the product in a manner not described in this manual, such as modifying, disassembling, or misusing the product, may be dangerous.
A&D shall not be held responsible for this in any way.

1.1. Cautions Regarding Installation

⚠WARNING
Danger of death due to fire or explosion

- Perform measurement in an appropriate environment.
  - ❑ Do not use the product in a dangerous environment, such as in an atmosphere of flammable gas.
  - ❑ Ensure that the product is installed in an environment with the following temperature and humidity. Temperature: 5 to 40°C; Humidity: 85% or lower RH (without condensation)
  - ❑ Do not use the product in a poorly ventilated environment. Using the product in an environment that hinders the dissipation of heat from the moisture analyzer, such as a sealed environment, may cause unexpected rises in temperature or symptoms of poisoning.

- ⚠Do not place flammable objects in the vicinity of the product.
  - ❑ The various parts of the moisture analyzer will be at a high temperature during measurement and immediately after measurement, and this can cause objects to catch fire.
  - ❑ Never place objects on the heater cover.
  - ❑ Do not operate the product with any cables or other objects on it.
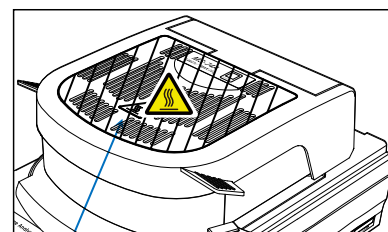
Heater cover

⚠WARNING
Danger of death or failure due to electrocution

- Check the power supply voltage.
  The compatible power supply voltage is indicated on the rear of the moisture analyzer. Confirm that it matches the power supply voltage you are using.

- When connecting the moisture analyzer to the power supply, use the included power cable.

- Ground the moisture analyzer. If the power outlet does not have a ground terminal, ground it with a ground adapter.

- Beware of water leaks. The moisture analyzer is not waterproof. Electrocution or failure may occur if water enters the inside of the moisture analyzer.

Grounding Method
Grounding with the power

Ground terminal

Power cable

Power outlet with ground terminal

Grounding with a ground

Grounding with a screw

Ground adapter
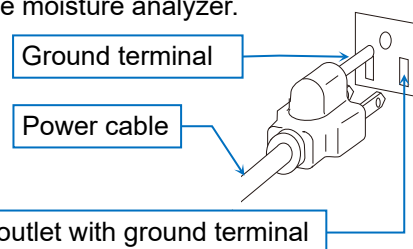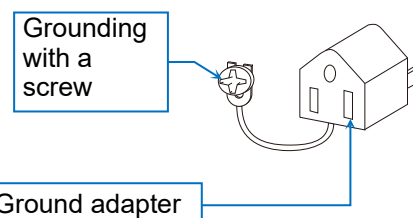
⚠CAUTION
To ensure correct measurement

- Note the following regarding the high-accuracy electromagnetic balance type mass sensor used by the product.
  - ❑ Install the product on a robust platform (table).
  - ❑ Avoid vibrations.
  - ❑ Install the product in a location where it will not be exposed to air from an air conditioner, etc.

1.2. Cautions Regarding Use

⚠WARNING
Danger of death due to fire, explosion, or poisoning

● Do not measure dangerous samples.

❑ Do not heat samples that are prone to explosion or combustion or heat samples that emit hazardous substances, as doing so is extremely dangerous. Samples with unknown properties are just as dangerous.

❑ If the internal pressure of the sample rises because the surface dries first, the sample may rupture. Do not perform measurement in this case, as it is dangerous.

❑ If the sample catches fire, immediately remove the power cable from the power outlet, and perform the appropriate procedures.
The case of the moisture analyzer uses flame-retardant material (UL94V-0).

❑ Do not place flammable objects in the vicinity of the product.

❑ The various parts of the moisture analyzer will be at a high temperature during measurement and immediately after measurement.
Do not place flammable objects in the vicinity of the product, as doing so may cause a fire.

❑ Never place objects on the heater cover.
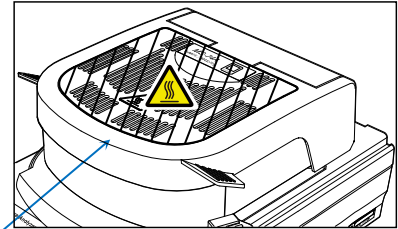
Heater cover

⚠WARNING
Danger of blindness

● Do not look directly at the halogen lamp during heating. Doing so may cause eye pain or vision problems.

● When performing measurement, wear appropriate protective gear, such as goggles and gloves.

● Do not modify or disassemble the moisture analyzer. Doing so may cause failure, electrocution, or fire. If you suspect that the product has failed, contact your place of purchase.

● Do not expose the moisture analyzer, power cable, or accessories to extreme temperatures, intense chemical vapors, humidity, impacts, vibrations, or strong magnetic fields. Follow the operating conditions listed in "17. Specifications".

⚠CAUTION

⚠Danger of burns caused by high temperature surfaces

- Make sure to follow the correct operation methods and procedures.
  - ❑ Make sure to place the breeze brake, tray holder, sample tray, and sample tray handle correctly.
  - ❑ Make sure to hold the heater cover handle when opening or closing the heater cover.

Install correctly

Sample tray

Tray holder

Sample tray handle

Breeze brake

Heater cover handle
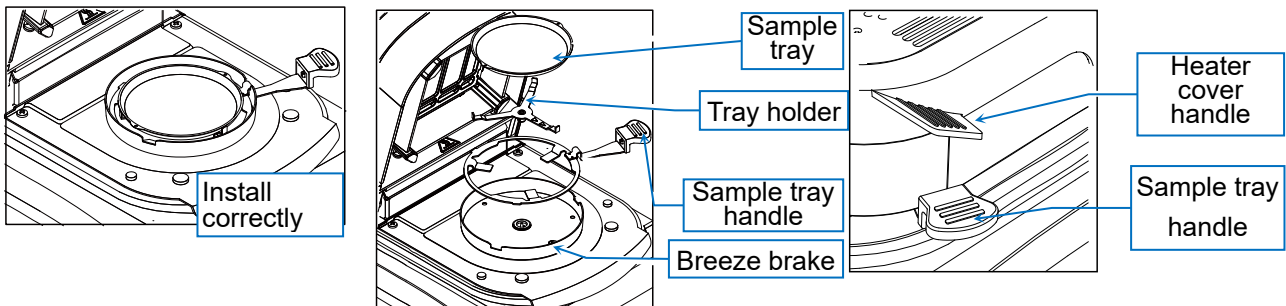
Sample tray handle

  - ❑ The areas with diagonal lines will be at a high temperature during measurement. Only touch the heater cover handle and sample tray handle when operating the product.

Heater cover handle
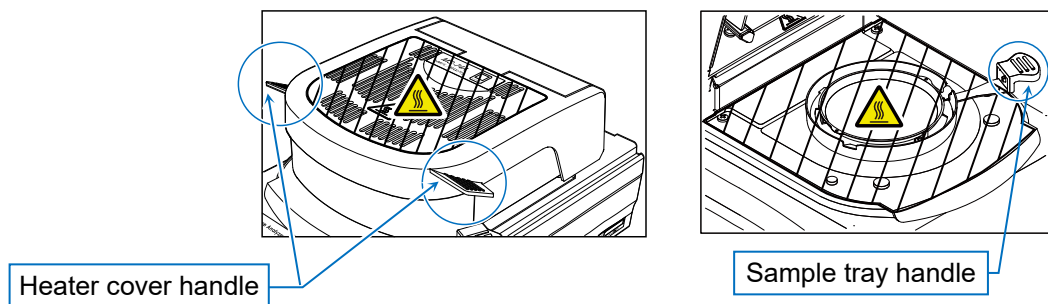
Sample tray handle

  - ❑ Do not touch the high temperature parts such as the inside of the heater cover or sample tray with your hands immediately after heating. Doing so may cause burns. The product will be at a high temperature during measurement and immediately after measurement. When touching the moisture analyzer, make sure to use the specified handle and included tool, and avoid touching the glass housing and the glass and metal (aluminum) parts near the halogen lamp (heater).
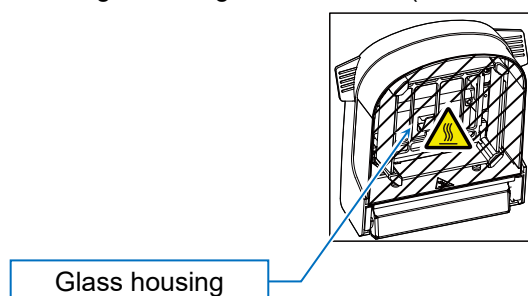
Glass housing

  - ❑ The aforementioned glass housing is at a particularly high temperature and can cause burns if you touch it directly.

  - ❑ The sample tray and sample tray handle will be at a high temperature immediately after measurement. Cool them in an appropriate location. Use tweezers, etc. when grasping the sample tray.

⚠️CAUTION
Danger of injury due to inappropriate handling

- Dispose of the used halogen lamp as-is.
  Breaking the halogen lamp can cause glass shards to scatter, which may result in injury.

- Do not drop, strike, or damage glass parts including the halogen lamp.
  Doing so may cause them to break and result in injury.

- The edges of the sample tray are sharp. Take care not to cut your hands.

- Make sure to hold the heater cover handle when opening or closing the heater cover, and take care not to get your hands caught.

- When moving the moisture analyzer, make sure it has cooled down and lift it directly up without tilting it.
  Moving it tilted may cause the heater cover to unexpectedly open and result in injury.

⚠️CAUTION
Danger of device failure due to inappropriate handling

- It is recommended that you replace the halogen lamp once it has reached its rated life (approx. 5,000 hours), as it may break.

- Do not drop, strike, or damage glass parts including the halogen lamp.
  Doing so may cause them to break.

- Do not allow dust or water to enter the inside of the moisture analyzer.

- Only use accessories and parts manufactured by A&D.

- If the moisture analyzer behaves in an unexpected manner, try removing the power cable from the power outlet and reconnecting it.
  If the product still does not operate normally, request a repair.

CAUTION

- Caution regarding high temperature heating

  - Do not perform continuous heating for 30 minutes or longer with the product set to 200°C. The safety mechanism may cut the power supply to the halogen lamp.
  - For safety purposes, the high temperature setting is automatically lowered to 160°C if one hour elapses after heating starts.

- The ⬛STOP⬛ key is always available during measurement. If you suspect any problem or danger, immediately press the ⬛STOP⬛ key to stop measurement.

1.3.   Cautions After Use and Cautions Regarding Storage

⚠CAUTION
⚠Danger of burns caused by high temperature surfaces
- Perform operations after confirming that the various parts of the moisture analyzer have cooled down.
    - In particular, confirm that the area around the glass housing has cooled down before replacing the lamp.

Device Failure
- Do not allow dust or water to enter the inside of the moisture analyzer.

- When cleaning the product, use a cloth dampened with diluted neutral detergent. Do not use organic solvents or chemical wipes. Doing so may cause product failure.

- Make sure to remove the power plug from the power outlet before performing maintenance.

- When transporting the product, use the dedicated packaging box.

CAUTION
- Clean the glass housing if it gets dirty, or it may not be able to heat properly. For information on handling, refer to "15.1. Cleaning the Heater".

- Clean the halogen lamp if it has any fingerprints on it, or its life may be shortened.
  For information on handling, refer to the separate instruction manual.

- Do not subject the moisture analyzer to impacts or drop it, as doing so may damage the halogen lamp or mass sensor.

- Make sure to remove the power plug from the power outlet if the product will not be used for an extended period of time.

2.   Product Overview/Features

- The product adopts an SHS (Super Hybrid Sensor), the mass sensor used in analytical scales, to enable measurement with high accuracy and high reproducibility.

- Because of its high measurement sensitivity, it only requires a small amount of sample, and this contributes to reduced measurement time.

- The product adopts a 400 W halogen lamp as its heater, which allows the tray temperature to reach 200°C within two minutes.

- The product has the following three measurement modes.

Standard mode	This mode automatically measures moisture content by specifying the measurement accuracy.
Timer mode	This mode measures moisture content by heating for a certain period of time.
Custom mode	This mode enables the user to configure detailed measurement conditions.

- The product has the following four heating pattern.

Standard heating	This mode maintains a constant heating temperature.
Slow heating	This mode gradually raises the heating temperature.
Step heating	This mode uses two heating temperatures.
Rapid speed heating	This mode reduces the measurement time by heating at high temperature for a certain period of time after measurement starts.

- 200 sets of optimal measurement conditions for various samples can be configured and recalled when performing measurement.

- More than 100 sets of example measurement conditions for various samples can be recalled when performing measurement.

- The moisture analyzer can store up to 200 measurement results and has a data memory function for the batch output of results.

- The dedicated WinCT-Moisture software has a function for the real-time graphing of changes in moisture content and a function for determining the appropriate heating temperature.

- You can also download the WinCT data communication software from the A&D website for easily importing data to a Windows computer.

- The product is equipped with USB and RS-232C interfaces as standard for easily connecting to a computer or printer.

- The product enables sensitivity adjustment of the mass sensor (use of the dedicated weight is recommended) and adjustment of the heater temperature (requires the dedicated temperature adjustment kit). When performing adjustment, data can be output in response to GLP/GMP/ISO requests.

- The product has a self-inspection function for checking the measurement results of a test sample and checking for electrical circuit and temperature control problems.

- The change in moisture content over time (%/min) during measurement is displayed in real-time. This can be used to help determine the termination value.

- The included sample tray is reusable. Disposable aluminum trays are also included as standard.

- The product has test samples for checking the accuracy of measurement. (Included with the MS-74A/MX-53A as standard.)

- The product has glass fiber sheets for precisely measuring liquid samples in a short time. (Included with the MS-74A/MX-53A as standard.)

- The product has a test mode for measuring the recommended value for the heating temperature (refer to "7.3. RS TEMP (Heating Temperature Detection Function)").

Principle and Intended Use

- The moisture analyzer is based on the principle of thermal mass analysis. It measures properties such as the moisture content and solids in a sample based on changes in mass by heating and drying the sample with a halogen lamp to vaporize the moisture.

3. Content of Package and Names of Parts

- Confirm that all the parts are included.
- Retain the packaging to use for transporting or repairing the product.
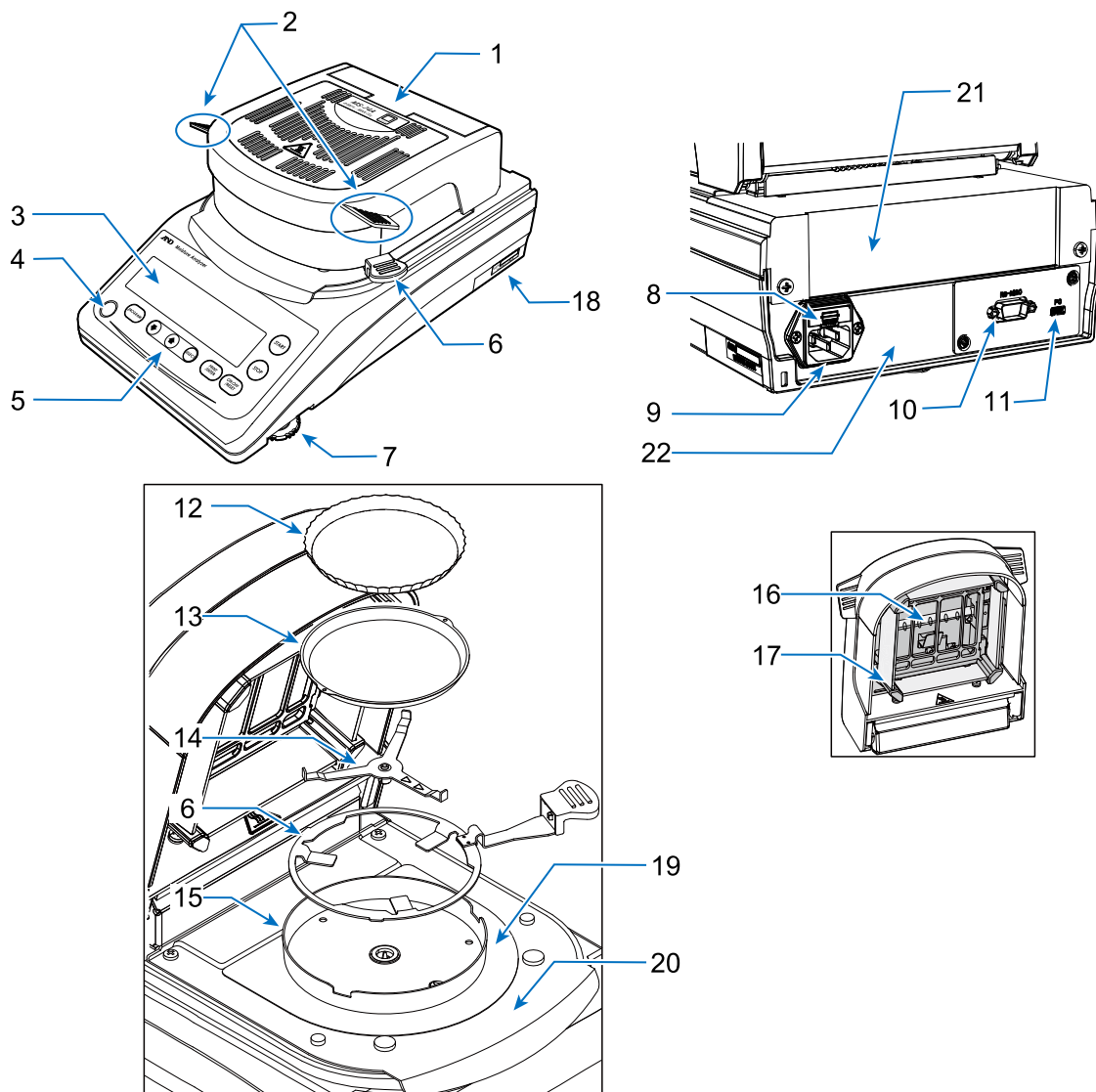
No.	Name	Material
1	Heater cover	PBT, PC, ABS
2	Heater cover handle	PBT
3	Display	
4	Leveler	
5	Keys	
6	Sample tray handle	SUS316, ABS
7	Foot adjuster	Elastomer, SUS
8	Fuse（T6.3 A 250 V）	
9	Power inlet	
10	RS-232C interface	
11	USB interface	
12	Disposable aluminum tray	

No.	Name	Material
13	Sample tray	Aluminum
14	Tray holder	SUS304, SUS316
15	Breeze break	SUS304（galvanized）
16	Halogen lamp	
17	Glass housing	Glass, Aluminum die-cast
18	Serial number	
19	Floor panel for insulation	SUS304
20	Floor panel	PBT
21	Main unit upper case	ABS
22	Main unit lower case	Aluminum die-cast (coated)

Accessories
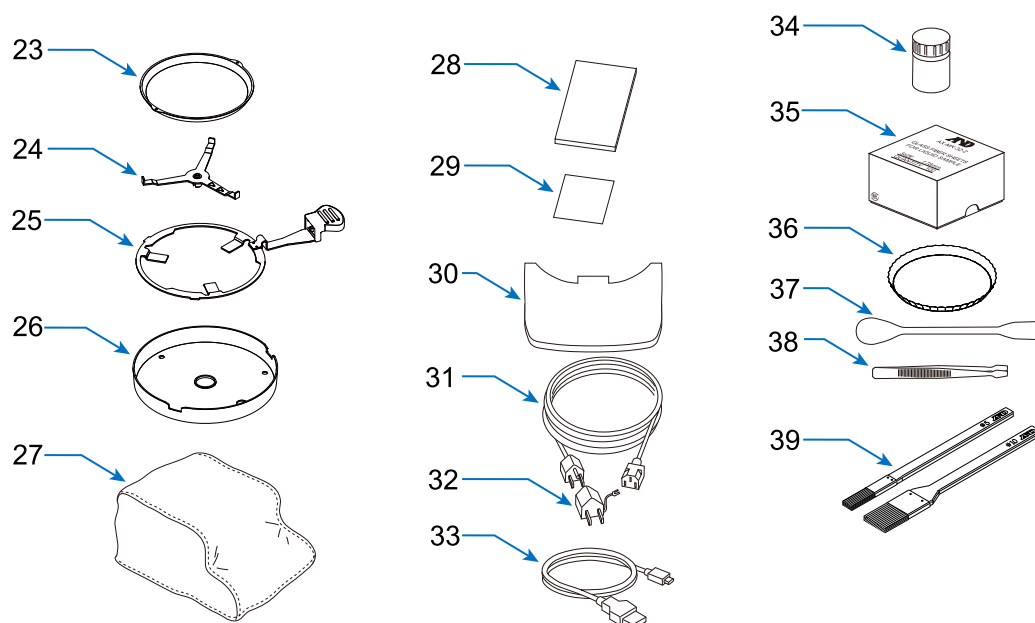
No.	Name	MS-74A	MX-53A	MF-53A	ML-53A	Accessory number
23	Sample tray	× 20	× 20	× 10	× 10	AX-MXA-31
24	Tray holder	Yes	Yes	Yes	Yes	
25	Sample tray handle	× 2	× 2	× 1	× 1	AX-MXA-35
26	Breeze break	Yes	Yes	Yes	Yes	
27	Body cover	Yes	Yes	-	-	AX-MXA-39
28	Quick Start Guide	Yes	Yes	Yes	Yes	
29	Warranty card	Yes	Yes	Yes	Yes	
30	Display protective cover	Yes	Yes	Yes	Yes	AX-MXA-38
31	Power cable	Yes	Yes	Yes	Yes	
32	Ground adapter	Yes	Yes	Yes	Yes	
33	USB cable (2 m) （Type-A — Type-C）	Yes [2]	Yes [2]	-	-	AX-KO7919-200
34	Test sample [1]	Yes	Yes	-	-	AX-MX-33
35	Glass fiber sheet	Yes	Yes	-	-	AX-MXA-32-2
36	Disposable aluminum tray	× 100	× 100	× 100	× 100	AX-MXA-30
37	Spoon	Yes	Yes	-	-	AX-MX-37
38	Tweezers	Yes	Yes	-	-	AX-MX-36
39	Cleaning brushes (large/small)	Yes	Yes	-	-	AX-CLEANING-SET

Yes: Included; -: Not included

[1] 30 g of sodium tartrate dihydrate

[2] UL certified products do not include a USB cable.

3.1.   Key Switches and Indicators
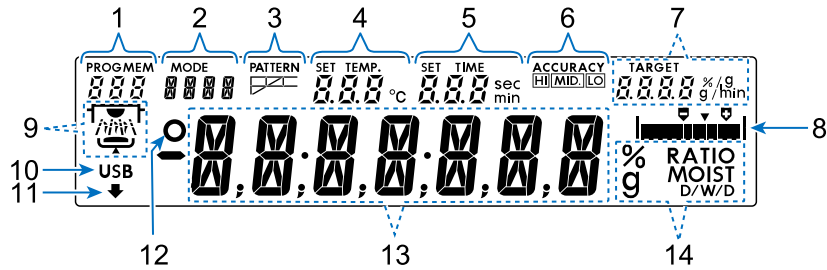
No.	Name	No.	Name
1	Program number Data number (when using data memory)	8	Level meter
2	Measurement mode	9	Operation indicator
3	Heating pattern	10	USB connection icon
4	Sample tray temperature indicator (set value/actual value)	11	Operation icon
5	Measurement time (set value/elapsed time)	12	Stable mass value icon
6	Measurement accuracy	13	Main display (mass value/moisture content/program ID, etc.)
7	Target value for sample mass Moisture change indicator	14	Unit indicator

Example of Displayed Mass
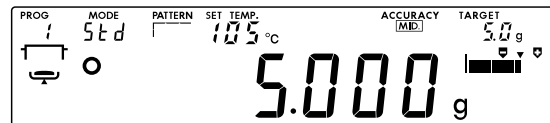
Example of Displayed Operation

Lid open/closed state
(Lights when the lid is closed)

Sample state
(Lights when there is a sample)

Lights during heating

High tray temperature warning
Lights when the tray is at a high temperature (60°C or higher) when not heating

Displaying mass   Heating   Heating finished
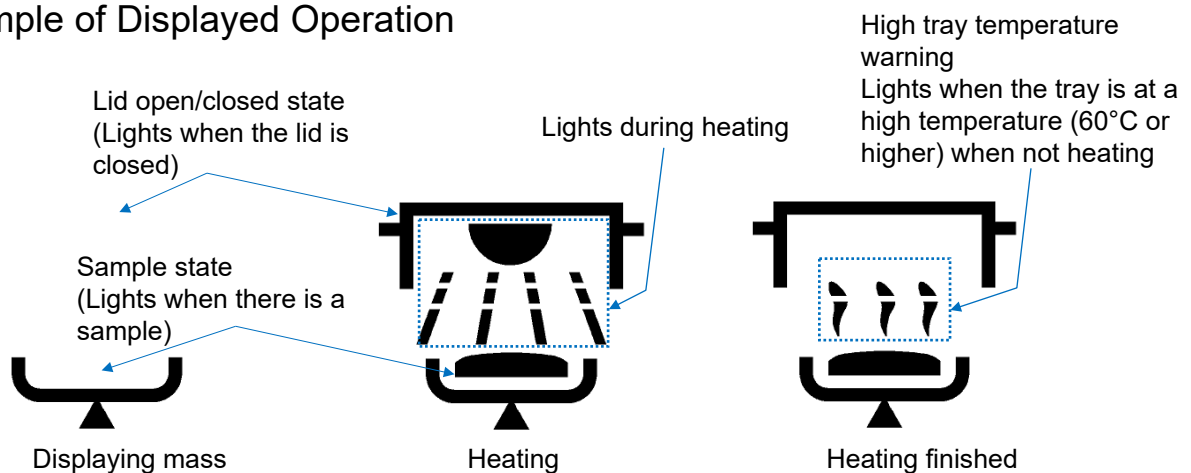
Key Switch Functions and Operations

There are two types of key operations: normal press and long press (press and hold for approx. two seconds).
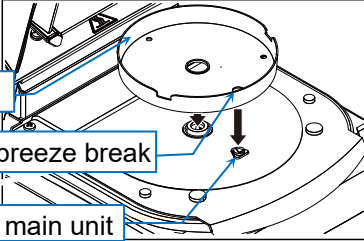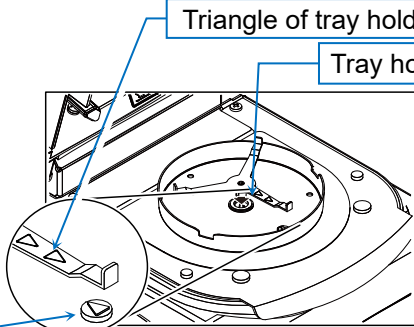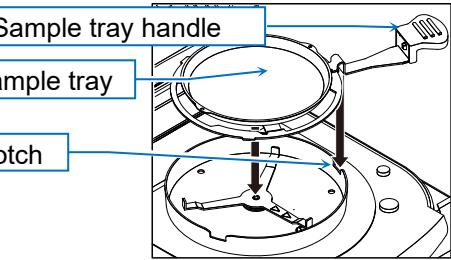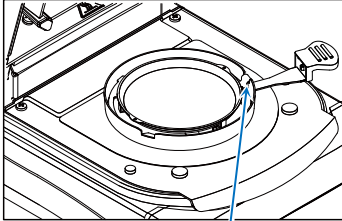
The regular key operations are normal presses.

Do not long press (press and hold for approx. two seconds) unless necessary.

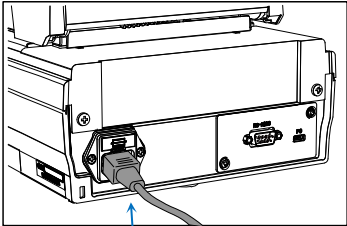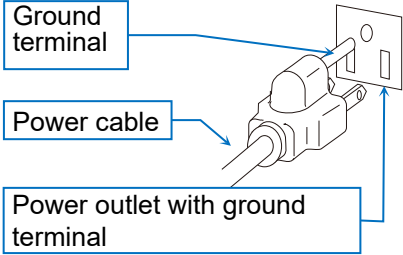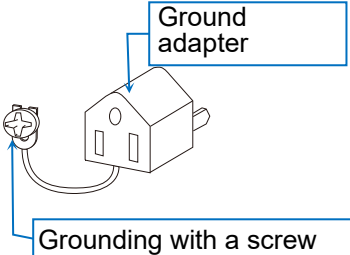| Key switch		Normal press (press and release immediately)	Long press (for approx. two seconds)
(PROGRAM)	PROGRAM	Enters the mode for selecting the program number.	Displays the function tests and adjustment modes.
(SELECT)	SELECT	Enters the mode for changing the measurement conditions.	Enters the mode for changing the internal settings.
(▼) (▲)	↓ ↑	Changes the set value.	Continuously changes the set value. (Only for some settings)
(PRINT /ENTER)	ENTER	Confirms the setting or outputs the displayed value.	Used for GLP output and the data memory function.
(START)	START	Starts measurement.	Performs preheating.
(STOP)	STOP	Stops measurement.	
(ON:OFF /RESET)	RESET	Resets the displayed mass to zero. Turns the display on.	Turns the display off.

4. Requirements for Preparing to Measure (Installation, Initial Configuration, and Measurement)

4.1. Installing the Moisture Analyzer

Step	Description
1.	Refer to "1.1. Cautions Regarding Installation " to select the installation location.
2.	Turn the left and right adjustable feet until the air bubble of the leveler is in the center of the black circle. (To make the product level) ○ Black circle ○ Air bubble Leveler — Level / Tilted Up Foot adjuster Down / Down Foot adjuster Up **When the air bubble is too far left** Turn the foot adjuster on the front right clockwise. **When the air bubble is too far right** Turn the foot adjuster on the front left clockwise. **When the air bubble is too far backward** Turn the two foot adjuster on the front clockwise. **When the air bubble is too far forward** Turn the two foot adjuster on the front counterclockwise.

Step	Description	Diagram
3.	Align the long hole of the breeze break with the protrusion of the main unit.	Breeze break Long hole of breeze break Protrusion of main unit
4.	Align the triangle of the tray holder with the triangle of the main unit.	Triangle of tray holder Tray holder Triangle of the main unit protrusion
5.	Place the sample tray on the sample tray handle, then align the sample tray handle with the notch of the breeze break. CAUTION ● When using a disposable aluminum tray, make sure to place it on the sample tray.	Sample tray handle Sample tray Notch Place on notch

Step	Description	Diagram
6.	Connect the power cable and ground the moisture analyzer. If the power outlet does not have a ground terminal, ground it with a ground adapter. ## ADVICE ● When measuring low moisture content less than 1%, it is recommended that you power the product for 30 minutes or more before performing measurement.	Power cable Grounding Method Grounding with the power outlet Ground terminal Power cable Power outlet with ground terminal Grounding with a ground adapter Ground adapter Grounding with a screw

4.2. Requirements for Ensuring Correct Measurement

4.2.1. Handling Samples

- Perform measurement with an appropriate amount of sample. If the amount of sample is small, the accuracy of calculating the moisture content may be adversely affected, which can also affect the reproducibility of the measurement results.
- When measuring samples with an expected moisture content of 1% or less (for example, plastic), the moisture content will be unable to be accurately measured if the amount of sample is small, because the change in mass after heating will also be small because the moisture mass is small. Refer to the table below for the estimated sample mass required for measurement.

Expected moisture content	0.5 to 1%	0.1 to 0.5%	Less than 0.1%
Required sample mass	2 g or more	5 g or more	20 g or more

- When measuring materials such as plastic that are prone to static electricity, we recommend that the AD-1683A is used to eliminate static.

Example	Sample	Expected moisture content	Required sample mass	Heating temperature	Termination value
	PBT	0.08%	20 g	160°C	0.005%/min
	ABS	0.43%	10 g	140°C	0.005%/min

- When repeatedly measuring the same sample, it is recommended that you measure the same amount of sample each time.

- For a sample with large granules, crush the sample before measurement to make it easier for the moisture to vaporize.

Bad / Good

- Spread the sample out evenly on the tray to ensure that it will be evenly heated.

- A heat drying moisture analyzer is suitable for measuring the moisture content of samples where mainly only water will vaporize. Mass changes due to the vaporization or degradation of substances other than water will also be measured as moisture.

- For a liquid sample or sample that forms a film on its surface, the use of a glass fiber sheet (AX-MXA-32-2) is recommended. Refer to "4.2.4. Using a Glass Fiber Sheet".
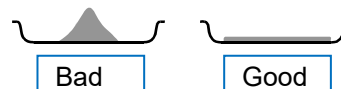
4.2.2. Requirements for the Operation Procedure

- Before performing measurement, press the ⌑RESET⌑ key and confirm that the displayed mass stabilizes at zero.
- Before pressing the ⌑START⌑ key to start measurement, confirm that the sample mass is sufficiently stable.
- Configure an appropriate termination value. Use the change in moisture content over time (%/min on the top right of the display) when measurement stops as a guide.
- When repeating measurement, there may be a difference between the first measurement result and the subsequent measurement results, due to the heat distribution of the various parts of the moisture analyzer. Ignore the first measurement result or perform preheating. (Refer to "4.2.3. How to Use the Preheat Function".)
- If you place a sample on the sample tray while the tray is hot, moisture will vaporize before measurement, and the moisture content will not be measured accurately. Recommended methods for preventing this include alternating between two sample trays when performing consecutive

measurements and waiting about 10 minutes after measurement before performing the next measurement.

- Do not stack sample trays when performing measurement.
- Avoid air conditioner convection and vibrations in the installation location. Otherwise measurement errors may occur or the measured value may not stabilize. The MS-74A in particular is susceptible to such disturbance, as it is high resolution.
- Accurate temperature control may not be possible if there is only a small difference between the sample tray temperature and the surrounding temperature.
  (Example) When the sample tray temperature is set to around 30°C to 50°C, the product will be more susceptible to the surrounding temperature.
- Use the icon to check the operation of the halogen lamp.
  (e.g.) When the sample tray temperature is set to a low temperature, the halogen lamp will light weaker.

The line gradually lights while the halogen lamp is operating.

4.2.3.　How to Use the Preheat Function

- The preheat function raises the temperature around the sample tray before performing moisture content measurement.
- The preheat function is effective for increasing the accuracy of moisture content measurement.
- The preheat function is effective when repeatedly measuring the same sample.
  (Because the heating conditions vary if the starting temperature differs between the first time and the second and subsequent times, the result of measuring the moisture content may also vary.)
- The preheat temperature is automatically determined according to the set measurement conditions.
- Stop preheating at a time of your choice and start measuring the moisture content.
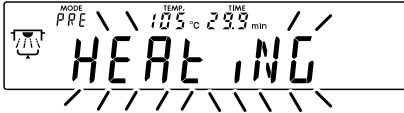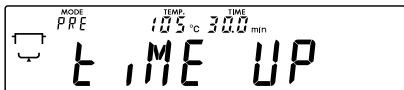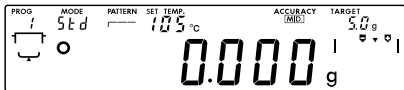 If 30 minutes elapse since preheating started, it will automatically stop.
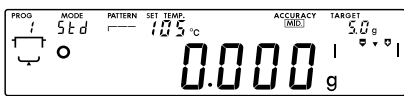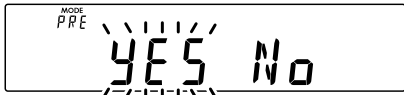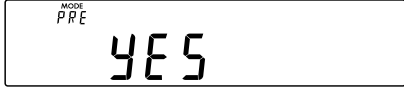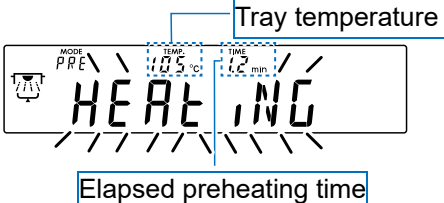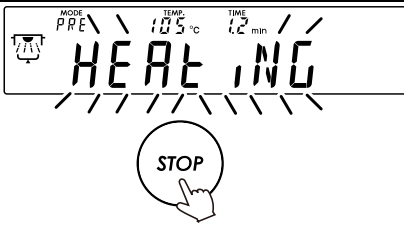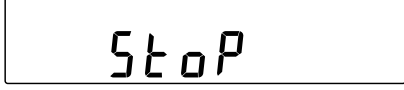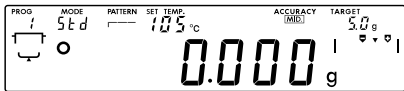
| Heating pattern[*1] setting	Preheat temperature	Time
Standard heating	Temperature[*2] setting	Maximum 30 min
Slow heating	Temperature[*2] setting	
Step heating	Temperature step 2[*2] setting	
Rapid heating	Temperature[*2] setting	

*1 Refer to "6.4.3. Heating Pattern"
*2 Refer to "6.4.4. Temperature and Time"

Procedure (preparations before moisture content measurement)

Step	Description	Operation
1.	Press and hold the START key.	 Press and hold (for approx. 2 seconds)
2.	With YES selected, press the ENTER key to start preheating.	
3.	Preheating starts. The current tray temperature and elapsed preheating time are displayed.	Tray temperature Elapsed preheating time
4.	When the target time has elapsed, press the STOP key or open the heater cover to return to the mass display. The displayed value is reset to zero.	
Remarks	When the preheating time reaches 30 minutes, the heater is automatically turned OFF and t iME UP is displayed. Press the STOP key to return to the mass display. The displayed value is reset to zero.	 30 minutes since preheating started

4.2.4.   Using a Glass Fiber Sheet

- A glass fiber sheet is used for liquid samples, samples that melt when heated, and samples with a surface that is prone to carbonization. Using a glass fiber sheet promotes moisture vaporization and enables faster and more accurate moisture measurement.
- 100 glass fiber sheets are included in a box (AX-MXA-32-2).
  A box is included with the MS-74A/MX-53A as standard.
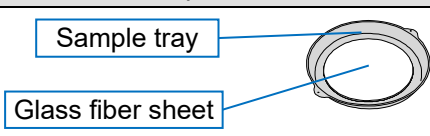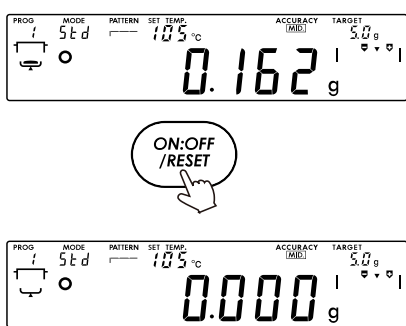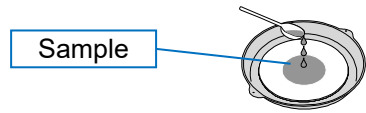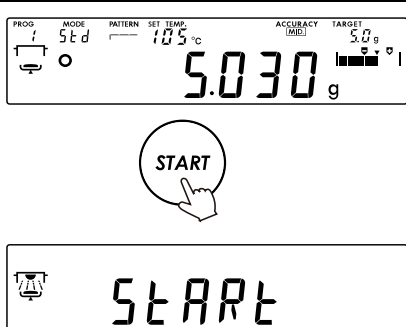 For the MF-53A/ML-53A, glass fiber sheets are available separately.
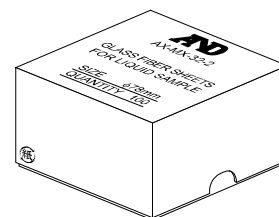
Example use 1: Liquid sample or sample that melts when heated

Soak the glass fiber sheet with the sample to increase the surface area and space required for moisture vaporization to make it easier for the moisture to vaporize. The glass fiber sheet will also help prevent a hard film from forming on the surface of the sample due to heating.

- Liquid samples with high moisture content
  Example: Milk, yogurt, soy milk, condensed milk, ketchup, resin paint, liquid glue, hand soap, etc.
- Samples that melt when heated and stick to the tray
  Example: Gum, caramel, honey, etc.

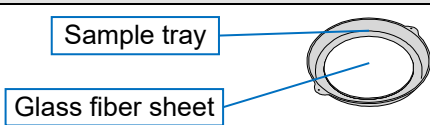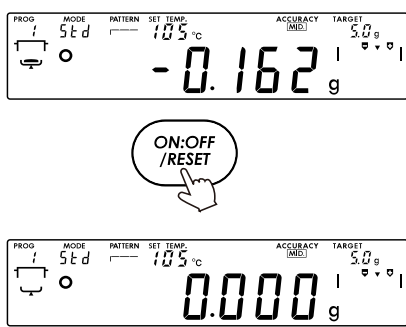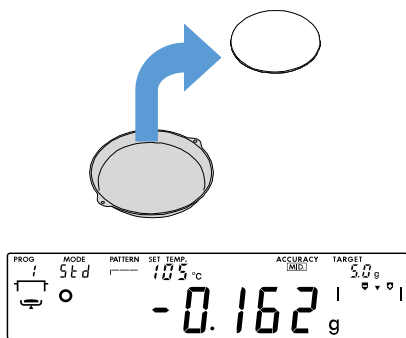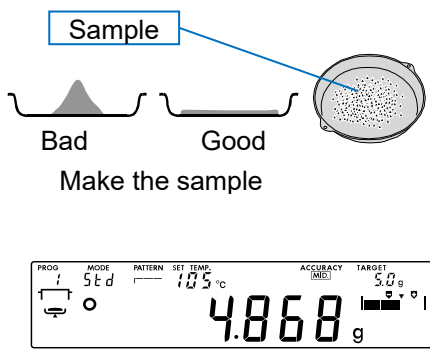### Procedure (preparations before moisture content measurement)

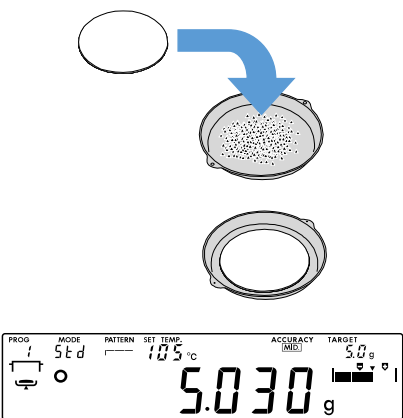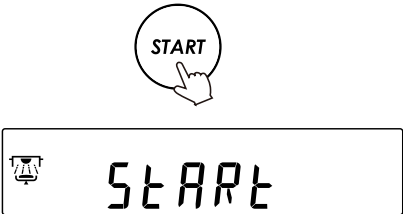| Step	Description	Operation
1.	Spread the glass fiber sheet over the sample tray.	Sample tray / Glass fiber sheet
2.	Press the RESET key to reset the displayed value to zero.	0.162 g → ON:OFF /RESET → 0.000 g
3.	Soak the glass fiber sheet with the sample. Or, place the sample on the glass fiber sheet.	Sample
4.	Press the START key to start heating.	5.030 g → START → StARt

Example use 2: Sample with a surface prone to carbonization

Cover the sample with the glass fiber sheet to reduce the sample surface carbonization due to heating.

Preventing sample carbonization enables stable measurement of the moisture content.

- Samples including a lot of sugar, protein, or oil
  Example: Honey, soy bean powder, tea leaves, cookies, etc.
- Samples with a black surface that are prone to burning
  Example: Coffee, peanuts, etc.

Procedure (preparations before heating)

Step	Description	Operation
1.	Spread the glass fiber sheet over the sample tray.	Sample tray Glass fiber sheet
2.	Press the RESET key to reset the displayed value to zero.	-0.162 g ON:OFF /RESET 0.000 g
3.	Remove the glass fiber sheet.	-0.162 g
4.	Place the sample on the sample tray.	Sample Bad Good Make the sample 4.868 g

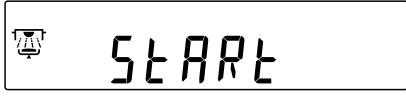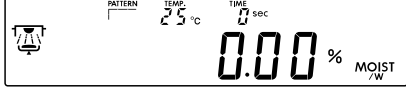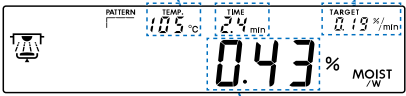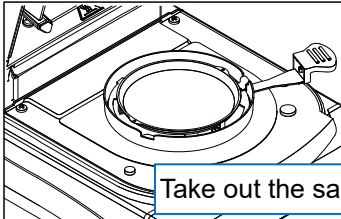| Step	Description	Operation
5.	Cover the top of the sample with the glass fiber sheet removed in step 3.	
6.	Press the START key to start heating.	

26

5.   Measurement

Measure the moisture content.

To change the measurement conditions, refer to "6.4. Detailed Description of Measurement Conditions".

5.1.   Procedure for Measuring the Moisture Content

Step	Description	Operation
1.	Turn the power of the main unit ON and display the mass.	
2.	Place the sample tray on the sample tray handle and load them on the tray holder. **CAUTION** ● Place the sample tray handle in the notch of the breeze break.	Sample tray handle Sample tray Notch of breeze break Preparing the tray
3.	Close the heater cover.	Close
4.	When the stable mass value icon lights and the displayed value stabilizes, press the RESET key to reset the displayed mass to zero. (Avoid disturbance such as vibrations during measurement.) If the displayed mass deviates from zero, press the RESET key to reset it to zero.	5.506 g PRINT /ENTER 0.000 g
5.	Open the heater cover and load an appropriate amount of sample, using the level meter as a guide. **CAUTION** ● At least 0.1 g of sample is required. ● Make the sample as flat as possible.	Suitable range of sample When there is 0.1 g or more of the sample, the icon lights and measurement can be performed. Bad Good

Step	Description	Operation
Rem arks	By pressing the [↑] key while the mass is displayed, you can check the unit and minimum displayed value of the moisture content result.	(display shows 5.030 g, then 0.01 % MOIST/W)
Rem arks	You can press the [ENTER] key to output (print) the current mass value. Example computer output (RsCom of WinCT) Standard A&D format (default setting) `ST,+0005.030␣␣g<TERM>` ␣ : Space (ASCII 20h) <TERM> : Terminator (CR LF or CR) CR : Carriage return (ASCII 0Dh) LF : Line feed (ASCII 0Ah)	(display shows 5.030 g, PRINT/ENTER)
6.	Close the heater cover, wait until the mass value stabilizes, then press the [START] key. The measured value changes according to the vaporization of the moisture in the sample.	(display 5.030 g, START, StARt, 0.00 % MOIST/W, then 0.43 % MOIST/W) Measurement time Change in moisture content Sample tray temperature Measured value

Step	Description	Operation
Rem arks	You can press a key during measurement to temporarily select a different measurement basis. # CAUTION ● The data output also changes according to the measurement basis. Do not switch the unit while measurement data is being output.	PATTERN `105`°C TIME `24`min TARGET `0.13`%/min `0.43` % MOIST/W SELECT | Display	
---	---
% MOIST/W	Moisture content (standard before drying)
% MOIST/D	Moisture content (standard after drying)
% RATIO D/W	Solids
% RATIO W/D	Ratio
g	Grams	
7.	When the termination value is met (either the moisture content going below a certain value or heating continuing for a certain time), a buzzer sounds and measurement stops.	End PATTERN `105`°C TIME `8.6`min `3.27` % MOIST/W
8.	You can perform the following operations while the result is displayed. The selected text flashes. ☐ ENTER ☐ key The data is output (printed). ☐ ↑ ☐ ☐ ↓ ☐ keys Switch the displayed result between percentage and grams. ☐ SELECT ☐ key, ☐ RESET ☐ key The product returns to the mass display (step 1). Example computer output (RsCom of WinCT) Standard A&D format `ST,+00003.27␣␣%<TERM>` ␣ : Space (ASCII 20h) <TERM> : Terminator (CR LF or CR) CR : Carriage return (ASCII 0Dh) LF : Line feed (ASCII 0Ah)	

Step	Description	Operation
9.	Open the heater cover, raise the sample tray with the sample tray handle, then take out the sample. # ADVICE ● The sample tray can be washed and reused.	 Take out the sample

6. Measurement Conditions

You can save measurement conditions of your choice to program numbers 1 to 200.

By selecting a program number (1 to 200), you can recall the measurement conditions saved to that number.

To perform moisture content measurement with the recalled measurement conditions, refer to "5. Measurement" to start measurement.

To change and save the measurement conditions, refer to "6.4. Detailed Description of Measurement Conditions".
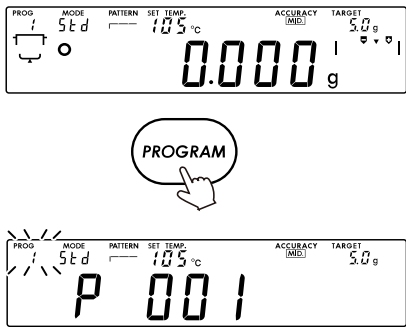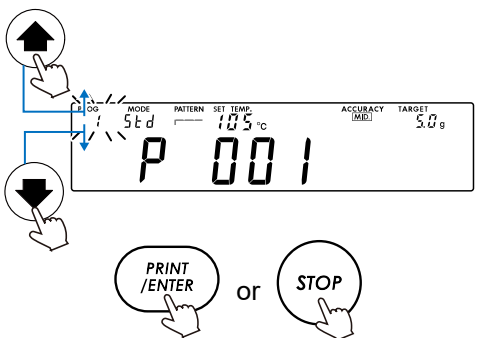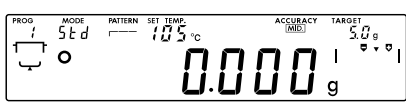
Example measurement conditions are saved to program numbers 201 and beyond. To use the example measurement conditions, refer to "6.2.2. How to Use Example Measurement Conditions".

6.1. How to Select a Program Number

Follow the procedure below to select the program number.

By selecting a program number, you can recall the measurement conditions saved to that number.

To save new measurement conditions, select the program number to save to, then change and save the measurement conditions (refer to "6.4. Detailed Description of Measurement Conditions ").

Step	Description	Operation
1.	Press the ⌐PROGRAM⌐ key with the mass displayed to display the screen for selecting the measurement conditions.	
2.	The program number flashes. An overview of the measurement conditions is displayed. ⌐↑⌐ ⌐↓⌐ keys Change the program number. Press and hold to continuously change the value. ⌐ENTER⌐ key Confirms the flashing program number and returns to the mass display. ⌐STOP⌐ key Returns to the mass display without changing the program number.	
3.	The product returns to the mass display.	

6.2. Example Measurement Conditions

The product contains example measurement conditions for various types of samples.

When measuring a sample for the first time, you can copy example measurement conditions to a program number from 1 to 200.

You can also change the measurement conditions after copying them.

6.2.1. List of Example Measurement Conditions and Actual Measurement Results

Household Items

Program number	Sample	Program ID	Heating temperature	Termination value[*1]	Sample mass	Measurement time	Moisture content			Remarks
							Average value	Reproducibility	CV value	
201	Cigarette	TOBACCO	100°C	0.10%/min	0.9 to 1.1 g	6.5 min	10.58	0.339	3.20	Take apart the sample and measure only the tobacco. There will be a strong odor during heating.
202	Dog food	DOGFOOD	160°C	0.10%/min	0.9 to 1.1 g	9.2 min	8.68	0.059	0.68	Pulverize the sample with a blender before measuring. There will be a strong odor during heating.
203	Toothpaste	TOOTH P	180°C	0.05%/min	0.9 to 1.1 g	8.8 min	51.70	0.046	0.09	Spread the sample over a glass fiber sheet before measuring.
204	Starch glue	STARCHG	200°C	0.05%/min	4.5 to 5.5 g	16.0 min	77.57	0.193	0.25	Spread the sample out evenly before measuring.
205	Laundry starch (liquid)	LSTARCH	200°C	0.05%/min	0.9 to 1.1 g	5.0 min	93.06	0.118	0.13	Spread the sample over a glass fiber sheet before measuring.
206	Wood glue	BOND	200°C	0.05%/min	0.9 to 1.1 g	9.7 min	40.75	0.349	0.86	Spread the sample over a glass fiber sheet before measuring.
207	Hand soap	HNDSOAP	200°C	0.05%/min	0.9 to 1.1 g	7.6 min	91.57	0.077	0.08	Spread the sample over a glass fiber sheet before measuring.

Program number	Sample	Program ID	Heating temperature	Termination value[*1]	Sample mass	Measurement time	Moisture content Average value	Moisture content Reproducibility	Moisture content CV value	Remarks
208	Lipstick	LIPSTK	100°C	0.01%/min	0.9 to 1.1 g	3.6 min	0.64	0.063	9.86	Spread the sample out directly on the sample tray before measuring.
209	Foundation (liquid)	FNDTN	160°C	0.05%/min	0.9 to 1.1 g	12.2 min	79.69	0.543	0.68	Spread the sample over a glass fiber sheet before measuring.
210	Dry chips (chips of Yezo pine)	DRYCHIP	200°C	0.05%/min	0.9 to 1.1 g	6.6 min	13.55	0.386	2.85	Cut the sample into small strips before measuring.
211	Silica sand	SILSAND	200°C	0.01%/min	9.0 to 11.0 g	4.1 min	0.30	0.022	7.35	
212	Cement (powder)	CEMENT	200°C	0.01%/min	9.0 to 11.0 g	4.1 min	0.68	0.018	2.63	
213	Water-based putty (paste)	PUTTY	160°C	0.05%/min	0.9 to 1.1 g	7.5 min	19.48	0.380	1.95	Use a disposable aluminum tray. Spread the sample out in a thin layer before measuring.
214	Synthetic resin paint (water-based acrylic paint, liquid)	RESINPT	200°C	0.05%/min	0.9 to 1.1 g	16.2 min	54.13	0.254	0.47	Use a disposable aluminum tray. Soak in filter paper before measuring.

[*1]   For some models, the setting value in the table may be lower than the lower limit value. In that case, the setting value will be set to the lower limit value.

Household Items

Program number	Sample	Program ID	Heating temperature	Termination value[*1]	Sample mass	Measurement time	Moisture content Average value	Moisture content Reproducibility	Moisture content CV value	Remarks
215	Copy paper	XER PAP	200°C	0.05%/min	0.9 to 1.1 g	3.2 min	6.58	0.128	1.95	Cut the sample into small strips before measuring.
216	Cardboard	CARD BD	100°C	0.05%/min	0.9 to 1.1 g	5.2 min	8.20	0.028	0.34	Cut the sample into small strips before measuring. Measure after preheating.
217	Plastic film	P FILM	100°C	0.02%/min	0.9 to 1.1 g	2.4 min	0.43	0.044	10.32	Cut the sample into small strips before measuring.

[*1]   For some models, the setting value in the table may be lower than the lower limit value. In that case, the setting value will be set to the lower limit value.

Food A (grains, beans, seafood, condiments, seasonings, additives)

Program number	Sample	Program ID	Heating temperature	Termination value[1]	Sample mass	Measurement time	Moisture content			Remarks
							Average value	Reproducibility	CV value	
218	Corn grits	CORNGTZ	160°C	0.05%/min	4.5 to 5.5 g	14.6 min	13.52	0.017	0.13	
219	Corn starch	CORNST	200°C	0.05%/min	4.5 to 5.5 g	8.0 min	12.86	0.030	0.23	
220	Potato starch	STARCH	200°C	0.05%/min	4.5 to 5.5 g	8.4 min	17.06	0.089	0.52	
221	Buckwheat flour	SOBAFLR	180°C	0.05%/min	4.5 to 5.5 g	12.1 min	13.26	0.081	0.61	
222	Cake flour	CAKEFLR	200°C	0.05%/min	4.5 to 5.5 g	8.1 min	11.71	0.061	0.52	
223	Rice flour	RICEFLR	200°C	0.05%/min	4.5 to 5.5 g	10.5 min	12.53	0.028	0.22	
224	Rolled oats	ROLOATS	200°C	0.05%/min	4.5 to 5.5 g	14.1 min	12.45	0.093	0.75	
225	Pregelatinized oats (dried powder)	PREOATS	160°C	0.10%/min	0.9 to 1.1 g	19.7 min	11.80	0.352	2.98	
226	White rice	RICE	200°C	0.10%/min	4.5 to 5.5 g	14.3 min	15.88	0.198	1.25	Pulverize the sample with a blender before measuring.
227	Pre-washed rice	PRERICE	200°C	0.10%/min	0.9 to 1.1 g	9.4 min	16.08	0.214	1.33	
228	Packaged white rice	PACKRCE	200°C	0.05%/min	1.8 to 2.2 g	19.4 min	64.94	1.235	1.90	
229	Soy flour	SOY FLR	160°C	0.05%/min	1.8 to 2.2 g	4.6 min	3.89	0.094	2.41	
230	Cashew nuts	CASNUTS	140°C	0.05%/min	4.5 to 5.5 g	7.4 min	1.72	0.065	3.77	Pulverize the sample with a blender before measuring.
231	Buttered peanuts	BTPEANT	160°C	0.05%/min	4.5 to 5.5 g	9.1 min	2.85	0.027	0.95	Pulverize the sample with a blender before measuring.
232	Coffee beans (powder)	C BEAN	140°C	0.05%/min	2.7 to 3.3 g	7.9 min	2.75	0.038	1.38	Cover the sample with a glass fiber sheet before measuring.
233	Dried squid	DRD SQD	200°C	0.05%/min	1.8 to 2.2 g	24.0 min	20.42	1.496	7.33	Cut the sample into small strips before measuring.

[1]   For some models, the setting value in the table may be lower than the lower limit value. In that case, the setting value will be set to the lower limit value.

Food A (grains, beans, seafood, condiments, seasonings, additives)

Program number	Sample	Program ID	Heating temperature	Termination value*1	Sample mass	Measurement time	Moisture content			Remarks
							Average value	Reproducibility	CV value	
234	Rehydrated squid	RHD SQD	160°C	0.05%/min	1.8 to 2.2 g	29.3 min	16.40	0.537	3.27	Cut the sample into small strips before measuring.
235	Dried sardine	DRDSRDN	200°C	0.05%/min	1.8 to 2.2 g	11.0 min	17.02	0.246	1.45	Pulverize the sample with a blender before measuring.
236	Dried whitebait	DRD WBT	200°C	0.05%/min	4.5 to 5.5 g	16.5 min	69.70	0.733	1.05	
237	Raw salmon	SALMON	200°C	0.05%/min	2.7 to 3.3 g	27.8 min	58.39	1.315	2.25	Use a disposable aluminum tray.
238	Dried bonito shavings	DRDBNTO	120°C	0.05%/min	0.9 to 1.1 g	6.1 min	14.30	0.765	5.35	
239	Fish sausage	FIS SG	200°C	0.05%/min	1.8 to 2.2 g	21.7 min	77.60	0.300	0.39	Cut the sample into small strips before measuring.
240	Freeze dried scallions	FD SCAL	100°C	0.05%/min	0.9 to 1.1 g	5.4 min	2.41	0.102	4.23	
241	Dried mushroom	DRDMSHM	140°C	0.05%/min	0.9 to 1.1 g	7 min	7.71	0.203	2.63	Cut the sample into small strips before measuring.
242	Dried sweet potato	DRDSWPT	140°C	0.05%/min	0.9 to 1.1 g	32.2 min	29.44	0.891	3.03	Cut the sample into 3 mm slices and place the slices on a glass fiber sheet before measuring.
243	White radish	RADISH	200°C	0.05%/min	1.8 to 2.2 g	18.9 min	94.66	0.073	0.08	Pulverize the sample with a blender before measuring.
244	Cabbage	CABBAGE	200°C	0.05%/min	0.9 to 1.1 g	16.1 min	92.86	0.089	0.10	Pulverize the sample with a blender before measuring.
245	Pumpkin	PUMPKIN	200°C	0.05%/min	1.8 to 2.2 g	22.6 min	84.98	0.283	0.33	Pulverize the sample with a blender before measuring.
246	Bell pepper	BLPEPPR	200°C	0.05%/min	1.8 to 2.2 g	18.8 min	93.80	0.094	0.10	Pulverize the sample with a blender before measuring.
247	Dried seaweed	SEAWEED	200°C	0.05%/min	0.9 to 1.1 g	7.8 min	4.02	0.195	4.85	Cut the sample into small strips before measuring.
248	Sugar crystals (powder)	SUGCRYS	140°C	0.01%/min	4.5 to 5.5 g	3.3 min	0.17	0.018	10.87	
249	Brown sugar (powder)	BRN SUG	120°C	0.01%/min	4.5 to 5.5 g	6.0 min	0.69	0.071	10.22	

| Program number | Sample | Program ID | Heating temperature | Termination value[*1] | Sample mass | Measurement time | Moisture content | | | Remarks |
							Average value	Reproducibility	CV value	
250	Salt	SALT	200°C	15 min	9.0 to 11.0 g	15.0 min	0.06	0.003	5.97	
251	Seasoning salt	S SALT	120°C	15 min	9.0 to 11.0 g	15.0 min	0.07	0.010	12.79	
252	Flavor seasoning	FLVSSN	140°C	0.05%/min	4.5 to 5.5 g	4.4 min	0.88	0.034	3.88	
253	Granulated stock	GRANULE	120°C	0.05%/min	4.5 to 5.5 g	13.6 min	2.77	0.136	4.91	
254	Tomato ketchup	KTCHP	160°C	0.05%/min	0.9 to 1.1 g	18.1 min	68.67	0.533	0.78	Spread the sample over filter paper before measuring.
255	Mayonnaise (yolk type)	MAYO	180°C	0.05%/min	0.9 to 1.1 g	6.6 min	18.92	0.535	2.83	Spread the sample over a glass fiber sheet before measuring.

*1   For some models, the setting value in the table may be lower than the lower limit value. In that case, the setting value will be set to the lower limit value.

Food A (grains, beans, seafood, condiments, seasonings, additives)

Program number	Sample	Program ID	Heating temperature	Termination value[1]	Sample mass	Measurement time	Moisture content			Remarks
							Average value	Reproducibility	CV value	
256	Pepper (roughly ground)	PEPPER	200°C	0.05%/min	4.5 to 5.5 g	20.1 min	14.20	0.134	0.94	
257	Curry powder	CURRYPW	180°C	0.05%/min	0.9 to 1.1 g	9 min	9.58	0.163	1.70	
258	Japanese pepper	SANSHO	120°C	0.05%/min	1.8 to 2.2 g	17.6 min	9.45	0.397	4.20	
259	Chili pepper	CHILI	120°C	0.05%/min	2.7 to 3.3 g	12.8 min	5.26	0.061	1.16	
260	Shichimi seasoning	SC CHIL	120°C	0.05%/min	2.7 to 3.3 g	12.0 min	4.35	0.120	2.76	
261	Wasabi paste	PAS WAS	180°C	0.05%/min	0.9 to 1.1 g	16.4 min	39.58	0.402	1.02	Use a disposable aluminum tray. Crush the sample with a glass fiber sheet before measuring.
262	Wasabi powder	POW WAS	140°C	0.05%/min	3.6 to 4.4 g	8.8 min	3.52	0.050	1.42	
263	Mustard paste (paste with grains)	MUSTARD	200°C	0.05%/min	0.9 to 1.1 g	20.1 min	47.51	0.422	0.89	Use a disposable aluminum tray. Cover the sample with a glass fiber sheet before measuring.
264	Mustard powder	POWMSTD	140°C	0.05%/min	3.6 to 4.4 g	7.5 min	4.09	0.030	0.73	
265	Ginger paste	GINGER	200°C	0.05%/min	0.9 to 1.1 g	13.8 min	87.01	0.366	0.42	Use a disposable aluminum tray. Cover the sample with a glass fiber sheet before measuring.
266	Citric acid	CITRIC	100°C	0.10%/min	4.5 to 5.5 g	7.2 min	4.54	0.210	4.63	
267	Anhydrous glucose	ANHYGLU	140°C	0.05%/min	4.5 to 5.5 g	1.2 min	0.21	0.022	10.48	

[1] For some models, the setting value in the table may be lower than the lower limit value. In that case, the setting value will be set to the lower limit value.

Food B (processed foods, dairy products, confectionery, other)

Program number	Sample	Program ID	Heating temperature	Termination value[*1]	Sample mass	Measurement time	Moisture content			Remarks
							Average value	Reproducibility	CV value	
268	Bread	BREAD	160°C	0.05%/min	0.9 to 1.1 g	10.7 min	41.97	0.611	1.46	Cut the sample into small strips before measuring.
269	Breadcrumbs	BRDCRMB	200°C	0.05%/min	0.9 to 1.1 g	6.9 min	11.52	0.087	0.76	
270	Dried soup	DRYSOUP	120°C	0.05%/min	0.9 to 1.1 g	8.4 min	3.29	0.048	1.46	Corn cream soup. Remove the kernels before measuring.

*1 For some models, the setting value in the table may be lower than the lower limit value. In that case, the setting value will be set to the lower limit value.

Food B (processed foods, dairy products, confectionery, other)

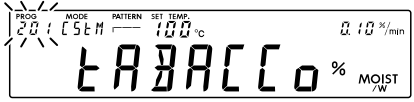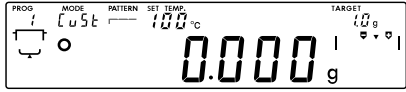| Program number	Sample	Program ID	Heating temperature	Termination value[*1]	Sample mass	Measurement time	Moisture content			Remarks
							Average value	Reproducibility	CV value	
271	Instant bean paste soup	BP SOUP	200°C	0.05%/min	0.9 to 1.1 g	18.3 min	65.37	0.364	0.56	Use a disposable aluminum tray. Place on filter paper before measuring.
272	Instant noodles	INSTNDL	180°C	0.05%/min	1.8 to 2.2 g	8.2 min	1.82	0.051	2.81	Crush the sample into small pieces before measuring.
273	Croutons	SIPPET	200°C	0.05%/min	1.8 to 2.2 g	8.5 min	8.02	0.158	1.97	Crush the sample into small pieces before measuring.
274	Breakfast cereal (brown rice)	CEREAL	180°C	0.05%/min	1.8 to 2.2 g	7.2 min	2.33	0.050	2.14	Crush the sample into small pieces before measuring.
275	Dried spaghetti	PASTA	200°C	0.05%/min	1.8 to 2.2 g	31.3 min	11.50	0.203	1.77	Crush the sample into small pieces before measuring.
276	Dried udon noodles	DRYUDON	200°C	0.05%/min	4.5 to 5.5 g	18 min	14.04	0.445	3.17	Cut the sample into 1 cm slices before measuring.
277	Boiled udon noodles	UDON	200°C	0.05%/min	2.7 to 3.3 g	23.3 min	67.37	0.257	0.38	
278	Dried vermicelli	B VERM	200°C	0.05%/min	1.8 to 2.2 g	22.3 min	11.80	0.132	1.12	Cut the sample into 1 cm slices before

Program number	Sample	Program ID	Heating temperature	Termination value[*1]	Sample mass	Measurement time	Moisture content Average value	Moisture content Reproducibility	CV value	Remarks
										measuring.
279	Dried seaweed	SEAWEED	200°C	0.05%/min	0.9 to 1.1 g	11.51 min	8.90	0.250	2.81	Pulverize the sample with a blender before measuring.
280	Sliced wood ear mushroom	WOODEAR	180°C	0.05%/min	1.8 to 2.2 g	25.7 min	14.39	0.205	1.42	Pulverize the sample with a blender before measuring.
281	Beef jerky	BFJERKY	180°C	0.05%/min	1.8 to 2.2 g	29.5 min	20.10	0.974	4.85	Cut the sample into small strips before measuring.
282	Rice cracker	R CRACK	200°C	0.05%/min	4.5 to 5.5 g	10.0 min	5.64	0.128	2.27	Crush the sample into small pieces in a mortar before measuring.
283	Cookie	COOKIE	160°C	0.05%/min	4.5 to 5.5 g	6.3 min	2.11	0.066	3.13	Lightly crush the sample before measuring.
284	Langue de chat cookie	LNGCHAT	160°C	0.05%/min	1.8 to 2.2 g	6.1 min	2.45	0.069	2.82	Lightly crush the sample before measuring.
285	Frozen pie dough	PIE DGH	200°C	0.05%/min	1.8 to 2.2 g	12.5 min	30.65	0.209	0.68	Cut the sample into small slices with scissors before measuring.
286	Sliced banana chips	Banana chips	160°C	0.05%/min	1.8 to 2.2 g	7.9 min	1.98	0.259	13.03	Crush the sample into small pieces in a mortar before measuring.
287	Potato chips	P CHIPS	160°C	0.05%/min	4.5 to 5.5 g	8.3 min	2.19	0.060	2.74	Lightly crush the sample before measuring.
288	Shrimp snacks	S SNACK	160°C	0.05%/min	0.9 to 1.1 g	4.5 min	2.55	0.146	5.73	Lightly crush the sample before measuring.
289	Noodle snacks	N SNACK	160°C	0.05%/min	4.5 to 5.5 g	8.4 min	1.54	0.040	2.60	
290	Gummy	GUMMY	120°C	0.05%/min	2.7 to 3.3 g	29.7 min	3.40	0.235	6.92	Use a disposable aluminum tray.
291	Strawberry jam	JAM	180°C	0.05%/min	0.9 to 1.1 g	15.7 min	59.84	0.780	1.30	Spread the sample over filter paper before measuring.
292	Honey at 120°C	HONEY 1	120°C	0.05%/min	0.9 to 1.1 g	19.5 min	17.05	0.338	1.98	Spread the sample over filter paper before measuring.
293	Honey at 140°C	HONEY 2	140°C	0.05%/min	0.9 to 1.1 g	14.1 min	18.61	0.326	1.75	Spread the sample over filter paper before measuring.

*1   For some models, the setting value in the table may be lower than the lower limit value. In that case, the setting value will be set to the lower limit value.

Food B (processed foods, dairy products, confectionery, other)

Program number	Sample	Program ID	Heating temperature	Termination value[*1]	Sample mass	Measurement time	Moisture content			Remarks
							Average value	Reproducibility	CV value	
294	Honey at 160°C	HONEY 3	160°C	0.05%/min	0.9 to 1.1 g	24.6 min	21.78	1.578	7.25	Spread the sample over filter paper before measuring.
295	Red bean paste (chunky)	ANKO	180°C	0.05%/min	0.9 to 1.1 g	11.6 min	33.56	0.194	0.58	Use a disposable aluminum tray. Cover the sample with a glass fiber sheet before measuring.
296	Milk	MILK	160°C	0.05%/min	0.9 to 1.1 g	7.2 min	88.49	0.335	0.38	Use a disposable aluminum tray. Cover the sample with a glass fiber sheet before measuring.
297	Solid salted butter	BUTTER	200°C	0.05%/min	0.9 to 1.1 g	3.13 min	15.00	0.542	3.61	Spread the sample over a glass fiber sheet before measuring.
298	Granulated cheese	GCHEESE	200°C	0.05%/min	0.9 to 1.1 g	10 min	13.75	0.110	0.80	
299	Skim milk	S MILK	140°C	0.10%/min	1.8 to 2.2 g	16.7 min	6.49	0.255	3.93	
300	Infant formula	MP MILK	140°C	0.05%/min	1.8 to 2.2 g	5.7 min	3.07	0.145	0.80	
301	Hard yogurt	YOGURT	200°C	0.05%/min	0.9 to 1.1 g	13 min	85.20	0.334	0.39	Spread the sample over a glass fiber sheet before measuring.
302	Coffee creamer	MSUBST	180°C	0.05%/min	0.9 to 1.1 g	6.9 min	88.11	0.294	0.33	Use a disposable aluminum tray. Cover the sample with a glass fiber sheet before measuring.
303	Condensed milk	C MILK	160°C	0.05%/min	0.9 to 1.1 g	16 min	28.74	0.311	1.08	Use a disposable aluminum tray. Place on filter paper before measuring.
304	Fat spread	FATSPRD	200°C	0.05%/min	0.9 to 1.1 g	3.25 min	31.26	0.486	1.55	Spread the sample over a glass fiber sheet before measuring.
305	Soy milk	SOYMILK	140°C	0.05%/min	0.9 to 1.1 g	7.5 min	96.65	0.648	0.67	Use a disposable aluminum tray. Soak in filter paper before measuring.
306	Green tea leaves	GRN TEA	120°C	0.05%/min	4.5 to 5.5 g	10.4 min	2.03	0.035	1.72	Pulverize the sample with a blender before measuring.

Program number	Sample	Program ID	Heating temperature	Termination value[*1]	Sample mass	Measurement time	Moisture content			Remarks
							Average value	Reproducibility	CV value	
307	Instant coffee powder	COFFEE	120°C	0.05%/min	3.6 to 4.4 g	11.2 min	4.20	0.182	4.33	Cover the sample with a glass fiber sheet before measuring.
308	Reconstituted orange juice	O JUICE	160°C	0.05%/min	0.9 to 1.1 g	10.3 min	89.68	0.380	0.42	Use a disposable aluminum tray. Cover the sample with a glass fiber sheet before measuring.
309	Powdered sports drink	P BEVER	120°C	0.01%/min	4.5 to 5.5 g	4.3 min	0.23	0.024	10.53	
310	Jellied sports drink	G BEVER	180°C	0.05%/min	0.9 to 1.1 g	17.1 min	75.49	0.431	0.57	Use a disposable aluminum tray. Place on filter paper before measuring.
311	Agar powder	AGARPOW	200°C	0.05%/min	4.5 to 5.5 g	7.5 min	15.95	0.066	0.41	
312	Gelatin powder	GELATIN	200°C	0.05%/min	4.5 to 5.5 g	9.4 min	12.46	0.030	0.24	

*1   For some models, the setting value in the table may be lower than the lower limit value. In that case, the setting value will be set to the lower limit value.

Chemicals

Program number	Sample	Program ID	Heating temperature	Termination value[*1]	Sample mass	Measurement time	Moisture content Average value	Reproducibility	CV value	Remarks
313	Skin care cream	SKINCRM	180°C	0.05%/min	0.9 to 1.1 g	19.8 min	75.08	0.514	0.68	Place the squashed sample between a glass fiber sheet folded into two before measuring.
314	Sodium tartrate	TARTNA	160°C	0.05%/min	4.5 to 5.5 g	8 min	15.71	0.007	0.04	
315	Cellulose	CELLOSE	200°C	0.05%/min	4.5 to 5.5 g	4.3 min	4.00	0.073	1.83	
316	Calcium stearate	STECA	180°C	0.10%/min	4.5 to 5.5 g	7.6 min	2.90	0.030	1.03	There will be a strong odor during heating.
317	Zinc oxide	ZN OX	200°C	0.01%/min	4.5 to 5.5 g	4.8 min	0.14	0.010	7.04	
318	Aluminum oxide	ALUM OX	200°C	0.01%/min	4.5 to 5.5 g	6.5 min	0.25	0.006	2.38	
319	Magnesium oxide	MG OX	200°C	0.01%/min	1.8 to 2.2 g	3 min	0.44	0.020	4.40	
320	Talc	TALC	160°C	0.01%/min	4.5 to 5.5 g	5.1 min	0.18	0.011	6.15	Measure after preheating.
321	Calcium carbonate	CACO3	200°C	0.01%/min	4.5 to 5.5 g	5.8 min	0.12	0.004	3.42	

*1   For some models, the setting value in the table may be lower than the lower limit value. In that case, the setting value will be set to the lower limit value.

Industrial Products

Program number	Sample	Program ID	Heating temperature	Termination value[*1]	Sample mass	Measurement time	Moisture content Average value	Reproducibility	CV value	Remarks
322	Powdered charcoal	CHARCL	200°C	0.05%/min	0.9 to 1.1 g	2.3 min	6.81	0.777	11.40	Lightly crush the sample before measuring.
323	Activated carbon granules for deodorization	ACTCHAR	120°C	0.05%/min	4.5 to 5.5 g	2.4 min	2.65	0.070	2.64	Cover the sample with a glass fiber sheet before measuring.
324	Red soil granules	REDSOIL	200°C	0.05%/min	2.7 to 3.3 g	10.1 min	27.45	0.475	1.73	
325	Silica gel particles	SIL PRT	200°C	0.05%/min	4.5 to 5.5 g	6.4 min	19.40	0.032	0.16	Leave the sample for one day at 23°C room temperature before measuring.
326	Black printer toner	P TONER	100°C	0.10%/min	4.5 to 5.5 g	1.6 min	0.30	0.013	4.36	

*1   For some models, the setting value in the table may be lower than the lower limit value. In that case, the setting value will be set to the lower limit value.

Plastics

Program number	Sample	Program ID	Heating temperature	Termination value[1]	Sample mass	Measurement time	Moisture content			Remarks
							Average value	Reproducibility	CV value	
327	PC pellets	PC	130°C	0.001%/min	24.0 to 25.0 g	15 min	0.093	0.002	2.15	When measuring a 0.5 g sample heated to 230°C with the Karl Fischer method three times and taking the average: 0.077% moisture content and 0.0021% reproducibility with a measurement time of 30 minutes
328	POM pellets	POM	130°C	0.001%/min	24.0 to 25.0 g	15.6 min	0.101	0.0009	0.89	When measuring a 2 g sample heated to 200°C with the Karl Fischer method three times and taking the average: 0.087% moisture content and 0.0022% reproducibility with a measurement time of 30 minutes
329	PET pellets (polyethylene terephthalate)	PET	160°C	0.001%/min	24.0 to 25.0 g	9.0 min	0.045	0.0008	1.78	When measuring a 3 g sample heated to 230°C with the Karl Fischer method three times and taking the average: 0.027% moisture content and 0.0025% reproducibility with a measurement time of 30 minutes
330	ABS resin pellets	ABS	130°C	0.001%/min	24.0 to 25.0 g	21.0 min	0.203	0.0027	1.33	When measuring a 0.1 g sample heated to 200°C with the Karl Fischer method three times and taking the average: 0.192% moisture content and 0.0097% reproducibility with a measurement time of 30 minutes

[1]   For some models, the setting value in the table may be lower than the lower limit value. In that case, the setting value will be set to the lower limit value.

Electrical Components

Program number	Sample	Program ID	Heating temperature	Termination value[1]	Sample mass	Measurement time	Moisture content			Remarks
							Average value	Reproducibility	CV value	
331	CPU （100 pin plastic QFP, 14 × 20 mm）	CPU	120°C	0.05%/min	9.0 to 11.0 g	1.7 min	0.06	0.006	8.59	Leave the sample for two days in a thermostatic tank at 80% RH and 30°C room temperature before measuring.

[1]   For some models, the setting value in the table may be lower than the lower limit value. In that case, the setting value will be set to the lower limit value.

Rubber

Program number	Sample	Program ID	Heating temperature	Termination value[*1]	Sample mass	Measurement time	Moisture content			Remarks
							Average value	Reproducibility	CV value	
332	Pulverized tire	TIRE	200°C	0.10%/min	4.5 to 5.5 g	4.3 min	22.30	0.080	0.36	Pulverize the sample before measuring.
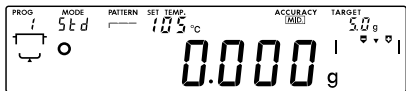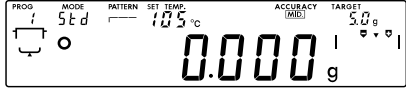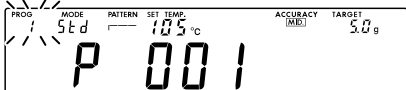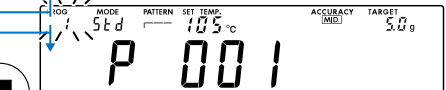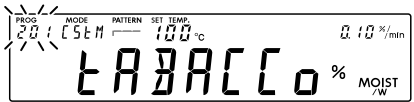
*1   For some models, the setting value in the table may be lower than the lower limit value. In that case, the setting value will be set to the lower limit value.

Sewage

Program number	Sample	Program ID	Heating temperature	Termination value[*1]	Sample mass	Measurement time	Moisture content			Remarks
							Average value	Reproducibility	CV value	
333	Liquid sewage	SEWAGE	140°C	0.10%/min	0.9 to 1.1 g	5.7 min	99.14	0.233	0.24	Use a glass fiber sheet. There will be a strong odor during heating.
334	Sewage paste	SEWAGEP	200°C	0.10%/min	4.5 to 5.5 g	16.3 min	86.64	0.560	0.65	There will be a strong odor during heating.

*1   For some models, the setting value in the table may be lower than the lower limit value. In that case, the setting value will be set to the lower limit value.

6.2.2. How to Use Example Measurement Conditions

Step	Description	Operation
1.	Refer to "6.1. How to Select a Program Number" to select the program number to change the measurement conditions of.	
2.	Press the PROGRAM key with the mass displayed to display the screen for selecting the measurement conditions.	PROGRAM
3.	The program number flashes. An overview of the measurement conditions is displayed. Press the ↑ ↓ keys to change the value of the program number. The example measurement conditions are in program number 201 and beyond. Select the example measurement conditions to use. Press and hold to continuously change the value.	
4.	Press the ENTER key.	PRINT /ENTER End
5.	The product returns to the mass display. The example measurement conditions selected in step 4 are copied to the program number selected in step 1. You can change the measurement conditions after copying them. (Refer to "6.4. Detailed Description of Measurement Conditions".)	

6.3. Overview of Measurement Conditions

6.3.1. List of Measurement Conditions

The following list indicates the items that can be configured in the measurement conditions.
For details on each item, refer to "6.4. Detailed Description of Measurement Conditions".

Measurement Conditions
- Program number （1 to 200）
- Program ID （maximum 7 characters）
- Measurement mode
  - Standard mode
  - Timer mode
  - Custom mode
- Heating pattern
  - Standard heating
  - Slow heating
  - Step heating
  - Rapid heating
- Heating temperature
  - Temperature[*1] （30 to 200°C）
  - Temperature step 1[*1] （30 to 200°C）
  - Temperature step 2[*1] （30 to 200°C）
- Heating time
  - Time step 1[*1] （1 to 480 min）
  - Overall measurement time[*1] （1 to 480 min）
- Measurement accuracy[*1]
  - High
  - Standard
  - Low
- Termination value[*1] （0.001 to 2%/min）[*2]
- Sample mass
  - Maximum mass value （0 to 50 or 70 g）[*2]
  - Minimum mass value （0 to 50 or 70 g）[*2]
- Measurement basis
  - Moisture content (standard before drying)
  - Moisture content (standard after drying)
  - Solids
  - Relative density
  - Grams
- Minimum displayed
  - Percentage （0.001 to 1%）[*2]
  - Grams （0.0001 to 0.1 g）[*2]
- Comparator
  - Upper limit value （0.0 to 999.9%）
  - Lower limit value （0.0 to 999.9%）
- Correction of measurement results
  - Offset (added to moisture content) （−9.999% to 9.999%）[*2]

[*1]   May not be able to be set, depending on the other settings.
[*2]   The range of available values depends on the model.

6.3.2. Available Measurement Conditions

The available measurement conditions depend on the selected measurement mode.

Measurement condition	Measurement mode		
	Standard measurement mode	Timer mode	Custom mode
Program ID	Yes		
Heating pattern	Yes		
Temperature	Yes		
Time	(The available items differ for each measurement mode and heating pattern. Refer to "6.4.4. Temperature and Time")		
Measurement accuracy	Yes	No	No
Termination value	No	No	Yes
Sample mass	No	Yes	Yes
Measurement basis	Yes		
Minimum displayed (%)	No	Yes	Yes
Minimum displayed (g)	No	Yes	Yes
Comparator (maximum, minimum)	Available when the function is enabled in the internal settings. Refer to "8. Internal Settings"		
Correction of measurement results			

6.3.3. Default Setting

The default measurement conditions are set as follows.

Measurement condition	MS-74A	MX-53A	MF-53A	ML-53A
Program ID	P *** (where *** is the program number)			
Measurement mode	Standard measurement mode			
Heating pattern	Standard heating			
Temperature	105°C			
Time				
Measurement accuracy	MID.			
Termination value	0.02%/min	0.05%/min	0.10%/min	0.20%/min
Sample mass	5 g			
Measurement basis	Moisture content (standard before drying)			
Minimum displayed (%)	0.001%	0.01%	0.05%	0.1%
Minimum displayed (g)	0.001 g	0.001 g	0.002 g	0.005 g
Comparator (maximum, minimum)	Do not compare			
Correction of measurement results	Do not correct			

6.4. Detailed Description of Measurement Conditions
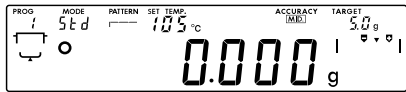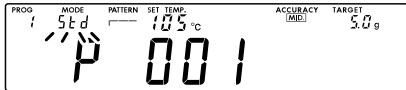
This section provides a detailed description of the measurement conditions and the method for configuring the settings.

The following keys are used to configure the settings.

Operation Keys

Key switch		Function and operation
(SELECT)	SELECT	Enters the mode for changing the measurement conditions. Moves to the next selection.
(down arrow) (up arrow)	↑ ↓	Changes the value of the selected measurement condition.
(PRINT /ENTER)	ENTER	Saves the values configured for the measurement conditions.
(STOP) (ON:OFF /RESET)	STOP , RESET	Exits without saving the values configured for the measurement conditions.
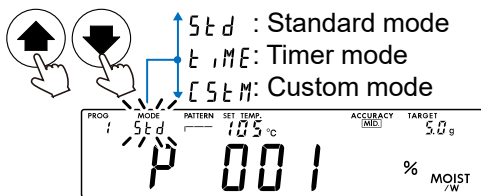
6.4.1. How to Select Measurement Conditions

Step	Description	Example Display
1.	Switch to the mass display.	PROG MODE PATTERN SET TEMP. ACCURACY TARGET 5.0 g 5td 105 ℃ 0.000 g
2.	Press the SELECT key.	(SELECT)
3.	The measurement mode flashes, and the product switches to the screen for changing the measurement conditions.	PROG MODE PATTERN SET TEMP. ACCURACY TARGET 5td 105 ℃ 5.0 g P 001
4.	The selected item changes each time the SELECT key is pressed. The flashing item is the currently selected item.	(SELECT)
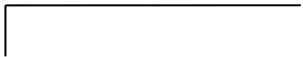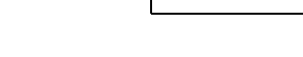
6.4.2.   Measurement Modes

Mode name	Description of operation
Standard mode	The standard mode for configuring the main parameters only. The sample mass, termination value, minimum displayed (%), and minimum displayed (g) are automatically set according to the measurement accuracy. (Refer to "6.4.5. Measurement Accuracy ".)
Timer mode	The mode for configuring the heating time. (1 to 480 min)
Custom mode	The mode for setting the termination value (change in moisture content) to an arbitrary value.
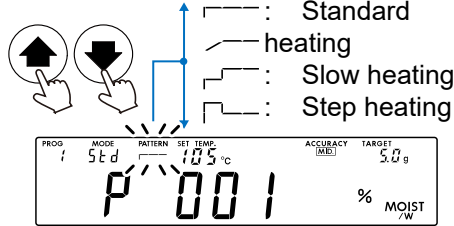
Changing the Measurement Conditions

Step	Description	Example Display
1.	Refer to ″6.4.1. How to Select Measurement Conditions″ to switch the operation for changing the measurement mode. The current measurement mode flashes. ↑ ↓ keys Change the measurement mode.	Std : Standard mode tiME: Timer mode CStM: Custom mode

6.4.3. Heating Pattern

Heating pattern name	Temperature change	Description
Standard heating		Maintains the set temperature.
Slow heating		Gradually raises the temperature over time until the set temperature is reached. Then maintains the set temperature.
Step heating		Enables you to set two temperatures. Set the two temperatures and the time to maintain the first temperature.
Rapid heating		Performs heating for approx. three minutes at 200°C. Then maintains the set temperature.

Changing the Heating Pattern

Step	Description	Example Display
1.	Refer to ″6.4.1. How to Select Measurement Conditions″ to select the operation for changing the heating pattern. 　The current heating pattern flashes. 　↑　　↓　　keys 　Change the heating pattern.	⎍ ⎍ :　Standard heating 　:　Slow heating 　:　Step heating PROG MODE PATTERN SET TEMP. ACCURACY MID TARGET 5.0 g 1 5td 105 °C P 001 % MOIST /W

6.4.4. Temperature and Time

Arbitrary values can be set for the heating temperature and time.

    Temperature: 30 to 200°C (in 1°C increments)

    Time: 1 to 480 min (1 min increments)
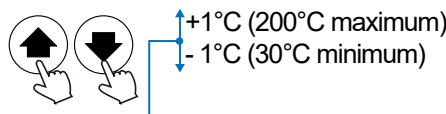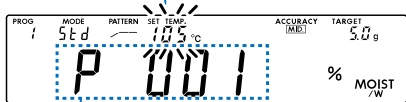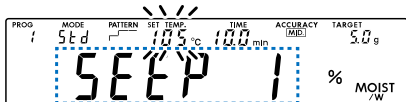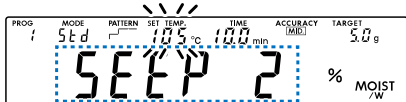
The available temperature and time values differ according to the measurement mode and heating pattern. The table below indicates the available temperatures and times for each condition.
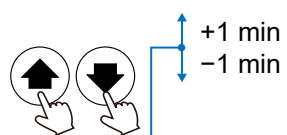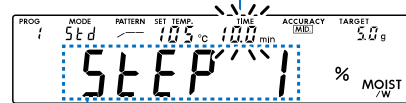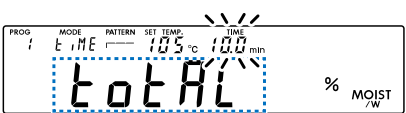
Heating pattern	Available temperature and time
Standard heating	(1) Temperature (2) Overall measurement time[*1]
Slow heating	(1) Temperature (2) Time step 1 (3) Overall measurement time[*1]
Step heating	(1) Temperature step 1 (2) Time step 1 (3) Temperature step 2 (4) Overall measurement time[*1]
Rapid heating	(1) Temperature (2) Overall measurement time[*1] Approx. 3 min (fixed)

[*1]   The value set for the overall measurement time can only be configured when the measurement mode is set to the timer mode.

Changing the Temperature

Step	Description	Example Display
1.	Refer to "6.4.1. How to Select Measurement Conditions" to select the operation for changing the temperature. • The temperature that is currently set flashes. • The information on the main display differs according to the value set for the heating pattern.	 +1°C (200°C maximum) - 1°C (30°C minimum) Example program ID Example step 1 Example step 2

Heating pattern	Selected temperature	Main display
Standard/slow/rapid	Temperature	Program ID
Step	Temperature step 1	SEEP 1
Step	Temperature step 2	SEEP 2

↑   ↓   keys
Change the set temperature value.

Changing the Time

Step	Description	Example Display
1.	Refer to "6.4.1. How to Select Measurement Conditions" to select the operation for changing the time. The time that is currently set flashes. The information displayed for the measurement value differs according to the measurement mode and heating pattern.	 +1 min −1 min Example program ID Example display totAL

Condition	Selected time	Part displayed for measured value
Heating pattern: Slow/step	Time step 1	SEEP 1
Measurement mode: Timer mode	Overall measurement time	totAL

↑   ↓   keys
Change the set time value.

6.4.5. Measurement Accuracy

This can only be selected with the standard measurement mode.
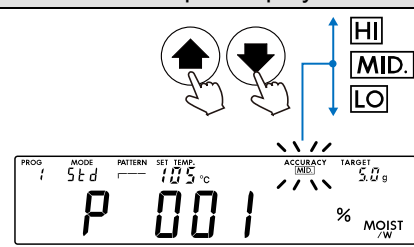
One of three levels ($\boxed{\text{HI}}$, $\boxed{\text{MID.}}$, $\boxed{\text{LO}}$) can be selected for the measurement accuracy.

The termination value, sample mass, minimum displayed (%), and minimum displayed (g) are automatically selected according to the measurement accuracy.

The selected values are as follows.

| Model | Measurement conditions | Measurement accuracy setting: ACCURACY | | |
| | | Accuracy priority | ↔ | Speed priority |
		HI	MID.	LO
MS-74A	Termination value	0.01%/min	0.02%/min	0.10%/min
	Sample mass	10 g	5 g	1 g
	Minimum displayed (%)	0.001%	0.001%	0.01%
	Minimum displayed (g)	0.001 g		
MX-53A	Termination value	0.02%/min	0.05%/min	0.50%/min
	Sample mass	10 g	5 g	1 g
	Minimum displayed (%)	0.01%	0.01%	0.1%
	Minimum displayed (g)	0.001 g		
MF-53A	Termination value	0.05%/min	0.10%/min	0.50%/min
	Sample mass	10 g	5 g	1 g
	Minimum displayed (%)	0.05%	0.05%	0.1%
	Minimum displayed (g)	0.002 g		
ML-53A	Termination value	0.10%/min	0.20%/min	0.50%/min
	Sample mass	10 g	5 g	1 g
	Minimum displayed (%)	0.1%	0.1%	1%
	Minimum displayed (g)	0.005 g		

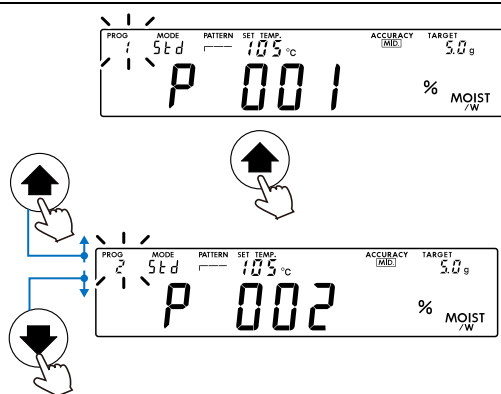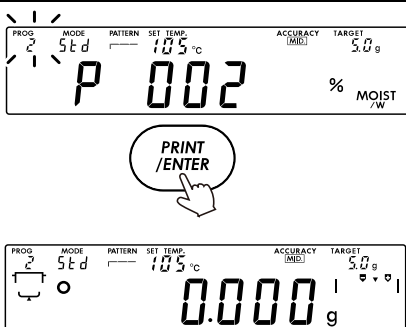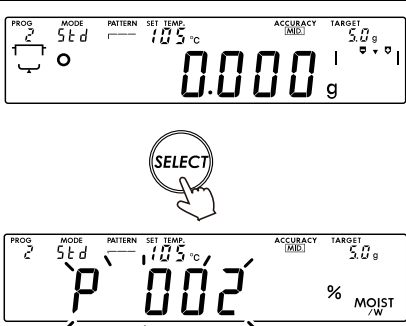### Changing the Measurement Accuracy (Standard Mode Only)

Step	Description	Example Display
1.	Refer to "6.4.1. How to Select Measurement Conditions" to select the operation for changing the measurement accuracy. 　　The current measurement accuracy flashes. $\boxed{\uparrow}$ $\boxed{\downarrow}$ keys Change the measurement accuracy.	

6.4.6.　Termination value
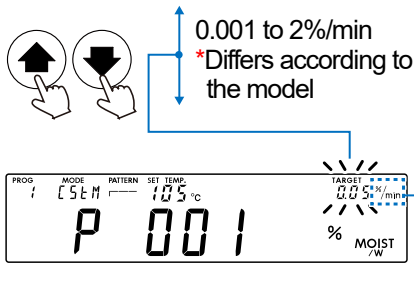
This can only be selected with the custom mode.

Because the moisture decreases as the sample dries, the change in moisture content per unit time decreases.
When the change in moisture content per minute becomes lower than the set value, drying is deemed to have ended and measurement stops.

The available settings are as follows.

		Available range of settings			
		MS-74A	MX-53A	MF-53A	ML-53A
2.00	%/min	↑	↑	↑	↑
1.00	%/min				
0.50	%/min				Available
0.20	%/min			Available	（default setting）
0.10	%/min		Available	（default setting）	
0.05	%/min	Available	（default setting）		↓
0.02	%/min	（default setting）		↓	
0.01	%/min				Unavailable
0.005	%/min		↓		
0.002	%/min			Unavailable	
0.001	%/min	↓			

Configuring the Termination Value (Custom Mode Only)

Step	Description	Example Display
1.	The current termination value flashes as indicated in "6.4.1. How to Select Measurement Conditions". *Confirm that "%/min" is displayed as the unit for the value. ↑ ↓ keys Change the value set for the termination value.	0.001 to 2%/min *Differs according to the model PROG *1* MODE *CStM* PATTERN SET TEMP. *105*℃　TARGET *0.05*%/min *P 001* ％ MOIST/W Confirm that "%/min" is lit.

56

6.4.7. Configuring the Sample Mass

The sample mass can be configured with the timer mode or custom mode.
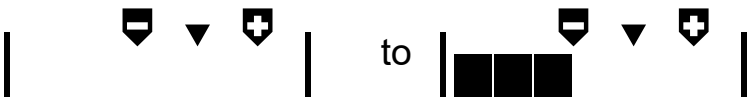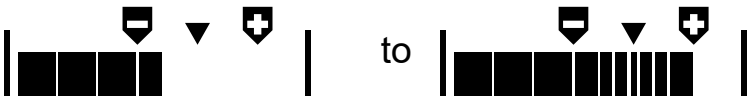
Set the upper limit value and lower limit value for loading the sample. When the mass is displayed, the average value of the upper limit value and lower limit value is displayed. The amount to load can be adjusted according to the displayed level meter.

If the sample mass is outside the range of setting values when the sample mass is set in the timer mode or custom mode, heating cannot be started by pressing the ⌐START⌐ key.
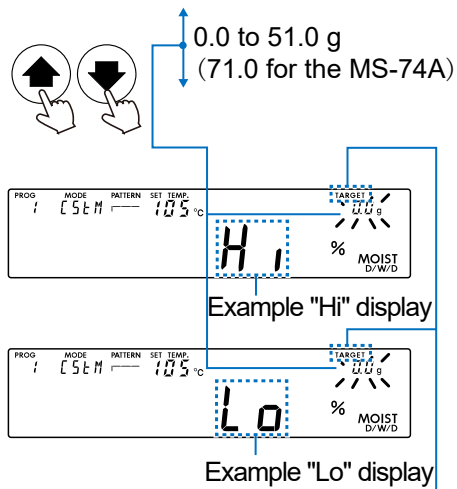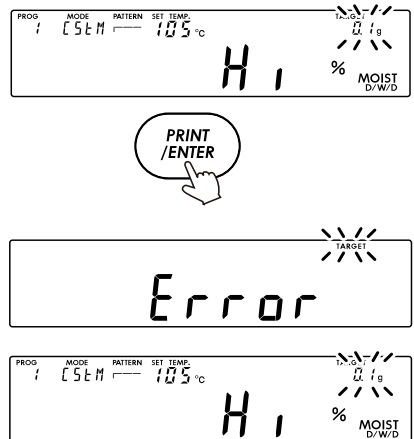
CAUTION

● If the sample mass is set to the default value (0 g for both the upper limit and lower limit), the level meter is not displayed and there is no limit on the heating start time.

● If the lower limit is set to 0 g and the upper limit is set to a value other than 0 g, the operation is the same as if 0.1 g was set for the lower limit.

● If the upper limit is set to 0 g and the lower limit is set to a value other than 0 g, the operation is the same as if the maximum value was set for the upper limit. (51 g for the MX-53A, MF-53A, and ML-53A. 71 g for the MS-74A.）

● If a value other than 0 g is set for both the upper limit and lower limit and a value at or below the lower limit is set for the upper limit, an error is displayed then the screen for setting the upper limit is displayed.

Example Level Meter Display

Sample mass	Level meter display
Lower than the set lower limit	to
Within range of set values	to
Higher than the set upper limit	

Setting the Sample Mass (Timer Mode or Custom Mode Only)

Step	Description	Example Display
1.	The current sample mass value flashes as indicated in "6.4.1. How to Select Measurement Conditions". *Confirm that "TARGET" is displayed above the sample mass. "Lo" is displayed when changing the lower limit and "Hi" is displayed when changing the upper limit. ↑ ↓ keys Change the set sample mass (upper limit or lower limit) value.	0.0 to 51.0 g (71.0 for the MS-74A) Example "Hi" display Example "Lo" display Confirm that "TARGET" is lit.
Remarks	Example: Operation when an error occurs An error occurs if the upper limit of the sample mass is set to a value that is smaller than the lower limit. When the heating conditions are confirmed, an error is displayed and the screen for setting the upper limit of the sample mass is displayed.	

58

6.4.8. Measurement Basis
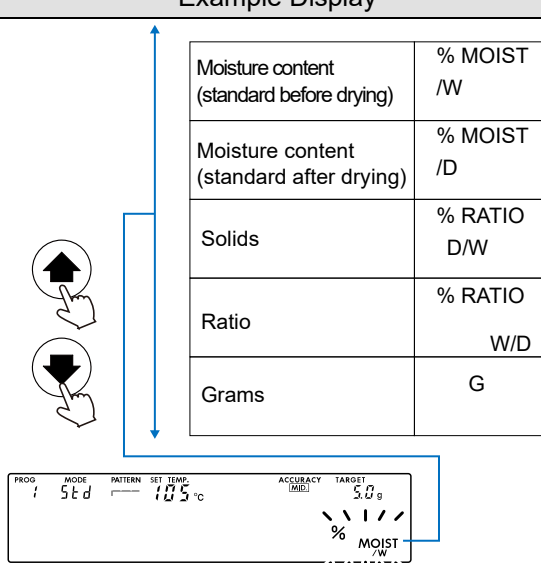
Unit	Formula of displayed value	Display
Moisture content (standard before drying)[*1]	$\dfrac{W - D}{W} \times 100$	% MOIST /W
Moisture content (Atro) (standard after drying)[*2]	$\dfrac{W - D}{D} \times 100$	% MOIST /D
Solids	$\dfrac{D}{W} \times 100$	% RATIO D/W
Ratio[*2]	$\dfrac{W}{D} \times 100$	% RATIO W/D
Grams	–	g

W: Sample mass before drying   D: Sample mass after drying

*1   Default setting

*2   If the sample mass decreases after drying and the measured value exceeds 999%, operation automatically stops because the measurement results cannot be calculated correctly.

Changing the Measurement Basis
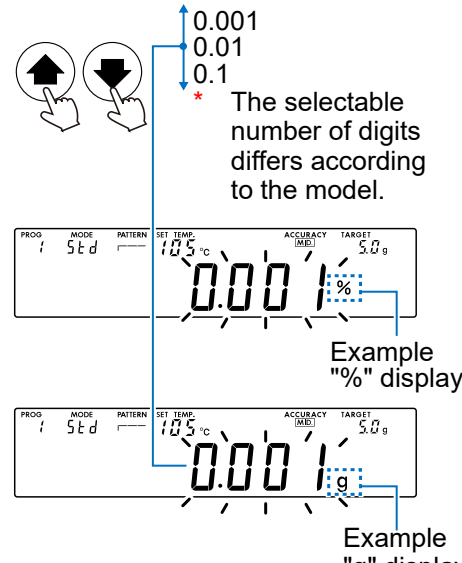
Step	Description	Example Display
1.	Refer to "6.4.1. How to Select Measurement Conditions" to select the operation for changing the measurement basis. The current measurement basis flashes. ↑ ↓ keys Change the measurement basis.	

6.4.9. Minimum Displayed (Percentage/Grams)

The available minimum selectable for each model is indicated in the table below.

Model	Minimum displayed	
	% (percentage)	g (grams)
MS-74A	0.001%	0.0001 g
	0.01%	0.001 g
	0.1%	0.01 g
		0.1 g
MX-53A	0.01%	0.001 g
	0.1%	0.01 g
		0.1 g
MF-53A	0.05%	0.002 g
	0.1%	0.01 g
	1%	0.1 g
ML-53A	0.1%	0.005 g
	1%	0.01 g
		0.1 g

Changing the Displayed Digits (Percentage/Grams)

Step	Description	Example Display
1.	Refer to "6.4.1. How to Select Measurement Conditions" to select the operation for changing the displayed digits (to percentage or grams). The displayed digits that are currently set flash. When changing the displayed digits for the percentage display, "%" is displayed for the unit. When changing the displayed digits for the grams display, "g" is displayed for the unit. ↑ ↓ keys Change the displayed digits that are set.	0.001 0.01 0.1 * The selectable number of digits differs according to the model. Example "%" display Example "g" display

6.4.10. Comparator Values

You can set an upper limit and lower limit for the comparator.

To configure the comparator function, it must first be enabled in the internal settings.

You can set an upper limit and lower limit for the comparator that are between 0.0 to 999.9%.

The comparator result is displayed on the screen when measurement stops and is appended to the GLP output and output for the measurement result of the data memory function.

CAUTION

- If the comparator function is disabled in the internal settings, the comparator result is not displayed.
- If the comparator is set to the default value (0% for both the upper limit and lower limit), the comparator result is not displayed.
- If the upper limit of the comparator is set to 0% and the lower limit is set to a value other than 0%, only the lower limit is compared.
- If a value other than 0% is set for the upper limit of the comparator and a value at or above the upper limit is set for the lower limit, an error is displayed then the screen for setting the upper limit is displayed.

Example Measurement Result

Comparator result flashes
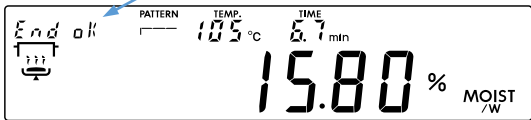
Display of moisture analyzer

```
            A & D
MODEL      MX-53A
S/N      P1234567
ID        LAB-123
PROGRAM    No.  1
PROGRAM ID
          P 001
MODE     STANDARD
             MID.
DRYING   STANDARD
          105  C
UNIT     MOIST /W
OFFSET   1.23  %
- - - - - - - -
INITIAL WEIGHT
        5.678  g
FINAL WEIGHT
        4.567  g
RESULT  MOIST /W
        19.57  %
JUDGMENT      OK
ANALYSIS TIME
        6.7min
DATE  2024/08/01
TIME    12:34:56
REMARKS


- - - - - - - -
SIGNATURE


- - - - - - - -
```

GLP output (output together when info = 1)

```
INITIAL WEIGHT
        5.039  g
FINAL WEIGHT
        4.242  g
RESULT  MOIST  W
        15.80  %
JUDGMENT      OK
ANALYSIS TIME
        6.7min
DATE  2024/08/01
TIME    12:34:56
REMARKS


- - - - - - - -
```

GLP output (output separately

Comparator result

```
PROGRAM    No. 1
PROGRAM ID
          P 001
MODE     STANDARD
             MID.
DRYING   STANDARD
          105  C
RESULT  MOIST /W
        15.80  %
JUDGMENT      OK
DATE  2024/08/01
TIME    12:34:56
- - - - - - - -
```

Data memory output

Comparator result

Configuring the Upper Limit and Lower Limit of the Comparator

Step	Description	Example Display
1.	Set CP (comparator mode) in $PrG\ Fnc$ (additional functions for measurement conditions) to 1 (enabled) in "8. Internal Settings".	
2.	Refer to "6.4.1. How to Select Measurement Conditions" to select the operation for changing the comparator values. Confirm that the current comparator settings are flashing. "CP" is displayed for the mode. H_1 is displayed when changing the upper limit of the comparator. Lo is displayed when changing the lower limit of the comparator. ⟦↑⟧ ⟦↓⟧ keys Changes the displayed digits that are set.	"CP" is 0 to 999.9 Hi 000.0 % Example "Hi" display Lo 000.0 % Example "Lo" display
Remarks	Example: Operation when an error occurs An error occurs if a value lower than the lower limit is input for the upper limit of the comparator. When the heating conditions are confirmed, an error is displayed and the screen for setting the upper limit of the comparator is displayed.	Hi 000.1 % PRINT /ENTER CP Error Hi 000.1 %

6.4.11. Correction of measurement results

The result of measuring the moisture content can be corrected.

Model	Range of corrected result values
MS-74A	-9.999% to 9.999%
MX-53A	-9.99% to 9.99%
MF-53A	-9.95% to 9.95%
ML-53A	-9.9% to 9.9%
Default setting (no correction)	0%
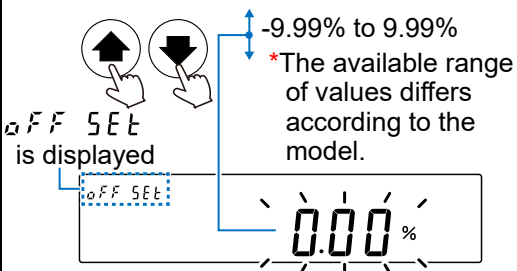
Formula
The displayed moisture content equals the moisture content that is actually measured plus the correction value.

CAUTION

- If the measured value is negative, 0% is displayed for the moisture content.
- Correction is not performed if the correction value is 0% or moisture content correction is disabled.
- The correction value is appended to the GLP output.

Correction of measurement results

Step	Description	Example Display
1.	Set $o F F$ $S E t$ (moisture content measurement result correction) in $P r G$ $F n c$ (additional functions for measurement conditions) to 1 (enabled) in "8. Internal Settings".	
2.	Refer to "6.4.1. How to Select Measurement Conditions" to select the operation for changing the result correction value. Confirm that the current result correction value is flashing. $o F F$ $S E t$ is displayed. ↑ ↓ keys Change the displayed digits that are set.	 -9.99% to 9.99% *The available range of values differs according to the model. $o F F$ $S E t$ is displayed

```
          A & D
MODEL    MX-53A
S/N      P1234567
ID       LAB-123
PROGRAM   No. 1
PROGRAM ID
          P 001
MODE STANDARD
          MID.
DRYING STANDARD
          105  C
UNIT    MOIST /W
OFFSET  1.23  %
- - - - - - - -
INITIAL WEIGHT
        5.678  g
FINAL WEIGHT
        4.567  g
RESULT  MOIST /W
        19.57  %
JUDGMENT     OK
ANALYSIS TIME
         6.7min
DATE  2024/08/01
TIME    12:34:56
REMARKS


- - - - - - - -
SIGNATURE


- - - - - - - -
```

GLP output (output together when info = 1)

```
          A & D
MODEL    MX-53A
S/N      P1234567
ID        LAB-123
PROGRAM   No. 1
PROGRAM ID
          P 001
MODE  STANDARD
          MID.
DRYING STANDARD
          105  C
UNIT    MOIST /W
OFFSET  1.23  %
```

← Correction of measurement results

GLP output (output separately

← Correction of measurement results
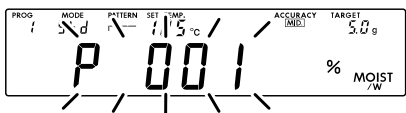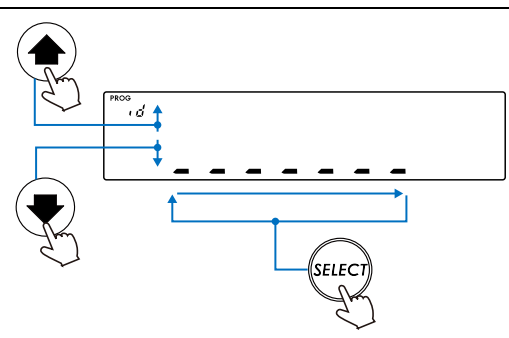
6.4.12. Program ID

A seven character name can be set for the parameter.

The following characters can be used.

0	1	2	3	4	5	6	7	8	9	-	␣	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
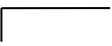
Changing the Program ID
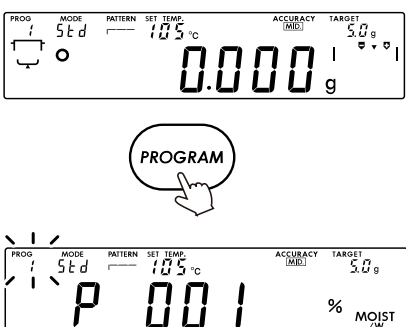
Step	Description	Example Display
1.	Refer to "6.4.1. How to Select Measurement Conditions" to select the operation for changing the program ID. Confirm that the current program ID is flashing.	
2.	Press the $\uparrow$ or $\downarrow$ key.	or
3.	Screen for changing the program ID The selected text flashes. SELECT key Selects the text in the next position. $\uparrow$ or $\downarrow$ key Changes the selected text. ENTER key Saves the string that is currently displayed and exits. STOP key Exits without saving the string that is currently displayed.	
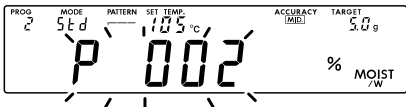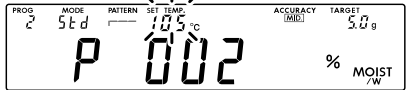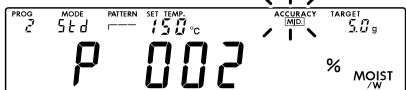
6.5. Examples of Changing the Measurement Conditions
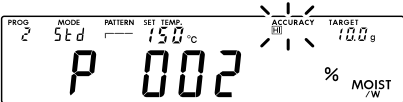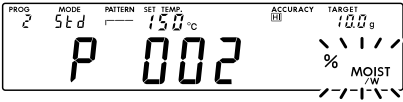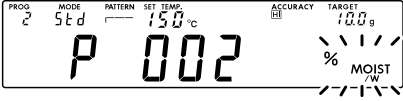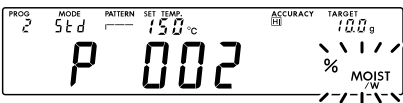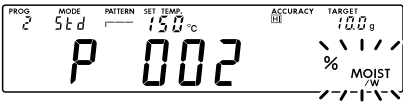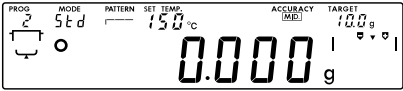
6.5.1. Example 1 (Standard Conditions)

This example describes how to configure the following conditions for program number 2 with the MX-53A.

Measurement condition	Set value		Description/purpose
Program number	2		
Program ID	No change.		
Measurement mode	Standard mode	5t d	The sample amount and termination value for moisture content measurement are automatically set based on the set measurement accuracy.
Heating pattern	Standard heating	⌐‾	Heating is performed at a constant temperature.
Temperature	Heating temperature	150°C	
Measurement accuracy	High	HI	This can only be selected with the standard mode. (Refer to "6.3.2. Available Measurement Conditions".)
Measurement basis	Moisture content (standard before drying)	% MOIST /W	

Step	Description	Operation
1.	Press the PROGRAM key with the mass displayed to display the screen for selecting the measurement conditions.	
2.	Press ↑ to make 2 flash. * ↑ ↓ enables you to change the program number.	
3.	Press the ENTER key to confirm the program number.	
4.	Press the SELECT key to display the screen for changing the measurement conditions.	

Step	Description	Operation
1.	Press the PROGRAM key with the mass displayed to display the screen for selecting the measurement conditions.	
2.	Press ↑ to make 2 flash. * ↑ ↓ enables you to change the program number.	
3.	Press the ENTER key to confirm the program number.	
4.	Press the SELECT key to display the screen for changing the measurement conditions.	

Step	Description	Operation
5.	Press the [SELECT] key several times to display the screen for changing the temperature setting.	 Press several times
6.	Press the [↑] key to display 150°C. You can press and hold the key to change the temperature value more quickly. *The [↑] [↓] keys enable you to change the value.	
7.	Press the [SELECT] key to display the screen for changing the accuracy.	
8.	Press the [↑] key to select "HI". * The [↑] [↓] keys enable you to change the accuracy.	

Step	Description	Operation
7.	Press the SELECT key to display the screen for changing the measurement basis.	
8.	If necessary, press the ↑ ↓ keys to display % MOIST /W . * % MOIST /W is selected by default.	
9.	Press the ENTER key to save all the settings. End is displayed, then the screen switches to the mass display. To perform moisture content measurement with the changed settings, refer to "5. Measurement ".	

6.5.2. Example 2 (Complex Conditions)
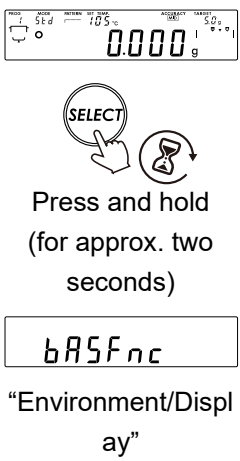
This example describes how to configure the following conditions for program number 3 with the MX-53A.
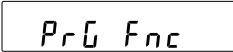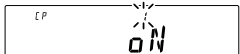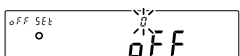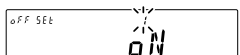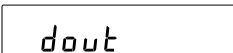
Measurement condition		Set value	Description/purpose
Program number		3	
Program ID		No change.	
Measurement mode	Timer mode	ㅌ.ᴍᴇ	Measurement stops when a certain period of time has elapsed since measuring the moisture content.
Heating pattern	Standard heating	⌐‾‾‾‾	Heating is performed at a constant temperature.
Temperature	Heating temperature	120°C	
Time	Heating time	15 min	
Sample mass	Hi	11 g	
	Lo	9 g	
Measurement basis	Moisture content (standard after drying)	% MOIST /D	
Minimum displayed	Percentage	0.1%	*The available values differ according to the model. Refer to "6.4.9. Minimum Displayed (Percentage/Grams) ".
	Grams	0.01 g	
Comparator	Hi	010.0%	
	Lo	008.0%	
Correction of measurement results		1.00%	Added to the moisture content.
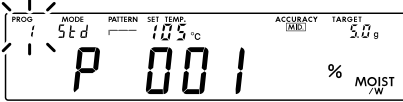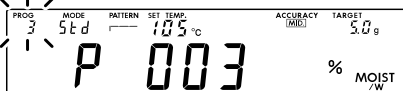
Preparing to Configure the Measurement Conditions
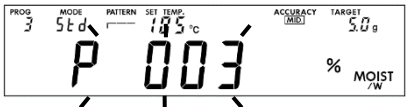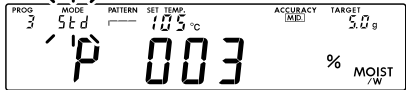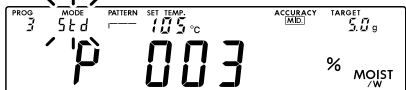
Enable the comparator and correction of measurement results functions in the internal settings.
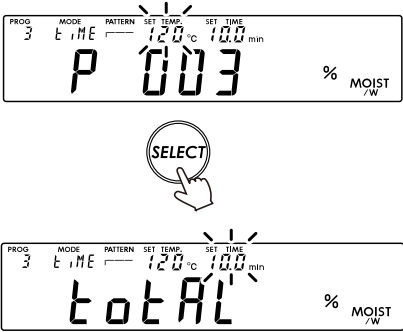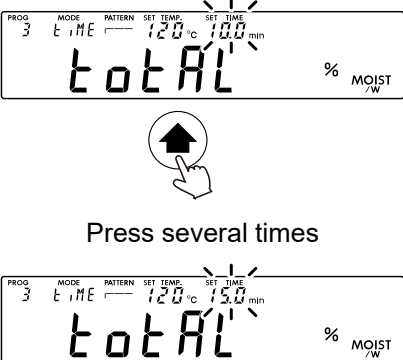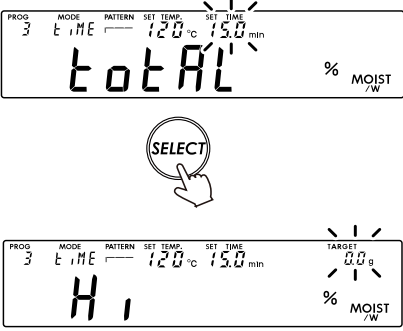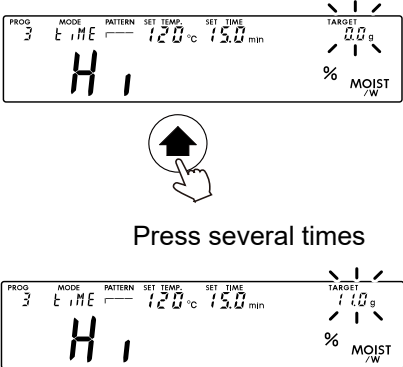
For details on the internal settings, refer to "8. Internal Settings".
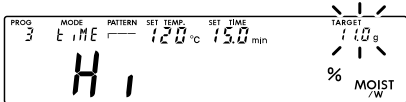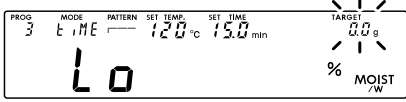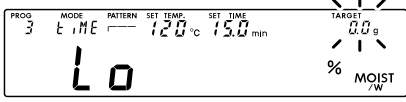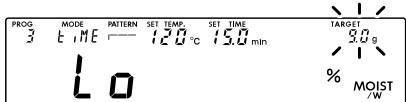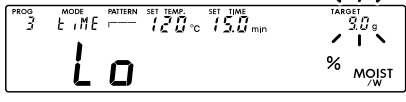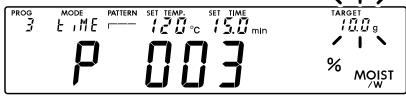
Step	Description	Category	Setting
1.	Press and hold the ⃞SELECT⃞ key (for approx. two seconds) with the mass displayed to display bASFnc.	Press and hold (for approx. two seconds) ⃞bASFnc⃞ "Environment/Display"	
2.	Press the ⃞SELECT⃞ key several times to display the additional functions (PrG Fnc) for the measurement conditions.	Press several times	

71
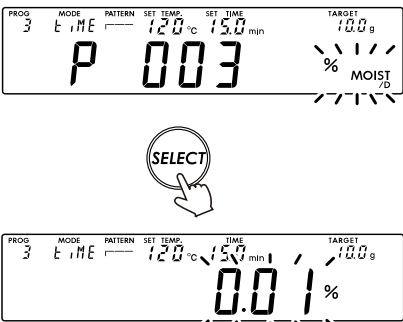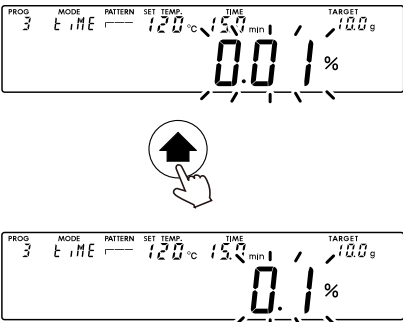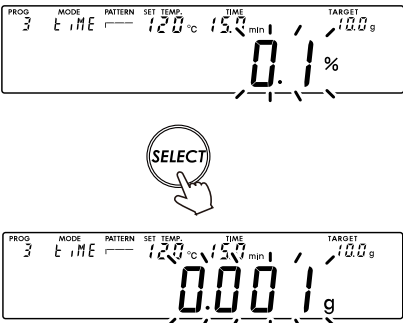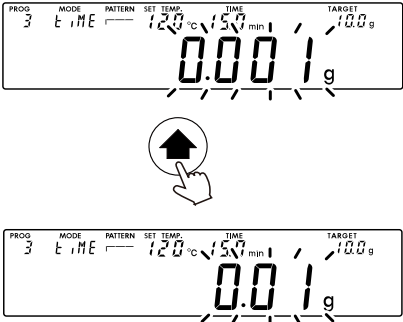
Step	Description	Category	Setting
		$PrG \ Fnc$ "Additional Functions for Measurement Conditions"	
3.	Press the ENTER key to enter the additional functions ($PrG \ Fnc$) for the measurement conditions.	PRINT /ENTER	CP oFF "Comparator Mode" "oFF"
4.	Use the ↑ ↓ keys to change the comparator function (CP) to 1 (enabled).	⬆ ⬇	CP oN "Comparator Mode" "oN"
5.	Press the SELECT key to display the setting for the result correction of moisture content measurement.	SELECT	$oFF \ SEt$ oFF "Moisture Content Measurement Result Correction" "oFF"
6.	Use the ↑ ↓ keys to change moisture content measurement result correction ($oFF \ SEt$) to 1 (enabled).	⬆ ⬇	$oFF \ SEt$ oN "Moisture Content Measurement Result Correction" "oN"
7.	Press the ENTER key to confirm the changes.	PRINT /ENTER $dout$ "Data Output"	
8.	Press the RESET key to exit the screen for changing the settings. The screen returns to the mass display.	ON:OFF /RESET $0.000 \ g$	
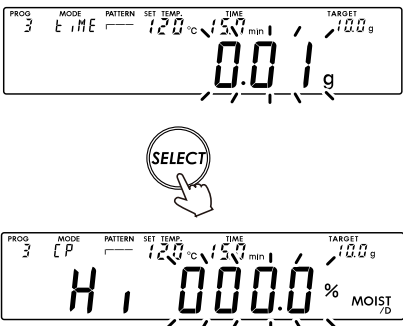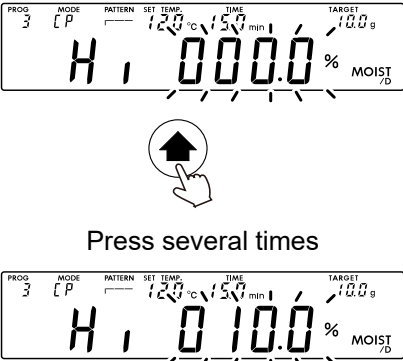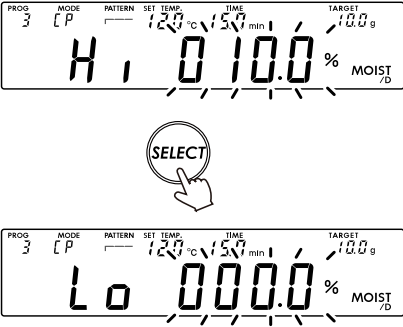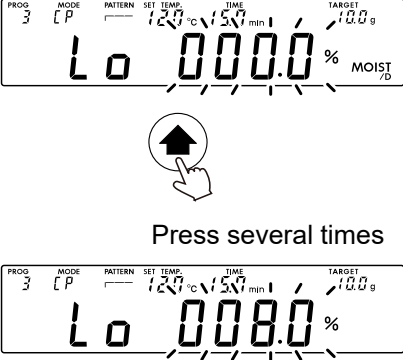
| Step	Description	Operation
1.	Press the PROGRAM key with the mass displayed to display the screen for selecting the measurement conditions.	
2.	Press the ↑ key to make 3 flash. *The ↑ ↓ keys enable you to change the program number.	
3.	Press the ENTER key to confirm the program number.	
4.	Press the SELECT key to display the screen for changing the measurement conditions.	
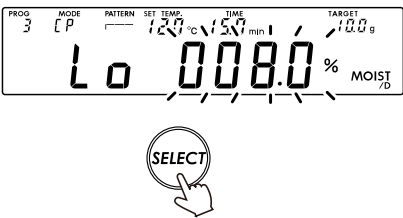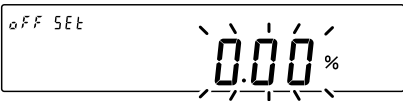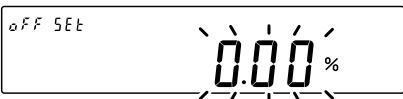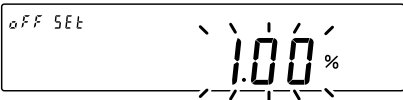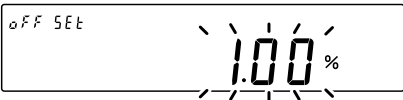
Step	Description	Operation
5.	Press the ⬚SELECT⬚ key once to display the screen for changing the measurement mode.	*(display showing)* PROG 3, MODE Std, SET TEMP. 105°C, ACCURACY MID, TARGET 5.0 g — P 003 % MOIST/W (SELECT) Press several times *(display showing)* PROG 3, MODE Std, SET TEMP. 105°C, ACCURACY MID, TARGET 5.0 g — P 003 % MOIST/W
6.	Press the ⬚↓⬚ key to display £ ιΠΕ. *The ⬚↑⬚ ⬚↓⬚ keys enable you to change the display.	*(display showing)* PROG 3, MODE Std, SET TEMP. 105°C, ACCURACY MID, TARGET 5.0 g — P 003 % MOIST/W (↓) *(display showing)* PROG 3, MODE £ιΠΕ, SET TEMP. 105°C, SET TIME 10.0 min — P 003 % MOIST/W
7.	Press the ⬚SELECT⬚ key several times to display the screen for changing the temperature setting.	*(display showing)* PROG 3, MODE £ιΠΕ, SET TEMP. 105°C, SET TIME 10.0 min — P 003 % MOIST/W (SELECT) *(display showing)* PROG 3, MODE £ιΠΕ, SET TEMP. 105°C, SET TIME 10.0 min — P 003 % MOIST/W
8.	Press the ⬚↑⬚ key to display 120°C. You can press and hold the key to change the temperature value more quickly. *The ⬚↑⬚ ⬚↓⬚ keys enable you to change the value.	*(display showing)* PROG 3, MODE £ιΠΕ, SET TEMP. 105°C, SET TIME 10.0 min — P 003 % MOIST/W (↑) *(display showing)* PROG 3, MODE £ιΠΕ, SET TEMP. 120°C, SET TIME 10.0 min — P 003 % MOIST/W

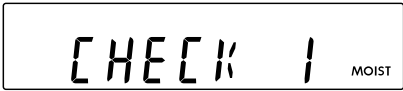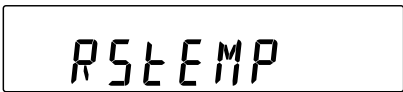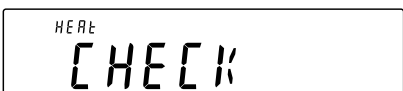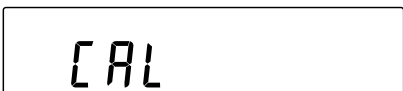| Step	Description	Operation
9.	Press the SELECT key to display the screen for changing the time setting.	PROG 3 ⏱ tIME 120°C 10.0 min P 003 % MOIST /w SELECT PROG 3 ⏱ tIME 120°C 10.0 min totAL % MOIST /w
10.	Press the ↑ key several times to display 15.0 min. You can press and hold the key to change the time value more quickly. *The ↑ ↓ keys enable you to change the value.	PROG 3 ⏱ tIME 120°C 10.0 min totAL % MOIST /w ⬆ Press several times PROG 3 ⏱ tIME 120°C 15.0 min totAL % MOIST /w
11.	Press the SELECT key to display the screen for changing the sample mass upper limit setting.	PROG 3 ⏱ tIME 120°C 15.0 min totAL % MOIST /w SELECT PROG 3 ⏱ tIME 120°C 15.0 min TARGET 0.0 g Hi % MOIST /w
12.	Press the ↑ key several times to display 11.0 g. You can press and hold the key to change the value more quickly. *The ↑ ↓ keys enable you to change the value.	PROG 3 ⏱ tIME 120°C 15.0 min TARGET 0.0 g Hi % MOIST /w ⬆ Press several times PROG 3 ⏱ tIME 120°C 15.0 min TARGET 11.0 g Hi % MOIST /w

Step	Description	Operation
13.	Press the ☐SELECT☐ key to display the screen for changing the sample mass lower limit setting.	
14.	Press the ☐↑☐ key several times to display 9.0 g. You can press and hold the key to change the value more quickly. *The ☐↑☐ ☐↓☐ keys enable you to change the value.	 Press several times
15.	Press the ☐SELECT☐ key to display the screen for changing the unit setting.	
16.	Press the ☐↓☐ key to display % MOIST/D. *The ☐↑☐ ☐↓☐ keys enable you to change the unit.	

Step	Description	Operation
17.	Press the [SELECT] key to display the screen for changing the decimal point position setting for the percentage display.	
18.	Press the [↑] key to display 0.1%. *The [↑] [↓] keys enable you to change the displayed digits.	
19.	Press the [SELECT] key to display the screen for changing the decimal point position setting for the grams display.	
20.	Press the [↓] key to display 0.01 g. *The [↑] [↓] keys enable you to change the displayed digits.	

Step	Description	Operation
21.	Press the SELECT key to display the screen for changing the maximum value setting of the comparator. *This is only displayed if the setting for the comparator function (C P) is set to 1 (enabled) in the internal settings. For information on changing the internal settings, refer to "8. Internal Settings".	
22.	Press the ↑ key several times to display 010.0%. You can press and hold the key to change the value more quickly. *The ↑ ↓ keys enable you to change the value.	Press several times
23.	Press the SELECT key to display the screen for changing the minimum value setting of the comparator. *This is only displayed if the setting for the comparator function (C P) is set to 1 (enabled) in the internal settings. For information on changing the internal settings, refer to "8. Internal Settings".	
24.	Press the ↑ key several times to display 008.0%. You can press and hold the key to change the value more quickly. *The ↑ ↓ keys enable you to change the value.	Press several times
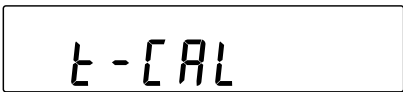
Step	Description	Operation
25.	Press the [SELECT] key to display the screen for changing the correction of measurement results setting. *This is only displayed if the setting for moisture content measurement result correction (oFF SEt) is set to 1 (enabled) in the internal settings. For information on changing the internal settings, refer to "8. Internal Settings".	
26.	Press the [↑] key several times to display 1.00%. You can press and hold the key to change the value more quickly. *The [↑] [↓] keys enable you to change the value.	 Press several times
27.	Press the [ENTER] key to save all the settings. [End] is displayed, then the screen switches to the mass display. To perform moisture content measurement with the changed settings, refer to "5. Measurement ".	

7.   Function Tests and Adjustment

This section describes the function tests included in the product for checking operation and the sensitivity adjustment for the mass sensor and heating temperature.

7.1.   Function Tests and Adjustment Modes

The product contains the following function tests and adjustment modes.

Name	Display	Description
Moisture content measurement check 1	CHECK 1 MOIST	Uses a test sample (sodium tartrate dihydrate) to check whether moisture content measurement is performed correctly.
RSTEMP	RStEMP	Automatically determines the recommended heating temperature by performing test heating of a sample for which the appropriate heating temperature is unknown.
Heater check	HEAt CHECK	Confirms that the heater is operating.
Mass sensor sensitivity adjustment	CAL	Adjusts the sensitivity of the mass sensor.
Heating temperature adjustment	t-CAL	Adjusts the heating temperature.

7.2.   Test Sample Function Check
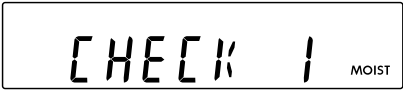
Regarding the test sample (sodium tartrate dihydrate)
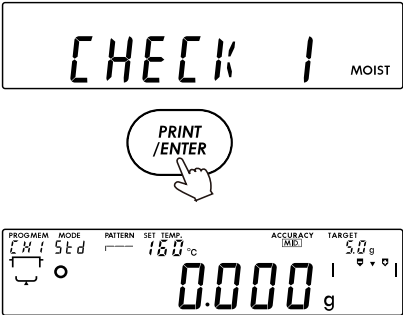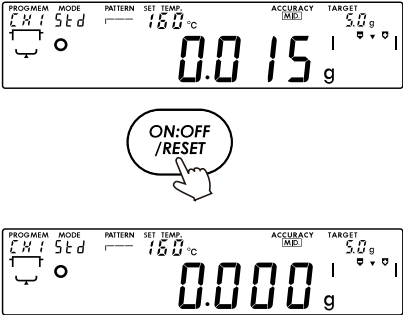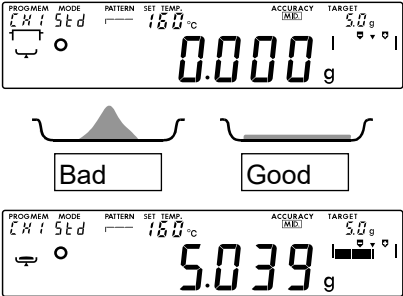
- Sodium tartrate dihydrate ($Na_2C_4H_4O_6/2H_2O$) can be used for checking the performance of the moisture analyzer. Sodium tartrate includes 15.66% moisture in theory but this value differs according to how the substance is stored.
- Normally, the following measurement method will give a moisture content of 15.0 to 16.0% (standard before drying).
- Sodium tartrate is also used as a food additive, but may irritate the eyes and nose. If it gets on your skin, wash it away with water.
- Dispose of the sodium tartrate after measurement as burnable waste. It cannot be reused.
- Sodium tartrate is included with the MS-74A/MX-53A.
  For the MF-53A/ML-53A, sodium tartrate is available separately.
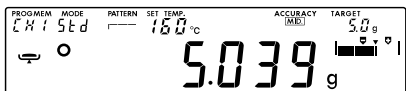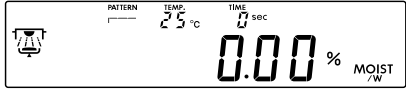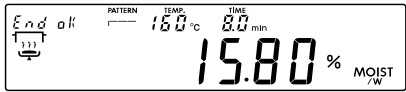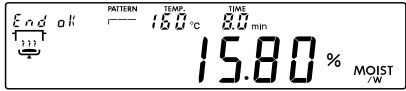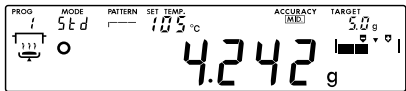
CAUTION

- If the sample tray is hot before measurement starts, measurement error may occur.

Step	Description	Operation
1.	Press and hold the PROGRAM key (for approx. two seconds) with the mass displayed to display moisture content measurement check 1 ($CHECK\ 1$ MOIST).	 Long press (for approx. two seconds)

Step	Description	Operation
2.	Press the ⎿ENTER⏌ key to switch to moisture content measurement check 1 (⌐HE⌐K I MOIST). The measurement conditions are automatically set to the following recommended conditions. 　Measurement conditions 　　Measurement mode: Standard measurement mode 　　Heating pattern: Standard heating 　　Temperature: 160°C 　　Measurement accuracy: ⎿MID.⏌ 　　Sample mass 　　Maximum mass value: 6.0 g 　　Minimum mass value: 4.0 g 　　Measurement basis: Moisture content (standard before drying) 　　Comparator 　　Maximum: 16.0% 　　Minimum: 15.4% To return to the mass display without executing the check, press the ⎿STOP⏌ key.	CHECK 1 MOIST PRINT /ENTER 0.000 g
3.	Press the ⎿RESET⏌ key to reset the displayed mass value to zero.	0.015 g ON:OFF /RESET 0.000 g
4.	Place the test sample flat on the sample tray.	0.000 g Bad　　　Good 5.039 g

Step	Description	Operation
5.	Close the lid, then press the [START] key to start measuring the moisture content. Approx. 10 minutes later, the measurement result is displayed. The product is operating normally if the measurement result is between 15.4 and 16.0% (if *oK* is displayed by the comparator function).	*(display: CH1 Std, SET TEMP 160°C, TARGET 5.0g, 5.039 g)* START *(display: StARt)* *(display: PATTERN, TEMP 25°C, TIME 0 sec, 0.00 % MOIST/W)* Wait for measurement to stop (approx. 10 min) *(display: End oK, TEMP 160°C, TIME 8.0 min, 15.80 % MOIST/W)*
6.	The product is operating normally if the measurement result is between 15.4 and 16.0% (if *oK* is displayed by the comparator function). If GLP output is set, the result of checking the product functionality with a test sample is output after the operation is finished. (Refer to "inFo (GLP output)" in "dout (data output)" in "8. Internal Settings".) For information on the output result, refer to "9.3.3. 9.3.3. Test Sample Output for Function Check". Press the [SELECT] key to return to the mass display.	*(display: End oK, TEMP 160°C, TIME 8.0 min, 15.80 % MOIST/W)* SELECT *(display: PROG 1 Std, SET TEMP 105°C, TARGET 5.0g, 4.242 g)*
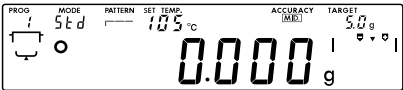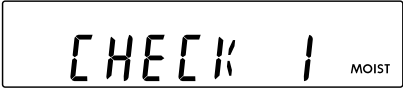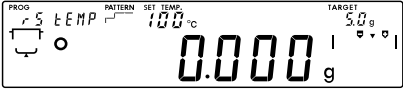
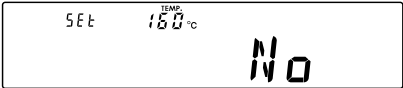# 7.3.   RS TEMP (Heating Temperature Detection Function)

Regarding RS TEMP
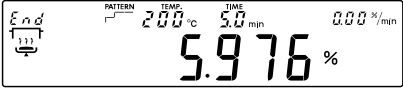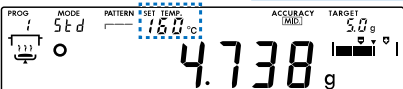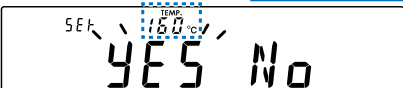
- This function automatically determines the recommended heating temperature based on changes in the moisture content when performing test heating at multiple temperatures (100 to 200°C) on a sample for which the appropriate heating temperature is unknown.
- The recommended heating temperature is displayed after performing test heating. You can also set the recommended temperature as the heating temperature if required.
- It takes about 30 minutes for the temperature to be determined. Test heating is performed at 100°C, 120°C, 140°C, 160°C, 180°C, and 200°C for five minutes each.
- You can connect to a computer and use the RsTemp function of the WinCT-Moisture software to perform test heating for an arbitrary temperature and heating time. (Refer to "13.4.2. RsTemp Software for Automatic Heating Temperature Detection")

CAUTION

● RsTemp determines the recommended heating temperature based on the measurement and calculated result, but the recommended temperature may not be able to be appropriately determined, depending on the sample type and amount.

● When deciding the heating temperature of the sample, also observe the state of the sample over time by sight and smell, etc. (whether it melts, burns, smells, or disintegrates) and use that information to help decide the heating temperature.

Step	Description	Operation
1.	Press and hold the ⌐PROGRAM⌐ key (for approx. two seconds) with the mass displayed to display moisture content measurement check 1 (*CHECK 1* MOIST).	PROG 1 Std MODE PATTERN SET TEMP. 105°C ACCURACY MID TARGET 5.0g 0.000 g PROGRAM Press and hold (for approx. two seconds) CHECK 1 MOIST
2.	Press the ⌐↑⌐ key to display *RSTEMP*.	CHECK 1 MOIST ⬆ RSTEMP
3.	Press the ⌐ENTER⌐ key to switch to moisture content measurement check 1. To return to the mass display without executing the check, press the ⌐STOP⌐ key.	RSTEMP PRINT /ENTER PROG rS tEMP PATTERN SET TEMP. 100°C TARGET 5.0g 0.000 g

Step	Description	Operation
4.	Place the sample to check the heating temperature of flat on the sample tray. Determine the sample amount based on the following. | Expected moisture content	Sample amount
---	---
0 to 0.1%	20 g or more
0.1 to 1%	5 g or more
1% or higher	2 g or more		PROG ┌ 5 ┣EMP PATTERN SET TEMP. *100*℃ TARGET *5.0*g *0.000* g Bad ⌣ Good ⌣ PROG ┌ 5 ┣EMP PATTERN SET TEMP. *100*℃ TARGET *5.0*g *5.039* g
5.	Close the lid, then press the START key to start test heating.	PROG ┌ 5 ┣EMP PATTERN SET TEMP. *100*℃ TARGET *5.0*g *5.039* g START *5┣ART* PROG ┌ 5 ┣EMP PATTERN TEMP. *100*℃ TIME *20*sec *0.12* % . . .

85
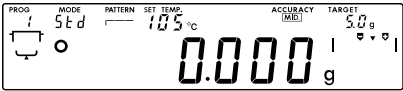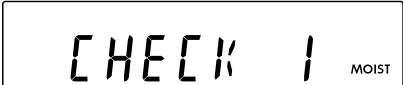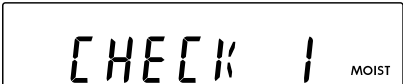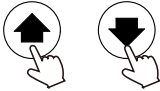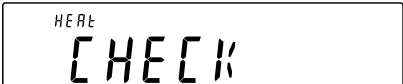
Step	Description	Operation
6.	Approx. 30 minutes later, the estimated heating temperature is displayed. The operation branches with keys as follows.	*End* PATTERN TEMP. 200°C TIME 5.0 min 0.00 %/min **5.976 %** SEt 160°C **YES No**
	To set the displayed temperature Press the ENTER key while *YES* is flashing. The estimated temperature measured in *AStEMP* is set in the measurement conditions.	Temperature display SEt 160°C **YES No** PRINT /ENTER **End** Applied as set temperature PROG 1 MODE Std PATTERN SET TEMP. 160°C ACCURACY MID TARGET 5.0 g **4.738 g**
	To not set the displayed temperature Press the SELECT key to select *No* (making it flash). Press the ENTER key while *No* is flashing. The product returns to the mass display without changing the heating temperature.	Temperature display SEt 160°C **YES No** SELECT SEt 160°C **YES No** PRINT /ENTER SEt 160°C **No** No temperature change PROG 1 MODE Std PATTERN SET TEMP. 105°C ACCURACY MID TARGET 5.0 g **4.738 g**

7.4.   Self-Inspection

The self-inspection function is used to check the operation of the moisture analyzer. This inspection checks the moisture analyzer for problems when the correct measurement results are not obtained or an operation error is expected. A light is turned on while the function is operating, and temperature control is also checked.

CAUTION

- Do not place flammable objects in the vicinity of the product, as with regular measurement.
- Do not place objects on the heater cover.

Step	Description	Operation
1.	Press and hold the PROGRAM key (for approx. two seconds) with the mass displayed to display moisture content measurement check 1 (*CHECK 1* MOIST).	Press and hold (for approx. two seconds)
2.	Press the ↑ or ↓ keys several times to display the heater check (*HEAT CHECK*).	

Step	Description	Operation
3.	Load the sample tray holder and sample tray only, close the heater cover, then press the ENTER key. (Align the sample tray handle with the notch of the breeze break.)	Sample tray only / Prepare the tray / Close HEAT CHECK PRINT /ENTER CH . . . . .
4.	The check normally finishes in about one minute.	
	If the check completes without an error A buzzer sounds, CH PASS is displayed for a certain period of time, then the product automatically returns to the mass display.	CH PASS PROG MODE PATTERN SET TEMP. ACCURACY TARGET 1 Std 105℃ MID 5.0 g 0.000 g
	If an error occurs A buzzer sounds and an error is displayed. *For information on handling the error, refer to "15.6. Errors Displayed". Example errors displayed CH no Error0 Ht Err	Example errors displayed CH no Error0 Ht Err
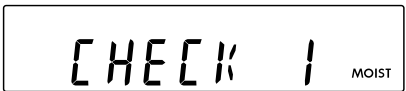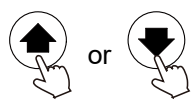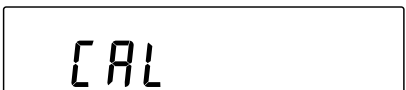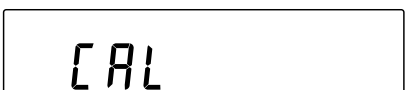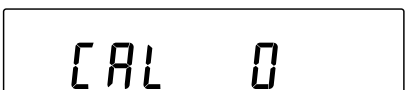
7.5.   Adjusting the Sensitivity of the Mass Sensor
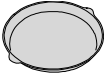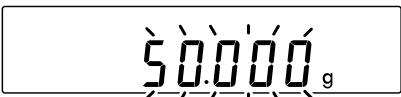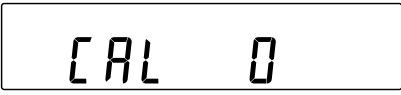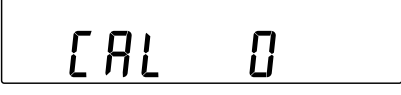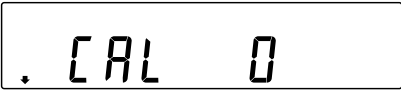
You can use the 20 g or 50 g weight.
It is recommended that you use the 20 g weight for sensitivity adjustment (AX-MX-41 or AD1603-20F1).
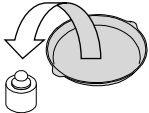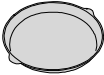
CAUTION

● Avoid disturbance such as vibrations or wind during sensitivity adjustment. Sensitivity adjustment may not be able to be performed if there is disturbance.

● Because a tall weight may touch the top glass of the heater, use a short weight (20 g weight) where possible. When you have no choice but to use a tall weight, perform sensitivity adjustment with the heater cover open. Ensure that there is no disturbance such as wind.

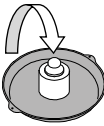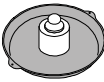| Step	Description	Display and key operation	Operation
1.	Open the heater cover, load the tray holder and sample tray, then close the heater cover.		
2.	Press and hold the ⎡PROGRAM⎤ key (for approx. two seconds) with the mass displayed to display moisture content measurement check 1 ($CHECK$ 1_{MOIST}).	0.000 g PROGRAM Press and hold (for approx. two seconds) $CHECK$ 1 MOIST	
3.	Press the ⎡↑⎤ or ⎡↓⎤ keys several times to display the mass sensor sensitivity adjustment (CAL).	$CHECK$ 1 MOIST ⬆ or ⬇ CAL	
4.	Press the ⎡ENTER⎤ key to switch to mass sensor sensitivity adjustment.	CAL PRINT /ENTER	
5.	The zero point for sensitivity adjustment is displayed. To change the weight value, proceed to step 6. Otherwise, proceed to step 8.	CAL 0	
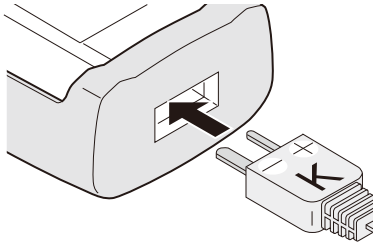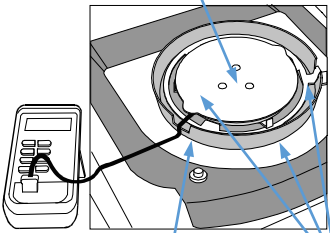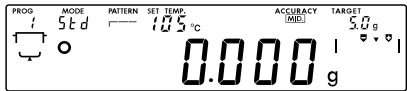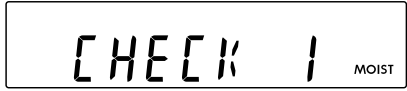
Step	Description	Display and key operation	Operation
6.	Press the SELECT key to display the current weight value.	20.000 g	
7.	Press the ↑ or ↓ key to change the weight value.	20.000 g ↑ or ↓ 50.000 g	
8.	Press the ENTER key to change the weight value. Press the RESET key to exit without changing the weight value.	50.000 g PRINT/ENTER or ON:OFF/RESET CAL 0	
9.	Confirm that there are no objects on the sample tray, then press the ENTER key with the heater cover closed.	CAL 0 PRINT/ENTER	
10.	Weigh the zero point. Avoid vibrations.	. CAL 0	
11.	The weight value to use for sensitivity adjustment is displayed. Place the weight on the sample tray, then press the ENTER key.	20 PRINT/ENTER	
12.	Weigh the weight. Avoid vibrations.	. 20	
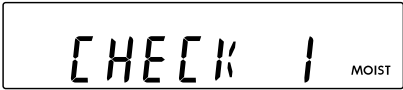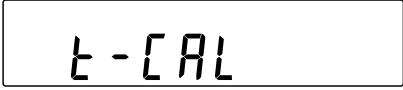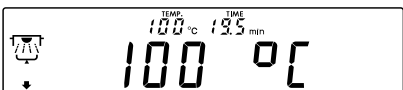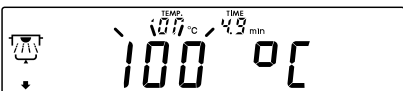
Step	Description	Display and key operation	Operation
13.	Remove the weight from the sample tray.	End	
14.	If GLP output is set, a sensitivity adjustment record is output after the operation is finished. (Refer to $info$ (GLP output) in $\boxed{dout}$ (data output) in "8. Internal Settings".) For information on the output result, refer to "9.3.4. Mass Sensor Output for Sensitivity Adjustment".	$.GLP$ GLP output End	
15.	The product automatically returns to the mass display.	PROG MODE PATTERN SET TEMP. ACCURACY TARGET 1 5td 105°c MID 5.0g 0.000 g	
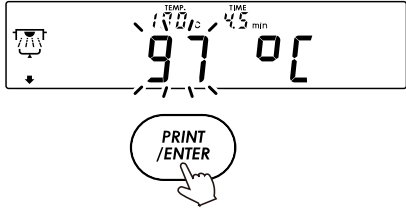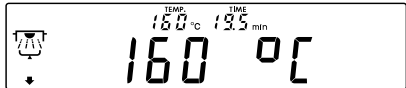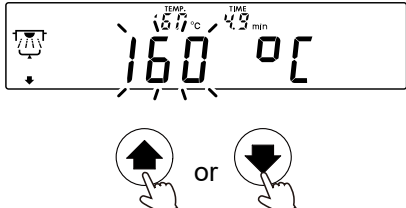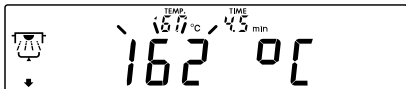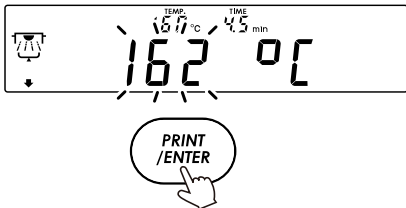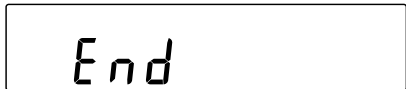
7.6. Adjusting the Heating Temperature

- Place the sensor of the optional temperature adjustment kit (AX-MXA-43) on the tray holder, measure the temperature of the sample tray part, then input the measurement result to the moisture analyzer. This process is performed at 100°C and 160°C.
- Heating is performed at both temperatures for 20 minutes. A buzzer sounds when 20 minutes have elapsed.
- If five minutes elapse without any data input since the buzzer sounded, t-UP is displayed and the process is canceled. Press any key to return to the mass display.
- For information on operating the temperature display, refer to the instruction manual that came with the temperature adjustment kit.

Sensor

Temperature display

Step	Description	Operation
1.	Connect the sensor of the temperature adjustment kit to the temperature display.	
2.	Press the ON OFF key for the temperature display of the temperature adjustment kit to turn the temperature adjustment kit on.	ON OFF
3.	Open the heater cover, remove the sample tray, then place the sensor of the temperature adjustment kit on the tray holder.	Sensor Ensure that the top sensor surface is flat Remain flat Bend the sensor wire so that it does not touch the heater cover.
4.	Close the heater cover. When doing so, ensure that the wire of the temperature sensor is not pushed by the glass inside the heater unit, as it can cause the sensor of the temperature adjustment kit to lift up. Fold back the cable protruding from the sensor as required.	
5.	Press and hold the PROGRAM key (for approx. two seconds) with the mass displayed to display moisture content measurement check 1 (CHECK 1 MOIST).	PROG 1 MODE Std PATTERN SET TEMP. 105°C ACCURACY MID TARGET 5.0g 0.000 g PROGRAM Press and hold (for approx. two seconds) CHECK 1 MOIST

Step	Description	Operation
6.	Press the ↑ or ↓ keys several times to display the heating temperature adjustment (*t - CAL*).	CHECK 1 MOIST ⬆ or ⬇ *t-CAL*
7.	Press the ENTER key to switch to heating temperature adjustment.	*t-CAL* PRINT /ENTER 20.0 min TIME 100 °C
8.	Press the START key. The moisture analyzer starts temperature control to heat the sample tray to 100°C.	20.0 min TIME 100 °C START 100 °C 19.5 min TEMP. TIME 100 °C
9.	When 20 minutes have elapsed, a buzzer sounds, then 100°C flashes. Press the ↑ or ↓ key to change the flashing number until it reaches the actual temperature displayed on the thermometer. (Example: 97°C)	100 °C 4.9 min TEMP. TIME 100 °C ⬆ or ⬇ 170 °C 4.5 min TEMP. TIME 97 °C

Step	Description	Operation
10.	Press the ENTER key to confirm the value. After displaying End, the moisture analyzer starts temperature control to heat the sample tray to 160°C.	170°C 4.5 min **97** °C PRINT /ENTER End 160°C 19.5 min **160** °C
11.	When 20 minutes have elapsed, a buzzer sounds, then 160°C flashes. Press the ↑ or ↓ key to change the flashing number until it reaches the actual temperature displayed on the thermometer. (Example: 162°C)	160°C 4.9 min **160** °C ↑ or ↓ 160°C 4.5 min **162** °C
12.	Press the ENTER key to confirm the value. After displaying End, the moisture analyzer starts temperature control to heat the sample tray to 160°C.	160°C 4.5 min **162** °C PRINT /ENTER End
13.	If GLP output is set, a heating temperature adjustment record is output after the operation is finished. (Refer to $info$ (GLP output) in $dout$ (data output) in "8. Internal Settings".) For information on the output result, refer to "9.3.5. 9.3.5. Output for Heating Temperature Adjustment".	. GLP GLP output End
14.	The product automatically returns to the mass display.	PROG 1 MODE 5td PATTERN SET TEMP. 105°C ACCURACY MID TARGET 5.0 g **0.000** g

8.   Internal Settings

In 8. Internal Settings, you can configure and change the operation and communication of the moisture analyzer. The setting values are retained even when the power cable is removed.
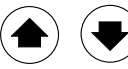
The menu in "8. Internal Settings" is comprised of two levels, categories and settings, and each setting stores a single value. The setting values that are last displayed are enabled. Updated setting values are reflected in the operation of the moisture analyzer after the ⎿ENTER⏌ key is pressed.

(Example) ⎿*dout*⏌ Data Output category

```
dout
```

Prt Data Output Mode setting

0 Key Mode setting

```
 Prt            0
  o      KEY
```
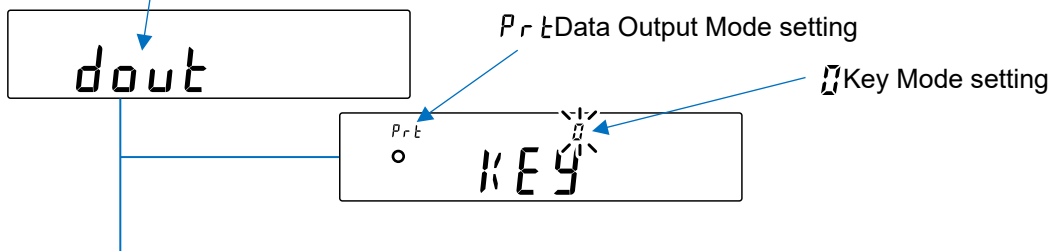
8.1.   Procedure
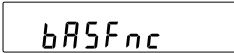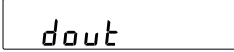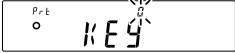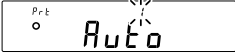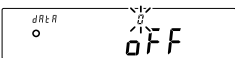
Internal settings display and key operation
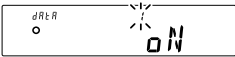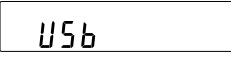
o	The **o** icon is displayed for setting values that are currently enabled.
(SELECT)	Press and hold (for approx. two seconds) with the mass displayed to switch to the internal settings menu. (Display the categories) It changes the category or setting.
(⬆) (⬇)	While a setting is displayed, changes the setting value.
(PRINT /ENTER)	Displays the setting in the category. Registers the setting value, then proceeds to the next category.
(ON:OFF /RESET)	While a setting is displayed, cancels the setting and proceeds to the next category. While a category is displayed, exits the internal settings and returns to the mass display.

Procedure

In this example, "the data output mode ($Pr\,t$)" is set to "auto print ($Pr\,t = 1$)",
and "the data memory function ($dAtA$)" is set to "oN record measurement results ($dAtA = 1$)".

Step	Description	Category	Setting
1.	Press and hold the ⌞SELECT⌟ key (for approx. two seconds) with the mass displayed to display ⌞bASFnc⌟.	Press and hold (for approx. two seconds) bASFnc Environment/Display	
2.	Press the ⌞SELECT⌟ key several times to change the category to display "dout".	Press several times dout "Data Output"	
3.	Press the ⌞ENTER⌟ key to switch to the selected category.	PRINT/ENTER	$Pr\,t$ KEY "Data Output Mode" "Key Mode"
4.	Press the ⌞↑⌟ ⌞↓⌟ keys to change the value of the selected setting and display " $1 : Auto$ ".	⬆ or ⬇	$Pr\,t$ Auto "Data Output Mode" "Auto Print Mode"
5.	Press the ⌞SELECT⌟ key to change the setting to display " $dAtA$ ".	SELECT	$dAtA$ oFF "Data Memory Function" "oFF"

Step	Description	Category	Setting
6.	To change other settings of the same category, repeat steps 4 and 5. To finish changing the settings of the selected category, proceed to step 7.	⬆ or ⬇	dAtA ○ oN "Data Memory Function" "oN"
7.	To register the setting, Press the ENTER key to display the next category.	PRINT /ENTER USb "Serial Interface"	
	To cancel the setting, Press the RESET key to display the next category. The setting value will not be changed.	ON:OFF /RESET USb "Serial Interface"	
8.	To change the settings of another category, return to step 2. To cancel changing the settings, press the RESET key. The screen returns to the mass display.	ON:OFF /RESET PROG MODE INTERVAL SET TEMP ACCURACY TARGET 1 Std 105℃ 50% 0.000 g	

8.2.   List of Items

Category	Setting	Set value		Description/purpose	
 `bASFnc` (**Bas**ic**Func**ti on) Environment/ display	`Pnt` (**P**o**i**nt) Decimal point	■ `0`	. Period	The symbol to display/output for the decimal point.	
		`1`	, Comma		

	`LEd`
	(Display **LED**)
	Backlight brightness
		`0`
		`{`
		`9`
			10% to 100%		

		■ `7`	80% by default		
	P-oFF (**P**ower **Off**) Auto power off	■ `0`	Off	The display automatically turns off if no operations are performed for 10 minutes.	
		`1`	On (10 minutes)		
	`CALC-Dt` (**Calc**ulation **Dat**a) Calculation data	■ `0`	int: Perform calculations with priority given to the accuracy of the moisture content. The moisture content is calculated with more digits than the displayed mass.		
		`1`	DiSPLAy: The moisture content is calculated with the number of digits for the displayed mass.		
 `CL AdJ` (**Cl**ock **Adj**ustment) Clock			Refer to "8.4. Checking and Configuring the Date/Time".	Checks and adjusts the date and time. The date and time are used for output.	
 `PrG Fnc` (**Prog**ram **Func**tion) Additional functions for measuremen t conditions	`CP` (**C**omparator) Comparator mode	■ `0`	oFF: Do not use the comparator function.		
		`1`	oN: Use the comparator function.		
	`oFF SEt` (**Off Set**) Moisture content measurement result correction	■ `0`	oFF: Do not use moisture content measurement result correction.		
		`1`	oN: Use moisture content measurement result correction.		

■ indicates a default setting.

Category	Setting	Set value	Description/purpose	
	Prt (**Pr**int) Data output mode	■ *0* Key mode	Press the ENTER key to output data.	
		1 Auto print mode	When measurement finishes, the data is automatically printed.	
		2 Stream mode	The data is continuously output during measurement.	
	dAtA (**Data** Memory) Data memory function	■ *0*	oFF: Do not record the measurement results.	
		1	oN: Record the measurement results.	
	S-d (**S**end **D**ata) Sent data	■ *0*	Output the measurement results only.	
		1	Output the measurement results and the temperature data.	
	PUSE (**Pa**use) Data output interval	■ *0* Disabled	Select the interval for data output.	
		1 Enabled: Wait 1.6 seconds		
dout (**D**ata **out**) Data output	*inFo* (**Info**rmation) GLP output	■ *0* Disabled		
		1	*ALL iNt*: For each measurement result, outputs (prints) device information, measurement conditions, measurement results, and the signature space together. The clock data of the moisture analyzer is used to output the date and time.	
		2	*SEP iNt*: Outputs the measurement results and the device information, measurement conditions, and signature space separately. The clock data of the moisture analyzer is used to output the date and time.	
		3	*ALL Ext*: For each measurement result, outputs (prints) device information, measurement conditions, measurement results, and the signature space together. The clock data of an external device is used to output the date and time.	
		4	*SEP Ext*: Outputs the measurement results and the device information, measurement conditions, and signature space separately. The clock data of an external device is used to output the date and time.	
USb (**USB**) USB settings	*UFnc* (**U**SB **Func**tion)	*0*	QuicK: Quick USB	
		■ *1*	V CoM: Bidirectional virtual USB COM	
id (**ID**) ID number settings			Refer to "9.2. Configuring the ID Number".	

Category	Setting	Set value		Description/purpose	
PASSwd (**Pass**word) Password	PW (**P**ass**w**ord) Password function	■ 0	Disabled	Refer to "11. Password Function".	
		1	Enabled (restrict use of moisture analyzer)		
		2	Enabled (moisture measurement is available)		
	PASSNo. (**Pass**word **No**.) Password registration	ADMIN	Administrator password entry		
		USER 01	User 1 password entry		
		(	(		
		USER 10	User 10 password entry		
initFnc (**Init**ialize **Func**tion) Initialization function	Clr Fnc (**Cl**ear **Func**tion) Initialize internal settings		Enables you to restore the default internal settings of the product. Refer to "15.4. Initializing the Settings".		
	Clr ALL (**Cl**ear **All**) Initialize all		Enables you to restore the default settings of the product. Refer to "15.4. Initializing the Settings".		

■ indicates a default setting.

8.3. Description of Environment/Display Settings

Description of Pnt (decimal point)
Selects the symbol to display and output for the decimal point.

Description of LEd (backlight brightness)
Selects the brightness of the LCD backlight.

Description of P-oFF (auto power off)
The display automatically turns off if no operations are performed for a certain period of time (approx. 10 minutes).

If "PW (the password function)" in "PASSwd (password)" is set to "enabled (Lock = 1 or 2)", the display automatically turns off and the user is logged out if no operations are performed.

CAUTION
- The display does not turn off during heating.
- The display does not turn off while the result is displayed, but it may turn off when the product returns to the mass display. (If no operations are performed for a certain period of time (approx. 10 minutes) when logged in as the administrator)

Description of CALC-Dt (calculation data)
You can select whether to use the internal mass value (with more digits than the displayed mass) to improve the accuracy of calculating the moisture content, or use the number of digits for the displayed mass.

If the internal mass value is used, the accuracy of the moisture content will be higher, but there may be a difference between the measurement result of the moisture analyzer and the moisture content separately calculated from the mass values output after drying and before drying.

8.4. Checking and Configuring the Date/Time

The moisture analyzer contains a date/time function. This mode enables you to check and configure the date and time. If "$inFo$ (GLP output)" is set to "$1 : ALL \ iNt$" or "$2 : SEP \ iNt$" in "$\boxed{dout}$ (data output)" in "8. Internal Settings", GLP output is performed when outputting the moisture content measurement result and when adjusting the mass sensor sensitivity or adjusting the heating temperature.
If "$inFo$ (GLP output)" is set to "$3 : ALL \ Ext$" or "$4 : SEP \ Ext$", the clock data of an external device is used.

CAUTION
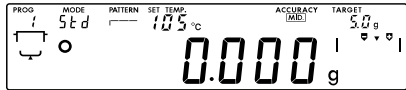
- Do not configure an invalid value (such as a date that does not exist).
- When the backup battery of the clock expires, $\boxed{rtc \ PF}$ will be displayed.

  Battery replacement requires a repair at the place of purchase, but functions other than the clock will continue to operate even if the backup battery has expired. The clock function will also operate normally, as long as power is supplied to the moisture analyzer.
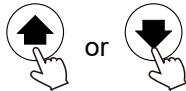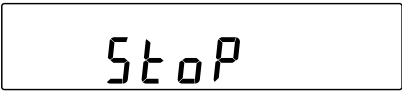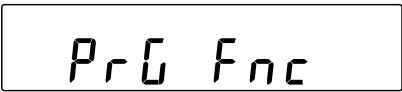
  Press the keys to configure the date and time.

You can perform the following operations to check and configure the date and time.
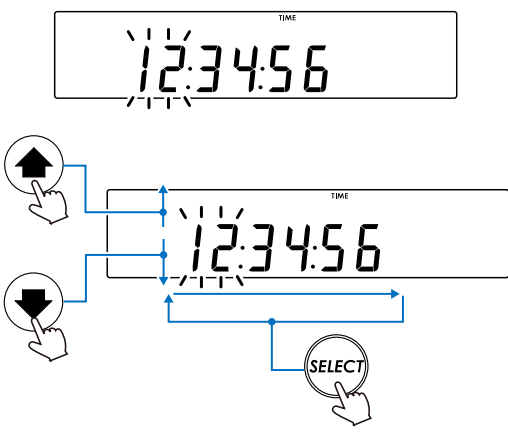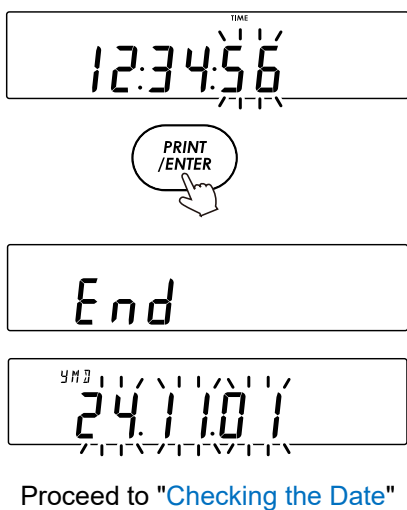
Switching to the Mode for Checking the Date and Time

Step	Description	Display and key operation
1.	Press and hold the $\boxed{\text{SELECT}}$ key (for approx. two seconds) with the mass displayed to display the "8. Internal Settings" menu.	SELECT — Long press (for approx. two seconds) — bASFnc
2.	Press the $\boxed{\text{SELECT}}$ key to match the display with the figure.	SELECT — CL Adj
3.	Press the $\boxed{\text{ENTER}}$ key to switch to checking the time.	PRINT/ENTER — 12:34:56
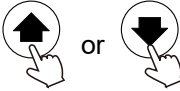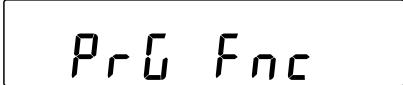
Checking the Time

Step	Description	Display and key operation
4.	The current time is displayed. (All digits flash) The operation branches with keys as follows.	TIME `12:34:56`
	· To change the time, press the [↑] or [↓] key. Proceed to "Configuring the Time" (step 5).	⬆ or ⬇ TIME `12:34:56` Proceed to "Configuring the Time"
	· To check the time, press the [SELECT] key. Proceed to " Checking the Date" (step 7).	SELECT YMD `24.11.01` Proceed to "Checking the Date"

	· To finish configuring the settings, press the [STOP] key.
	Proceed to "Finishing the Check/Configuration Operation"
	(step 10).
		ON:OFF /RESET
		`StoP`
		`PrG Fnc`
		Proceed to "Finishing the Check/Configuration Operation"
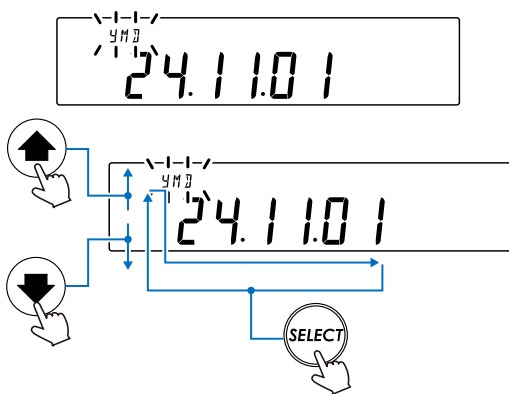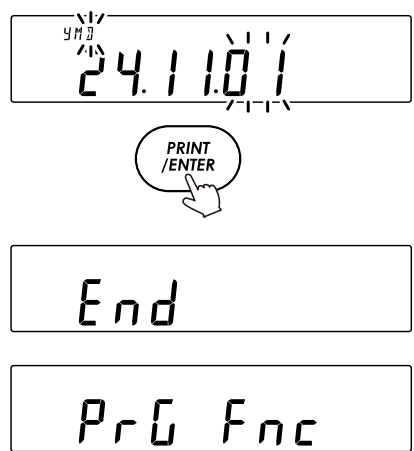
Configuring the Time

Step	Description	Display and key operation
5.	Press the following keys to configure the time. (In the 24-hour format) ↑ key ·········· Increments the value of the flashing digit (+1).*1 ↓ key ·········· Decrements the value of the flashing digit (-1).*1 SELECT key·· Moves the cursor. *1 Increases or decreases by 30 when changing the number of seconds.	TIME 12:34:56 TIME 12:34:56 SELECT
6.	Press the ENTER key to register the new time. (Press the RESET key to cancel.) Proceed to "Checking the Date" (step 7).	TIME 12:34:56 PRINT /ENTER End YMD 24.11.01 Proceed to "Checking the Date"
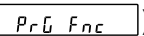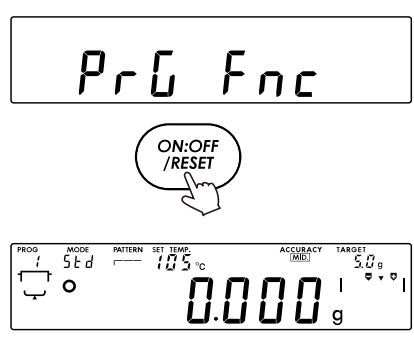
Checking the Date

Step	Description	Display and key operation
7.	The current date is displayed. (All digits flash) The operation branches with keys as follows.	YMD 24.11.01
	· To change the date, press the [↑] or [↓] key. Proceed to "Configuring the Date" (step 8).	⬆ or ⬇ YMD 24.11.01 Proceed to "Configuring the Date"
	· To check the time again, press the SELECT key. Proceed to "Checking the Time" (step 4).	SELECT TIME 12:34:56 Proceed to "Checking the Time"
	· To finish configuring the settings, press the STOP key. Proceed to "Finishing the Check/Configuration Operation" (step 10).	ON:OFF /RESET StoP PrG Fnc Proceed to "Finishing the Check/Configuration Operation"

Configuring the Date

Step	Description	Display and key operation
8.	Press the following keys to configure the date. (For the year, set the last two digits of the Gregorian calendar.) $\boxed{\uparrow}$ key ·········· Increments the value of the flashing number (+1). $\boxed{\downarrow}$ key ·········· Decrements the value of the flashing number (-1). $\boxed{\text{SELECT}}$ key·· Moves the cursor.	YMD 24.11.01
9.	Press the $\boxed{\text{ENTER}}$ key to register the new time. (Press the $\boxed{\text{STOP}}$ key to cancel.) Proceed to "Finishing the Check/Configuration Operation" (step 10).	YMD 24.11.01 PRINT /ENTER End PrG Fnc Proceed to "Finishing the Check/Configuration Operation"

Finishing the Check/Configuration Operation

Step	Description	Display and key operation
10.	The next internal setting (PrG Fnc) is displayed. Press the $\boxed{\text{STOP}}$ key to return to the mass display.	PrG Fnc ON:OFF /RESET PROG 1 MODE Std PATTERN SET TEMP. 105°C ACCURACY MID TARGET 5.0 g 0.000 g

8.5. Additional Functions for Measurement Conditions

You can enable measurement conditions that are disabled by default.

When a function is enabled, the setting is added to the measurement conditions.

Even if functions are configured in the measurement conditions, they will not operate if they are disabled in the internal settings.

Description of CP (comparator mode)

If $1 : oN$ is set, the comparator setting is added to the measurement conditions.

When a moisture content lower limit and upper limit are set, the comparator result of $Hi/oK/Lo$ is added when displaying the moisture content of measurement results, when performing GLP output for the measurement results, and when saving the measurement results with the data memory function.

If $0 : oFF$ is set, the comparator setting is not added to the measurement conditions.

(For details, refer to "6.4.10. Comparator Values".)

Description of oFF SEt (moisture content measurement result correction)

If $1 : oN$ is set, the correction of measurement results setting is added to the measurement conditions.

The set value is added when displaying/outputting the measured moisture content.

Formula

The displayed moisture content equals the moisture content that is actually measured plus the correction value.

CAUTION

● If the measured value is negative, 0% is displayed for the moisture content.

If $0 : oFF$ is set, correction is not performed.

(For details, refer to "6.4.11. Correction of measurement results".)

8.6. Description of Data Output

8.6.1. Data Output Mode

The timing of the data output can be switched with "Prt (data output mode)" in "[$dout$] (data output)" in "8. Internal Settings".

Key mode
Internal settings [$dout$] $Prt = 0$

You can press the ⌷ ENTER ⌷ key to output the displayed mass value and moisture content once.

Auto print mode
Internal settings [$dout$] $Prt = 1$

When moisture content measurement finishes, the measurement results are automatically output.
You can also press the ⌷ ENTER ⌷ key to output the displayed mass value and moisture content once.

Stream mode
Internal settings [$dout$] $Prt = 2$

The data is continuously output during measurement.
You can also press the ⌷ ENTER ⌷ key while the mass or result is displayed to output the displayed mass value and moisture content once.

8.6.2.   Data Format

Format output from the virtual COM (USB) and RS-232C: Standard A&D format

($5\text{-}d$ = 0 and $info$ = 0 in the internal settings)

- Each item of data includes 15 characters. (Not including the terminator)
- The state of the data is indicated in two headers.
- The data is signed and is zero-padded (leading spaces are filled with zeros).
- When the data is zero, it is deemed positive.
- Each item of data includes 3 characters.

C_R	0Dh	Carriage return
L_F	0Ah	Line feed
$_\sqcup$	20h	Space

Virtual COM (USB), RS-232C | S | T | , | + | 0 | 0 | 0 | 0 | . | 1 | 2 | 3 | $\sqcup$ | $\sqcup$ | g | CR | LF |

Header   Data   Unit   Terminator

S	T	When stable	CR	: Carriage return	ASCII 0Dh
U	S	When unstable	LF	: Line feed	ASCII 0Ah
O	L	When overloaded	$\sqcup$	: Space	ASCII 20h
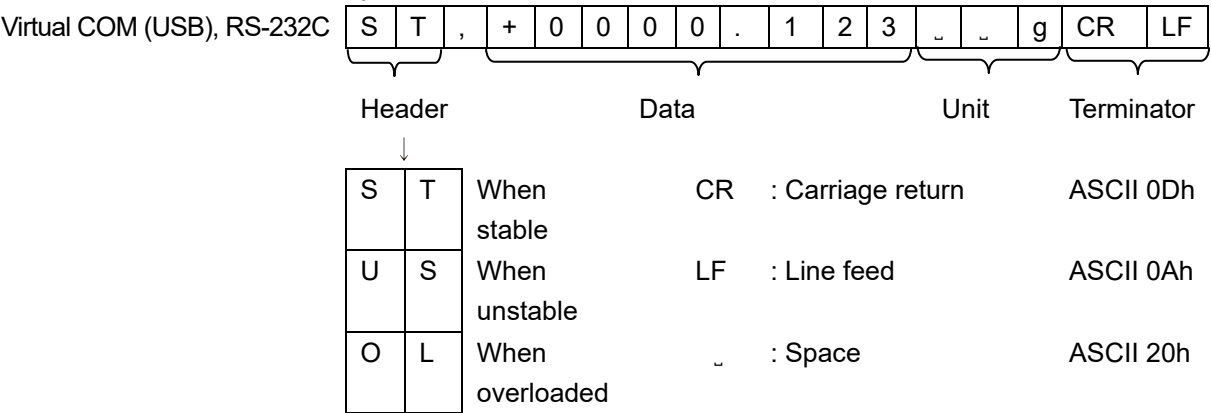
Format output with quick USB: NU2 format

($5\text{-}d$ = 0 and $info$ = 0 in the internal settings)

- Only values are output.
- When the data is zero or a positive value, it is not signed.

Quick USB | 0 | . | 1 | 2 | 3 | CR | LF |

Data   Terminator
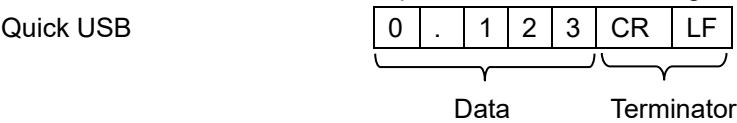
8.6.3.   Example Output for Data Format

Sample mass value (data format output when performing measurement with the mass display or "g" for the unit)
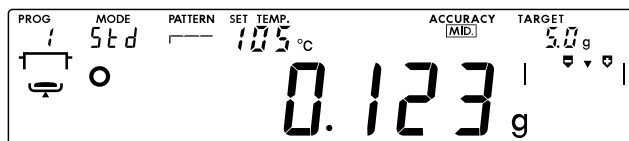
| A&D | S | T | , | + | 0 | 0 | 0 | 0 | . | 1 | 2 | 3 | ␣ | ␣ | g | CR | LF |
| NU2 | 0 | . | 1 | 2 | 3 | CR | LF | | | | | | | | | | |

When over (positive)
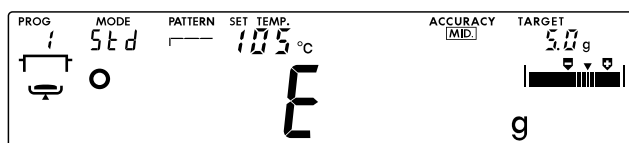
| A&D | O | L | , | + | 9 | 9 | 9 | 9 | 9 | 9 | 9 | E | + | 1 | 9 | CR | LF |
| NU2 | + | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | CR | LF | | | | | | |

When over (negative)
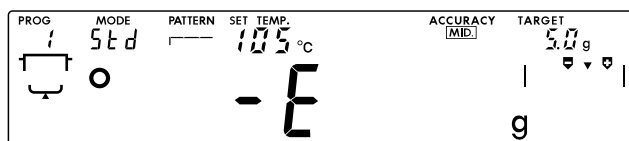
| A&D | O | L | , | – | 9 | 9 | 9 | 9 | 9 | 9 | 9 | E | + | 1 | 9 | CR | LF |
| NU2 | – | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | CR | LF | | | | | | |

Moisture content (data format output during measurement or after measurement is finished)

*   The position of the decimal point in the data depends on the model and the minimum displayed.

($S\text{-}d$ = 0 and $info$ = 0 in the internal settings)
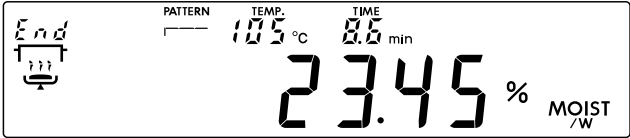
A&D	S	T	,	+	0	0	0	2	3	.	4	5	␣	␣	%	CR	LF
NU2	2	3	.	4	5	CR	LF										

When adding temperature data to the moisture content data

($S\text{-}d$ = 1 and $info$ = 0 in the internal settings)
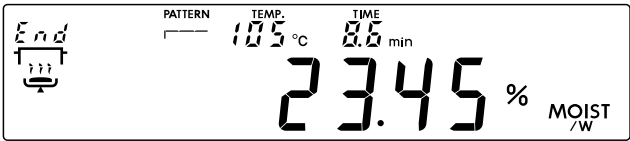
A&D	1	0	5	,	S	T	,	+	0	0	0	2	3	.	4	5	␣	␣	%	CR	LF
NU2	1	0	5	TAB	2	3	.	4	5	CR	LF										

TAB: Horizontal tab, ASCII 09h

9. GLP and ID Numbers

9.1. Main Uses

By setting "$inFo$ (GLP output)" to 1 to 4 in $dout$ (data output) in "8. Internal Settings", data supporting GLP/GMP can be output from the moisture analyzer to a printer or computer.

GLP refers to "Good Laboratory Practice".

GMP refers to "Good Manufacturing Practice".

The data output supporting GLP or GMP includes the moisture analyzer manufacturer name (A&D), model name, serial number, ID number, date, time, and signature. Mass sensor sensitivity adjustment includes the weight used, and heating temperature adjustment includes the set temperature.

The following data supporting GLP or GMP can be output from the RS-232C or USB terminal.

● Record of mass sensor sensitivity adjustment

(output when sensitivity adjustment is performed with a weight you have)

● Heating temperature adjustment

(output when heating temperature adjustment is performed with the temperature adjustment kit)

- The ID number can be used as the moisture analyzer identification number for maintenance management.
- The ID number is retained even when the power is turned off and is enabled until a new number is registered.
- For information on checking/adjusting the date and time, refer to "8.4. Checking and Configuring the Date/Time".
- When connecting the AD-8127 (multi printer) or AD-8129TH (thermal printer) to the moisture analyzer to print the GLP output, the clock function of the printer can be used to print the date and time.
- (dout $inFo$ = 3 or 4 in 8. Internal Settings)

   Useful for the centralized management of date/time modification prevention using the password function of the AD-8127 or AD-8129TH.

ADVICE

● When outputting data supporting GLP/GMP, set the print mode of the AD-8127 or AD-8129TH to the dump print mode (DUMP). If the external key print mode (EXT.KEY) was used to print the mass value and moisture content, you can press and hold (for approx. two seconds) the ⌈ENT SAVE⌋ button of the AD-8127 or AD-8129TH to switch between the external print mode and dump print mode.

9.2. Configuring the ID Number

Display Correspondence Table

Refer to the following table to identify the segment display corresponding to each character.
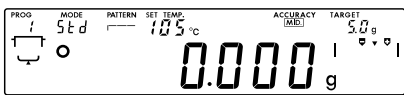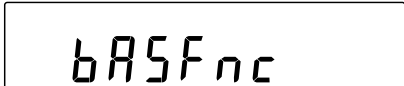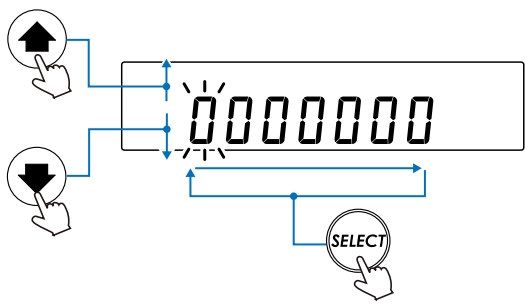
0	1	2	3	4	5	6	7	8	9	-	␣	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
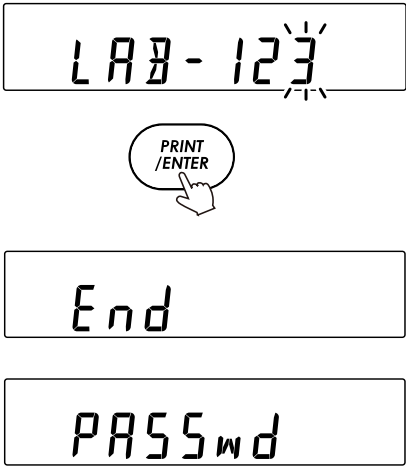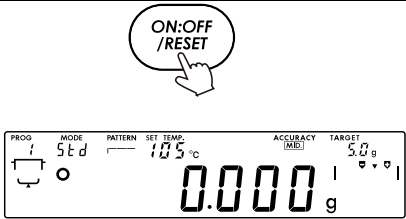
← ↓ key   ␣Space   ↑ key →

Setting Method (Changing the Internal Settings)

Step	Description	Display and key operation
1.	Press and hold the SELECT key (for approx. two seconds) with the mass displayed to display the "8. Internal Settings" menu.	Long press (for approx. two seconds) bASFnc
2.	Press the SELECT key several times to match the display with the figure.	Press several times id
3.	Press the ENTER key to input the ID number using the following keys. SELECT key ······· Moves the flashing digit. ↑ key ················ Changes the character of the flashing digit. (+) ↓ key ················ Changes the character of the flashing digit. (-)	PRINT /ENTER 0000000 SELECT

112

Step	Description	Display and key operation
4.	Press the ENTER key to register the change. (Press the RESET key to cancel without registering the changes.)	LAB-123 PRINT /ENTER End PASSwd
5.	Press the RESET key to return to the mass display.	ON:OFF /RESET PROG MODE PATTERN SET TEMP. ACCURACY TARGET 1 Std 105 ℃ MID 5.0 g 0.000 g

9.3. GLP output

To output data supporting GLP or GMP to the AD-8127 (multi printer), AD-8129TH (thermal printer), or a computer, set "*inFo* (GLP output)" to " *1* to *4* " in "*dout* (data output)" in "8. Internal Settings".
The differences between each setting are as follows.

inFo setting	Measurement result output[*1]	Clock data
1 : ALL iNt	Output all	Use internal data
2 : SEP iNt	Output separately	Use internal data
3 : ALL Ext	Output all	Use external device data
4 : SEP Ext	Output separately	Use external device data

*1   Measurement result output

Output all: Outputs the "device information", "measurement conditions", and "signature space" together with the measurement results.
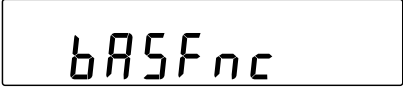
Output separately: Outputs the "device information", "measurement conditions", and "signature space" separately from the measurement results.
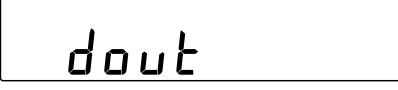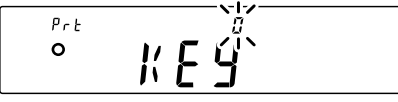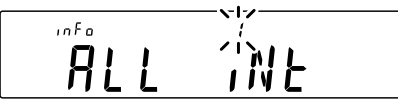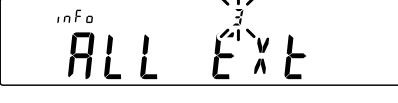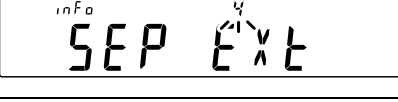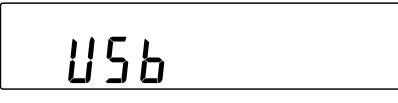
If you want to manage clock data with the clock function of an external device, it is convenient to set this to " *3 : ALL Ext*" or "*4 : SEP Ext*".
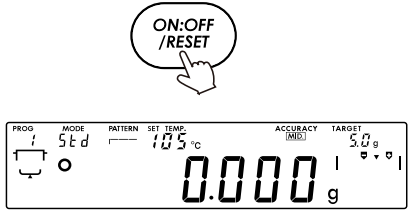
CAUTION

- If the date/time does not match when outputting the clock data in the moisture analyzer (*inFo = 1* or *2*), adjust the time/date using " *Cl Adj* (time)" in "8. Internal Settings".
- Clock data output using an external device is only supported for devices with a clock function that can output the date/time by receiving <ESC>**D** and <ESC>**T**. [※1]
  (AD-8127, AD-8129TH, and RsCom data communication software of WinCT, etc.)
  *1   <ESC> refers to the escape code (ASCII 1Bh).
- The clock data saved with the data memory function is always the internal data. Eternal device data cannot be used.
- When outputting to a printer, set the AD-8127 or AD-8129TH (multi printer) to the dump print mode (DUMP).

Setting Method (Changing the Internal Settings)

Step	Description	Display and key operation
1.	Press and hold the SELECT key (for approx. two seconds) with the mass displayed to display the "8. Internal Settings" menu.	PROG MODE PATTERN SET TEMP. ACCURACY TARGET *1 Std 105℃ MID 5.0g* **0.000** g SELECT Long press (for approx. two seconds) **bASFnc**

Step	Description	Display and key operation
2.	Press the SELECT key several times to match the display with the figure.	(SELECT) Press several times *dout*
3.	Press the ENTER key.	PRINT/ENTER Prt ○ *KEY*
4.	Press the SELECT key several times to display *info* (GLP output).	(SELECT) info ○ *oFF*
5.	Press the ↑ and ↓ keys several times to change "*info* (GLP output)" to " *1 : ALL iNt*"," *2 : SEP iNt*"," *3 : ALL Ext*",or " *4 : SEP Ext*".	⬆ ⬇ Press several times info *ALL iNt* info *SEP iNt* info *ALL Ext* info *SEP Ext*
6.	Press the ENTER key to register the change.	PRINT/ENTER *USb*

Step	Description	Display and key operation
7.	Press the RESET key to return to the mass display.	

9.3.1.　Example Measurement Result Output

Example with All Data Output

This method outputs the measurement results together with the device information, measurement conditions, measurement data, and signature space.

Refer to "8. Internal Settings" to set " $inFo$ (GLP output)" to " $1 : ALL\ iNt$" or " $3 : ALL\ Ext$".

Example Output (1)

When ″8. Internal Settings″ - ″ınҒ o(GLP output)″ is set to ″ ı : ᴚᴸᴸ   ınᴸ ″

Printer output

```
        A & D
MODEL    MX-53A
S/N     P1234567
ID       LAB-123
PROGRAM  No.  1
PROGRAM ID
        P 001
MODE    TANDARD
           MID.
DRYING  STANDARD
         105  C
UNIT    MOIST /W
CP  HI  21.0  %
    LO  18.0  %
OFFSET  1.23  %
- - - - - - - -

INITIAL WEIGHT
        5.678  g
FINAL WEIGHT
        4.567  g
RESULT  MOIST /W
        19.57  %
JUDGMENT      OK
ANALYSIS TIME
          6.7min
DATE  2024/08/01
TIME   12:34:56
REMARKS


  - - - - - - -

SIGNATURE


  - - - - - - -
```

1
2
3
4
5
6

7

8

9
10

11

12

13

14
15

16
17

18

19

Computer output (RsCom of WinCT)

```
␣␣␣␣␣␣␣␣␣␣␣A␣&␣D<TERM>
MODEL␣␣␣␣␣MX-53A<TERM>
S/N␣␣␣␣␣P1234567<TERM>
ID␣␣␣␣␣␣␣LAB-123<TERM>
PROGRAM␣␣␣No.␣␣1<TERM>
PROGRAM␣ID<TERM>
␣␣␣␣␣␣␣␣␣␣P␣001␣␣<TERM>
MODE␣␣␣␣␣STANDARD<TERM>
␣␣␣␣␣␣␣␣␣␣␣␣␣MID.<TERM>
DRYING␣␣STANDARD<TERM>
␣␣␣␣␣␣␣␣␣␣105␣␣C<TERM>
UNIT␣␣␣␣MOIST␣/W<TERM>
CP␣␣HI␣␣21.0␣␣%<TERM>
␣␣␣␣LO␣␣␣18.0␣␣%<TERM>
OFFSET␣␣␣1.23␣␣%<TERM>
-␣-␣-␣-␣-␣-␣-␣-␣-<TERM>
INITIAL␣WEIGHT<TERM>
␣␣␣␣␣␣␣␣␣5.678␣␣g<TERM>
FINAL␣WEIGHT<TERM>
␣␣␣␣␣␣␣␣4.567␣␣g<TERM>
RESULT␣␣MOIST␣/W<TERM>
␣␣␣␣␣␣␣␣19.57␣␣%<TERM>
JUDGMENT␣␣␣␣␣␣OK<TERM>
ANALYSIS␣TIME<TERM>
␣␣␣␣␣␣␣␣␣␣6.7min<TERM>
DATE␣␣2024/08/01<TERM>
TIME␣␣␣␣12:34:56<TERM>
REMARKS<TERM>
<TERM>
<TERM>
-␣-␣-␣-␣-␣-␣-␣-␣-<TERM>
SIGNATURE<TERM>
<TERM>
<TERM>
␣-␣-␣-␣-␣-␣-␣-␣-<TERM>
<TERM>
<TERM>
```

␣	:	Space: ASCII 20h
\<TERM\>	:	Terminator: C$_R$ L$_F$
C$_R$	:	Carriage return: ASCII 0Dh
L$_F$	:	Line feed: ASCII 0Ah

1	Manufacturer name	8	Heating pattern[*1]	15	Comparator result[*3]
2	Model name	9	Measurement basis	16	Measurement time[*1]
3	Serial number	10	Comparator setting[*3]	17	Measurement date/time
4	ID	11	Correction of measurement results[*2]	18	Remarks space[*1]
5	Program number	12	Sample mass before drying	19	Signature space[*1]
6	Program ID	13	Sample mass after drying		
7	Measurement mode[*1]	14	Measurement result		

*1   Refer to ″9.3.2. Description of Printed Information″

*2   Only printed when correction of measurement results is enabled and the setting value is not 0%

*3   Only printed when the comparator function is enabled and either the upper limit or lower limit is set to a value other than 0%

Example Output (2)

When "8. Internal Settings" - "ınFo(GLP output)" is set to "3 : ALL ExE"

Printer output

```
            A & D
MODEL     MX-53A
S/N       P1234567
ID        LAB-123
PROGRAM   No.  1
PROGRAM ID
           P 001
MODE   STANDARD
            MID.
DRYING STANDARD
          105  C
UNIT    MOIST /W
CP  HI   21.0  %
    LO   18.0  %
OFFSET   1.23  %
- - - - - - - -

INITIAL WEIGHT
          5.678  g
FINAL WEIGHT
          4.567  g
RESULT  MOIST /W
          19.57  %
JUDGMENT      OK
ANALYSIS TIME
           6.7min
DATE 2024/08/01
TIME 12:34:56
REMARKS



    - - - - - - -

SIGNATURE



    - - - - - - -
```

Computer output (RsCom of WinCT)

```
␣␣␣␣␣␣␣␣␣␣␣A␣&␣D<TERM>
MODEL␣␣␣␣␣MX-53A<TERM>
S/N␣␣␣␣␣P1234567<TERM>
ID␣␣␣␣␣␣␣LAB-123<TERM>
PROGRAM␣␣␣No.␣1<TERM>
PROGRAM␣ID<TERM>
␣␣␣␣␣␣␣␣␣␣P␣001␣␣<TERM>
MODE␣␣␣␣STANDARD<TERM>
␣␣␣␣␣␣␣␣␣␣␣␣MID.<TERM>
DRYING␣␣STANDARD<TERM>
␣␣␣␣␣␣␣␣␣␣105␣␣C<TERM>
UNIT␣␣␣␣MOIST␣/W<TERM>
CP␣␣HI␣␣21.0␣␣%<TERM>
␣␣␣␣LO␣␣18.0␣␣%<TERM>
OFFSET␣␣␣1.23␣␣%<TERM>
-␣-␣-␣-␣-␣-␣-␣-<TERM>
INITIAL␣WEIGHT<TERM>
␣␣␣␣␣␣␣␣␣5.678␣g<TERM>
FINAL␣WEIGHT<TERM>
␣␣␣␣␣␣␣␣␣4.567␣g<TERM>
RESULT␣␣MOIST␣/W<TERM>
␣␣␣␣␣␣␣␣19.57␣␣%<TERM>
JUDGMENT␣␣␣␣␣␣OK<TERM>
ANALYSIS␣TIME<TERM>
␣␣␣␣␣␣␣␣␣␣6.7min<TERM>
2024-08-01<TERM> *1
12:34:56<TERM>
REMARKS<TERM>
<TERM>
<TERM>
-␣-␣-␣-␣-␣-␣-␣-<TERM>
SIGNATURE<TERM>
<TERM>
<TERM>
-␣-␣-␣-␣-␣-␣-␣-<TERM>
<TERM>
<TERM>
```

␣	:	Space: ASCII 20h
<TERM>	:	Terminator: C_R L_F
C_R	:	Carriage return: ASCII 0Dh
L_F	:	Line feed: ASCII 0Ah

1   Manufacturer name
2   Model name
3   Serial number
4   ID
5   Program number
6   Program ID
7   Measurement mode[*2]

8   Heating pattern[*2]
9   Measurement basis
10   Comparator setting[*4]
11   Correction of measurement results[*3]
12   Sample mass before drying
13   Sample mass after drying
14   Measurement result

15   Comparator result[*4]
16   Measurement time[*2]
17   Measurement date/time
18   Remarks space[*2]
19   Signature space[*2]

*1 The order and notation used for the year, month, and day depend on the version of WinCT and the configuration of the computer.
*2 Refer to "9.3.2. Description of Printed Information"
*3 Only printed when correction of measurement results is enabled and the setting value is not 0%
*4 Only printed when the comparator function is enabled and either the upper limit or lower limit is set to a value other than 0%
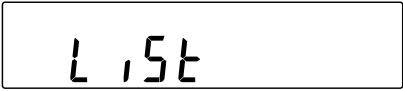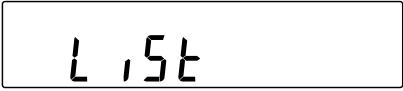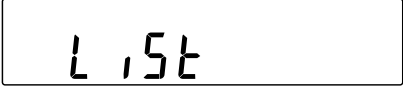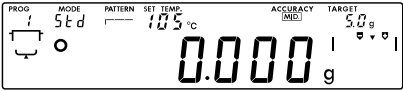
When Outputting Data Separately

In this example, the device information, measurement conditions, and signature space are printed at a different time to the measurement data.

This enables you to save paper when the measurement conditions are the same.

Refer to "8. Internal Settings" to set " $inFo$ (GLP output)" to " $2 : SEP$ inE" or " $4 : SEP$ ExE".

How to Print the Device Information and Measurement Conditions
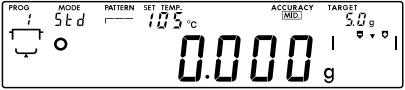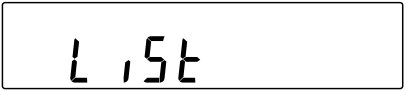
Step	Description	Display and key operation
1.	Press and hold the ⬚ENTER⬚ key with the mass displayed.	 Long press (for approx. two seconds) L_iSE or SiG
2.	Press the ⬚SELECT⬚ key to display L_iSE. When the data memory function is enabled (when " $dAEA$ (data memory function)" is set to " l"), ouE and $[Lr$ are also displayed.	 L_iSE
3.	Press the ⬚ENTER⬚ key to output the "device information" and "measurement conditions". When the output is complete, the product automatically returns to the mass display.	L_iSE "Device information" and "measurement conditions" output

How to Print the Measurement Data

The method for printing the data depends on the internal settings of the moisture analyzer. (For details, refer to "8.6.1. Data Output Mode".)

Prt setting	Output method
_0_	Press the [ENTER] key with the measurement result displayed.
_1_	When measurement finishes, the "measurement data" is automatically printed.
_2_	Press the [ENTER] key with the measurement result displayed. (This method is not appropriate for outputting only the "measurement data" while heating, because the moisture content will be continuously output.)

How to Print the Signature Space

Step	Description	Display and key operation
1.	Press and hold the [ENTER] key with the mass displayed.	Long press (for approx. two seconds) `L iSt` or `S iG`
2.	Press the [SELECT] key to display `S iG`. * When the data memory function is enabled (when " _dAtA_ (data memory function)" is set to " _1_"), _out_ and _CLr_ are also displayed.	`S iG`
3.	Press the [ENTER] key to output the "signature space". When the output is complete, the product automatically returns to the mass display.	`S iG` "Signature space" output

Example Output

When "ınFo (GLP output)" in "8. Internal Settings" is set to " 2 : SEP ınt"

Printer output

```
            A & D
MODEL     MX-53A
S/N       P1234567
ID        LAB-123
PROGRAM   No. 1
PROGRAM ID
          P 001
MODE   STANDARD
            MID.
DRYING STANDARD
          105  C
UNIT    MOIST /W
CP  HI   21.0  %
    LO   18.0  %
OFFSET   1.23  %
- - - - - - - -
INITIAL WEIGHT
        5.678  g
FINAL WEIGHT
        4.567  g
RESULT  MOIST /W
        19.57  %
JUDGMENT      OK
ANALYSIS TIME
          6.7min
DATE  2024/08/01
TIME    12:34:56
REMARKS


- - - - - - - -
INITIAL WEIGHT
        5.791  g
FINAL WEIGHT
        4.680  g
RESULT  MOIST /W
        19.18  %
JUDGMENT      OK
ANALYSIS TIME
          7.8min
DATE  2024/08/01
TIME    12:57:12
REMARKS


- - - - - - - -
SIGNATURE


- - - - - - - -
```

1	2 3 4 5 6 7 8 9 10 11

Computer output (RsCom of WinCT)

```
˽˽˽˽˽˽˽˽˽˽˽A˽&˽D<TERM>
MODEL˽˽˽˽˽MX-53A<TERM>
S/N˽˽˽˽˽P1234567<TERM>
ID˽˽˽˽˽˽˽LAB-123<TERM>
PROGRAM˽˽˽No.˽1<TERM>
PROGRAM˽ID<TERM>
˽˽˽˽˽˽˽˽˽˽P˽001˽˽<TERM>
MODE˽˽˽˽STANDARD<TERM>
˽˽˽˽˽˽˽˽˽˽˽˽MID.<TERM>
DRYING˽˽STANDARD<TERM>
˽˽˽˽˽˽˽˽˽˽105˽˽C<TERM>
UNIT˽˽˽˽MOIST˽/W<TERM>
CP˽˽HI˽˽21.0˽˽%<TERM>
˽˽˽˽LO˽˽18.0˽˽%<TERM>
OFFSET˽˽˽1.23˽˽%<TERM>
-˽-˽-˽-˽-˽-˽-˽-˽-<TERM>
INITIAL˽WEIGHT<TERM>
˽˽˽˽˽˽˽˽˽5.678˽˽g<TERM>
FINAL˽WEIGHT<TERM>
˽˽˽˽˽˽˽˽˽4.567˽˽g<TERM>
RESULT˽˽MOIST˽/W<TERM>
˽˽˽˽˽˽˽˽˽19.57˽˽%<TERM>
JUDGMENT˽˽˽˽˽˽OK<TERM>
ANALYSIS˽TIME<TERM>
˽˽˽˽˽˽˽˽˽˽6.7min<TERM>
DATE˽˽2024/08/01<TERM>
TIME˽˽˽˽12:34:56<TERM>
REMARKS<TERM>
<TERM>
<TERM>
-˽-˽-˽-˽-˽-˽-˽-˽-<TERM>
INITIAL˽WEIGHT<TERM>
˽˽˽˽˽˽˽˽˽5.791˽˽g<TERM>
FINAL˽WEIGHT<TERM>
˽˽˽˽˽˽˽˽˽4.680˽˽g<TERM>
RESULT˽˽MOIST˽/W<TERM>
˽˽˽˽˽˽˽˽˽19.18˽˽%<TERM>
JUDGMENT˽˽˽˽˽˽OK<TERM>
ANALYSIS˽TIME<TERM>
˽˽˽˽˽˽˽˽˽˽7.8min<TERM>
DATE˽˽2024/08/01<TERM>
TIME˽˽˽˽12:57:12<TERM>
REMARKS<TERM>
<TERM>
<TERM>
-˽-˽-˽-˽-˽-˽-˽-˽-<TERM>
SIGNATURE<TERM>
<TERM>
<TERM>
-˽-˽-˽-˽-˽-˽-˽-˽-<TERM>
<TERM>
<TERM>
```

Connection numbers: 12, 13, 14, 15, 16, 17, 18, 12, 13, 14, 15, 16, 17, 18, 19

	:	Space: ASCII 20h
`<TERM>`	:	Terminator: C_R L_F
C_R	:	Carriage return: ASCII 0Dh
L_F	:	Line feed: ASCII 0Ah

1	Manufacturer name	8	Heating pattern[*1]	15	Comparator result[*3]
2	Model name	9	Measurement basis	16	Measurement time[*1]
3	Serial number	10	Comparator setting[*3]	17	Measurement date/time
4	ID	11	Correction of measurement results[*2]	18	Remarks space[*1]
5	Program number	12	Sample mass before drying	19	Signature space[*1]
6	Program ID	13	Sample mass after drying		
7	Measurement mode[*1]	14	Measurement result		

*1   Refer to "9.3.2. Description of Printed Information"

*2   Only printed when correction of measurement results is enabled and the setting value is not 0%

*3   Only printed when the comparator function is enabled and either the upper limit or lower limit is set to a value other than 0%

9.3.2. Description of Printed Information

Measurement Mode, Measurement Conditions

Measurement mode	Printed part and description
Standard mode 5td	```MODE STANDARD``` ``` HI``` → Standard mode / Measurement accuracy setting: ACCURACY
Timer mode t iME	```MODE TIMER``` ``` 20.0min``` → Timer mode / Measurement time
Custom mode [5tM	```MODE CUSTOM``` ``` 0.10 %/min``` → Custom mode / Termination value

Heating Pattern

Heating pattern	Printed part and description
Standard drying	```DRYING STANDARD``` ``` 140 C``` → Standard heating / Sample tray temperature
Slow heating	```DRYING RAMP``` ```15.0min 110 C``` → Slow heating / Target sample tray temperature / Time step 1

Step heating	```DRYING STEP```
	```8.0min 95 C```
	``` 180 C``` → Step heating / Sample tray temperature step 1 / Sample tray temperature step 2 / Time step 1

Rapid heating	```DRYING QUICK``` ``` 130 C``` → Rapid heating / Sample tray temperature

Comparator

This is only printed when the "comparator mode (CP)" in "8. Internal Settings" is set to " $oN : CP = 1$ " and either the upper limit or lower limit is set to a value other than 0%.

Item		Printed part and description
Set value		CP HI 21.0 % — Comparator setting upper limit value LO 18.0 % — Comparator setting lower limit value
Result	Result when upper limit value is less than moisture content	JUDGMENT HI — Comparator result
	Result when lower limit value is less than or equal to moisture content result and moisture content result is less than or equal to upper limit value	JUDGMENT OK — Comparator result
	Result when moisture content result is less than lower limit value	JUDGMENT LO — Comparator result

Result Correction

The correction value adding when calculating the final measurement result from the moisture content measurement result.

Only printed when "moisture content measurement result correction ($oFF\ SEt$)" is set to " $oN : oFF\ SEt = 1$ " in "8. Internal Settings" and the correction value is not 0%.

```
OFFSET   1.23  %
```

Measurement basis

Measurement Basis	Printed part	Formula of displayed value	Display
Moisture content (standard before drying)[*1]	UNIT MOIST/ W	$\dfrac{W - D}{W} \times 100$	% MOIST /W
Moisture content (Atro) (standard after drying)[*2]	UNIT MOIST/ D	$\dfrac{W - D}{D} \times 100$	% MOIST /D
Solids	UNIT RATIO D/W	$\dfrac{D}{W} \times 100$	% RATIO D/W
Ratio[*2]	UNIT RATIO W/D	$\dfrac{W}{D} \times 100$	% RATIO W/D
Grams	UNIT g	—[*3]	g

W: Sample mass before drying   D: Sample mass after drying

[*1]   Default setting

[*2]   If the sample mass decreases after drying and the measured value exceeds 999%, operation automatically stops because the measurement results cannot be calculated correctly.

[*3]   The moisture content result is derived from the moisture content (standard before drying).

Measurement Date/Time

The measurement date/time outputs the date/time of the clock in the moisture analyzer.

The date order (YYYYMMDD, MMDDYYYY, or DDMMYYYY) follows the setting in "8.4.   Checking and Configuring the Date/Time".

For information on adjusting the clock, refer to "8.4.   Checking and Configuring the Date/Time".

```
DATE  2003/08/01
TIME   13:24:57
```

Remarks Space

Enables you to enter a comment such as the name of the measured sample.

```
REMARKS



_ _ _ _ _ _ _ _
```

Signature Space

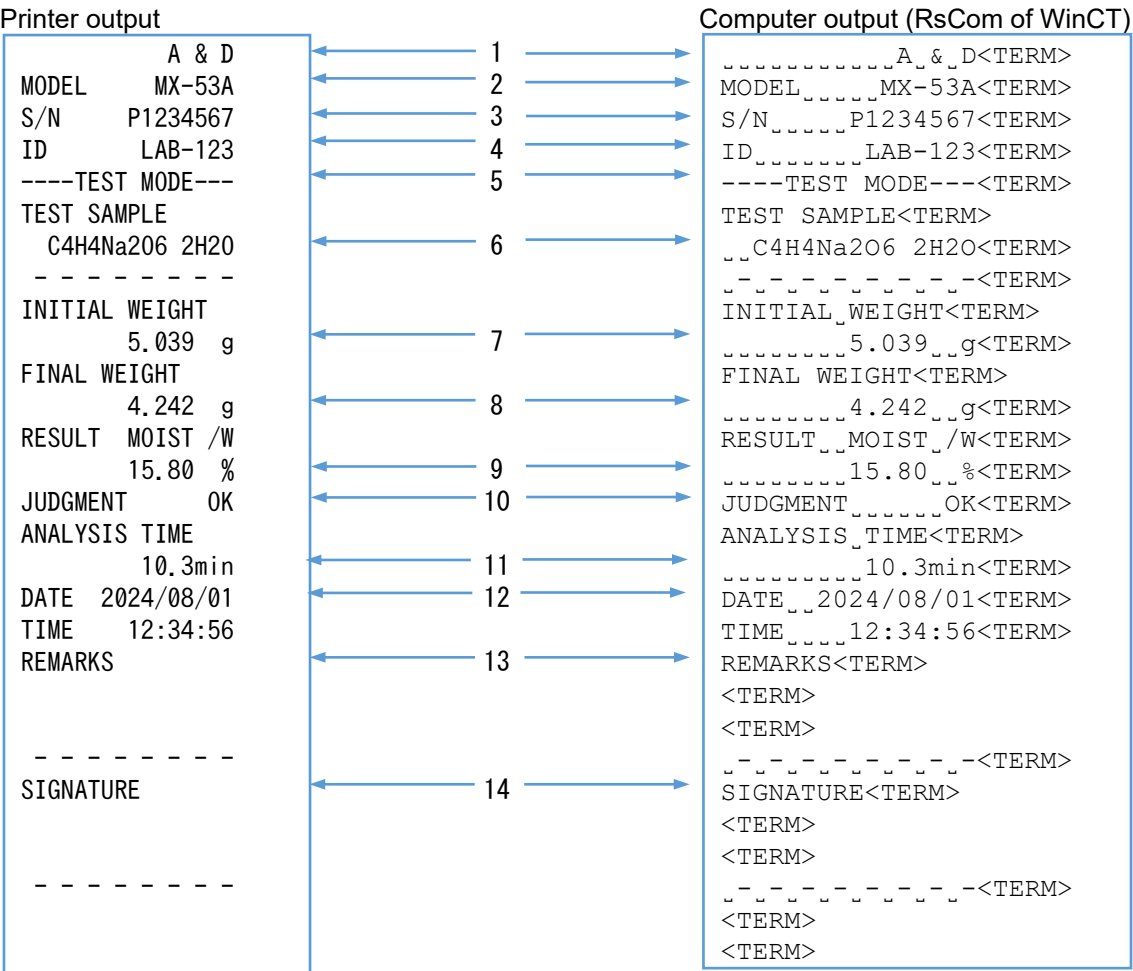Enables you to write your signature.

```
SIGNATURE



_ _ _ _ _ _ _ _
```

9.3.3. Test Sample Output for Function Check

The GLP output when performing a function check with a test sample is indicated below.

Example Output

When "8. Internal Settings" - "info(GLP output)" is set to " 1 : ALL int"

Printer output

```
              A & D
MODEL      MX-53A
S/N      P1234567
ID       LAB-123
----TEST MODE---
TEST SAMPLE
   C4H4Na2O6 2H2O
 - - - - - - - -
INITIAL WEIGHT
         5.039  g
FINAL WEIGHT
         4.242  g
RESULT  MOIST /W
         15.80  %
JUDGMENT      OK
ANALYSIS TIME
         10.3min
DATE  2024/08/01
TIME    12:34:56
REMARKS


 - - - - - - - -
SIGNATURE


 - - - - - - - -
```

Computer output (RsCom of WinCT)

```
_____A_&_D<TERM>
MODEL_____MX-53A<TERM>
S/N_____P1234567<TERM>
ID_____LAB-123<TERM>
----TEST MODE---<TERM>
TEST SAMPLE<TERM>
__C4H4Na2O6 2H2O<TERM>
_-_-_-_-_-_-_-_-<TERM>
INITIAL_WEIGHT<TERM>
_____5.039__g<TERM>
FINAL WEIGHT<TERM>
_____4.242__g<TERM>
RESULT__MOIST_/W<TERM>
_____15.80__%<TERM>
JUDGMENT_____OK<TERM>
ANALYSIS_TIME<TERM>
_____10.3min<TERM>
DATE__2024/08/01<TERM>
TIME____12:34:56<TERM>
REMARKS<TERM>
<TERM>
<TERM>
_-_-_-_-_-_-_-_-<TERM>
SIGNATURE<TERM>
<TERM>
<TERM>
_-_-_-_-_-_-_-_-<TERM>
<TERM>
<TERM>
```

Arrows numbered 1–14 connect the printer output and computer output lines.

⎵	:	Space: ASCII 20h
`<TERM>`	:	Terminator: C_R L_F
C_R	:	Carriage return: ASCII 0Dh
L_F	:	Line feed: ASCII 0Ah

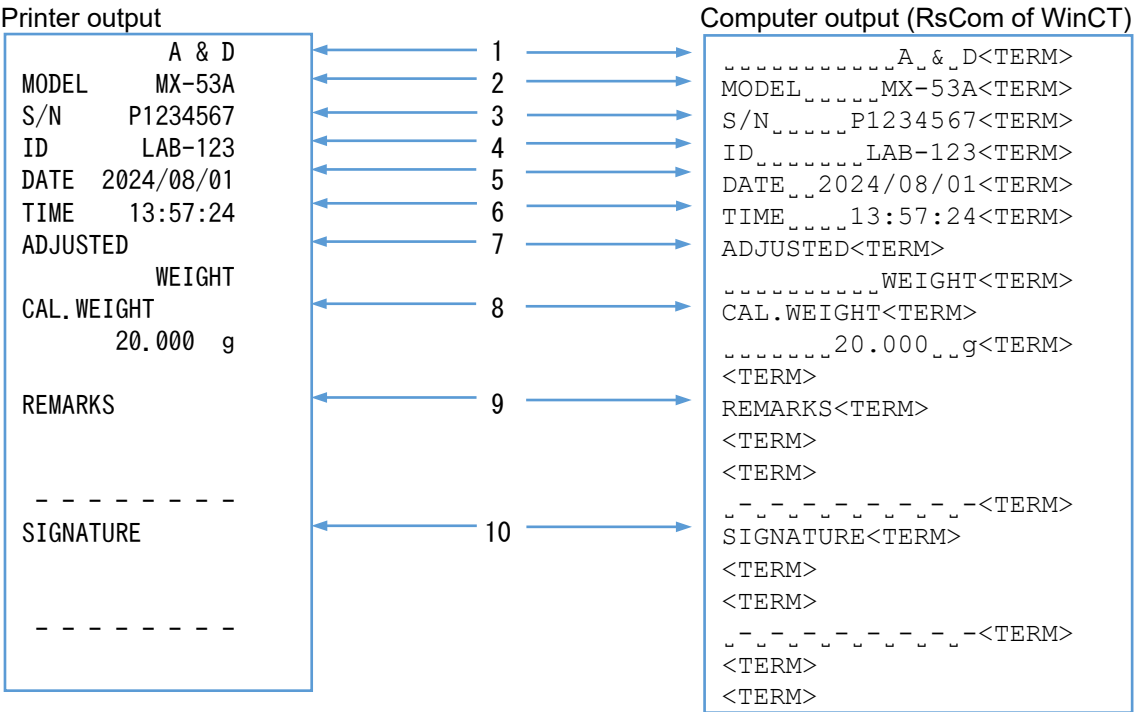| 1	Manufacturer name	7	Sample mass before drying	13	Remarks space[1]
2	Model name	8	Sample mass after drying	14	Signature space[1]
3	Serial number	9	Measurement result		
4	ID	10	Comparator result		
5	Test mode	11	Measurement time[1]		
6	Test sample name (sodium tartrate)	12	Measurement date/time		

[1] Refer to "9.3.2. Description of Printed Information"

9.3.4. Mass Sensor Output for Sensitivity Adjustment

The GLP output when performing sensitivity adjustment of the mass sensor is indicated below.

Example Output (1)

When ″8. Internal Settings″ - "ınЕₒ(GLP output)" is set to " ₁ : ALL ₁NЕ"

Printer output / Computer output (RsCom of WinCT)

```
        A & D                1          ␣␣␣␣␣␣␣␣␣A␣&␣D<TERM>
MODEL    MX-53A              2          MODEL␣␣␣␣␣MX-53A<TERM>
S/N      P1234567            3          S/N␣␣␣␣␣P1234567<TERM>
ID       LAB-123             4          ID␣␣␣␣␣␣␣LAB-123<TERM>
DATE  2024/08/01             5          DATE␣␣2024/08/01<TERM>
TIME     13:57:24            6          TIME␣␣␣␣13:57:24<TERM>
ADJUSTED                     7          ADJUSTED<TERM>
        WEIGHT                          ␣␣␣␣␣␣␣␣␣WEIGHT<TERM>
CAL.WEIGHT                   8          CAL.WEIGHT<TERM>
     20.000  g                          ␣␣␣␣␣␣20.000␣␣g<TERM>
                                        <TERM>
REMARKS                      9          REMARKS<TERM>
                                        <TERM>
                                        <TERM>
 - - - - - - -                          ␣-␣-␣-␣-␣-␣-␣-<TERM>
SIGNATURE                   10          SIGNATURE<TERM>
                                        <TERM>
                                        <TERM>
 - - - - - - -                          ␣-␣-␣-␣-␣-␣-␣-<TERM>
                                        <TERM>
                                        <TERM>
```

␣	:	Space: ASCII 20h
<TERM>	:	Terminator: C_R L_F
C_R	:	Carriage return: ASCII 0Dh
L_F	:	Line feed: ASCII 0Ah

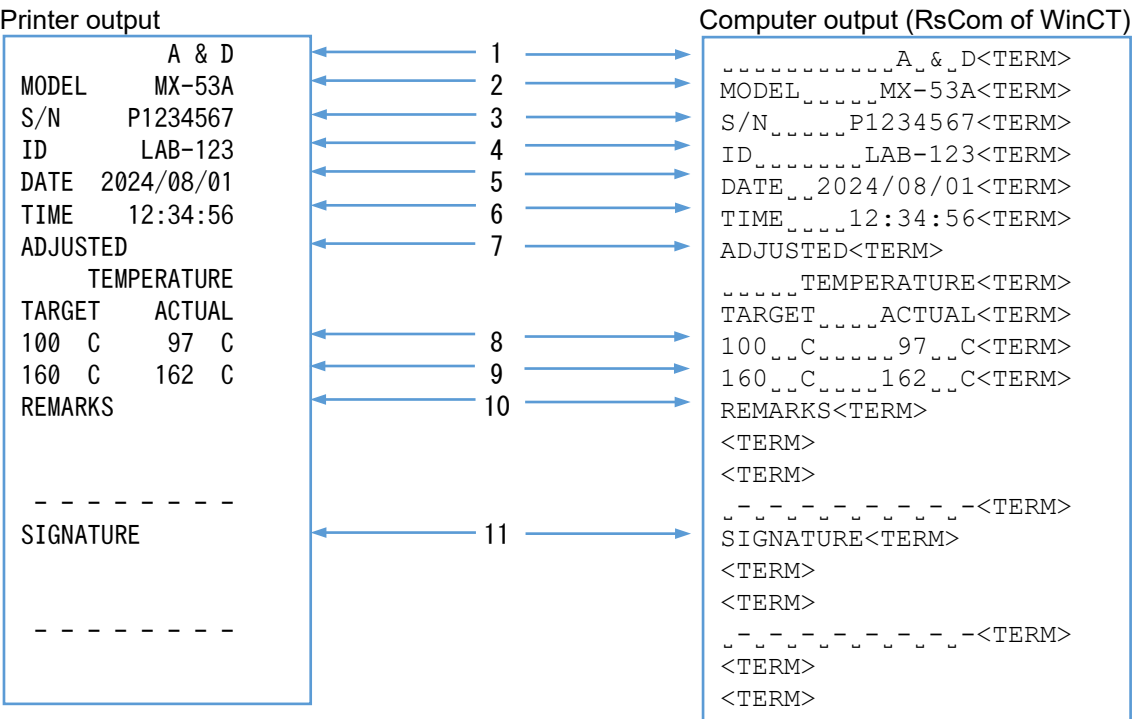|				
1	Manufacturer name	7	Sensitivity adjustment (mass sensor)
2	Model name	8	Weight value
3	Serial number	9	Remarks space[1]
4	ID	10	Signature space[1]
5	Date		
6	Time		

[1] Refer to "9.3.2. Description of Printed Information"

9.3.5. Output for Heating Temperature Adjustment

The GLP output when performing adjustment of the heating temperature is indicated below.

Example Output
When ″8. Internal Settings″ - "ınFo(GLP output)" is set to " 1 : ALL ıNt"

Printer output

```
          A & D
MODEL     MX-53A
S/N       P1234567
ID        LAB-123
DATE   2024/08/01
TIME      12:34:56
ADJUSTED
      TEMPERATURE
TARGET    ACTUAL
100  C      97  C
160  C     162  C
REMARKS


  - - - - - - -
SIGNATURE


  - - - - - - -
```

Computer output (RsCom of WinCT)

```
␣␣␣␣␣␣␣␣␣␣A␣&␣D<TERM>
MODEL␣␣␣␣␣MX-53A<TERM>
S/N␣␣␣␣␣P1234567<TERM>
ID␣␣␣␣␣␣␣LAB-123<TERM>
DATE␣␣2024/08/01<TERM>
TIME␣␣␣␣12:34:56<TERM>
ADJUSTED<TERM>
␣␣␣␣␣TEMPERATURE<TERM>
TARGET␣␣␣␣ACTUAL<TERM>
100␣␣C␣␣␣␣␣97␣␣C<TERM>
160␣␣C␣␣␣␣162␣␣C<TERM>
REMARKS<TERM>
<TERM>
<TERM>
␣-␣-␣-␣-␣-␣-␣-<TERM>
SIGNATURE<TERM>
<TERM>
<TERM>
␣-␣-␣␣-␣-␣-␣-␣-<TERM>
<TERM>
<TERM>
```

␣	:	Space: ASCII 20h
<TERM>	:	Terminator: C$_R$ L$_F$
C$_R$	:	Carriage return: ASCII 0Dh
L$_F$	:	Line feed: ASCII 0Ah

1	Manufacturer name	7	Sensitivity adjustment (heating temperature)	
2	Model name	8	Target temperature: 100°C input temperature)	Actual temperature (corrected
3	Serial number	9	Target temperature: 160°C input temperature)	Actual temperature (corrected
4	ID	10	Remarks space[1]	
5	Date	11	Signature space[1]	
6	Time			

[1] Refer to "9.3.2. Description of Printed Information"

10. Data Memory Function

- The data memory function automatically records the measurement results when measurement is complete.
- Up to 200 sets of data can be recorded.
- The recorded measurement results can be output to the AD-8127 (multi printer) or AD-8129TH (thermal printer) or imported to a computer using the communication software (WinCT).
- The recorded measurement results can also be erased.
- You can select either " *1* (record)" or "*0* (do not record)" for the "data memory function (*dAtA*)" in "8. Internal Settings".
- **MEM** is displayed when the data memory function is enabled.
- If *FUL* is displayed, new results cannot be recorded unless existing results are erased.
- To record measurement results, make sure to enable the data memory function before performing measurement.
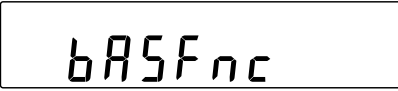
CAUTION
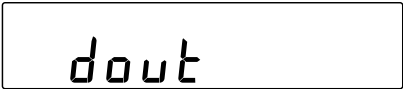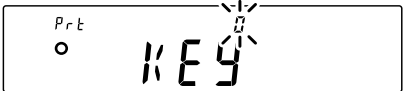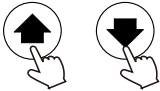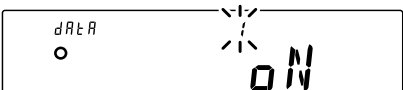
- If the data memory function is used to display the mass, the data number (**MEM**) is prioritized over the program number (**PROG**).

Data memory function in use

Number of recorded results

Full memory
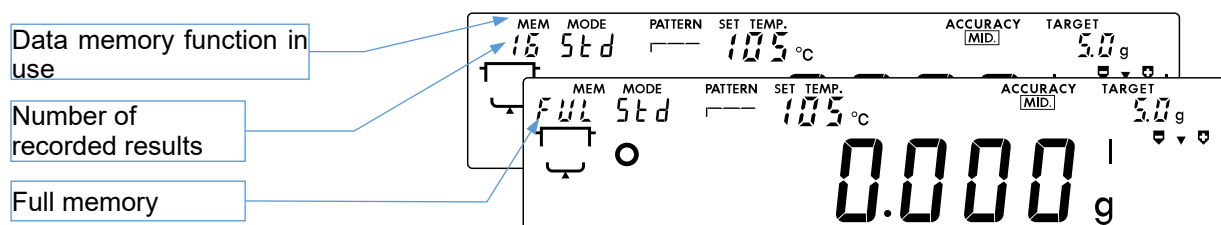
10.1. Preparations

Enabling the Data Memory Function (Changing the Internal Settings)
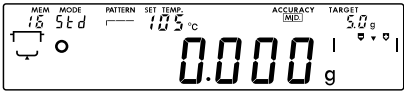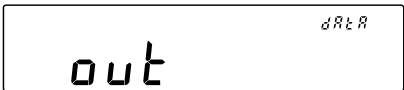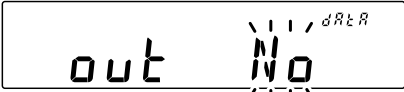
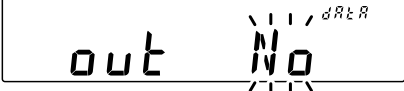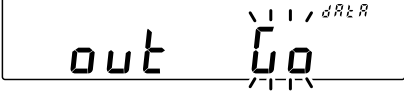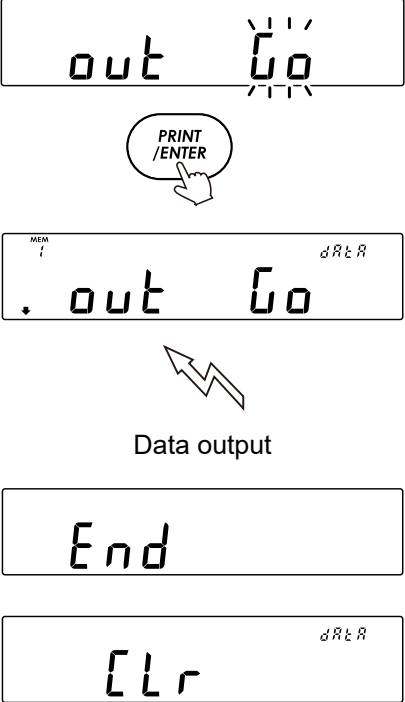| Step	Description	Display and key operation
1.	Press and hold the SELECT key (for approx. two seconds) with the mass displayed to display the "8. Internal Settings" menu.	Long press (for approx. two seconds) *bASFnc*

Step	Description	Display and key operation
2.	Press the SELECT key several times to match the display with the figure.	Press several times *dout*
3.	Press the ENTER key.	PRINT /ENTER *Prt* ○ *KEY*
4.	Press the SELECT key to display the "*dAtA* (data memory function)" item.	SELECT *dAtA* ○ *oFF*
5.	Press the ↑ or ↓ key to set "*dAtA* (data memory function)" to " *1* (enabled)".	↑ ↓ *dAtA* ○ *oN*
6.	Press the ENTER key to register the change.	PRINT /ENTER *USb*

CAUTION

- With the default internal settings, the "data output interval ($PUSE$)" is set to "no interval ($PUSE$ = 0)". If the printer set as the output destination requires an interval, refer to "8. Internal Settings" to change to "about a 1.6 second interval ($PUSE$ = 1)".

Step	Description	Display and key operation
1.	Press and hold the ENTER key (for approx. two seconds) with the mass displayed.	MEM MODE PATTERN SET TEMP. ACCURACY MID TARGET iS Std $i05$°C 5.0g 0.000 g PRINT/ENTER Long press (for approx. two seconds) dAtA out
2.	Press the SELECT key several times to display out, as required. *When GLP output is enabled (when " $info$ (GLP output)" is set to "2" or "4"), $LiSt$ and SiG are also displayed.	SELECT Press several times dAtA out
3.	Press the ENTER key. *If the measurement result has not been saved, No $dAtA$ is displayed.	dAtA out PRINT/ENTER dAtA out No
4.	Press the SELECT key.	dAtA out No SELECT dAtA out Go

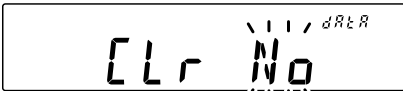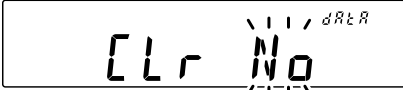| Step	Description	Display and key operation
5.	Press the ENTER key. All the recorded data is output from the RS-232C or USB terminal.	out Go PRINT /ENTER out Go Data output End Clr
6.	Press the RESET key to return to the mass display.	SELECT Press several times 0.000 g

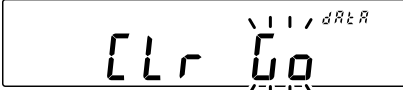## Example Output
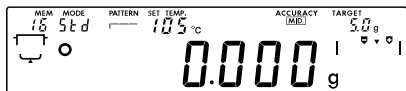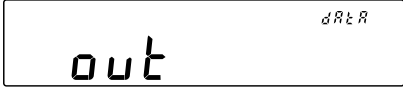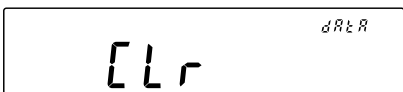
With data memory output, the data is output in a format like the following.
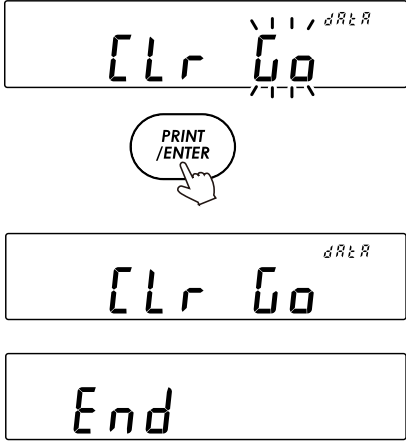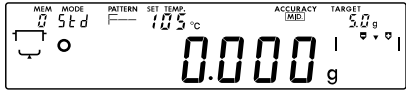
```
PROGRAM   No.   1
PROGRAM ID
          P 001
MODE      STANDARD
             MID.
DRYING   STANDARD
          180  C
OFFSET   1.23  %
RESULT   MOIST /W
          7.692  %
JUDGMENT      OK
DATE  2024/02/14
TIME    19:15:57
- - - - - - - -
```

10.3.　Batch Erasure of Recorded Results

Step	Description	Display and key operation
1.	Press and hold the ENTER key (for approx. two seconds) with the mass displayed.	MEM MODE PATTERN SET TEMP. ACCURACY TARGET 16 5td 105°C MID 5.0g **0.000** g PRINT/ENTER Long press (for approx. two seconds) dAtA **out**
2.	Press the SELECT key several times to display CLr, as required. *When GLP output is enabled (when " info (GLP output)" is set to "2" or "4"), L ist and S iG are displayed.	SELECT Press several times dAtA **CLr**
3.	Press the ENTER key.	dAtA **CLr** PRINT/ENTER dAtA **CLr No**
4.	Press the SELECT key.	dAtA **CLr No** SELECT dAtA **CLr Go**

Step	Description	Display and key operation
5.	Press the ENTER key. All the recorded data is deleted.	
6.	When the process is complete, the product automatically returns to the mass display. The data number is reset to zero.	

11.   Password Function

The password function enables the use of the moisture analyzer and its functions to be restricted.

This is useful for preventing modifications to the date and time settings and changes to the internal settings by non-administrator users.

Enter one of five keys four times for the password.

This allows for 5 × 5 × 5 × 5 ＝ 625 combinations.

Five keys: PROGRAM , ↓ , ↑ , SELECT , and ENTER

The password function is disabled by default.

Enable/disable the password function and enter the password in "8. Internal Settings".

"PW (the password function)" in "*PASSwd* (password)" can be set to one of three values in "8. Internal Settings".

Set value	Function
PW = *0*	No password function
PW = *1*	Request password entry to use the moisture analyzer
PW = *2*	Request the administrator password to log in when changing settings

PW = *0*   No password function

The password function is not used.

Anyone can measure moisture content.

All functions can be used.

Settings can also be changed.

PW = *1*   Request password entry to use the moisture analyzer

The administrator (*ADMIN*) can set a unique password to restrict the users of the moisture analyzer.

The default administrator (*ADMIN*) password is "*PPPP*" (PROGRAM key four times).

Password entry is required to display the mass with the RESET key when the display is off.

The moisture analyzer cannot display the mass unless the correct password is entered.

There are two login levels: administrator (*ADMIN*) and user (*USER 01* to *USER 10*).

Login level	Description
Administrator (*ADMIN*)	All functions and settings can be used.
	A separate password can be set for 10 users.
User (*USER 01* to *USER 10*)	Initialization, setting changes (including the clock), mass sensor sensitivity adjustment, heating temperature adjustment, and measurement condition changes are restricted.
No password	The moisture analyzer cannot be used.

PW = *2*   Request the administrator password to log in when changing settings

With this function, anyone can perform measurement with the moisture analyzer but initialization and setting changes (including the clock) are restricted.

(Password entry is not required to display the mass with the RESET key when the display is off.)

There are two login levels: administrator (*ADMIN*) and guest (*GUEST*).

Login level	Description
Administrator (*ADMIN*)	All functions and settings can be used.
Guest (*GUEST*) No password[*1]	Initialization, setting changes (including the clock), mass sensor sensitivity adjustment, heating temperature adjustment, and measurement condition changes are restricted.

[*1]   If you log in by pressing the RESET key while holding the STOP key with the display off, administrator (*ADMIN*) password entry is requested.

Items Limited by Login Level

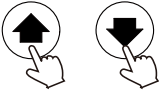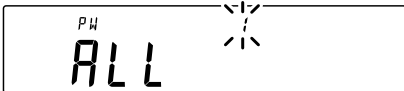| Item	Login level		
	Administrator (*ADMIN*)	User (*USER 01* to *10*)	Guest (*GUEST*)
Password entry (when logging in)	Required		Not required
Mass sensor sensitivity adjustment/heating temperature adjustment	Yes	No	
Changing internal settings (time/date settings, etc.)	Yes	No	
Changing the measurement conditions	Yes	No [*2]	
Changing the program number	Yes	Yes [*2]	
RsTemp (moisture analyzer unit)	Yes	No	
RsTemp (computer software)	Yes	Yes	
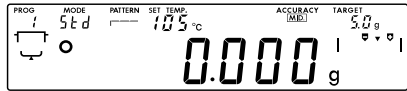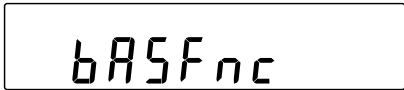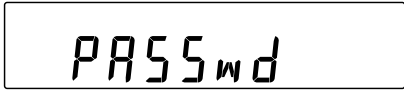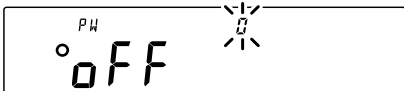
[*2]   A program number can be used to select an arbitrary measurement condition from among multiple measurement conditions.
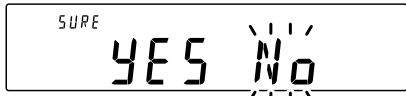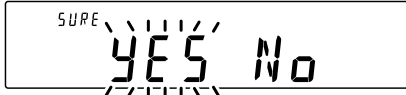Individual measurement conditions cannot be changed because the functionality is restricted.
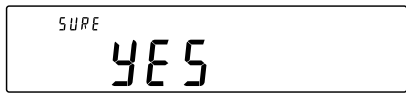
11.1.   Preparing the Password Function

PW (the password function) in "$PASSwd$ (password)" can be "enabled (PW = 1 or 2)" or "disabled (PW = 0)" in "8. Internal Settings".

Procedure

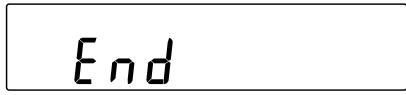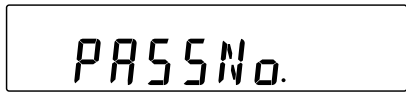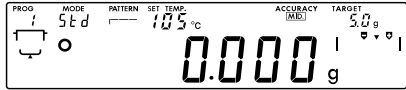| Step	Description	Display and key operation
1.	Press and hold the SELECT key (for approx. two seconds) with the mass displayed to display the "8. Internal Settings" menu.	PROG 1 MODE 5td PATTERN SET TEMP. 105 °C ACCURACY MD TARGET 5.0 g **0.000 g** SELECT Press and hold (for approx. two seconds) **bASFnc**
2.	Press the SELECT key several times to match the display with the figure.	SELECT Press several times **PASSwd**
3.	Press the ENTER key to display the "PW (password function)" item. (Press the RESET key to cancel.)	PRINT /ENTER PW °**oFF** 0
4.	Press the ↑ ↓ keys to display " 1 (enabled: restrict use of the moisture analyzer)" or " 2 (enabled: allow moisture measurement)".	↑ ↓ Press several times PW **ALL** 1 or PW **Fnc** 2

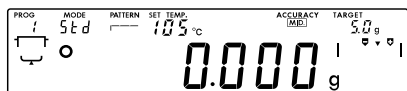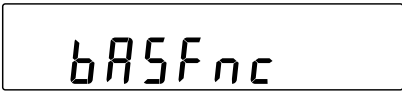| Step	Description	Display and key operation
5.	Press the ENTER key to match the display with the figure. (*No* flashes while *No* is selected)	PRINT /ENTER SURE YES No
6.	Press the SELECT key to switch *YES* / *No* so that *YES* flashes.	SELECT SURE YES No
7.	With *YES* selected, press the ENTER key to enable the password function.	PRINT /ENTER SURE YES End
8.	The screen changes to that indicated in the figure. To cancel registration (modification), press the RESET key twice to return to the mass display. To register (change) the password, proceed to step 5 of "11.2. Registering (Changing) the Password".	PASSNo. ON:OFF /RESET Press twice PROG MODE PATTERN SET TEMP. ACCURACY TARGET 1 Std 105 °C MID 5.0 g 0.000 g
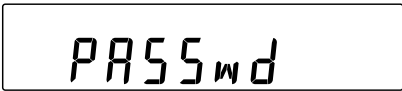
11.2. Registering (Changing) the Password
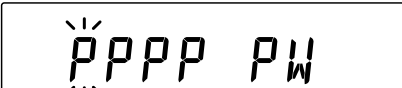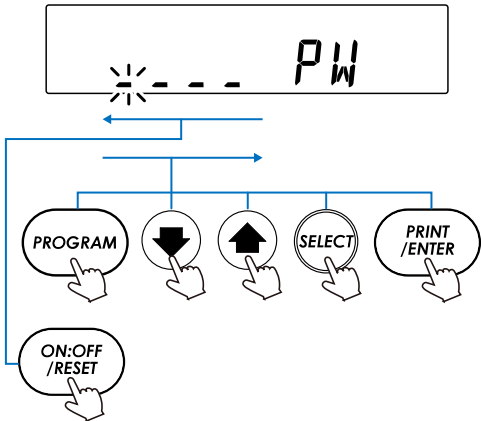
The password can be registered or changed in "*PASS No* (register password)" in "*PASSwd* (password)" in "8. Internal Settings".
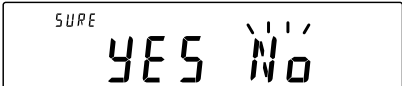
CAUTION

● The RESET key can be pressed and held (for approx. two seconds) to turn the display off (log out).
● When set to *Lock = 2*, administrator (*ADM iN*) password entry is required to log in as the administrator. Password entry is not required for users (*USER 01* to *USER 10*).
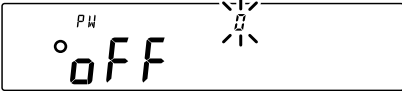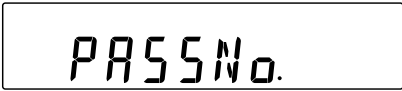● The moisture analyzer will not be able to use if the password is forgotten. Make a record of the registered password and store/manage it appropriately.
● The same password as that registered for the administrator (*ADM iN*) cannot be registered for users (*USER 01* to *USER 10*).
● For information on deleting a password, refer to "11.5. How to Delete a User (USER) Password".

How to Register (Change) the Password

Step	Description	Display and key operation
1.	Press and hold the SELECT key (for approx. two seconds) with the mass displayed to display the "8. Internal Settings" menu.	Press and hold (for approx. two seconds) *bASFnc*
2.	Press the SELECT key several times to match the display with the figure.	Press several times *PASSwd*
3.	Press the ENTER key to display the "*PW* (password function)" item.	*PW* *oFF*
4.	Press the SELECT key.	*PASSNo.*

139

Step	Description	Display and key operation
5.	Press the ENTER key to display the login level (*ADMIN*).	PRINT /ENTER °*ADMIN*
6.	Press the SELECT key to display the login level to change. In this example, display administrator (*ADMIN*). "**o** (the safety icon)" lights for login levels which already have a password registered. The password can be changed.	SELECT Press several times *USRE 01* to *USRE 10* °*ADMIN*
7.	Press the ENTER key on the login level to register (change) the password of. In this example, change the password of the administrator (*ADMIN*).	°*ADMIN* PRINT /ENTER
8.	The current password is displayed. (The default administrator (*ADMIN*) password is set to "*PPPP*" (PROGRAM key four times).)	*PPPP PW*
9.	Perform the following key operation to enter the four digit password. If no key operations are performed for 10 minutes, the screen automatically returns to the login level display. PROGRAM key ···· input *P* ↓ key ················ input *D* ↑ key ················ input *U* SELECT key ········ input *S* ENTER key ········· input *E* RESET key ·········· go one character back No key operations for 10 minutesscreen automatically returns to login level display	*- - - PW* PROGRAM ↓ ↑ SELECT PRINT /ENTER ON:OFF /RESET

Step	Description	Display and key operation
10.	The new password is displayed after pressing the key four times.	```DUSE PW```
11.	Press the SELECT key to switch YES / No so that YES flashes.	SURE YES No (SELECT) SURE YES No
12.	With YES selected, press the ENTER key to register the password.	(PRINT /ENTER) SURE YES End
13.	When configuration is complete, the next login level is displayed. To continue configuration, repeat the procedure from step 6.	```USRE 01```
14.	To finish configuration, press the RESET key three times to return to the mass display.	(ON:OFF /RESET) Press three times PROG MODE PATTERN SET TEMP. ACCURACY TARGET 1 Std 105°c MD 5.0 g 0.000 g

11.3. How to Log In
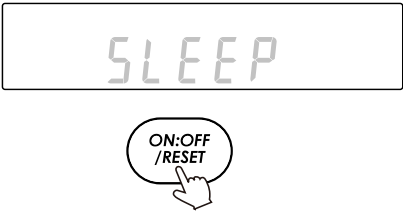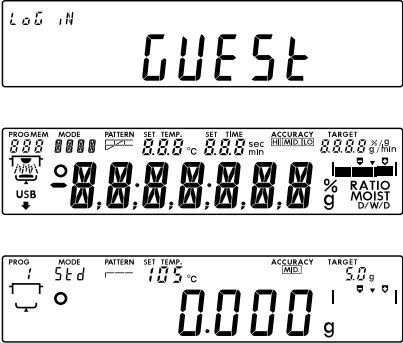
Logging In as the Administrator ($ADMiN$) or a User ($USER\ 01$ to $USER\ 10$)

If PW (the password function) in $PASSwd$ (password) is set to $PW = 1$ (enabled: restrict use of moisture analyzer) in "8. Internal Settings", password entry is required when logging in.

Step	Description	Display and key operation
1.	Press the [RESET] key with the display off. (Refer to "11.4. " to switch to the display off state.)	$SLEEP$ ON:OFF /RESET
2.	Password entry is displayed.	USER $PW.$ _ _ _
3.	Perform the following key operation to enter the four digit password. If no key operations are performed for 10 minutes, the screen automatically turns off. [PROGRAM] key ···· input P [↓] key ················· input D [↑] key ················· input U [SELECT] key ········ input S [ENTER] key ········· input E [RESET] key ·········· go one character back No operations performed for 10 minutes　display off	USER $PW.$ _ _ _ PROGRAM　↓　↑　SELECT　PRINT/ENTER ON:OFF /RESET
4.	If the password matches, the login level is displayed, the entire display lights up, then the screen switches to the mass display. Enter the password of the administrator to log in as the administrator. (The default administrator password is set to "$PPPP$" ([PROGRAM] key four times).) If you enter the wrong password, a buzzer sounds three times with [$FAiL$] displayed, then the display turns off.	USER $PW.\ PPPP$ Password matches　Password does not match $ADMiN$　$FAiL$ LoG iN　Buzzer × 3 （mass display graphic）　$SLEEP$ 　　　　　Display off PROG MODE Std 105℃ 5.0s 0.000 g Mass display

Logging In as a Guest (𝐺𝑈𝐸𝑆𝑡)
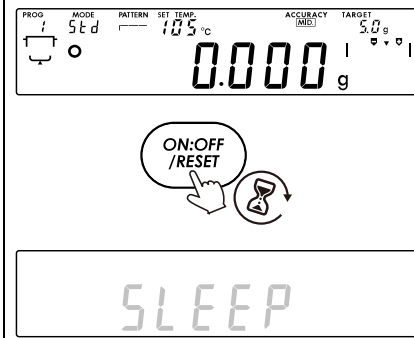
If "PW (the password function)" in "𝑃𝐴𝑆𝑆𝑤𝑑 (password)" is set to "PW = 2 (enabled: moisture measurement available)" in "8. Internal Settings", password entry is not required when logging in.

Step	Description	Display and key operation
1.	Press the ⎡RESET⎤ key with the display off. (Refer to "11.4. " to switch to the display off state.)	SLEEP ON:OFF /RESET
2.	The screen switches to that indicated in the figure, then switches to the mass display.	LoG iN GUESt

Logging In as the Administrator (*ADMiN*)

Step	Description	Display and key operation
1.	With the display off, press the RESET key while holding the STOP key. (Refer to "11.4. " to switch to the display off state.)	*SLEEP* STOP + ON:OFF/RESET Hold
2.	Password entry is displayed.	*A DMiN* *P W.* _ _ _
3.	Perform the following key operation to enter the four digit password. If no key operations are performed for 10 minutes, the screen automatically turns off. PROGRAM key ···· input *P* ↓ key ················ input *D* ↑ key ················ input *U* SELECT key ········ input *S* ENTER key ········· input *E* RESET key··········· go one character back No operations performed for 10 minutes display off	*A DMiN* *P W.* _ _ _ PROGRAM ↓ ↑ SELECT PRINT/ENTER ON:OFF/RESET
4.	If the password matches, the login level is displayed, the entire display lights up, then the screen switches to the mass display. Enter the password of the administrator to log in as the administrator. (The default administrator password is set to " *PPPP*" (PROGRAM key four times).) If you enter the wrong password, a buzzer sounds three times with *FAiL* displayed, then the display turns off.	*A DMiN* *P W. PPPP* Password matches Password does not match *LoG iN* *ADMiN* *FAiL* Buzzer × 3 *SLEEP* Display off *0.000* g Mass display

144

11.4. How to Log Out

Step	Description	Display and key operation
1.	The ⌞RESET⌟ key can be pressed and held (for approx. two seconds) to log out and turn the display off. The display is dark when it is off. When $PW = 1$, password entry is required to display the mass again if the display is off. If "$P\text{-}oFF$ (auto power off)" is set to "$P\text{-}oFF = 1$ (enabled)" in "$bASFnc$ (environment/display)" in the internal settings, the display will automatically turn off if no operations are performed for 10 minutes.	0.000 g ON:OFF /RESET SLEEP
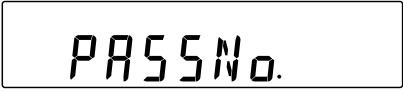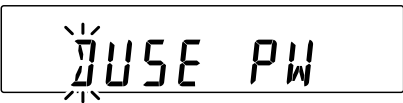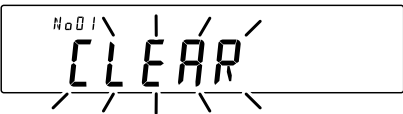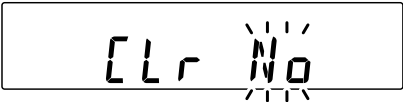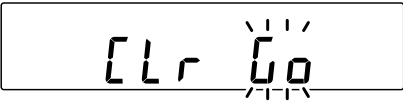
11.5. How to Delete a User (USER) Password
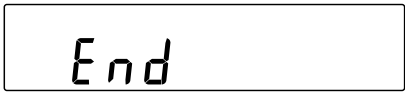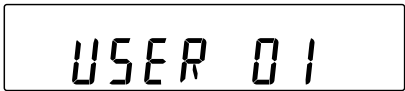
CAUTION
- The administrator (ADM,N) password cannot be deleted. Refer to "11.2. Registering (Changing) the Password" to change it to a password of your choice.

How to Delete a Password

Step	Description	Display and key operation
1.	Press and hold the ⌞SELECT⌟ key (for approx. two seconds) with the mass displayed to display the "8. Internal Settings" menu.	0.000 g SELECT Press and hold (for approx. two seconds) bASFnc
2.	Press the ⌞SELECT⌟ key several times to match the display with the figure.	SELECT Press several times PASSwd
3.	Press the ⌞ENTER⌟ key to display the "PW (password function)" item.	PRINT /ENTER PW oFF

Step	Description	Display and key operation
4.	Press the $\boxed{\text{SELECT}}$ key to match the display with the figure.	SELECT $PRSSNo.$
5.	Press the $\boxed{\text{ENTER}}$ key to display the login level ($RDM\,iN$).	PRINT /ENTER $°RDM\,iN$
6.	Press the $\boxed{\text{SELECT}}$ key to display the login level to change. In this example, display $USER\ 0\ 1$ (user 01). " o (the safety icon)" lights for login levels which already have a password registered.	SELECT Press several times $°USER\ 0\ 1$
7.	Press the $\boxed{\text{ENTER}}$ key. The current password is displayed.	SELECT $DUSE\ PW$
8.	Press and hold the $\boxed{\text{RESET}}$ key (for approx. two seconds) while entering the password to match the display with the figure.	ON:OFF /RESET Press and hold (for approx. two seconds) $No0\ 1$ $CLEAR$
9.	Press the $\boxed{\text{ENTER}}$ key to match the display with the figure.	PRINT /ENTER $CLr\ No$
10.	Press the $\boxed{\text{SELECT}}$ key to switch Go / No.	SELECT $CLr\ Go$

Step	Description	Display and key operation
11.	With ʊo flashing, press the ENTER key to delete the password.	PRINT /ENTER End USER 01

11.6. If the Administrator (ADMIN) Password Is Forgotten

The moisture analyzer will not be able to use if the password is forgotten.

To cancel the password, the product must be returned to A&D for a repair. Request a repair.

12. Interface Specifications

12.1. USB

Connector   Type-C (female)
Standard   USB 2.0
Device class   HID (human interface device): Quick USB
                     CDC (communication device class): Virtual COM

USB Type-C (female)
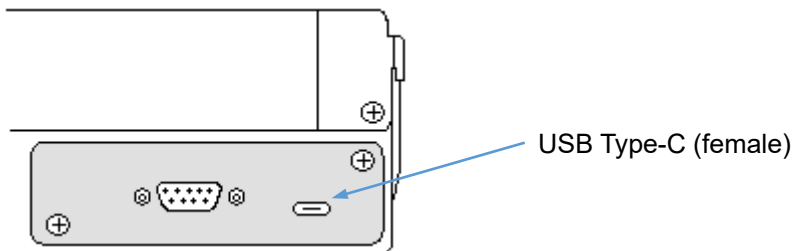
CAUTION

- Power cannot be supplied from a USB AC adapter or mobile battery.
- Do not connect a USB AC adapter or mobile battery, as doing so may cause product failure.
- USB Type-C USB memory cannot be used.
- Power cannot be supplied to external devices from the moisture analyzer.

12.2. RS-232C

Connector	9-pin D-Sub (male)
Communication method	EIA RS-232C
Communication format	Bidirectional asynchronous communication method
Data transfer rate	Approx. 5 times/second
Signal format	Baud rate 2400 bps
	Data bits 7 bits
	Parity Even
	Stop bits 1 bit
	Encoding ASCII encoding

One character format
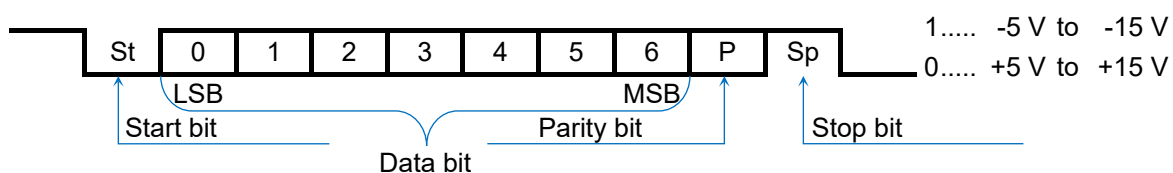
9-pin D-Sub pin layout

Pin no.	Signal name	Direction	Description/Remarks
1	-	-	Same potential as SG[*1]
2	TXD	Output	Sent data
3	RXD	Input	Received data
4	-	-	N.C.
5	SG	-	Signal ground
6	DSR	Output	Data set ready
7	RTS	Input	Request transmission
8	CTS	Output	Allow transmission
9	-	Output	12 V output[*1]

#4-40UNC inch screw
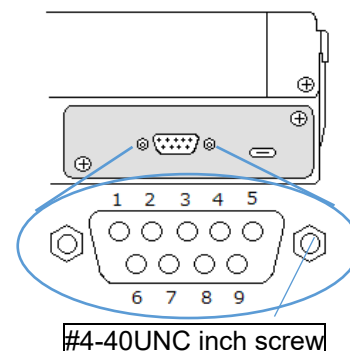
Signal names other than TXD and RXD are the names on the DTE side.

Wiring diagram
(for computer connection)

Moisture analyzer (DCE)	Pin no.	PC (DTE)
TXD	2	RXD
RXD	3	TXD
RTS	7	RTS
CTS	8	CTS
DSR	6	DSR
SG	5	SG
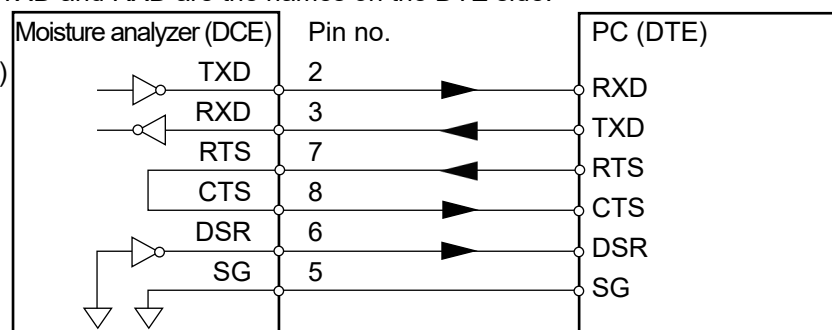
*1 Used for some A&D peripherals. Do not wire these pins when connecting to a device from another manufacturer where power is output. Make sure to use a compliant cable, as using an incorrect connection cable may damage the device.

13.   Connecting to a Peripheral

You can use the standard RS-232C connector and USB Type-C connector of the moisture analyzer to connect to a peripheral, computer, or device such as a PLC.

13.1.   Cables Used for Connecting to a Peripheral

"Cables used for connecting to peripherals" indicates the connection cables compliant with the interfaces used with peripherals.

Cables used for connecting to peripherals

Peripheral		Communication interface used	Connection cable		Remarks
Product name	Product code		Standard/optional	Cable product code	
Multi printer	AD-8127	RS-232C	[Included as standard] RS-232C cable included with printer	AX-KO2741-100	
Thermal printer	AD-8129TH				
Computer			[Sold separately]		*1
		USB	[Included as standard] *2 USB cable included with moisture analyzer	AX-KO7919-200	

*1   Uses AX-USB-9P, AD-8541-SCALE, and AD-1688 to connect with the computer.
   When exchanging data, the connection cable included with these products can be used.
*2   UL certified products do not include a USB cable.

13.2.   Printing Mass and Moisture Content Values to a Printer

The table below indicates internal settings of the moisture analyzer and example printer settings for printing data such as the moisture content.

13.2.1. For the AD-8127 or AD-8129TH

- The standard RS-232C interface can be used to print measurement results and sensitivity adjustment records supporting GLP/GMP/ISO to a multi printer (AD-8127) or thermal printer (AD-8129TH).
- The functions of the AD-8127 or AD-8129TH can be used to print changes in the moisture content over a fixed period of time and the results of processing statistics about the measurement results.
- Use the cable included with the AD-8127 or AD-8129TH to connect.

Setting correspondence chart

| How to use | Internal settings of moisture analyzer | | | | AD-8127 setting |
	Prt	*5-d*	*PU5E*	*inFo*	PRN MODE
Print measurement results including measurement conditions (non-statistical computation)	*0, 1*	*0*	*0*	*1, 2, 3, 4*	DUMP Dump print mode
Print measurement results (statistical computation)	*0, 1*	*0*	*0*	*0*	EXT.KEY External key print mode
Output changes in moisture content	*2*	*0*	*0*	*0*	TIMER Interval print mode
GLP/GMP/ISO compatible printing	*0, 1*	*0*	*0*	*1, 2, 3, 4*	DUMP Dump print mode
Output measurement data with data memory function	*0, 1*	*0*	*0*	*0, 1, 2, 3, 4*	DUMP Dump print mode

For details on the settings, refer to "8. Internal Settings" and the instruction manual of the printer.

13.3. Connecting to a Computer

13.3.1. Virtual COM Mode

The virtual COM mode function enables you to use the included USB cable *1 to connect the moisture analyzer to a computer and create a COM port on the computer to perform bidirectional communication. Operating systems from Windows XP and later are supported. With Windows 10 and Windows 11, the driver is automatically installed. If the driver is not automatically installed, refer to the PDF file in "Driver for Virtual COM Mode-" on the A&D website (https://www.aandd.jp).

By selecting the COM port in software such as the WinCT-Moisture data communication software, you can perform communication equivalent to RS-232C.

With the virtual COM mode, it is not necessary to configure the baud rate, data bit, parity, and stop bit of the data communication software.

*1 UL certified products do not include a USB cable.
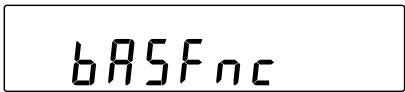
CAUTION
● It may take some time to install the driver for the virtual COM mode for the first time.
● The output format is fixed to the standard A&D format.
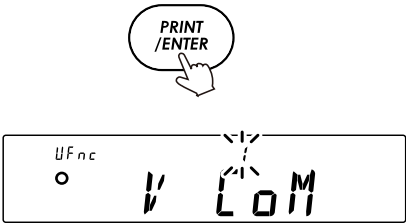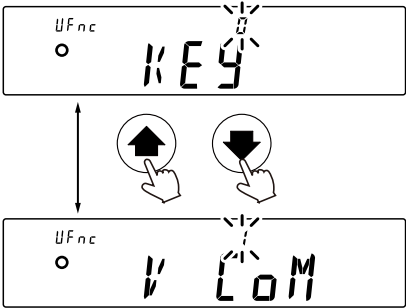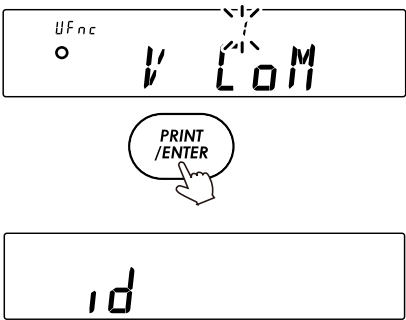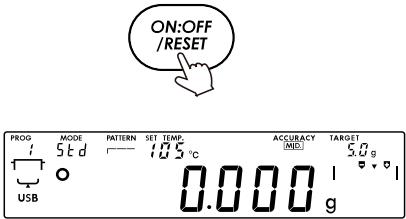
How to Use
In this example, the ⌈ ENTER ⌉ key or a data request command from a computer is used to output the mass value and moisture content from the moisture analyzer.
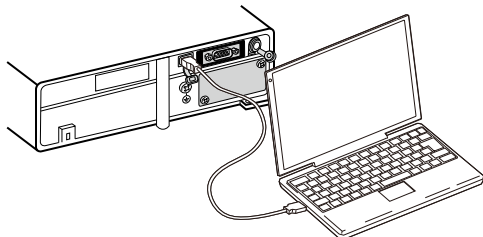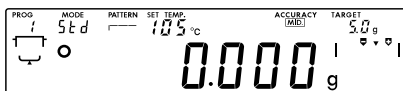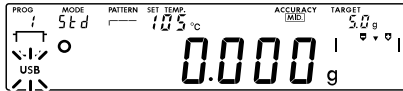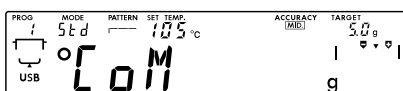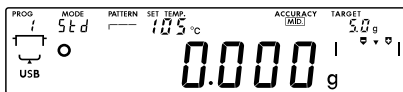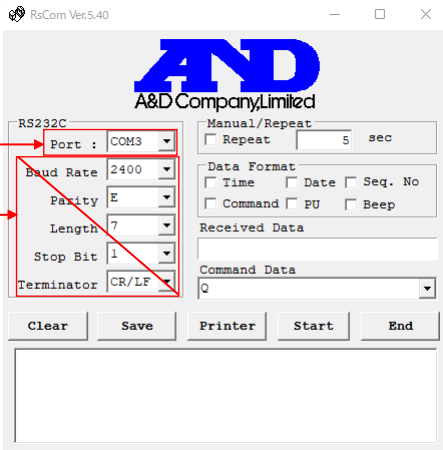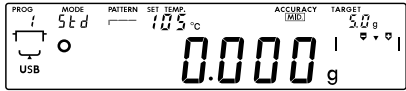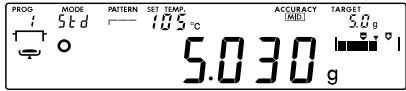
Switching the USB Operation Mode (Changing the Internal Settings)
Switch to the virtual COM mode ($UFnc = 1$) (for bidirectional communication).
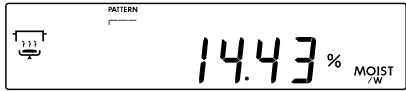
Step	Description	Display and key operation
1.	Press and hold the ⌈ SELECT ⌉ key (for approx. two seconds) with the mass displayed to display the "8. Internal Settings" menu.	Press and hold (for approx. two seconds) bASFnc
2.	Press the ⌈ SELECT ⌉ key several times to match the display with the figure.	Press several times USb

Step	Description	Display and key operation
3.	Press the ENTER key.	
4.	Press the ↑ or ↓ key to switch the value of the "UFnc (USB operation mode)" setting to "UFnc = 1 (virtual COM mode)".	
5.	Press the ENTER key when the screen switches to that indicated in the figure to register the settings.	
6.	Press the RESET key to return to the mass display.	

Output Method

Step	Description	Display and key operation
1.	Use the USB cable included with the moisture analyzer *1 to connect the moisture analyzer to the computer. When connecting for the first time with Window 10 or Windows 11, the computer will automatically start installing the driver. With an operating system other than Windows 10 or Windows 11, the driver must be manually installed. For information on installing the driver, refer to the PDF file in "Driver for Virtual COM Mode-" on the A&D website (https://www.aandd.jp). *1　UL certified products do not include a USB cable.	
2.	When the moisture analyzer connects to the computer, **USB** flashes on the display of the moisture analyzer, as indicated in the figure. (This indicates that communication with the computer is being established.)	
3.	When communication is established between the moisture analyzer and the computer, the virtual COM connection is indicated on the display of the moisture analyzer (for approx. two seconds) as indicated in the figure, then the screen automatically switches to the mass display. The "**USB**" icon (USB connection icon) lights while the product is connected via USB.	Displayed for approx. two seconds
4.	Start the computer software for sending the mass and moisture content values (such as WinCT).	

Step	Description	Display and key operation
5.	By selecting the COM port, you can perform communication equivalent to RS-232C. With the virtual COM mode, it is not necessary to configure the baud rate, data bit, parity, and stop bit of the data communication software. For information on how to operate WinCT, download and read the required instruction manual from "Software Downloads" on the A&D website (https://www.aandd.jp). Example for RsCom COM port Not	
6.	Press the RESET key to reset the display to zero.	
7.	Place the object to measure on the sample tray.	
8.	Press the ENTER key on the moisture analyzer or send a data request command from the computer. The mass value is output from the moisture analyzer. Example output `ST,+0005.030␣␣g<TERM>` ␣ : Space (ASCII 20h) <TERM> : Terminator (CR LF) CR : Carriage return (ASCII 0Dh) LF : Line feed (ASCII 0Ah)	 or Send data request command from computer Data output

Step	Description	Display and key operation
9.	Measure the moisture content.	
10.	Press the ⎢ENTER⎥ key on the moisture analyzer or send a data request command from the computer. The moisture content value is output from the moisture analyzer. Example output `ST,+00014.43␣␣%<TERM>` ␣ : Space (ASCII 20h) <TERM> : Terminator (CR LF) CR : Carriage return (ASCII 0Dh) LF : Line feed (ASCII 0Ah)	 or Send data request command from computer Data output
11.	To end the procedure, remove the USB cable. When the moisture analyzer disconnects from the computer, the USB connection icon (**USB**) disappears.	

13.3.2. Quick USB Mode

The Quick USB mode enables you to connect the moisture analyzer to a computer via a USB cable to directly input the output of the moisture analyzer to computer software such as Excel or Word. Operating systems from Windows XP and later are supported.

Because the standard Windows driver (HID) is used, a dedicated driver does not need to be installed and communication can be performed simply by connecting the USB cable.

CAUTION

- The quick USB mode performs one-way communication from the moisture analyzer to the computer. Commands cannot be sent from the computer to the moisture analyzer.
- The output format is fixed to the NU2 format.
- Make sure to disable the screen saver and standby mode of the computer.
- Do not use the quick USB mode when the data output mode of the moisture analyzer is set to the stream mode.
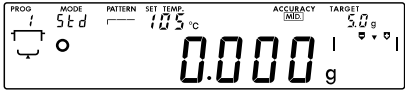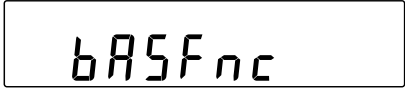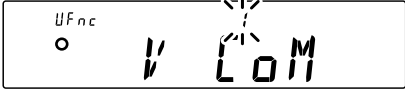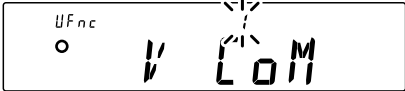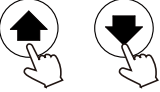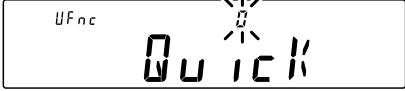
  Because the stream mode continuously outputs the mass value from the moisture analyzer to the computer, it may cause the computer to operate in an unexpected manner.
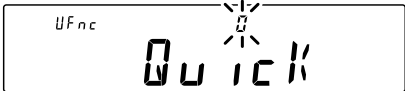
How to Use

In this example, the ENTER key is used to output the mass value and moisture content from the moisture analyzer.
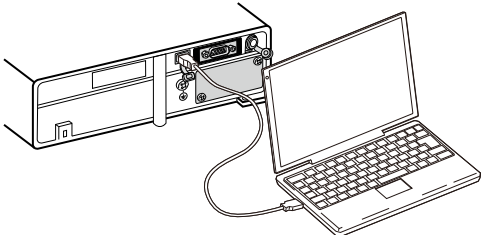
Switching the USB Operation Mode (Changing the Internal Settings)
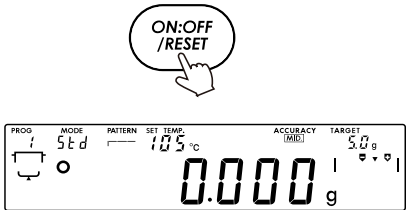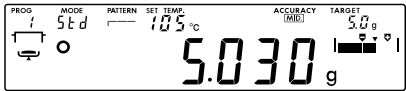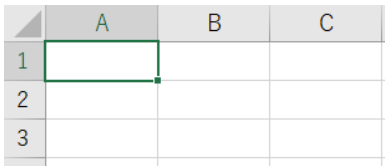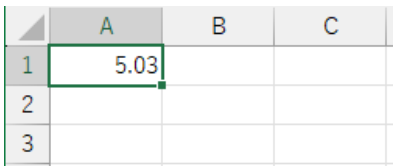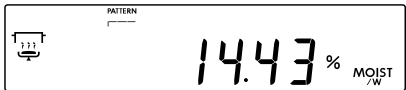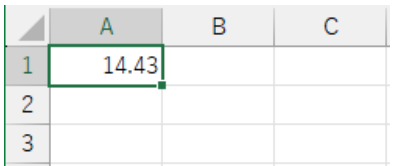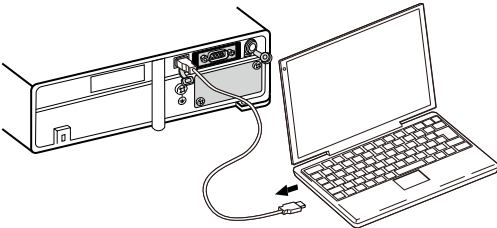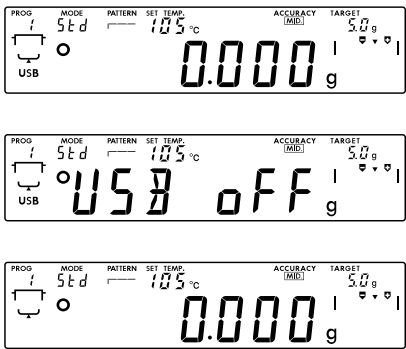
Switch to the quick USB mode ($UFnc$ = 0) (for one-way communication).

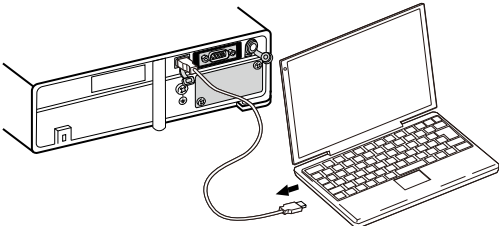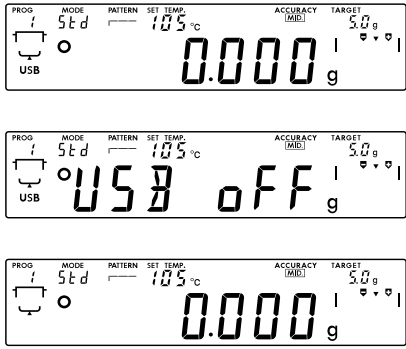| Step	Description	Display and key operation
1.	Press and hold the SELECT key (for approx. two seconds) with the mass displayed to display the "8. Internal Settings" menu.	0.000 g Press and hold (for approx. two seconds) bASFnc
2.	Press the SELECT key several times to match the display with the figure.	Press several times USb
3.	Press the ENTER key.	PRINT /ENTER UFnc V CoM
4.	Press the ↑ or ↓ key to switch the value of the "$UFnc$ (USB operation mode)" setting to "$UFnc$ = 0 (quick USB mode)".	UFnc V CoM UFnc Quick

158

Step	Description	Display and key operation
5.	Press the ENTER key when the screen switches to that indicated in the figure to register the settings.	
6.	Press the RESET key to return to the mass display.	

Output Method

Step	Description	Display and key operation
7.	Use the USB cable included with the moisture analyzer *1 to connect the moisture analyzer to the computer. When connecting for the first time, the computer will automatically start installing the driver. *1 UL certified products do not include a USB cable.	
8.	When the moisture analyzer connects with the computer, the quick USB connection is indicated on the display of the moisture analyzer (for approx. two seconds) as indicated in the figure, then the screen automatically switches to the mass display. The "USB connection icon (USB)" is lit while the product is connected via USB.	 Displayed for approx. two seconds
9.	Launch the computer software to send the mass and moisture content values to (such as Excel).	
10.	Set the keyboard input mode to half-width input. Values cannot be input correctly if it is set to full-width input.	

Step	Description	Display and key operation
11.	Press the RESET key to reset the display to zero.	 PROG *1* MODE *Std* PATTERN SET TEMP. *105* °C ACCURACY [MID] TARGET *5.0* g **0.000** g
12.	Place the sample on the sample tray.	PROG *1* MODE *Std* PATTERN SET TEMP. *105* °C ACCURACY [MID] TARGET *5.0* g **5.030** g
13.	Place the cursor in the location to input the mass value. 		A	B	C
---	---	---	---
1			
2			
3					
14.	Press the ENTER key to send the mass value from the moisture analyzer and input it to the location of the cursor. 		A	B	C
---	---	---	---
1	5.03		
2			
3					PRINT /ENTER Data output
15.	Measure the moisture content.	PATTERN **14.43** % MOIST /W
16.	Press the ENTER key to send the moisture content value from the moisture analyzer and input it to the location of the cursor. 		A	B	C
---	---	---	---
1	14.43		
2			
3					PRINT /ENTER Data output
17.	To end the procedure, remove the USB cable. When the moisture analyzer disconnects from the computer, the USB connection icon (**USB**) disappears.	PROG *1* MODE *Std* PATTERN SET TEMP. *105* °C ACCURACY [MID] TARGET *5.0* g USB **0.000** g PROG *1* MODE *Std* PATTERN SET TEMP. *105* °C ACCURACY [MID] TARGET *5.0* g USB **USB oFF** g PROG *1* MODE *Std* PATTERN SET TEMP. *105* °C ACCURACY [MID] TARGET *5.0* g **0.000** g

13.3.3. RS-232C

The RS-232C interface of the moisture analyzer is DCE (Data Communication Equipment) that can connect to a computer. A straight-type RS-232C cable is used to connect. If the computer does not have an RS-232C connector, connect it via the virtual COM mode of a USB connector. (For information on the communication settings, refer to "12.2. RS-232C".)
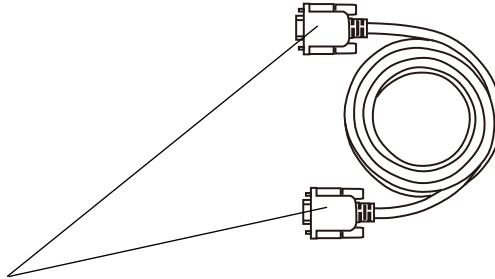
9-pin D-Sub (female), inch screws

13.4. WinCT-Moisture Communication Software

- WinCT-Moisture is data communication software for Windows that enables the data of the moisture analyzer to be imported to a computer for saving or data analysis.
- WinCT-Moisture can be downloaded from "Software Downloads" on the A&D website https://www.aandd.jp).
- WinCT-Moisture includes two programs: RsFig and RsTemp.

13.4.1. RsFig Graph Software for Moisture Content Measurement

- RsFig is Windows software that enables the data received from the moisture analyzer to be graphed in real-time.
- This enables you to check changes in the moisture content being measured to understand the process by which the moisture content stops changing (the convergence process).
- Graphs can also be overlaid on each other, so when measurement is repeated with different heating temperature conditions, the measurement process can be overlaid on the same graph.
- The measured data can be exported to a CSV file.
- For information on how to change and restrict the settings, refer to the instruction manual for RsTemp (RsFig_ReadMe).

Example display for RsFig

The figure below is an example of overlaying the measurement results for sodium tartrate dihydrate on the graph when the heating temperature is changed by 20°C each time (100 to 200°C).

The horizontal axis is the time elapsed (in minutes) since measurement started and the vertical axis is the moisture content (%).

The mass of the sample will decrease as the water evaporates due to heating, and that decrease in mass is calculated and displayed as the moisture content. When the moisture content stops changing (when the graph becomes flat), that is the moisture content of the sample.
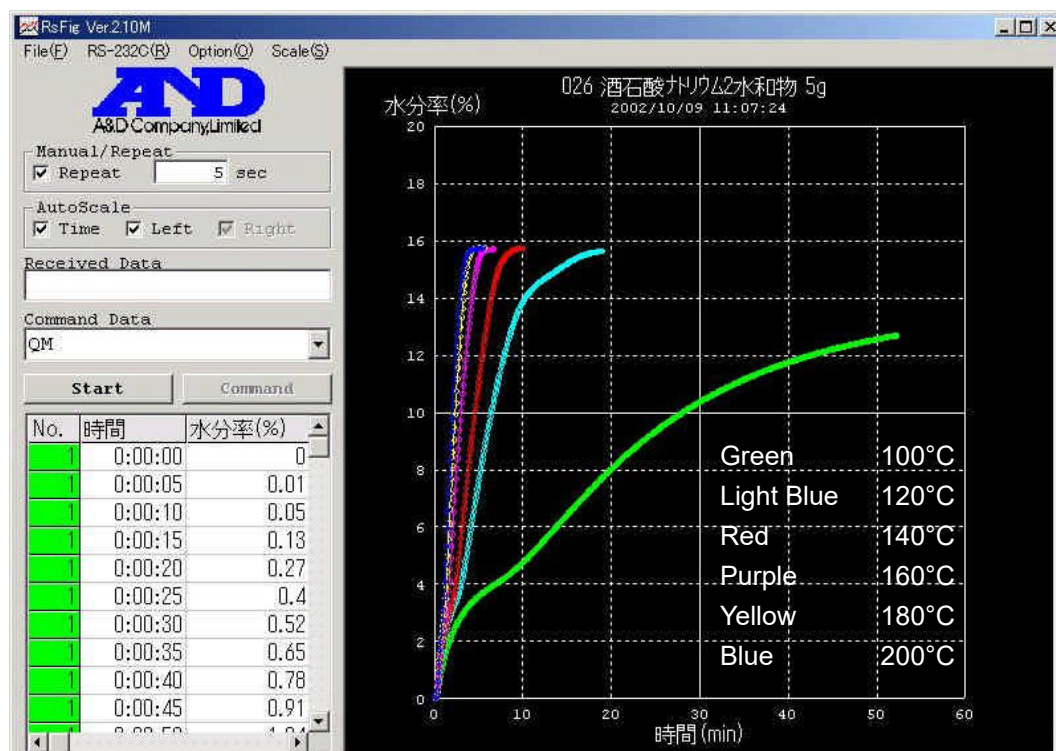
13.4.2. RsTemp Software for Automatic Heating Temperature Detection

- RsTemp is heating temperature detection software that automatically detects the recommended heating temperature when measuring the moisture content of a sample using an A&D moisture analyzer.
- The heating temperature is determined by gradually changing the temperature for heating the sample (in steps) and measuring the moisture content.
- The figure below is an example of measuring a sodium tartrate dihydrate sample with RsTemp.
- The horizontal axis indicates the elapsed time, the red curve in the figure indicates the moisture content, which is the left vertical axis. The green curve in the figure indicates the change in moisture content (%/min), which is the right vertical axis.
- The moisture content is measured with the heating temperature automatically increased by 20°C every five minutes.
- The starting heating temperature, temperature increase per step, and measurement time per step can be adjusted.
- (In the figure, the starting heating temperature is set to 100°C, the temperature increase per step is set to 20°C, and the measurement time per step is set to 5 minutes.)
- The table under the graph indicates the "heating temperature" for each step, the "moisture content" and "moisture content change" when measurement stops, and the "recommended temperature level". Recommended temperatures are given in six levels of A to F, where A is the temperature deemed to be the most recommended.

   Recommended   Not recommended
    A B C D E F

- For information on how to change and restrict the settings, refer to the instruction manual for RsTemp (RsTemp_ReadMe).

CAUTION

- RsTemp determines the recommended heating temperature based on the measurement and calculated result, but the recommended temperature may not be able to be appropriately determined, depending on the sample type and amount.
- When deciding the heating temperature of the sample, also observe the state of the sample over time (whether it melts, burns, smells, or disintegrates) and use that information to ultimately help decide the optimal heating temperature.
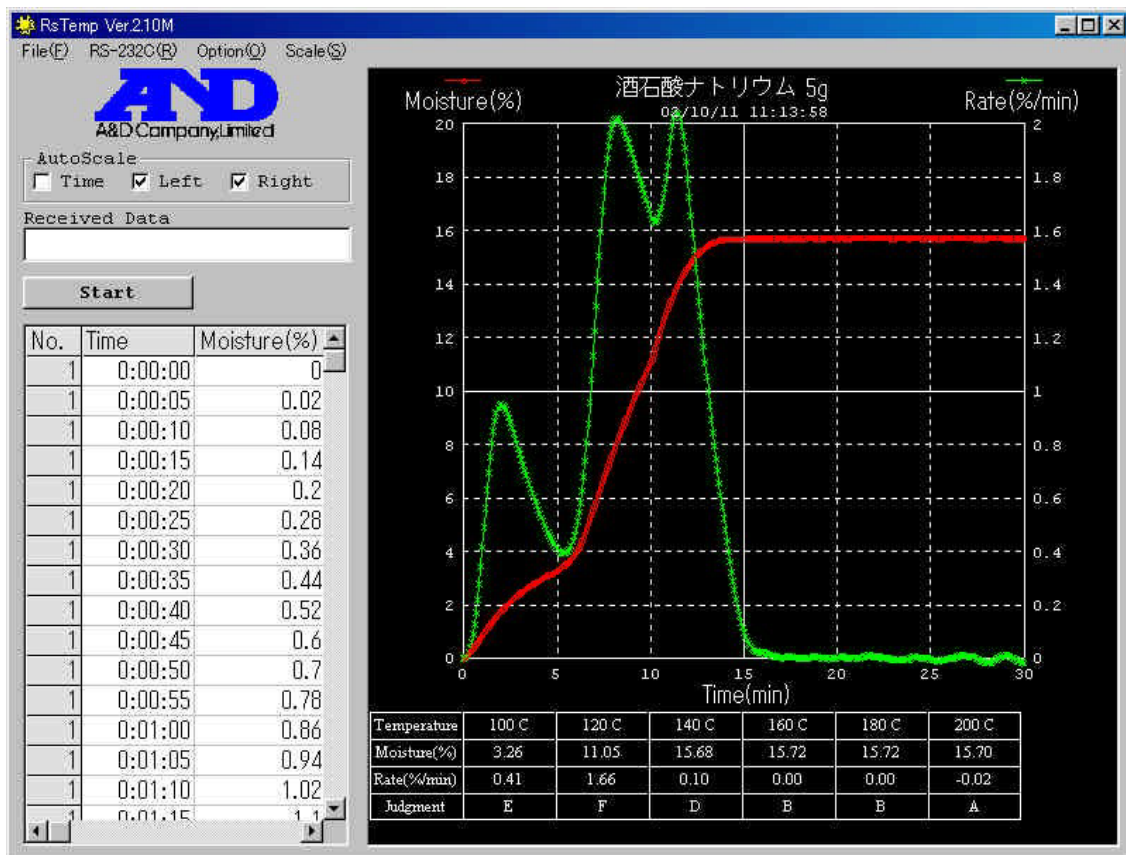
13.5. WinCT Data Communication Software

- WinCT is data communication software for Windows that enables the mass and moisture content values of the moisture analyzer to be easily imported to a computer. It uses RS-232C for communication.
- WinCT can be downloaded from "Software Downloads" on the A&D website (https://www.aandd.jp). For information on installing and setting up WinCT, see "Setting Up WinCT" and "WinCT Instruction Manual".
- WinCT includes three programs: RsCom, RsKey, and RsWeight.

"RsCom"

- Enables the moisture analyzer to be controlled by sending commands.
- Displays the received data and saves it as a text file (.txt).
- Multiple instances can be executed to communicate with multiple moisture analyzers.
- Can be executed at the same time as other applications. (Does not monopolize the computer.)
- Can also receive the GLP output data of the moisture analyzer.

"RsKey"

- Enables the mass and moisture content values of the moisture analyzer to be directly input to another application.
- Any application such as Word or Excel can be used, as long as it allows keyboard input.
- Can also input the GLP output of the moisture analyzer.
- Enables the test display function to be used to use a computer as an external display for the moisture analyzer.
  (With the moisture analyzer in the stream mode.)

"RsWeight"

- Graphs received data in real-time.
- Enables the maximum, minimum, average, standard deviation, and coefficient of variation of the received data to be calculated and displayed.

13.6. Commands

The following commands can be sent from a computer to control the moisture analyzer.

Add a terminator $\boxed{^C_R{}^L_F}$ (0Dh, 0Ah) to the command before sending it to the moisture analyzer.
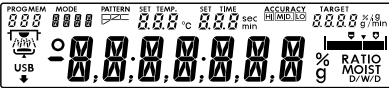
List of Commands

Command	Description
Q	Sends one measurement value.
SIR	Continuously sends measurement values.
C	Stops continuously outputting measurement values with the SIR command.
QM	Outputs one measurement value during measurement. QM can only be used during measurement.
START	Performs the same function as the $\boxed{\text{START}}$ key.
STOP	Performs the same function as the $\boxed{\text{STOP}}$ key.
RESET	Performs the same function as the $\boxed{\text{RESET}}$ key.
ENTER	Performs the same function as the $\boxed{\text{ENTER}}$ key.
SELECT	Performs the same function as the $\boxed{\text{SELECT}}$ key.
DOWN	Performs the same function as the $\boxed{\downarrow}$ key.
UP	Performs the same function as the $\boxed{\uparrow}$ key.
PROGRAM	Performs the same function as the $\boxed{\text{PROGRAM}}$ key.

14. How to Check the Software Version of the Moisture Analyzer

The specifications of the product may differ according to the software version of the moisture analyzer.
You can follow the procedure below to check the software version.

Procedure for Checking the Software Version

Step	Description	Display and operation
1.	Connect the power cable of the moisture analyzer main unit to the power outlet.	
2.	The LCD of the moisture analyzer will fully light up.	
3.	P-*.*** is displayed for approx. one second. The number in *.*** is the software version.	P-2.000

15.   Maintenance

- Make sure to remove the power plug from the power outlet before performing maintenance.

- Perform operations after confirming that the various parts of the moisture analyzer have cooled down sufficiently.

- The sample tray, tray holder, and breeze break can be removed.

- Remove any dirt using a cloth that has been dampened with water or water containing a small amount of neutral detergent and wrung out well.

- Do not use organic solvents or chemical wipes.

- Perform assembly as described in "4.1. Installing the Moisture Analyzer" and "1. Cautions Regarding Handling" after the parts are completely dry.

- When transporting the product, use the dedicated packaging box.

Power outlet

Power plug
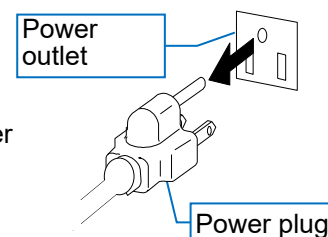
15.1.   Cleaning the Heater

- Clean the glass housing if it gets dirty, or it may not be able to heat properly. The glass housing can be easily detached by removing the two screws.

- Clean the halogen lamp if it has any fingerprints on it, or its life may be shortened.

- Do not touch the metal plate for reflection on the rear of the halogen lamp.
  Doing so may cause the set temperature of the sample tray and the actual heating temperature to deviate.

- Do not touch the temperature sensor adjacent to the halogen lamp.
  Doing so may cause the set temperature of the sample tray and the actual heating temperature to deviate.

Heater

Halogen lamp

Temperature sensor

Metal plate for reflection

Glass housing
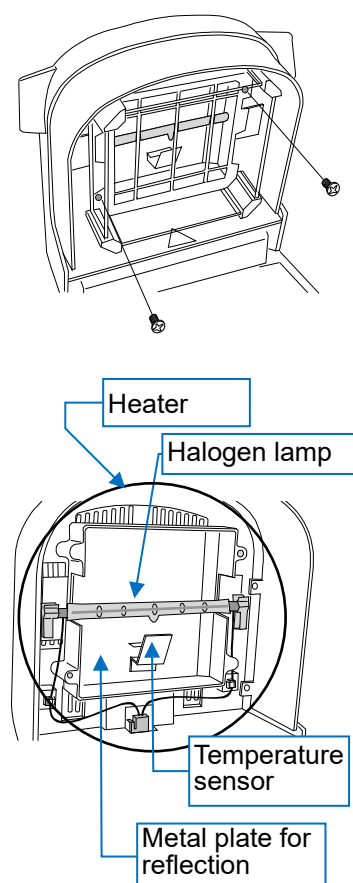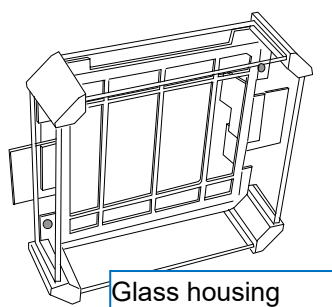
15.2.   How to Replace the Halogen Lamp

If drying takes time because the halogen lamp output has decreased due to lamp degradation or the halogen lamp has stopped lighting, replace the halogen lamp. Use the halogen lamp of accessory AX-MX-34-120V [1] or AX-MX-34-240V that is adapted to your local voltage. The expected life of the halogen lamp is approx. 5,000 hours.
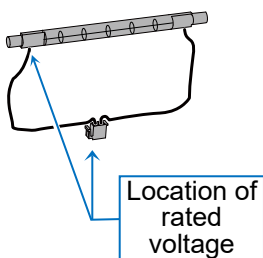
CAUTION
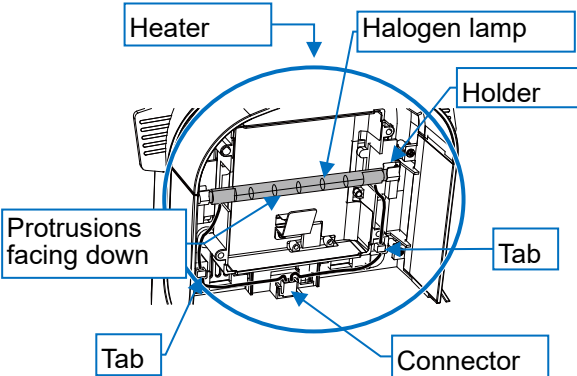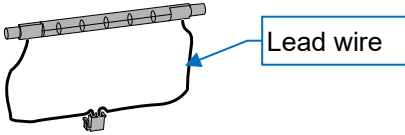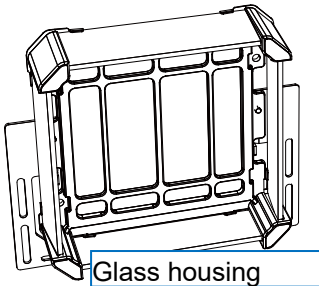
- Performing this procedure without removing the power cable can result in electrocution.
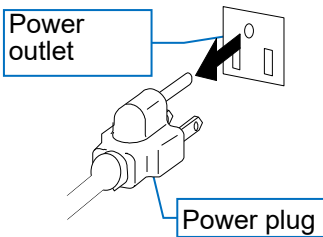- Read the power supply voltage label on the back of the heater cover and confirm that the rated voltage of the halogen lamp is correct for your power supply voltage.

Voltage Label	The Rated Voltage of the Halogen Lamp	Accessory number [1]
100 – 120V	AC 120 V	AX-MX-34-120V
200 – 240V	AC 240 V	AX-MX-34-240V

- Do not drop, strike, or damage glass parts including the halogen lamp.
  Doing so may cause it to break and lead to injury due to glass shards.
- The halogen lamp degrades due to contamination on its surface. Do not directly touch the glass of the halogen lamp.
- Dispose of the used halogen lamp as-is.
  Breaking a halogen lamp can cause glass shards to scatter, which may result in injury.
- It is recommended that you replace the halogen lamp once it has reached its rated life.
  Continuing to use it may cause damage to the product.

[1]   UL certified products are 120 V Version only.

Step	Description	Diagram
1.	Remove the power cable from the power outlet.	
2.	Confirm that the rated voltage of the new halogen lamp. The rated voltage is indicated on the edge of the connector and the halogen lamp.	
3.	Confirm that the heater has sufficiently cooled.	
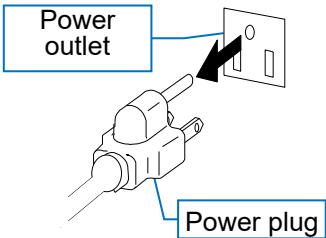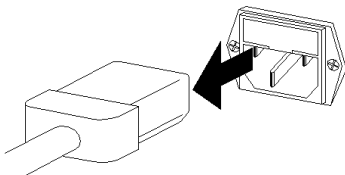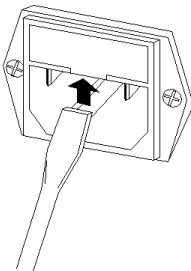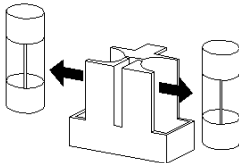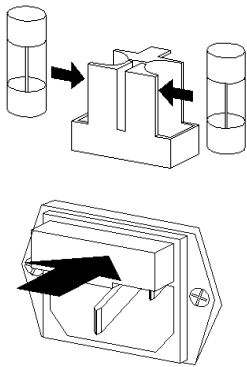
Step	Description	Diagram
4.	Remove the two screws of the glass housing.	Screw Screw
5.	Disconnect the connector of the halogen lamp, then remove it from the holder.	Heater Halogen lamp Holder Protrusions facing down Tab Tab Connector
6.	Load the halogen lamp with the protrusions facing down, as indicated in the figure, then connect the connector.	
7.	Hook the lead wire of the halogen lamp on the two tabs (on the left and right).	Lead wire
8.	Secure the glass housing with screws so that it does not pinch the lead wire of the lamp.	Glass housing

15.3. How to Replace the Power Fuse

The fuse inside the power supply may blow to protect the moisture analyzer main unit in cases such as when a power supply with the wrong voltage is connected. If the fuse blows, replace it with a new fuse (AX-FST6.3A250V; sold separately).
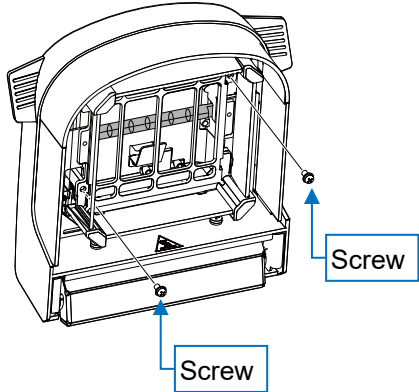
CAUTION

● Performing this procedure without removing the power cable can result in electrocution.

Step	Description	Diagram
1.	Remove the power cable from the power outlet.	Power outlet Power plug
2.	Remove the power cable from the power inlet of the moisture analyzer.	
3.	Use a flat-head screwdriver to remove the fuse cover on the top of the power inlet. (Insert the flat-head screwdriver under the tab on the bottom of the fuse cover, then prise it open to remove the fuse cover.)	
4.	Remove the fuse from the fuse cover, then visually check whether the fuse has blown, or use a multimeter. If the fuse has blown, replace it with a new fuse (sold separately).	
5.	Place the fuse in the fuse cover, then place the fuse cover together with the fuse into the power inlet.	

15.4. Initializing the Settings

You can initialize the settings of the product to restore the factory defaults.

There are two initialization methods, which initialize different settings.
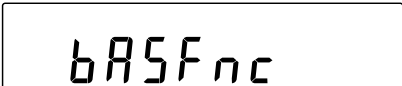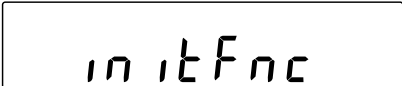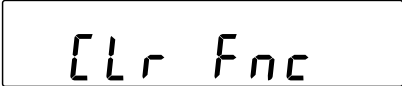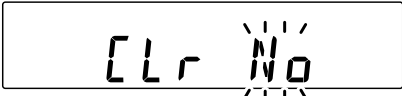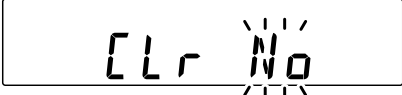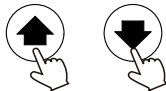
The initialized settings are as follows.
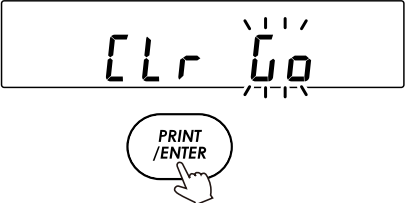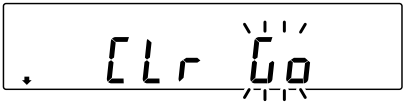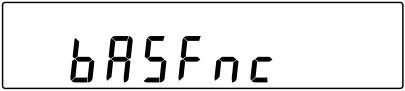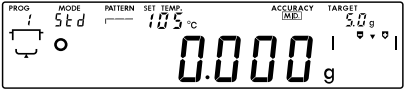
Item	Initialize (internal settings)	Initialize (all settings)
Mass sensor sensitivity adjustment data	No	Yes
Heating temperature adjustment data	No	Yes
Measurement conditions	No	Yes
Internal settings (excluding the password function)	Yes	Yes
ID number	Yes	Yes
Results recorded with the data memory function	Yes	Yes

Yes: Initialized
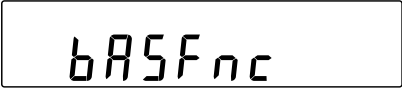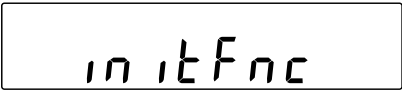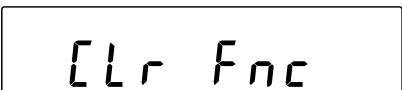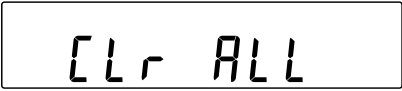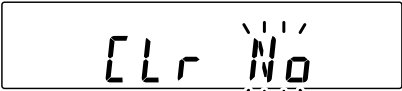
No: Not initialized
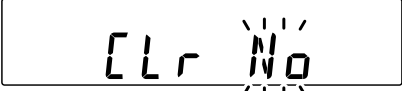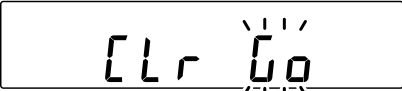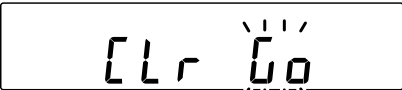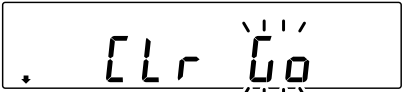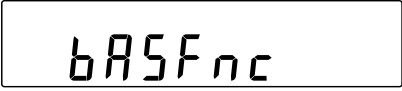
15.4.1. How to Initialize (Internal Settings)

Step	Description	Display and key operation
1.	Press and hold the SELECT key (for approx. two seconds) with the mass displayed to display the "8. Internal Settings" menu.	Press and hold (for approx. two seconds) bASFnc
2.	Press the SELECT key several times to match the display with "init Fnc".	Press several times init Fnc
3.	Press the ENTER key.	PRINT/ENTER Clr Fnc
4.	Press the ENTER key.	PRINT/ENTER Clr No
5.	Press the ↑ or ↓ key to switch to "Go".	Clr No Clr Go

Step	Description	Display and key operation

6.	Press the ENTER key.
	
	Initialization completes in several seconds, and End is displayed.
		`ELr Go`
		PRINT /ENTER
		`. ELr Go`
		(Wait several seconds)
		`End`
		`bASFnc`

7.	Press the RESET key to return to the mass display.	ON:OFF /RESET PROG 1 MODE Std PATTERN SET TEMP. 105 ℃ ACCURACY MD TARGET 5.0 g `0.000` g

15.4.2. How to Initialize (All Settings)

Step	Description	Display and key operation
1.	Press and hold the ⎣ SELECT ⎦ key (for approx. two seconds) with the mass displayed to display the "8. Internal Settings" menu.	*PROG 1 MODE 5td PATTERN SET TEMP. 105 °C ACCURACY MID TARGET 5.0 g* **0.000 g** (SELECT) Press and hold (for approx. two seconds) **bASFnc**
2.	Press the ⎣ SELECT ⎦ key several times to match the display with "int Fnc".	(SELECT) Press several times **init Fnc**
3.	Press the ⎣ ENTER ⎦ key.	(PRINT /ENTER) **Clr Fnc**
4.	Press the ⎣ SELECT ⎦ key to match the display with "Clr ALL".	(SELECT) Press several times **Clr ALL**
5.	Press the ⎣ ENTER ⎦ key.	(PRINT /ENTER) **Clr No**

Step	Description	Display and key operation
6.	Press the ↑ or ↓ key to switch to "Go".	$[Lr \ No$ ⬆ ⬇ $[Lr \ Go$
7.	Press the ENTER key. Initialization completes in several seconds, and End is displayed.	$[Lr \ Go$ PRINT /ENTER . $[Lr \ Go$ (Wait several seconds) End $bASFnc$
8.	Press the RESET key to return to the mass display.	ON:OFF /RESET PROG MODE PATTERN SET TEMP. ACCURACY MID TARGET 1 Std 105 ℃ 5.0 g 0.000 g

15.5. Troubleshooting

If the measurement results seem incorrect

- Refer to "7.4. Self-Inspection" to try a self-inspection.

- With the product switched to the mass display, load and unload the weight to check the repeatability of the mass value. Because a tall weight may touch the heater, use as short a weight as possible. When you have no choice but to use a 50 g weight, perform measurement with the heater cover open. Avoid disturbance such as wind when doing so.
The maximum height of the weight that can be placed on the sample tray (the height from the sample tray to the glass housing) is approx. 26 mm.

Weight height
Maximum: 26

- Perform the function tests to check whether the moisture content of the included test samples can be correctly measured (refer to "7.2. Test Sample Function Check").

- Is the moisture analyzer subject to any (air conditioner) wind or vibrations? Place the product on a stable surface and ensure it is not subject to any wind or vibrations.

- Has the measurement sample been appropriately processed?
For information on cutting samples with large granules or using a glass fiber sheet, refer to "4.2. Requirements for Ensuring Correct Measurement".

- Has measurement been performed properly?
For information on preheating before measurement and replacing the tray during continuous measurement, refer to "4.2. Requirements for Ensuring Correct Measurement ".
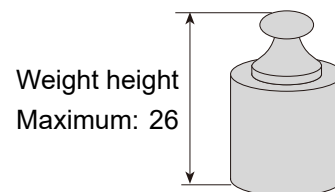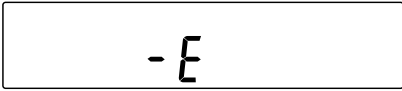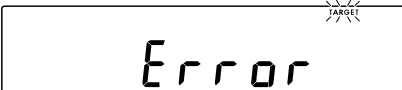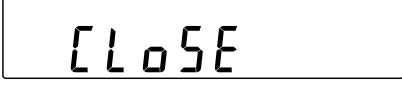
If the lamp does not light when measurement starts or it takes time to reach the set temperature
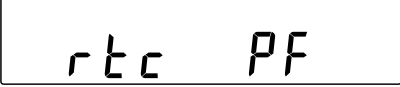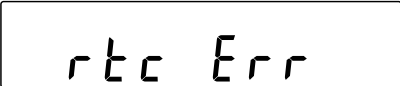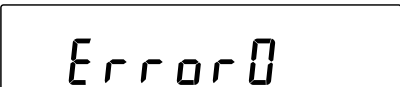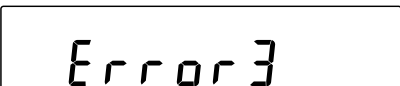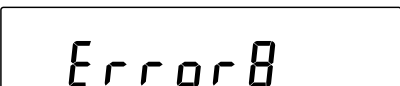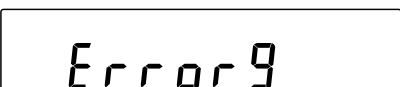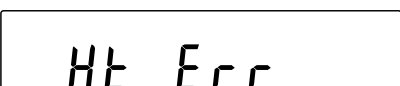
- It normally takes approx. six seconds until the lamp lights after the $\boxed{\text{START}}$ key is pressed.

- If the heater cover is open, power is not supplied to the halogen lamp.

- The connector of the halogen lamp indicates the compatible voltage. Confirm that the rated voltage.

Halogen lamp

Location of rated voltage
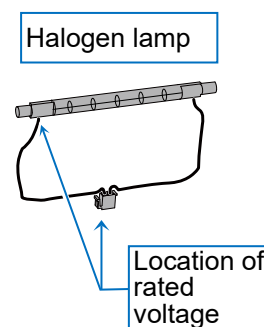
- Has the fuse blown? Remove the power plug from the power outlet, then check the fuse of the power inlet on the rear of the main unit. (Refer to "15.3. How to Replace the Power Fuse".)

- Was measurement performed at a low temperature after performing measurement at a high temperature? The lamp will not light if the temperature of the tray is higher than the set temperature.

- Confirm that the tray has sufficiently cooled before performing measurement.

- Otherwise, the halogen lamp may have expired. Check the filament of the lamp, and replace the lamp if necessary. Refer to "15.2. How to Replace the Halogen Lamp".

15.6. Errors Displayed

Errors displayed	Description and remedy
E	Overload The sample mass exceeded the allowed range. Reduce the sample. If this error occurs when only the sample tray is loaded, contact A&D for a repair.
-E	Underload The sample is too light. (The output from the mass sensor is too low.) Place the tray holder and sample tray on the product correctly, then press the RESET key. Perform mass sensor sensitivity adjustment. If the problem persists, contact A&D for a repair.
LoWVolt	AC power supply voltage error Check the power supply voltage. The voltage may drop if a power strip is used to share the power supply with other devices.
FrEQErr	AC power supply frequency error Check whether the power supply is appropriate.
Lo TARGET 50g SAMPLE	Insufficient sample error when heating starts Increase the amount of sample and perform heating. You can set the amount of sample to an arbitrary value. Refer to "6.4.7. Configuring the Sample Mass".
Hi TARGET 50g SAMPLE	Excess sample error when heating starts Decrease the amount of sample and perform heating. You can set the amount of sample to an arbitrary value. Refer to "6.4.7. Configuring the Sample Mass".
Error1	Unstable measurement value Mass sensor sensitivity adjustment cannot be executed because the measurement value is unstable. Inspect the area around the tray. Improve the installation environment (vibrations, wind, temperature changes, electrostatic, magnetism, etc.) so that it does not affect the moisture analyzer. The error will automatically clear in 10 seconds.
TARGET Error	Sample mass setting value error The sample mass setting value is incorrect. Set the upper limit to a value larger than the lower limit.
CP Error	Comparator setting value error The comparator setting value is incorrect. Set the upper limit to a value larger than the lower limit.
CH no	Self-inspection error A self-inspection error occurred. Request a repair.
CLoSE	Heater cover error If this error continues to be displayed, a repair is required.

Errors displayed	Description and remedy
CAL E	Mass sensor sensitivity adjustment weight problem (positive) The weight for mass sensor sensitivity adjustment is too heavy. Check the area around the tray. Confirm that the weight for mass sensor sensitivity adjustment is not touching the glass housing of the heater cover and that the mass of the weight for mass sensor sensitivity adjustment is appropriate. Press any key or wait 15 seconds to return to the mass display.
-CAL E	Mass sensor sensitivity adjustment weight problem (negative) The weight for mass sensor sensitivity adjustment is too light. Check the area around the tray. Confirm that the mass of the weight for mass sensor sensitivity adjustment is appropriate. Press any key or wait 15 seconds to return to the mass display.
t-UP	Heating temperature adjustment data input timeout Indicates that there was no temperature input after waiting for five minutes when adjusting the heating temperature. Press any key to clear the error. To adjust the heating temperature, repeat the procedure from the start.
FUL MEM	Full memory The number of results recorded with the data memory function reached the upper limit. Existing results must be erased to record new results. Refer to "10. Data Memory Function".
rtc PF	Internal clock battery error Press any key, then enter the date and time. Refer to "8.4. Checking and Configuring the Date/Time". If the problem persists, request a repair.
rtc Err	Internal clock malfunction Request a repair.
Error0	Internal error Turn the power OFF then ON again. If the error occurs again, request a repair.
Error3 Error8 Error9	IC error Request a repair.
Ht Err	Temperature control error Try again after turning the power OFF and waiting for at least 30 minutes. If the error occurs again, request a repair.

16.   Disposal

Due to the requirements of the European Directive on Waste Electrical and Electronic Equipment (WEEE) 2012/19/EU, the product must not be disposed of as general waste. Follow the local laws when disposing of the product.

Dispose of the product according to the local regulations on recycling electrical and electronic devices. If you have any questions, contact the relevant local government office. Make sure to convey these disposal requirements if transferring the product to a new owner.

17. Specifications

			MS-74A	MX-53A	MF-53A	ML-53A
Heating method			400 W halogen lamp			
Range of sample tray temperature settings			30°C to 200°C (1°C increments)			
Sample tray heating patterns			Standard heating, slow heating, step heating, rapid heating			
Heating temperature adjustment			Available with separate temperature adjustment kit (AX-MXA-43; sold separately)			
Measurable sample mass			0.1 g to 71 g	0.1 g to 51 g		
Measurement accuracy Reproducibility Standard deviation	Moisture content[*1]	Sample mass 5 g or more	0.01%	0.02%	0.05%	0.1%
		Sample mass 1 g or more	0.05%	0.1%	0.2%	0.5%
	Weight		0.0005 g	0.001 g	0.002 g	0.005 g
Minimum displayed	Moisture content		0.001%, 0.01%, 0.1%	0.01%, 0.1%	0.05%, 0.1%, 1%	0.1%, 1%
	Weight		0.0001 g	0.001 g	0.002 g	0.005 g
Sample mass required for measurement with an expected moisture content of 1% or less			When the expected moisture content is less than 0.1% Sample mass 20 g or more			
			When the expected moisture content is 0.1% to 0.5% Sample mass 5 g or more			
			When the expected moisture content is 0.5% to 1% Sample mass 2 g or more			
Measurement conditions	Measurement mode	Standard mode	The sample mass and termination value[*2] are automatically determined according to the measurement accuracy, then measurement stops when the termination value is reached.			
		Timer mode	Measures moisture content by heating for a certain period of time. (1 to 480 min)			
		Custom mode	Enables the user to configure detailed measurement conditions. Measurement ends when the set termination value[*2] is reached.			
	Measurement basis		Moisture content (standard before heating), moisture content (Atro, standard after heating), solids, ratio, grams			
	Recordable measurement conditions		200 sets			
Recordable measurement results (data memory function)			200			
Interfaces	RS-232C		9-pin D-Sub (male) EIA RS-232C			
	USB		Type-C (female) USB 2.0 HID CDC			
Sample tray dimensions			φ95 mm			
Operating temperature and humidity			5°C to 40°C; Humidity: 85% or lower RH (without condensation)			
Usage range			Indoor use only			
Elevation			Maximum: 2000 m			

	MS-74A	MX-53A	MF-53A	ML-53A
Power supply	120 V AC Version 100 V to 120 V, 50/60 Hz, 3A *4 240 V AC Version 200 V to 240 V, 50/60 Hz, 1.5A Voltage fluctuations −15%, +10% Power load Approximately 500 W *3			
Overvoltage category	II			
Pollution level	2			
Maximum power consumption	500 W			
External Dimensions	215 (W) ×380 (D) × 176 (H)			
Main unit weight	Approx. 6 kg (excluding accessories)			

*1 The result of performing preheating then measuring the included test sample (approx. 5 g of sodium tartrate dihydrate) at 160°C with standard heating and the standard mode (MID.) and cooling for 15 minutes at room temperature with the heater cover raised after each measurement.

*2 Measurement stops when the time change of the moisture content is at or below the set value.

*3 Please confirm that this analyzer is compatible with your local voltage, receptacle type, and power cable.

*4 UL certified products are 120 V Version only.

List of Included Accessories

Yes Included as standard; -   Available for purchase

	MS-74A	MX-53A	MF-53A	ML-53A
Tray holder	Yes	Yes	Yes	Yes
Breeze break	Yes	Yes	Yes	Yes
Display protective cover	Yes	Yes	Yes	Yes
Power cable	Yes	Yes	Yes	Yes
Ground adapter	Yes	Yes	Yes	Yes
Quick Start Guide	Yes	Yes	Yes	Yes
Warranty card	Yes	Yes	Yes	Yes
Body cover	Yes	Yes	-	-
Test sample[1]	Yes	Yes	-	-
Glass fiber sheet	Yes	Yes	-	-
Spoon	Yes	Yes	-	-
Tweezers	Yes	Yes	-	-
USB cable	Yes [2]	Yes [2]	-	-
Sample tray	× 20	× 20	× 10	× 10
Sample tray handle	× 2	× 2	× 1	× 1
Disposable aluminum tray	× 100	× 100	× 100	× 100

Yes: Included; -: Not included

[1]   30 g of sodium tartrate dihydrate

[2]   UL certified products do not include a USB cable.

17.1.   External Dimensions

215

Maximum height from plate

26

326

16

380

176
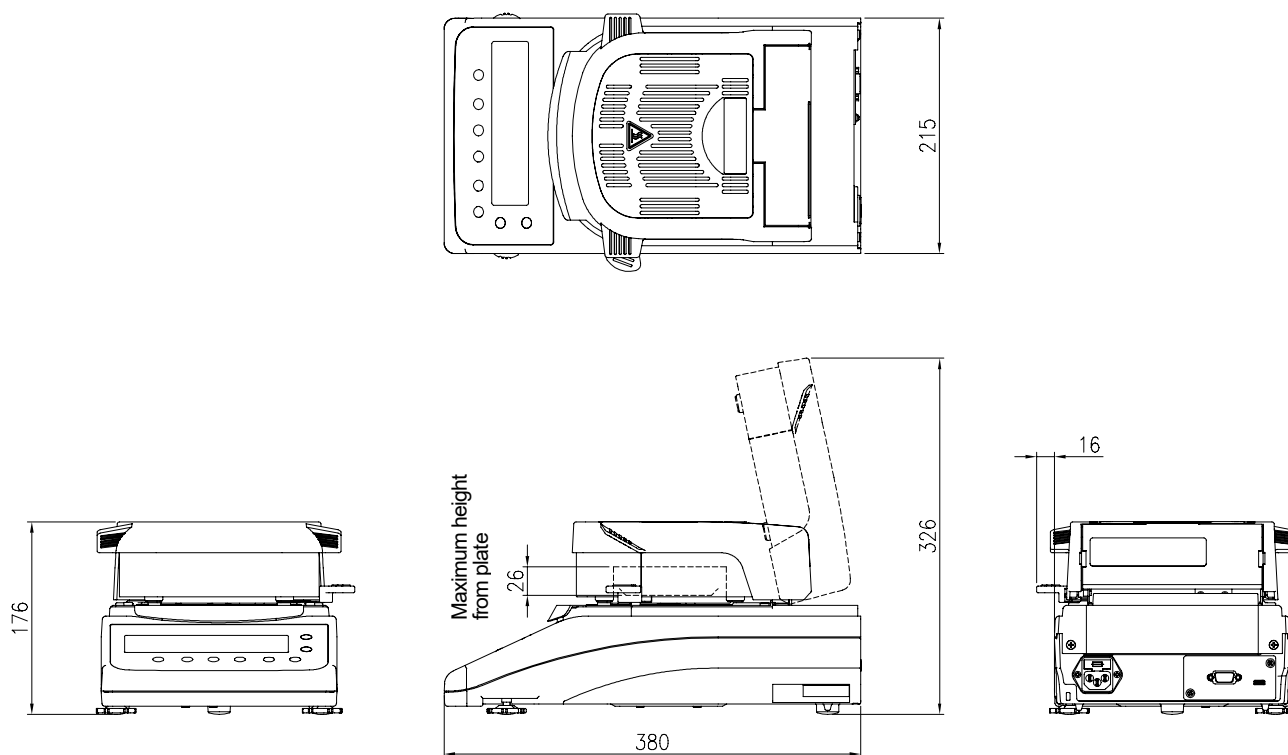
Unit: mm

18. Accessories (Sold Separately)

Accessory

Name	Number
Disposable aluminum tray (φ90 mm, set of 100)	AX-MXA-30
Sample tray (φ90 mm, set of 100)	AX-MXA-31
Glass fiber sheet φ70 mm (filter paper, set of 100) Use for liquid samples with high surface tension.	AX-MX-32-1

Glass fiber sheet   φ86 mm (glass paper, set of 100)
    The same as that included with the MS-74A and MX-53A.
    Use for liquid samples.
	AX-MXA-32-2

Test samples (sodium tartrate dihydrate; 30 g × 12 sets)	AX-MX-33
Halogen lamp (100 V to 120 V)	AX-MX-34-120V
Halogen lamp (200 V to 240 V)	AX-MX-34-240V [1]
Sample tray handle (set of two)	AX-MXA-35
Tweezers (set of two)	AX-MX-36
Spoon (set of two)	AX-MX-37
Display protective cover (set of five)	AX-MXA-38
Body cover	AX-MXA-39
Mass sensor sensitivity adjustment weight (20 g; OIML F1 class accuracy)	AX-MX-41
Temperature adjustment kit (with calibration certificate)	AX-MXA-43
Fuse (T6.3 A 250 V)	AX-FST6.3A250V

[1]   UL certified products are 120 V Version only.

List of Accessories Available Separately

AD-8129TH: Thermal printer

❑   Multifunctional

❑   Statistical computation, calendar/clock function, interval print function (prints at a certain interval from 5 sec to 30 min), chart print function (prints the specified two digits in graph format), dump print mode

❑   13 × 28 dots; 24 characters per line

❑   Thermal paper   AX-PP147-S (57.5 mm (W) × approx. 30 m)
    Dust-free thermal paper   AX-PP183-S (57 mm (W) × approx. 25 m)

AD-1687: Environment logger

❑   Four environment sensors (temperature, humidity, air pressure, and vibration) are included to enable simultaneous measurement and recording with standalone operation. By connecting with the RS-232C output of the moisture analyzer, the mass value can be recorded together with the environment data. Dedicated data importing software is not required.

AD-1688: Measurement data logger
- ❑ Enables data output from the RS-232C port to be recorded. This enables mass and moisture content values to be saved in environments where a computer cannot be used. Dedicated data importing software is not required.

AD-8526: Ethernet converter
- ❑ Enables management of measurement values using an Ethernet network, via a LAN port and the RS-232C port of a measurement device.
- ❑ Includes "WinCT-Plus" data communication software

AX-USB-9P: USB converter
- ❑ Enables serial communication software such as "WinCT" to be used with a USB connection, even on a computer without a COM port. Bidirectional communication can be performed after the driver is installed.

AX-KO2741-180: 1.8 m RS-232C cable (9-pin D-Sub (female) to 9-pin D-Sub (female))
- ❑ A cable for connecting the moisture analyzer to a PLC, etc.

AX-KO7919-200: 2 m USB cable (Type-A to Type-C)
- ❑ The USB cable included with the moisture analyzer as standard. *1
  - *1   UL certified products do not include a USB cable.

AD-1683A: Ionizer
- ❑ Prevents measurement error caused by static electricity during measurement via static elimination. Optimal for precise measurement of samples such as powders because it is a direct flow-type ionizer that does not emit wind.
- ❑ It is compact and lightweight.

AD-1684A: Non-contact electrostatic measuring instrument
- ❑ Displays the result of measuring the charge (of an automatic measurement line, etc.) of moisture analyzer peripherals such as the measured sample, tare, or breeze break. AD-1683A (static eliminator) can be used to remove an electrostatic charge from the product.

AD-1689: Tweezers for analysis operations
- ❑ Tweezers for retaining the 1 g to 500 g weight used for the mass sensor sensitivity adjustment of the moisture analyzer.
- ❑ The tweezers are 210 mm long and feature a cap on the end.

AX-TWEEZERS-25: Tweezers for analysis operations
- ❑ Tweezers for retaining the 1 g to 500 g weight used for the mass sensor sensitivity adjustment of the moisture analyzer.
- ❑ The end features a cap made of polycarbonate + 10% carbon + 10% glass fiber materials, which makes it less susceptible to electrostatic.

AD-1603-20F1: Mass sensor sensitivity adjustment weight
- ❑ A 20 g OIML shape F1 class weight.

AD-8541-PC: Bluetooth® dongle for connecting a computer

❑ Enables bidirectional communication between the AD-8541-SCALE and a computer via the COM port using Bluetooth.

Maximum communication distance: Approx. 10 m

(For details, refer to "AD-8541-PC Instruction Manual".)

AD-8541-SCALE: Bluetooth® converter for connecting a scale

❑ Enables wireless communication via Bluetooth with a Bluetooth device such as a smartphone/tablet, computer, external Bluetooth display, or the AD-8931-JA or AD-8541-PC.

Maximum communication distance: Approx. 10 m

(For details, refer to "AD-8541-SCALE Instruction Manual".)

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