AD-4714A

Digital Moisture Balance

INSTRUCTION MANUAL

Instruction-AD-4714A-v.1.a 11.20.92 OGA

Digital Moisture Balance

A&D Company, Limited

Table of Contents

FCC Rules

Please note that this equipment generates, uses and can radiate radio frequency energy. This equipment has been tested and has been found to comply with the limits of a Class A computing device pursuant to Subpart J of Part 15 of FCC rules. These rules are designed to provide reasonable protection against interference when equipment is operated in a commercial environment. If this unit is operated in a residential area it might cause some interference and under these circumstances the user would be required to take, at his own expense, whatever measures are necessary to eliminate the interference.

(FCC = Federal Communications Commission in the U.S.A.)

Welcome!

Thank You For Your A&D Purchase!

The Model AD-4714A Infrared Moisture Determination Balance is a measuring device which determines the moisture content (as a percentage) of a sample by heating the sample with infrared light to evaporate the moisture content and then measuring the change in mass.

Features

- ❑ The AD-4714A can be used to easily measure samples weighing 5 to 70 grams.
- ❑ The AD-4714A features a Auto Tare function which automatically raises and lowers the sample pan to eliminate drift so that it is constantly maintained at the zero point and thus makes highly precise measurements possible. (PAT PEND.)
- ❑ Moisture content, sample weight, temperature and drying time are all displayed on an easy-to-read high-contrast LCD display.
- ❑ The drying temperature is automatically controlled to match with the temperature set in advance.

About Samples

Moisture content measurements can be made for most types of substance for which it is possible to evaporate the moisture content by heating. However, the AD-4714A should not be used to measure the moisture content of substances which produce chemical reactions (explosion or generation of poisonous gases).

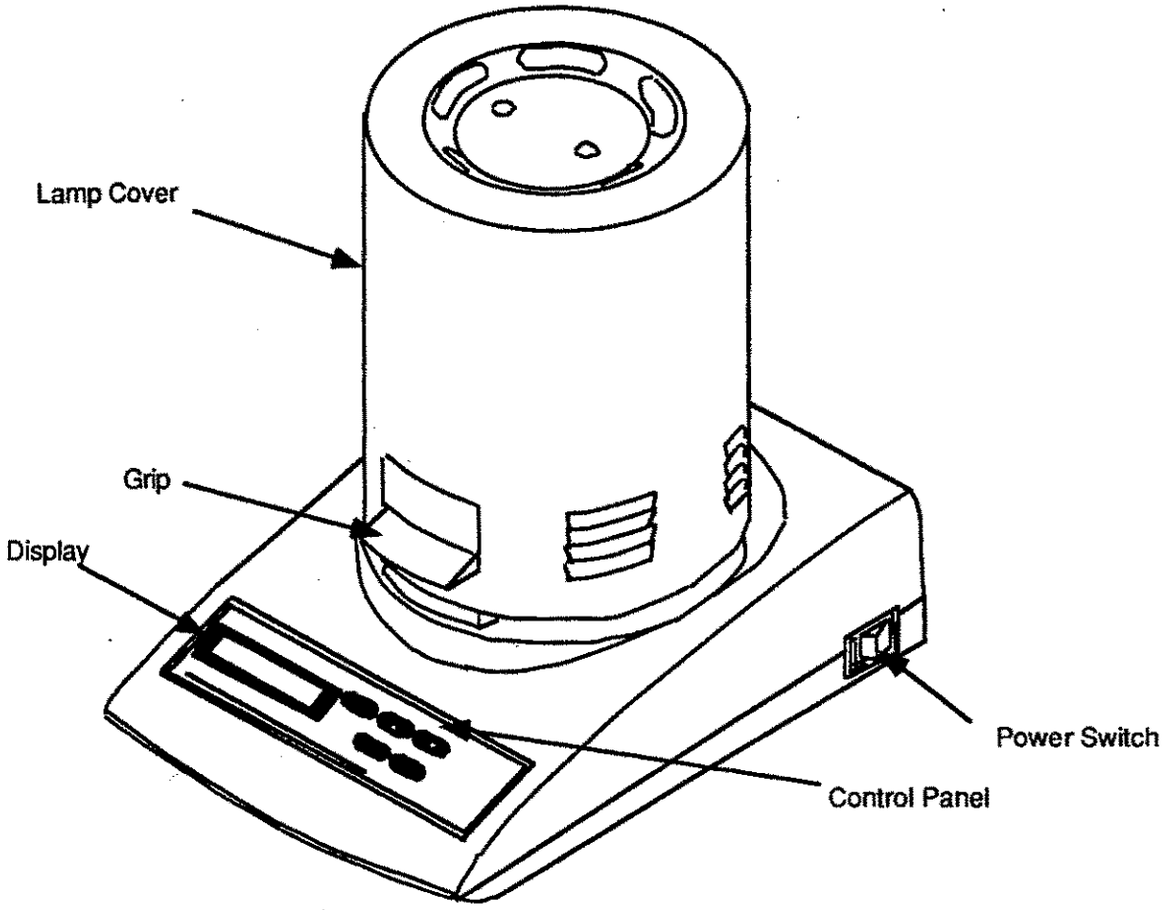
Specifications

Sample Pan	:	Diameter 95mm, depression 10mm , thickness 0.3mm
Optional Weight Sampling	:	5 - 70g
Minimum Weight Displayed	:	10mg
Minimum Moisture Content Displayed	:	0.1%
Moisture Content Precision	:	±0.1% (10 - 70g) ±0.2% (5 - 10g)
Display	:	Digital LCD display
Data Displayed	:	Moisture Content (0.0 - 100%) Initial Weight (0.00 - 69.99g) Over 70g, "WEIGHT CHECK" will be displayed. Temperature (0 - 180°C) Time (00 : Continuous measurement mode, 01 - 99 minutes: Interval measurement mode)
Drying Temperature Setting Range	:	01 to 99 minutes or continuous measurement (Drying operation can be performed using the keys on the panel, every one minute with memory function activated.) Even in the continuous measuring mode, drying operation will be automatically stopped on the safe side when 99 minutes have passed.
Drying Temperature Setting	:	50°C (122°F) to 180°C (356°F) (Drying operation can be performed using the keys on the panel, at intervals of one centigrade with memory function activated.) Automatic temperature control available.
Temperature Measurement Method	:	By thermistor
Heat Source	:	185W Infrared lamp
Power Supply	:	100/120V AC or 220/240V AC (switchable) (50/60Hz)
External Dimensions	:	210 (W) x 320 (D) x 318 (H) mm
Weight	:	3.0kg
Power Consumption	:	185W (lamp) + 2W (control section) (max)

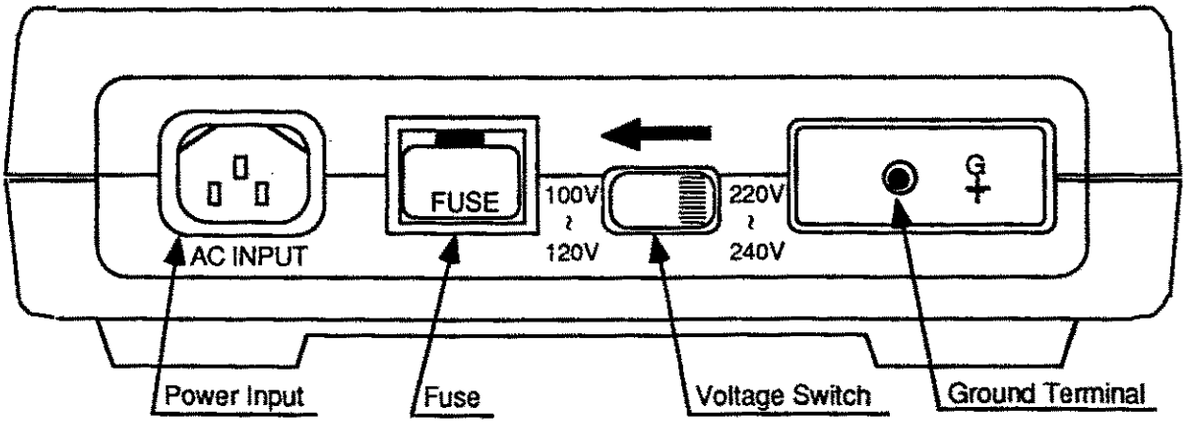
Alarm Function	:	Piezoelectric buzzer (Sounds for 15 seconds upon completion of measurement)
Auto Tare Function	:	Automatic at 30-second intervals
Accessories	:	Infrared lamp (2), Sample Pan (2), Sample Pan Support, Shield, Fuse (1), Power Supply Cord, Aluminum sheets (20), Spoon, Sample Pan, A pair of Tweezers, Instruction Manual, Dust Cover

Unpacking your AD-4714A

Main Unit



RearPanel

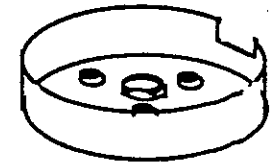


Accessories

2 IR Lamps

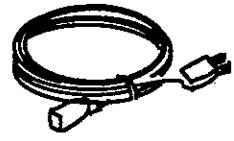
2 Sample Pans

Sample Support



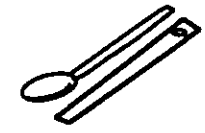
Breeze Break

Two kinds of Fuses
(0.5A 100/120V)
(0.3A 220/240V)



Power Cord

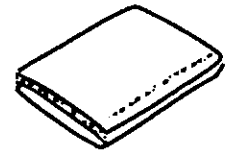
Aluminum
Sheets
(10 pcs x 2 boxes)



A set of Spoon

A Pair of Tweezers

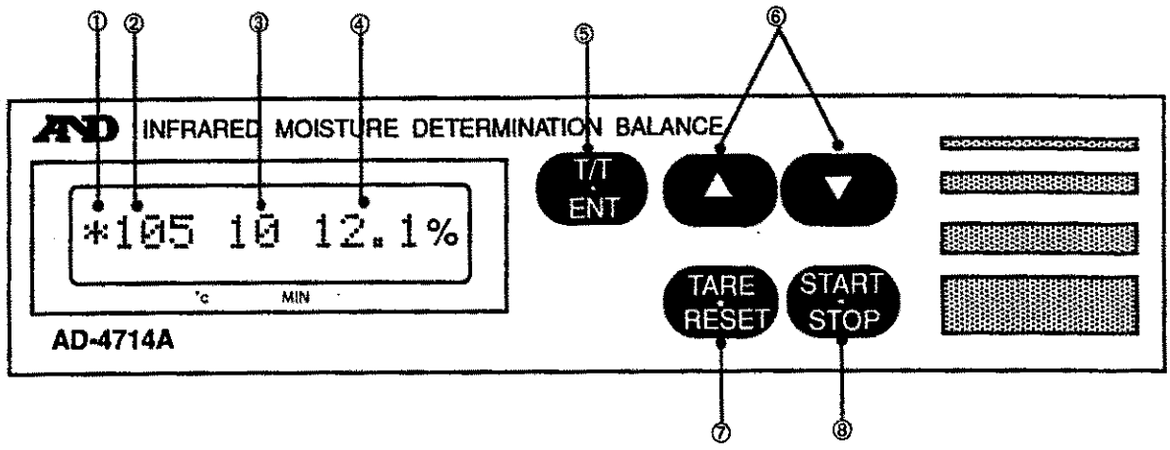
Instruction Manual



Dust Cover

Display and Keys

Reading the Display



① ⁘ : This indicator comes ON when drying operation has completed.

② Temperature °C: This display indicates the temperature set in advance and the temperature during drying. The maximum temperature is approximately 180°C.

③ Time MIN : This display indicates the set drying time. (01 - 99 minutes)

The time remaining will be displayed during measurement.

Drying will be performed continuously until 99 minutes when the drying time is set to "00". The elapsed time will be displayed during measurement with "+" symbol.

④ Moisture Content (%):
Weight (g) : This indicator indicates the initial weight of the sample (in grams), and the moisture content (as a percentage) during measurement. Moisture content measurements are made at 30-second intervals and the " ▦ " mark flashes on "%" signal place while the sample pan is being raised or lowered.

⑤ T/T ENT
Temperature/Time Enter Key

: This key is pressed to set the desired drying temperature and time. When this key is pressed the AD-4714A will enter the Temperature & Time Setting Mode.

❑ *Setting the drying temperature*

The " ▒ " mark will appear on the ⁜ place just before the temperature display section when this key is pressed once.

Use the [Δ] and [∇] keys to change and display the drying temperature you desire.

▣ Press the [T/T•ENT] key to store the temperature into memory.

The " ▒ " mark will appear just before the time display section and blink to indicate that the AD-4714A is awaiting input.

❑ *Setting the drying ttime*

Use the [Δ] and [∇] keys to change and display the drying time you desire.

▣ Press the [T/T•ENT] key once again to store the time into memory.

The temperature and time set will be retained in memory even if the power supply is turned off as long as it is not re-entered.

⑥ 

Increment
Decrement
Key

: These keys are pressed to set the temperature or time values when the AD-4714A is in the Temperature & Time Setting MODE.

Each press of these keys changes the time settiing by one minute or changes the temperature setting by one degree.

The time or temperature values will change continuously if these keys are held down.

⑦ 

Tare/Reset
Key

: This key is pressed to adjust the unit to the zero point or to cancel the tare weight and to return the AD-4714A to the initial state. While the sample pan is being raised or lowered "BUSY" will be displayed. After that, "0.000" will be displayed.

⑧ 

Start/Stop
Key

: This key is pressed to start and stop drying.

The infrared lamp will light when this key is pressed to start drying.

The display will switch from the weight display (g) to the percentage display (%).

▶ Press the START/STOP key if you wish to stop drying at any time.

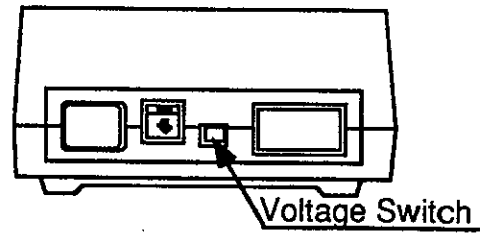
After the sample pan is raised or lowered, the final moisture content reading will be displayed and the infrared lamp will go out.

Setting Up The AD-4714A

1

After unpacking the unit, check the following items:

1. Is the Voltage Switch on the rear panel of the unit set to the voltage to be used?



2. Does the voltage of the supplied infrared lamp match the voltage to be used?

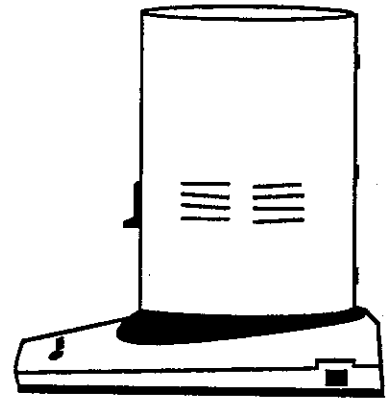
   Lamps corresponding to the voltage used at the place the unit is to be used are packed with the unit when the unit is shipped from the factory, but please check to make sure that the voltage is appropriate.

   Using the lamps with the wrong voltage may result in malfunction.

LIVE VOLTAGE	LAMP
100V	100V
120V	120V
220/240V	220V

2

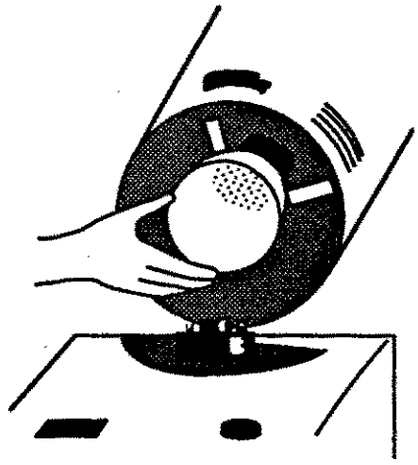
Install the unit on a flat, stable surface which is resistant to external vibrations and drafts.



3

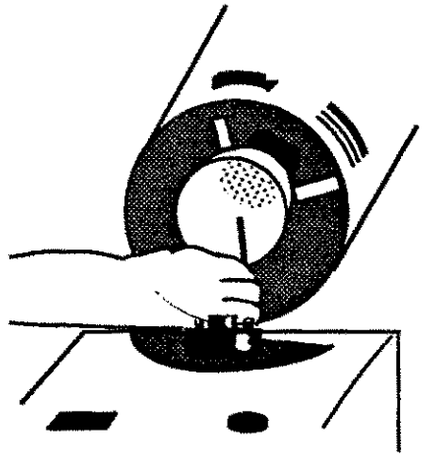
Installing the infrared lamp:
Tilt the lamp cover lifting up the "grip".

Move the thermistor aside a little (Caution, it is spring loaded) shown in the figure below and then screw in the infrared lamp tightly.



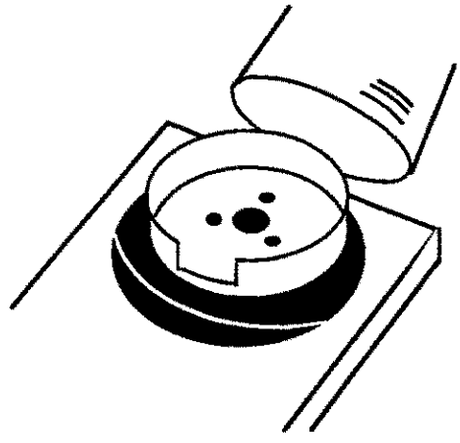
4

Release your finger from the the thermistor slowly.
Thermistor should automatically return to the original place .
If the spring does not return the thermistor to its original position, move it by hand.



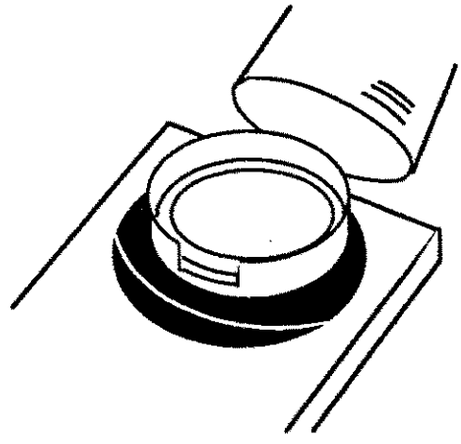
5

Installing the Breeze Break:
Install it so that the "Δ" mark faces the front side of the main unit. In this position the main unit's three columns match up perfectly with the small three holes in the breeze break.



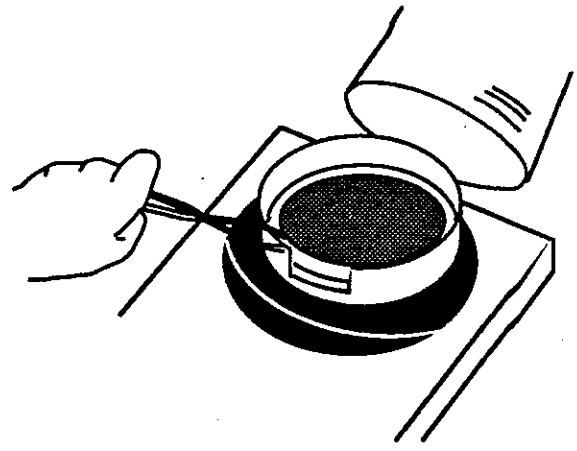
6

Installing the sample pan support :
Install the sample pan support so that the "Δ" mark on the sample pan support faces "Δ" mark of the main unit and gently insert it into the hole in the center of the breeze break.
When the sample pan support is installed correctly, it will be held firmly in place and will not rotate.



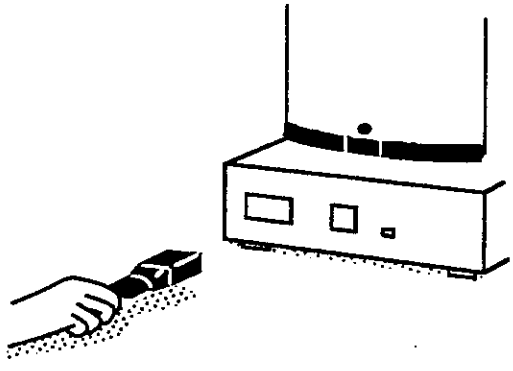
7

Install the sample pan on the sample pan support using a pair of tweezers.
Next, close the breeze break using the " grip " of the breeze break.



8

After inserting the plug into the main unit's receptacle, plug the power cord into an electrical outlet.
Ground the unit if necessary.

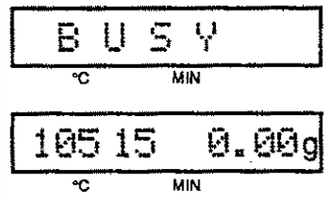


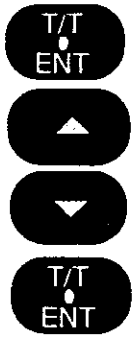
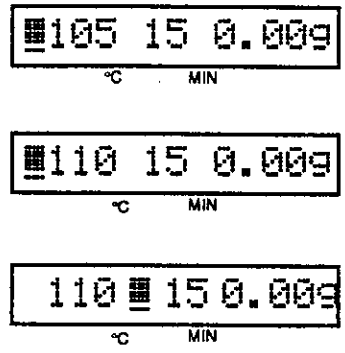
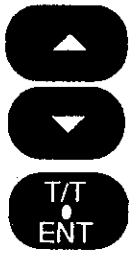
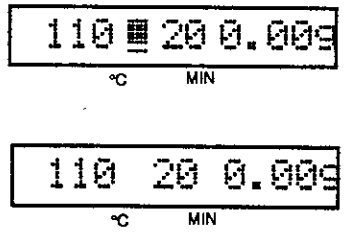
Measuring Procedure

❑ *Setting the drying conditions*

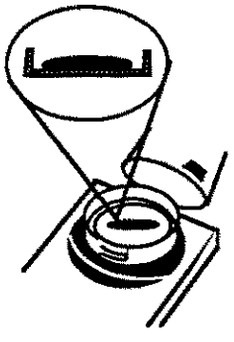
To obtain an accurate moisture content, it is necessary to set the proper drying temperature and time for the sample to be dried.

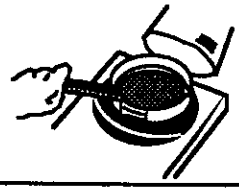
If you wish to measure the moisture contents without setting the drying time, you need to set the drying mode to " continuous drying mode". To select the continuos drying mode, set the drying time to " 00 ". In this mode, the AD-4714A keeps drying the sample until the **START-STOP** key is pressed, however the drying operation will be stopped automatically on the safe side if 99 minutes elapse.

Main Unit Key Operation	Display	Explanation of Operation
1) Turn on the power.		▣ Turn on the power switch on the right side of the main unit. " BUSY " will be displayed for several seconds and the sample pan will be raised or lowered automatically to adjust the zero. After this has been completed, drying temperature, time and weight will be displayed.

2) Setting the drying temperature 		▶ Press the T/T•ENT key. " ▮ " mark will blink on the left digit of the temperature section. ▶ Press the Δ or ∇ key to display the desired drying temperature. ▶ After the temperature has been set, press the T/T•ENT key. The temperature is stored in memory and " ▮ " mark goes off.
3) Setting the drying time 		▶ Press the Δ or ∇ key to display the desired drying temperature. ▶ After the time has been set, press the T/T•ENT key. The time is stored in memory and " ▮ " mark goes off.

❑ *Starting Measurement*

Main Unit Key Operation	Display	Explanation of Operation
4) Zero point adjust-ment and tare weight deletion TARE • RESET	B U S Y °C MIN 110 20 0.009 °C MIN	▶ With the lamp cover closed, press the TARE/RESET key without placing anything on the sample pan. "BUSY" will be displayed for several seconds while the sample pan is raised or lowered to automatically adjust the balance to the zero point. Weight display will be " 0.009 ". If you use supplied aluminum foils as a tare, press the TARE/RESET key after placing an aluminum foil on the sample pan.
5) Placing a sample on the sample pan 	120 20 8.219 °C MIN	▶ With the lamp cover open, place a sample on the pan while the weight display is " 0.009 ". Spread the sample as flat and evenly on the pan as possible.
6) Starting drying START • STOP	30 20 0.0 % °C MIN	▶ Press the START/STOP key once. The IR lamp will light and the display will switch from the weight (g) display to the moisture content (%) display.

7) Displaying the measuring process	105 19 2.1% °C MIN 110 18 2.6 ▮ °C MIN 110 18 2.6% °C MIN	▶ The DA-4714A measures the weight taring automatically once every 30 seconds and " ▮ " mark will blink for about 10 seconds on the "%" place while taring is being performed.
8) Stopping the drying using the START•STOP Key or timer START STOP	110 0 12.3% °C MIN 110 0 12.3 ▮ °C MIN *110 0 12.3% °C MIN	▶ When the START/STOP key is pressed to stop drying or the drying time has reached the set drying time, " ▮ " mark will blink for about 10 seconds in place of the "%" while taring is being performed automatically. The final content (%) will be displayed after the final weight is measured. After that, the IR lamp will turn off and the buzzer sounds for 15 seconds telling that the drying has completed or is stopped. Also, " * " mark is displayed on the left digit of the temperature values. If the measurement mode had been set to the continuous measurement mode" 00 ", the elapsed time (Start to Stop drying) is displayed with the positive sign "+".
9) Disposing of the remaining samples 		▶ Open the lamp cover and remove the sample pan using the supplied a pair of tweezers and dispose of the used sample.

10) Making further measurements Further measurement can be made by the same procedure described above from step **2)**. However, if no change needs to be made in the settings in step **2)** and **3)**, the procedure can be begun with step **4)**.		▶ Press the TARE/RESET key to make further measurements. The display will return to the initial state. Use another un-heated sample pan. Also open the lamp cover and let the entire unit cool down for a while before making the next measurement.
11) Turning off the power		▶ Be sure to turn off the power after all the measurements have been completed.

Notes On Measurements

- Use two different sample pans alternately when making measurements in succession.

  When making measurements in succession, be sure to use an extra, cooled sample pan to make the next measurement.
  When samples are placed on sample pans which still posses some residual heat some of the moisture content is evaporated and this may result in incorrect measurements.

  Also allow the entire unit to cool down for one or two minutes before making the next measurement.

  Two sample pans are supplied with the AD-4714A

- Lay the sample as flat in the sample pan as possible.

  If the sample is piled up, extra time will be required for drying and the top of the pile may become scorched, etc., resulting in incorrect measurements.

- To prevent the dried sample from adhering to the sample pan, spread out the supplied aluminum foils, etc., in the sample pan and then place the sample on this before making measurements.

  Additional aluminum foils are also available separately.

- Crush large-grained samples to an appropriate size before making measurements. Measuring large-graind samples not only results in longer drying times but may also cause the surface of the sample to become scorched before the entire sample has been dried, thus making accurate measurements impossible.

- Use the wall outlet directly as a power supply, do not use an extention cord.

  The fluctuation of the power supply voltage has a great effect on the drying temperature or moisture contents so we recommend that the wall outlet be used directly.

- Warm-up the AD-4714A to improve the measurement accuracy.

  Be sure to warm-up the AD-4714A for ten minutes at least when you use the AD-4714A for the first time or after leaving the AD-4714A unused for a long time.

- Be careful of drafts which may degrade the measurement accuracy

  Sometimes it happens that measuring devices are exposed to drafts from

the air conditions. Though the AD-4714A is designed so that its accuracy is not degraded by drafts, try to keep the AD-4714A away from direct drafts as much as possible.

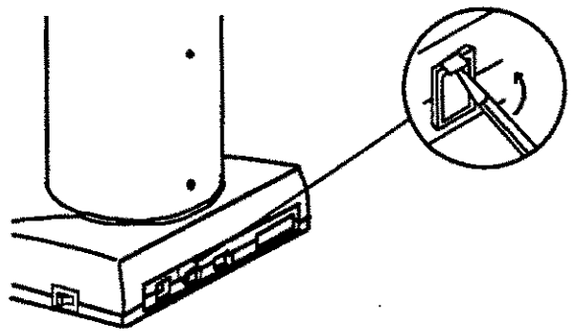
Maintenance

Fuse Replacement

A fuse is installed in the AD-4714A before shipment from the factory. A spare fuse is also provided with the unit.
If for some reason the fuse is blown during measurement, replace the fuse with a new following procedures.

1 Removal

Insert a screwdriver into the square hole in front of the fuse holder and tilt it up lightly. A spring push the holder section out.
Pull the fuse out.



2 Installing

Place a new fuse in the holder and push the holder back into the main unit.

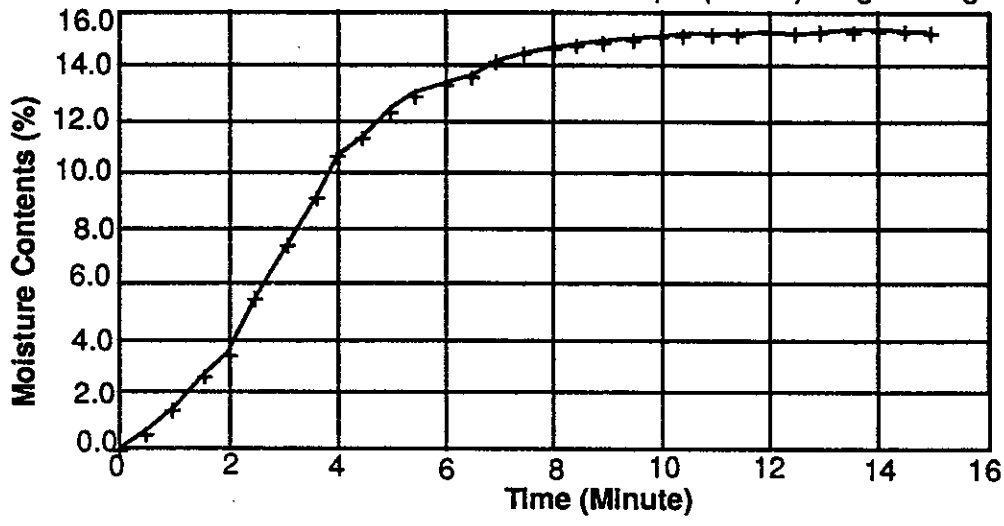
LIVE VOLTAGE	FUSE
100~120V	0.5A
220~240V	0.3A

Appendix

The following table shows a relationship between the moisture contents and the drying time.

Typical Drying Example (Flour)

Drying Temperature : 120°C
Sample (Flour) weight : 5.1g



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