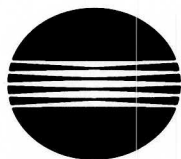


Spectrophotometer

CM-3220d

INSTRUCTION MANUAL



KONICA MINOLTA

Safety Symbols

The following symbols are used in this manual to prevent accidents which may occur as result of incorrect use of the instrument.



Denotes a sentence regarding a safety warning or note.
Read the sentence carefully to ensure safe and correct use.



Denotes a prohibited operation.
The operation must never be performed.



Denotes an instruction.
The instruction must be strictly adhered to.



Denotes a prohibited operation.
Never disassemble the instrument.












Denotes an instruction.
Disconnect the AC power cord from the AC outlet.





Notes on this Manual

- Copying or reproduction of all or any part of the contents of this manual without MINOLTA's permission is strictly prohibited.
- The contents of this manual are subject to change without prior notice.
- Every effort has been made in the preparation of this manual to ensure the accuracy of its contents. However, should you have any questions or find any errors, please contact a Minolta-authorized service facility.
- MINOLTA will not accept any responsibility for consequences arising from the use of the instrument.
- The name MINOLTA or MINOLTA CO.,LTD and its associated logo used in this manual (or on the product or any included materials) has been superseded by the new name KONICA MINOLTA or KONICA MINOLTA SENSING, INC.

Safety Precautions

To ensure correct use of this instrument, read the following points carefully and adhere to them. After you have read this manual, keep it in a safe place where it can be referred to anytime a question arises.

 WARNING (Failure to adhere to the following points may result in death or serious injury.)	
 Do not use the instrument in places where flammable or combustible gases (gasoline etc.) are present. Doing so may cause a fire.	 Do not disassemble or modify the instrument or the AC adapter. Doing so may cause a fire or electric shock.
 Always use the AC adapter supplied as a standard accessory or the optional AC adapter, and connect it to an AC outlet of the rated voltage and frequency. If the AC adapters other than those specified by MINOLTA, this may result in damage to the unit, fire or electric shock	 The instrument should not be operated if it is damaged or AC adapter is damaged, or if smoke or odd smells occur. Doing so may result in a fire. In such situations, turn the power OFF immediately, disconnect the AC adapter from the AC outlet and contact the nearest Minolta-authorized service facility.
 If the instrument will not be used for a long time, disconnect the AC adapter from the AC outlet. Accumulated dirt or water on the prongs of the AC adapter's plug may cause a fire and should be removed.	 Do not disassemble or modify the instrument. Doing so may cause a fire or electric shock.
	 Do not insert or disconnect the AC adapter with wet hands. Doing so may cause electric shock.
 Take special care not to allow liquid or metal objects to enter the instrument. Doing so may cause a fire or electric shock. Should liquid or metal objects enter the instrument, turn the power OFF immediately, disconnect the AC adapter from the AC outlet, and contact the nearest Minolta-authorized service facility.	

 CAUTION (Falling to adhere to the following points may result in injury or damage to the instrument or other property.)	
 Do not perform measurement which the measurement aperture directed towards your face. Doing so may damage them.	 Do not place the instrument on an unstable or sloping surface. Doing so may result in its dropping or overturning, causing injury. Take care not to drop the instrument when carrying it.
	 Make sure that the AC outlet is located near the instrument and that the AC adapter can be connected to and disconnected from the AC outlet easily.

Notes on Use

<Operating Environment>

- The CM-3220d should be used at ambient temperatures of between 5 and 40°C at relative humidity no higher than 80% (at 35°C/no condensation).
- Do not use it in areas of rapid temperature change.
- Do not leave the CM-3220d in direct sunlight or near sources of heat, such as stoves etc. The internal temperature of the instrument may become much higher than the ambient temperature in such cases.
- Do not use the CM-3220d in areas where dust, cigarette smoke or chemical gases are present. Doing so may cause deterioration in performance or breakdown.
- Do not use the CM-3220d near equipment which produces a strong magnetic field (such as speakers etc.).
- The CM-3220d is designed for indoor use only, and should never be used outside.
- The operating environment for this instrument should conform to "Pollution Degree 2" (i.e. where there is no possibility of metal dust and condensation), "Installation Category II" (i.e. the specified commercial power voltage should be used) and altitude of below 2000m.

<White Calibration Plate>

- The calibration data for the white calibration plate was measured at 23°C. To achieve the highest accuracy when measuring absolute values (colorimetric values), calibration and measurement should be performed at 23°C.
- Do not allow the white calibration plate to get scratched or stained.
- If you are not going to use the white calibration plate, store the white calibration plate unit in the main body to prevent entry of ambient light.

<Power Source>

- Make sure that the power switch is set to OFF ("O") when the CM-3220d is not in use.
- Always use the AC adaptor (AC-A17) supplied as a standard accessory and connect it to an AC outlet of the rated voltage and frequency.

<System>

- Do not subject the CM-3220d to strong impact or vibration. Doing so may cause deterioration in performance or breakdown.
- Since the specimen measuring port (measuring section) is an extremely precise optical component, great care should be taken to prevent it getting dirty or being exposed to impact. When the instrument is not in use, be sure to attach the sample holder to the measuring port to prevent entry of foreign matter.
- The CM-3220d may cause interference if used near a television, radio, etc.
- This instrument uses a microcomputer. It may malfunction if it is exposed to strong external electromagnetic noise. In this case, turn the power OFF, and then turn it ON again after 30 seconds or more have elapsed.

Notes on Storage

- The CM-3220d should be stored at temperatures of between 0 and 45°C. Do not store it in areas subject to high temperatures, high humidity, or rapid changes of temperature, or where condensation may occur. For added safety, it is recommended that it be stored with a drying agent (such as silica gel) at near room temperature.
- Do not leave the CM-3220d inside a car or in the trunk of a car. Under direct sunlight in summer, the increase in temperature can be extreme and may result in malfunction.
- Do not store the CM-3220d in areas where dust, cigarette smoke or chemical gases are present. Doing so may cause deterioration in performance or breakdown.
- Accumulation of dust inside the specimen measuring port will hinder accurate measurement. Block the sample holder to prevent entry of the dust.
- The white calibration plate may become discolored if it is left exposed to light. So, make sure that it is placed into the main body to prevent entry of ambient light when it is not in use.
- Be sure to keep all packing materials (cardboard box, cushioning material, plastic bags, etc.). They can be used to protect the instrument during transportation to service facility for maintenance (re-calibration etc.).

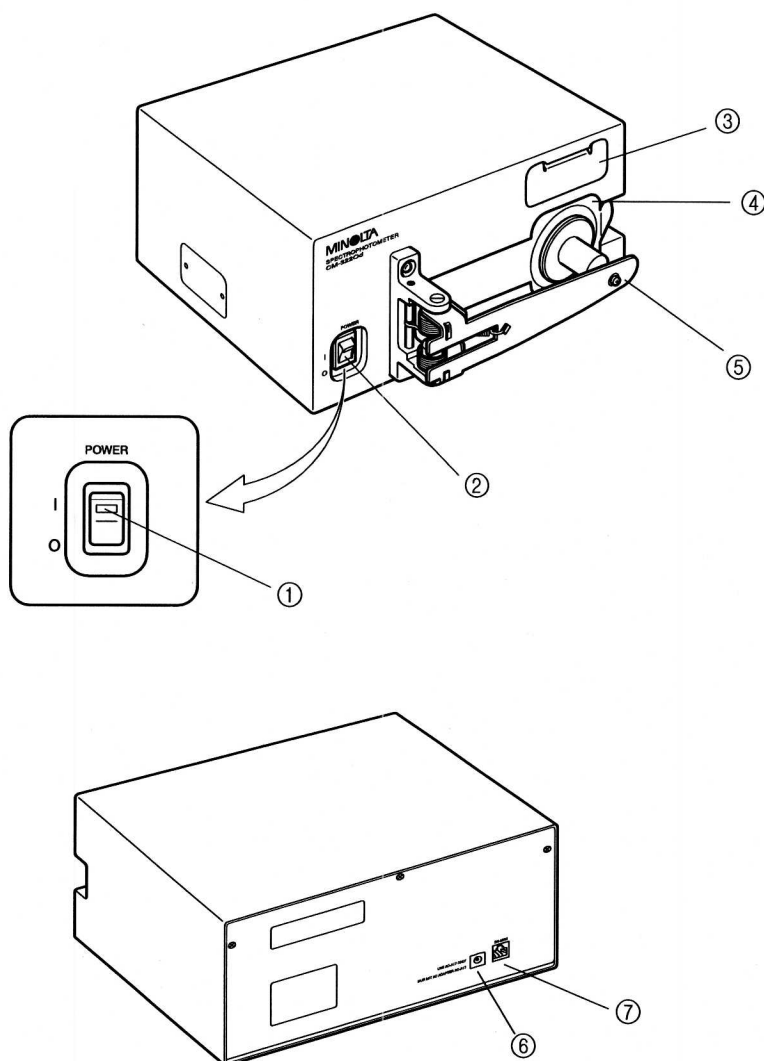
Notes on Cleaning

- If the CM-3220d becomes dirty, wipe it with a soft, clean dry cloth. Never use solvents such as thinner and benzene.
- If the white calibration plate becomes dirty, wipe it gently with a soft, clean dry cloth. If dirt is difficult to remove, contact a Minolta-authorized service facility.
- Should the CM-3220d break down, do not try to disassemble and repair it by yourself. Contact a Minolta-authorized service facility.

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Names and Functions of Parts



- ① **Power lamp** Lights up when power is turned ON.
- ② **Power switch** Used to turn power ON and OFF.
- ③ **White calibration plate unit** .. Used for white calibration. Draw out the unit and measure the white calibration plate.
- ④ **Specimen sighting plate** Checks the measuring position of the specimen.
- ⑤ **Sample holder** Pushes the specimen against the target mask to hold it.
- ⑥ **AC adapter terminal** Used to connect the AC adapter.
- ⑦ **RS-232C connector**..... Used to connect the instrument to the computer with a RS-232C cable.

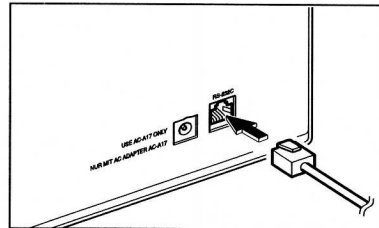
Connecting to a Computer

[Notes on Connecting]

- When connecting the connector, make sure that it is correctly oriented. To secure the connector on the computer, fasten it with screws.
- Before connecting, make sure that the power to both the instrument and computer is turned OFF.
- When disconnecting the cable, be sure to grip the plug or connector and pull it. Do not pull on or forcibly bend the cable.
- Do not touch the connector terminals with your hands, allow them to get dirty or exert excessive force on them.
- Make sure that the cable has a sufficient amount of slack. Pulling the cable taut may cause connection failure or wire breakage.
- Connect the instrument to the computer with the RS-232C cable that is supplied with the instrument as a standard accessory. If another cable is used, a malfunction may occur or incorrect data may be transferred between the instrument and computer.
- The baud rate for the instrument must be set to 9600.

[Connecting Method]

- 1 Turn OFF the power to both the instrument and the computer (switch position: "○").**



- 2 Connect the RS-232C connector on the instrument to that on the computer with the RS-232C cable.**

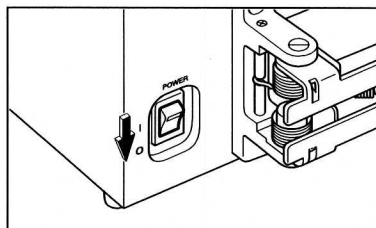
Connecting the AC Adapter

⚠ WARNING

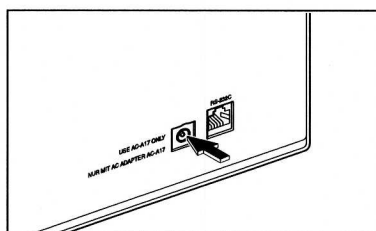
- ❗ Always use the AC adapter supplied as a standard accessory or use the optional AC adapter, and connect it to an appropriate AC outlet. Failure to do so may damage the AC adapter, causing a fire or electric shock.
- ⚡ If you are not going to use the instrument for a long time, disconnect the AC adapter from the AC outlet. Since dirt or water may collect on the prongs of the AC adapter, resulting in a fire, make sure it is removed.
- ⊘ Do not insert or disconnect the AC adapter plug with wet hands. Doing so may cause electric shock.
- ⊘ Do not disassemble or modify the AC adapter. Doing so may cause a fire or electric shock.
- ⊘ Before connecting or disconnecting the AC adapter from the AC outlet, always make sure that the power is turned OFF. Failure to do so may result in breakdown of the instrument.

[Connecting Method]

- 1 Make sure that the power to both the instrument and the computer is OFF (switch position: "○").**



- 2 Connect the AC adapter to the AC adapter terminal on the rear of the instrument.**



- 3 Plug the AC adapter plug to an AC outlet.**

- Always use the AC adapter (AC-A17) supplied as a standard accessory.
- Before removing the AC adapter, make sure that power is turned OFF (switch position: "○").

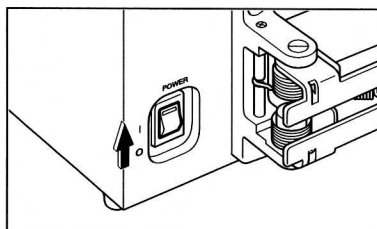
Turning Power ON/OFF

WARNING

- ⊘ The instrument and AC adapter should not be used if they are damaged, or if smoke or odd smells occur. Doing so may result in a fire. In such situations, turn the power OFF immediately, disconnect the AC adapter from the AC outlet, and contact the nearest Minolta-authorized service facility.

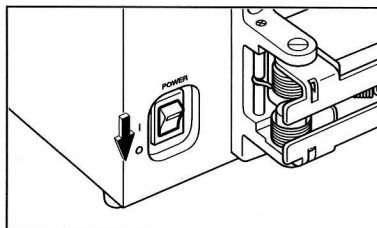
1 Setting the power switch to the "I" position will turn the power ON.

- The LED (power lamp) on the power switch will light up when the power is turned ON.



2 Setting the power switch to the "O" position will turn the power OFF.

- The LED (power lamp) on the power switch will go out when the power is turned OFF.



How to Use the White Calibration Plate Unit

⚠ CAUTION

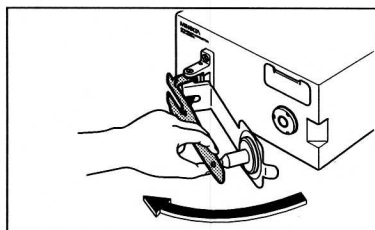
- ⊘ Never perform measurement with the specimen measuring port directed toward your eyes. Doing so may damage the eyes.
- ❗ Take care not to allow your fingers to be trapped in the openings of the instrument. Failure to observe this warning may result in injury.
- ❗ When moving the sample holder and specimen sighting plate, always hold the sample holder to move them. If you move them by holding the specimen sighting plate, the sample holder may unexpectedly come off, causing injury or damage to the specimen.

The white calibration plate is designed for use when you perform white calibration for reflectance measurement.

- 1** Pull the sample holder toward you until it stops.

Memo

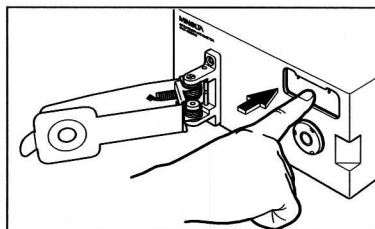
The specimen sighting plate will also move as the sample holder is moved.



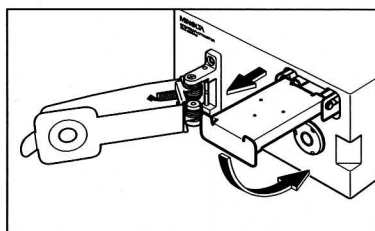
- 2** Push the white calibration plate unit into the instrument with your finger.

Note

Do not push it with excessive force.



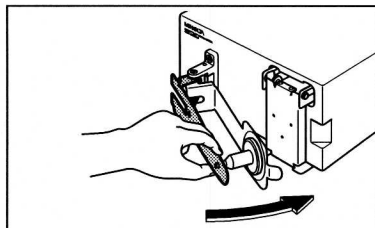
- 3** When a click is felt and the white calibration plate unit jumps out a little, pull it toward you so that the white calibration plate comes into contact with the specimen measuring port.



- 4** Hold the sample holder, and move it slowly to fix it to the white calibration plate unit.

Note

When the calibration is finished, store the white calibration plate unit in the main body.






Notes on Use of White Calibration Plate



- The white calibration plate may become discolored if it is left exposed to light. So, make sure that the white calibration plate unit is placed into the main body to prevent entry of ambient light when it is not in use.
- Take care not to scratch or make the white calibration plate dirty.
- If the white calibration plate gets dirty, wipe it with a clean, soft, dry cloth.
- If dirt is difficult to remove, dampen a cloth with commercially available lens cleaning liquid and wipe the white calibration plate. Then wipe off the liquid with a cloth dampened with water, and leave it to dry.
- Should the white calibration plate be scratched or get so dirty that it cannot be cleaned, contact a Minolta-authorized service facility.

Setting a Specimen

WARNING

-  Do not use the instrument in places where there are flammable or combustible gases (gasoline fumes etc.). Doing so may result in a fire.
-  Do not disassemble or modify the instrument and AC adapter. Doing so may cause a fire or electric shock.
-  Take special care not to allow liquid or metal objects to enter the instrument. Doing so may cause a fire or electric shock. Should liquid or metal objects enter the instrument, turn the power OFF immediately, disconnect the AC adapter from the AC outlet, and contact the nearest Minolta-authorized service facility.

CAUTION

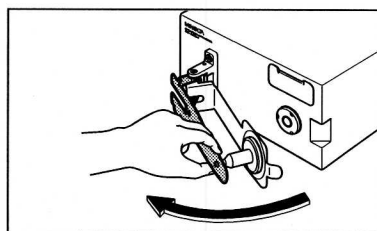
-  Never perform measurement with the specimen measuring port directed toward your eyes. Doing so may damage the eyes.
-  Take care not to allow your fingers to be trapped in the openings of the instrument. Failure to observe this warning may result in injury.

To measure the reflectance of a film- or plate-like specimen, the specimen needs to be secured with the sample holder.

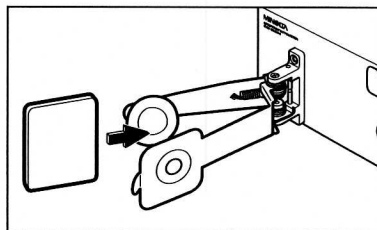
If the specimen cannot be secured with the sample holder, make sure that the specimen is placed tight against the specimen measuring port.

1 Pull the sample holder toward you until it stops.

- The specimen position check plate will also move as the sample holder is moved.

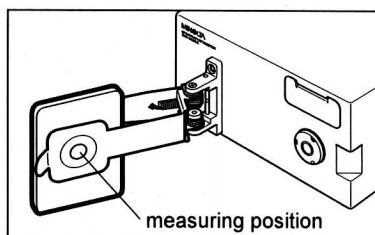


2 Move the specimen sighting plate so that the specimen is sandwiched between the sample holder and specimen sighting plate.



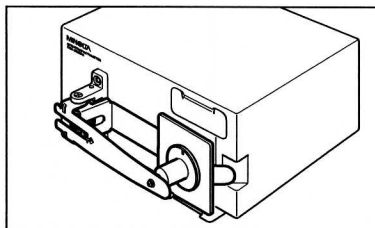
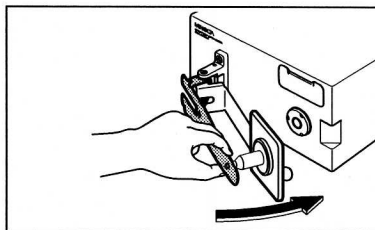
3 Check the measuring position.

- If necessary, repeat steps 2 and 3 until the target area of the specimen is positioned within the measurement range.
- Take care not to expose the specimen sighting plate to strong force when it is open.



4 Return the sample holder slowly to the specimen measuring port, while taking care to keep the specimen in the same position.

- When moving the sample holder and specimen sighting plate, always hold the sample holder to move them. If you move them by holding the specimen sighting plate, the sample holder may unexpectedly come off, causing injury or damage to the specimen.
- To protect the surface of the specimen when adjusting its position, pull the sample holder toward you and keep it open while adjusting it.



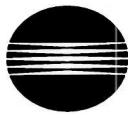
Troubleshooting

If an abnormality has occurred with the instrument, take necessary actions as given in the table below. If the instrument still does not work properly, turn the power OFF, and then turn it ON again. If the symptom remains, contact a Minolta-authorized service facility.

Symptom	Check Point	Action
Abnormal measurement result.	Is the instrument directed perpendicular to the specimen?	During measurement, make sure that the instrument is directed perpendicular to the specimen, to prevent leakage of light.
	Was white calibration performed correctly?	Attach the white calibration plate properly and perform white calibration.
	Was zero calibration performed correctly?	Make sure that the specimen measuring port is directed into the air during zero calibration.
Measurement results fluctuate.	Is instrument kept stationary during measurement?	Do not allow the instrument to move during measurement.
Not possible to take measurements.	Is the RS-232C cable connected correctly?	Make sure that the communication parameters match.
	Do communication parameters on the instrument match those on the computer?	Make sure that the communication parameters match.
Commands from the computer cannot be accepted.	Are commands entered in upper-case letters?	Enter them in upper-case letters. Turn the power OFF, and then turn it ON again.

Specifications

Illuminating/viewing system	d/8 (diffused illumination, 8-degree viewing angle), equipped with SCI/SCE.
Wavelength range	360nm to 740nm
Wavelength pitch	10nm
Reflectance range	0 to 175%
Light sources	2 pulsed xenon lamps
Measurement time	1.5 seconds (Until data is output)
Minimum measurement interval	3 seconds
Measurement/illumination area	φ8mm/φ11mm (Specimen measuring port: φ11mm)
Repeatability	Spectral Reflectance: within 0.1% (360 to 380nm within 0.2%) Chromaticity Value: Standard deviation ΔE^*_{ab} within 0.04 (When a white calibration plate is measured 30 times at 10-second intervals after white calibration)
Interface	Conforms to RS-232C
Power	AC adapter (AC-A17)
Size	232 (W) × 127 (H) × 232 (D) mm
Weight	Approx. 4 kg
Operating environment	Temperature/humidity: 5 to 40°C; less than 80% RH (at 35°C /no condensation) ; Pollution Degree : 2 ; Installation Category : II ; Altitude : 2000m or lower (indoor)
Storage environment	0 to 45°C ; less than 80% RH (at 35°C/no condensation)
Standard accessories	AC adapter: AC-A17, RS-232C cable: IF-A16



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