Spectrophotometer
CM-3700A-U Plus

En Instruction Manual

Please read before using the instrument.

KONICA MINOLTA

■ Safety Symbols

The following symbols are used in this manual and on the product to prevent accidents that may occur because of incorrect use of the instrument.

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

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

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

Denotes an instruction.
Be sure to disconnect the plug from the outlet.

Denotes a prohibited operation.
Never disassemble the instrument.

Be aware that there is the risk of electric shock.

This symbol indicates alternating current (AC).

This symbol indicates direct current (DC).

This symbol indicates class II protection against electric shock.

Trademarks

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- The KONICA MINOLTA logo and symbol marks and SpectraMagic are registered trademarks of KONICA MINOLTA, Inc.

Notes on This Manual

- Copying or reproduction of all or part of the contents of this manual without the permission of KONICA MINOLTA 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 your retailer or a **KONICA MINOLTA-authorized service facility**.
- KONICA MINOLTA will not accept any responsibility for consequences arising from the use of the instrument.

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.
	Use the specified AC adapter and connect it to a 100 to 240 V ∿ (100 to 120 V in North America and Taiwan and 100 V in Japan), 50/60 Hz AC outlet. If an AC adapter other than those specified by KONICA MINOLTA is used, or if the adapter is connected to an unsupported voltage, it may result in damage to the instrument or AC adapter, fire, or electric shock.
	If the instrument will not be used for a long time, disconnect the AC adapter power plug from the AC outlet. Accumulated dirt or water on the prongs of the AC adapter's plug may cause a fire. Clean off any dirt or water on the prongs of the AC adapter's plug before use.
	Do not insert or disconnect the AC adapter plug with wet hands. Doing so may cause electric shock.
	Do not disassemble or modify the instrument or the AC adapter. Doing so may cause a fire or electric shock.
	Do not operate the instrument if it or the AC adapter is damaged, or if smoke or odd smells occur. Doing so may cause a fire. In such situations, turn the power OFF immediately, disconnect the AC adapter plug from the AC outlet, and contact the nearest **KONICA MINOLTA-authorized service facility**.
	Do not allow liquid or metal objects to enter the instrument and the AC adapter. 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 power plug from the AC outlet, and contact the nearest **KONICA MINOLTA-authorized service facility**.
	Do not forcibly bend, twist, or pull the cords or cables. Also, do not scratch, modify, or place heavy objects on the cables. Doing so may damage the cable and cause a fire or electric shock.
	Always grasp the power plug itself when disconnecting the power cable from an outlet. Pulling on the power cable may damage it and cause a fire or electric shock.
	Firmly push the AC adapter power plug completely into the outlet. Incomplete insertion may cause fire or electric shock.
	Do not look directly at the lamp. The lamp is extremely bright and emits ultraviolet rays. Looking directly at the light may injure the eyes.

CAUTION	(Failure to adhere to the following points may result in injury or damage to the instrument or other property.)
	Do not place the instrument on an unstable or sloping surface. Doing so may result in the instrument dropping or overturning, causing injury. Be careful not to drop the instrument when carrying it as well.
	Take care not to pinch yourself on the areas of the instrument that open and close. Doing so may result in injury.
	Do not use the instrument if the specimen measuring port (measurement area) is in the line of sight. Doing so may result in injury to the eye.
	When using the AC adapter, make sure that an AC outlet is located near the instrument, and that the AC adapter plug can be connected to and disconnected from the AC outlet easily.
	When cleaning the instrument, unplug the AC adapter plug from the outlet. Failure to do so may result in electric shock.
	Take sufficient care when handling the glass cell. The glass may become cracked, resulting in injury.

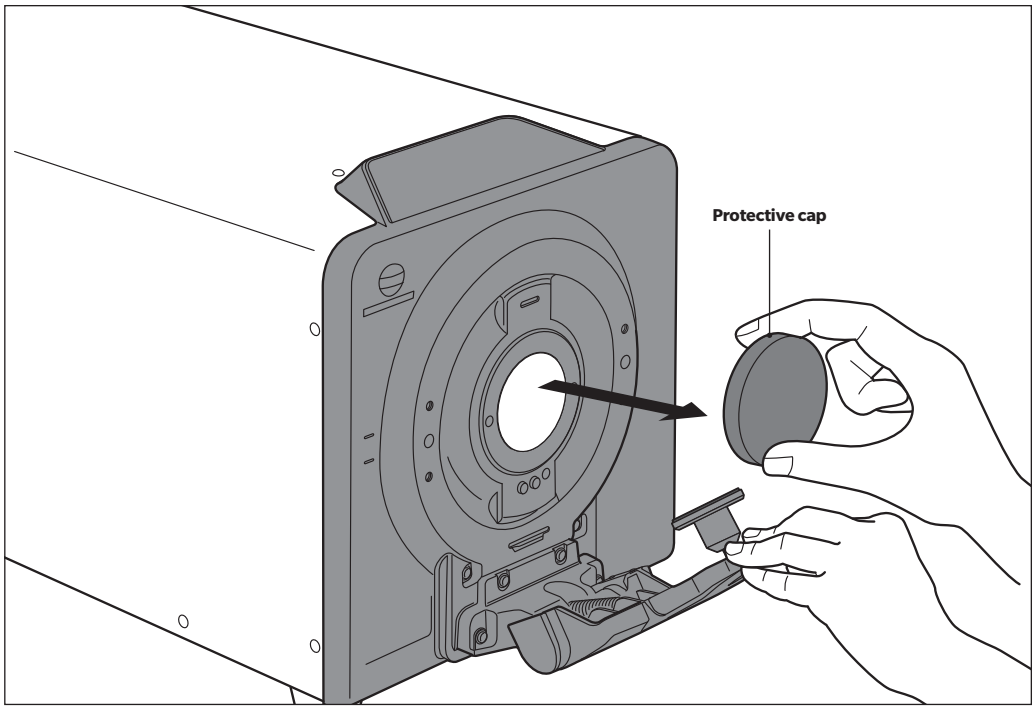
Introduction

The CM-3700A-U Plus is a reflective high-precision stationary spectrophotometer developed for measuring color and color differences in a variety of industrial fields.

Packing materials of the product
Be sure to keep all packing materials used for shipping the instrument (cardboard box, cushioning material, plastic bags, etc.). This instrument is a precision measuring instrument. When transporting the instrument to a service facility for maintenance or for other reasons, be sure to use the packing materials to minimize shock or vibration. If the packing materials are lost or damaged, contact a **KONICA MINOLTA-authorized service facility**.

Protective Cap

The instrument is shipped without the target mask installed in the target mask mounting section.
Therefore, a protective cap is installed to protect the specimen measuring part (opening of the integrating sphere).
Remove the protective cap before using the instrument.
When transporting the instrument, protect the specimen measuring part by attaching the protective cap to the specimen measuring part (opening of the integrating sphere).
Carefully store and use the protective cap attached at the time of purchase.



■ Notes on Use

The instrument must be used correctly. Using the instrument in a manner other than that described in the instruction manual may result in injury, electric shock, or damage to equipment.

Operating Environment

- This instrument should be installed and used in an environment with an ambient temperature between 13°C and 33°C and a relative humidity of 80% or less (at 33°C) with no condensation. Use of the instrument outside this range will result in unsatisfactory performance.
- This instrument and the AC adapter supplied as a standard accessory (AC-A312F) have been designed exclusively for indoor use. Outdoor use is prohibited due to the risk of damage to the instrument caused by rain or other factors.
- This instrument is composed of precision electronic components. Never disassemble or modify the instrument as doing so may cause malfunction, electric shock, fire, or other accident.
- This instrument is a pollution level 2 product (equipment to be used primarily in manufacturing environments, laboratories, warehouses, and similar locations). This instrument should be used in environments where exposure to metallic dust or condensation is not a concern.
- This instrument is an overvoltage category I product (equipment for connection to circuits in which measures are taken to limit transient overvoltage to an appropriately low level).
- Take care to prevent foreign matter from entering the instrument. Using the instrument while subjected to intrusion of water or metals is extremely dangerous.
- Using the instrument in direct sunlight or near heating equipment can cause the internal temperature of the instrument to become much higher than the ambient temperature, resulting in malfunction. Do not use the instrument in such areas.
- Avoid subjecting the instrument to sudden temperature changes and condensation.
- Do not use the instrument in areas where dust, smoke, or chemical gases are present, or in extremely humid environments.
- Do not use the instrument at altitudes higher than 2,000 m.
- Do not use the instrument near equipment that produces a strong magnetic field (such as speakers).

System

- Do not subject the instrument to strong vibrations or impacts.
- Do not pull, forcibly bend, or apply excessive force to the connected cables and cords. Doing so may cause the cable or cord to break.
- The instrument specimen measuring port and inside of the integrating sphere are particularly high-precision components of the optical system. Do not allow them to become dirty or subject them to impact. In addition, make sure to install the target mask and cover the specimen measuring port when the instrument is not in use.
- This instrument and the AC adapter are EMC Class B products. Use of the instrument and the AC adapter in home environments may cause radio interference. Users may be required to take appropriate measures in such cases.
- If the instrument is exposed to strong external static electricity, the display may go blank or fail to display information correctly. Communication with a connected external device may also be interrupted. In such cases, turn the power OFF and then ON again.
- When turning the power OFF and then ON again, wait several seconds after turning the power OFF before turning the power back ON.
- The instrument should be connected to a power source with as little noise as possible.
- This instrument complies with Electrical equipment for measurement, control and laboratory use - EMC(Electromagnetic Compatibility) requirements - Part 1: General requirements (EU Harmonized Standards

EN 61326-1:2021). Conformity verification is performed under KONICA MINOLTA's test conditions in an INDUSTRIAL ELECTROMAGNETIC ENVIRONMENT specified in the relevant harmonized standards. The limit of performance degradation when subjected to continuous disturbance during immunity testing is up to 4 times KONICA MINOLTA's repeatability specifications (ΔE*ab).

- When a malfunction or abnormal behavior occurs, turn the power OFF immediately, disconnect the AC adapter plug from the AC outlet, and refer to "Troubleshooting" P. 29.
- Should the instrument break down, do not try to disassemble and repair the instrument. Contact a **KONICA MINOLTA-authorized service facility**.

Measurement

- Make sure no dust or dirt enters the openings of the instrument.
- When the instrument is used over a prolonged period, the measured values may deviate due to changes in the environment or other factors. In order to maintain good measurement accuracy, it is recommended that white calibration be performed regularly.

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, calibration and measurement should be performed at 23°C.
- Do not allow the white calibration plate to become scratched or dirty.
- Do not move the white calibration plate when it is installed in the sample holder. Doing so may scratch the white calibration plate.
- When the white calibration plate is not in use, be sure to close the cap so that this plate is not exposed to external light.

Target Mask

- Do not touch the target mask inner surface (white coated surface) with a hand, or allow it to become dirty or scratched.
- When the target mask is not in use, be sure to place it inside the instrument's accessory storage space so that it is not exposed to external light.

Power Source

- Make sure that the power is turned OFF when the instrument is not in use.
- Use the specified AC adapter and connect it to a 100 to 240 V ∿ (100 to 120 V in North America and Taiwan and 100 V in Japan), 50/60 Hz AC outlet.
- Use an AC power supply of the rated voltage (within ±10%).
- Make sure the AC adapter output plug is not short-circuited. Failure to do so may cause a fire or electric shock.
- Do not connect the AC adapter to an overloaded electrical circuit. In addition, do not wrap or cover the AC adapter with cloth or other material while in use. Doing so may cause an electric shock or fire.
- When removing the AC adapter from the instrument, first remove the power cord from the outlet, and then remove the output plug.

■ Notes on Storage

- This instrument should be stored at a temperature between 0°C and 40°C with relative humidity of 80% or less (at 35°C) and no condensation. Storing the instrument in an environment with high temperatures and high humidity will result in unsatisfactory performance. Storing the instrument together with the drying agent at or near room temperature is recommended.
- When transporting the instrument, use the packaging box that the instrument was shipped in. This box can protect the instrument from sudden temperature changes, vibration, and shock.
- Storing the instrument in direct sunlight or near heating equipment can cause the internal temperature of the instrument to become much higher than the ambient temperature, resulting in malfunction. Do not store the instrument in such areas.
- Make sure that the instrument is not subjected to condensation when stored. In addition, take care to prevent rapid temperature changes to prevent condensation from occurring when transporting the instrument to the storage location.
- Do not store the instrument in areas where dust, smoke, or chemical gases are present. Doing so may cause deterioration in performance or a malfunction.
- Dust inside the integrating sphere may prevent accurate measurement. When the instrument is not in use, be sure to attach the protective cap to the instrument.
- Do not leave the instrument with the target mask installed for a prolonged period.
- If the instrument is left inside the cab or trunk of a vehicle, the temperature and/or humidity may exceed the allowable storage range, resulting in malfunction. Do not leave the instrument in such places.
- The white calibration plate may become discolored if left in a place that is exposed to light. When the calibration plate is not in use, be sure to close the cover so that the plate is not exposed to external light.
- The target mask may become discolored if left in a place that is exposed to light. Therefore, store the target mask in the instrument's accessory storage space when it is not in use. Doing so not only keeps this mask away from external light but also prevents it from being scratched or getting dusty.
- When not in use, store the instrument in the packing used for shipment and keep it in a safe place.
- Take care not to pinch yourself in the parts of the accessory storage space that open and close. Failing to do so may cause injury.

■ Notes on Cleaning

- If the instrument becomes dirty, wipe it with a soft, dry cloth. Never use organic solvents (such as naphtha or thinner) or other chemicals for cleaning.
- If there is dust or dirt on the lens or the receptor window, use a blower to blow it off. Never use organic solvents (such as naphtha or thinner) or other chemicals for cleaning.
- If the white calibration plate, inside of the zero calibration box, or target mask (other than the white painted surface on the inside) becomes dirty, wipe it with a soft, clean, and dry cloth. If the dirt does not come off easily, wipe with a cloth that was slightly moistened with ethanol. If the cloth becomes dirty, clean the cloth by washing it. Never use organic solvents (such as naphtha or thinner) or other chemicals for cleaning.
- If the inside of the target mask (the white painted surface) or the inside of the integrating sphere becomes dirty, contact a **KONICA MINOLTA-authorized service facility**.
- If you are unable to remove dirt from the instrument through the above procedure, or if the instrument becomes scratched, contact a **KONICA MINOLTA-authorized service facility**.
- Should the instrument malfunction, do not try to disassemble and repair the instrument yourself. Contact a **KONICA MINOLTA-authorized service facility**.

■ Notes on Transporting

- In order to protect the specimen measuring part (opening of the integrating sphere) when transporting the instrument, remove the target mask and be sure to install the protective cap before transporting the instrument.
- The instrument weighs approximately 18 kg. When moving the instrument, including when transporting it, ensure that this task is carried out by two or more workers.
- When transporting the instrument, be sure to use the packing materials to minimize shock or vibration.
- When sending the instrument in for service, package and send the instrument and all accessories.

■ Maintenance and Inspection

- To maintain measurement accuracy, the instrument should be inspected once a year. For information on inspection, contact the nearest **KONICA MINOLTA-authorized service facility**.

■ Disposal Method

- Make sure that the instrument, all accessories, and the packing materials are either disposed of or recycled correctly in accordance with local laws and regulations.

Table of Contents

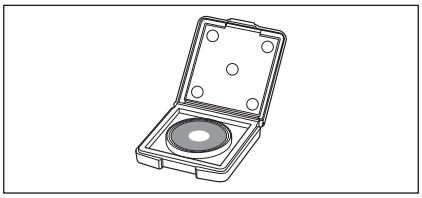
Accessories

Standard and optional accessories are available with the instrument.

Memo The shape of some products may be different from those shown.

■ Standard Accessories

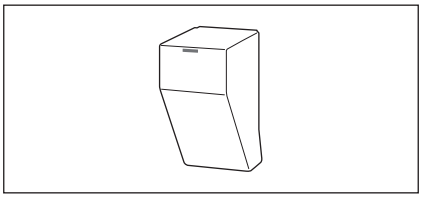
White Calibration Plate CM-A309



This plate is used to perform white calibration for reflectance measurement.

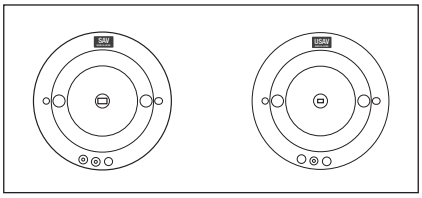
Memo When the plate is not being used, close the cover to prevent the plate from becoming dusty or scratched and to protect it from external light.

Zero Calibration Box CM-A155



This box is used to perform zero calibration for reflectance measurement.

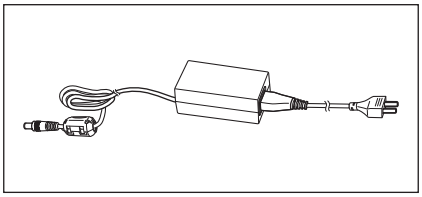
Target Mask CM-A310/A314



This is used to change the illumination area (specimen measuring port size) according to the specimen. Each target mask measurement area/illumination area (specimen measuring port size) is as shown below.

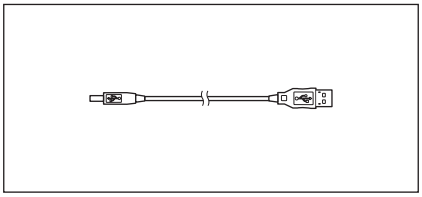
CM-A310 (SAV) : measurement area 1 × 3 mm / illumination area 5 × 7 mm
CM-A314 (USAV) : measurement area 1 × 3 mm / illumination area 3 × 5 mm

AC Adapter AC-A312F



(ATS036T-A120)
This connects to an AC outlet using an AC cable and supplies power to the instrument.
Input: 100 to 240 V ∿, 50 to 60 Hz, 1 A maximum
Output: 12 V ⎓ 3 A
Plug design: ⊖—◉—⊕ Center-positive

USB Cable (3 m) IF-A48



Used to connect the instrument to a computer.

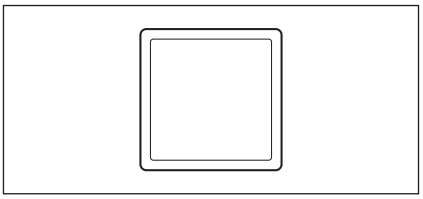
■ Optional Accessories

SpectraMagic NX2 Color Data Software

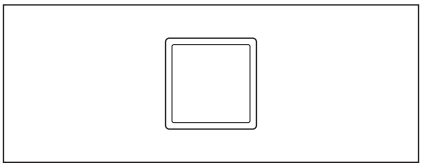
This computer software is used to control the instrument and manage data from a computer.
This software can be provided on a USB memory stick or downloaded from the web (https://www.konicaminolta.com/instruments/download/software/color/smnx2/index.html).

Color Plates (White, Black, and 12 Other Colors) CM-A247 to CM-A260

Used for simple diagnosis of instrument measurement performance (instrumental errors and repeatability).

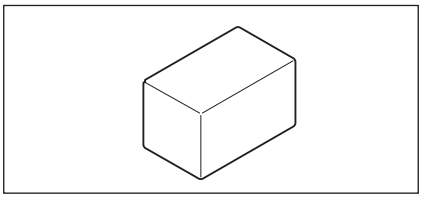


Color Tile (Green) CM-A101GN



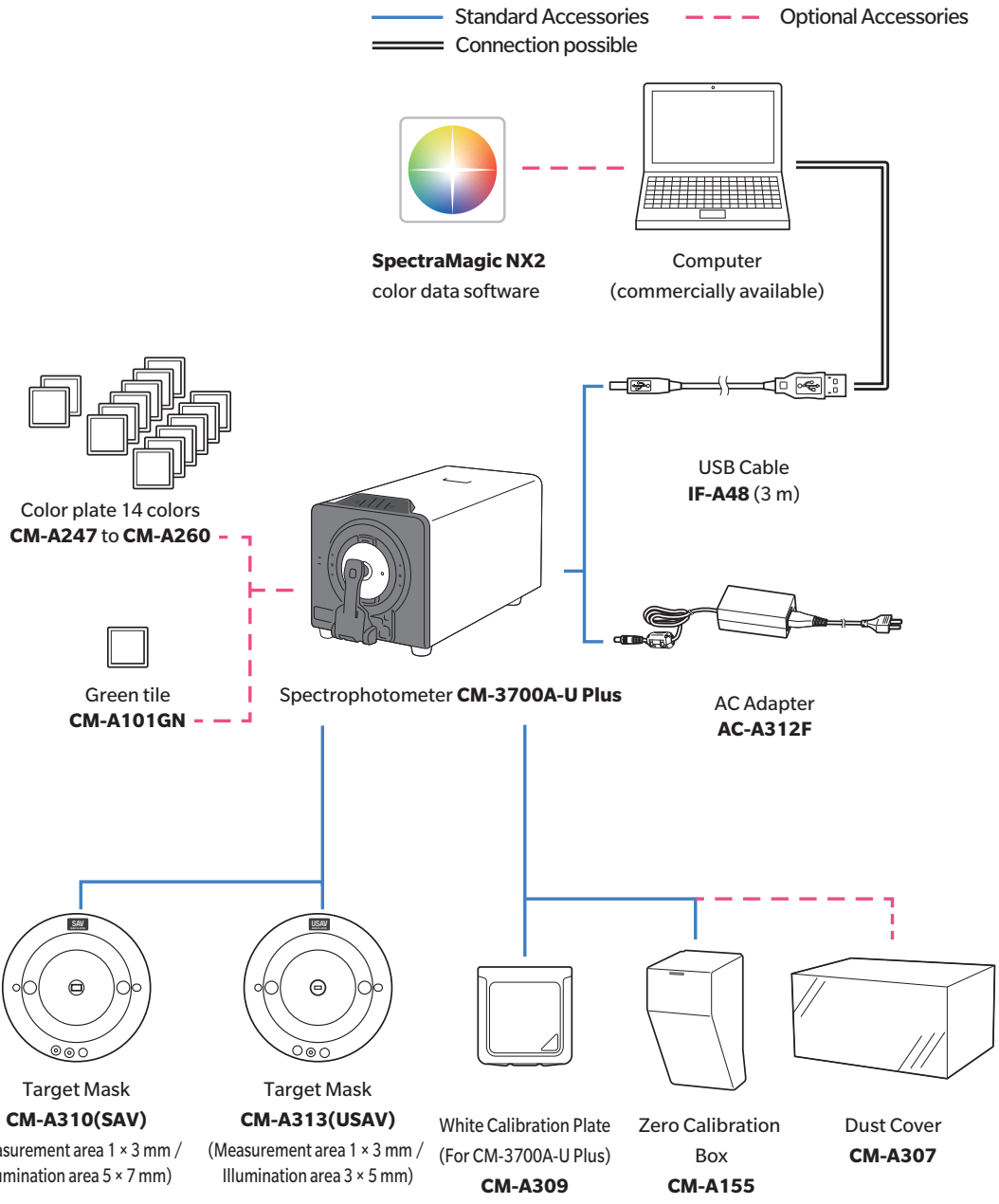
Dust Cover CM-A307

This can prevent foreign substances from entering the instrument when it is stored in a location where there is much dust.

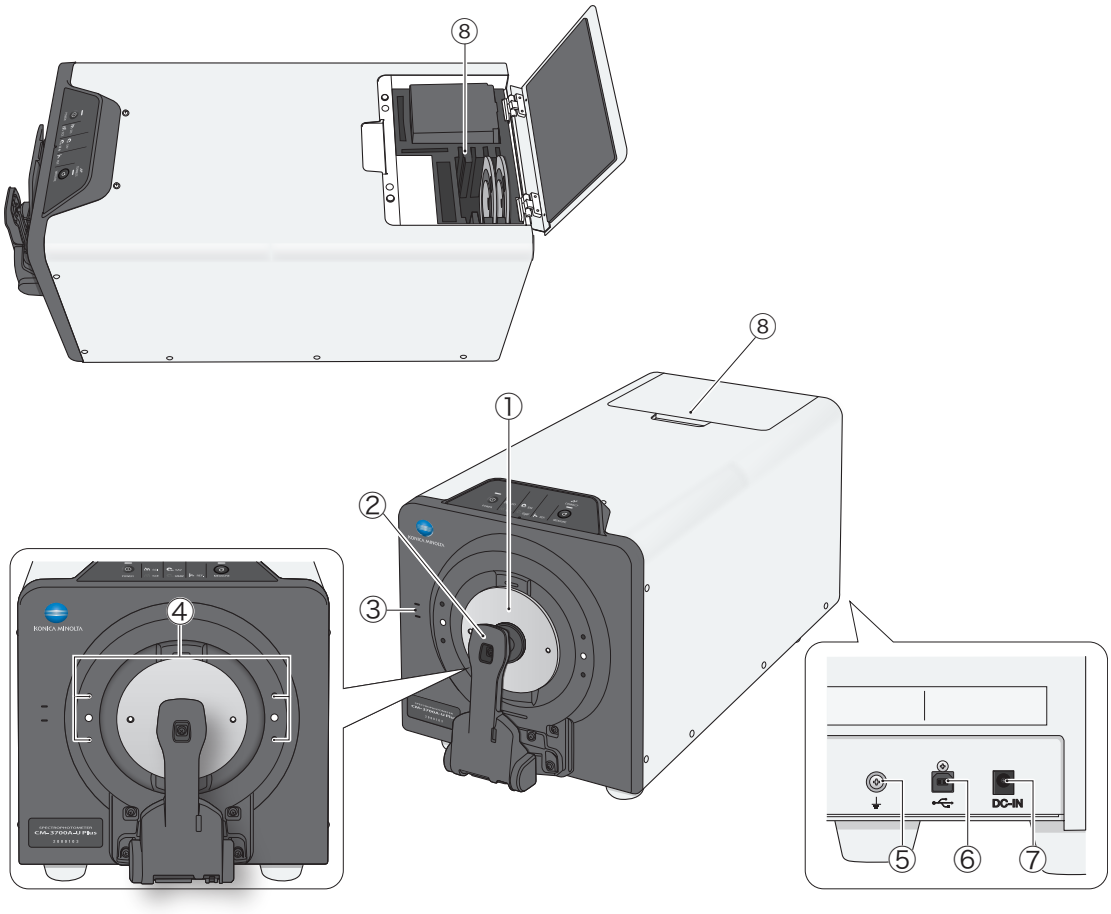


System Diagram

CM-3700A-U Plus



Names and Functions of Parts



① **Target mask**
Select a illumination area of 5 × 7 mm (SAV) or 3 × 5 mm (USAV) according to the specimen to be measured, and install into the instrument.

② **Sample holder**
Used to install the reflectance measurement specimen, white calibration plate, or zero calibration box.

③ **Ambient temperature/humidity meter**
Used to measure the temperature and humidity in the measurement environment.

④ **Jig mounting screw holes**
These screw holes are used to mount jigs or other components for fastening the specimen.

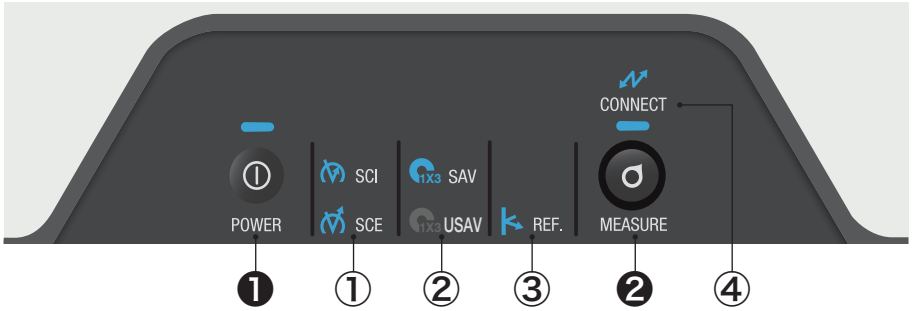
⑤ **Functional ground terminal**
This terminal is used when connecting the earth wire.
Pinch the earth wire between the screw and washer.

⑥ **USB connection terminal** (**B type**)
Used to connect the instrument to a computer with the supplied USB cable (IF-A48).

⑦ **AC adapter input terminal**
Connects the provided AC adapter.

⑧ **Accessory storage space**
Stores accessories such as the white calibration plate, zero calibration box, and target mask.

Indicators



Status panel and operation keys

Operation keys

❶ Power key

Used to turn the power ON/OFF. The instrument switches between ON/OFF every time the power key is pressed.
The lamp illuminates blue when the power is ON.

ON : Press once.
OFF : Press and hold.

Notes
- **While the LED is flashing, the power ON/OFF process is in progress. Do not unplug the AC adapter.**

❷ Measurement key

When the PC software was connected and a remote trigger was set, it becomes possible to perform measurement on the instrument side.

Illuminated (blue) : Indicates that measurement is possible.
Illuminated (orange) : Indicates that calibration has not been completed.
Not illuminated : Indicates measurement is in progress or the power is OFF

Status panel

The LED illuminates to indicate the measurement mode that was set with the PC software.

① Measurement mode

SCI
SCE
Both LEDs illuminate when “SCI + SCE” is set with the PC software.

② Measurement area

SAV
USAV

③ Reflectance measurement mode

REF : Reflectance measurement

④ Communication status

The LED illuminates when the product is connected to the computer (connected to the PC software).

Cleaning Parts

☐ Zero Calibration Box

- Use a blower to blow off any dust inside the zero calibration box. If the dirt does not come off easily, wipe using a soft cloth dampened with ethanol. In such cases, be careful not to leave behind fingerprints or the like.

☐ White Calibration Plate

- If the white calibration plate becomes dirty, use a blower to blow off the dust, then gently wipe the dirt off with a soft dry cloth.
- If the dirt on the white calibration plate does not come off easily, wipe using a soft cloth dampened with ethanol.
- If a part other than the white calibration plate becomes dirty, gently wipe the dirt off with a soft cloth dampened with water or soapy water.

Notes
- **Be careful not to scratch the white calibration plate.**
- **Never use solvents such as paint thinner or naphtha.**
- **Scratches or dirt on the white calibration plate may affect measurement values.**

☐ Target Mask

- Use a blower to blow off dirt or dust on the target mask.
- If the dirt on the outside or inside surface of the target mask does not come off easily, remove the target mask from the instrument, and wipe the target mask using a soft cloth soaked in ethanol.

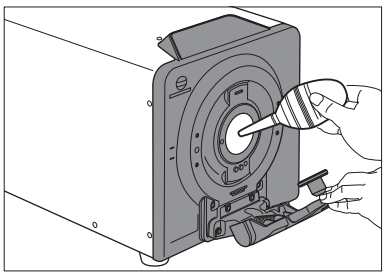
Notes
- **Do not touch the white painted surface of the target mask.**

☐ Integrating Sphere

1 Set the specular component to SCI from the software.

2 Open the sample holder and use a blower to blow off any dirt or dust.

- Do not touch the white-coated inner surface of the integrating sphere, wipe it with a cloth, or put an object inside it. If it becomes dirty and the dirt cannot be removed by a blower, contact a KONICA MINOLTA-authorized service facility.



Measurement Procedure

- This manual explains the measurement preparation procedure, specimen setting procedure, and other procedures for measurement with the CM-3700A-U Plus.
- Control is performed and measurement is executed from the computer connected to the instrument by using the optional SpectraMagic NX2 color data software.
- For the measurement procedure using SpectraMagic NX2, refer to the SpectraMagic NX2 instruction manual.

■ Flow of Measurement

Connecting to the computer	Use the USB cable to connect the instrument and computer. (P. 16)
▼	
Connecting the AC adapter	Use the AC adapter and connect the instrument to the outlet. (P. 17)
▼	
Starting the computer (Start Windows.)	Turn ON the power of the connected computer.
▼	
Power ON	Turn the instrument power ON. (P. 17)
▼	
Launching the software	Launch SpectraMagic NX2 and enable control.
▼	
Installing a calibration target mask	Install the target mask (CM-A310(SAV)) for calibration. (P. 18)
▼	
Executing zero calibration	Install the zero calibration box and execute zero calibration. (P. 20)
▼	
Executing white calibration * When using WAA (Wavelength Analysis & Adjustment), execute it after white calibration. WAA execution requires approximately 20 seconds.	Install the white calibration plate and execute white calibration. (P. 21)
▼	
Installing a measurement target mask	Install an appropriate measurement target mask. (P. 18)
▼	
Setting a specimen	Set the specimen into the instrument. (P. 22)
▼	
Executing measurement	Execute measurement from SpectraMagic NX2. Or set to trigger measurement mode and execute measurement by pressing the measurement key on the instrument.
▼	
Power OFF	After measurement is completed, turn the instrument power OFF. (P. 17) Exit SpectraMagic NX2 and turn the computer power OFF.

☐ Connecting to a Computer

Connect the instrument to the computer with the supplied USB cable IF-A48 (3 m).

Notes **Be sure to connect the USB cable to the designated USB terminal on the instrument when it is used.**

Memo • Instrument USB communications conform to USB 2.0.

- When connecting the instrument to the computer, the dedicated USB driver must be installed. Install the USB driver supplied with the software that enables connection and operation of the instrument.
- The instrument cannot be powered through the USB cable. Connect the AC adapter before use.
- Make sure that the USB connector plug is oriented correctly and connected securely.
- When connecting/disconnecting the USB cable, be sure to hold the connector plug. Do not pull on or forcibly bend the cable. Otherwise, wire breakage may result.
- Make sure that the cable has sufficient length. Putting tension on the cable may cause connection failure or wire breakage.
- Firmly push in the USB cable connector that matches the shape of the port (connection terminal) until it can go in no further.

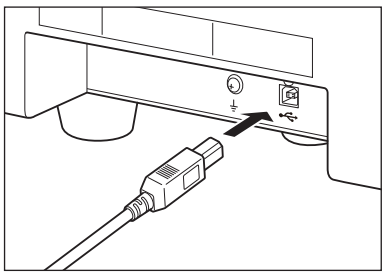
Procedure

In general, a USB cable can be connected/disconnected while the instrument is turned ON. However, in the following procedure, the instrument is turned OFF before connecting. For information about connecting the AC adapter and power ON/OFF, refer to P. 17.

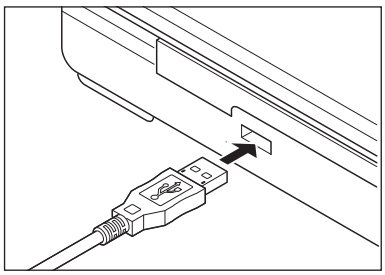
1 Turn the instrument power OFF.

2 Connect the USB cable Type-B connector to the USB terminal on the instrument.

- Fully insert the connector and ensure the connection is secure.



3 Connect the USB cable Type-A connector to the USB port on the computer.



4 Connect the AC adapter and turn the instrument power ON.

- When installation of the USB driver is prompted, specify the USB driver included with the software to complete the installation.
- After installation of the USB driver is completed, turn the power OFF and then back ON again.

☐ Connecting the AC Adapter

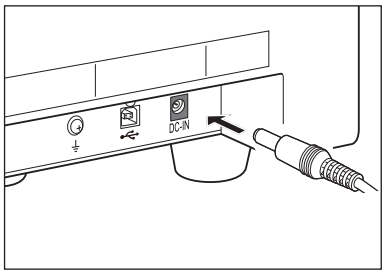
Notes
- **To supply AC power to the instrument, always use the AC adapter (AC-A312F) that was supplied with the instrument.**
- **Insert the AC adapter plug all the way.**

Procedure

1 Check that the power of both the instrument and computer is OFF (LED lamp is not illuminated).

2 Connect the DC output plug of the AC adapter to the DC input terminal on the side of the instrument.

3 Connect the AC adapter power plug to a 100 V (50/60 Hz) AC outlet.



Notes **Be sure that the power switch is OFF before inserting or removing the DC output plug of the AC adapter.**

☐ Turning the Power ON/OFF

Procedure

Turning the Power ON

1 With the power OFF, press and hold the power key for around 1 second.
The power turns ON and the LED lamp above the power key illuminates blue.

Notes
- **After pressing the power key, the LED lamp flashes until power ON is completed. While the LED is flashing, the start process is in progress. Do not unplug the AC adapter.**

Turning the Power OFF

1 Press and hold the power switch for around 3 seconds.
The power will turn OFF. The LED lamp flashes and then turns off.

Notes
- **After pressing the power key, the LED lamp flashes until power OFF is completed. While the LED is flashing, the shutdown process is in progress. Do not unplug the AC adapter.**

Installing the Target Mask

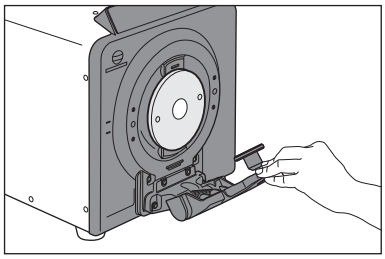
With this instrument, the target mask can be selected according to the specimen being measured and application.

Target masks	SAV	CM-A310 (measurement area 1 × 3 mm / illumination area 5 × 7 mm)
	USAV	CM-A314 (measurement area 1 × 3 mm / illumination area 3 × 5 mm)

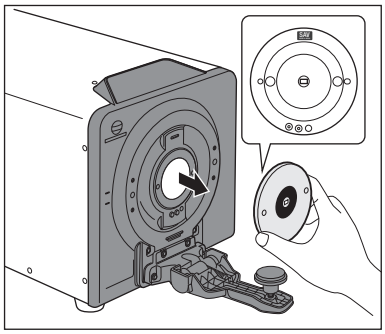
Memo Be sure to use the target mask CM-A310 (SAV) for zero calibration or white calibration.

Procedure

1 Pull the sample holder toward you and hold it so it is opened.



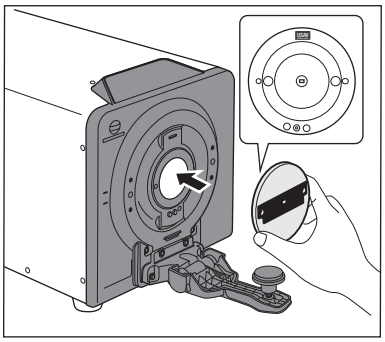
2 Pull the currently installed target mask or protective cap toward you to remove it.



Memo
- The target mask is fastened by a magnet.
- There are notches on the left and right instrument contact surfaces of the target mask. Placing your hand so that your thumb and index finger are positioned on the notches will make it easier to remove.

Notes
- **When removing the target mask, make sure the instrument is facing you and remove the target mask along a straight line so that it is not at an angle. Removing the target mask at an angle may damage the instrument components.**

3 Align the positioning holes on the target mask with the instrument's target mask positioning pins, and then install the target mask on the instrument.



Memo
- Install the target mask with the white painted surface on the inside (CM-3700A-U Plus side). Ensure that text such as "SAV" on this surface is at the top.

Notes
- **If the installation direction of the target mask is not correct, it will not fit properly in place. Check the direction and fit the target mask in place, then check that there is no looseness or lifting.**

4 Return the sample holder to its original position.

■ Precautions for Use of the Target Mask

- Do not scratch the target mask inner surface (white coated surface), or allow it to be dirtied by fingerprints or other dirt.
- The target mask may become discolored if left in a place that is exposed to light. Therefore, store the target mask in the accessory storage space when it is not in use.
- Do not leave the instrument with the target mask installed for a prolonged period.

☐ Mask Detection Function

This instrument includes a function to detect the type of target mask installed.

Procedure

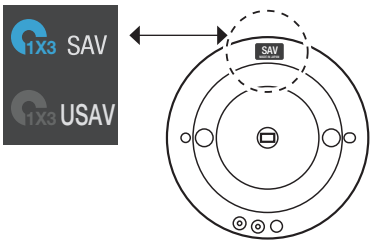
1 Use the optional software (SpectraMagic NX2) and turn ON the mask detection function.

2 Install the target mask.

Memo • For the installation procedure, refer to "Installing the Target Mask" on P. 18 of the instruction manual.

Notes • **Incorrect detection may occur if the target mask is not installed correctly, or if it is dirty or scratched.**

3 Check that the indicator display matches the size of the installed mask.



Inside of the target mask

If the sizes do not match, check the following two points and perform the operation again.

- Check that the target mask is installed correctly. If it is not, install it correctly.
- Check that there is no dirt or scratching on the mounting surface of the target mask. If there is dirt, use a blower to remove any dust, dirt, and other substances. Do not touch the white-coated surface of the target mask or wipe it with a cloth. If the dirt does not come off easily from surfaces other than the white-coated surface, wipe using a soft cloth dampened with ethanol.

If the above does not resolve the problem, contact a KONICA MINOLTA-authorized service facility.

☐ White calibration data

The white calibration data of White Calibration Plate are provided under the following of measurement conditions.

- SAV (Measurement area: 1 x 3 mm, Illumination area: 5 x 7 mm) / Specular component : SCI
- SAV (Measurement area: 1 x 3 mm, Illumination area: 5 x 7 mm) / Specular component : SCE

Installing the Zero Calibration Box

The zero calibration box is used to perform zero calibration for reflectance.

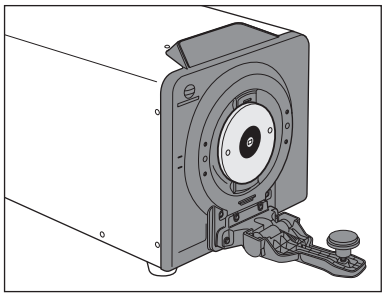
- Install the target mask (SAV) to use for calibration in advance.
- From the software in advance, set the same specular component (SCI/SCE) and UV output that will be used for measurement.

For fluorescence measurement that does not require strict accuracy (fluorescence calibration is not performed), perform measurement with the UV cutoff filter not covering the xenon lamp (with UV output at 99.9).

Procedure

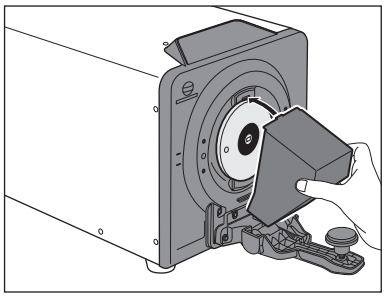
1 Pull the sample holder toward you and hold it so it is opened.

The sample holder will remain open after it is opened approximately 70 degrees.



2 Fit the protrusion on the zero calibration box into the indentation on the instrument, and then hold this box in place with the sample holder.

Memo After fitting the zero calibration box in place, check that there is no looseness or lifting.



■ Precautions for Use of the Zero Calibration Box

- Do not apply any force to the zero calibration box after it is installed. Doing so may cause the zero calibration box to fall off.
- Be careful not to scratch or allow fingerprints or other dirt to contact the inside of the zero calibration box.
- If the inside of the zero calibration box becomes dirty, wipe it gently with a soft, clean, and dry cloth.
- If the dirt on the zero calibration box does not come off easily, wipe using a cloth dampened with ethanol.
- If the inside is scratched or the dirt cannot be removed, replace the zero calibration box.

Installing the White Calibration Plate

The white calibration plate is used to perform white calibration for reflectance measurement.

- Install the target mask (SAV) to use for calibration in advance.
- From the software in advance, set the same specular component (SCI/SCE) that will be used for measurement.

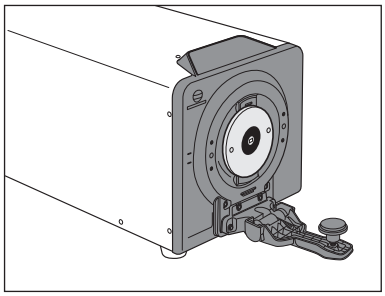
For fluorescence measurement that does not require strict accuracy (fluorescence calibration is not performed), perform measurement with the UV cutoff filter not covering the xenon lamp (with UV output at 99.9).

Notes

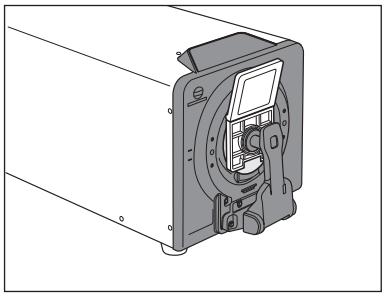
- **The message "White calibration is required." will be displayed when the power is turned on if the set calibration initiation time (8 hours) has passed since white calibration was last performed. Perform calibration before using the instrument.**
- **When using WAA (Wavelength Analysis & Adjustment), execute it after white calibration. WAA execution requires approximately 20 seconds. Do not remove the white calibration plate before confirming that WAA has completed based on the progress bar that is displayed in the software.**

Procedure

1 Pull the sample holder toward you and hold it so it is opened.



2 As shown in the figure, press on the sample holder so that the sample holder fits into the indentation on the reverse side of the white calibration plate.



■ Precautions for Use of the White Calibration Plate

Memo

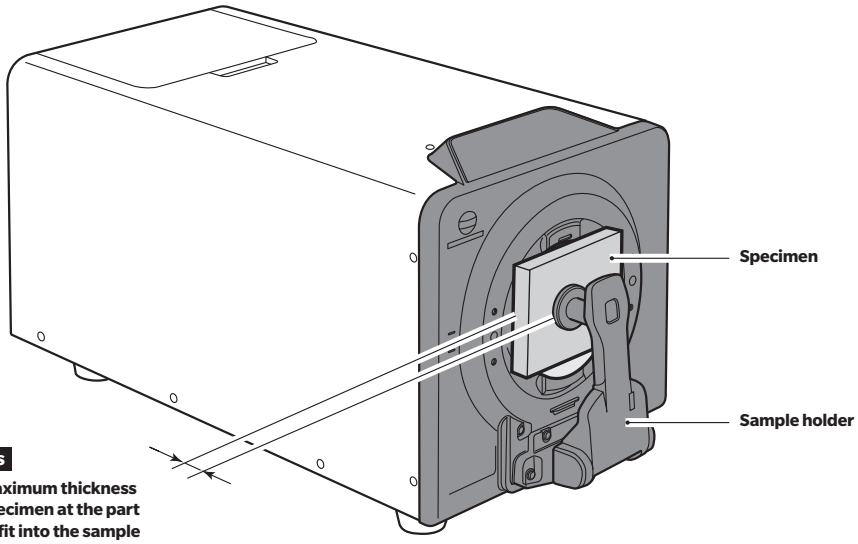
- White calibration data is used when performing white calibration using the white calibration plate. White calibration data is set in the instrument at the time when it is purchased.

- The white calibration plate may become discolored if left exposed to light. Therefore, make sure to close the cap when the plate is not in use in order to prevent the plate from being exposed to external light.
- Be careful that the white calibration plate does not become scratched and does not contact fingerprints or other dirt.
- If the white calibration plate becomes dirty, wipe it gently with a soft, clean, and dry cloth.
- If the dirt does not come off easily, wipe it off with a cloth dampened with ethanol, then wipe off the ethanol with a cloth dampened with water, and allow the white calibration plate to dry before using.
- If the white calibration plate is scratched or the dirt cannot be removed, replace it. After the white calibration plate was replaced, set the white calibration data to the data for the new white calibration plate.

Setting a Specimen

Reflectance Measurement P.23 " ■ Reflectance Measurement"

When measuring the reflectance of a film or plate specimen, install the specimen into the sample holder before setting it onto the instrument. When measuring a specimen that is not fit into the sample holder, remove the sample holder and measure with the specimen measuring port in close contact with the specimen.



Notes

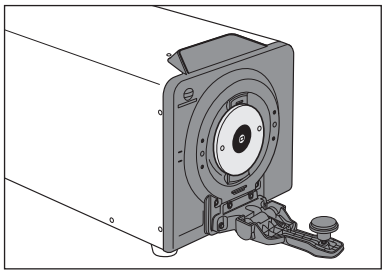
The maximum thickness of a specimen at the part that is fit into the sample holder is 30 mm.

■ Reflectance Measurement

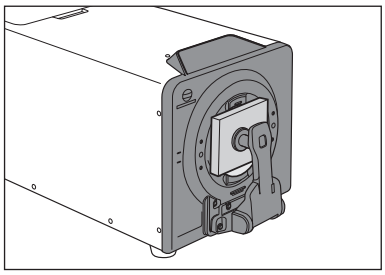
- Install the target mask to use for measurement in advance.
- From the software in advance, set the measurement area, the specular component, and UV output.

Procedure

1 Pull the sample holder toward you and hold it so it is opened.



2 Insert the sample into the sample holder.



3 Position the specimen so that the part you want to measure is within the measurement points.

- When moving the specimen position, pull the sample holder toward you and hold it so it is opened in order to protect the sample surface.

Memo If you want to check the measurement point, connect the instrument to the computer and use the viewfinder function of the SpectraMagic NX2 software.
This viewfinder has a pointer that indicates the measurement point. If the pointer is difficult to see because its color is close to that of the specimen, you can switch to a simulated pointer.

4 Use the optional SpectraMagic NX2 color data software and perform measurement. When trigger measurement mode is selected, measurement can also be performed using the measurement key on the instrument status panel.

■ Opacity Measurement

When the optional SpectraMagic NX2 color data software is used, opacity is calculated on the basis of two types of measurements: white background and black background.

Error Messages

During control from the computer connected to the instrument using the optional SpectraMagic NX2 color data software, error messages such as the following may be displayed on the SpectraMagic NX2 operating screens. When a message is displayed, perform the correction shown below. If the conditions do not return to normal after performing the correction, contact a KONICA MINOLTA-authorized service facility.

Symptom	Displayed message	Possible cause	Correction	Reference Page
Warning	A long time has passed since last calibration. Please calibrate your instrument.	A certain amount of time passed after white calibration.	Perform white calibration again.	21
	UV conditions have been changed. Recalibrate to ensure correct measurements.	The UV conditions have been changed.	Perform calibration again.	20, 21, 32
	Annual Calibration is approaching.	The time when regularly scheduled device calibration is required has arrived.	For regularly scheduled device calibration, contact a KONICA MINOLTA-authorized service facility.	—
	Annual Calibration is required.	A certain amount of time passed after regularly scheduled device calibration.	For regularly scheduled device calibration, contact a KONICA MINOLTA-authorized service facility.	—
	Reflectance is not covered by the warranty.	The reflectance of the measured specimen was more than 200%.	—	—
	The intensity of light for color measurement is decreasing.	The light intensity of the light source used for color measurement has dropped.	To replace the color measurement light source, contact a KONICA MINOLTA-authorized service facility.	—
	The license expiration for Wavelength Analysis Adjustment (WAA) is approaching.	The time when wavelength correction license renewal is required has arrived.	To renew the wavelength correction license, contact a KONICA MINOLTA-authorized service facility.	31
	The license for Wavelength Analysis Adjustment (WAA) has expired.	The wavelength correction license has expired.	To renew the wavelength correction license, contact a KONICA MINOLTA-authorized service facility.	31
	The intensity of light for Wavelength Analysis Adjustment (WAA) is decreasing.	The light intensity of the light source used for wavelength correction has dropped.	Confirm that white calibration was performed under the conditions listed in “Installing the White Calibration Plate” on P. 21. If it is not resolved, then it is necessary to replace the wavelength correction light source. Contact a KONICA MINOLTA-authorized service facility.	31

Symptom	Displayed message	Possible cause	Correction	Reference Page
	The intensity of light for Wavelength Analysis Adjustment (WAA) is insufficient.	The light intensity of the light source used for wavelength correction is insufficient.	Confirm that white calibration was performed under the conditions listed in "Installing the White Calibration Plate" on P. 21. If it is not resolved, then it is necessary to replace the wavelength correction light source. Contact a KONICA MINOLTA-authorized service facility.	31
	Wavelength diagnosis is out of the temperature specification range. The correction accuracy has decreased.	The ambient temperature for performing wavelength correction is out of the specification range.	Bring the ambient temperature within the specification range, and then perform wavelength correction again.	12, 31
	Wavelength Analysis Adjustment (WAA) is out of the correction specification range. The correction accuracy has decreased.	The wavelength correction is out of the specification range.	Contact a KONICA MINOLTA-authorized service facility.	31
	Since the temperature change after calibration is large, reconfiguration is recommended.	The temperature changed by a certain amount after white calibration.	Perform white calibration again.	21
	The amount for shift of pointer is over the specification range.	The amount of shift of pointer has exceeded the specification range.	Turn the power OFF and then turn it ON again. If the message is displayed again, contact a KONICA MINOLTA-authorized service facility.	17, 23
	Environment Measurement is Inappropriate	Ambient temperature or humidity measurement failed. The sensor that measures the ambient temperature or humidity is malfunctioning.	Turn the power OFF and then turn it ON again. If the message is displayed again, contact a KONICA MINOLTA-authorized service facility.	12, 17

Symptom	Displayed message	Possible cause	Correction	Reference Page
Error	Error Code:10 Failed to connect to the instrument. Please make sure that the instrument is properly connected to your PC, the selected instrument type is correct, or is not being used by another application.	Communication with the instrument failed. • The instrument power is OFF.	Turn ON the instrument power, and then connect the instrument.	17
		Communication with the instrument failed. • The cable is not connected correctly.	Connect the cable correctly to the PC, then connect the instrument.	16
		Communication with the instrument failed. • The instrument is connected to another application.	Disconnect from the application that is in use, then connect the instrument.	—
		Communication with the instrument failed. • The selected instrument model name is not correct.	Select the correct model name, then connect the instrument.	For details, refer to the Spectra Magic NX2 instruction manual.
	Error Code:130 Necessary calibration was not executed beforehand.	Zero calibration or white calibration has not been performed.	Perform zero calibration and white calibration.	20, 21
	Error Code:120 Zero calibration failed. Make sure the calibration sample is installed correctly and try again.	Zero calibration was not performed using the correct procedure.	Perform zero calibration using the provided zero calibration box and appropriate target mask.	20
	Error Code:120 White calibration failed. Make sure the calibration sample is installed correctly and try again.	White calibration was not performed using the correct procedure.	Perform white calibration using the provided white calibration plate and appropriate target mask.	21

Symptom	Displayed message	Possible cause	Correction	Reference Page
	Error Code:131 Calibration data is not set.	The calibration data for white calibration has not been written.	Write the calibration data to the instrument.	For details, refer to the Spectra Magic NX2 instruction manual.
	In order to perform measurement by Ganz &Griesser, calibration must be performed with the UV light intensity setting to XX. Please set UV light intensity to XX and perform calibration.	Calibration was not performed with the UV output at XX, which is required when measuring with the Ganz & Grieser method.	Set the UV output to XX and perform calibration.	For details, refer to the Spectra Magic NX2 instruction manual.
	Error Code:119 Correct target mask is not attached, or target mask is not attached.	Calibration and measurement cannot be performed because the installed target mask is not correct or a target mask is not installed.	Install the appropriate target mask before performing measurement.	18
	Error Code:172 UV adjustment failed. Change Standard value or tolerance settings, or use a different Fluorescent Standard.	UV adjustment failed because the specimen does not include fluorescence.	Perform UV adjustment using a specimen that includes fluorescence.	For details, refer to the Spectra Magic NX2 instruction manual.
		The target value may not be appropriate.	Check the input target value. If the target value is incorrect, enter the correct value and perform UV adjustment.	
		The tolerance may not be appropriate.	Change the set tolerance and perform UV adjustment.	
	Error Code:116 Failed to acquire viewfinder image. Please check if the instrument is properly connected, reopen the window.	The camera installed in the instrument is not operating correctly.	Turn the power OFF and then turn it ON again. If the message is displayed again, contact a KONICA MINOLTA-authorized service facility.	17
		The camera has not been enabled in the PC settings.	Check the settings by navigating to Settings > Privacy > Camera in Windows. If “Allow apps to access your camera” is turned off, please turn it on.	—

Symptom	Displayed message	Possible cause	Correction	Reference Page
	Error Code:116 Failed to acquire viewfinder image. Please check if the camera and the computer is properly connected.	The camera installed in the instrument is not operating correctly.	Turn the power OFF and then turn it ON again. If the message is displayed again, contact a KONICA MINOLTA-authorized service facility.	17
		The camera has not been enabled in the PC settings.	Check the settings by navigating to Settings > Privacy > Camera in Windows. If “Allow apps to access your camera” is turned off, please turn it on.	—
	Error Code:118 Motor has malfunctioned.	The operation cannot be executed because the motor that performs switching of the measurement area, SCI/SCE, and the UV adjustment filter is currently operating.	Wait for motor operation to end before executing the operation.	—
	Error Code:111 The A/D conversion in the instrument has malfunctioned.	The A/D conversion device installed in the instrument has failed.	Turn the power OFF and then turn it ON again. If the message is displayed again, contact a KONICA MINOLTA-authorized service facility.	17
	Error Code:112 Charging of the light emission circuit in the instrument has malfunctioned.	Charging of the light output circuit is not completed. The light output circuit is not operating correctly.		17
	Error Code:113 The light emission circuit in the instrument has malfunctioned.	The light output circuit installed in the instrument is not operating correctly.		17
	Error Code:182 The motor in the instrument has malfunctioned.	The motor that performs switching of the measurement area, SCI/SCE, and the UV adjustment filter is not operating correctly.		17
	Error Code:181 Reading or writing the memory in the instrument has failed.	The memory installed in the instrument is not operating correctly.		17

Troubleshooting

If an abnormality has occurred with the instrument, take the 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 conditions still do not return to normal, contact a KONICA MINOLTA-authorized service facility.

Symptom	Check Point	Action	Reference Page
The instrument does not start up even though the power is ON.	Is the AC adapter connected correctly to the instrument?	Correctly connect the AC adapter.	17
	Is the AC adapter that is supplied as a standard accessory (AC-A312F) connected?	Connect the AC adapter supplied as a standard accessory (AC-A312F).	9
Measurement results from the reflectance measurement are abnormal.	Is the specimen placed properly?	Set the instrument so that the sample is in closest possible contact with the target mask surface.	22
	Is the target mask installed correctly?	Read "Installing the Target Mask," and install the target mask correctly.	18
	Is there foreign matter or other dirt on the inside of the integrating sphere?	Foreign matter or dirt larger than several mm may affect the measurement results. Foreign matter and dust inside the integrating sphere can easily scratch the barium sulfate paint on the inside of the sphere. Use a blower from the specimen measuring port to blow these substances off. If such objects cannot be removed with the blower, zero calibration and white calibration may improve performance.	14
	Has correct calibration data been written?	Set the data for the white calibration plate that you are using.	For details, refer to the SpectraMagic NX2 instruction manual.
	Has zero calibration been performed correctly?	Read "Installing the Zero Calibration Box," install the zero calibration box correctly, and perform zero calibration.	20
	Has white calibration been performed correctly?	Read "Installing the White Calibration Plate," install the white calibration plate correctly, and perform white calibration.	21

Symptom	Check Point	Action	Reference Page
Data input/output from the instrument to the computer is not possible. No commands from the computer are being accepted.	Is the USB cable connected correctly?	Connect the instrument and computer correctly to the USB cable.	16
	Is the software operating correctly?	Refer to the software instruction manual and perform the operation correctly.	For details, refer to the SpectraMagic NX2 instruction manual.

Wavelength Correction (WAA*) Function

Wavelength Correction Function

In spectrophotometers, fluctuations caused by shifts in the wavelength direction (hereinafter referred to as "wavelength shift") do occur rarely due to unforeseen shocks or temperature, humidity, or other environmental changes in the process of using the instrument.

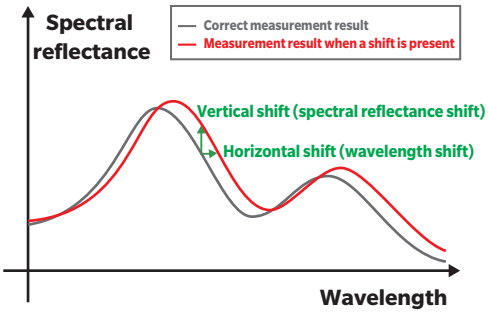
The wavelength correction function uses our proprietary technology (patent pending)* that detects and corrects wavelength shifts using a bright-line light source installed inside the instrument. In daily use, wavelength shift from the time of purchase (calibration at our factory) can be detected and corrected to maintain high measurement accuracy. In addition, a warning is displayed when an abnormality occurs, helping to prevent measurement errors caused by spectrophotometer abnormalities.

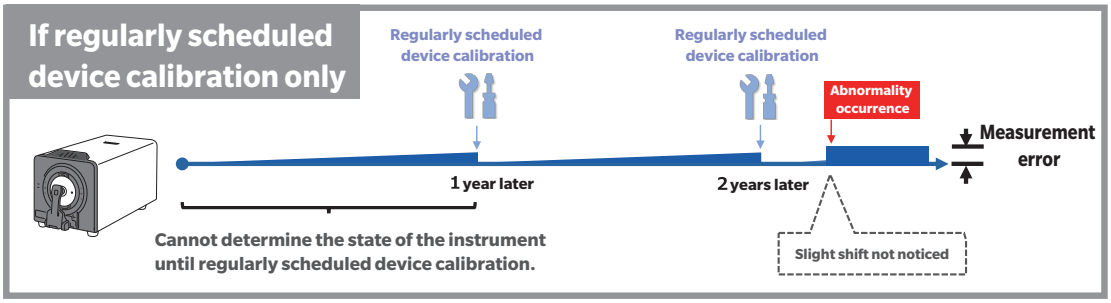
Fluctuations in the reflectance level direction are calibrated by zero calibration and white calibration, which are performed prior to measurement using a zero calibration box and white calibration plate.

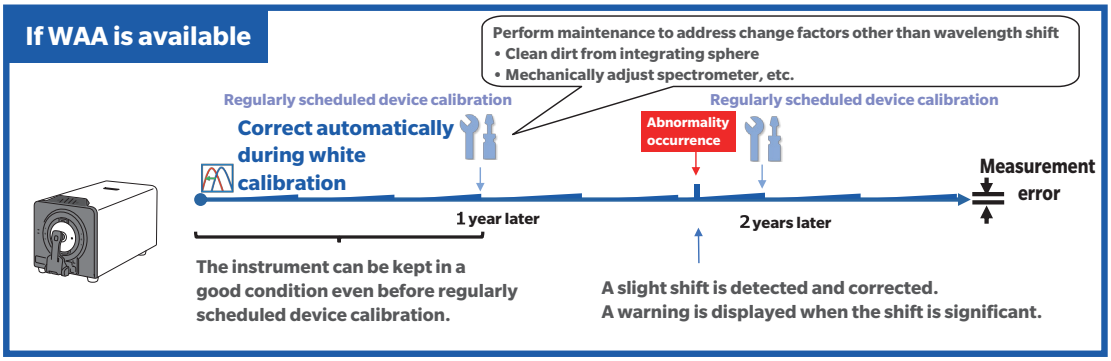
* Our proprietary wavelength shift correction function is called WAA (Wavelength Analysis & Adjustment).

Spectrophotometer Maintenance

Inspection and calibration services perform maintenance, inspection, and calibration of instruments for measurement in their normal operating environment. If wavelength shift becomes severe, WAA is not sufficient to compensate for it, and the spectrophotometer in use needs to be sent for inspection and calibration services. In addition, fluctuations in the reflectance level direction are calibrated by zero calibration and white calibration performed during startup of the instrument, but grime, dust, and other contaminants in the white calibration plate or instrument can be error factors other than wavelength shift. We recommend that you have the instrument serviced and calibrated to ensure its effective use.







<The figure shows a conceptual diagram of the regularly scheduled device calibration/WAA.>

Fluorescence Measurement

A motor-driven UV cutoff filter is installed at the front of this instrument's xenon lamp. The movement of this filter partially cuts off (with the filter positioned to fully cover the front of the xenon lamp, all light with wavelengths of 390 nm or less is cut off) the light in the ultraviolet range of the xenon lamp, allowing for adjustment to the UV output. Therefore, the light source of this instrument can be made to better approximate a D_{65} light source.

Adjusting the UV Output

The UV output can be adjusted in 1,000 steps from 0.0 to 99.9.
In actuality, when strictly measuring a fluorescent color, a fluorescence standard plate whose value is known is measured and the UV cutoff filter position is adjusted (fluorescence calibration) so the measured value and the known value become the same (when changing the position of the UV cutoff filter, perform zero calibration and white calibration). Furthermore, changes to the xenon lamp over time affect the measured value in fluorescence measurement, so fluorescence calibration should be performed regularly.

Performing Fluorescence Calibration

When using SpectraMagic NX2, the two following fluorescence calibration methods are available for strict fluorescent reflectance measurement.

1. Tint mode

Finds the fluorescence measurement correction coefficient to bring the CIE Tint value of the fluorescence standard plate within the range specified as the standard.
(Enter the Tint value.)

2. Whiteness [WI] mode

Finds the fluorescence measurement correction coefficient to bring the CIE WI value (whiteness) of the fluorescence standard plate within the range specified as the standard.
(Enter the WI value.)

Without Fluorescence Calibration

For fluorescence measurement that does not require strict accuracy (fluorescence calibration is not performed), perform measurement with the UV cutoff filter not covering the xenon lamp (with UV output at 99.9).

Specifications

		CM-3700A-U Plus
Illumination/ viewing system	Reflectance	di: 8°, de: 8° (diffused illumination, 8° viewing angle)
		SCI (specular component included) / SCE (specular component excluded) switchable, simultaneous measurement possible
		Conforms to JIS Z 8722 Condition c, ISO 7724/1, CIE No. 15 (2004), ASTM E 1164, DIN 5033 Teil 7 standards
Size of integrating sphere		Ø152 mm (6 inches)
Detector		38-element silicon photodiode array
Spectral separation device		Diffraction grating
Wavelength range		360 to 740 nm
Wavelength pitch		10 nm
Half bandwidth		Approx. 14 nm
Reflectance range		0 to 200%; Resolution: 0.001%
Light source		Pulsed xenon lamp
Measurement area/ Illumination area	Reflectance	SAV : 1 × 3/5 × 7 mm USAV : 1 × 3/3 × 5 mm
Repeatability	White	Colorimetric values: Standard deviation within ΔE*ab 0.005 Spectral reflectance: Standard deviation within 0.05% (When a white calibration plate is measured 30 times at 10-second intervals after white calibration)
	Black	Colorimetric values: Standard deviation within ΔE*ab 0.02 Spectral reflectance: Standard deviation within 0.02% (When a BCRA Black tile [with reflectance of 1%] is measured 30 times at 10-second intervals after white calibration)
Inter-instrument agreement		Within ΔE*ab 0.15 (Based on average for 12 BCRA Series II color tiles; SAV-SCI. Compared to values measured with a master body under Konica Minolta standard measurement conditions)
UV adjustment		UV setting: UV cutoff filter: 400 nm * Computer controlled: continuously variable, 0.0% to 100.0% (1,000 steps)
Measurement time		Reflectance measurement SCI or SCE: Approx. 2 s Reflectance measurement SCI + SCE: Approx. 5 s
Minimum interval between measurements		Reflectance measurement SCI or SCE: Approx. 3 s Reflectance measurement SCI + SCE: Approx. 6 s
Camera viewfinder function		Using internal camera. Image viewable/copiable using optional software such as SpectraMagic NX2 Ver. 1.5 or later with pointer-based measurement point guidance function
Wavelength correction function*1		WAA (Wavelength Analysis & Adjustment) technology
Ambient temperature/ humidity measurement function		Available
Interface		USB 2.0

	CM-3700A-U Plus
Target mask auto detection	Available
Power	Dedicated AC adapter
Size	Approx. 307 (H) × 271 (W) × 600 (D) mm
Weight	Approx. 18 kg
Operating temperature/ humidity range	Temperature: 13 to 33°C, Relative humidity: 80% or less (at 33°C) with no condensation
Storage temperature/ humidity range	Temperature: 0 to 40°C, Relative humidity: 80% or less (at 35°C) with no condensation
Standard accessories	White calibration plate; target masks (SAV, USAV); zero calibration box; USB cable (3 m), AC adapter
Optional accessories	SpectraMagic NX2 color data software; color plates; green tile; dust cover

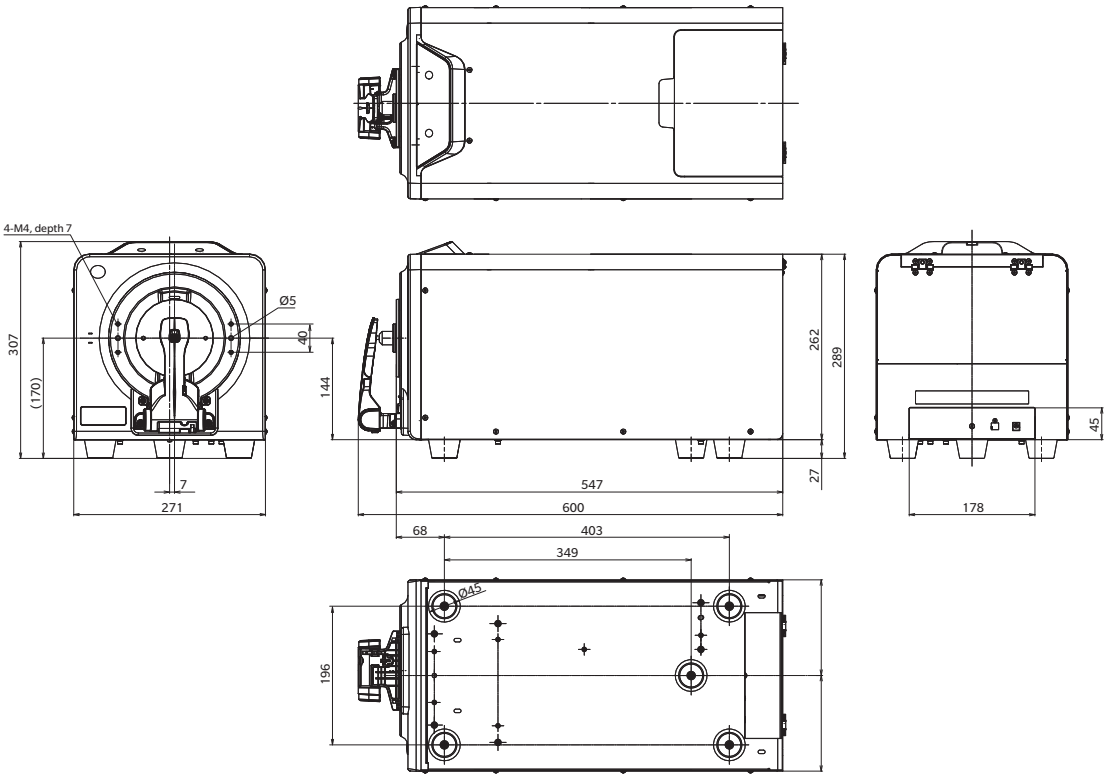
For details of the measurement items (various color spaces, indexes, color difference equations), refer to the instruction manual for the optional SpectraMagic NX2 color data software.

*1 The WAA function enables wavelength diagnosis and wavelength correction of the instrument. This function is available free of charge for the first year after purchase, and can be continued to be used after the second year by having the instrument serviced and calibrated.

Dimensions

CM-3700A-U Plus

(Unit: mm)



<CAUTION>

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