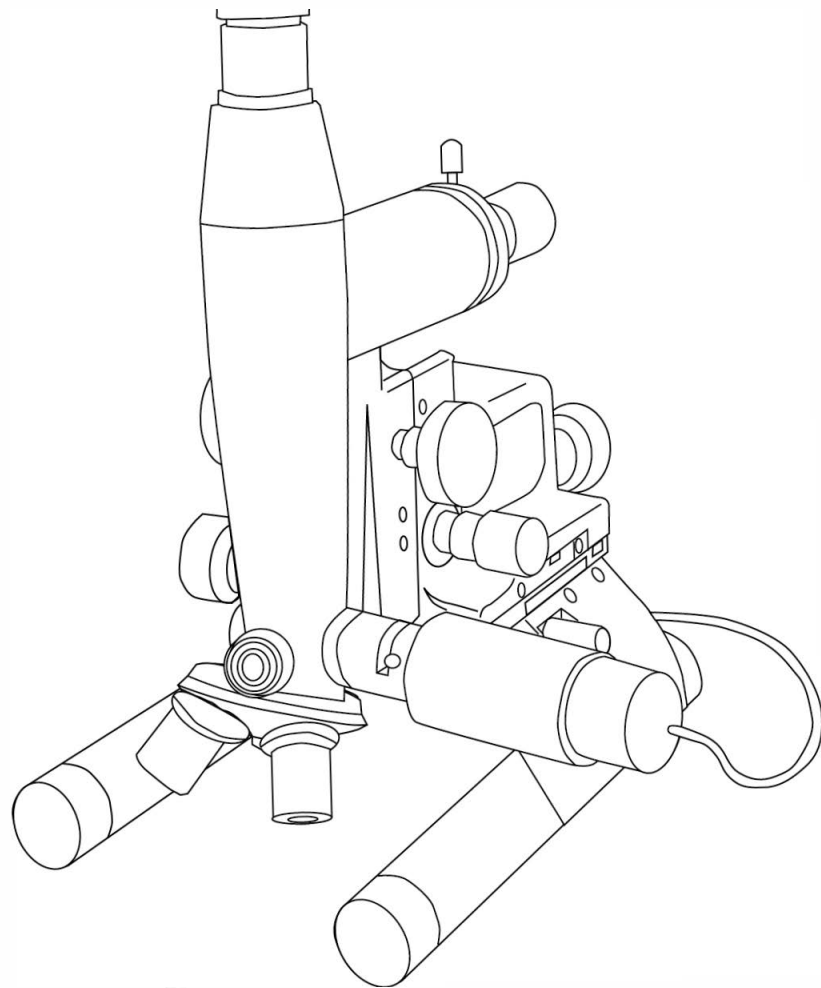


Roll scope

RMM-A3

Instruction Manual

Thank you for purchasing our Roll Scope, RMM-A3.
Please read this manual thoroughly to ensure proper and safe use before handling this product. After reading this manual, please keep it in a safe place and refer to it when necessary.



CHUO PRECISION INDUSTRIAL CO., LTD.

Introduction

Thank you very much for purchasing the roll scope.

This product is an optical instrument composed of precision parts.

Please read this instruction manual carefully to understand the product and function for the proper use before using RMM-A3 for the first time.

■ Feature

- The special-shaped legs allow easy and stable observation of sample objects for roll inspection.
- The main body structure is easy to carry around. Move the main body easily over a large sample for observation.
- Built-in epi-illumination LED light is equipped as a standard feature, which is ideal for metal surface observation. There is almost no heat generation from the lighting device.
- The lens tube motion mechanism allows the lens tube to move forward, backward, left and right, making it easy to position the lens for observation.
- Equipped with C-mount for external optical equipment. Use TV cameras and other devices to observe and record.
- By attaching the dial gauge (optional setting), it allows measuring on the sample surface in fine steps.

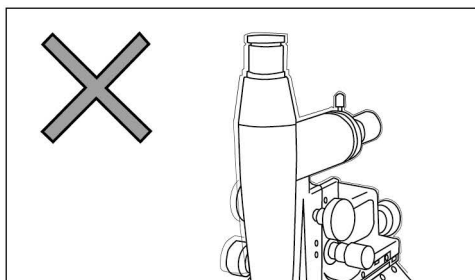
■ Part Components

Part name	Quantity included
Main body (with camera lens tube)	1
Eyepiece:	
WF10X (with cross scale)	1
WF20X (without scale)	1
Objective lens: M5X, M10X & M40X	1 each
TV adapter	1
LED lighting	1
Filter (yellow, green)	1
LED lighting power supply unit	1
AC adapter	1
AA alkaline batteries	4
Vinyl cover	1
Hexagonal wrench (wrench type 1.3, 1.5 & 2)	1 each
Instruction manual (this booklet)	1

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1 Precautions

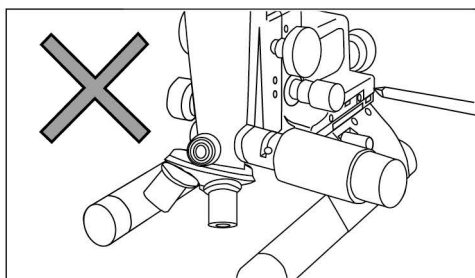


Avoid using the product in the following locations:

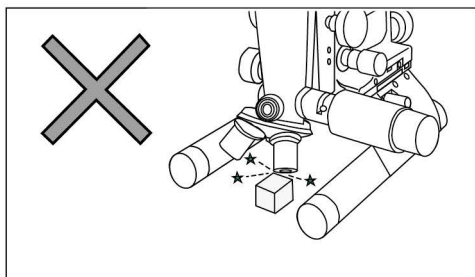
- Places with high vibration
- Places in direct sunlight
- Places with large temperature change
- Places with high humidity

Lens surface may condensate, mainly due to sudden temperature changes.

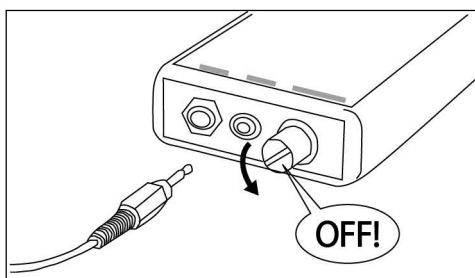
Please do not use the product in said environment.



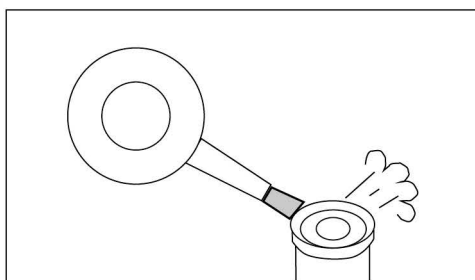
Do not remove, disassemble, or modify the screws.



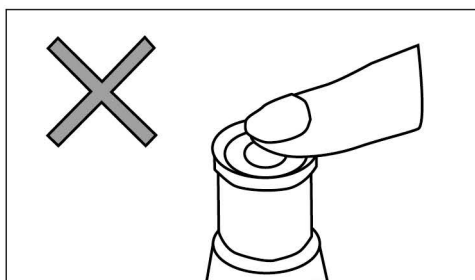
When lowering the objective lens with operating the control handle, be careful not to let the lens tip come in contact with the object. Especially when replacing the objective lens by turning the revolver, keep your eyes away from the eyepiece and operate the revolver while checking the objective lens.



Before connecting the connector to the LED lighting power supply, make sure the power switch of the power supply is turned OFF.



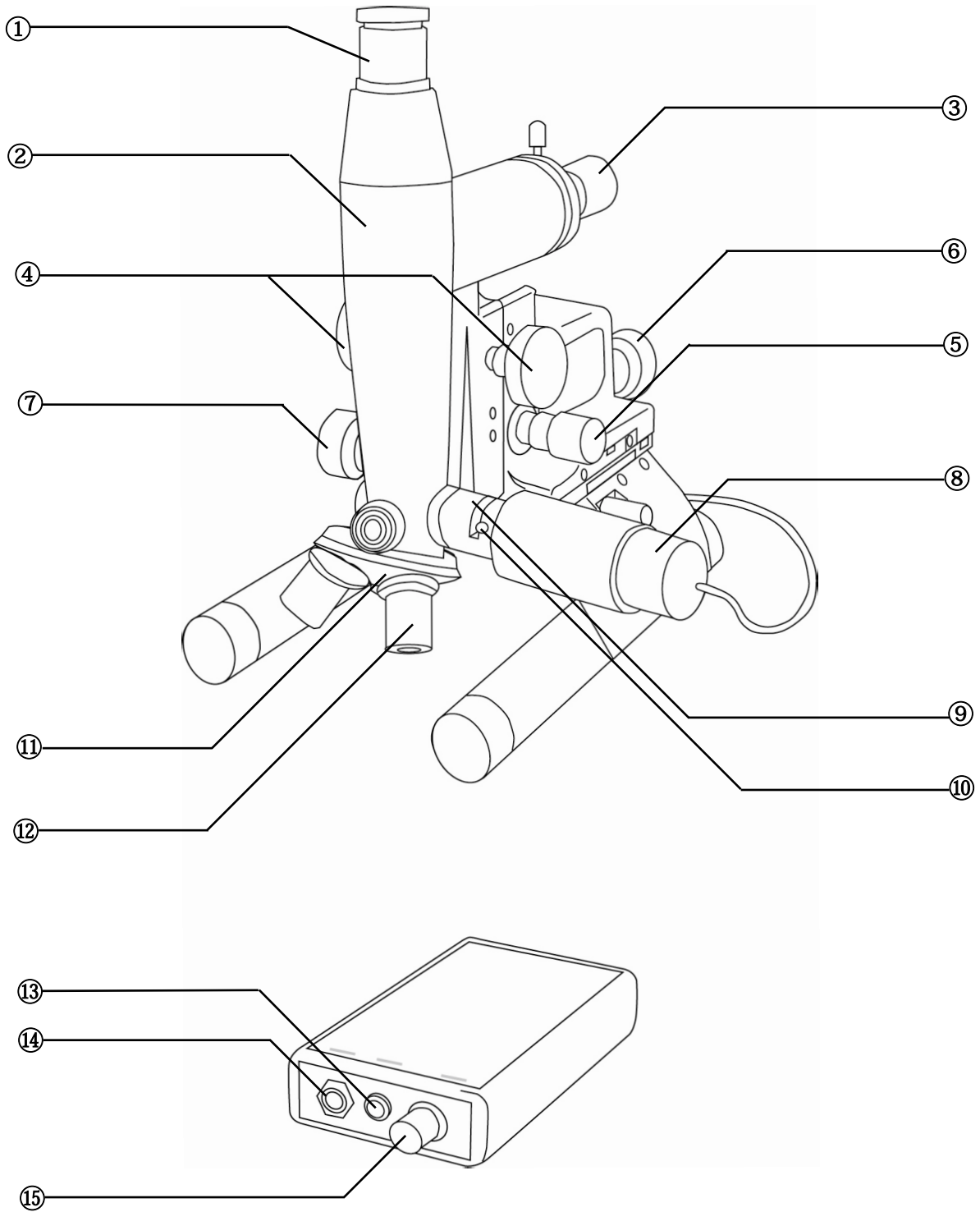
Dust on the eyepieces or objective lenses can interfere with observation. Always clean with a soft brush or air blow.



Do not touch the surface of the eyepiece or objective lens. Wipe it off with a lens cloth with a lens cleaner (sold separately) or a lens paper (sold separately) when fingerprints are found.

*A cleaning set (sold separately) is equipped with these lens care products.

2 Part Name and functions



① Eyepiece

Eyepiece with two lenses: WF10X and WF20X.

② Main body

Equipped with a camera lens tube.

③ TV adapter

Secure this adapter when using a C-mount optical device.

④ Vertical coarse control handle

Move the tube up and down (coarse movement).

⑤ Vertical fine control handle

Move the lens tube up or down (fine movement).

⑥ Left/right control handle

Move the tube to the left or right.

⑦ Front/rear control handle

Move the tube back and forth.

⑧ LED light

Reflective lighting system using a white LED as a light source.

⑨ Filter mounting slit

Attach when using the supplied filter (yellow, green).

⑩ Aperture control lever

Intended to block unwanted light rays affecting visual contrast. Ensure to narrow down not to interfere with the field of vision, depending on the level of magnification.

⑪ Revolver

Attach three objective lenses included in the package. Rotate the revolver to change the lens.

⑫ Objective lens

RMM-A3 has three lenses: M5X, M10X, and M40X.

⑬ LED lighting connector (output)

Connect the cable for LED lighting.

⑭ AC adapter connector (Adapter)

Connect the supplied AC adapter. When the AC adapter is connected, it will automatically switch from battery to AC power supply.

Do not connect a power supply or AC adapter other than the supplied AC adapter. Failure to follow may cause a malfunction.

⑮ Power switch/light intensity adjustment knob (Power SW)

Adjust the light level with the switch. Turn the knob counterclockwise for weak low light level, and clockwise for strong high light intensity. When turning the power OFF, turn the knob to counterclockwise direction until you hear a "click" sound.

3 Preparation

Follow the steps below to attach each component when using the product for the first time.

1. Mounting the lens

Insert the lens into the eyepiece and secure with a "clamp screw". Screw in to attach the screw-type objective lens. Attach the supplied three objective lenses to the revolver.

2. Mounting the LED light

Ensure that the LED light and power supply unit are not connected. Insert the LED light into the main body and tighten the "LED light fixing screw" with the supplied hexagonal wrench. Ensure the "filter attachment slit" of the LED light section is facing upwards when mounting.

3. Connecting the LED light

Ensure the LED light power supply is switched "OFF", and connect the LED light connector.

4. Preparing the power supply

Using AC adapter:

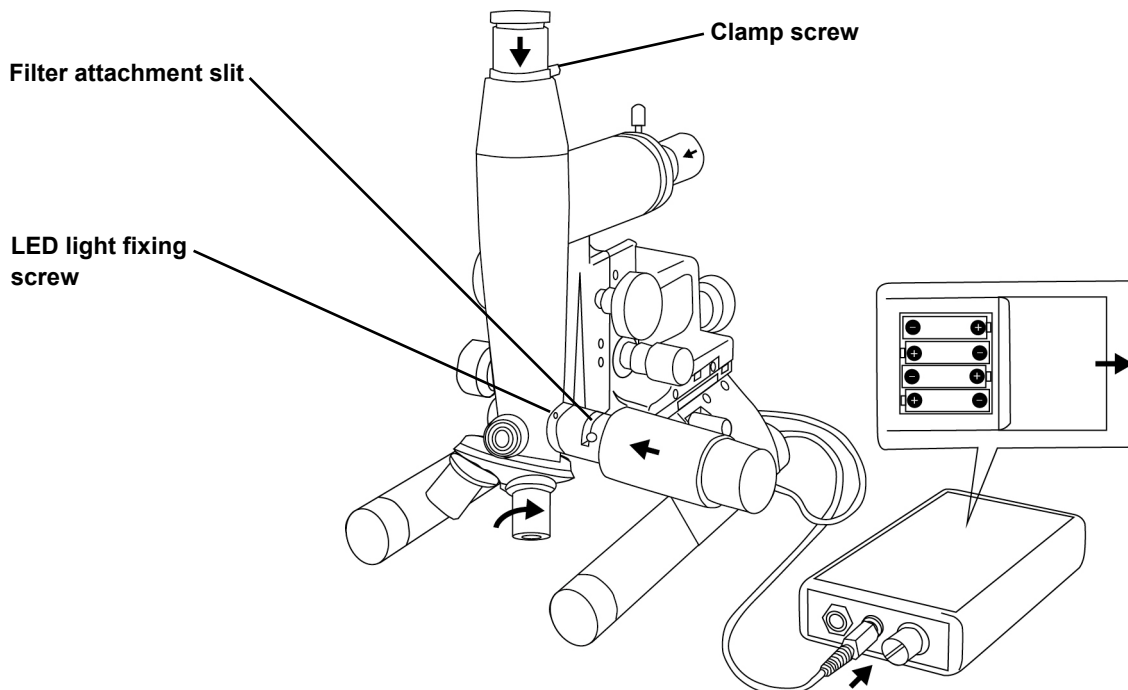
Connect the supplied AC adapter to the power supply and plug the AC adapter into an electrical outlet (AC100V).

Using batteries:

Insert the supplied batteries (four AA alkaline batteries) into the LED light power supply unit. (Reference) After the AC adapter is connected, it will automatically switch from the battery supply to the AC power supply. Please remove the batteries from the power supply unit when batteries are not in use for an extended period.

5. Attaching TV camera (preparation for using TV adapter)

Attach the TV adapter when using a TV camera. Please refer to "Attaching C-mount compatible optical equipment"(p.8) for details.



4 How to use

△ Caution

If the user is unfamiliar with microscopic observation, it is recommended to use the combination of WF10X and M10X with low magnification as a start.

1. Check the observation position of the sample surface and gently position the legs. Ensure the legs are resting level as possible.
2. Turn on the LED light and adjust the light intensity.
3. Operate the vertical coarse control handle to focus roughly on the observation surface, and use the vertical fine control handles to align precisely.
4. Determine the observation position by operating the left/right or the front/rear control handle.

■ Adjusting contrast

Use aperture control lever to block out unwanted light rays affecting visual contrast.

Ensure to narrow down not to interfere with the field of vision, depending on the level of magnification.

■ Filter

Use the green filter to reduce eye fatigue for long-hour observations. Some samples show a better observation view with green or yellow filters.

■ Using objective lens (40X)

When using the M40X objective lens, the working distance, the distance from the tip of the objective lens to the observation surface, is extremely short (0.3 mm). Be careful not to let the lens tip come in contact with the sample.

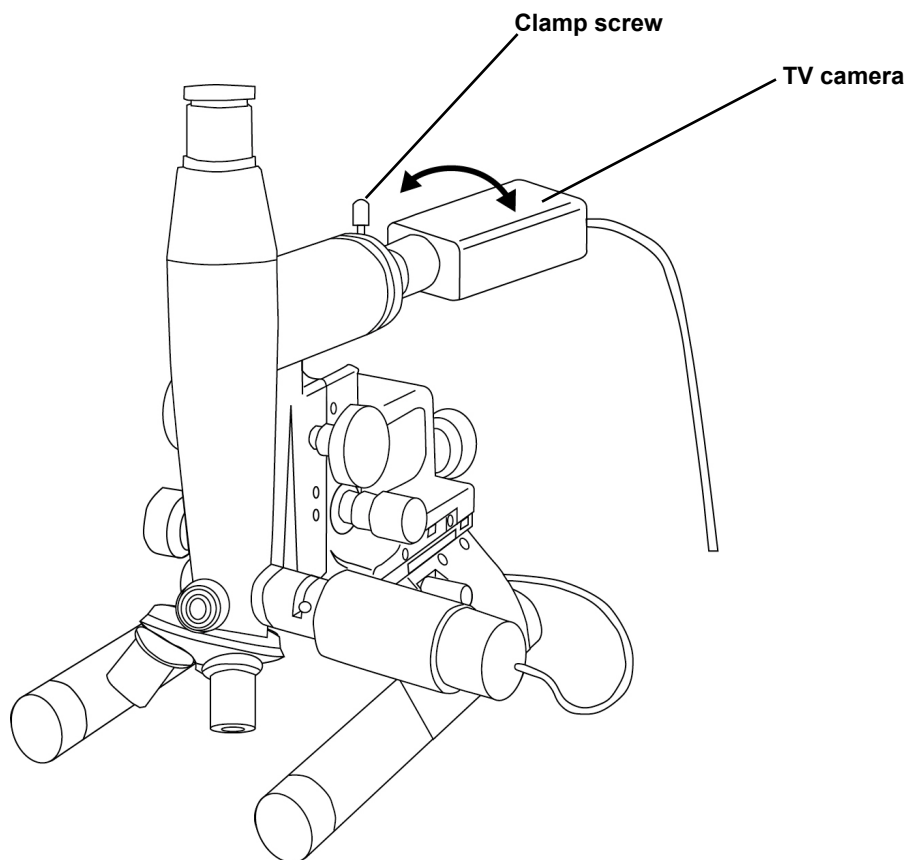
It is recommended to first focus with M10X, rotate the revolver switching to M40X, and focus by using vertical fine control handle.

5 Attaching C-mount compatible optical equipment

Use the supplied TV adapter to attach C-mount optical devices, such as a C-mount TV camera. (Reference) Magnification of imaging surface on TV camera is approximately 0.7 times the objective lens magnification.

■ Attaching TV camera

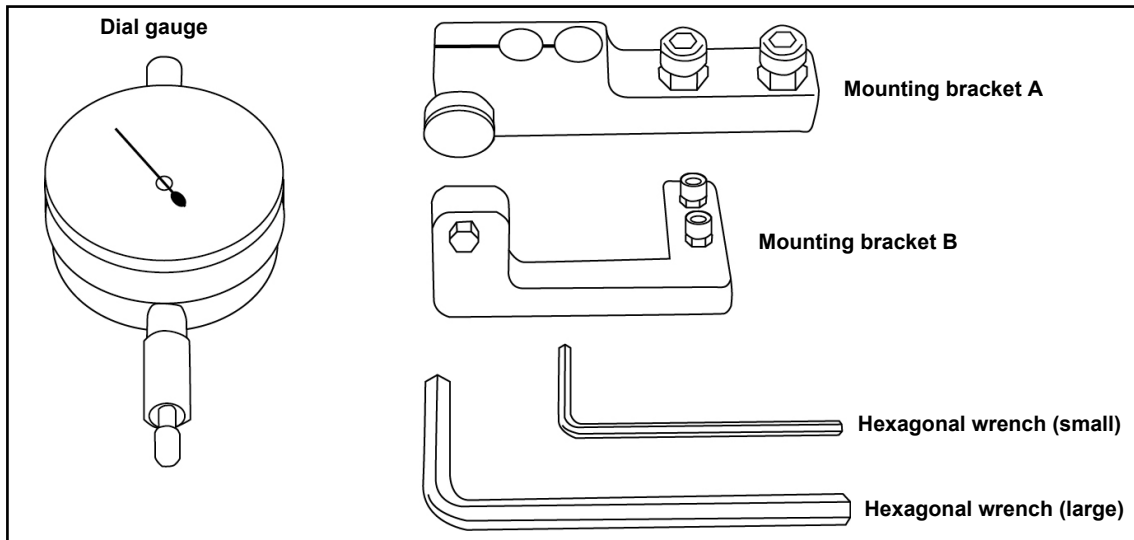
1. Attach the TV adapter on a C-mount TV camera.
Screw in the TV adapter to the TV camera to fasten.
2. Attach the TV adapter section to the lens tube.
Loosen the clamp screw, insert the TV adapter and tighten the clamp screw to secure.
3. Connect the TV camera to show the image on the monitor.
4. Prepare an easy-to-focus sample and determine the focal point using an eyepiece.
5. Check the level of monitor image.
Slightly loosen the clamp screw and rotate the TV camera to adjust the level when the monitor image is tilted compared to the image seen through the eyepiece (see the diagram below).
6. Tighten the clamp screw to secure the TV camera as the last step.



6 Depth & step measurement using dial gauge

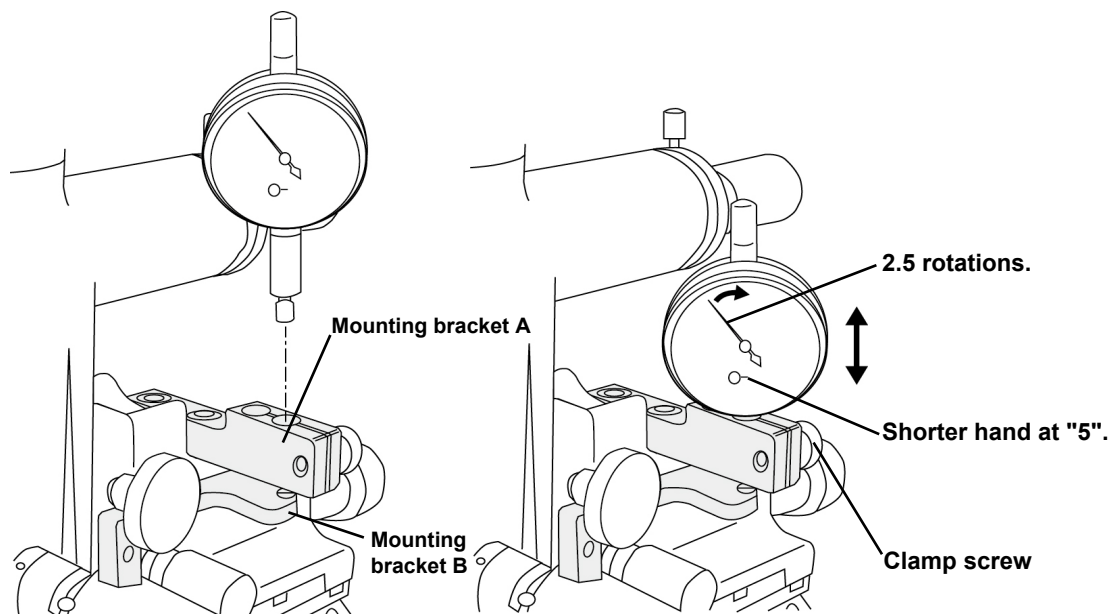
Attach a dial gauge (optional) to measure 0.001mm scale depth & step within 1mm or less measurement range.

The dial gauge set includes the gauge, two mounting brackets, mounting screws, and wrenches in two sizes.



■ Attaching dial gauge

1. Place the mounting brackets A and B as shown in the diagram. Turn the vertical fine control handle to move the optical tube near the center of the travel as a start.
2. Insert the dial gauge into the hole on the outside of mounting bracket A.
3. While checking the indications on the dial, push in gently and stop at the position after the pointer has made two and a half turns (shorter hand pointing at "5") and tighten the clamp screw to secure. (Reference) The Dial gauge scale can be rotated to set any position to "0".



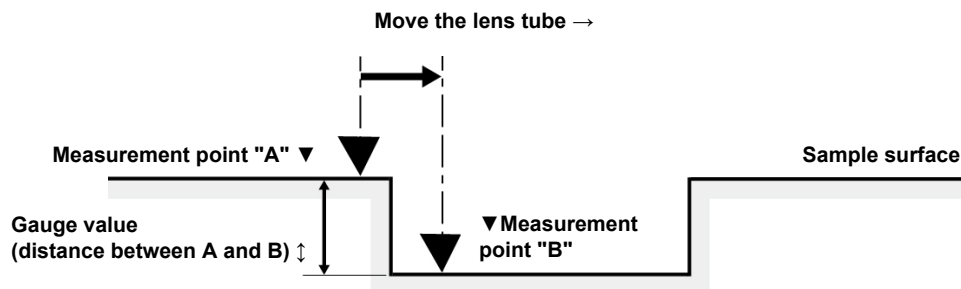
△ Caution

Be careful not to tighten the clamp screws too tightly. It will cause a dial gauge pointer to slow its motion.

■ Depth and step measurement

Follow procedures as below to measure using the dial gauge.

1. Focus on the sample surface at measurement point "A", and turn the dial gauge scale to position the pointer to "0".
2. Move the lens tube to measurement point "B" by operating the left/right or the front/rear control handle.
3. Focus to measurement point "B" at that position with the vertical fine control handle.
4. Read the value of the dial gauge. The amount traveled from "0" is the distance between "A and B".
(Reference) The higher the magnification of the lens to be used, the more precise the measurement can be.



7 Adjusting coarse control handle

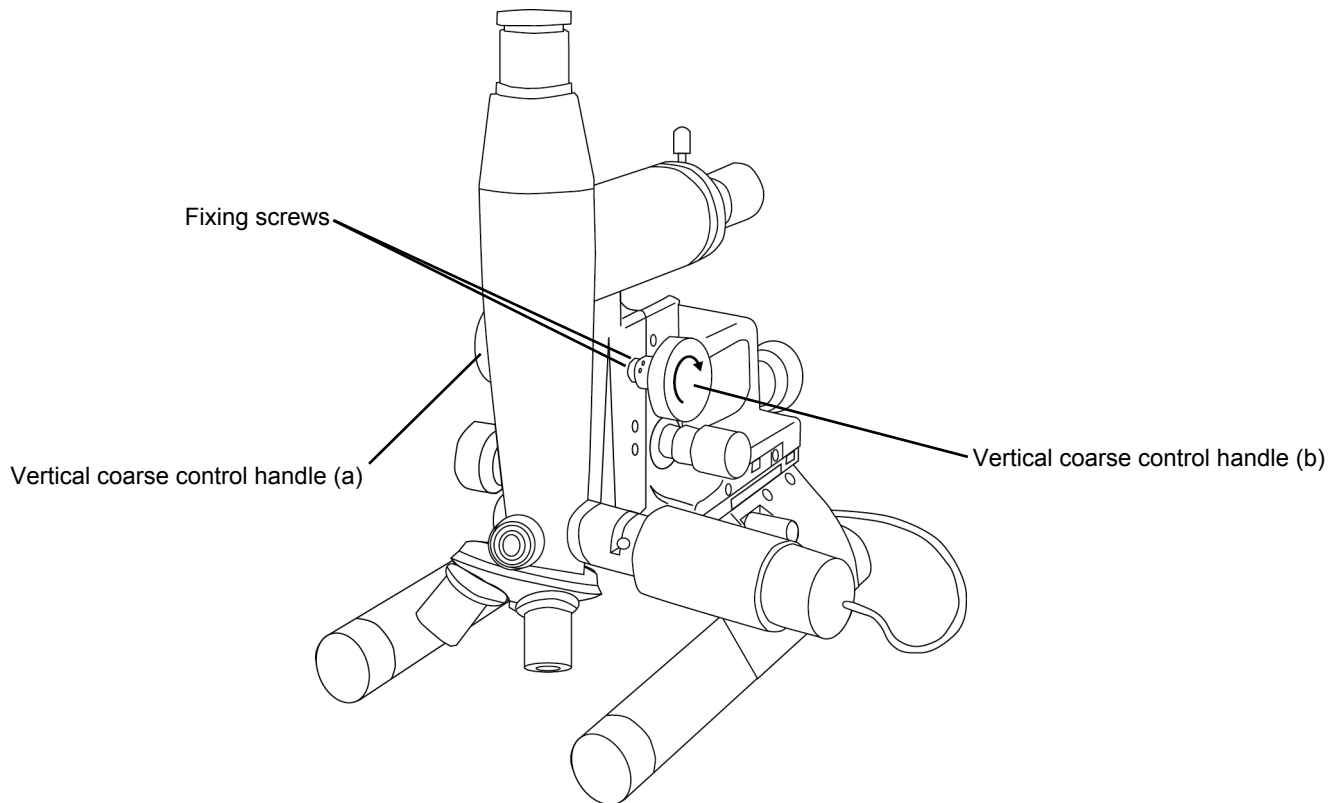
Perform the following procedure for adjustment if vertical coarse control handle moves lightly, or the lens tube naturally lowers.

Adjusting handle stiffness

Loosen two fixing screws on the vertical coarse control handle (b) with the supplied hexagonal wrenches. Turn the handle (b) slightly in a clockwise direction while firmly supporting the other side of the vertical coarse control handle (a). Make sure that the lens tube does not fall off naturally, then tighten the fixing screws to check the movement.

△ Caution

Do not tighten the screws any harder than necessary.
The screws and the internal mechanism may be damaged.



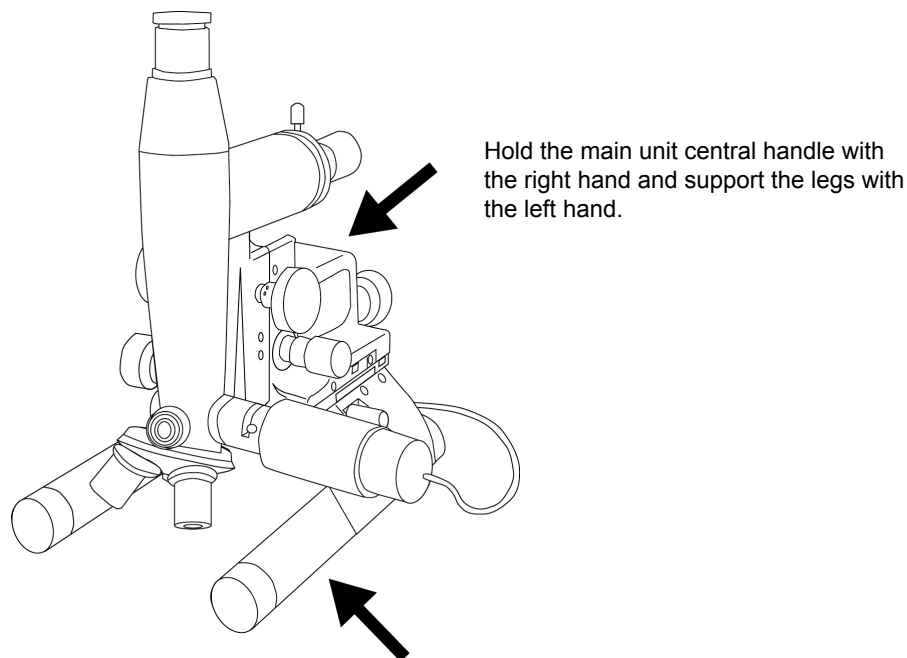
8 Carrying & storage

■ Carrying (how to hold the main body)

Hold the handle and the legs with both hands as shown below when carrying.

△ Caution

Never lift the main unit by holding the lens barrel or lighting section. It may cause malfunction or damage to the product or parts.



■ Storage (when not in use)

Keep the product in a safe place as described below, when not in use.

1. Turn OFF the power switch.

Remove the batteries when not in use for an extended period.

2. Turn the vertical fine control handle to bring the lens tube to the lowest position.

3. Apply the vinyl cover while the lenses are still attached.

Remove the eyepiece, objective lens, LED lighting, and TV adapter when not in use for an extended period. Make sure to use the lid for cover to prevent catching the dust. Keep all removed lenses and other parts in a case for safekeeping.

△ Caution

Choose a dry location for storage. It may cause condensation and mold when stored in a humid place. Please be very careful and avoid the said environment.

9 Main specifications

Total magnification:	50X, 100X, 200X, 400X, 800X
Eyepiece:	WF10x, WF20X
Objective lens:	M5x, M10X, M40X
Mirror base movement:	Front/rear 50mm, left/right 30mm
Focusing:	Coarse movement 50mm, fine movement 2mm
Reflective lighting system:	White LED light source
Lighting power supply:	LED lighting power supply unit (Dedicated AC adapter or AA alkaline batteries)

10 Warranty and repair

■ Warranty

Repair services are available free of charge in the event of technical failure under warranty period per CHUO regulations as follows.

■ Free warranty

Warranty period 1 year from shipment

Warranty period	1 year from shipment
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Repair costs will not be covered for the following cases.

- Due to improper use, inappropriate repair, or remodeling of the product.
- Due to applying external shock after purchasing the product.
- Due to fire, earthquake, flood, lightning, or other natural disasters.
- Due to environmental pollution or by applying abnormal voltage.
- Products exceeding the warranty period.
- Products without a warranty.
- For products and parts predetermined by CHUO not to apply this warranty.
- Consumables.

■ Repair service during the warranty period

Please contact the authorized distributors or company of purchase for repair service.

■ Repair service for out-of-warranty products

Contact the authorized distributors or company of purchase for out-of-warranty products. Repair services will be provided with charges depending on conditions. Please provide the following information to prepare and deliver effective repair services. Shipping charges are not covered by CHUO for out-of-warranty products.

- Date of purchase, product name, and manufacturing number.
- Details of how the product is used.
- Specific description of defects.
- Matters that may be the cause of the defect.

■ Contact us

Please contact the authorized distributors or company of purchase.

**All descriptions and specifications in this manual are subject to change without prior notice.
Please note in advance that products are also subject to change without prior notice.**

<p>RMM-A3 Instruction Manual Ver.2.4.(E) November, 2021</p> <p>Chuo Precision Industrial Co., Ltd. Sales Division Oikawa Bldg 3F, 1-5 Kanda Awajicho, Chiyoda-ku, Tokyo 1010063 JAPAN</p>

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