

# RM-2000PLUS Surgical Microscope

## User's Manual

(Please read the instruction carefully before using it)

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LJYL-IFU-S003 (E)

Version: A0

2023-10-31

**Shenzhen Rogin Medical Co., Ltd.**

**Product Information:**

Name: Surgical Microscope

Model: RM-2000PLUS

Production Date: See the instrument label for details

**Manufacturer & After-Sale Service Provider:**

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## Safety Caution

When using the instrument, you must observe the safety instructions, and the meanings of these symbols are as follows:

### Prompt Symbols

Information about safety has been included in this user manual. Please pay attention to this information, especially the contents with the following symbols



**Warning**, indicating that there is potential hazard; failure to follow the instructions may pose a risk of harming users or product failure!



**Note**, promoting the user of the instrument, or providing the useful information to the user.



**Annotation**, promoting the user of the instrument, or providing the useful information to the user.



In case of serious incident related to this equipment, please report to ROGIN and the competent authority.

### Information Symbols

The definitions of the bullet points used in this user manual are as follows:

- The content of the upper and lower items is equal; there is no sequence or subordination relation.
- ✓ The precondition of operation, the precondition that the product must meet before performing a certain operation.
- ▶ There is a sequential relationship between the upper and lower items, and the next step can be carried out after the previous step is completed.

### The Meaning of Other Figures, Symbols and Contractions



Please refer to the User's Manual.



No pushing



Medical device



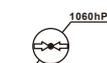
Manufacturer



Manufacturing date



Power Switch

	Class II equipment
	Upward
	Keep dry
	Handle With Care
	The number of stacked layers must not exceed 3 layers
	Ambient temperature range: -40°C~55°C
	Relative humidity range: 10%~80%
	Atmospheric pressure range: 50kPa~106kPa
	Non ionizing radiation symbol
<b>POWER</b>	Power switch identification
<b>HDMI</b>	Video output interface identification
<b>USB</b>	USB interface identification

## Structure and Composition

RM-2000PLUS Surgical Microscope consists of support bracket (floor-mounted mobile bracket (standard)/optional floor-mounted bracket, ceiling bracket, high wall-mounted bracket and low wall-mounted bracket (optional)), cross arm bracket (including electric installation) and microscope head (including visual optical component, microscope body, objective lens and illuminating system).

## Scope of Application



RM-2000PLUS surgical microscope is a manual microscope for surgical microsurgery amplification, illumination, etc. It can assist you in microsurgery and fine examination in departments such as otolaryngology and dentistry.



**Cannot be used in ophthalmology!**

## Contraindication

- Patients with light allergy.

- Shall not be used in ophthalmology.
  - Do not directly radiate it to the human eyes.
- 

### Working Environment

- Ambient temperature range: 5°C ~ 40°C.
  - Relative humidity range: 10% RH ~ 80% RH.
  - Atmospheric pressure range: 70kPa ~ 106kPa.
- 

### Transportation Environment

- Ambient temperature range: -40°C ~ +55°C.
  - Relative humidity range: 10% ~ 80% RH
  - Atmospheric pressure range: 50kPa ~ 106kPa
  - Products should not be stacked more than 3 layers during transportation, and packaging should not be turned over or exposed to rain.
- 

### Storage Environment

- Ambient temperature range: -40°C ~ +55°C.
  - Relative humidity range: 10% ~ 80% RH.
  - Atmospheric pressure range: 50kPa ~ 106kPa.
  - Well ventilated indoor environment free of corrosive gas or other harmful substances.
- 

### Safety Characteristics

- Adaptor: Input: AC100~240V, 50-60Hz / 1A  
Output: DC 12V / 3A.
  - Classification based on the degree of protection against liquid ingress: IPX0 for the entire machine.
  - Standard IEC60601-1 Type II Equipment.
-

## Safety Requirements on Installation and Use

### Safety Requirements

- ✓ This instrument can be used only for the purposes described in the User's Manual.
- ✓ Only trained and instructed personnel are allowed to use this instrument. The customer or the organization operating the equipment has the responsibility to train and guide all personnel using the equipment.
- ✓ Before starting the instrument, please completely comprehend the User's Manual, including the User's Manual for accessories and other system components.
- ✓ Keep the User's Manual in order to facilitate the operator to read at any time.
- ✓ Please observe all symbols and labels of the instrument!
- ✓ The modification and repair of this instrument can only be performed by the ROGIN service personnel or others authorized by ROGIN.
- ✓ Do not place any container filled with liquid over the instrument. Confirm that no liquid can penetrate into the instrument.



No modification of this equipment unless authorized by the manufacturer.



The HDMI port of the camera is an output port for outputting the camera's image to a display device.



The USB port of the camera is used to connect a USB flash drive and a mouse, and cannot be connected to the power outlet.



Do not modify this equipment without authorization from the manufacturer.



Although the equipment conforms to the intent of the standard IEC 60601-1-2 in relation to electromagnetic compatibility, electrical equipment may produce interference. If interference is suspected, move equipment away from sensitive device or contact us.



Do not store or use the instrument in a damp room. Do not expose the instrument in the place with splashing, dropping or water mist.



When the instrument is generating smoke, electric spark or a strange noise, please immediately cut off power supply of the instrument. Do not use this instrument until it has been repaired by our service agent.



Please note that local regulations take precedence over the requirements of the above mentioned criterions. If you have any enquiry, please contact the local ROGIN dealer.

### Requirements on Installation



The installation of the product will be completed by our service representative or by professional personnel authorized by us. Please make sure that the following operational requirements have been met:

- ✓ All the safety-related mechanical connections (please find the Manual for details) are properly connected and all screws have been tightened.

✓ All wires and plugs work normally.

✓ The adopted power wires meet the design requirements of this instrument.



Do not place this instrument in a location where the power switch is difficult to operate.

### Operating Requirements

✓ Please pay special attention to the PROMPT symbols on the instrument (Especially Warning sign).

✓ Do not disassemble and assemble the binocular head barrel and objective lens during use to prevent falling and injuring the patient.

✓ Do not disassemble or assemble the supporting components during use to prevent the Support system from being out of balance, damaging the components or hurting the patient.



**This instrument cannot be used in ophthalmic examination and surgery!** Avoid looking directly at the microscope light source, such as looking at the microscope objective lens. The light and thermal radiation of this instrument can damage human eyes. Patients need to wear protective goggles to effectively prevent eye damage from blue light, ultraviolet light, and high temperatures.

### Safety Signs on the Instrument



1 Product label

It contains basic information of the product.



2 Generalized label

Please refer to the User's Manual, no pushing and actual production date of the instrument.



3 Warning

Make sure that the safety screw has been tightened, otherwise the arm support has the risk of falling.



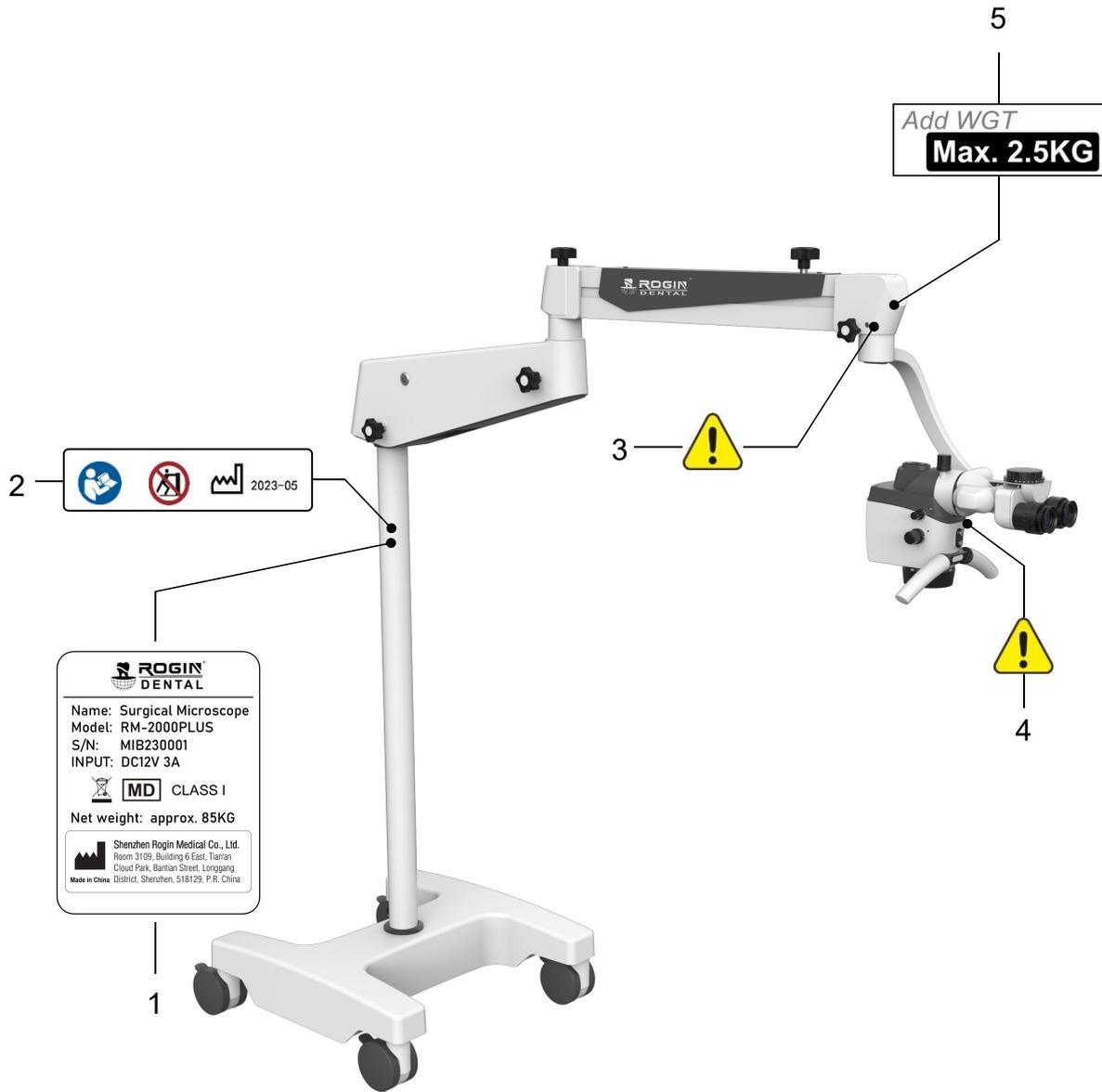
4 Warning

Make sure that the binocular tube is safely installed and the screw has been tightened, otherwise the binocular tube has the risk of falling.



5 Load-bearing tip of cross arm bracket

The balance arm would fail in case of an added weight of greater than 2.5 kg.



2 — 2023-05

1 — **ROGIN DENTAL**  
Name: Surgical Microscope  
Model: RM-2000PLUS  
S/N: MIB230001  
INPUT: DC12V 3A  
 **MD CLASS I**  
Net weight: approx. 85KG  
Shenzhen Rogin Medical Co., Ltd.  
Room 3109, Building 6 East, Tianran  
Cloud Park, Banliu Street, Longgang  
Made in China, District, Shenzhen, 518129, P.R. China

5 — **Add WGT**  
**Max. 2.5KG**

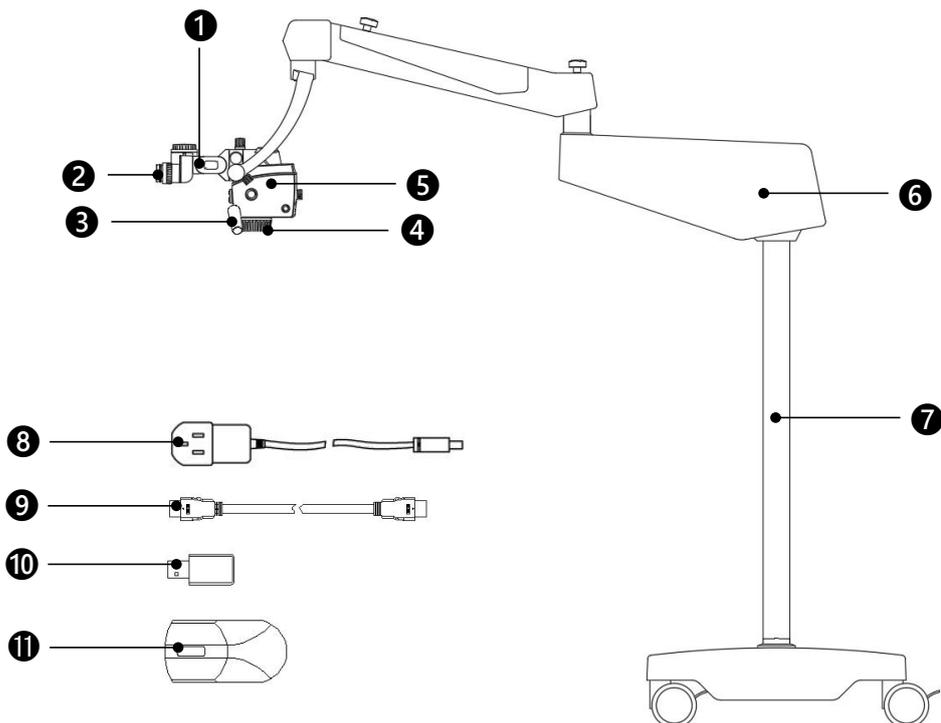
3 —

4 —

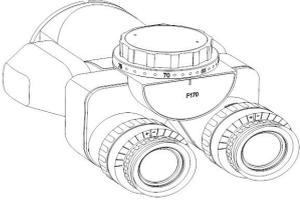
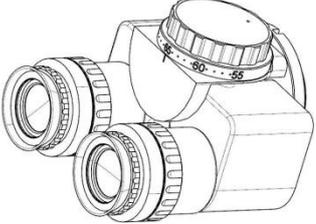
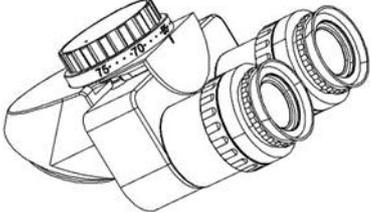
## Product Assembly

### Standard Configuration

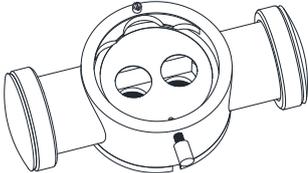
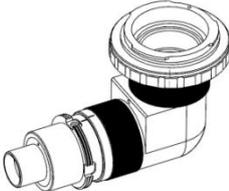
Name of Components	Specification	Quantity
① Inclined Binocular	Available in 0-180 degree variable-angle; <b>Optional:</b> straight or 45° bevel.	1
② Eyepiece	12.5X/18B; <b>Optional:</b> 25X/11B	2
③ Handgrip		1
④ Objective lens	F198~455 Variable Objective Lens	1
⑤ Microscope primary mirror	Five-range zooming	1
⑥ Cross arm bracket	650mm	1
⑦ Support system	Floor-mounted mobile bracket; <b>Optional:</b> floor-mounted bracket, ceiling bracket, high wall-mounted bracket and low wall-mounted bracket	1
⑧ Power adapter	Input: AC100~240V, 50-60Hz / 1A Output: DC 12V / 3A.	1
⑨ HDMI high definition video transmission wire	3 m	1
⑩ U-disk	Full electronic instructions is saved in U-disk	1
⑪ Mouse	2.4G wireless mouse	1



## Optional Components

NO.	Name of Components	Specification	Picture
1	0~180 degrees inclined binocular	0- 180 degree variable-angle	
2	90 degrees inclined binocular	0-90 degree variable-angle	
3	45 degrees inclined binocular	0-45 degree variable-angle	

## Additional Components

NO.	Name of Components	Specification	Picture
1	Beam Splitter	2:8 Beam Splitting, Optional 5:5 beam Splitting	
2	Camera Adapter	Interfaces with Sony, Canon, Nikon Cameras Optional	

## Inspection before Assembly



After opening the packaging box, find the packaging list, check the parts with the real objects one by one according to the package list, check if any component is not provided; if any component is not provided, please contact the local dealer in time;



Please check the product if there's any damage, especially the optical components, if any, please contact the local dealer in time;



The product is the high precision instrument, please handle with care when taking it out, and make sure the components are put at the safe place.

✓ Before assembly, make sure the staffs have carefully read the User's Manual and well know the assembly steps.

## Installation of Support System

### Installation of Mobile Floor Stand

- ✓ Move the base ① from the wood pallet, take away the plastic cover ② and the compression ring ④ firstly and put it aside;

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- ▶ Put base ① on the horizontal ground and lock four casters;

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- ▶ Fit the plastic cover ② onto the base ① and tighten the compression ring ④;

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- ▶ Insert the upright post ③ in the installation hole of base ①, the positioning pin and the positioning hole need to be aligned to ensure that the upright post is installed in place;

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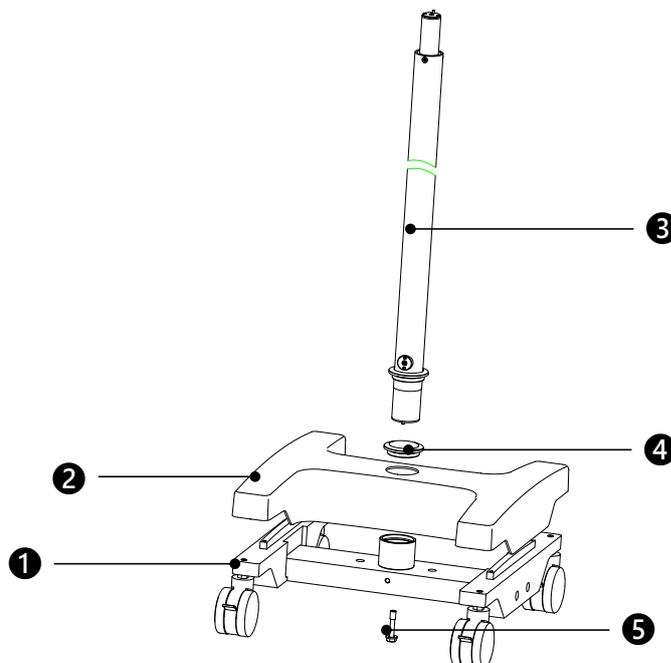
- ▶ After the upright post is installed in place, tighten the screw ⑤ ;

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- ▶ Finish the assembly of the mobile floor stand.



**Before starting the assembly, the casters must be locked to prevent injury caused by unexpected movement of the bracket during installation**



## Installation of Cross Arm System

### Upright Installation of Cross Arm



The upright installation of cross arm is applicable to mobile floor stand, fixed floor support and low-position wall mount.



Because the cross arm is heavy and long, please install by two operators for safety.

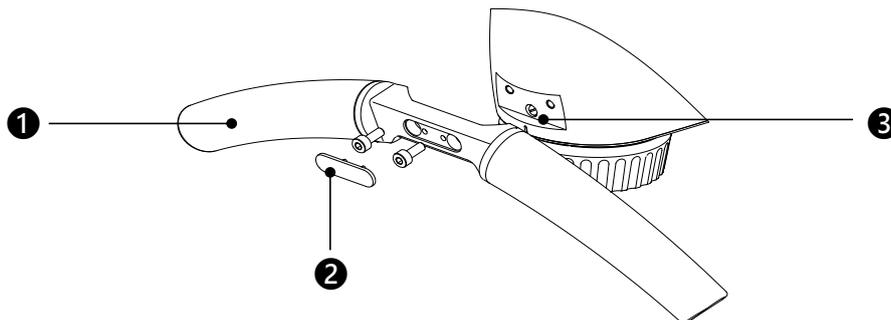
- ▶ Install the cross arm ① to the pole ②

Note: In order to install it in place, completely loosen the locking knob ③ before inserting the cross arm into the pole.



### Installation of Handgrip assembly

- ▶ Mount the handgrip assembly **1** into the microscope mount **3** with two M4 screws.
- ▶ Finally, install the decorative panel **2** onto the handgrip assembly **1**.

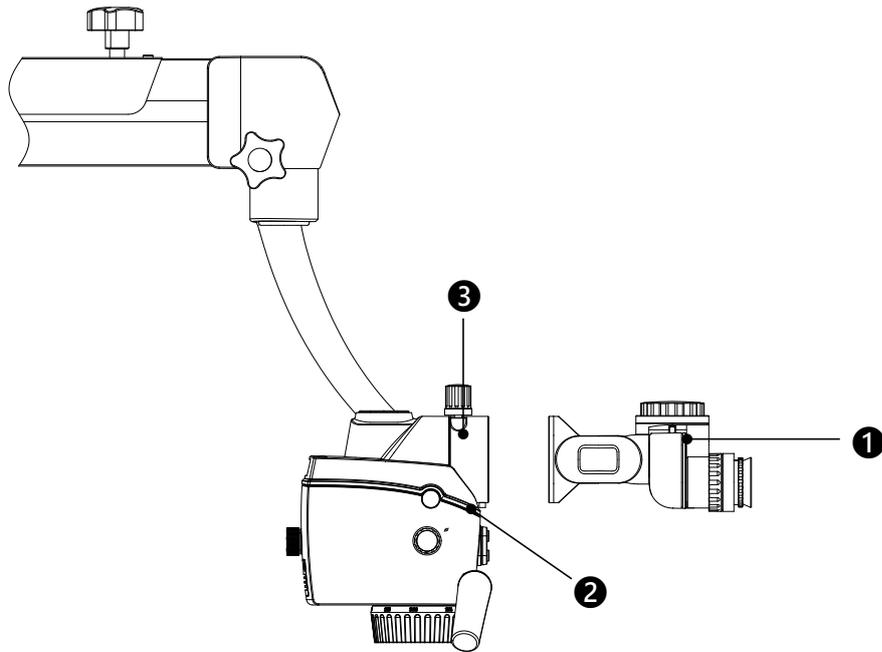


### Installation of Binocular Head Barrel

- ▶ Make sure that the locking screw **2** is completely loosened before installation;
- ▶ Align the binocular tube **1** at the positioning pin, and install it in the bayonet of microscope body **3**;
- ▶ Finally, use a tool to tighten the locking screw **2**



Before loosening the grip, please make sure: (1)the binocular head barrel has been fully installed in place and has been completely clamped in the bayonet; (2) the locking screw has been tightened. Otherwise, the binocular head barrel will be at risk of falling.



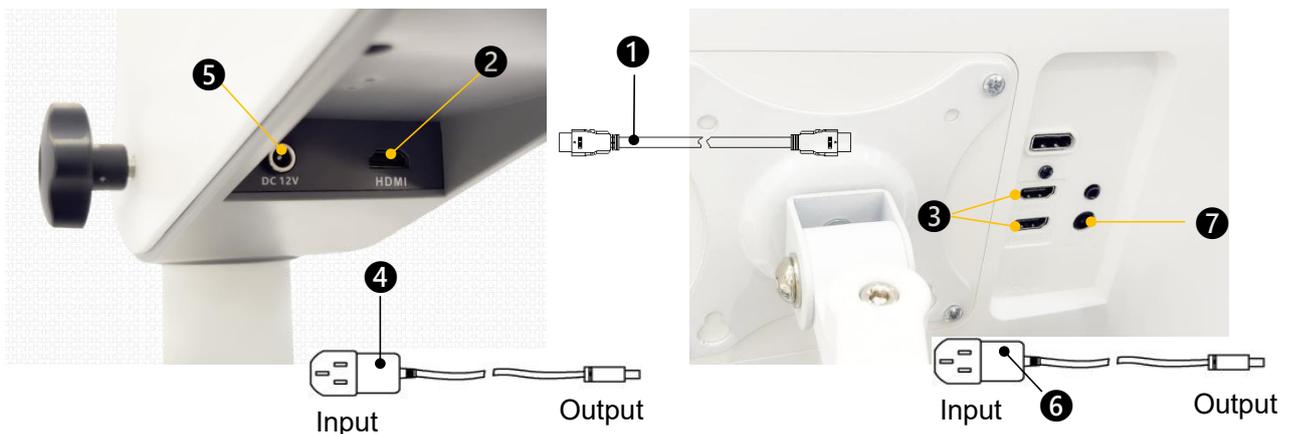
## Wiring

▶ Connect the randomly provided HDMI cable ① to the HDMI interface ② on the cross arm bracket, and connect the other side to one of the HDMI interface ③ on the monitor.

▶ Connect the output end of the supplied power adapter ④ to the DC connector ⑤ on the stand, and connect the output end of the supplied power adapter ⑥ to the DC connector ⑦ on the monitor, then connect the input end of the power adapter to the network power supply.



If the specification of power cord plug does not match the local socket standard, please contact your local dealer or store for replacement.



## Installation Confirmation

▶ Check whether the threaded connection of all assembled positions have been tightened, judge whether the whole machine has completed installation;

▶ Loosen all locking knobs, check if the rotation and movement of all joints of the whole machine are smooth, judge whether the mechanical function is normal;

▶ Check whether the locking knob of each joint is valid, judge whether the locking function is normal;

- ▶ Turn on the power switch, observe whether the indicator of the power switch turns on, whether the light is illuminated from the microscope body, judge whether the power is supplied;
- ▶ Turn the dimming knob to observe whether the lighting spot changes bright and dark, judge whether the dimming function is normal;
- ▶ After turning on the power switch, the built-in camera will start up synchronously. Observe whether the display has image output to determine whether the built-in camera is working properly.



When the suspension arm moves to the highest point, there is no illumination light; when the dimming knob is adjusted to the minimum, there is no illumination light;



The input channel of the HDMI video cable should be consistent with the display channel of the monitor, otherwise it will cause no image output from the monitor.

**If the above functions are normal, it can be confirmed that the product is well installed.**

## Installation of Supporting Components

### Installation of Straight Inclined Binocular and 45°Inclined Binocular

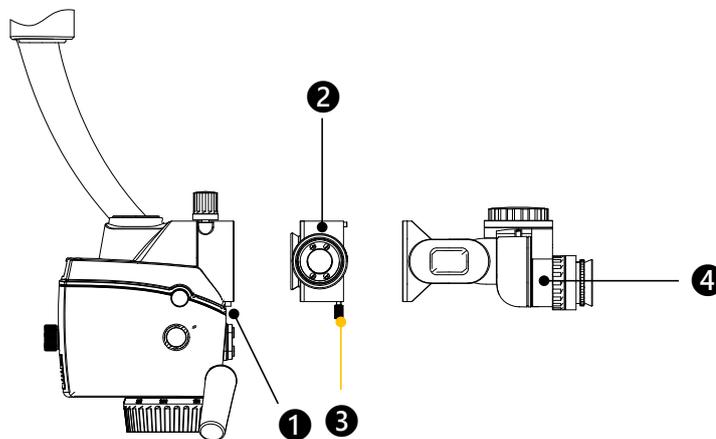
The installation method is the same as the Installation of Inclined Binocular, see Page 10.

### Installation of Beam Splitter

- ▶ Use an Allen wrench to loosen the locking screw ①, install the spectroscope ② into the bayonet of the microscope main mirror, and tighten the locking screw ①;
- ▶ Loosen the screw ③, install the binocular tube ④ into the bayonet of the spectroscope, and tighten the screw ③.



**Before you release the handle, please ensure that the beam splitter has been installed in place, fully inserted into the bayonet, and the screws have been tightened; The binocular tube has been installed in place and fully inserted into the bayonet. The screws have been tightened, otherwise there is a risk of falling.**

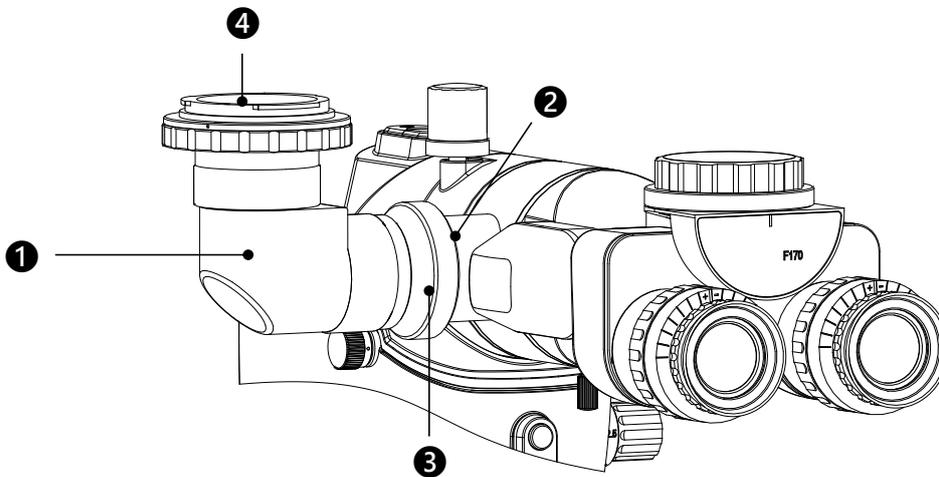


## Installation of Camera connector

- ▶ Install the beam splitter according to the installation method (see page 12);
- ▶ Install the camera connector ① onto the beam splitter interface ② and lock it with the locking ring ③;
- ▶ Install the camera into the camera connector ④ on the camera connector ①.



Before releasing the hand, please ensure that the beam splitter has been installed in place, completely inserted into the bayonet, and the screws have been tightened; The camera connector has been installed in place, and the locking ring has been tightened; The binocular tube has been installed in place and completely clamped into the bayonet, and the screws have been tightened, otherwise there is a risk of falling.



## Installation of other components



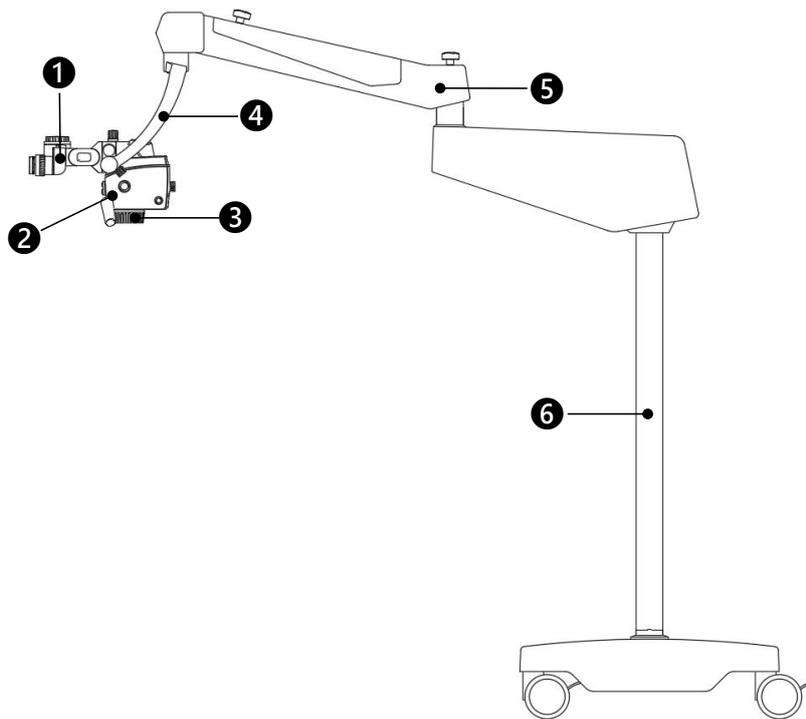
For installation methods of other supporting components, see the user manual provided with the component.

## Product Functions

### Product Components

#### Component Name

- |   |                                 |
|---|---------------------------------|
| ① | Inclined binocular and eyepiece |
| ② | Main body of microscope         |
| ③ | Objective lens                  |
| ④ | C-type hanging arm              |
| ⑤ | Cross arm bracket               |
| ⑥ | Mobile floor stand              |



### Inclined Binocular and Eyepiece

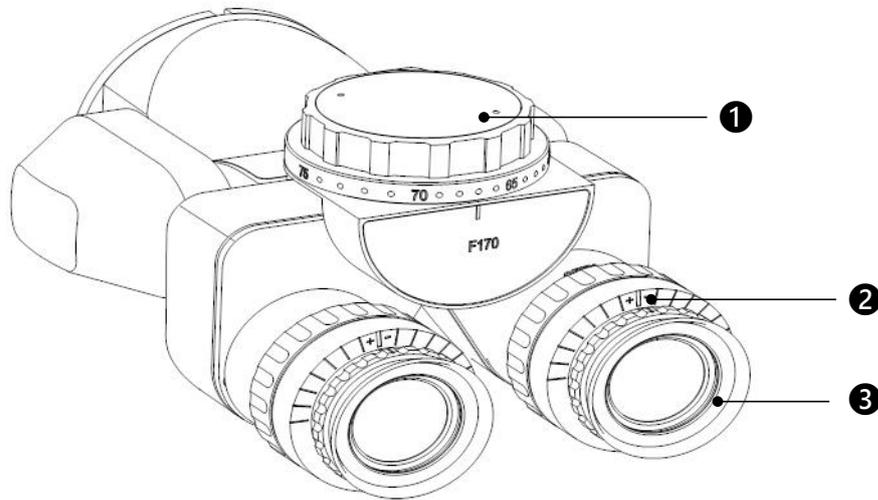
- ① Pupillary distance adjustment  
Rotate the binoculars with both hands; adjust the papillary to make two images through both of eyepieces into one. The number on the knob is the pupillary distance.
- ② Diopter adjustment  
The eyepieces provide diopter compensation at -7D and +7D. Setting the diopter adjustment at 0D if the operators wear glasses. Rotating the diopter adjustment to the best position till you see the most clear view if the operator doesn't wear glasses. In the positioning device, the built-in brake can keep the diopter adjustment still.

③

**Eyecup**

Adjust the eyecup to the right place till you can see the whole field of view.

- View with glasses: turn the eyecup inwards
- View without glasses: turn the eyecup outwards until you see the whole field of view

**Main Body Lens of Microscope**

①

**Optical Zoom Knob**

Used to manually adjust the optical magnification. The number on the knob is the magnification factor.

②

**Aperture Switch Knob**

Depth enhancement is achieved by switching the size of the aperture, where "●" indicates entering depth enhancement mode; "●" means to exit depth enhancement mode.

③

**Fora Module**

Used to control the main mirror of a microscope to swing left and right within a certain angle range.

④

**Damping Adjustment knob**

Used to adjust the damping force when the microscope main mirror swings left and right.

⑤

**Camera Buttons**

Press the  button to freeze the screen, and press again to exit the screen freeze;

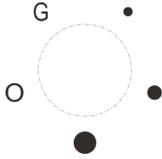
Press the  button to take pictures; Long press to enter recording mode, and long press again to exit recording mode.

⑥

**Dimming Knob**

Used to adjust the brightness of the illumination light.

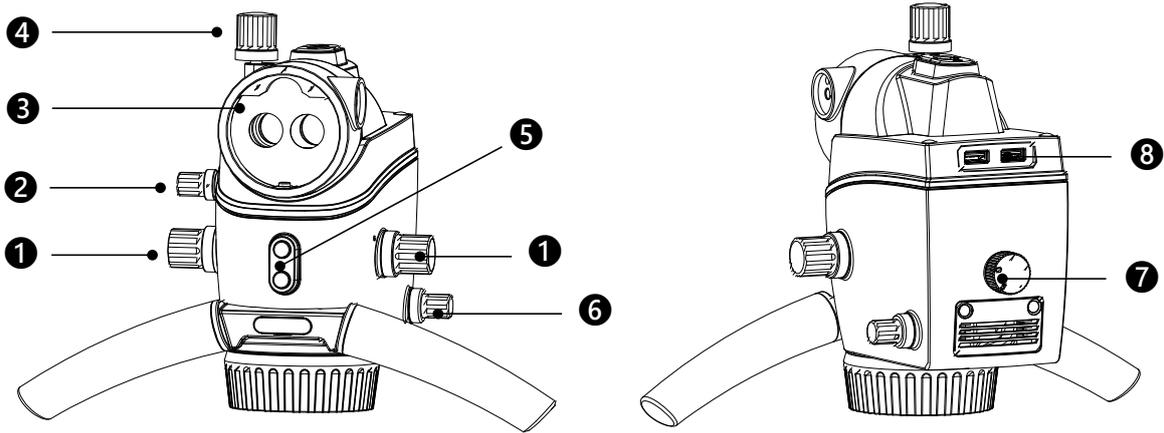
**7** Lighting Shift Knob



For switching different illumination, "●" means large spot without color filter, "●" means medium spot without color filter, "●" means small spot without color filter, "G" means green filter, "O" means orange filter.

**8** USB Interface

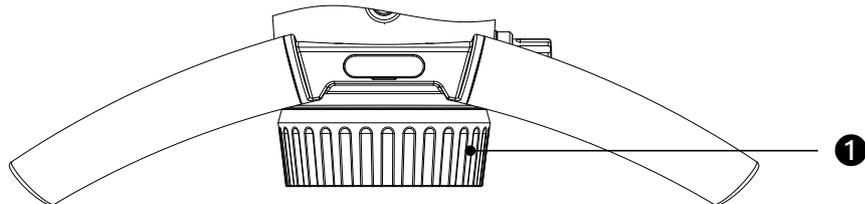
Used to connect wireless mouse and USB drive.



**Objective**

**1** Focusing Knob

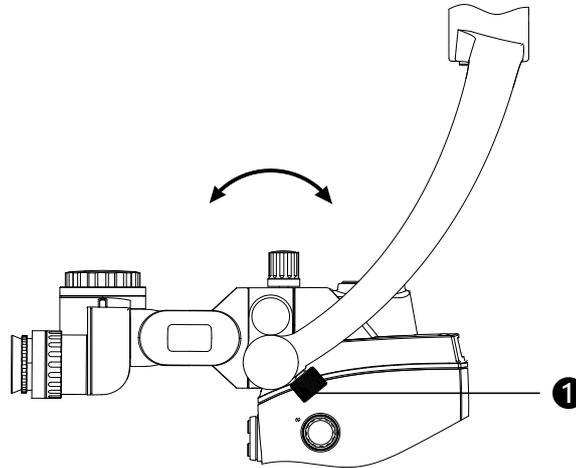
Used to adjust image clarity (focusing, working distance).



## C-type Hanging Arm

### ① Damping adjustment knob

Used to adjust the friction of the main mirror of the microscope during tilting (as shown by the arrow in the figure below).



## Floor Stand Mobile Support System

### ① C-type hanging arm rotating friction adjustment knob

Used to adjust the friction of the C-arm rotation.

### ② The friction adjusting knob for the up and down movement of the second horizontal arm

Friction force for up and down movement of the second horizontal arm

### ③ Balance adjustment knob

The knob used to adjust the spring force required for balance. After installing the surgical microscope with all accessories, use this screw to adjust the balance of the second arm. The adjustment mark is shown in the figure:



Note: To easily rotate the knob, adjust the balance with the second arm above the horizontal position.

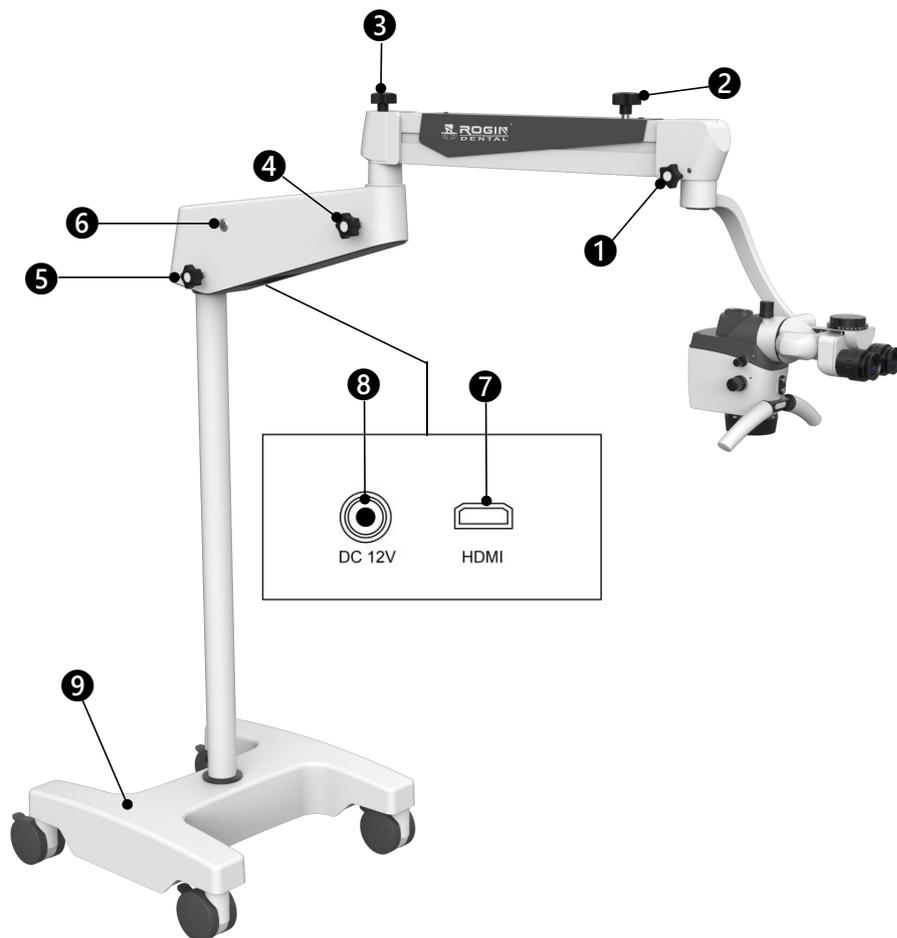
### ④ Balanced arm rotation friction adjusting knob

It is used for adjusting the rotation friction of the balanced arm.

### ⑤ Load-bearing arm rotation friction adjusting knob

It is used for adjusting the rotation friction of the load-bearing arm.

- 6** Power switch  
Used to turn on and off the power supply of the instrument. When turned on, the green indicator light on the power switch will light up.
- 7** HDMI video output interface  
For high-definition video output.
- 8** DC power interface  
For power supply of adapter, input voltage DC12V / 3A.



## Operation of the Microscope

### Check before Use

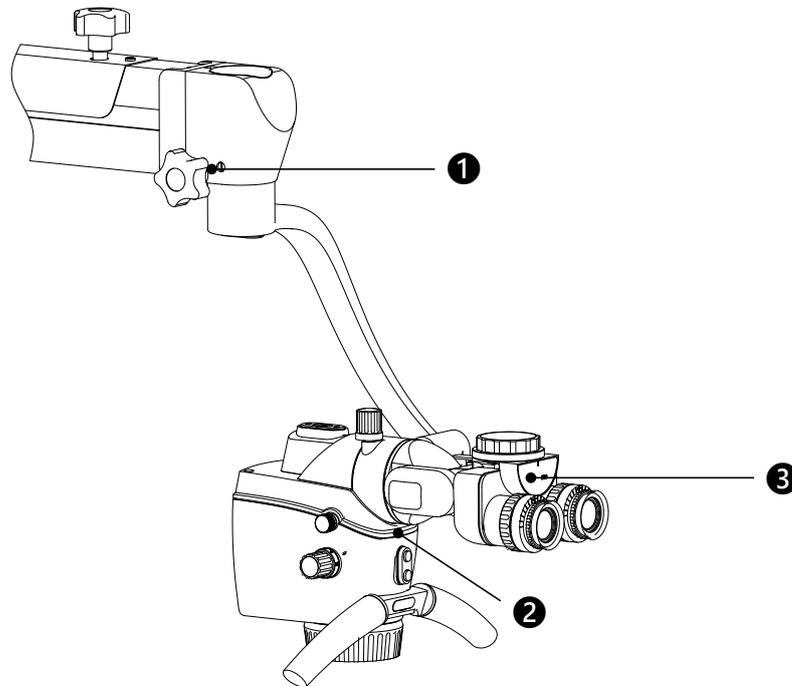


There must be no patient when checking the microscope!



To terminate the operation of the equipment, please turn off the power switch or disconnect from the network power supply!

- ✓ Check whether the safety screw **①** has been locked.
- ✓ Check whether the binocular tube has been installed in place and whether the screw **②** has been tightened.
- ✓ Check whether the handgrip assembly **③** is locked.



### Optical Adjustment

- ▶ Adjust the surgical microscope to the minimum magnification, move the surgical microscope to the chosen position till the object is observed clearly.
- ▶ Adjust the pupillary distance of the binocular barrel, and when the images of the two eyepieces merge into one, the correct position is reached.
- ▶ Adjust the surgical microscope to the maximum magnification and move the surgical microscope to the position that has clearest image.



Clearer image can be obtained by fine adjustment of the focus knob on the objective lens.

- ▶ Change the surgical microscope to the minimum magnification, and adjust the knob of

.....  
diopter on the eyepiece until the clearest image is observed.

- User with normal vision: adjust the diopter to 0;
  - User with abnormal vision and wearing glasses: adjust the diopter to 0;
  - User with abnormal vision and not wearing glasses: adjust the diopter till gaining clearest image.
- .....

**▶** Finish optical adjustment.

---

## Built-in Camera

### Scope of Application



The built-in camera device/system is only suitable for non-medical purposes such as doctor-patient communication, teaching interaction, and case recording.

### System startup

Confirm before starting:

- ✓ The line cable has been connected.
- ✓ The HD video cable has been connected.

Turn on the power switch on the base:

- The camera starts and waits for about 20 seconds to enter the main interface, and the waiting process is a full black screen state.

### System Interface Area Introduction



- Video Function Area : Pause, Snap, Record, Naming Setting, AE, AWB, Browse, Effects, Cross Line, System Settings, USB Storage.

### Operation Instructions on Video Function Area

#### Video Preview Switch



- ▶ Click the “Pause” Preview icon.

- The camera will enter into freezing state, it also will be shown that the pause preview icon  located in the upper right corner in the display, and video preview area will keep displaying the last image.



- ▶ Click the “Play” Preview icon, the camera returns to the video preview state.



## Snap Image



✓ Under Video Mode

▶ Click the “Snap” Image icon.

- Photograph icon  is shown on the upper right corner located in the display during the process of photographing.
- One jpg image will be saved in the inserted external storage device, the saving position is the img folder in the root directory.



The default image naming format is automatic naming, to transfer into independent naming, click the “Manu Name” in “System Setting”. Please refer to page 23.



If the U disk is not connected, the photo cannot be taken.

## Video Recording



✓ Under Video Mode

▶ Click the “Record” icon.

- During video recording process, Video icon  is shown on the upper right corner located in the display during video recording, the left upper corner of LCD displays the video recording format, video recording time and red flashing round icon as show in left.
- To save the video with mp4 format in the video folder of the root directory in the designated storage device.
- Click the “Pause” (Stop Video Recording ) icon   
- To finish recording video.



The naming rule for video recording file is the same as that of image.



When the remaining storage capacity is less than 5%, clicking on the video will prompt “No enough space left” and don’t perform the video recording. If the video process recognizes that the storage capacity less than 5%, the ongoing video will automatically stop.

## Naming settings



- ✓ Under Video Mode
- ▶ Click the “Naming settings” icon.
  - The naming setting interface pops up, shown in below:



- Auto Name / Manu Name
 

Auto Name / Manu Name are the modes of naming the image and video when taking image and recording video. When it is set as “Automatic”, the file when taking image / recording video will be named according to the set prefix + photo/video time in the storage, when it is set as “Manual”, the screen will display the window of naming the image/video when taking image/recording video, and then input the name of the image / video.

## Automatic Exposure



- ✓ Under Video Mode
- ▶ Click the “AE” icon.
  - The camera enters into the automatic exposure state, Automatic exposure icon  is shown on the upper right corner located in the display, under this state, the camera will automatically adjust the exposure value of the current image according to the environment, and ensure it meets the set brightness value.
- ▶ Click it again to exit the automatic exposure state.

## White Balance

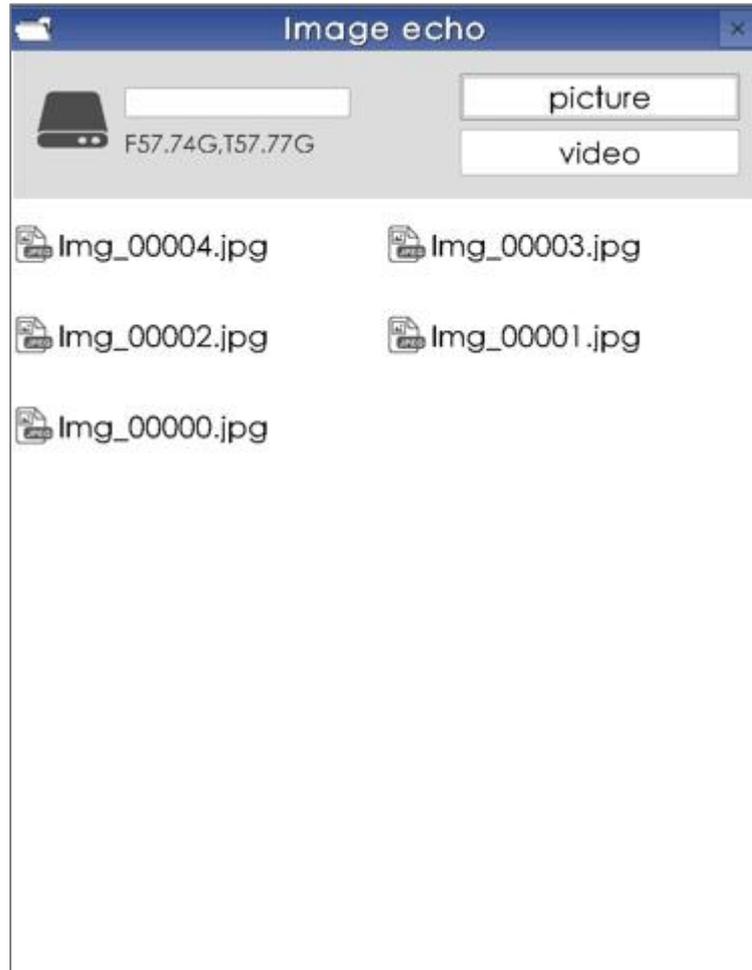


- ✓ Under Video Mode
- ▶ Click the “AWB” icon
  - The video enters into the automatic white balance state, White balance icon  is shown on the upper right corner located in the display, and then stops white balance after reaching the suitable value and automatically exit white balance state.

## Image Echo



- ✓ Under Video Mode
- ▶ Click the “Browse” icon.
  - Will go directly to the picture and video browsing interface, shown in below:

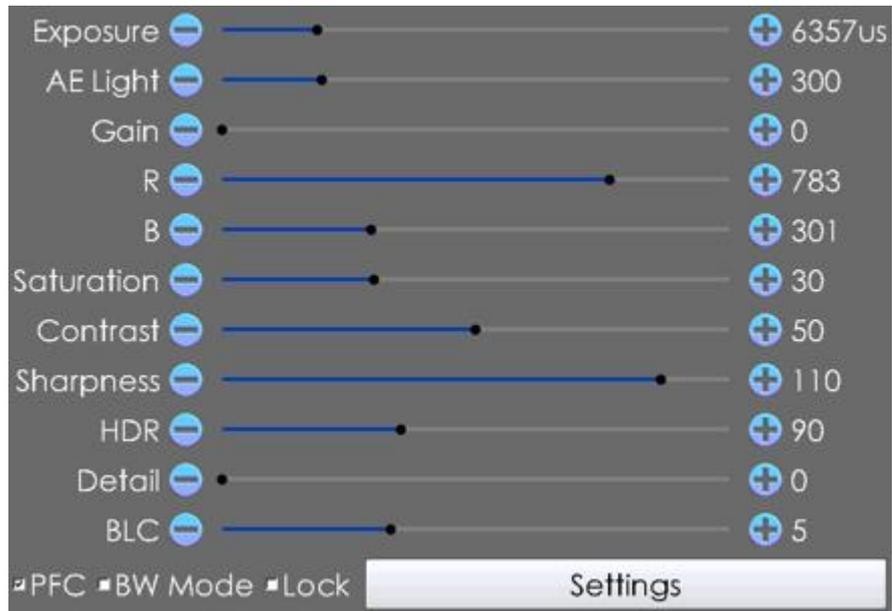


- ▶ Switch between image and video browsing interface by clicking the “picture” or “video” button.
  - Double click the left button of mouse any one image thumbnail.
  - To display the image in full screen.
  - Double click the left button of mouse any video file.
  - To open the video in full screen, click the Play button to play the video, click it again to pause the video, click the replay button to replay the video.

## Image Effects



- ✓ Under Video Mode
- ▶ Click the “Effects” icon.
  - Display the Image Effects Setting Interface, shown in below:



### Exposure Value

Exposure value affects the exposure level of current image, this adjustment is available when video is on.



When automatic exposure is enabled, the exposure value can't be adjusted, the default is automatic exposure enabled.

### Best Brightness (AE Light)

Best brightness affects the real-time exposure effect, this adjustment is available when video is on.

### Gain

This gain is overall gain, increase the gain to greatly improve the brightness of the image, but it also increase the noise points of the video image, this adjustment is available when video is on.

### Red Gain (R)

The increase or decrease of this parameter will affect the red color in the current image, this adjustment is available when video is on



After white balance, red plus will be automatically set by white balance.

### Blue Gain (B)

The increase or decrease of this parameter will affect the blue color in the current image, this adjustment is available when video is on.



After white balance, blue plus will be automatically set by white balance.

### Saturation

Saturation refers to the color chroma of the image, when the saturation of the whole image is dropped to 0, the image will change into gray, increase the saturation, it will increase the color purity of the image. This adjustment is available when video is on.

### **Contrast**

Contrast refers to the differences between different colors. The higher the contrast is, the higher the differences between colors, this adjustment is available when video is on.

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### **Sharpness**

Sharpness refers to the resolution of the details and boundary of the image, this adjustment is available when video is on.

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### **HDR**

HDR refers to high dynamic range imaging, speaking simply, it means to make clear details of high luster or shadow in your image, and ensure that the effect of the image is nearly the same as the effect when observing with eyes, this adjustment is available when video is on.

---

### **Detail**

Enhance the details of the image, this adjustment works when the video is turned on.

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### **BLC**

Backlight compensation, also known as backlight compensation, is used to suppress overexposure in the presence of reflective objects.

---

### **PFC**

Defringing refers to removing purple streaks that may appear on the color dividing line, while also suppressing purple and reducing the saturation of purple.

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### **BW Mode**

When checked, the live image will become black and white; If left unchecked, the live image is a color image.

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### **Lock**

When checked, enter the password to lock the parameter settings. (the default password is blank), you can change the password yourself.

---

### **Settings**

- The image effect parameters set by the current user can be saved to meet the usage habits of different users.
  - Adjust the parameters of the image effect according to the user's requirements.
  - Click Parameter Settings, click New in the parameter template, then enter the name of parameter Settings, and click Save, the current parameter Settings will be saved.
  - Next time you need to call up the parameter Settings you saved before, select the parameter name you set, and click load.
-

## Crosshairs



✓ Under Video Mode

▶ Click the “Crosshairs” icon.

- Display the crosshairs menu, shown in below:



- “1”, “2”, “3” and “4” mean the first, second, third and fourth group of crosshairs respectively.
- Click the button  to adjust the reticle center.
-  Means crosshairs is under display state.
-  Means crosshairs is under hidden state.
- Click  to adjust the crosshairs color.
- Click the “+” and “-” at the right side of the crosshairs parameter to adjust the position.



When crosshairs is under hidden state, the adjustment function is unavailable.

## System Setting



✓ Under Video Mode

▶ Click the “Setting” icon.

- Display the crosshairs menu, shown in below:



### Flip horizontally

Turn the current image left and right at the horizontal direction.

### Flip vertically

Turn the current image top and down at the vertical direction.

### Show LOGO/Hide LOGO

- Show LOGO: LOGO icon is displayed in the upper right corner of the screen. LOGO does not appear in the photos and videos.
- Hide LOGO: LOGO icon is not displayed in the upper right corner of the screen.
- Default Setting: Show LOGO.

### Language

- There are 11 languages available:  
Chinese, English, German, French, Spanish, Italian, Portuguese, Swedish, Japanese, Russian, Polish.



Language selection takes effect immediately.

### Save Element/Do not Element

Select Save Element to save the current image as a new picture with survey element information; Select Do not save elements to save the measurement element information to the picture, only the picture.



Measurement element information is saved to the image only after it is added.

### System Update

- ▶ Copy the update package with the postfix of “.tar.gz” to the root directory of U disk (FAT32/NTFS);
- ▶ Insert the U disk in the USB interface of the camera;
- ▶ Click the “Update” to display the update schedule bar , after

updating, the camera will automatically reboot, after rebooting, check the Version Information to browse the version after updating.



After the update, you can check the software version number in the version information to confirm whether the update was successful.



If the camera is not connected with external storage, or external storage doesn't have the update package, update failure will pop up after clicking the "Update", shown in below:



### Restore Default



Clicking the "Restore Default"

- All values in "Image Effect" and "Crosshairs" will be recovered to the default state.
- The "Language" are not affected by Restore Default.

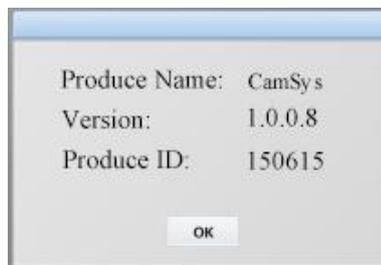


If the image effect is adjusted improperly which causes distorted image display, please use the "Restore Default" function to recover to default settings, then perform white balance once to recover the image display to normal state.

### Version Information



Click the "Version" button to pop up Version Information window as below:



- Display the "Product Name", "Software Version" and "Hardware Version" of the camera. The above mentioned information will change as system update.

### USB Storage



-  Without memorizer.
-  With memorizer.



Only when there's memorizer, the camera can take photograph, record video and operate other functions.



When storage capacity less than 20% , the bottom left corner of the camera interface will prompt “ Capacity is less than 20%”.



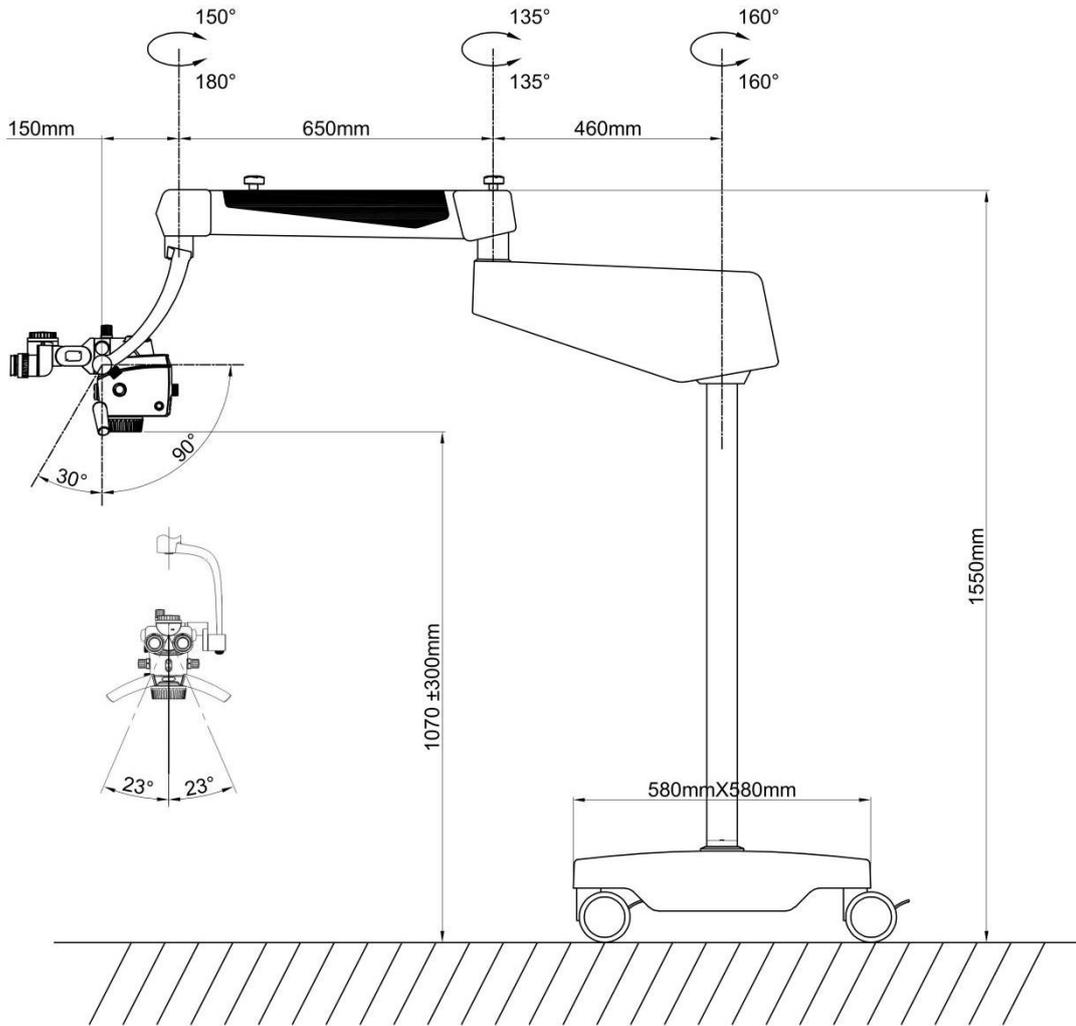
When the remaining storage space is less than 5%, clicking on the video will prompt “No enough space left” and don't perform the video recording. If the video process recognizes that the storage space less than 5%, the ongoing video will automatically stop.

---

## Performance Parameters

### Basic Dimension

The basic dimensions of the whole machine and the motion range of the joint are shown in the following figure.



### Microscope Parameters

<b>Zoom system</b>	Manual five-range zooming : 0.4X/0.6X/1X/1.6X/2.5X
<b>Large objective lens</b>	Standard configuration: F198~455 large objective lens
<b>Binocular barrel</b>	180° variable angle binocular barrel, f=170mm, Rang of Pupillary distance:: 50mm~75mm
<b>Eyepiece</b>	12.5X/Φ18mm, diopter adjustment range: ±7D
<b>Fora</b>	Standard configuration, ±23°

<b>Depth of field enhancement mode</b>	Primary mirror integrated depth-of-field enhancement mode
<b>Object surface illumination (lx)</b>	With 198-455 variable objective lens (working distance 200mm) : maximum illumination $\geq$ 80000 Lux
<b>Light source</b>	Color temperature 5500K, color rendering index $\geq$ 85%
<b>Illumination shift</b>	Orange filter, green filter, large spot without filter, medium spot without filter, small spot without filter

## Optical Parameters

The optical magnification corresponding to different working distances is shown in Table 1.

Table 1 Optical magnification

Variable objective lens	W.D.=198~455					
	W.D.=198mm (f' =279mm)		W.D.=300mm (f' =373.6mm)		W.D.=455mm (f' =513mm)	
Variable magnification on shift	Total magnification rate	Diameter of the view(mm)	Total magnification rate	Diameter of the view(mm)	Total magnification rate	Diameter of the view(mm)
<b>0.4</b>	3.0x	71.8	2.3x	96.1	1.7x	132.0
<b>0.6</b>	4.6x	47.9	3.4x	64.1	2.5x	88.0
<b>1</b>	7.6x	28.7	5.7x	38.5	4.1x	52.8
<b>1.6</b>	12.2x	18.0	9.1x	24.0	6.6x	33.0
<b>2.5</b>	19.0x	11.5	14.2x	15.4	10.4x	21.1

## Built-in Camera

<b>Photosensitive chip</b>	SONY high sensitivity and low noise CMOS
<b>Output interface</b>	HDMI 1.4, 1 pcs, output image to display device USB2.0, 2 pcs, only for connecting USB stick and mouse
<b>Resolution</b>	4K (3840×2160) 30FPS (16:9)
<b>Storage</b>	External USB flash drive is required (supports FAT32, exFAT, NTFS format) Photo: JPG format; Video: MP4 format
<b>Camera optical splitter ratio</b>	2:8
<b>Video setting</b>	1080P 25FPS
<b>Picture size</b>	8M(3840×2160)

<b>Basic functions</b>	Freezing, Snap Image, Video Recording, Automatic Exposure, White Balance , Image Echo, Crosshairs
<b>Image effect</b>	Exposure Value, Best Brightness, Gain, Red Gain, Blue Gain, Saturation, Contrast, Sharpness, HDR, Detail, BLC, PFC, BW Mode, Lock, Setting
<b>System setting</b>	Horizontal flip, vertical flip, show LOGO/hide LOGO, language, save elements, system update, factory reset, version information

## Electrical Parameters

<b>Rated voltage</b>	DC12V/3A (Adapter:Input:AC100-240V 50/60Hz, output:DC12V 3A)
<b>Input power</b>	Max. 45VA
<b>Electrical safety standard</b>	IEC60601-1:2005 + A1: 2012 IEC60601-1-2:2014
<b>Lighting system</b>	LED bulb, life time is over 50,000 hours
<b>Noise</b>	≤65dB
<b>Running mode</b>	Continuous running

## Electromagnetic Compatibility



Without approval from Shenzhen Rogin Medical Co., Ltd., it may result in the electromagnetic compatibility of the device or other equipment if it is not authorized to change or refit the device.



The design and test of RM-2000PLUS surgical microscope comply with relevant operating instructions on electromagnetic compatibility.



The equipment or system shall not be adjacent to or stacked together with other equipment. If it is required, observe and verify whether it can operate correctly in such a configuration.

### Requirements on Wire Installation

	Name of Wire	Type	Length (m)
1	The adapter power cord	Non-shielded parallel wire	3
2	HDMI	Shielding wire	3

### Key Components for Electromagnetic Compatibility

The electromagnetic compatibility key components of the product include the power adapter and dimming circuit board, It will cause significant decreasingly in electromagnetic compatibility transmission and immunity performance to use or replace with the accessories with non-matched design.



Do not replace the components without authorization.

### Guidance and Manufacturers Declaration—electromagnetic Emission



The RM-2000PLUS surgical microscope is intended for use in the electromagnetic environment specified below. The customer or the user of the RM-2000PLUS surgical microscope should assure that it is used in such an environment.

Emissions test	Compliance	Electromagnetic Environment - Guidance
RF emissions CISPR11	Group 1	RM-2000PLUS surgical microscope uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR11	Class A	RM-2000PLUS surgical microscope is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations /flicker emissions IEC 61000-3-3	Complies	

## Guidance and Manufacturer's Declaration – electromagnetic Immunity– for all Equipment and Systems



The RM-2000PLUS surgical microscope is intended for use in the electromagnetic environment specified below. The customer or the user of the RM-2000PLUS surgical microscope should assure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic Environment - Guidance
Electrostatic discharge (ESD) IEC 61000-4-2	± 8 kV contact  ± 15 kV air	± 8 kV contact  ± 15 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30 %.
Electrostatic transient / burst IEC 61000-4-4	± 2 kV for power supply lines	± 2 kV for power supply lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	± 1 kV differential mode	± 1 kV differential mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5 % $U_T$ ; for 0.5 cycle,(On $U_T$ , > 95% of the drop) 40 % $U_T$ ; for 0.5 cycles, (On $U_T$ , 60% of the drop) 70 % $U_T$ ; for 0.5 cycles, (On $U_T$ , 30% of the drop) <5 % $U_T$ ; for 0.5s,(On $U_T$ , > 95% of the drop)	<5 % $U_T$ ; for 0.5 cycle,(On $U_T$ , > 95% of the drop) 40 % $U_T$ ; for 0.5 cycles, (On $U_T$ , 60% of the drop) 70 % $U_T$ ; for 0.5 cycles, (On $U_T$ , 30% of the drop) <5 % $U_T$ ; for 0.5s,(On $U_T$ , > 95% of the drop)	Mains power quality should be that of a typical commercial or hospital environment. If the user of the RM-2000PLUS surgical microscope requires continued operation during power mains interruptions, it is recommended that the RM-2000PLUS surgical microscope be powered from an uninterruptible power supply or a battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

$U_T$  is the a. c. mains voltage prior to application of the test level

## Guidance and Statement from Manufacturer - Electromagnetic Immunity- for Equipment and System that are not Life-supporting



The RM-2000PLUS surgical microscope is intended for use in the electromagnetic environment specified below. The customer or the user of the RM-2000PLUS surgical microscope should assure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic Environment - Guidance
Conducted RF IEC 61000-4-6	3Vrms 150kHz~ 80MHz	3Vrms	<p>Portable and mobile RF communications equipment should be used no closer to any part of the RM-2000PLUS surgical microscope, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.</p> <p>Recommended separation distance</p> $d = \left[ \frac{3.5}{V_1} \right] \sqrt{p}$ $d = \left[ \frac{3.5}{E_1} \right] \sqrt{p} \text{ 80MHz} \sim \text{800MHz}$ $d = \left[ \frac{7}{E_1} \right] \sqrt{p} \text{ 800MHz} \sim \text{2.5GHz}$
Radiated RF IEC 61000-4-3	3V/m 80MHz~ 2.5GHz	3V/m	<p>where <math>p</math> is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and <math>d</math> is the recommended separation distance in metres (m).</p> <p>Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey <sup>a</sup> should be less than the compliance level in each frequency range <sup>b</sup>.</p> <p>Interference may occur in the vicinity of equipment marked with the following symbol:</p> 



- At 80 MHz and 800 MHz, the higher frequency range applies.
  - These guidelines may not apply in all situations. Electromagnetic is affected by absorption and reflection from structures, objects and people.
- a. Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the RM-2000PLUS is used exceeds the applicable RF compliance level above, the RM-2000PLUS should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the RM-2000PLUS.
- b. Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3V/m.

## Recommended Separation Distances between Portable and Mobile RF Communications Equipment and the RM-2000PLUS



The RM-2000PLUS surgical microscope is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the RM-2000PLUS surgical microscope can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the RM-2000PLUS surgical microscope as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output of transmitter (W)	Separation distance according to frequency of transmitter		
	150kHz ~ 80MHz $d = \left[ \frac{3.5}{V1} \right] \sqrt{P}$	80MHz ~ 800MHz $d = \left[ \frac{3.5}{E1} \right] \sqrt{P}$	800MHz ~ 2.5GHz $d = \left[ \frac{7}{E1} \right] \sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23



For transmitters rated at a maximum output power not listed above the recommended separation distance  $d$  in metres (m) can be estimated using the equation applicable to the frequency of the transmitter, where  $P$  is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

- At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.
- These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

RM-2000PLUS surgical microscope has been tested in accordance with IEC 60601-1-2:2014, which cannot be guaranteed against electromagnetic interference in any way, and should avoided to be in a high electromagnetic environment.

## Cleaning and Maintenance of the Instrument



If possible, the equipment and accessories shall be cleaned immediately after use. Contaminants cannot be dried on the object as this will make it more difficult to clean and disinfect.

### Preventive Maintenance and Inspection

Operator of preventive inspection, maintenance and calibration: User

Maintenance cycle: 3 months.

Parts for preventive inspection and maintenance: eyepiece and Objective

### Clean the Optical Surface



The optical component has a multi-layer laminating (e.g., eyepiece, objective) to ensure optimum image quality, the contaminants attached to the surface of the optical component will reduce the image quality. The internal optical equipment shall be protected from dust, the equipment shall not be stored without objective lens, binocular and eyepiece. After use, cover the dust cover on the surface of the system to avoid dust on the equipment. When the optical components and accessories are not in use, they are always kept in the dust-free box.



Do not use any chemical cleaning agent, corrosive solvent or detergent with scratching effect, which will damage the surface of the optical device.

▶ The stain (blood stains, etc.) on the surface of the optical part shall be removed with distilled water having added an appropriate amount of washing liquid. The surface can only be wiped with humid cloth, and the surface of the component must not be scrubbed with wet cloth;

▶ After removing the stains from surface, use a clean cloth to dip 75% medical alcohol for further cleaning.

### Clean the Mechanical Surface

All mechanical surfaces of the instrument can be cleaned by wiping with humid cloth. Do not use any irritative or corrosive cleaning agent. The residual dirt shall be wiped off with the mixture of 50% of normal alcohol and 50% of distilled water and a small amount of household tableware cleaning liquid.



**Disconnect the power supply when wiping the instrument.**

### Disinfection of disinfection cover



Due to the large size of the instrument and its precise optical system, it is difficult to disinfect the entire machine. Therefore, only the disinfection cover covering the operating system, such

as the knob and splash guard, needs to be cleaned; After disinfection, the disinfection cover of this instrument will not produce any defects that affect its use.

All disinfection covers of the instrument are disinfected using the method of lower exhaust pressure steam sterilization. The disinfection parameters are temperature 130 °C, pressure 102.9kpa, and time 20 minutes.

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## Disposal of Waste



The wastes generated during use include the sight glass wiping paper or absorbent cotton. Please don't throw it at will. If there is special garbage disposal facility near you, use it as much as possible.

The scrapped instruments shall be handled according to the provisions of local environmental protection laws for avoiding polluting the environment.

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## Maintenance Related Information



If necessary, the manufacturer may provide circuit diagrams, component lists, annotations, calibration details, or other information that can assist maintenance personnel in repairing surgical microscope components that can be repaired by the manufacturer's designated maintenance personnel.

### Troubleshooting

Faults	Possible Reasons	Solutions	Refer to
Lighting failure	Power cable is not connected	Connect the power wire	
	Power switch is not turned on	Turn on the power switch	See page 18
	Multi-function knob is adjusted to the minimum position	Adjust the multi-function knob	See page 16
	Instrument electrical failure	Contact the local dealer or after-sales service agent	
	LED bulb failure	Contact the local dealer or after-sales service agent	
Illumination fails intermittently during use	The cooling window and the air inlet are covered or blocked by external object	Remove the foreign object and clean the cooling window	
	Failure of cooling fan	Contact the local dealer or after-sales service agent	
	Instrument electrical failure	Contact the local dealer or after-sales service agent	
Camera failure	Instrument electrical failure	Contact the local dealer or after-sales service agent	
The instrument cannot stop at any time when it moves up and down	Balanced arm is not adjusted to balance after adding or decreasing accessories of the microscope	Balance the balanced arm	See page 17
	Spring failure	Contact the local dealer or after-sales service agent	
The instrument is running stiffly	The friction adjustment knob is adjusted too tight.	Loosen the friction adjusting knob, and moderately adjust the friction.	See page 17
Optical magnification switching failure	Mechanical failure of the instrument	Contact the local dealer or after-sales service agent	
Without image	The input channel of the video cable is	Change the video line input	

output	not consistent with the display channel of the monitor.	channel or the display channel of the display.	
	The video cable is not connected properly	Reconnect the video cable	
	There is a problem with the video cable	Replace the video cable	
	Built-in camera failure	Contact the local dealer or after-sales service unit	
Color distortion	The color is adjusted improperly	Factory Reset, white balance again	See page 29/23
	White balance is not operated correctly	White balance again	See page 23
	Video wire has quality problem	Please use the original video cable	
Camera crashes	System crash	Restart or update the system	
The picture taken is not clear	The objective lens of microscope has stains	Clean the objective lens of microscope	
	Not in focus	Re-focus the optical system	See page 15/16
	The microscope vibrates when taking pictures	Try to keep the microscope stationary or use the mouse / foot switch to take pictures when taking pictures	

## After-sale Service

Any unauthorized maintenance or repair of the instrument can no longer be guaranteed. The duration and scope of the warranty are detailed in the **ROGIN Operating Microscope Warranty Clause**. In order to safely transport the instrument back to ROGIN company during repairing, please keep the original packing box and packing material of the instrument.

## For More Information

Phone: +86-755-2675 8572

Email: [admin@rogindental.com](mailto:admin@rogindental.com)

Web: <https://www.rogindental.com>

The information needed to identify the device and its manufacturer is available and kept up to the newest IFU on the above website.