ESC®
MEDICAMS

Surgical Microscope Camera
SRG-HD-2385X

Instruction Manual

WARNINGS

To avoid potential serious injury to the user and the patient and/or damage to this device, please note the following warnings:

1. Read this operating manual thoroughly, especially the warnings, and be familiar with its contents before connecting and using this equipment.

2. Be a qualified physician, having complete knowledge of the use of this equipment.

3. Test this equipment prior to a surgical procedure. This unit was fully tested at the factory before shipment. Never use this equipment in the presence of flammable or explosive gases.

4. Avoid dissembling any part of the camera head, as doing so may break the seals, causing leakage and/or electric shock.

5. Attempt no internal repairs or adjustments not specifically detailed in this operating manual.

6. Pay close attention to the care and cleaning instructions in this manual. Any deviation may cause damage.

7. Before each use, check the outer surface of the eyepiece.

Precautions for Use

Safety precautions for using this unit

- Viewing images may result in eye strain, fatigue, nausea, or other symptoms of discomfort. It is best to take frequent breaks when viewing content. Because the length and frequency of breaks will differ from person to person, be sure to trust your instincts when deciding to take breaks from viewing. When feelings of discomfort occur, stop viewing the images until the symptoms subside, and consult with a specialist physician if necessary.
- Avoid using this unit while walking or exercising, or in areas that shake violently, as doing so can increase the chances of feelings of discomfort.
- When connecting the unit to medical equipment, refer to "Precautions when connecting this unit to medical equipment".

Use with electrosurgical knives and similar devices

If this unit is used together with an electrosurgical knife, etc., the picture may be disturbed, warped or otherwise abnormal as a result of strong radio waves or voltages from the device. This is not a malfunction.

When you use this unit simultaneously with a device from which strong radio waves or voltages are emitted, confirm the effect of this before using such devices, and install this unit in a way that minimizes the effect of radio wave interference.

Usage and storage locations

Store the unit in a level, well-ventilated place. Avoid using or storing the unit in the following places.
- Extremely cold or hot locations (Operating temperatures: 0 °C to 40 °C (32 °F to 104 °F))
- Locations in direct sunlight for long periods, or close to heating appliances (The inside of a vehicle can reach up to 50 °C (122 °F) in the summer when the windows are closed.)
- Humid or dusty places
- Locations where the unit may be exposed to rain
- Locations subject to strong vibrations
- Locations close to strong magnetic fields
- Near TVs that emit strong electromagnetic waves, or near locations where radio waves are emitted
- Locations with a strong risk of fire or explosion

Precautions when connecting this unit to medical equipment

- Before using this unit for medical purposes, be sure to confirm that use of this unit will not cause symptoms that may interfere with medical practice, such as eye strain, fatigue, and nausea, etc.
- Refrain from using this unit if symptoms occur that interfere with medical practice, or if such symptoms are likely to occur.

Phenomena specific to the CMOS image sensor

The following phenomena are specific to the CMOS image sensor, and their presence on the shooting screen do not indicate malfunctions.

White spots

The CMOS image sensor is fabricated using extremely high-precision technology, however, in very rare cases, outside influence, such as cosmic rays, may cause minute white spots to appear on the screen. This not a malfunction, but is related to the principle of the imaging element.

White spots may also be visible in the following situations.
- When the unit is used in locations subject to high temperatures
- When the gain is raised

Aliasing

When shooting fine patterns or lines, a jagged or flickering effect may occur.

Flicker

When shooting under discharge tube lighting, such as fluorescent lamps, sodium lamps, or mercury vapor lamps, the screen may flicker, change color, or horizontal stripes may appear to roll across the screen.

Focal plane

Due to characteristics of how the CMOS image sensor reads image signals, subjects that quickly move across the screen may appear slightly distorted.
Additionally, light from a flash or quickly flashing light sources may cause the brightness to change at the top and bottom of the screen.

Precautions concerning heat generation by the unit

Be careful during operation of the unit, as the metal surfaces of the unit may become hot. Generation of heat during operation of the unit is not a malfunction.

Precautions concerning laser beams

Laser beams may damage the CMOS image sensor. When shooting scenes that include laser beams, be careful not to allow laser beams to hit the surface of the CMOS image sensor (do not let laser beams enter the lens).

Do not subject the unit to strong impacts

Dropping the camera head or exposing it to excessive shocks may damage it.

Do not block the camera vents

To prevent the interior of the unit from overheating, maintain a clearance of at least 10 cm (4 in.) around the unit.

Do not subject the unit to sudden changes in temperature

Sudden changes in temperature may affect the camera picture output.

Operation instruction

I. Use preparation:

1. rive lens cap and install lens;△notice: tear dustproof protective film on sensitization flat!!!

2. insert HDMI line and DC source, LED lamp lighted up at that moment, which indicates camera has started;

II. Language selection （as example of chinese）

1. press OK of telecontroller, open menu showed as following figure;

2. icon of language selection is in check state, press OK can change into English;

Language

III. Freeze and thaw

1. under status of menu opened, use telecontroller to freeze icon by left and right keys, press OK to determine the figure is starting to frozen;

Freeze

2. when image frozen, freeze icon twinkled, press OK and image can be thawed

IV. Take photos

1. under status of menu opened, use teleconntroller's left and right keys to choose taking icon, press OK to take photo; this performance is valid after inserting TF card, it will display "memory error" if hasn't insert TF card;

Snap

2. it points out memory error if TF card hasn't inserted in, press OK to turn back;

V. Record

1. under status of menu opened, use teleconntroller's left and right keys to choose taking icon, press OK to Record; this performance is valid after inserting TF card, it will display "memory error" if hasn't insert TF card;

Record

VI. One key exposure

1. under status of menu opened, use telecontroller's left and right keys to select one key exposure icon, press OK to execute one key exposure;

One Button Exposure

VII. One key white balance

1. under status of menu opened, use left and right keys of telecontroller to select one key white balance icon, press OK to execute one key while balance; tip: when execute one key white balance, please put a dense white paper under lens, which execute one key while balance accurately;

One Button WB

VIII. Black-white model

1. under status of menu opened, use left and right keys of telecontroller to select black-white icon, image will shift from colorful to black-white after pressing OK, and black-white will shift to colorful after re-pressing OK.

B/W

IX: horizontal acoustic image

1. under status of menu opened, use left and right keys of telecontroller to select horizontal acoustic image icon, press OK to execute horizontal image and re-press OK to recover image;

Mirror

X: flip vertical

1. under status of menu opened, use left and right keys of telecontroller to select flip vertical icon, press OK to execute flip vertical and re-press OK to recover image;

Flip

XI: digital zoom

1. under status of menu opened, use left and right keys of telecontroller to select digital zoom icon, press OK to execute digital zoom;

Zoom in

XII: digital narrow

1. under status of menu opened, use left and right keys of telecontroller to select digital narrow icon, press OK to execute digital narrow, this performance is valid only when digital is zoomed;

Zoom out

XIII: photo playback

1. under status of menu opened, use left and right keys of telecontroller to select photo playback icon, press OK and enter into playback page;

Browse

2. after entered into playback page, it can choose "last" or "next" through left and right key of telecontroller, press OK and view photos which reserved in TF card, choose withdraw and press OK , turn back to menu.

XIV: camera setting

1. under status of menu opened, use left and right keys of telecontroller to select camera setting icon, press OK and enter into camera setting page;

Camera Set

	WB Setting	...
	Exposure Set	...
	Saturation	2
	Sharpness	0
	Contrast	2
	Frequency	50Hz
	Display	16-9
	Reset	
	Save and Exit	

2. white balance setting

In camera's setting menu, use up and down keys of telecontroller to move to white balance setting, press OK and enter into white balance setting menu;

[A]	**Auto WB**	On
[hand]	**One Button WB**	...
[red]	Red	138
[green]	Green	64
[blue]	Blue	23
[reset]	**Reset**	
[save]	**Save and Exit**	

Using up and down keys of telecontoller to move to white baalnce selection, default and automatic white balance opened, it can use left and right of telecontroller to open or close automatic white balance according to practical demand, OK is automatic white balance opening, OFF is automatic white balance closing;

Using up and down keys of telecontroller to move to one key white balance, press OK to execute one key white balance. After one key white balance, automatic white balance closed; tip: when execute one key white balance, please put a dense white paper under lens, so that one key white balance can be accurate;

When automatic white balance closed, it can use up and down keys of telecontroller to move to red, green or blue, use left and right keys of telecontroller to decrease or increase corresponding value; when automatic white balance opened, value of red, green and blue cannot be adjusted;

Using up and down keys of telecontroller to reset, re-press OK can recover parameter of white balance to default value;

Using up and down keys of telecontroller to reserve and withdraw, re-press OK and reserve current setting and withdraw white balance setting menu;

3. exposure setting

In camera's setting menu, use up and down keys of telecontroller to move to exposure setting, press OK and enter into white balance setting menu;

[A]	**Auto Exposure**	On
[+/-]	**EV Compensation**	0EV
[hand]	**One Button Exp**	...
[reset]	**Reset**	
[save]	**Save and Exit**	

Using up and down keys of telecontroller to move to automatic exposure selection, default automatic exposure closed, it can use left and right keys of telecontroller to open or close automatic

exposure according to practical environment;

When automatic exposure opened, it can use up and down keys of telecontroller to move to exposure compensation, use left and right keys to adjust exposure EV value;

Using up and down keys of telecontroller to move to one key exposure, press OK to execute one key exposure. After pressing one key exposure, automatic exposure is closed;

Using up and down keys of telecontrller to reset, re-press OK will recover exposed parameter to default value;

Using up and down keys of telecontroller to move to reserve and withdraw, re-press OK to reserve current   setting and withdraw exposure setting menu;

4. saturation level adjustment

In camera's   setting menu, use up and down keys of telecontroller to move to saturation, use left and right keys of telecontroller to adjust saturation value;

5. acuity adjustment

In camera's setting menu, use up and down keys of telecontroller to move to acuity, use left and right of telecontroller   key to adjust acuity value;

6. contrast control

In camera's setting menu, use up and down keys of telecontroller to move to contrast ratio, use left and right keys of telecontroller to adjust contrast ratio;

7. light frequency adjustment

In camera's setting menu, use up and down keys of telecontroller to move to light frequency, use left and right keys of telecontroller to adjust light frequency to 50Hz or 60Hz

8.reset

In camera's setting menu, use up and own keys of telecontroller to move to reset will recover camera's factory setting;

9. reserve and withdraw

In camera's setting menu, use up and down keys of telecontroller to move to reserve and withdraw, re-press OK and camera will reserve adjusted paramter and withdraw from camera's setting and turn back to menu;

XV: line set

1. under status of menu opened, use left and right keys of telecontroller to select line set icon, press OK and enter into line set page;

Line Set

2. in line setting menu, use left and right keys of telecontroller, move to opem/close line; open up and down keys to open or close all lines;

Open all line,

Close all line

3. in line setting menu, use left and right keys of telecontroller and move to line's name, use up and down keys to choose name of line which need to be adjusted;

Represents line 1,

 represents line 2......

 represents line 8,

represents central line;

4. in line setting menu, use left and right keys of telecontroller, choose direction of close and definition line to be horizontal or vertical;

 Represent close

Represent line's direction is horizontal

Represent line's direction is vertical

5. in line' setting menu, use left and right keys of telecontroller, choose think line to adjust, press up and down keys of telecontroller to choose essential line's thickness, the camera provided four kinds of line thickness for adjustment;

6. in line's setting menu, use left and right keys of telecontroller, choose line color adjustment , press up and down keys to choose essential line color, there is selective colors of red, black, red, green and blue;

7. in line's setting menu, use left and right keys of telecontroller, choose line movement, use up and down keys to choose the direction, press OK to move;

Represent line moves upward

Represent line moves downward

Represent line moves leftward

Represent line moves rightward

8. in line's setting menu, use left and right keys of telecontroller, choose to withdraw line's setting menu, press OK to withdraw and turn back to menu;

XVI: withdraw from menu

1. under status of menu opened, use left and right keys of telecontroller to close, press OK to withdraw from menu;

关闭

Notice: the camera's menu parameter setting supports interrupt reserve

SPECIFICATIONS

Model	SRG-HD-2385X	
Signal System	PAL	NTSC
Image Sensor	1/1.9" Sony CMOS Full HD 1080p Sensor	
Total Pixels	2000 (H) x 1241 (V) approx. 2.48M pixels	
Unit Cell Size	3.75 µm (H) x 3.75 µm (V)	
Scanning Frequency	H: 15.625 KHz / V: 50 Hz	H: 15.734 KHz / V: 59.94 Hz
Frame Rate	50 Fps @ 1080p	60 Fps @ 1080p
Sensor Resolution	2.13 Megapixel 1080p	
Effective Pixels	1945 (H) x 1097 (V) approx. 2.13M pixels	
Mount Type	C-Mount	
Gain Control (AGC)	0 - 10 Steps	
Brightness Control	0 - 20 Steps (Adjust according to light source intensity)	
Output	1 HDMI , 1 USB	
Input	SD Card for Recording	
Recording Resolution	1080p Full HD @ 60 fps	
Snapshot Resolution	1920 x 1080 Pixels	
Digital Zoom	1x- 5x	
Recording Mode	Via USB Pen Drive	
Min. System Requirement for PC	OS : Windows 7,8,10 , Ram : 16 Gb , Intel i5 / i7 , Memory : 512 Gb , Graphics: 2 Gb	
Sharpness	0-10	
Color	0-10	
White Balance	Manual / Automatic	
Min. Illumination	0.00001 Lux	
HDMI Cable Length	2 Meters Ultra Slim	
Power Cable Length	1 Meter	
Supported Slot	C-Mount Port	
Supported Light Source	Work best with LED Light Source	
Power Voltage	12VDC (Camera Head) , AC110V-240V (Control Unit)	
Power Consumption	Max. 2W / 170mA	
Operating Temperature	-10°C ~ +50°C	
Operating Humidity	30% ~ 80% RH	
Dimensions	70 (L) x 58 (W) x 58 (H) mm.	
Weight (Net)	Approx. 225 g.	