4K Surgical Camera Operation Manual (SM-BC4K-S)

1. Overview

1.1 Introduction

The 4K surgical camera is designed for recording surgical procedures in operating rooms and automatically adapts to various specific application conditions. The camera mounts on the medical arm(AC2000/ AC3000) in the operating room, providing flexible positioning and operation capabilities.

1.2 Common information

a. To ensure the proper functioning of the camera and the safety of patients and surgical staff, strictly adhere to all instructions in this manual..

b. The camera and its accompanying accessories (collectively, the "Product"): All documentation provided reflects the Product's design specifications and the applicable safety standards in effect at the time of publication. We reserve all intellectual property rights for the camera, circuitry, procedures, software, terminology, and all other related elements described in this documentation or incorporated into the Product

c. The Product must be operated in accordance with all local regulations and standards of the country in which it is used.

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1.3 Product liability information

Our company assumes liability for product safety, reliability, and performance only under the following conditions:

a. Indoor electrical installation complies with VDE 0100-710 or IEC 60364-7-10 regulations;

b. The product is used in accordance with these operating instructions.

1.4 Applicable Environment and Conditions for the Product

For transportation and storage (in original packaging, up to 15 weeks):

a. Ambient temperature: -20°C to +60°C;

b. Relative humidity: 30% to 95%.

1.5 User manual instructions

In this manual, the following symbol is placed before critical information to denote its importance:

This symbol indicates safety-related information. Failure to follow these instructions may result in Product damage.

2. Installation and commissioning

2.1 Product composition

No.	Component	Quantity	Specifications	Component Display Diagram
1	surgical field camera	1	3840*2160P/30HZ, including handle;	
2	power adapter	1	DC 12V/3/3A output	
3	Remote Control	1	2.4G wireless;	
4	Special control cable & power cable	1	5m;	No Diagram
5	HDMI Optical Fiber Cable	1	20m	

2.2 Installation and commissioning instructions

The camera is mounted on and operated with the Ondal AC2000(default) spring boom system, following these steps:

1) Unpack and Inventory check

Remove all items from the packaging and check them against the component list to ensure everything is included.

2) Cable Orientation Confirmation

For external hdmi optical fiber cables, ensure correct orientation: the camera-end connector is marked "Source," and the display/matrix equipment-end connector is marked "Display". Route the cables in accordance with this above orientation.

3) Cable Routing

Route the fiber optic video cable and power/control cable through the spring arm of the camera, leaving approximately 15 cm of cable extending beyond the end of the arm. (Noted: Cable connection ports are located in the vertical opening of the camera mounting bracket).

4) Mount Installation

Mount the complete camera assembly (including camera unit) onto the spring boom.

5) Cable Connections

First, connect the control and power cable ports; then, connect the video cable port.

6) Power Supply Connection

Connect the power adapter(12V DC) to power cable

7) System Testing

Connect the video output signal to monitors or matrix systems. Use the remote control to test the camera's zoom function, and verify that the 4K video output is stable, clear, and displayed correctly.

8) Final Adjustments

Adjust the damping and counterweight screws at each joint of the camera mount and boom for optimal balance and stability.

3. Operations

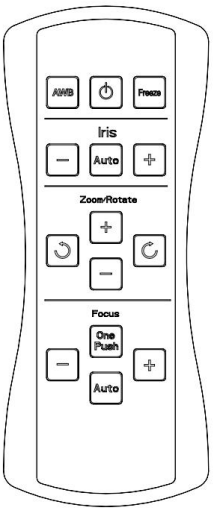
3.1 Remote control operation

a. Focal Length Adjustment

Use the **Zoom (+/-)** controls in the middle-right indicator area of the remote to adjust camera focal length. (+/-).

b. Lens Rotation

The high-end version of the camera incorporates a stepper motor and a mechanical rotation mechanism. Use these two buttons( ) to rotate the lens and adjust it to the optimal viewing position. Note: This feature is exclusive to the high-end model.



c. Freeze Mode

Press the **Freeze** button in the upper-right corner of the remote control to freeze the current screen image.

d. One-Touch Focus

Press the **One Touch Focus** button located below the remote control for automatic image focusing.The '+' and '-' buttons on the side adjust the color saturation of the image

e. Shutter Speed Adjustment

Use the **Shutter (+/-)** controls to increase or decrease image shutter speed.

f. Manual Focus Adjustment

Use the **Focus (+/-)** controls to manually adjust image focus settings.

g. Power Control

The **Power** button is used for wireless control pairing.

3.2 Camera positioning operation

a. Rough Adjustment

Aim at the surgical field to be captured, and align the center of the surgical field with the center of the monitor display.

b. Zoom and Angle Adjustment

Press the Zoom (+) button on the remote control to expand the surgical field to fill the entire monitor screen. Then, hold the disinfected handle to fine-tune the viewing angle. Do not touch the camera main unit directly during operation.The focus is in automatic mode and requires no manual setup

c. If image flicker occurs due to surgical or ambient lighting, manually adjust the shutter speed to eliminate it. The default shutter speed is 1/100, which generally prevents flicker under most lighting conditions.

d. If you are not satisfied with the image color saturation, you can manually increase or decrease the saturation level.

Note 1: The lens is a fragile component. Avoid contact with hard objects during positioning to prevent equipment damage.

4. Maintenance

4.1 Cleaning and disinfection of the camera

 take care！

To prevent scratching, clean the lens only with lens cleaning paper. The use of any other materials may cause damage and void the warranty

To ensure proper maintenance and avoid damage, observe the following:

a. During cleaning and disinfection, ensure no liquid enters the camera or components of the support system.

b. When using surface disinfectants, strictly adhere to the concentration specifications provided by the disinfectant manufacturer.

c. The use of sodium hydroxide solution may alter the composition of the surface aluminum coating, reducing the product’s service life.

d. Improper use of surface disinfectants (e.g., leaving large amounts of liquid residue on the product surface, where the liquid remains stagnant and unremoved) can cause the surface coating to dissolve. If a thick layer of disinfectant residue is present, it must be thoroughly cleaned off.

e. The following substances are unsuitable for disinfection, as they may damage product materials:

a) Halogen-decomposing adhesives (halogen-splitting bonds)

b) Strong organic acids

c) Oxygen-decomposing adhesives (oxygen-splitting bonds)

d) Solvents, fuels, and other similar substances

f. To prevent damage to stainless steel parts, only use disinfectants that do not contain chloride or chlorinated groups.

g. Avoid contact with acetaldehyde and amino-based products. Notably, if amino-based products have been used first, it is critical to perform an intermediate cleaning step before using acetaldehyde-based disinfectants. Skipping this step may leave permanent, unremovable residues.

h. For information regarding the microbial efficacy of disinfectants, contact the disinfectant manufacturer.

4.2 Disinfection of the Handle – Manual Disinfection Procedure

4.2.1 Disinfect Handle

Disinfect the handle following these steps:

1) Use alcohol, QAV, or acetaldehyde-based disinfectants.

2) After cleaning, rinse the interior of the handle with water to ensure complete removal of all residues.

Important Warnings:

a. Do not use manual disinfection methods that could damage the product.

b. Failure to follow these instructions may result in product damage and will invalidate the standard warranty.

4.2.2 Disinfected Handle, Heat Treatment

The disinfected handle is made of heat-resistant and impact-resistant plastic. Treat the disinfected handle according to the following steps:

1) Use a basic cleaner without active chlorine.

2) Neutralize with an acidic neutralizer.

The disinfected handle can be machine-cleaned by dry heat method at a temperature of 93°C for 10 minutes.

4.2.3 Disinfected Handle, Sterilization

1) Clean and disinfect the disinfected handle using conventional methods before sterilization.

2) Place the disinfected handle in a suitable sterilization package (disposable sterilization package, such as film/paper sterilization bag; single-layer or double-layer package) for sterilization.

3) The disinfected handle can be sterilized by steam. The recommended parameters are as follows:

a. 121°C/1.3 bar; 25 – 30 minutes (standard)

b. 134°C/3 bar; 3 minutes (standard)

c. 134°C/2-3 bar; 18 minutes (special cases)

When loading the autoclave, ensure that the open end of the sleeve faces downward. Leave sufficient space around the disinfected handle, away from any other items being sterilized.

Note:

a. The normal service life of the disinfected handle is approximately 100 disinfection cycles.

b. Damaged handles shall not be used continuously.

5. Fault diagnosis

The surgical field cameras are produced under rigorous manufacturing controls and are designed for reliable, trouble-free operation. In the unlikely event of a malfunction, please perform the following self-checks first

Symptoms	Troubleshooting Procedure
No Display	First, check that all cables are correctly connected and the camera is powered on. Then, bypass the system by accessing the maintenance port and connecting the HDMI or SDI cable directly to the display
Color issue	First, activate the white balance mode. Then, adjust the color intensity via the remote control. Finally, calibrate the monitor by resetting its color saturation and, if necessary, setting the color temperature to 5600 K
Moiré Pattern	To eliminate stripe interference, set the shutter speed via the remote control to a value between 1/90 and 1/180, which synchronizes with most lighting frequencies. Also, minimize external electronic interference
Remote Control Failure	Confirm the camera is powered on and connected Try using the camera's built-in control buttons Replace the remote control's batteries Re-pair the remote with the main unit by pressing its power button again after startup

To retain your warranty, all product servicing must be done by Shenzhen SmoVision Medical Technology Co., Ltd. or its authorized agents. For returns, please use the original packaging and attach your contact information, the equipment ID, and a description of the fault.

6. Technical data

Image Sensor	SONY 1/2.5 inch 4K CMOS
Pixels	8.51 million pixels
Video Output	HDMI*1
Horizontal Resolution	Up to 3840*2160P/30HZ
Lens Zoom	20x optical, 12x digital
Aperture Focal Length	F=4.4mm-88mm
Object Distance	10-800mm (20X)
Recommended Illuminance	100-100,000lx
Screen Aspect Ratio	16:9
Signal-to-Noise Ratio	>50dB
Operating Temperature	0°C – 40°C
Focusing	Auto, Manual, One-touch Focus
Shutter	Auto, Manual
White Balance	Auto, Manual
Color Intensity	One-touch Adjustable
Video Format	2160P/30; 1080P/60; Switchable
Operating Temperature	0-40°C
Storage Temperature	-20°C -60°C
Power Consumption	DC12V/9W
Weight	≦3.0 kg

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