



7" Display Camera for
Compound Microscopes
User Guide V1.0



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1 Overview

1.1 Features

- ◆ ARM efficient processor.
- ◆ Supports the snapping and video recording of microscope images.
- ◆ Calibration and measurement function.
- ◆ Stable and reliable upgrade function.

1.2 Application and Scope

For compound microscopes with a minimum.

1.3 Operating Environment

- 1、 Ambient temperature: 0 ~ 60°C.
- 2、 Relative humidity: 0% ~ 95%, no condensation.
- 3、 Environment: no vibration, no dust, corrosive gas, flammable gas, oil fog, water vapor, water drop or salt, etc.
- 4、 Atmospheric pressure: 70 ~ 106kPa.
- 5、 Altitude: ≤5000M.
- 6、 Power input 5V.

2 Parameters and Composition

- 1、 Basic structure: Camera with 7-inch IPS display.
- 2、 Installation: Mounting on the microscope.
- 3、 Weight: < 2.5kg.
- 4、 Color: white, black.
- 5、 Surface coating: spray paint.

2.1 Parameters

Type of sensor	Color CMOS Image Sensor
Sensor size	1/2.8 Inch
Pixel size	2.9 μm (H) \times 2.9 μm (V)
Resolution ratio	1920 X 1080
Exposure control	Auto / Manual
Power Frequency	DC / 50Hz / 60Hz
White balance control	Auto WB / Once WB / Manual
Cross-line	4 Sets
Calibration and measurement	Support Calibrating and line measuring
Snap	Button snap / timed snap
Video recording	Supported
Frame rate	30FPS@1920*1080
Image adjusting Parameters	Saturation/ Hue / Brightness / Contrast / Monochrome / Flip vertical / Flip horizontal / FOV
FOV	20%-100%
Storage for snap and record	TF card
Language	English / Chinese
Firmware Software Update	Supported
Overall dimensions	182mm*125mm*85mm

2.2 Included Components

- ◆ 7-inch microscope display camera
- ◆ 5V/1A power adapter

2.3 Appearance



3 Operation Procedure

Before installing the camera, make sure that all equipment listed in 2.2 is included in the package.

3.1 Connect the power adapter to the camera

Insert the power adapter of 5V/1A into the power port behind the camera. After power on, the red light will light up. Press the power button at this time, the indicator light will change from red to green and the camera will start up.

3.2 Use the back button to operate the interface

Use the back button to operate the camera functions and adjust the camera parameters. After modifying the parameters, exit the interface to save. In the upper left corner of the screen, "Param. saved " appears. This is shown

in Figure 3-1.

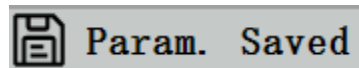


Figure 3-1

3.3 Snap

1. The snap button is on the right side of the camera, above the power button. Press it to capture the current image on the screen and store it in the SD card.

2. The screen shows "Take Successfully", which means that the picture has been taken successfully. This is shown in Figure 3-1.

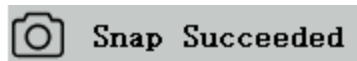


Figure 3-2

Warning: Disconnect the power supply if the equipment is not used for a long time.

4 Menu and Functions

After turning on the power and pressing the power button, wait for the screen to light up. At this point, press the MENU key to call out the menu. As shown in Figure 4-1. The position of the current cursor (that is, the position of the highlighted icon) is the white balance function option.

Press $\uparrow\downarrow$ for function selection, press \rightarrow to enter the sub-menu interface of the corresponding functions, press MENU to hide the interface, and save all parameters that have been modified.

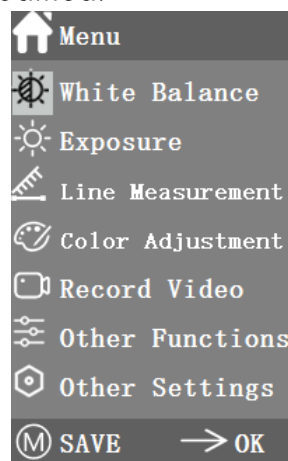


Figure 4-1

The specific functions of this product are shown in Figure 4-2. ■

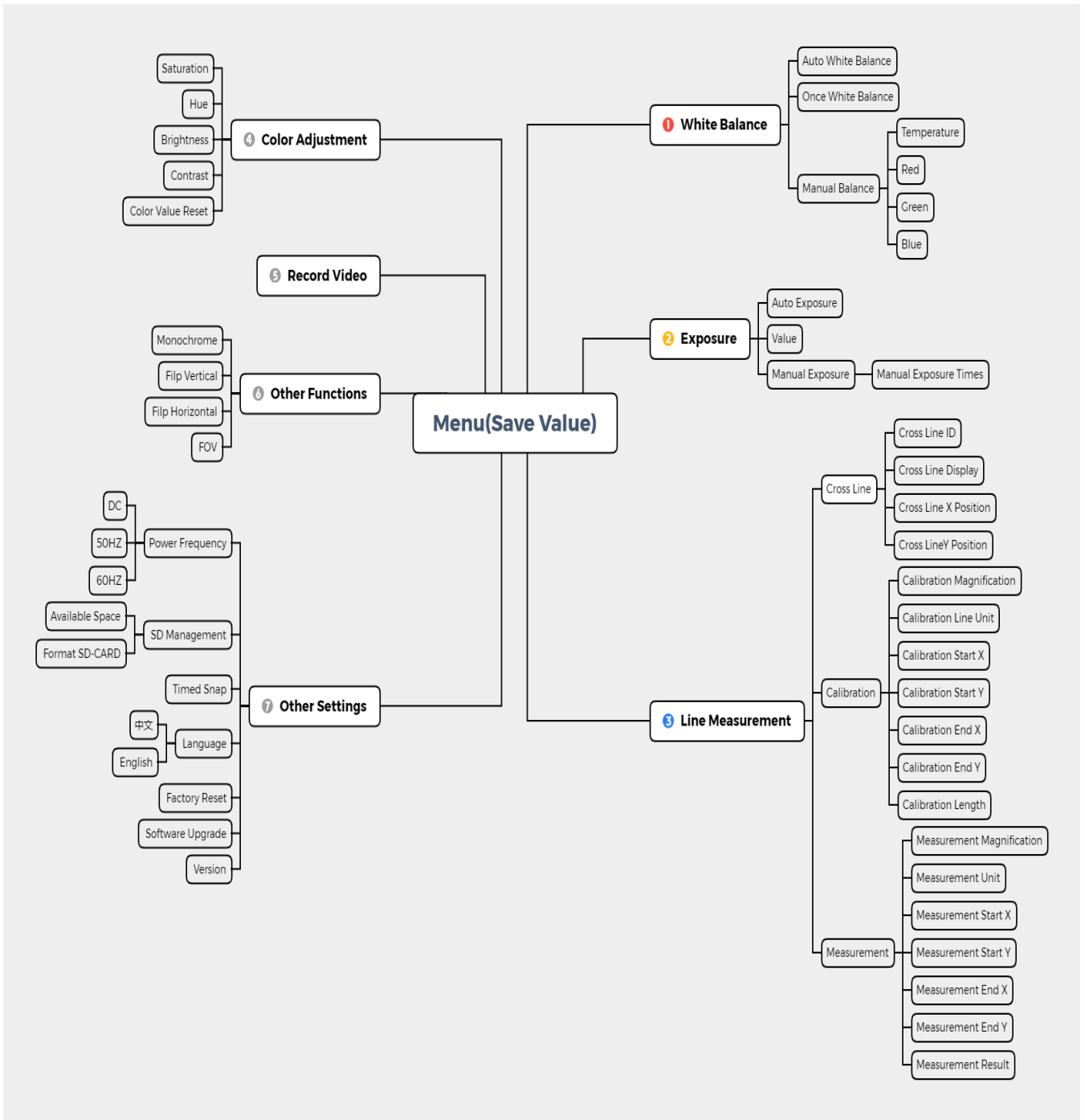


Figure 4-2. Function block diagram of camera

5 Operating Instructions

5.1 White Balance

After entering the white balance menu, the default option is "Auto White Balance", as shown in Figure 5-1.

When the effect of automatic white balance is not ideal due to the difference of color temperature between different light sources, manual white balance is to adjust the parameters of color temperature, R, G and B respectively. This is shown in Figure 5-2.

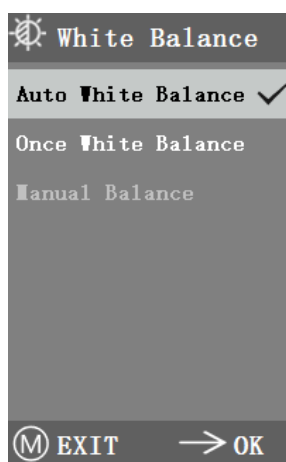


Figure 5-1

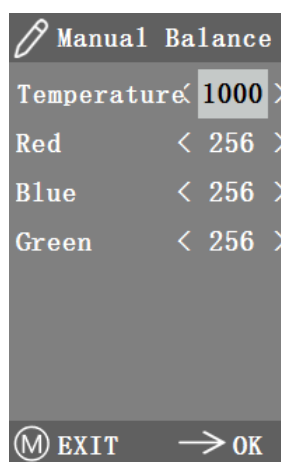


Figure 5-2

5.2 Exposure

After entering the exposure menu, the default option is "Auto exposure", as shown in Figure 5-3. Under automatic exposure, you can adjust the target "value" to adjust the degree of exposure. In manual exposure, you can also adjust the exposure by adjusting the value of exposure "time". As shown in Figure 5-4.

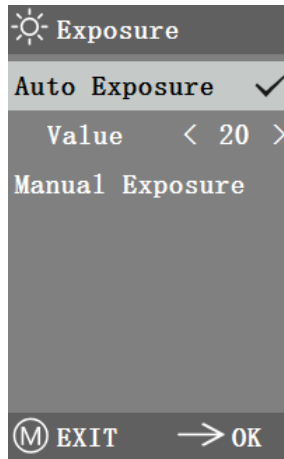


Figure 5-3

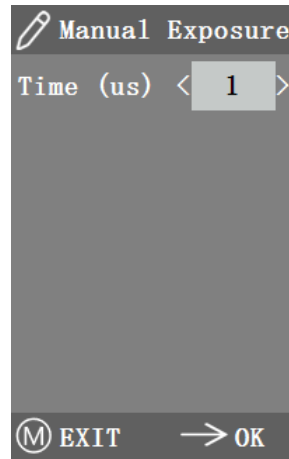


Figure 5-4

5.3 Line Measurement

This menu includes Cross Line, Calibration, and Measurement as shown in Figure 5-5.

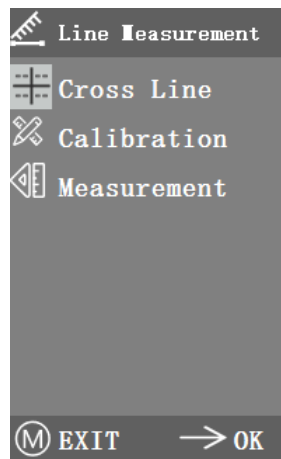


Figure 5-5

5.3.1 Cross Line

Four groups of crossline are provided in red, blue, green and white colors. You can choose according to your requirements.

Enter the Cross Line menu, as shown in Figure 5-6. "ID" refers to the number of each group of crossline. "Display" adjusts whether the reticle is displayed. "X Position" and "Y Position" adjusts the position of the center point of the reticle.

You can select and press the "Turn off All Crosslines" to close all crosslines.

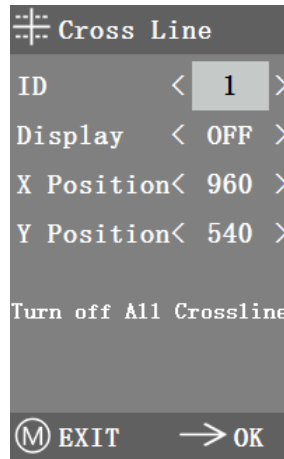


Figure 5-6

5.3.2 Calibration

There are default calibration values for this product. However, due to the different objective standards of the microscope, the calibration value may have errors, so it is suggested to recalibrate. The following is the calibration process.

1. Calibration requires a micrometer. Put the micrometer on the object platform and adjust the microscope so that the micrometer scale is clearly displayed on the screen. In order to facilitate calibration, it is suggested to rotate the camera so that the micrometer is placed horizontally in the screen without being blocked by the menu.

2. After entering the Calibration menu, it is shown in Figure 5-7.

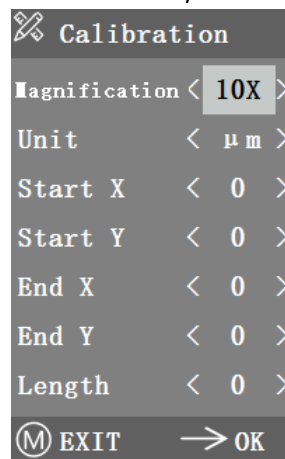


Figure 5-7

3. Adjust the positions of the starting and ending points of calibration to make the calibration line coincide with the micrometer scale and try to select the length containing most possible multiple scales, so as to make the measurement more accurate.

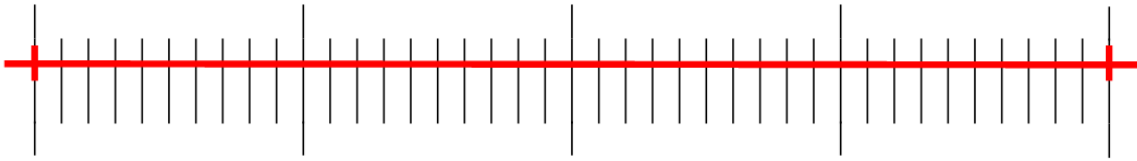


Figure 5-8

4. The minimum range of the selected micrometer is 0.01 mm (10 micron). Figure 5-8 shows the image under a tenx objective lens. At this time, the "magnification" is set to "10X", the "unit" is marked as " μm ", and the "length" is set to "40".

5. After adjusting the parameters, exit the calibration interface, and the calibration is completed.

5.3.3 Measurement

The image needs to be calibrated before it can be measured. And the calibration ruler of different magnification is different, so it needs to be calibrated separately under different objective lenses.

Enter the Measurement menu. Select the measurement magnification, adjust the starting and ending point, and the measurement length is displayed at the bottom in real time, as shown in Figure 5-9.

Changes in the field of vision did not affect the measurements.

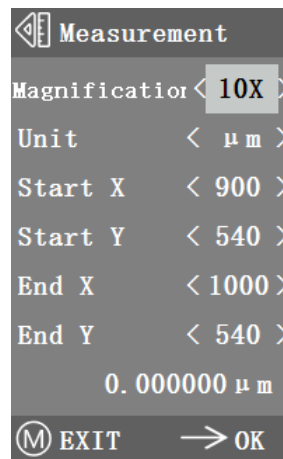


Figure 5-9

5.4 Color Adjustment

After entering the color adjustment menu, as shown in Figure 5-10, Saturation, Hue, Brightness, and Contrast can be adjusted to make the picture reach the required level. In order to facilitate the color adjustment, the "Color Value Reset" option is added in the menu. When selected and pressed, all the color values in the menu will be restored to the default value.

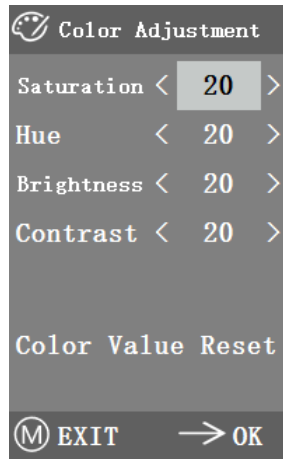


Figure 5-10

5.5 Record Video

Before recording the video, you should check whether to insert an SD-CARD with a FAT32 file system and free space. You cannot take a photo during the recording process. The recording time is shown in Figure 5-11.

00:00:00

Figure 5-10

5.6 Other Functions

The menu includes functions of Monochrome, Flip vertical, Flip horizontal, and FOV. The numerical option can be adjusted by ←→ key, and the switch options can be opened and closed by → key. After the adjustment is completed and the main menu is closed, the function states will be saved. The function states will be retained when the next boot is started. As shown in Figure 5-12.

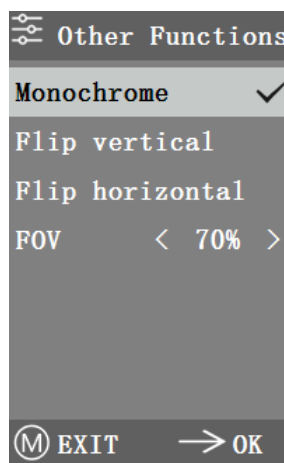


Figure 5-11

5.6.1 Monochrome

The function produces visual images in varying tones of a single color (such as gray).

5.6.2 Flip

This function is divided into vertical flipping and horizontal flipping.

5.6.3 Field of View

This function can adjust the range of observation field. Use the ←→ key in the menu to adjust the size. When the menu is not displayed, press ↑↓ key to adjust, and 70% similar signs will appear in the upper left corner.

5.7 Other Settings

This menu contains Power Frequency, SD Management, Timed Snap, Language, factory Reset, Software Upgrade, Version. As shown in Figure 5-13.

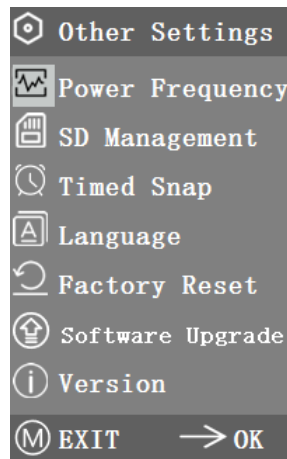


Figure 5-12

5.7.1 Power Frequency

CMOS detectors have a rolling curtain effect that causes flicker problems, which can be resolved by capturing a line of pixels as an integer (n) times the flicker period. Among them, 60Hz in North America and 50Hz in Europe. As shown in Figure 5-14.

1. DC (DC): for DC (DC) light source, there is no light fluctuation, so there is no need to compensate the flashing light source.

2. AC (50Hz): radio AC (50Hz) to eliminate the dark strip of the lamp curtain caused by the 50Hz fluorescent lamp.

3. AC (60Hz): radio AC (60Hz) to eliminate the dark strip of the lamp curtain caused by 60Hz fluorescent lamp.

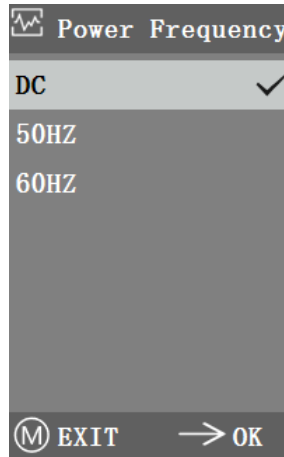


Figure 5-13

5.7.2 SD Management

After inserting the SD card, the remaining space and total space of the SD card can be seen in "Available Space", as shown in Figure 5-15.

If "0.00 Gb / 0.00 Gb" as shown in Figure 5-16, the SD card was not successfully mounted, please try to reinsert it.

Enter "Format SD-CARD" to format, as shown in Picture 5-17. Please back up important files on your computer before formatting SD-CARD.

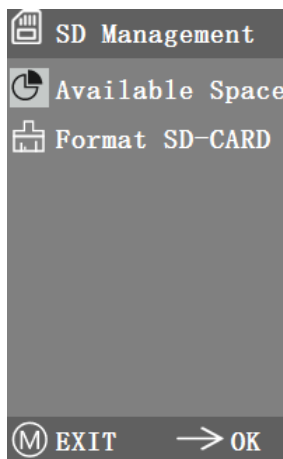


Figure 5-14

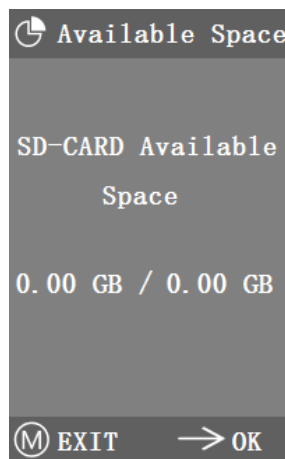


Figure 5-15

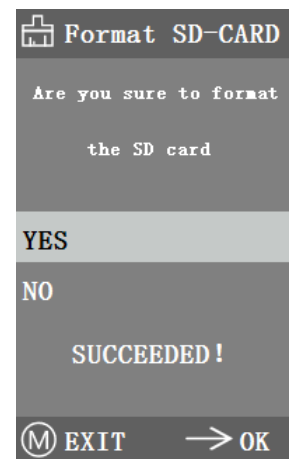


Figure 5-16

5.7.3 Timed Snap

"Hours, minutes and seconds" refers to the time interval of timed snap,

and "counts" refers to the number of timed snap. After setting the parameters, move the cursor to "Timed Snap Start" and press → to start timed snap. At this point, the number jumps below. This is the number of photos that have been successfully taken so far. As shown in Figure 5-18.

If the available space of SD card is insufficient during the process of timed snap, it will exit.

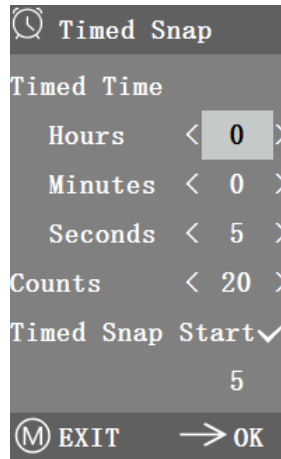


Figure 5-17

5.7.4 Language

The current version can switch between Chinese and English. As shown in Figure 5-19.



Figure 5-18

5.7.5 Factory Reset

Press → key to reset the menu settings to factory settings. This is shown in Figure 5-20.

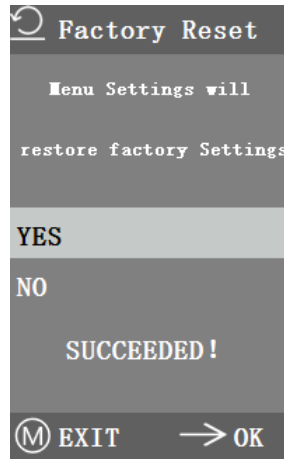


Figure 5-19

5.7.6 Software Upgrade

After the system upgrade, the menu parameters will be restored to the factory Settings, so you need to record the parameters before the update, so as to restore after the upgrade.

5.7.6.1 The System is Upgraded Normally

When the system upgrade files are published, the upgrade files can be put into the SD card and the system upgrade can be carried out in this page. Where, the need to upgrade the file name corresponds to the match, for example:

`main_app_v1.0.bin , rootfs_uclibc_64k_v1.0.jffs2`

Select "Yes" to upgrade, and the following message will appear: "UPGRADING..." While the system was being upgraded, as shown in Figure 5-21.

WARNING: Please wait patiently for 2-3 minutes, during which time do not operate the device and keep power connected.

If "FILES ERROR" or "NO FILE" occurs, please check whether the upgrade file is missing and the version number is corresponding. After checking, please upgrade the system again.

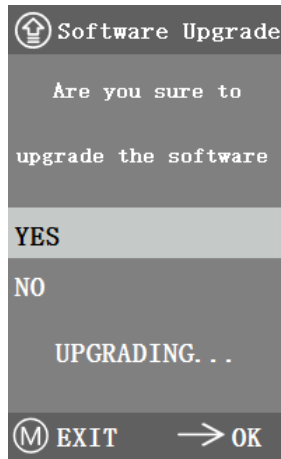



Figure 5-20

5.7.6.2 System Upgrade Failed

When a system upgrade fails, it goes into the tiny system, which is used for emergency updates.

1. After entering the tiny system, "Upgrade Failed. Please try again according to the instructions." will be displayed on the screen.
2. Insert SD card with upgrade files, then the screen shows "Files detected, Press Menu to Upgrade."
3. When you press the Menu key , the screen shows "Upgrading... Please do not power off." When the upgrade is completed, the system will be automatically restarted to complete the upgrade.
4. If The screen shows "The version is illegal, please check the file." that means The upgrade file is missing or the version number does not match, please check the version number of The file and update it again.

5.7.7 Version

You can view the version information of this product, as shown in Figure 5-22.

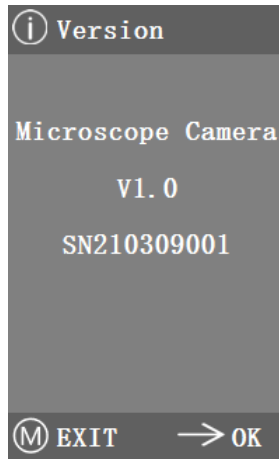


Figure 5-212

6 Failure Analysis and Troubleshooting

1. When pressing the snap button, recording videos, taking photos at a fixed time, or entering the SD card management menu, "NO SD-CARD" will be displayed, as shown in Figure 6-1. Please insert the SD card with file system FAT32 into the SD card slot on the right side of the camera, and then carry out corresponding operations.

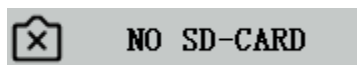


Figure 6-1

2. When pressing the snap button, recording videos, and taking photos at a fixed time, "insufficient available space" will be displayed, as shown in Figure 6-2. Please sort out the SD Card space on the computer before inserting the camera for use.

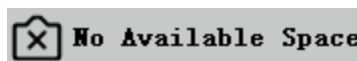


Figure 6-2

3. The camera screen image appears wavy pattern phenomenon, open "Other Settings" - "Power Frequency", select the appropriate power frequency.

4. The image is blurry and out of focus. Please change the objective lens or microscope to observe again.

5. If an unknown problem occurs and cannot be solved by yourself, please press the power button for 10s to restart. If it can be successfully reproduced after restart, please contact the manufacturer to solve.