LCD Digital Biological Microscope
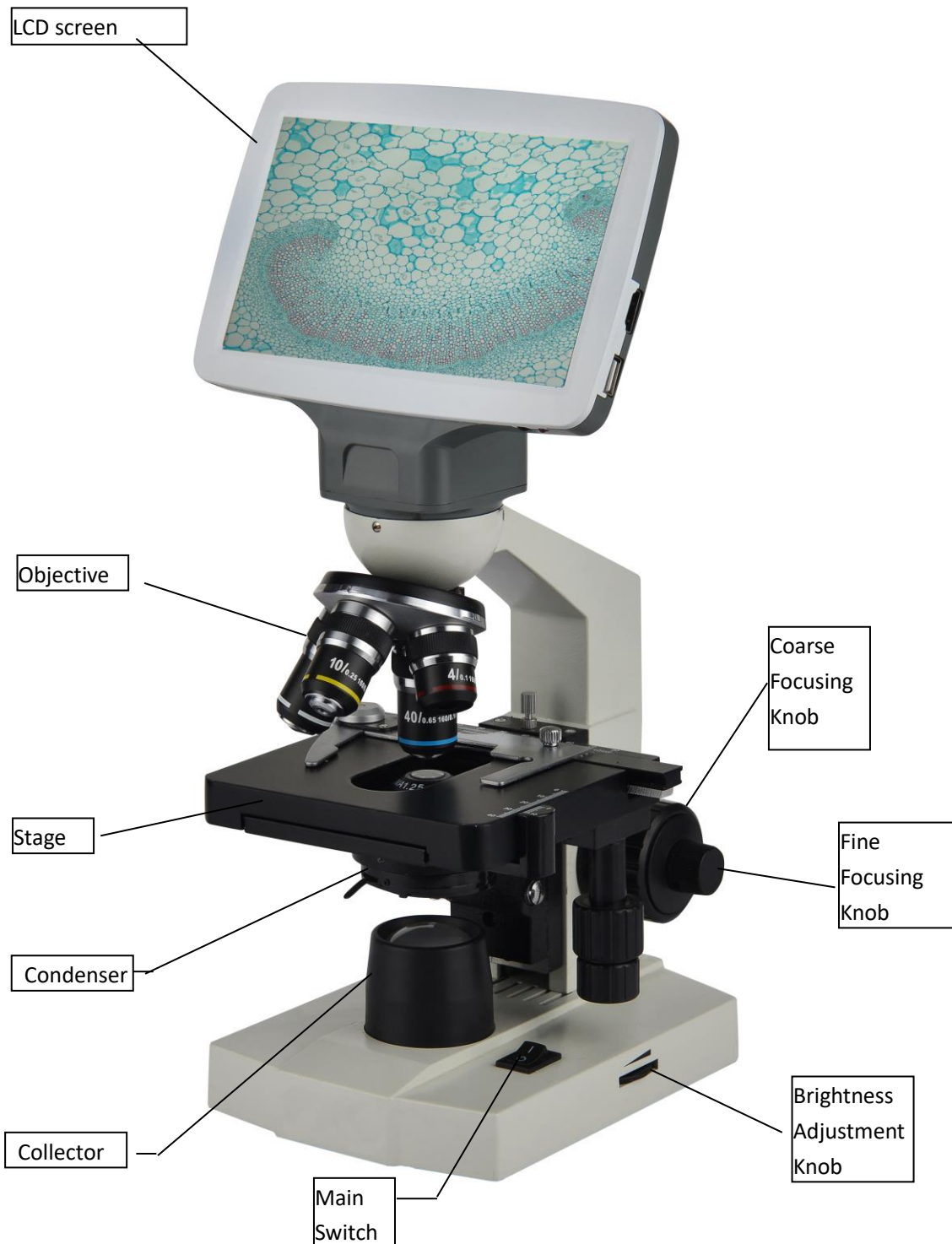
BLM-210

Instruction Manual

This manual is for BLM-210 LCD digital biological microscope. To ensure the safety, obtain optimum performance and to familiarize yourself fully with the use of this microscope, it is recommended strongly that you study this manual thoroughly before operating the microscope. Retain this instruction manual in an easily accessible place near the microscope for further reference.

Optical Microscope Part

LCD screen

Objective

Coarse Focusing Knob

Stage

Fine Focusing Knob

Condenser

Collector

Brightness Adjustment Knob

Main Switch

BLM-210

1. Application

BLM-210 LCD digital biological microscope is widely used in medical and hygienic establishments for conventional microscopic examination, general biologic, pathologic and bacteriological studies, clinical investigations and classroom demonstrations. Designed in a very modern way what can take convenient and safe to your operations.

2. Specification

2.1 Mechanical tube length: 160mm

2.2 Objective:

Magnification	Numerical Aperture (NA)	Focus Distance (mm)	Working Distance (mm)	Remark
4X	0.10	31.05	18	
10X	0.25	17.13	7	
40X	0.65	4.65	0.53	
100X	1.25	2.906	0.13	

2.3 LCD digital head

Item	Specification
Viewing Head	7-inch IPS LCD screen with wide visual angle, resolution 1024×600, Built-in 1/2.8" 2.0MP CMOS camera, output 1920×1080 HD Video. 1*USB2.0 interface for mouse, 1* HDMI interface, 1* SD card slot.
Built-in Camera	Resolution: 2.0MP, 1920×1080
	Image resolution: 1920×1080
	Video resolution: 1920×1080
	Pixel Size: 2.9×2.9μm

2.4Total Magnification

Digital Magnification	14X	14X	14X	14X
Objective	4X	10X	40X	100X
Total	56X	140X	560X	1400X

2.5 Conjugate Distance: 195mm

2.6 Stage：

BLM-210 D.E: Double Layers Mechanical Stage 116mmX125mm

BLM-210 C: Plain Stag with Attachable Mechanical ruler 110×120mm/ 60×30mm

BLM-210 A. B: Plain Stage with Slide Clips 110×120mm

2.7 Coarse Focusing range: 10mm

2.8 Condenser:

BLM-210: Abbe NA=1.2with Iris Diaphragm, Spiral Adjustment

2.9 Diameter of Color Filter: Ø32mm

2.11 Illumination: LED Illumination, Brightness Adjustable

3. Parameters

Item	Specification	BLM-210
Viewing Head	7-inch IPS LCD screen with wide visual angle, resolution 1024×600, Built-in 1/2.8" 2.0MP CMOS camera, output 1920×1080 HD Video. 1*USB2.0 interface for mouse, 1* HDMI interface, 1* SD card slot.	●
Built-in Camera	Resolution: 2.0MP, 1920×1080, 1/2.8"	●
	Image resolution: 1920×1080	●
	Video resolution: 1920×1080	●
	Pixel Size: 2.9×2.9μm	●
Nosepiece	Quadruple Nosepiece	●
Objective	Achromatic Objective 4×(195), 10×(195), 40×(195), 100×(195)	●
	Achromatic Objective 20×(195)	○
	Achromatic Objective 60×(195)	○
Stage	Double Layers Mechanical Stage 110×120mm/ 60×30mm	●
Focusing	Coaxial Coarse and Fine Adjustment, Moving Range 10mm, with stage height limiting screw	●
Condenser	Abbe NA 1.2 with Iris Diaphragm & Blue Filter, Rack and Pinion Adjustment for Condenser	●
Illumination	Transmitted LED Illumination, Brightness Adjustable	●
	Mirror	○
Spare Parts	Dust Cover	●
Power Supply	AC100-220V power adapter, microscope input voltage DC5V	●
Package	Styrofoam & Carton, Dimension 35×28×45 cm, 6kg	●

Note: ● Standard Outfit, ○ Optional

4. Configuration

a)   LCD digital head, Objective and Nosepiece

The monocular microscope has wide field sensor 10X and achromatic objective 4X, 10X, 40X and 100X. The nosepiece is small structured, and located stably and exactly. It has a large and sharp image, with 360º rotatable monocular or sliding binocular head.

b)   Bend arm and Coarse and fine focusing knob

The curved arm use C-shaped, has sprightly lines. Also, with upper focus stop, the coarse focusing adjustment adopts dovetail guide which make focusing adjustment smooth and comfortable.

c)   Base：

The base is designed to the instrument, which having a streamlined shaped circular, and it harmonized the aim's shape slinky，Electrical components and lamp built inside it as the illuminator.

d)   Stage：

Fixed stage or moveable stage

e)   Illumination

The system consists of illuminator which contains collector / mirror, iris aperture diaphragm and condenser. And the condenser can be lift up and down.

5. Assembly

a)   Working environment requirement:

   1) Room temperature: 0-40℃. Maximum comparatively humidity: 85%.

   2) High temperature will result in mildew, dew and even ruinous instrument.

   3) Avoid from the dust room. When it is not in use, please cover the microscope with dust cover.

   4) Please place the microscope in a stable situation without any surging.

b)   Check the Input voltage: be sure the power supply voltage is accordant with the nominal input voltage which is signed outside the microscope, or it will bring a serious damage to the microscope.

c)   Lamp

   1. The lamp has been well adjusted and checked before the microscope leaves factory.

   2. The lamp housing parts become extremely hot during operation. Take care not to burn yourself.

   3. Lamp replacement：The lamp has its standard service life. When it has expired, a lamp replacement is necessary. Set the main switch to off state, disconnect the power cord from the wall outlet, then allow the old bulb to cool before replacing the bulb with a new of the designated type. Open the lamp holder on the bottom of microscope to do the replacement, the surface of the new lamp bulb should be clean and free of fingerprint or dirt, which will decrease the brightness or even explode the bulb .

   Note: Must not missing the grounded screw

      Do not touch the lamp`s glass part with your hands, when sitting should take gloves or cover the lamp with protector. Fingerprint or dirt on the surface of the lamp should be cleaned with the clean cloth with dipping alcohol, which will decrease the brightness or even explode the bulb.

d)   LCD digital head:

Please insert the LCD digital head into the dovetail of the microscope body. (There is small screw in the dovetail, which can make the LCD digital head can not be pull out arbitrarily)

e)   Objective:

Lower the stage to its lower limit, then screw down the objectives into the nosepiece (from low to high).

f)   Condenser:

 he condenser has been adjusted well before delivery.

g)   Collector:

 The collector has been adjusted well before delivery. Frame of the collector's pedestal is screw thread can taken by contra rotate.

 Note: It cannot be taken down when the outfit is LED.

h)   Color filter:

 Lay the filter into the iris diaphragm bracket under the condenser if necessary.

6. Operation

1. Connect the LCD head to the microscope body, then rotate the objectives in sequence, according to their magnifications, into the threaded holes of the nosepiece. Place the specimen in the center of the field of view, first use low power objective to find the specimen image and then observe it with high power objective, at the same time, adjust fine focusing knob until the image is clear. When using 100X oil-immersion objective, the space between the front of objective and specimen surface should be full of cedar oil. Drops of cedar oil must be strictly free from air bubble, and the objective should be cleaned immediately after using, otherwise

it may solidify and make cleaning difficult.

2. In order to get a sharp and clear image, you must adjust the illumination system. When using objectives of different magnification, please adjust the iris diaphragm of the condenser to bring its numerical aperture and objective's numerical aperture into coincidence. Generally speaking, the rate of objective increase，the location of the condenser need to move up. Aperture is design for adjust NA and not for adjust brightness. Usually, aperture is open to 70~80% of the objective's exit pupil, until can see clearly image in the view.

3. When to watch the same type of specimens, can adjust limit screw to proper position and lock it up with nut. Then directly make coarse focusing knob up to the position where the first specimen can focusing clearly. That can simplify the operation and reduce the working intensity.

Note: The same type of specimen refer to the thickness of the slice, the coverslip and the carry slip are uniform.

7. Maintenance and storage.

1. When you open the carton, please be careful not to make the lens dropping.
2. All the lens has been adjusted by manufacturer already, please do not disassemble by yourself.
3. Nosepiece, coarse and fine focus is installed precisely, please do not disassemble by yourself.
4. You should make the instrument clean, and often wipe the dusts.
5. Place the instrument in a shady, cool and dry place, when finishing the operation, always use the dust cover for protection.

8. Troubleshooting Guide.

If problems occur during use, please review the following list and take remedial action as needed. If you cannot solve the problem after checking the entire list, please contact the service department for assistance.

1. Optical Part

Problem	Cause	Solution
the edge of the field of view has shadow or the brightness is uneven	The nosepiece is not in he located Position (objective is not in the center of the optical path)	Turn to the right position(Turn objective to the optical light center)）
	The image of the filament is not in the center	Center it
	The surface of the lens is moldy or has contaminant (including condenser, objective, sensor and collector)	Clean it up
Find dust and stain in the field of view	There are stains on the lens (include condenser, objective, sensor and collector)	Clean it up
	There are stains on the specimen	Clean it up
	The position of the condenser is too low	Loosen the condenser's locking bolt adjust the condenser to the right position, then screw down.
	There is no coverslip on the specimen	add coverslip
	The coverslip is too thick or too thin	Use the standard coverslip

	The specimen is placed inversely	Reverse it back
the image is defocus (low resolution/contrast)	There was oil on the dry objective (easily happened in 40X objective)	Clean it up
	There are stains on the lens (including condenser, objective, sensor and collector)	Clean it up
	The oil objective didn't immerse oil	Use immerse oil
	There was bubbles in the oil	Eliminate the bubbles
	Use a unsuitable oil	Change to the specified one
	The size of the aperture diaphragm is too big	Minify it
	There are stains on the incident lens of the binocular tube	Clean it up
	The size of the aperture diaphragm is too small	Open it up
	The position of the condenser is too low	Adjust the position
One side of the image is dark	The condenser is not in the center of the field of view\the condenser inclines	Install the condenser again and adjust the center carefully by the centering bolt
	The nosepiece is not in the right position	Turning it until it reach the "clicked" position
	The specimen is floating	Fix it
The image shifts during focusing	The specimen slips on the stage	Fix it
	The nosepiece is not in the right position	Turn it to the "clicked" position
The image is a little yellow	Not use the blue color filter	Use the blue filter
The brightness is not enough	The size of the aperture diaphragm is too small	Adjust again
	The position of the condenser is too low	Adjust the position
	There are stains on the lens (include condenser, objective, sensor and collector)	Clean it up

2. Mechanical Part

Problem	Cause	Solution
The image can not focus when using high magnification objective	The specimen is placed inversely The coverslip is too thick	Turn inversely Use the standard coverslip (0.17 mm)
The objective and the specimen touch when change the low magnification to the higher magnification	The specimen is placed inversely The coverslip is too thick	Turn inversely Use the standard coverslip (0.17 mm)

The specimen is not easy to move	The specimen holder is not fixed	Fix it
The eyes is too tired	No diopter adjustment	Adjust the diopter correctly
	The brightness is not suitable	Adjust the brightness of the lamp

3. Electrical Part

Problem	Cause	Solution
The lamp can't light when turning on the switch	No power	Check the connection of the power cord
	The bulb is not inserted	Insert it correctly
	The bulb burns out	Replace it
The lamp burns out suddenly	Use an unstandard lamp The voltage is too high	Use the specified lamp to replace, if the problem is not solved, contact with the service department
The brightness is not enough	Use a substandard lamp	Use the specified lamp
	The voltage is too low	Add the voltage
The bulb flickers or the brightness is vertiginous	The bulb is going to burn out	Replace it

LCD Digital Camera Part

Contents

1 Overview

1.1 Features

◆ ARM efficient processor.

◆ Supports the snapping and video recording of microscope images.

◆ With calibration and measurement function.

◆ Stable and reliable upgrade function.

1.2 Application and Scope

For Microscopes.

1.3 Operating Environment

1. Ambient temperature: 0 ~ 60℃.

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: < 2.5 kg.

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) × 2.9 μm (V)
Resolution ratio	1844 × 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@1844*1080
Image adjusting Parameters	Saturation/ Hue / Brightness / Contrast / Monochrome / Flip vertical / Flip horizontal/ FOV
FOV	20%-100% of Eyepiece FOV
Storage for snap and record	TF card
Language	English / Chinese
Firmware Software Update	Supported
Connecting way	Mounted to Microscope dovetail
Overall dimensions	182mm*125mm*85mm

2.2 Composition

◆   7 inch 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.
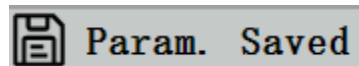
Figure 3-1

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.
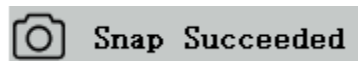
Figure 3-2

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 ↑↓ for function selection, press → to enter the sub-menu interface of the corresponding functions, press MENU to hide the interface, and save all parameters that have been modified.
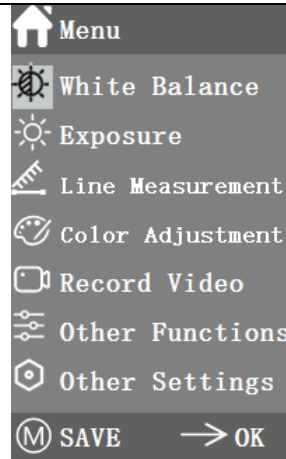
Figure 4-1

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 can be used to adjust the parameters of color temperature, R, G and B respectively. This is shown in Figure 5-2.
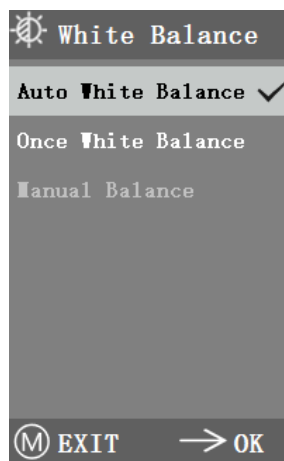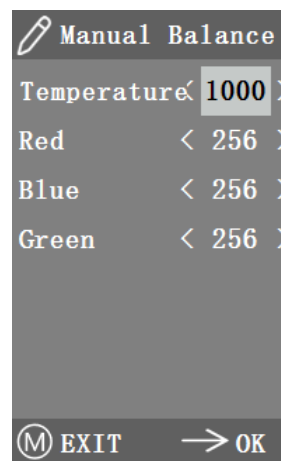

Figure 5-1	Figure 5-2

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.
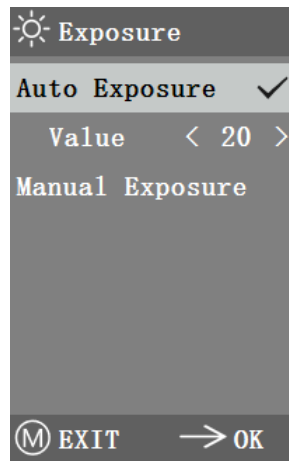
Figure 5-3　　　　　　　Figure 5-4

5.3　Line Measurement

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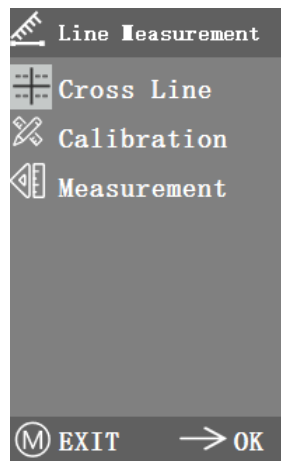
Figure 5-5

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.
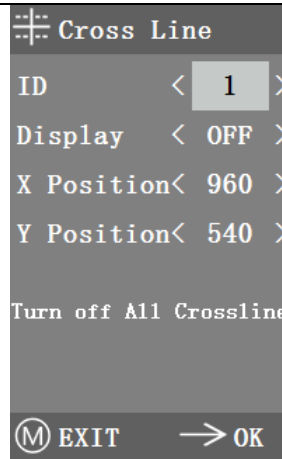
Figure 5-6

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.
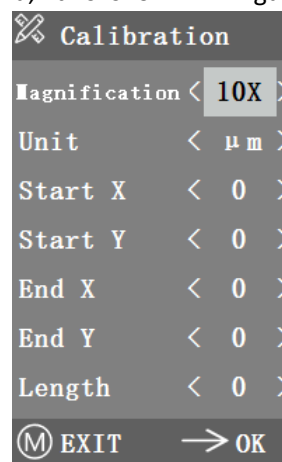
Figure 5-7

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.
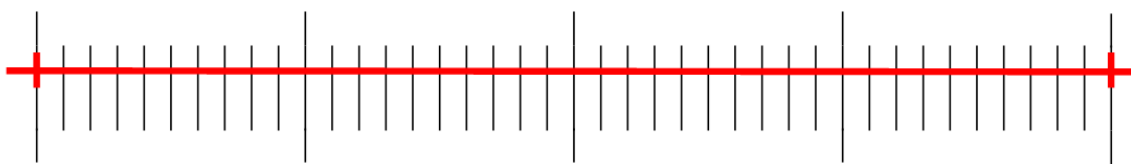
Figure 5-8

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.
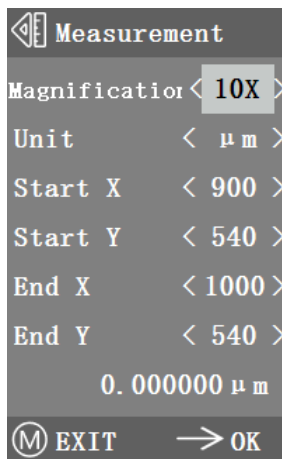
Figure 5-9

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.
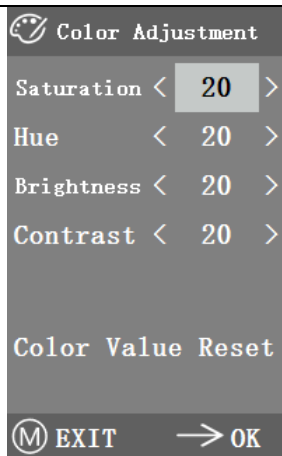
Figure 5-10

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.
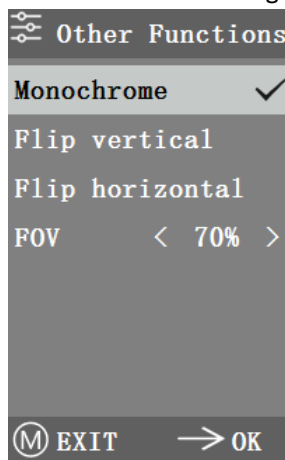
Figure 5-11

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.
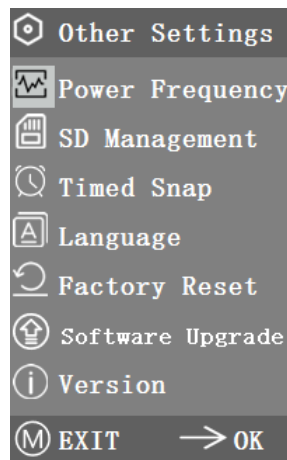
Figure 5-12

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.
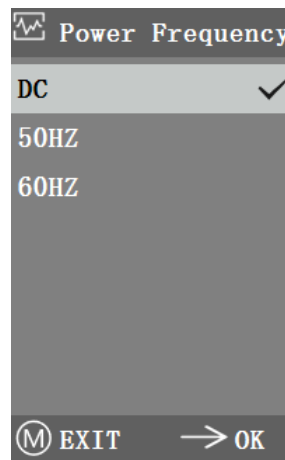

Figure 5-13

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.
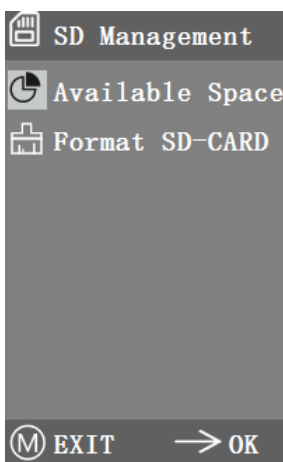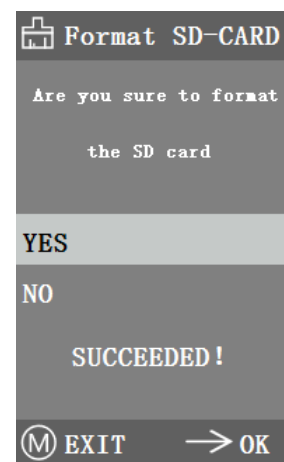

Figure 5-14
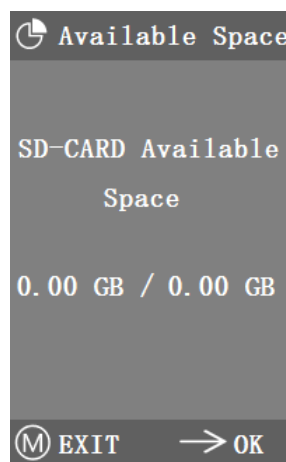
Figure 5-15

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.
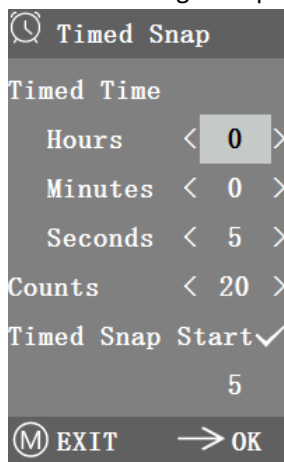

Figure 5-17

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.
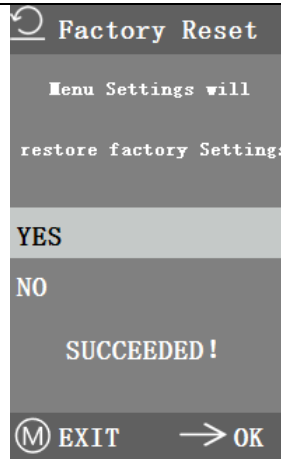
Figure 5-19

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.

<mark>WARNING:</mark> 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.
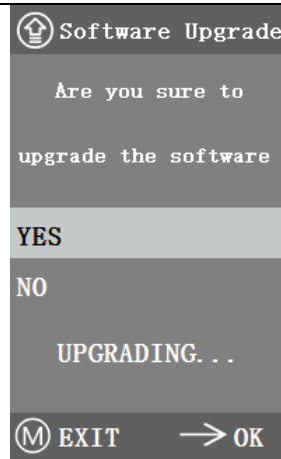
Figure 5-20

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 (M), 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

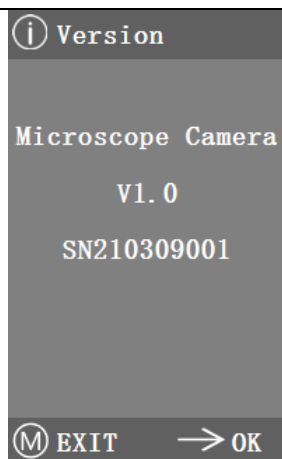You can view the version information of this product, as shown in Figure 5-22.

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.
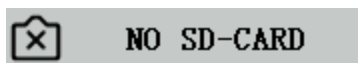

Figure 6-1

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.
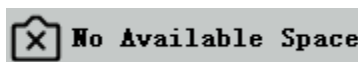

Figure 6-2

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, please contact the manufacturer to solve.