



**Digital hand-held slit lamp**  
**(Model : HSL-01)**  
**Operation manual**



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## Preface

Thank you for purchasing our product digital hand-held slit lamp. In order to operate this device properly and safely, please read this operation manual carefully before using.

### Scope of Application

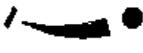
Digital hand-held slit lamp is mainly used for ophthalmic examination in hospitals, outdoor diagnosis, tele-medicine, etc.

**Product contraindications:**N/A

### Product feature

- l Easy capturing high resolution and stable images of anterior segment
- l Easy operation and carrying out for doctors outdoor diagnosis
- l Real-time display for observing, large storage, one button magnification

### Symbols

	Notice: please read precautions and operating instructions in operation manual
	Type B applied part
	Date of manufacture.
	Manufacture
	Please refer to the instructions for use.
	Don't throw away.
	Keep dry
	Fragile
	Upward
	Handle with care
	Camera switch
	Slit width adjustment, clockwise to increase the slit width, anti-clockwise to decrease the slit width
	Aperture size: Ø0.2mm 、 Ø1mm、 Ø5mm、 Ø12mm

	Filter: Cobalt blue, Red free, Heat-absorption, Gray
	Positive pole
	Negative pole

## Cautions

Please read the following precautions carefully, in order to avoid accidental injuries, product damages or other probable danger.



Please do not use the device at the environment prone to fire, explosion and high temperature. Please operate it in a clean and dry room.



Please do operate the device according to instructions and guide in this operation manual.



Please do not directly touch patient's nose or eye with optical lens to avoid injuries when using the device.



Please avoid shaking and striking the device. Please turn off the device and put it at a safe place when not using.



Before using, please do check and make sure all parts are in good condition, without damage or defect. If there is any damage or appearance defect, please contact us.



Only 3.6V@2200mAh battery appointed by us is permitted to use.



Please choose FAT32 format card, if you want to change a different Micro SD card.



Please do not use excessively high illumination to avoid damage to eyes.



When illuminating and photographing, please do not over expose. Please do not use it to do much examination on one eye, in order not to cause damage.



If the user's qualified technicians get permission from manufacturer to repair the parts, the manufacturer will offer circuit diagrams, components lists, figures and detailed rules of corrections if needed.



The device will be affected by electromagnetic interference, please keep it with a distance away from magnetic objects and strong magnetic place.



The device will release electromagnetic energy, but not affecting other equipment in correct operation. While if the device installed or used without following the user manual, it may affect other equipment.

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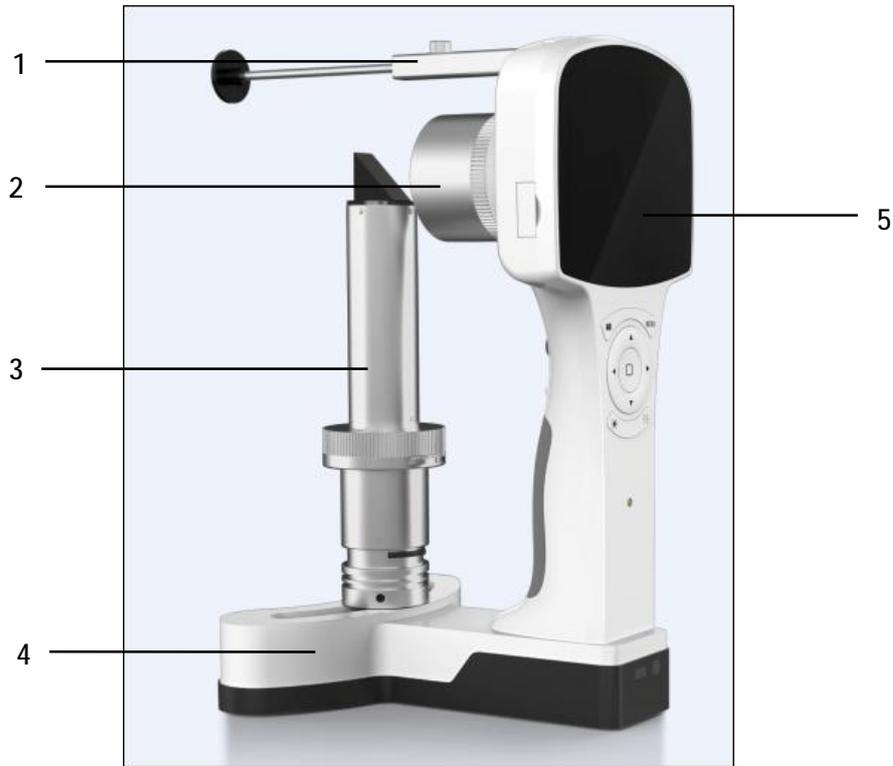
# Operation instruction

## 1. Intended use

The device is used to examine diseases of anterior segment and other parts of the eye.

## 2. Basic component

The device consists of forehead module, lens module, illumination module, base module, camera module, battery, shell, USB cable and software disc.



1---forehead module    2---lens module    3---illumination module  
4---base module        5---camera module

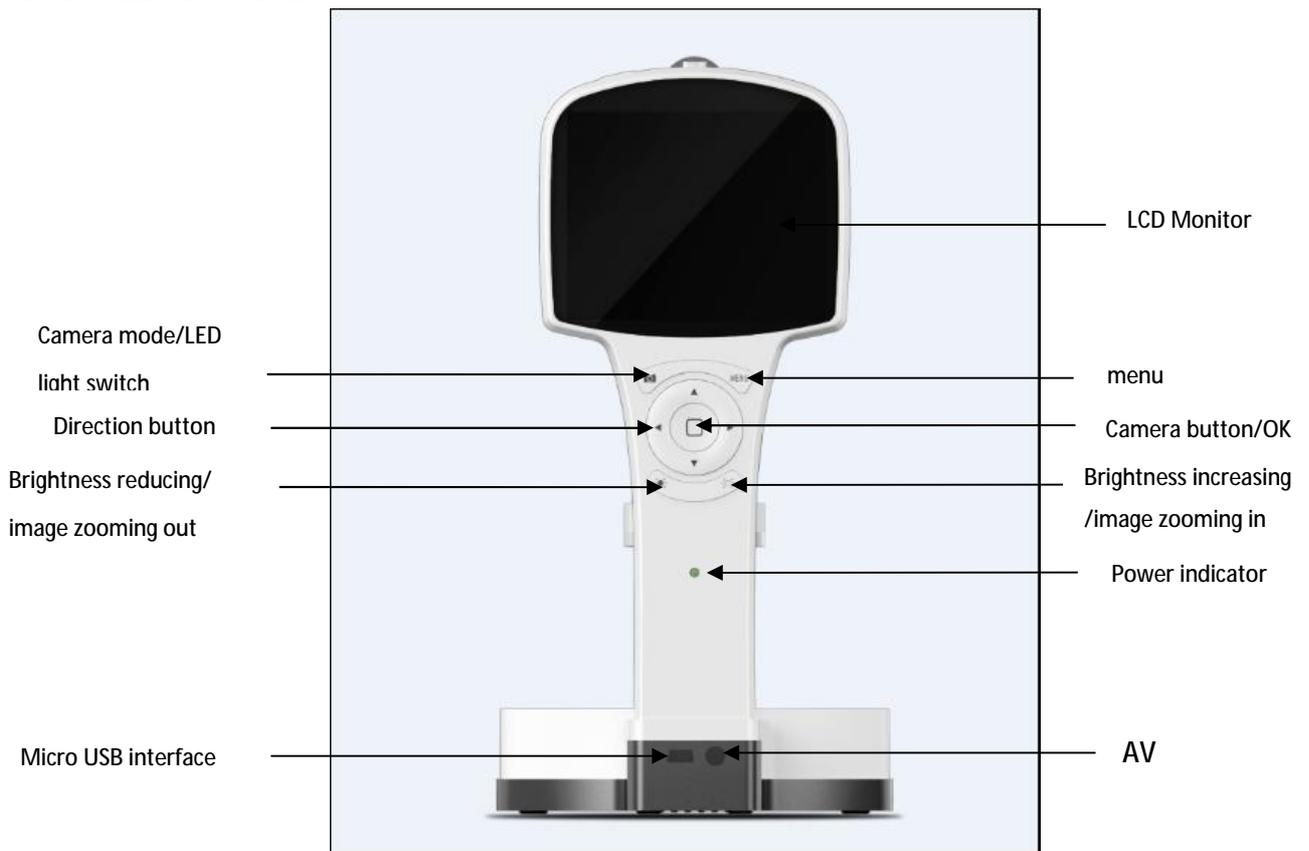
**Fig 1 Basic component**



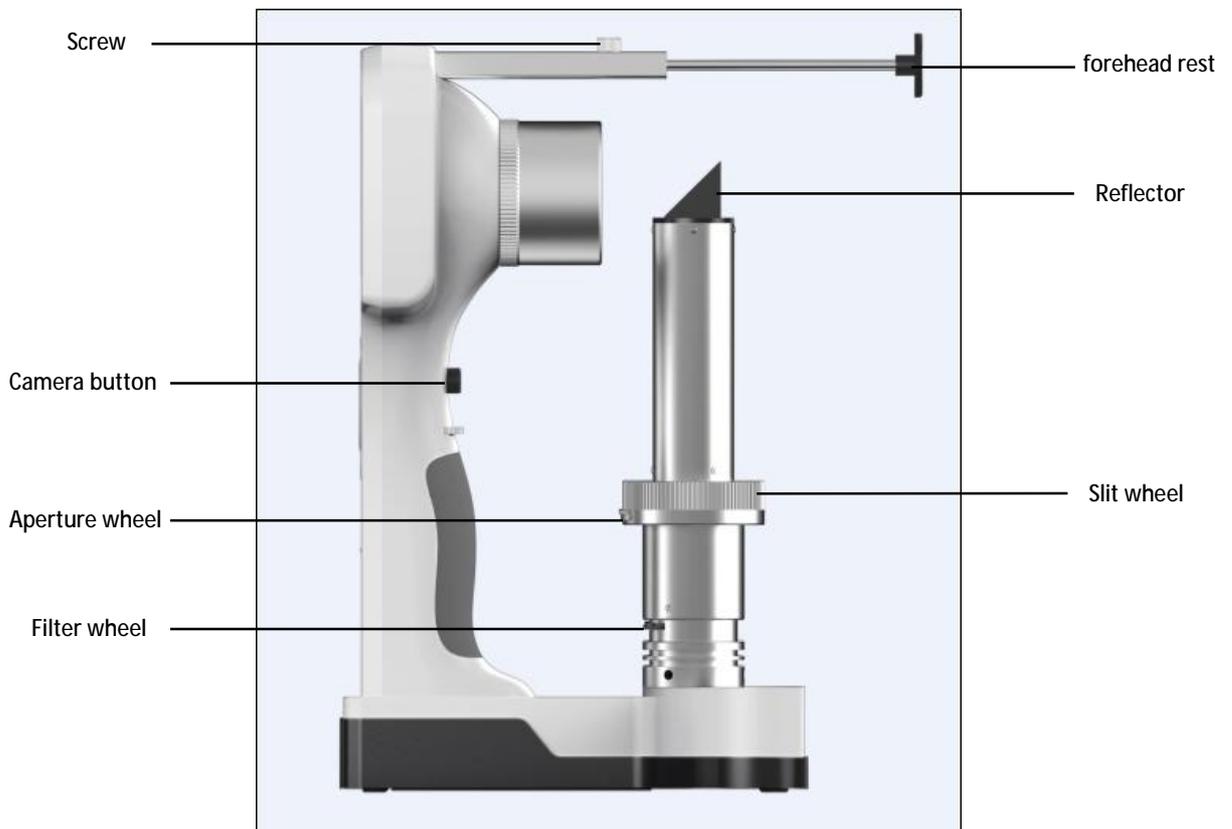
Lithium battery

**Fig 2 Lithium battery**

### 3.Parts instruction



Note: AV port is reserved for later use.





Power  
Button

Frequently used functions:

- 1) Power button – for turning on/off the equipment
- 2) Camera/LED light button – press this button to go to photographing mode when browsing image; for turning on/off the LED light at photographing mode.
- 3) Menu – display, delete images, and format SD card
- 4) Direction buttons – to browse images
- 5) Luminance reduction and zoom out – In photographing mode, press this button to reduce image luminance; in browsing mode, press this button to zoom out then image
- 6) Luminance increase and zoom in – In photographing mode, press this button to increase image luminance; in browsing mode, press this button to zoom in the image.
- 7) Power indicator: to indicate the energization, power and recharging condition
- 8) MiniUSB interface: to connect USB cable for recharging or data transfer
- 9) Forehead rest: to adjust the distance between patient's forehead and lens
- 10) Screw: to fasten the forehead rest
- 11) Camera button: press this button to take a photo
- 12) Slit wheel: to adjust slit width
- 13) Aperture wheel: to choose different size aperture
- 14) Filter wheel: to choose different filter

## **4. Product overview**

### **4.1 Product model: HSL**

### **4.2 Power supply**

I Supply voltage: DC3.6V

I Power input: <6VA

- 1) Please make sure the battery is fully recharged. If not, please recharge the battery.
- 2) Push and pull focusing bar to make sure it moving smoothly.
- 3) Press power button for 3 seconds to start up the device.
- 4) Rotate aperture wheel and filter wheel to make sure them working well, and observe the aperture and filter on the focus target. Turn slit wheel to make sure the slit change works well.
- 5) Press Camera/LED light switch button to turn on the light.

### **4.3 Operation environment**

I Temperature: 0°C~35°C

I Relative humidity: 10%~80%

I Air pressure: 760hPa~1060hPa

### **4.4 Storage environment**

I Temperature : -10°C~40°C

I Relative humidity: 80%

I Air pressure: 760hPa~1060hPa

I Notes : If the device is stored more than 2 weeks, please take battery out.

### **4.5 Product characteristics**

Electric shock protection types: internally powered equipment

Electric shock protection levels: B

Harmful liquid protection levels: IPX0, ordinary equipment

In mixture of air with flammable gas type: N/A

Operational mode type: continuous operation

Voltage rating: DC 3.6V

Input power : < 6VA

Defibrillation charges : N/A

Signal input/output: Yes

Permanent or non-permanent installed equipment type: non-permanent and portable equipment

Power type: internal power supply

Applied part: forehead rest

### **4.6 Contraindication: NO**

**4.7 Working life: 7 years**

**4.8. Production date: Please refer to product label**

## **5. Operation instruction**

### **5.1 Battery installation**

Please take off the battery cover, insert battery to battery slot, and please make sure the mark ‘+’ on battery corresponding to ‘+’ in the slot.

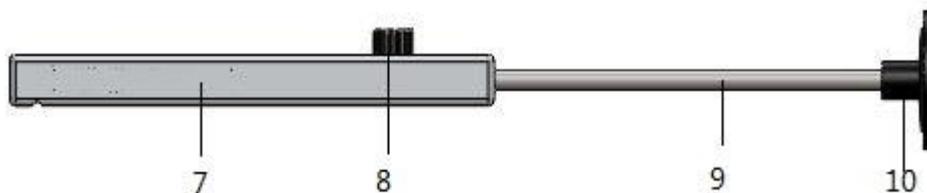
### **5.2 Preparation before use**

- 1) Please make sure the battery is fully recharged. If not, please recharge the battery.
- 2) Push and pull focusing bar to make sure it moving smoothly.
- 3) Press power button for 3 seconds to start up the device.
- 4) Rotate aperture wheel and filter wheel to make sure them working well, and observe the aperture and filter on the focus target. Turn slit wheel to make sure the slit change works well.
- 5) Press Camera/LED light switch button to turn on the light.

### **5.3 Product application**

#### **5.3.1 Working distance adjustment**

Please put forehead rest 7 on patient’s forehead, and make the lens center and patient eye at the same level, then move the device forward and back slightly to adjust the distance between the lens and patient eye, till clear image coming out, then tighten screw 9.



7---forehead rest 8---forehead bar 1

9---screw 10---forehead bar 2

**Fig 5 Forehead module**

#### **5.3.2 Slit width adjustment**

Slit width can be continuously adjustable between 0-12mm.

As the picture shows below, please rotate slit wheel 23, clockwise rotation to decrease slit width, anti-clockwise rotation to increase slit width.



21---filter wheel    22---aperture wheel  
23---slit wheel    24---reflector

**Fig 6 Illumination module**

### 5.3.3 Aperture adjustment

This slit lamp has 4 apertures, which are  $\varnothing 12\text{mm}$ 、 $\varnothing 5\text{mm}$ 、 $\varnothing 1\text{mm}$ 、 $\varnothing 0.2\text{mm}$ .

As Fig 6 shows above, rotate slit wheel 22 to change different aperture.

### 5.3.4 Filter change

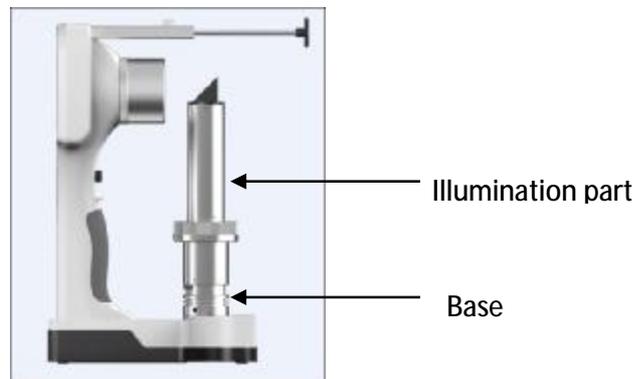
As Fig 6 shows above, rotate filter wheel 21 to select Cobalt Blue, Red-free and Heat absorption to meet doctors' needs.



Notice: It is safe under reasonable and expected condition. It is class I LED, please do not use this light to focus on patient's eye for a too long time.

### 5.3.5 Illumination stand adjustment

To take photo of different part of the eye, please move the base of the illumination stand to adjust the position as showing in Fig 7.



**Fig 7 Slit lamp**



Notes: Please do not hold the illumination part to move the illumination stand.

### 5.3.6 Image taking

According to 4.3.1-4.3.4, get the distance, slit width, aperture and filter ready, and then focus on anterior segment, cornea, iris or whole eye, then press Camera button to take a photo.

### 5.3.7 Image display

- I After capturing images, press Camera button to go back to photographing mode, and it save the image automatically
- I Press Menu button to display or delete recent image; to display more images by pressing ▲/▼, ◀/▶.

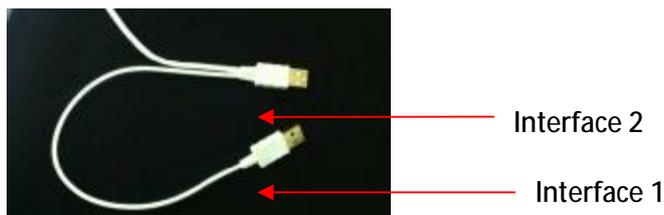
- I Press to zoom in and zoom out the image, for more details, please press ▲/▼, ◀/▶

### 5.3.8 Data transfer

#### 4.3.8.1 Data transfer by USB card

- I Connect USB mini interface 1 to the base
- I Connect USB interface 2 to the computer to transfer data

The mini-USB port shall only be connected to AC adapter Model (AKN2G-0500200UU) or the USB 2.0 port of an agency approved equipment certified to IEC 60950-1 or IEC 60601-1



**Fig 7 USB cable**

#### 4.3.8.2 WiFi transfer

- I Transfer data to PC: please set up and start up the software for digital hand-held slit lamp, and find its Access Point at WiFi signal on PC, then get connected. If digital hand-held slit lamp successfully get connected with PC, the disc will become conn on slit lamp screen, then hand-held slit lamp taking photo can real-time show in the software on PC. The specific and detailed installation and operation method, please refer to Digital hand-held slit lamp software operation manual on PC.
- I Transfer to mobile phone: please download APP software on mobile phone, and open digital hand-held slit lamp software, then find its Access Point at WiFi signal on mobile phone, and get connected. If digital hand-held slit lamp successfully get connected with PC, the disc will become conn on mobile phone screen, then hand-held slit lamp taking photo can real-time show in the software on phone. The specific and detailed installation and operation method, please refer to Digital hand-held slit lamp APP software operation manual.

### 5.3.9 Battery replacement

Please recharge 12 hours for first time. Long time storage or using out power, please recharge the battery.

Battery replacement:

- 1) Take off the battery cover
- 2) Take the battery out of the slot
- 3) Put the new battery in the slot and cover it.

### 5.4 Daily maintenance

#### 5.4.1 Battery and charger safe use and maintenance

- 1) Please do not recharge and use different model battery to avoid probable explosion or severe damage.
- 2) Lithium battery has no memory function, so it can be recharged with left electricity inside, not reducing its capacity.
- 3) Lithium battery is not allowed to over time use when the power indicator turns to orange, please stop use and recharge it.
- 4) There is over recharging protecting function for the battery, so please do not worry about over recharging.
- 5) All rechargeable batteries have maximum recharging and releasing times, please do not frequently recharge and release electricity.
- 6) Lithium battery will work in its best condition between 0°C to 35°C. At too low or too high temperature, it will not work well, so please do not recharge it at lower than 0°C or higher than 40 °C.
- 7) If the device is in stock for long time, please fully recharge the battery and take it out of the device, then store it separately.
- 8) If the battery is broken, replace it with batteries supplied by usCo., Ltd
- 9) Please do not place the battery together with metal things in a pocket to avoid short circuit causing fire.
- 10) Please do not use broken battery or battery without shell.
- 11) Please make battery short circuit, or take apart it, or throw it in fire.
- 12) Please use charger supplied by our company to recharge the battery.
- 13) If the power indicator darkens or light off, please recharge.
- 14) After fully recharging the battery, please disconnect the device with charger, over recharging may cause damage to battery.
- 15) A battery can be recharged more than 300 times. Recharging times depends on left power in battery during recharging, the less the power is , the longer battery working life will be.
- 16) After recharging or not using charger, please unplug the charger.
- 17) During recharging, please do not cover the charger to avoid fire.

#### 5.4.2 Clean and Sterilization

The slit lamp can be cleared by clean cloth and sterilized by alcohol. Please keep distance with strong acid and alkali, and please make sure to keep it power off during cleaning and sterilizing.

#### 5.4.3 Recharging

- I Connect USB Mini interface to the base
- I Connect interface 1/2 with charger or computer

#### 5.4.4 Power indicator

Color	Status
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Green	Ready for use (Power is more than 25%)
Flash orange	Power is lower than 25%
Orange	Recharging
No light	Power off

#### 5.4.5 Maintenance

Digital hand-held slit lamp is precise optical instrument, please do handle with care and maintain specially. Please be noted the following instruction:

- I Regularly check the device and parts
- I Please make sure it power off before any clean up
- I Please use special optical soft cloth or tissue to clean the optical lens
- I When cleaning the lens, please do not break aperture

### 6. Technical requirement

#### 6.1 Technical specification

Power supply: Internally powered by battery (3.6 Vdc, 2200 mAh) or powered via USB (5Vdc, maximum input 6VA)

Size: 16cm\*9cm\*19cm

Net weight: 1000g(Typical)

Image resolution: 1920\*1080

Flashlight: White LED

LCD screen: 3.5 inch TFT color

Image format: JPEG

Interface: Mini USB

Document transfer: Mini USB

Document storage: Micro SD card 8G, up to 16G

Forehead rest bar:  $\geq 10\text{mm}$

Illumination angle:  $\geq \pm 30^\circ$

Object eyepiece: 0.42X

Numerical aperture: 0.05

Slit width: 0mm~12mm

Aperture diameter:  $\varnothing 0.2\text{mm}$ 、 $\varnothing 1\text{mm}$ 、 $\varnothing 5\text{mm}$ 、 $\varnothing 12\text{mm}$

Filter : Red-free, Cobalt blue, Heat absorption

### 7. Liability

We considers itself responsible for the effects on safety, reliability and performance of this product only if:

- I Assembly operations, extensions, re-adjustments, modifications or repairs are carried out by persons authorized.
- I The electrical installation of the relevant room complies with the requirements.
- I The equipment is used in accordance with these instructions for use.

## 8. Warranty

- I We provides one year warranty for the parts. Warranty for battery is six months.
- I The warranty starts at delivery date.
- I Natural disasters, man-made damage, lack of reasonable care, disassembly, upgrade, warranty sticker torn off, or any phase-out parts are not included in the warranty.

## 9. Trouble shooting

Trouble	No.	Reason	Solution	Remark
Aperture out of shape	1	Aperture wheel is not in the right position	Please make sure aperture wheel in its right position.	
	2	Illumination stand block the light.	Please place the illumination stand on one side of the camera lens, not in the middle.	
	3	The filter wheel is not in the right position.	Please adjust the filter wheel to its right position.	
No light	4	Illumination switch is off.	Please turn on the illumination power.	
	5	Aperture wheel is off.	Please rotate the aperture wheel to its biggest position.	
	6	The brightness of illumination is in the lowest position.	Please turn up the brightness.	
Strips on screen or on images	7	Low battery	Please change or recharge the battery.	
	8	Internal connection loose	Please contact your supplier.	
WI-FI connection failure	9	WI-FI function is not starting up.	Please restart the device/re-connect WIFI	

	10	WIFI setting on PC is changed	Please set automatic acquisition for WIFI on PC	
	11	Wrong password for WIFI connection	Reset: In photographing mode, press MENU, Display Picture will show up, then press ▼ twice to go to Default AP, press YES, then the device will be reset, and restart the device. WIFI connection password is 12345678.	After reset, the WIFI spot name will change to Micro_HFC. If you want to change WIFI name, please refer to the software operation manual.
System halt, black /blue screen	12	Illumination switch is off; or aperture wheel is off;	1. please make sure to turn on the light 2. please make sure to turn up the aperture wheel	
	13	Incorrect operation	Turn off the device and restart.	
	14	Failure reading/saving on SD	1. SD wrong format, please make sure to use FAT32 Micro SD card; 2. We suggest formatting SD card on PC. Please find Removable disk in My Computer, and right click to choose Format, then confirm to choose FAT32, click start to format; complete the step, then disconnect the USB cable, and restart the device to confirm.	1. Before format, please store the data in the SD card; after format, please keep the SD card at FAT32 2. After format, the WIFI name will change to Micro_HFC; If you want to change WIFI name, please refer to the software operation manual.
	15	SD card is not installed	Please install an SD card.	
	16	Screen damage	Please contact your wholesaler/agent or directly contact us	

	17	Bug of software version		
Fail to save /delete images	18	Image error	The current device support images of JPG or JPEG. Please use USB to connect to PC to delete the image on PC. If you can not delete on PC , please format SD card.	
	19	SD card error		
When connecting to PC with USB, SD card can not be read.	20	SD damage	Please change a new SD card	
	21	USB connection at the base is loose.	Please contact your wholesaler/agent or directly contactus	
Illumination stand loose	22	The screw is loose.	Please contact your wholesaler/agent or directly contactus	
The device /button does not work	23	Incorrect operation causing keyboard error	Please contact your wholesaler/agent or directly contactus	Violent operation means frequently press the button when it does not work properly.
	24	Violent operation causing key structure damage		
The device can not turn on	25	Low battery	The device is a battery consuming equipment, please change a battery or recharge the battery.	
	26	Incorrect operation	Press the switch for 3 to 5 seconds to turn it on ;if the device is not turned on after 5 seconds, please repeat this step; if the device is still not turned on after the above step, please contact your wholesaler/agent or directly contactus;	
The image is not at the center of the screen	27	Illumination stand is loose.	Please contact your wholesaler/agent or directly contactus;	
The smallest slit does not work.	28	Focal distance is not adjusted in its right place.	Put the forehead rest on patient forehead, move the device forward and backward to get a clear focal distance, then take a photo; if the forehead rest can not be adjusted, please contact your wholesaler/agent or directly contactus;	

## 10. Packing list

Digital Hand-held slit lamp	1
Forehead rest	1
USB cable	1
Power adapter	1
Battery 18650(NCM18650-220)	1
USB flash drive for PC software	1
User manual	1

## 11.EMC Information

Guidance and manufacturer's declaration - electromagnetic emissions - for all ME EQUIPMENT and ME SYSTEM.

Table 1:Guidance and manufacturer's declaration – electromagnetic emissions		
The HSL is intended for use in the electromagnetic environment specified below. The customer or the user of the HSL should assure that it is used in such an environment.		
Emissions test	Compliance	Electromagnetic environment - guidance
RF emissions CISPR 11	Group 1	The HSL is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes
RF emissions CISPR 11	Class A	
Harmonic emissions IEC 61000-3-2	A	
Voltage fluctuations/ Flicker emissions IEC 61000-3-3	Complies	

Guidance and manufacturer's declaration - electromagnetic immunity - for all ME EQUIPMENT and ME SYSTEM.

Table 2:Guidance and manufacturer's declaration – electromagnetic immunity

The HSL is intended for use in the electromagnetic environment specified below. The customer or the user of the HSL 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	±6 kV contact ±8 kV air	±6 kV contact ±8 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%.
Electrical fast 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 lines to lines ±2 kV lines to earth	±1 kV lines to lines ±2 kV lines to earth	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% $U_T$ (>95% dip in $U_T$ ) For 0,5 cycle 40% $U_T$ (60% dip in $U_T$ ) For 5 cycle 70% $U_T$ (30% dip in $U_T$ ) For 25 cycle <5% $U_T$ (>95% dip in $U_T$ ) For 5 cycle	<5% $U_T$ (>95% dip in $U_T$ ) For 0,5 cycle 40% $U_T$ (60% dip in $U_T$ ) For 5 cycle 70% $U_T$ (30% dip in $U_T$ ) For 25 cycle <5% $U_T$ (>95% dip in $U_T$ ) For 5 cycle	Mains power quality should be that of a typical commercial or hospital environment. If the user of HSL requires continued operation during power mains interruptions, it is recommended that the HSL be powered from an uninterruptible power supply or a battery.
Power frequency (50/60Hz) magnetic field	3A/m	3A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment

IEC 61000-4-8			
Note: $U_T$ is the a.c. mains voltage prior to application of the test level.			

Guidance and manufacturer's declaration – electromagnetic immunity for ME EQUIPMENT and ME SYSTEM that are not LIFE-SUPPORTING.

Table 3: Guidance and manufacturer's declaration – electromagnetic immunity			
The HSL is intended for use in the electromagnetic environment specified below. The customer or the user of the HSL should assure that it is used in such an environment.			
Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment-guidance level
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80MHz	3V	<p>Portable and mobile RF communications equipment should be used no closer to any part of the SYSTEM, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.</p> <p>Recommended separation distance</p> $d = \left[ \frac{3.5}{V_1} \right] \sqrt{P}$
Radiated RF IEC 61000-4-3	3 Vrms 80MHz to 2.5GHz	3V/m	$d = \left[ \frac{3.5}{E_1} \right] \sqrt{P} \quad 80\text{MHz to } 800\text{MHz}$ $d = \left[ \frac{7}{E_1} \right] \sqrt{P} \quad 800\text{MHz to } 2.5\text{GHz}$ <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, should be less than the compliance level in each frequency range.</p> <p>Interference may occur in the vicinity of</p>

			equipment marked with the following symbol: 
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Recommended separation distances between portable and mobile RF communications equipment and the ME EQUIPMENT and ME SYSTEM – for ME EQUIPMENT and ME SYSTEM that are not LIFE-SUPPORTING.

Recommended separation distances between portable and mobile RF communications equipment and the HSL			
The HSL is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the HSL can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the HSL as recommended below, according to the maximum output power of the communications equipment.			
Rated maximum output power of transmitter  W	Separation distance according to frequency of transmitter  m		
	150kHz to 80 MHz	80MHz to 800MHz	800MHz to 2.5GHz
	$d = \left[\frac{3.5}{V_1}\right]\sqrt{P}$	$d = \left[\frac{3.5}{E_1}\right]\sqrt{P}$	$d = \left[\frac{7}{E_1}\right]\sqrt{P}$
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