



## Patharity™ Smart Camera

Model **ECS1**

User Manual

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Attention: ECS1 is only used for research purpose.

Version: Chinese V1.0 April 2021

Congratulations on your purchase of the ESC1 Smart Camera,  
please contact us if you have any questions: [info@singularity.ai](mailto:info@singularity.ai)

# General descriptions

# General descriptions

## Clean

- Try to keep all optical components clean.
- If there is thick dust on the surface of the optical components, please use a brush to gently remove the dust before wiping.
- The surface of the optical components should be cleaned with a lint-free cloth, lens tissue or cotton swab soaked in 70% ethanol, or with a commercially available glass washer. It is not recommended to use pure alcohol.
- Lint-free cloth, lens tissue or cotton swabs should only be slightly moistened with solvents to avoid excessive use of solvents.

## Maintenance

- Repair work can only be performed by maintenance technicians trained by Qingge Medical.
- Only use accessories designated by Qingge Medical.

# Icon descriptions

Before using the device, please read and understand this user manual carefully.

## Important information



This icon indicates additional information or explanation.

## Safety descriptions

- If it is not specifically designated for use in diagnostic procedures, do not use ECS1 or its components for this purpose.
- The instruments and accessories described in this user manual have passed safety and potential hazard tests.
- If you want to modify or improve this instrument or use it with components outside the scope of this manual, you must first consult Qingge Medical!
- Unauthorized modification of the instrument or non-compliant use of the instrument will invalidate all warranties.

### Place of use

- The distance between electrical components and the wall must be greater than 10cm.
- Keep away from flammable materials.
- Place the intelligent computing box at least 20cm away from the user.
- Avoid sudden temperature changes, direct sunlight and vibration, otherwise it will affect the camera's functions.
- When using in a warm and humid climate, professional maintenance of each component is required to prevent the growth of mould.



# Foreword

# Congradulations!

Congratulations on your purchase of the Ruiyiming TM smart camera, model ECS1. This document guides you to install and use this product easily.

## Image display

Smart cameras can collect images of different resolutions and display them on a high-definition monitor to obtain the following resolutions:

- 1080P: 1920 (H) x1080 (V) 2.21MPixel
- 4K: 3840 (H) x2160 (V) 8.85MPixel
- MAX: 4000 (H) x3000 (V) 12MPixel

## Cloud storage

Your ECS1 camera comes with a cloud image storage space, which can be registered and used at the following website:

<https://live.singularity.ai>

Or contact our local sales representative to get in touch.

# Standard configuration and optional accessories

## Standard configuration

1. ECS1 Microscope Smart Camera
2. Intelligent computing box

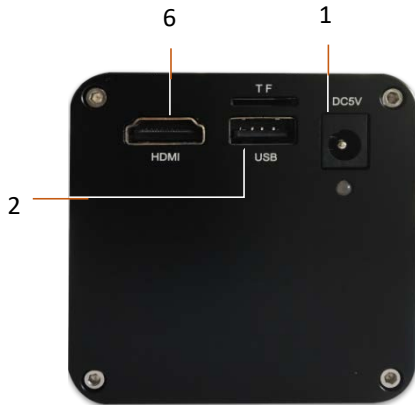


## Accessories

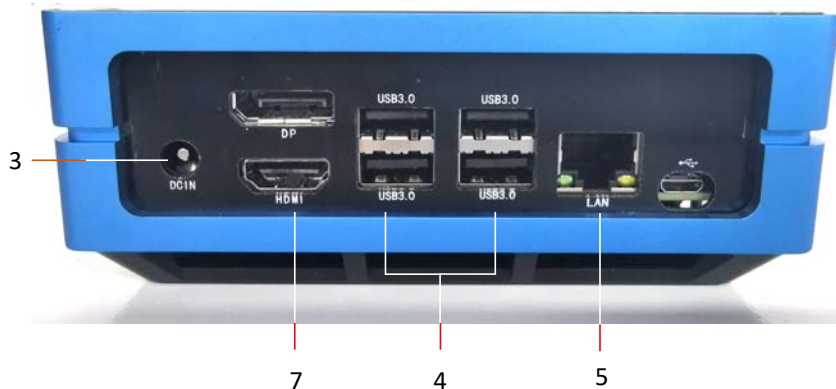
1. USB cable, used to connect the camera and the smart computing box
2. Power cord, used to connect the camera
3. Power cord, used to connect smart computing box
4. C-mount 0.5X interface (optional)



## Instrument overview



1. Camera power extension cord jack/power jack
2. USB cable socket, used to connect the camera and the smart computing box
3. Intelligent computing box power jack
4. USB socket, used to connect the camera USB cable
5. Ethernet (Ethernet) CAT-5/CAT-6 wired network interface



6. HDMI: shielded, do not use.
7. HDMI: optional, smart computing box HDMI interface.

# Assembling

## A must for installation!

Installing the camera requires basic tools and local network information. Please prepare the following items before starting the installation:

- 1) The SSID/Password of the local network (network name and password, you should be able to obtain this information from the IT staff).
- 2) Use the right tool to remove your original camera (if you have one), and install a new camera and adapter (you may need an Allen key, because some microscopes come with an Allen key tool).
- 3) An electronic device (laptop or desktop computer, a large-screen display is recommended) with a wireless network, and a browser is used to set the network settings of the smart computing box and collect images.
- 4) A certain length of network cable (optional): Only required when the smart computing box is set up with a wired network connection.

## Assembling the camera



The ECS1 camera is connected to the microscope through the C-type interface. If you do not have a suitable interface, please contact our sales representative.



It is forbidden to directly install the camera with a mismatched adapter to avoid damage to the equipment or lower image quality.



During installation, prevent dust from entering the optical system.



There is a suitable C-type interface on the microscope, and the camera can also be directly connected to the C-type interface.

### Assembling

1. Screw the camera onto the C-mount.
2. Screw the camera onto the trinocular head of the microscope using the C-mount from step 1.



3. Use the USB cable to connect the camera and the smart computing box.
4. Connect the provided camera power cord.
5. After the power is turned on, the camera indicator light changes from red to blue.

## Assembling the camera

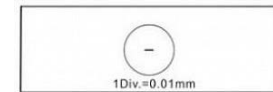
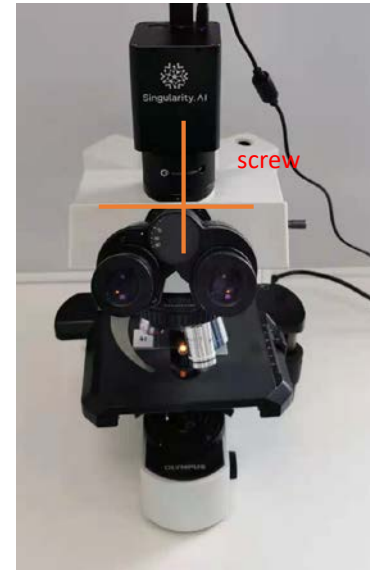


The angle of the camera and the adapter on the trinocular head of the microscope are very important for the panoramic image stitching function. Please adjust the camera by loosening the screw (the screw is the one that installs the adapter on the trinocular microscope) (see the picture on the right, the camera logo is on the front) ).



By horizontally calibrating the slice, adjust the horizontal movement direction of the camera and the slide to be parallel, the method is as follows:

1. Place the calibration slice (as shown on the right) horizontally on the stage, adjust the level of the stage and the level of the slide holder, and observe the eyepiece field of view to ensure that the calibration slice moves horizontally with the stage.
2. At this time, observe the camera acquisition page to determine whether the calibration slice of the acquisition page is also horizontal. If it is not horizontal, please loosen the screw slightly and turn the connector slightly to adjust the calibration slice on the camera acquisition page to be horizontal.



Horizontal calibration slice



# Assembling intelligent computing box



The smart computing box is the "brain" of the camera, please place it in a safe and stable location.



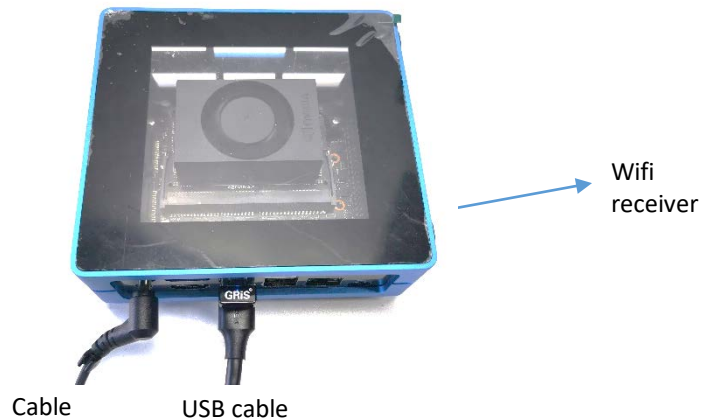
After the smart computing box is running for a long time, there will be slight heat, which is normal. Please do not disconnect the power of the smart computing box at will.



The Wifi receiver has been installed at the factory, and it is not recommended to plug it in or out. If plugging or unplugging occurs, please restart the power of the smart computing box, wait 3 minutes before proceeding with subsequent operations.

## Assembling

1. Use the USB cable to connect the smart box and the camera;
2. Connect the power cord of the smart computing box, and it will take about 5 minutes to start up for the first run. Please wait for a while.



# Login collection system

After the system is assembled, use your computer to capture images, connect to Wifi empath, and access the camera through a browser to capture images:

Visit address: `http://10.0.0.1:5000`

The initial input user name and password are both admin.

English (英语) ▼

## Sign-In

Username\*

Username

Password\*

Password

SIGN IN

Need an account? 

SIGN UP

## Set up smart computing box network (optional)



When the user needs to use the local external network to access the camera, a smart computing box network needs to be set up.



It needs to be set after installing/restarting the smart computing box for the first time/after power off.



The system provides three ways to set up the network connection, you can choose them freely.

Among them, the two-dimensional code scanning method can ensure the accuracy of input, which is more convenient and quicker than the mobile phone.

### Method 1: Wired network connection

Please insert the network cable into the smart box.

Make sure that the network cable can be connected to the external network.



After connecting to the network, please contact your IT staff to know the IP address assigned to the camera (it is recommended to ask the IT staff to set a fixed IP).

## Set up smart computing box network (optional)



If you are using an iPhone or other Apple products, the QR code can be identified by the camera that comes with your device.

Android system mobile devices need to download the QR code scanning application from its application center (WeChat scanning code is not supported).

Recommended use: QR code scanning APP (see here)



二维码扫描 官方  
3.8分 1187万次下载



The page after scanning the code on the right is as follows::



Method 2: QR code to quickly set up a wireless network (Wifi) connection

1. Connect to the wifi of the smart computing box:

Scan the following QR code with your device (mobile phone/computer/tablet):

## Set up smart computing box network (optional)



During the setup process, your device is not allowed to connect to other networks.



After connecting to the network, please contact your IT staff to know the IP address assigned to the camera (it is recommended to ask the IT staff to set a fixed IP).



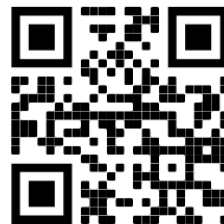
The page after scanning the code is on the right:



### Method 2: QR code to quickly set up a wireless network (Wifi) connection (continued)

2. Connect to the local network:

After your device is successfully connected to the smart box wifi network, scan the following QR code with your device (mobile phone/computer/tablet):



Follow the prompts on the page and enter the SSID (name) and password of the local network. Click Submit. The smart computing box will restart and connect to your local network.

## Set up smart computing box network (optional)



After connecting to the network, please contact your IT staff to know the IP address assigned to the camera (it is recommended to ask the IT staff to set a fixed IP).

### Method 3: Manually set up the wireless network (Wifi) connection

#### 1. Connect smart box wifi:

Use your device (mobile phone/computer/tablet) to open the network settings, find the network empath, enter the password USCAP2020, and connect to the network.

#### 2. Connect to the local external network:

After your device is successfully connected to the smart box wifi network, open the browser and enter the following address:  
<http://10.0.0.1:3000/connect>

Follow the prompts on the page and enter the SSID (name) and password of the local network. Click Submit. The smart computing box restarts automatically and connects to your local network.

## Log in the data acquisition system

After setting up the network in any of the above three methods, ask your IT staff to find the IP address assigned to the camera (it is recommended to ask the IT staff to set a fixed IP).

After obtaining the IP, use your computer for capturing images, connecting to the network you set up, and accessing the camera through a browser to capture images:

Visit address: `http://IP:5000`

The initial input user name and password are both admin.



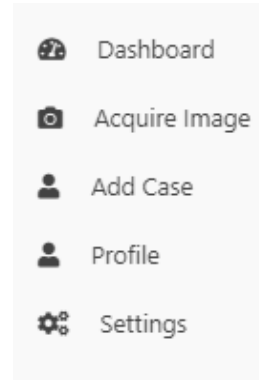
The screenshot shows a web interface for logging into a data acquisition system. At the top right, there is a language selector showing 'English (英语)' with a dropdown arrow. The main heading is 'Sign-In'. Below this, there are two input fields: 'Username\*' and 'Password\*'. Both fields have placeholder text matching their labels. Below the password field is a blue 'SIGN IN' button. At the bottom left, there is a link 'Need an account?' followed by a blue 'SIGN UP' button.

# An introduction to the data acquisition system



## Page icon descriptions

- Case list: display the collected case images
- Image acquisition: real-time image acquisition page
- Add case: add a new case
- Personal Information: Edit user information
- Settings: Advanced settings such as system update and restart



## Page icon descriptions (continued)

### Add case page

- Manage slice types: You can add or delete slice types.
- Add case: Fill in the pathology number and slice number of the case, and select the slice type to add a case.

Add Case

Path#

Path#

Slide#

Slide#

Slide Type\*

-- Select --

Received

25 May, 2021

Due Date

25 May, 2021

ADD CASE

Manage Slide Type

HE

KI-67


Plant

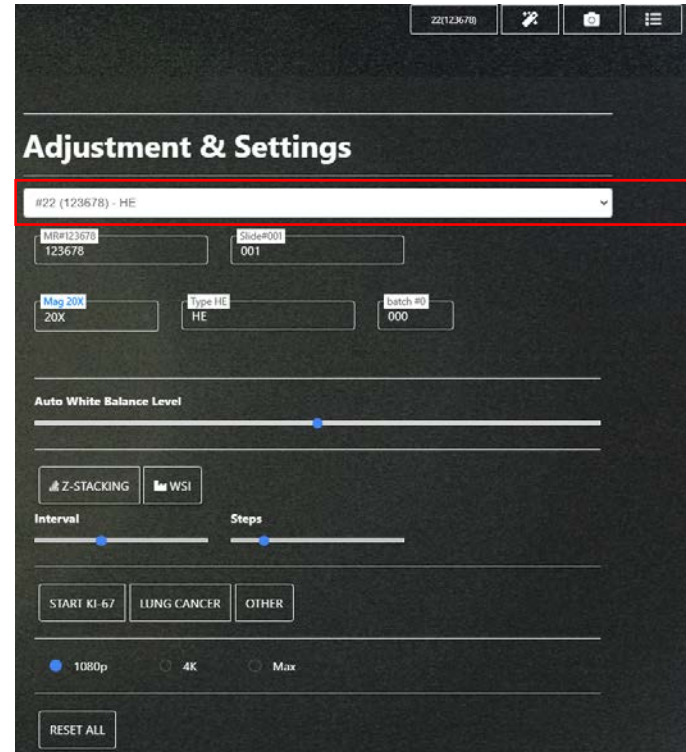
New Slide Type

## Page icon descriptions (continued)

### Capture image page

Name the captured image:

- Click the settings icon 
- Select case: You need to add a case before you can select a case in this position.
- Select magnification: refers to the magnification of the microscope objective.



## Page icon descriptions (continued)

### Capture image page:

- Automatic white balance



- Take a picture



- Settings



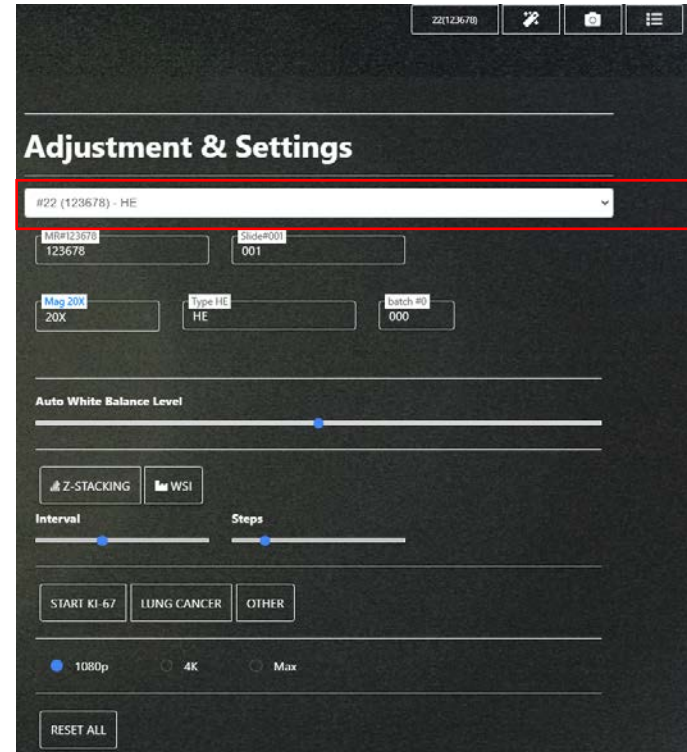
- Back to main page



- Depth-of-field overlay




- Panoramic image stitching sWSI



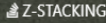
## Autofocus function

Left-click the area you are interested in on the image for autofocus.

## White balance function modes

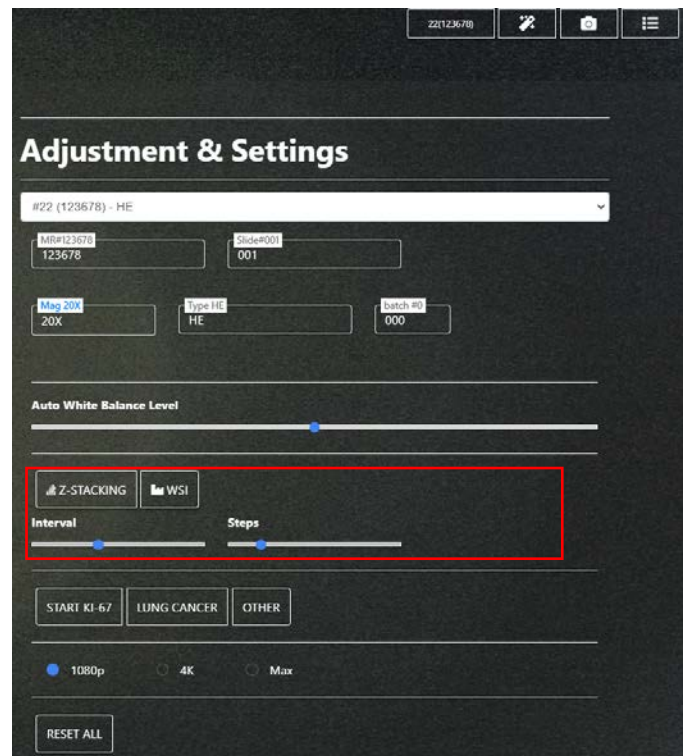
1. Click on the white balance icon  on the page, the icon starts flashing and enters the white balance state.
2. Left-click the white area of the image as a white reference, at this point you can take a picture.
3. After taking the picture, click on the white balance icon again to cancel the white balance mode.

## Depth of field overlay

1. Drag to set the interval and number of steps.
2. Click the depth-of-field superimposition icon  to take a depth-of-field superimposition image.
3. After the depth-of-field superimposed image is completed, the page prompts to notify that the depth-of-field superimposed image has been completed. You can go to the case to view the depth-of-field superimposed image.



When using depth-of-field overlay, please use the default resolution of 1080P, and the generated image is a 12M high-definition image.

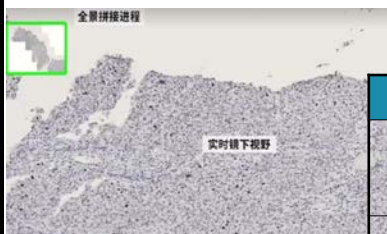
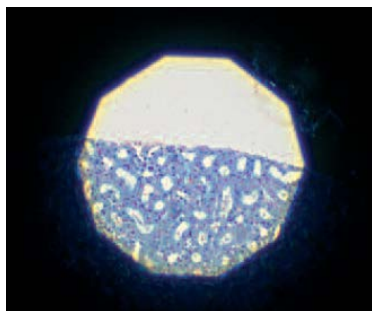


## sWSI (panoramic image stitching function)





Before the panoramic image stitching, adjust the condenser to Koehler illumination: After the sample is focused, the aperture is gradually reduced, and the image in the field of view becomes smaller.

The picture below shows the adjusted Koller illumination: the bright spot is in the center of the field of view image, and the aperture is sharp.



When using the sWSI function, please use the default resolution of 1080P. The recommended objective magnifications are 4x and 10x.

1. Click the icon  start panoramic stitching, and slowly move the field of view under the mirror to stitch.
2. Left-click the panoramic stitching process map in the upper left corner of the mouse to switch between the panoramic stitching map and the field of view under the mirror.
3. During the panoramic stitching process, you can adjust the operation according to the prompts on the page.
4. Click the icon  again to cancel stitching the panoramic image.

prompts	meanings	what users should do
too close	It indicates that the current field of view is too close to the previous field of view.	The moving distance of the stage should be farther.
too far away	It prompts that the current field of view is too far away from the previous field of view.	The moving distance of the stage should be closer, please move back a little.
Slide is twisted	When the slide moves horizontally, there is no guarantee that it does not move in the vertical direction, or the camera and the stage do not move in parallel.	Please move back a little. Or recalibrate the camera to be parallel to the moving direction of the stage (see page 16).

## Case list page

- After the image is collected, click the homepage to return to the case list page.
- Left-click on a row of cases to enter the case image viewing page.



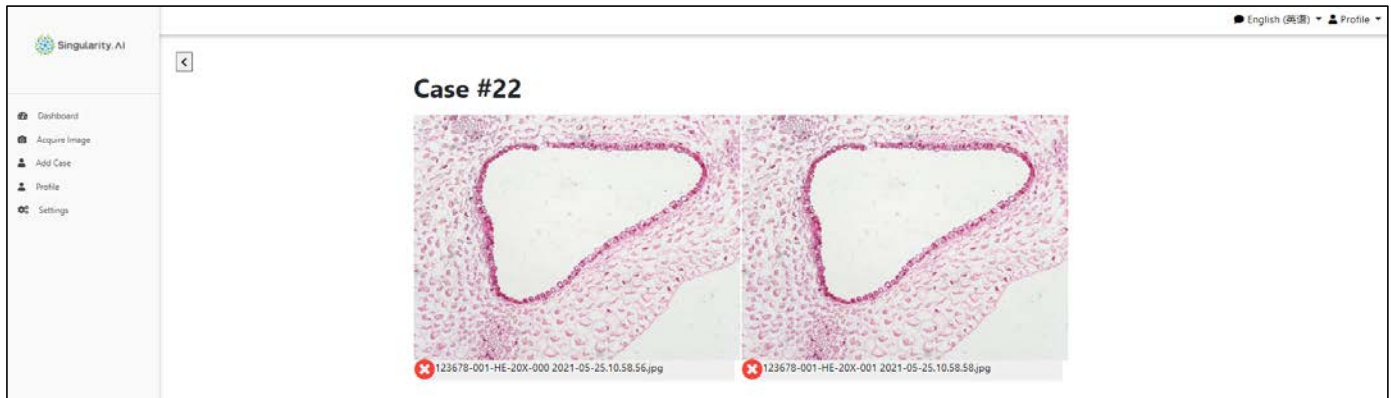
The screenshot shows the Singularity AI web interface. On the left is a sidebar with navigation links: Dashboard, Acquire Image, Add Case, Profile, and Settings. The main content area displays a 'Cases' table. Above the table is a dropdown menu set to 'Select' and a blue 'DELETE' button. The table has columns for Status, Case#, Received, Due, Path#, Slide#, and Type. It contains two rows of data, both with a 'Pending' status. Below the table is a search bar and pagination controls showing 'Rows per page: 10' and '1 - 2 of 2'.

Status	Case#	Received	Due	Path#	Slide#	Type
Pending	22	5/25/2021	5/25/2021	123456	001	H-E
Pending	21	5/25/2021	5/25/2021	7890	001	E-H



## Case list page

- Image viewing page, you can slide the mouse wheel or drag the page scroll bar to view all the images in the case.
- Left-click an image to enter the image viewing page.

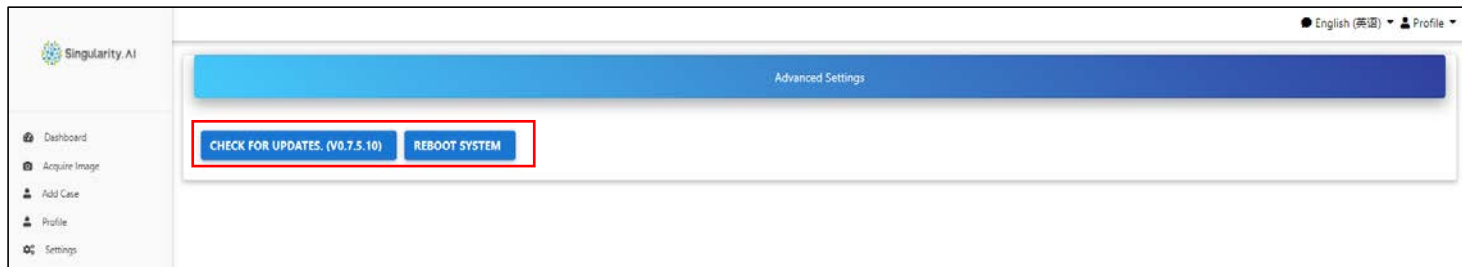


## Syetem update

When the software is connected to the Internet, the acquisition system can be upgraded by checking the new version.

## System restart

Click the system restart icon to restart the smart computing box.



# Care and maintenance

# Care and maintenance

## Care

- Try to keep all optical components clean.
- If there is thick dust on the surface of the optical components, please use a brush to gently remove the dust before wiping.
- The surface of the optical components should be cleaned with a lint-free cloth, lens tissue or cotton swab soaked in 70% ethanol, or with a commercially available glass washer. It is not recommended to use pure alcohol.
- Lint-free cloth, lens tissue or cotton swabs should only be slightly moistened with solvents to avoid excessive use of solvents.
- Keep the microscope camera away from moisture, acid, alkaline, corrosive substances and other chemicals as much as possible.
- Keep the microscope camera away from grease. Do not apply grease on mechanical parts.
- Do not disassemble or replace plugs, optical systems, and mechanical parts, unless specifically permitted and described in the manual.
- When the camera is not used for a long time, please unplug the camera to disconnect the camera. Do not power off the smart computing box.

## Care and maintenance

### Dust-proof

- When the microscope camera is not used for a long time, please cover it with a dust cover (optional accessory). Or place it in a dust-free place.

### Service

- Repair work can only be performed by maintenance technicians trained by Qingge Medical.
- Only spare parts designated by Qingge Medical Company can be used.

## Spare parts

Number	Qingge medical item number	Name of spare parts
1	QGPN-CAUSB	USB cable, used to connect the camera and the smart computing box
2	QGPN-CAADAP	Power cord, used to connect the camera
3	QGPN-ADAP	Power cord, used to connect smart computing box
4	QGPN-5XC (optional)	C-mount 0.5X interface (optional). For microscopes of different brands and models, please select the corresponding C-mount (0.4X-0.6X is acceptable)

# Technical specifications

# ECS1 smart camera

## Camera

- Weight: 420g (camera only)
- Sensor: 1/1.7" (7.53 x 5.64 mm) CMOS type
- Maximum resolution: 12MP
- Pixel size: 1.85 x 1.85  $\mu\text{m}$
- Input: 5V, 2A
- File format: JPG/BMP/TIFF

## Mechanical interface

- C type thread interface

## Camera electronic interface

- USB interface

## Environmental conditions

- Working temperature: 0°C~50°C
- Working/storage relative humidity: 10%-90%
- Pollution degree 2
- For indoor use only
- Installation category II (overvoltage category)
- Working height: 0 m to 2,000 m (0 ft to 6,561 ft)

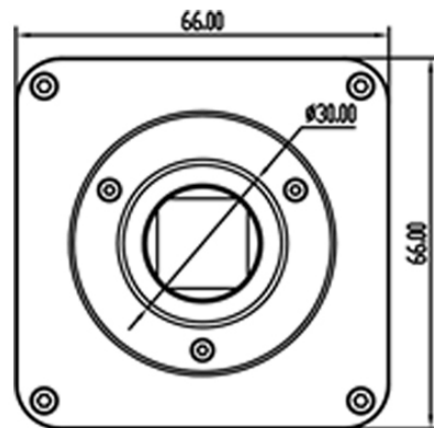
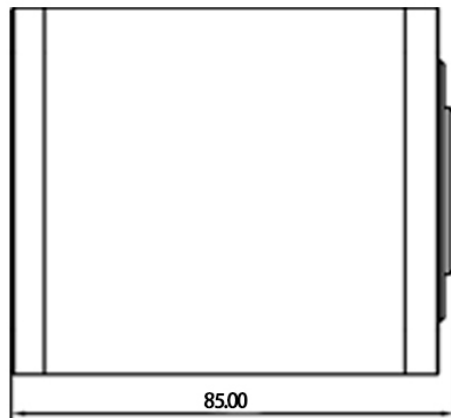
## Intelligent computing box

- Motherboard: DFROBOT NVIDIA JETSON nano
- Wifi receiver
- SD card: 128G



## Dimensions

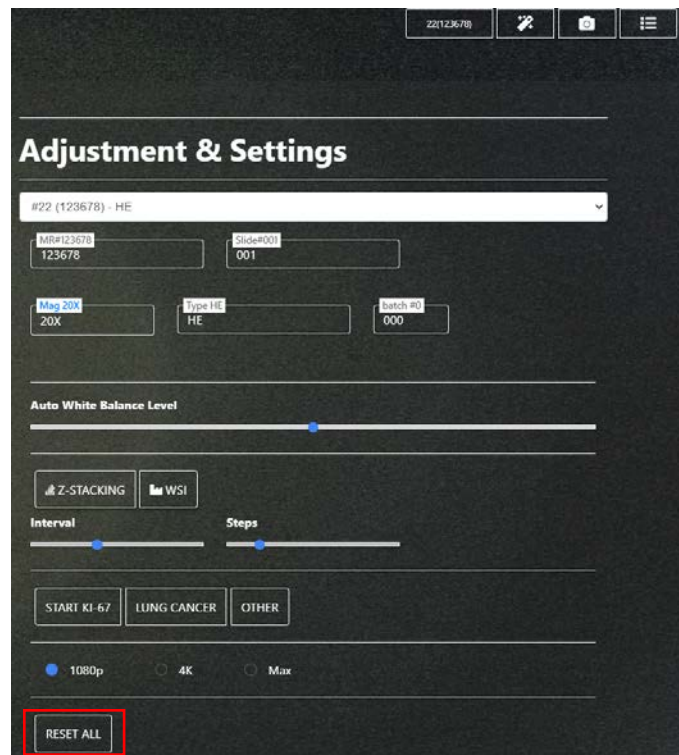
Unit: mm



# Troubleshooting

## Troubleshooting

- When the image acquisition page does not display the field of view under the microscope: Please refresh the page and click the reset all icon. If the view under the lens is still not visible, please restart the camera power extension switch (the camera indicator turns from red to blue to complete the restart), wait five minutes, refresh the page again, and click the reset icon again.
- If there is no operation for ten minutes, the camera will enter a temporary sleep state. If you find that the image page does not follow the movement of the microscope, please click on the image page to perform an autofocus operation.





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Contact Us



## FCC WARNING

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

To maintain compliance with FCC's RF Exposure guidelines, This equipment should be installed and operated with minimum 20cm distance between the radiator and your body: Use only the supplied antenna.