OPTIKA®
I T A L Y

Inspection System Series

INSTRUCTION MANUAL

Model
IS-4K2
IS-4K3

Ver. 1.0   2023

CE   UK CA

Table of contents

1.   Warning

This device is a scientific precision instrument designed to last for many years with a minimum of maintenance. It is built to high optical and mechanical standards and to withstand daily use. We remind you that this manual contains important information on safety and maintenance, and that it must therefore be made accessible to the instrument users. We decline any responsibility deriving from incorrect instrument use uses that does not comply with this manual.

2.   Safety Information

Avoiding Electrical Shock

Before plugging in the power supply, make sure that the supplying voltage of your region matches with the operation voltage of the equipment and that the lamp switch is in off position. Users should observe all safety regulations of the region. The equipment has acquired the CE safety label. However, users have full responsibility to use this equipment safely. Please follow the guidelines below, and read this manual in its entirety to ensure safe operation of the unit.
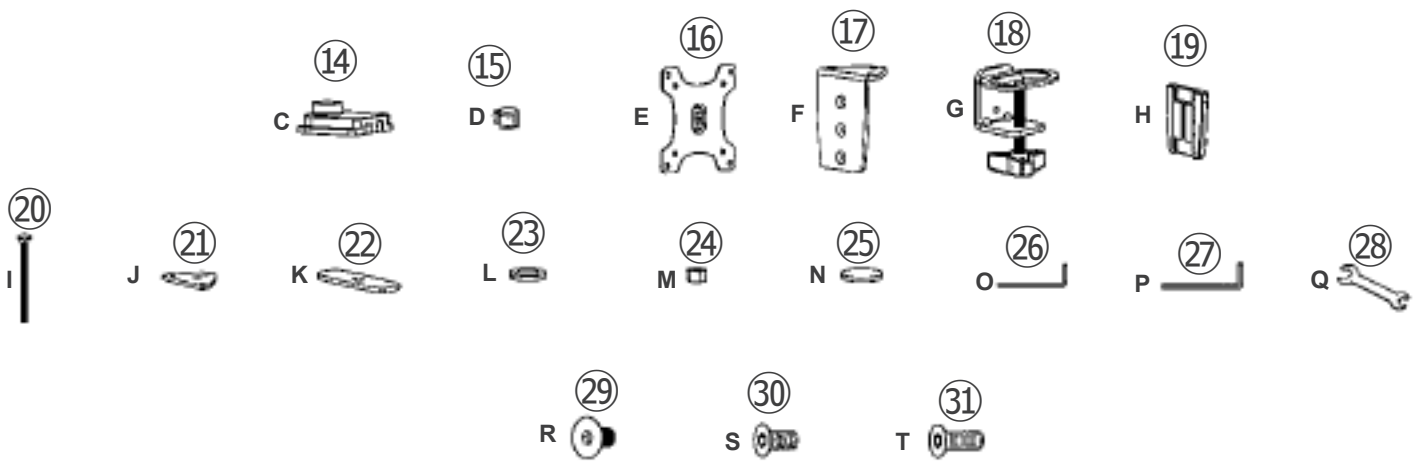
3. Package content

3.1 IS-4K2

① Base	⑨ USB cable
② Pillar	⑩ Camera power supply
③ Horizontal arm	⑪ Power cord
④ Drop prevention ring	⑫ Monitor power supply
⑤ Camera mounting plate	⑬ Wireless mouse
⑥ Autofocus camera + LED anular ringlight	⑭ SD card
⑦ Monitor	⑮ USB WiFi adapter
⑧ HDMI cable	⑯ USB Wireless mouse adapter

3.2   IS-4K3

① Pillar
② Horizontal arm
③ Autofocus camera + LED anular ringlight
④ Monitor
⑤ HDMI cable
⑥ USB cable
⑦ Camera power supply
⑧ Power cord
⑨ Monitor power supply
⑩ Wireless mouse
⑪ SD card
⑫ USB WiFi adapter
⑬ USB Wireless mouse adapter
⑭ Table clamp (C)
⑮ Cable holder (D)
⑯ Camera mounting plate (E)

⑰ Clamp holder (F)
⑱ Table clamp (G)
⑲ Plastic cover (H)
⑳ Screw for through-hole mounting (I)
㉑ Fixing plate (J)
㉒ Fixing plate (K)
㉓ Washer (L)
㉔ Nut (M)
㉕ Rubber pads (4pcs) (N)
㉖ Allen wrench 4mm (O)
㉗ Allen wrench 6mm (P)
㉘ Spanner (Q)
㉙ Screws M6x10 (2pcs) (R)
㉚ Screws M6x12 (3pcs) (S)
㉛ Screws M6x16 (3pcs) (T)

4. Unpacking

The device is housed in a moulded Styrofoam container. Remove the tape from the edge of the container and lift the top half of the container. Take some care to avoid that the optical items (objectives and eyepieces) fall out and get damaged. Using both hands (one around the arm and one around the base), lift the device from the container and put it on a stable desk.

Do not touch with bare hands optical surfaces such as lenses, filters or glasses. Traces of grease or other residuals may deteriorate the final image quality and corrode the optics surface in a short time.

5. Intended use

Standard models

For research and teaching use only. Not intended for any animal or human therapeutic or diagnostic use.

IVD Models

Also for diagnostic use, aimed at obtaining information on the physiological or pathological situation of the subject.

6. Symbols and conventions

The following chart is an illustrated glossary of the symbols that are used in this manual.

CAUTION

This symbol indicates a potential risk and alerts you to proceed with caution.

ELECTRICAL SHOCK

This symbol indicates a risk of electrical shock.

7. Instrument description

7.1 IS-4K2

MONITOR

PILLAR

AUTOFOCUS
CAMERA

HORIZONTAL ARM
SLIDING LOCK

LED RINGLIGHT

HORIZONTAL ARM
FIXING KNOB

PILLAR
FIXING KNOB

CAMERA SWIVEL
LOCK KNOB

DROP PREVENTION
RING

HORIZONTAL ARM

BASE

7.2   IS-4K3

MONITOR

HORIZONTAL ARM

AUTOFOCUS
CAMERA

PILLAR

LED RINGLIGHT

CABLE
HOLDER

TABLE
CLAMP

7.3   Autofocus Camera

TRIPOD
CONNECTION
HOLES

LED RINGLIGHT

CAMERA LENS

USB2.0
SOCKET

USB MOUSE
SOCKET

USB Mouse

USB2.0

HDMI

HDMI SOCKET

USB VIDEO
SOCKET

USB Video

LAN SOCKET

LAN

ON/OFF

DC12V3A

ON/OFF BUTTON

SD⛛

POWER SUPPLY
SOCKET

ON/OFF LED

SD SLOT

8. Assembling
8.1 IS-4K2

1. Screw the pillar on the base. (Fig. 1)

Fig. 1

2. Tighten the screw to lock the pillar. (Fig. 2)

Fig. 2

3. Insert the drop preventing ring and fix it at the desired height by screwing the fixing knob. (Fig. 3)

Fig. 3

4. Insert the horizontal arm and secure it with the fixing screw ①. (Fig. 4)

①

Fig. 4

5. Connect the camera to camera holder. Using the provided screws attach the plate of the camera holder to the back side of the camera. (Fig. 5)


Fig. 5

6. Insert the back part of the camera holder (silver round part) ② in the hole at the end of the horizontal arm and tighten the knob ③. (Fig. 6)

Fig. 6

7. Install the HDMI monitor using the provided bracket and the provided screws.
8. Insert the provided knob ④ into the monitor bracket, then screw it into the threaded hole of the horizontal arm. (Fig. 7)

Fig. 7

9. Connect one end of the HDMI cable to "HDMI" socket ⑤ and the other end to the monitor. (Fig. 8)


Fig. 8
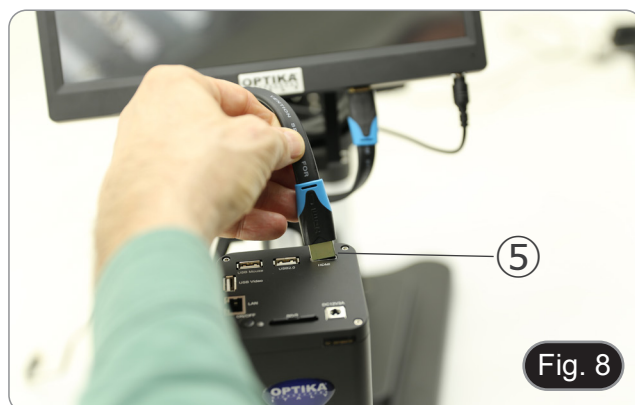
10. Connect the USB receiver of the mouse to the "USB Mouse" socket ⑥.
11. Insert the SD card into the slot ⑦.
12. Connect the plug of the camera power supply ⑧.
13. Connect the plug of the monitor power supply.
14. Press the "ON/OFF" button ⑨ on the camera to turn on the camera.
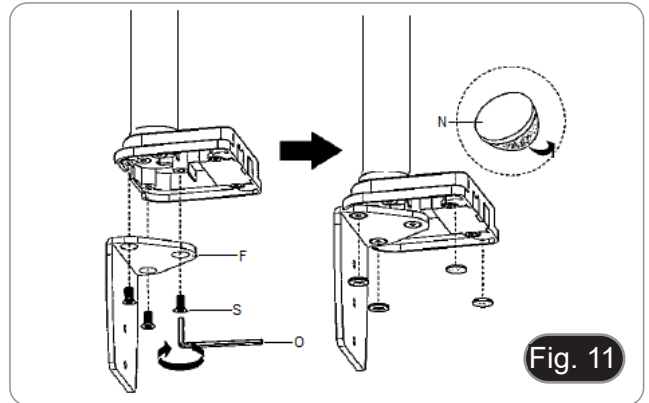• Indicator LED ⑩ will turn from red to blue. (Fig. 9)


Fig. 9

8.2   IS-4K3

8.2.1   Table fixing with clamp

1. Attach the pillar (B) to the table clamp (C) using the three screws (T). (Fig. 10)

Fig. 10
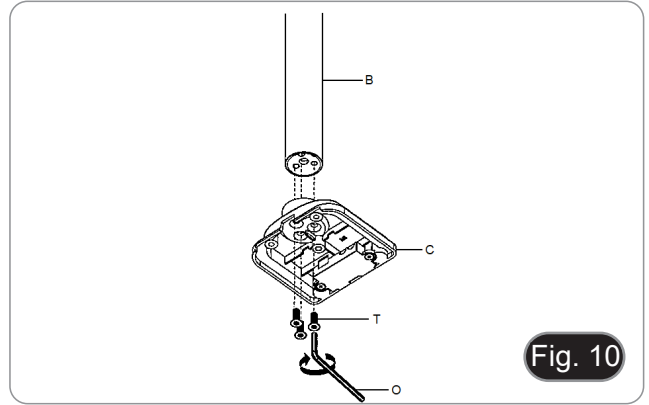
2. Attach the clamp holder (F) to the table clamp (C) using the three screws (S). (Fig. 11)
3. Stick the rubber damps (N) to the table clamp.

Fig. 11

4. Attach the clamp (G) to the clamp holder (F) using the two screws (R). (Fig. 12)
•   **NOTE: Depending on the thickness of the table, the clamp (G) can be mounted in two different positions.**

Fig. 12
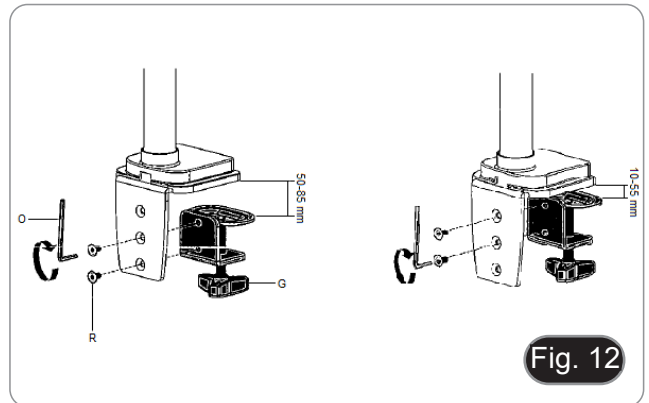
5. Attach the plastic cover (H) to the clamp holder, then fix the assembly to the table by screwing the fixing knob. (Fig. 13)
•   **NOTE: The plastic cover (H) also serves as a container for the Allen keys used for assembly and tension adjustment of the various parts.**

Fig. 13
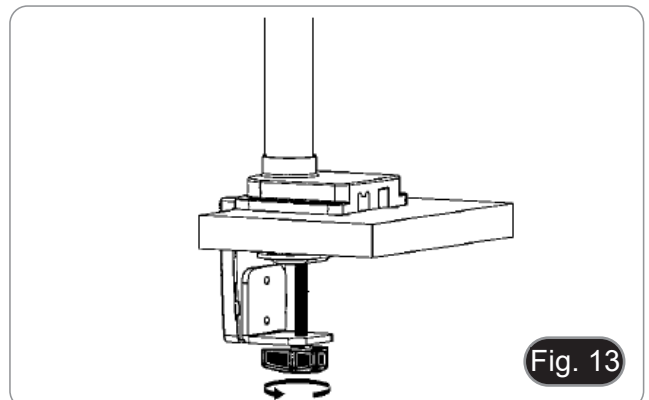
6. Insert the cable holder (D) in the pillar.
7. Insert the flexible arm (A) and tighten the fixing screw. (Fig. 14)

Fig. 14

8.2.2 Table fixing with through-hole

1. Drill a hole in the table where you mean to install the stand.
2. Repeat the procedure described in step 1) of the chapter 8.2.1.
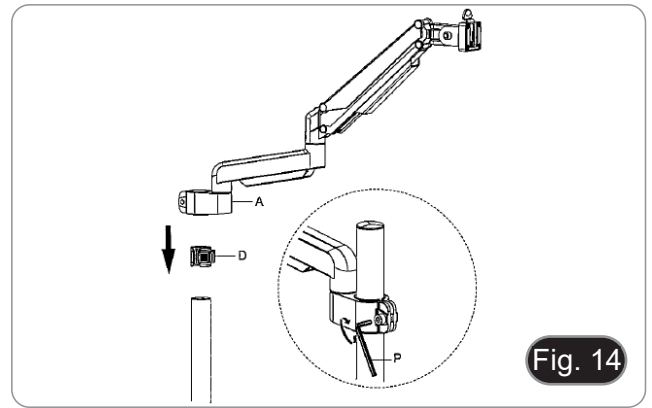3. Insert the screw (I) into the fixing plate (J).
4. Tighten the fixing plate using the three screws (S). (Fig. 15)
5. Stick the rubber damps (N) to the table clamp.
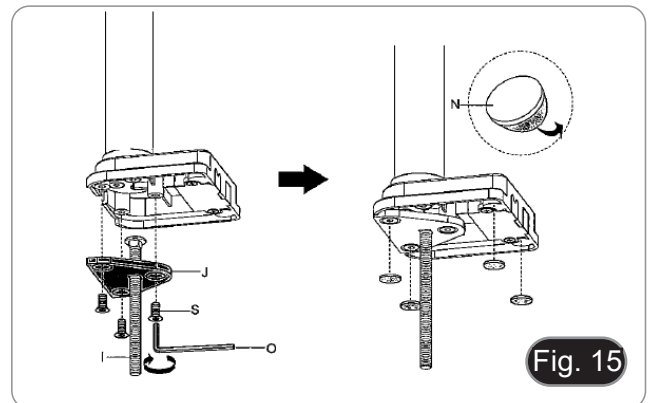
Fig. 15

6. Insert the screw (I) into the hole of the table.
7. Fix the assembly using the fixing plate (K), the washer (L) and the nut (M).
8. Tighten the nut using the spanner (Q). (Fig. 16)
9. Repeat the procedure described in steps 6) and 7) of the chapter 8.2.1 to install the flexible arm.

Fig. 16

- The camera is delivered with a square plate already installed. This is used as a mounting bracket to the base.

10. Mount the camera on to the arm, using the provided screws and bolts ①. (Fig. 17)

Fig. 17

11. Install the HDMI monitor using the provided bracket and the provided screws.
12. Insert the provided knob ② into the monitor bracket, then screw it into the threaded hole of the horizontal arm. (Fig. 18)

Fig. 18

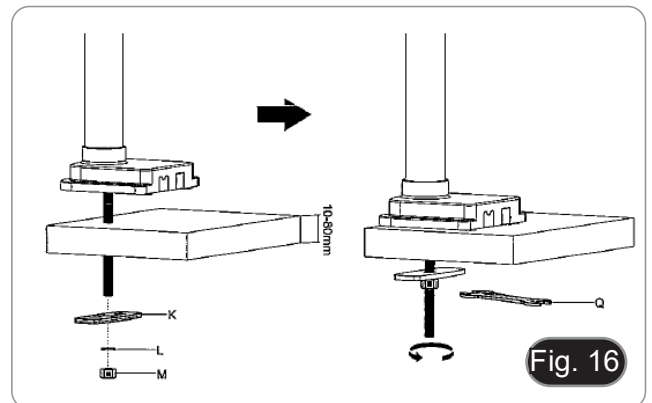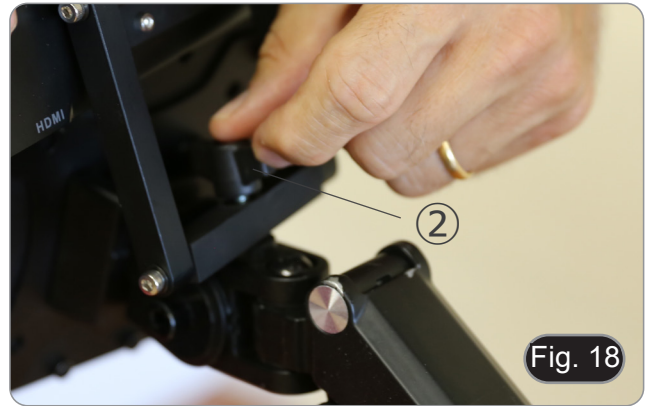13. Connect one end of the HDMI cable to "HDMI" socket ③ and the other end to the monitor. (Fig. 19)

Fig. 19

14. Connect the USB receiver of the mouse to the USB socket ④.
15. Insert the Micro SD card into the slot ⑤.
16. Connect the plug of the camera power supply ⑥.
17. Connect the plug of the monitor power supply.
18. Press the "ON/OFF" button ⑦ to turn on the camera.
•   Indicator LED ⑧ will turn from red to blue. (Fig. 20)

Fig. 20

8.3   LED Anular ringlight (camera)

1. Install the LED ringlight by aligning the pins ① on the ringlight with the holes ② on the camera. (Fig. 21)

Fig. 21

2. Tighten the two fixing screws ③. (Fig. 22)

•   **NOTE: Brightness adjustment is done only through the built-in HDMIPRO software.**

Fig. 22

9. Use of the base

9.1 IS-4K2

Moving the horizontal arm

1. Unlock the knob on the right side of the horizontal arm ①. (Fig. 23)

Fig. 23
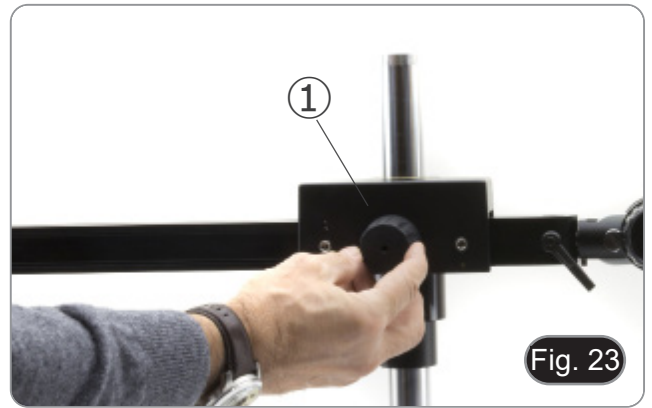
2. The arm can be extended or shortened according to specific needs. (Fig. 24)

Fig. 24

Adjusting the horizontal lock

1. Unlock the fixing knob of the stopper ② and move it in a position suitable to user's needs. (Fig. 25)
2. Lock the fixing knob to set the movement limit.

Fig. 25
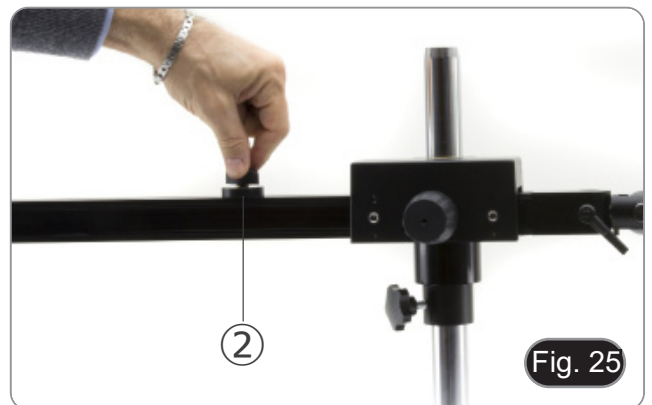
Swivel the camera

1. Unlock the fixing knob ③ (Fig. 26) and rotate the camera to the desired swivel angle (left or right), (Fig. 27) then fix the knob again.

Fig. 26

Fig. 27

Tilting the camera

1. Slightly loosen the locking screw ④ and tilt the camera to the desired angle, then lock the screw again. (Fig. 28)

④
Fig. 28

Rotating the horizontal arm

1. Loosen the horizontal arm locking knob ⑤ and rotate the arm, then retighten the knob. (Fig. 29)
• **NOTE: 180° rotation of the camera with respect to the base could cause a rollover of the entire system.**

⑤
Fig. 29

9.2   IS-4K3

Adjusting the horizontal arm tension

*   **If the horizontal arm tends to drop automatically, the tension may need to be adjusted to match the total weight of the system.**
1. Using 6mm Allen wrench (P) tighten the screw ① to increase the resistance of the horizontal arm bracket. (Fig. 30)
*   **Counterclockwise rotation increases the tension, while clockwise rotation reduces it.**
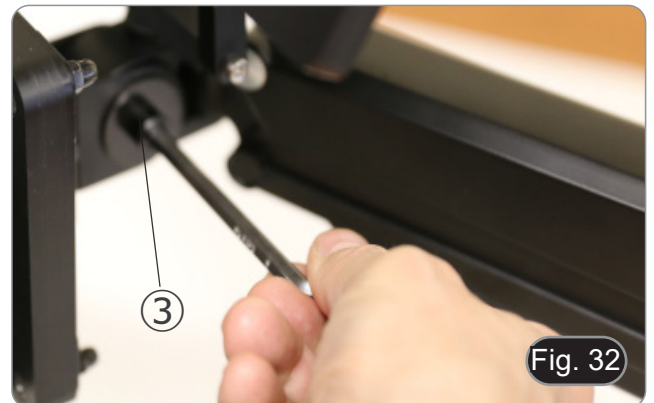

Fig. 30
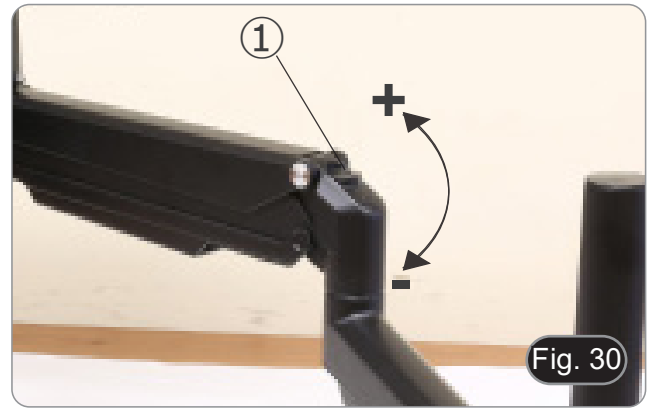
Swinging the camera

*   Camera can be rotated horizontally.
1. Using 6mm Allen Wrench (P) loosen the screw ②, rotate the camera in the desired position then tighten the screw. (Fig. 31)

Fig. 31

Tilting the camera

1. Using 6mm Allen Wrench (P) loosen the screw ③, tilt the camera in the desired position then tighten the screw. (Fig. 32)

Fig. 32

10. Use of the camera

C-HAF4K is a multiple interfaces (HDMI + USB2.0 + LAN + WiFi + SD card) CMOS camera.
HDMI, USB2.0 and LAN are used as the data transfer interface to HDMI display or computer.

For HDMI output, the *Camera Control Panel + Measurement Toolbar* and *Camera Control Toolbar* are overlaid on the HDMI screen when the mouse moves to the related region.
In this case, the USB mouse can be used to set the camera, browse and compare the captured image, play the video and perform the measurement.

For USB output, there are three possibilities:
1. Connect USB flash drive to save pictures and videos.
2. Connect 5G WLAN modules to transfer image wirelessly in real time (AP/STA)
3. Connect computer with USB connection to transfer image in real time.

For LAN output, the camera can be connected with an Ethernet cable directly to a PC or to a router.
From here the ProView/LiteView software can control each camera function.

10.1 Quick Instructions for C-HAF4K camera

Fig. 33 - C-HAF4K Rear Panel

You can use the C-HAF4K camera in 5 different ways. Each application requires different hardware environment.

10.1.1 HDMI Mode

1. Plug the HDMI cable into the "HDMI" port ④ to connect the C-HAF4K camera to HDMI display.
2. Plug the USB mouse into "USB Mouse" port ① to get control of the camera by using built-in software HDMIPRO.
3. Plug the power adapter into "DC12V3A" socket ⑨ to supply power for the camera.
• The LED Indicator ⑧ will turn into red.
4. Insert SD card into "SD" slot ⑥ or a USB flash disk into "USB2.0" port ② for saving images and videos.
5. Press "ON/OFF" Button ⑦ to turn on the camera.
• The LED indicator will turn into blue.
6. Move mouse cursor to the left side of the video window, a *Camera Control Panel* will appear. It includes Manual/ Automatic Exposure, White Balance, Sharpness and other functions, please refer to 11.1 for details.
7. Move mouse cursor to the bottom of the video window and a *Camera Control Toolbar* will appear. Operations like Zoom In, Zoom Out, Flip, Freeze, Cross Line, Comparison and so on can be achieved. Please refer to 11.3 for details.
8. Move mouse cursor to the upper side of the video window, a *Measurement Toolbar* with calibration and other measurement tools will appear, please refer to 11.2 for details. The measurement data can be output with *.CSV format.

10.1.2 USB Mode

1. Plug the USB cable provided with the camera into "USB Video" ③ to connect the C-HAF4K camera to the computer.
• **Do not connect the USB cable into the "USB Mouse" port. Connecting the camera to the "USB Mouse" port, it will not be connected to the PC and it will not display any image on the screen**.
2. Plug the power adapter into "DC12V3A" socket ⑨ to supply power for the camera.
• The LED Indicator ⑧ will turn into red.
3. Press "ON/OFF" Button ⑦ to turn on the camera.
• The LED indicator will turn into blue.
4. Install ProView or LiteView on your PC and run the software.
5. Clicking the camera name in the *Camera List* starts the live image.

• **When the USB cable is connected, the mouse does not operate. If you want to use the mouse, please unplug the USB cable and restart the camera**.

10.1.3 WLAN Mode (AP mode)

The PC should be a WLAN enabled one.
- For Windows user (Windows 7/8/10 [32/64 bit]), use ProView.
- For Mac OS and Linux user (Mac OS 10.10 or above or Linux distributions with kernel 2.6.27 or higher), use LiteView.

1. Plug the HDMI cable into the "HDMI" port ④ to connect the C-HAF4K camera to HDMI display.
2. Plug the USB mouse into "USB Mouse" port ① to get control of the camera by using built-in software HDMIPRO.
3. Plug the power adapter into "DC12V3A" socket ⑨ to supply power for the camera.
- The LED Indicator ⑧ will turn into red.
4. Press "ON/OFF" Button ⑦ to turn on the camera.
- The LED indicator will turn into blue.
5. Move the mouse to the bottom of the screen and click the ✖ button on the *Camera Control Toolba*r at the bottom of the video window. A dialog box called *Settings* will pop up as shown below.
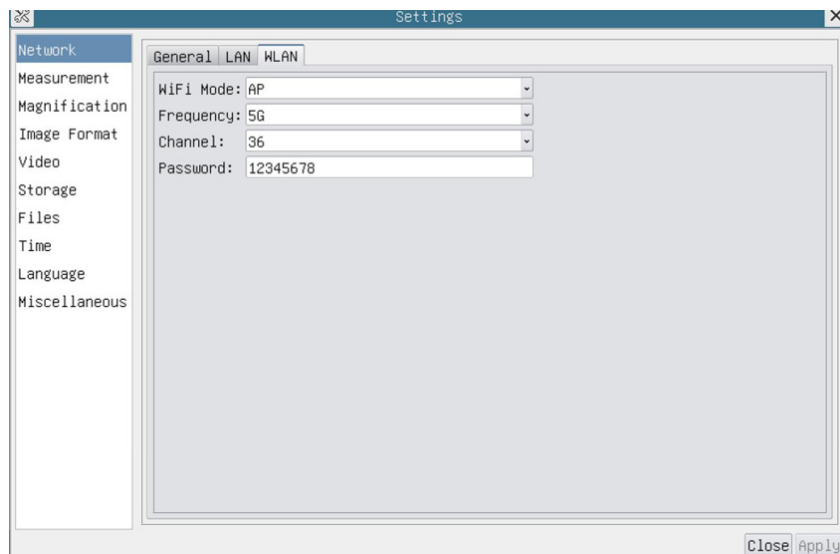

Fig. 34 - WLAN configuration Page

6. Click *Network>WLAN* property page and choose the *AP* option in the *WiFi Mode* edit box (the factory default configuration is AP mode).
7. Install ProView or LiteView on your PC.
8. Plug the USB WLAN adapter into the "USB2.0" port ② of the camera.
9. Connect the PC with the WLAN AP point that the camera provides.
- The network name (*SSID*) and the WLAN password (default one is *12345678*) can be found on the camera's *Setting>-Network>WLAN* page in *AP* mode.
10. Start ProView / LiteView software and check the configuration.
- Normally, active cameras are automatically recognized.
- The live image of each camera is displayed.
11. Clicking the camera name in the *Camera List* starts the live image.

10.1.4 LAN Ethernet Mode

This mode uses the camera as the network camera. User must configure the IP of the camera and PC manually and ensure their IP addresses are in the same net. The subnet mask and gateway of the camera and PC must be the same.

1. Plug the HDMI cable into the "HDMI" port ④ to connect the C-HAF4K camera to HDMI display.
2. Plug the USB mouse into "USB Mouse" port ① to get control of the camera by using built-in software HDMIPRO.
3. Plug the power adapter into "DC12V3A" socket ⑨ to supply power for the camera.
• The LED Indicator ⑧ will turn into red.
4. Press "ON/OFF" Button ⑦ to turn on the camera.
• The LED indicator will turn into blue.
5. Move the mouse to the bottom of the screen and click the ✂ button on the *Camera Control Toolbar* at the bottom of the video window. A dialog box called *Settings* will pop up as shown below.
6. Click the *LAN* property page, uncheck the *DHCP* item. Input the *IP Address*, *Subnet Mask* and *Default Gateway* for the camera.
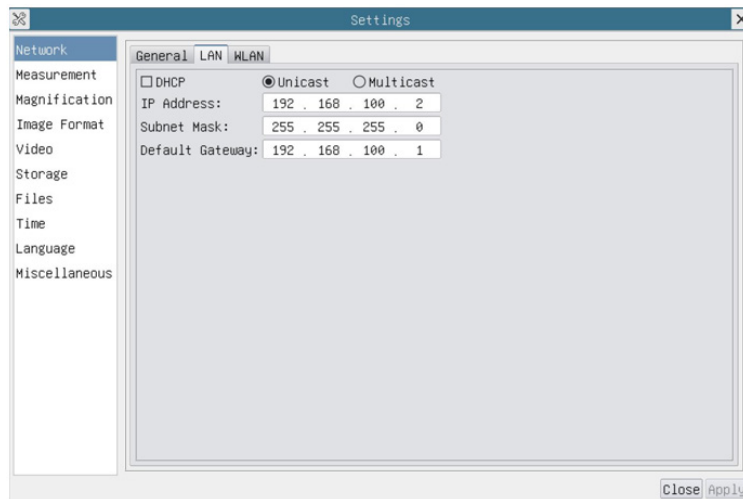

Fig. 35 - Camera IP configuration Page

7. Designate the Internet Protocol Version 4 (TCP/IPv4) Settings page's IP address on the PC with similar configuration as shown below but with different IP address.
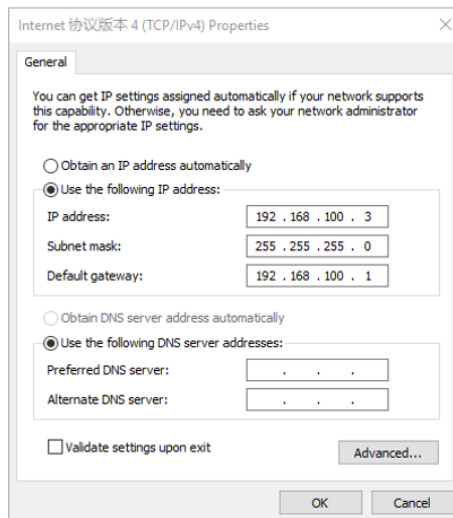

Fig. 36 - PC'S IP configuration Page

8. After the above configurations are finished, user can connect the camera to the computer.
• Connect the "LAN" port ⑤ with the Ethernet cable to the PC's network port.
• Insert the SD card (supplied) or USB flash disk (not supplied) into the camera "SD" slot / "USB2.0" port.
9. Start ProView / LiteView software and check the configuration.
10. Clicking the camera name in the *Camera List* starts the live video.

10.1.5 Connecting multi-cameras to a router via LAN / WLAN STA

In LAN/WLAN STA mode, the camera connects to router LAN/WLAN by LAN port / WLAN STA mode.
If a router with LAN/WLAN capability is used, users could connect the router with Ethernet cable/WLAN and control the camera.
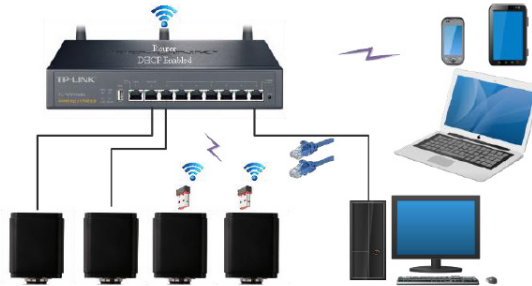
1. When connecting via LAN the connection and configuration are just the same as in chapter 10.1.1. or 10.1.4, but here, users need to enable the *DHCP* check box.
- If *Multicast* is disabled or is not supported, users should only select *Unicast*.
- If *Multicast* is supported by the network, users could select *Multicast* to achieve a better performance, especially in the case that multi-users connect to the same camera.
- In addition, please guarantee that the broadcasting function is enabled in the network.
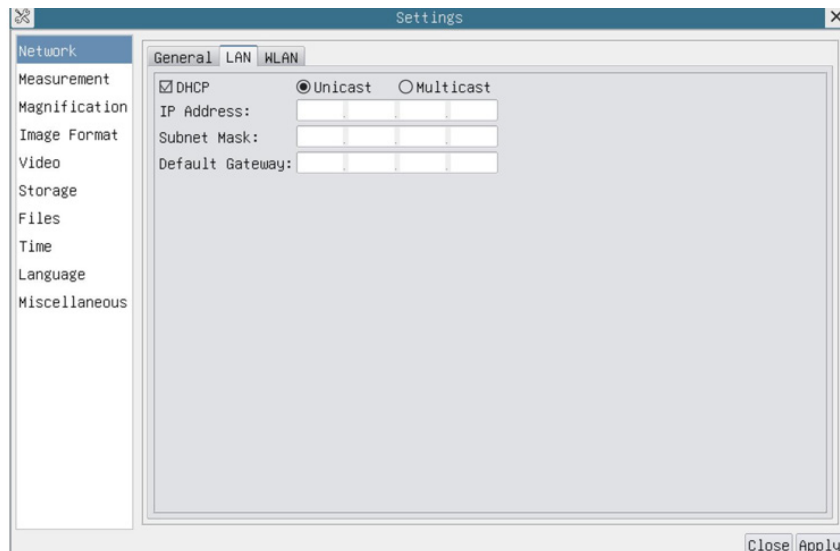

Fig. 37 - LAN configuration

2. When connecting via WLAN the connection and configuration are just the same as in chapter 9.1.3 but here, users need to check *STA*.
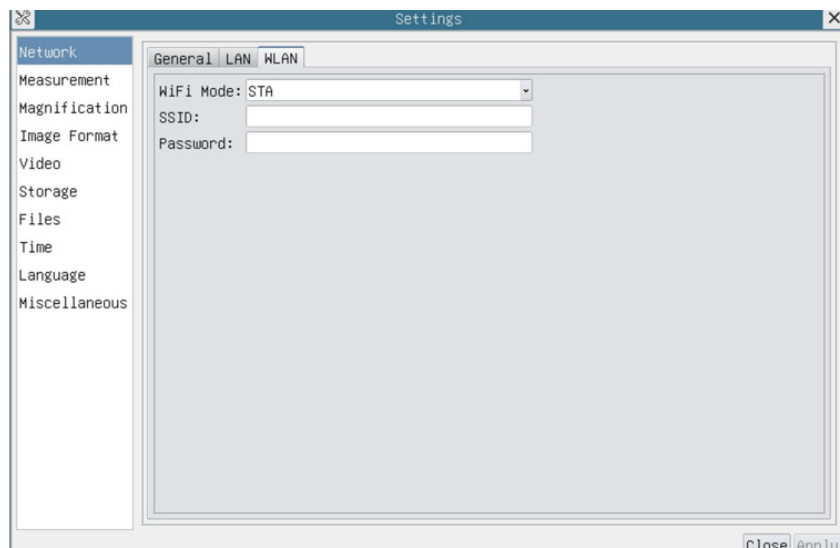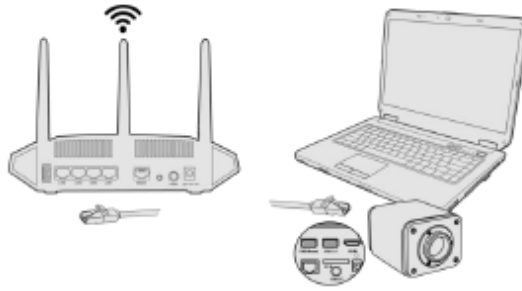

Fig. 38 - WLAN configuration

3. Install ProView or LiteView on your PC.
- Plug the Ethernet cable into the camera's "LAN" port and the other end to the PC (for those connected to router with WLAN STA mode).

- Or plug the USB WLAN adapter into the camera's "USB2.0" port (for those connected to router with WLAN STA mode).
4. Finally as shown below, 2 cameras are connected to the router with LAN cable and 2 HDMI cameras are connected to the same router with WLAN STA mode (the number of the cameras, the connection mode (LAN or WLAN STA) connected to the router are determined by the router performance).
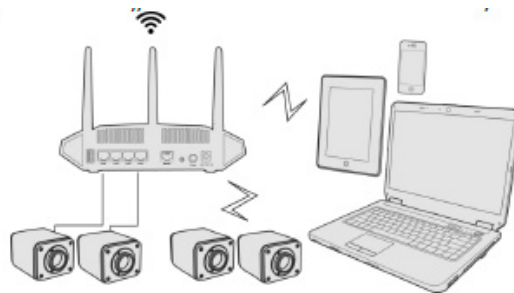
5. Make sure that your PC is connected to the LAN or WLAN of the router.
6. Start ProView / LiteView software and check the configuration.
- Normally, active cameras are automatically recognized.
- The live image of each camera is displayed.
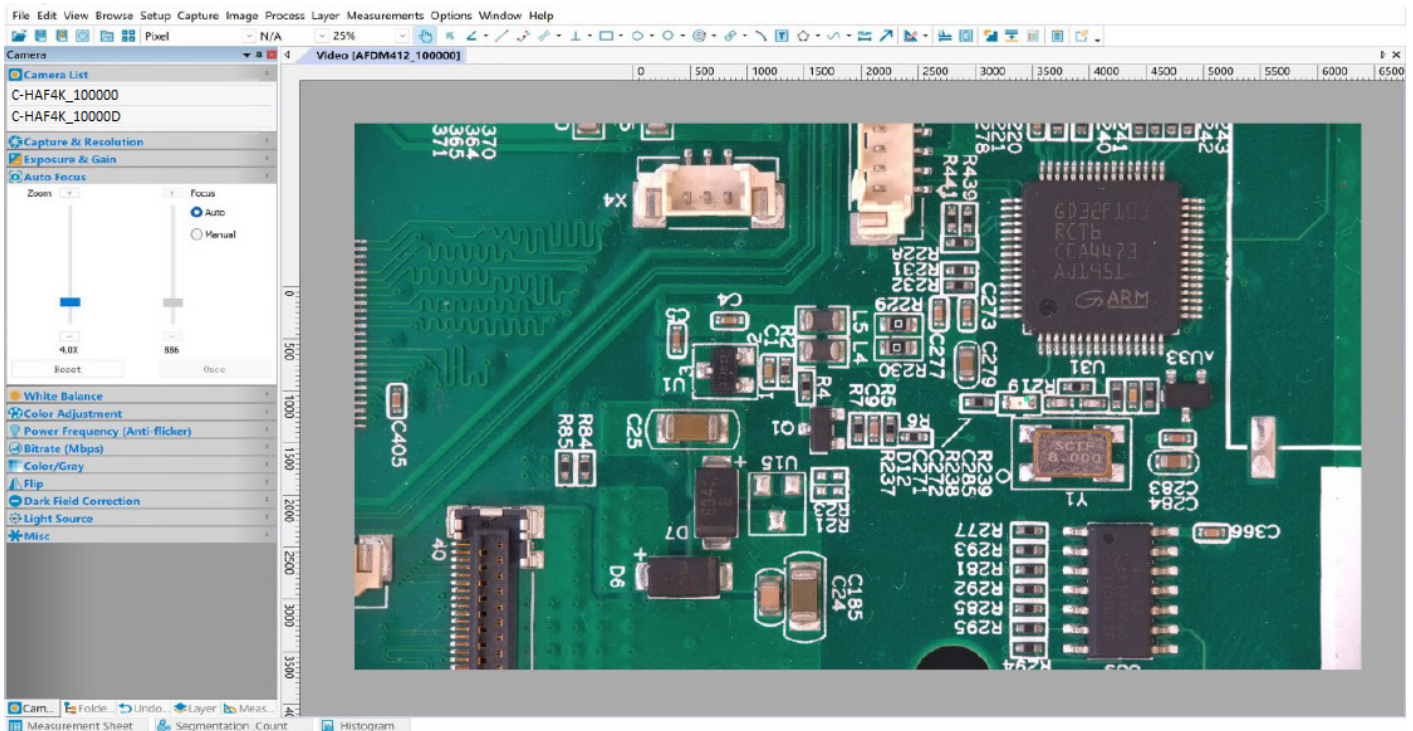7. Clicking the camera name in the *Camera List* starts the live video.

Fig. 39 - PROVIEW and C-HAF4K Cameras connected in LAN port/WLAN STA mode

- **Note on data security**

The data transfer of the HDMI 4K camera in LAN or WLAN is not encrypted. Anyone who is connected to the network and has installed the Optika software, can see the live image of all active cameras.
Operate the camera with the ProView software, if you want to make sure that nobody in the network can see the camera's live image.

- **About the routers/switches**

It is suggested that routers/switches supporting 802.11ac 5G segment should be selected to achieve better wireless connection experience.

11. Camera User Interface (UI) and its Functions

The C-HAF4K User Interface shown in Fig. 40 includes a *Camera Control Panel* on the left side of the video window, a *Measurement Toolbar* on the upper side of the video window, a *Camera Control Toolbar* on the bottom of the video window and an *Auto Focus Control Panel* on the right side of the video window.
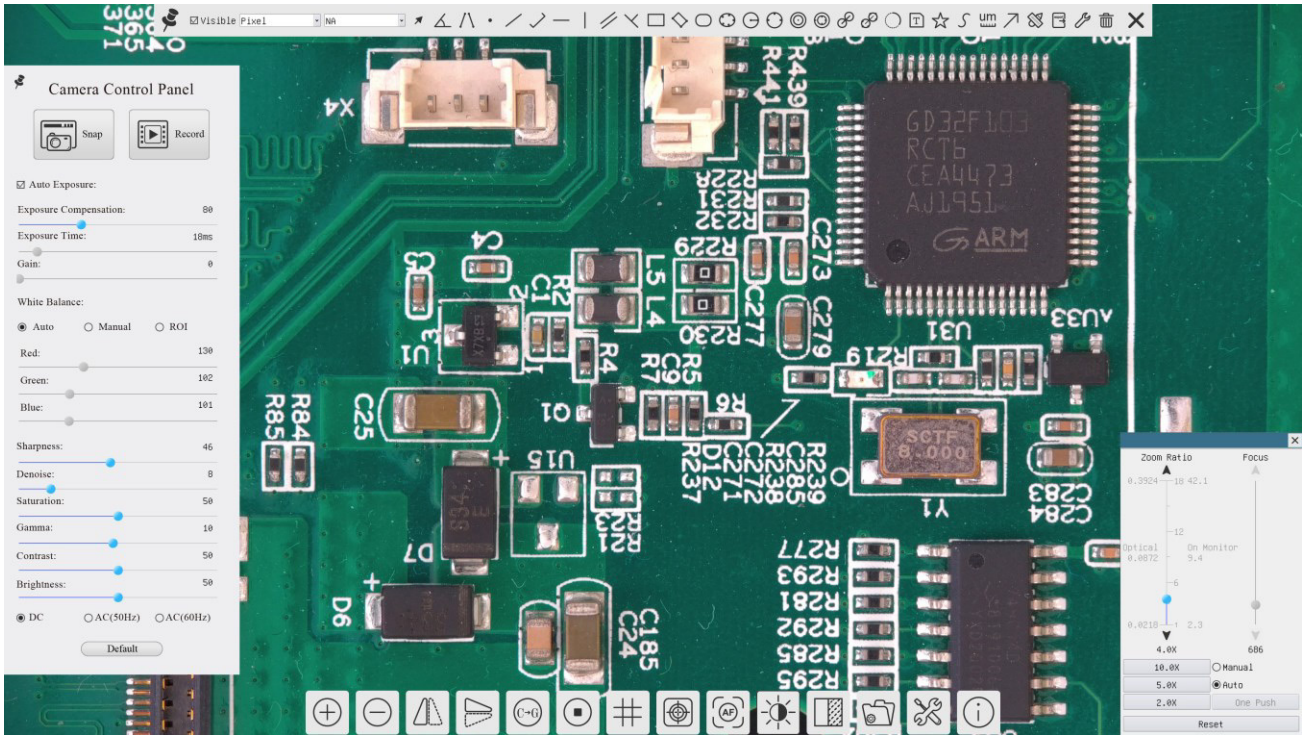

Fig. 40 - Camera Control User Interface

1. Move the mouse cursor to the left side of the video window: the *Camera Control Panel* will pop up automatically.

2. Move the mouse cursor to the top of the video window: a *Measurement Toolbar* will pop up for the calibration and measurement operations.
- When user left-clicks the *Float/Fixed* button on the *Measurement Toolbar*, the Measurement Toolbar will be fixed. In this case the *Camera Control Panel* will not pop up automatically even if users move mouse cursor to left side of the video windows.
- Only when user left-clicks the ✖ button on the *Measurement Toolbar* to exit from measuring procedure it will be possible to perform other operations on the *Camera Control Panel*, *Auto Focus Control Panel* or *Camera Control Toolbar*.
- During the measuring process, when a specific measuring object is selected an *Object Location & Attributes Control Bar* will appear for changing location and properties of the selected objects.

3. Move the mouse cursor to the bottom of the video window, the *Camera Control Toolbar* will pop up automatically.
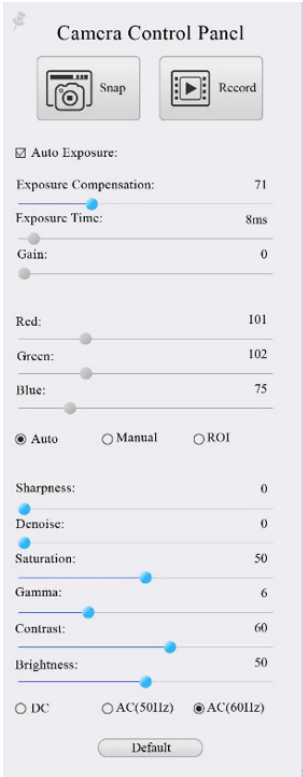

4. Click the button and the *Auto Focus Control Panel* will appear for autofocus operation.

11.1 The Camera Control Panel

The *Camera Control Panel* controls the camera to achieve the best image quality according to the specific applications. It will pop up automatically when mouse cursor is moved to the left side of the video window (in measurement status, the Camera Control Panel will not pop up. Only when measurement process is terminated will the Camera Control Panel pop up by moving mouse cursor to the left side of the video window).

Left-click button 📌 to achieve *Display/ Auto Hide* switch of the Camera Control Panel.

Control Panel	Function	Description
	Snap	*Capture* image and save it to the SD card or USB flash disk
	Record	*Record* video and save it to the SD card or USB flash disk
	Auto Exposure	When *Auto Exposure* is checked, the system will automatically adjust exposure time according to the value of Exposure Compensation
	Exposure Compensation	Available when *Auto Exposure* is checked. Slide to left or right to adjust *Exposure Compensation* according to the current video brightness to achieve proper brightness value
	Exposure Time	Available when *Auto Exposure* is unchecked. Slide to left or right to reduce or increase exposure time, adjusting brightness of the video
	Gain	Adjust *Gain* to reduce or increase brightness of video. The noise will be reduced or increased accordingly
	Red	Slide to left or right to decrease or increase the proportion of *Red* in RGB on video
	Green	Slide to left or right to decrease or increase the proportion of *Green* in RGB on video
	Blue	Slide to left or right to decrease or increase the proportion of *Blue* in RGB on the video
	Auto	*White Balance* adjustment according to the window video every time the button is clicked
	Manual	Slide the *Red* or *Blue* to manually set the *White Balance*
	ROI (Region of Interest)	Check the *ROI* item will display a red *ROI* rectangle on the video window; drag it to the interested area will perform the *White Balance* according to the area video data
	Sharpness	Adjust *Sharpness* level of the video window
	Denoise	Slide left or right to *denoise* the image
	Saturation	Adjust *Saturation* level of the video window
	Gamma	Adjust *Gamma* level of the video. Slide to the right side to increase Gamma and to the left to decrease Gamma
	Contrast	Adjust *Contrast* level of the video. Slide to the right side to increase contrast and to the left to decrease Contrast
	Brightness	Adjust *Brightness* level of the video. Slide to the right side to increase and to the left to decrease Brightness
	DC	For *DC* illumination, there will be no fluctuation in light source so no need for compensating light flickering
	AC(50HZ)	Check *AC(50HZ)* to eliminate flickering "strap" caused by 50Hz illumination
	AC(60HZ)	Check *AC(60HZ)* to eliminate flickering "strap" caused by 60Hz illumination
	Default	Restore all the settings in the *Camera Control Panel* to default values

11.2   The Measurement Toolbar

The *Measurement Toolbar* will pop up when moving mouse cursor to any place near the upper side of the video window.

Icon	Function
📌	*Float/ Fix* switch of the *Measurement Toolbar*
☑ Visible	Define measuring object in *Show up/ Hide* mode
Nanometer(nm)	Select the desired *Measurement Unit*
4X	Select *Magnification* for Measurement after Calibration
↗	Object *Select*
∠	*Angle*
/\	*4 Points Angle*
·	*Point*
/	*Arbitrary Line*
⟋	*3 Points Line*
—	*Horizontal Line*
|	*Vertical Line*
⤬	*3 Points Vertical line*
⫽	*Parallel*
▭	*Rectangle*
⬯	*Ellipse*
⊖	*Circle*
◯	*3 Points Circle*
◎	*Annulus*
⚭	*Two Circles and Center Distance*
⚮	*3 Points Two Circles and Center Distance*
◌	*Arc*
Ⓣ	*Text*
☆	*Polygon*

$\int$	*Curve*	
um	*Scale Bar*	
↗	*Arrow*	
⊗	Execute *Calibration* to determine the corresponding relation between magnification and resolution, which will establish the corresponding relationship between measurement unit and the sensor pixel size. Please refer to Chapter 10.2.1 for detailed steps in performing the calibration.	
🗎	Export the *Measurement* to CSV file(*.csv)	
🔧	*Measurement Setup*	
🗑	*Delete All* the Measurement Objects	
✖	*Exit* from *Measurement* mode	
⋀ ⋁ ◁ ▷ 🔴 🗑	When the measurement ends, left-click on a single measuring object and the *Object Location & Properties Control Bar* will show up. User could move the object by dragging the object with the mouse. But more accurate movement could be done with the control bar. The icons on the control bar mean *Move Left*, *Move Right*, *Move Up*, *Move Down*, *Color Adjustment* and *Delete*.	
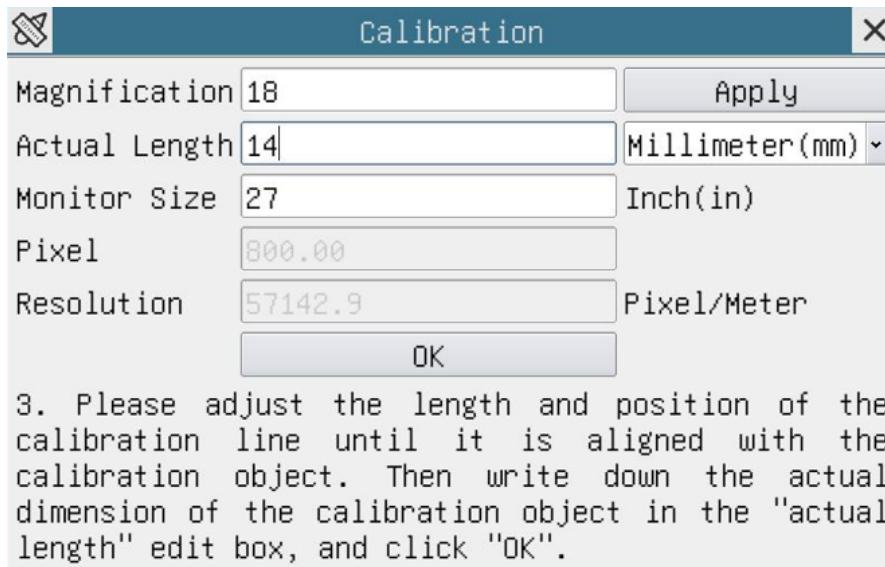
Note:

1. When user left-clicks *Display/Hide* button 🎤 on the *Measurement Toolbar*, it will be fixed. In this case the *Camera Control Panel* will not pop up automatically even if moving the mouse cursor to the left edge of the video window. Only when user left-click the ✖ button on the *Measurement Toolbar* to exit from the measurement mode it will be possible to perform other operations on the *Camera Control Panel* or on the *Camera Control Toolbar*.

2. When a specific item is selected during the measurement process, the *Object Location & Attributes Control Bar* ⋀ ⋁ ◁ ▷ 🔴 🗑 will appear for changing the object location and properties of the selected objects.

3. To ensure accuracy of the measurement, after the calibration is turned on, the camera will automatically reset, and then sets the normalization magnification to 18X, and adjusts the focus to the required standard object distance. If the *Calibration Object* under the camera is not sharp on the monitor, you need to manually adjust the height of the bracket to the clearest position, which is the standard object distance. After the *Calibration* is completed, use the *Measurement Toolbar* to measure the 1 mm physical distance on the ruler, which should display 1 mm on the monitor.

4. Even if the *Calibration* has been completed, once the user needs to measure, but is not sure whether the camera is at the standard object distance position, it is always better to reset it first, adjust the stand height in the reset state to make the observation object clear, and ensure that the camera is at the standard object distance position before measurement.

11.2.1 Calibration procedure

User needs to prepare a *Calibration Object* such as ruler before *Calibration*.

1. Move the mouse to the upper side of the video window, the *Measurement Toolbar* will appear.
2. Click *Calibration* button ⚅ on the *Measurement Toolbar* to start the calibration.
3. The software will pop up the message box: "*1. Camera resetting for calibration...*"
4. After the reset is finished, the message box "*2. Please put the calibration object on the stage(if not), adjust the height of the stand until the calibration object is in focus, then click OK button;*" will pop up.
5. After clicking the *OK* button, the software will pop up the *Calibration* dialog box:

```
┌─────────────────────────────────────────────────┐
│ ⚅           Calibration                      ✕  │
│                                                   │
│ Magnification │18          │  │    Apply       │ │
│                                                   │
│ Actual Length │14          │  │Millimeter(mm) ▾│ │
│                                                   │
│ Monitor Size  │27          │   Inch(in)          │
│                                                   │
│ Pixel         │800.00      │                     │
│                                                   │
│ Resolution    │57142.9     │   Pixel/Meter       │
│               │      OK      │                    │
│                                                   │
│ 3. Please adjust the length and position of the  │
│ calibration line until it is aligned with the    │
│ calibration object. Then write down the actual   │
│ dimension of the calibration object in the "actual│
│ length" edit box, and click "OK".                 │
└─────────────────────────────────────────────────┘
```

Magnification:	The *Magnification* edit box can be set from 1 to 18 as user want. • Click in the edit field and a "virtual keyboard" appears to let you type in the desired value. Click *Apply* button to confirm.
Actual Length:	The a*ctual length* of the *Calibration object*, the unit can be selected with the right drop-down list box. Read the hint on the *Calibration* dialog to get the correct Calibration result.
Monitor Size:	The *Monitor Size* (in Inches) for the magnification calculation of the object displayed on the monitor.
Pixel:	The length in *Pixel* of the *Calibration Line* on the monitor.
Resolution:	The resolution in *Pixel/Meter* unit which is obtained by *Pixel/Actual Length*.
OK:	Click *OK* button to end the *Calibration*.
Users can refer to the message: "*3. Please adjust the length and position of the calibration line until it is aligned with the calibration object. Then write down the actual dimension of the calibration object in the actual length edit box, and click OK.*" to get the correct calibration result.	

•   **The default monitor size is *27.0* inches. Users can enter the effective *Monitor Size*.**

•   **NOTE: The camera, once calibrated, adjusts the measurement according to the zoom currently being used. This starts only and exclusively if the working distance of the camera is about 250mm. For larger or smaller working distances, the "auto-calibration" function is not available.**

11.3 Icons and Functions of the Camera Control Toolbar

Icon	Function	Icon	Function
⊕	Zoom In the Video Window	⊖	Zoom Out the Video Window
◁	Horizontal Flip	▷	Vertical Flip
Ⓒ→Ⓖ	Color / Gray	⊙	Video Freeze
⌗	Display Cross Line	◉	Image Overlay
(AF)	Auto Focus Control Panel	☀	LED Brightness Control
▦	Compare Image with the current video	🗀	Browse Images and Videos in the SD Card
✕	Settings	ⓘ	Check the HDMIPRO Version

The ✕ *Setting* function is relatively more complicated than the other functions. Here are more info about it:
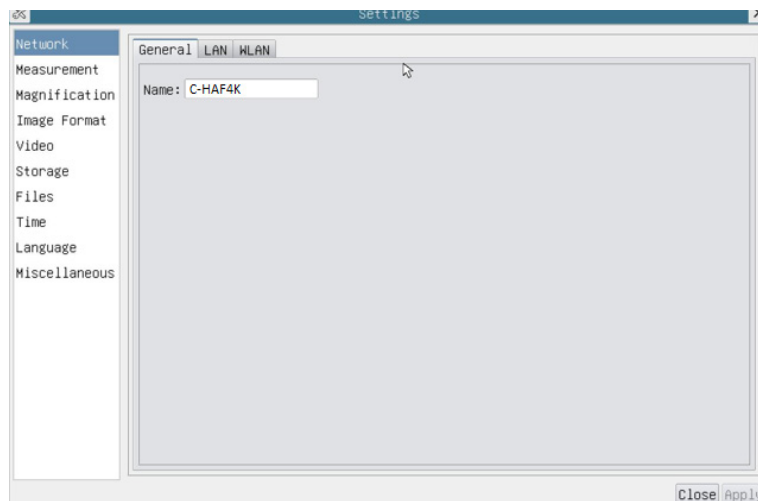
11.3.1 Setting > Network > General

Fig. 41 - General Network Settings Page

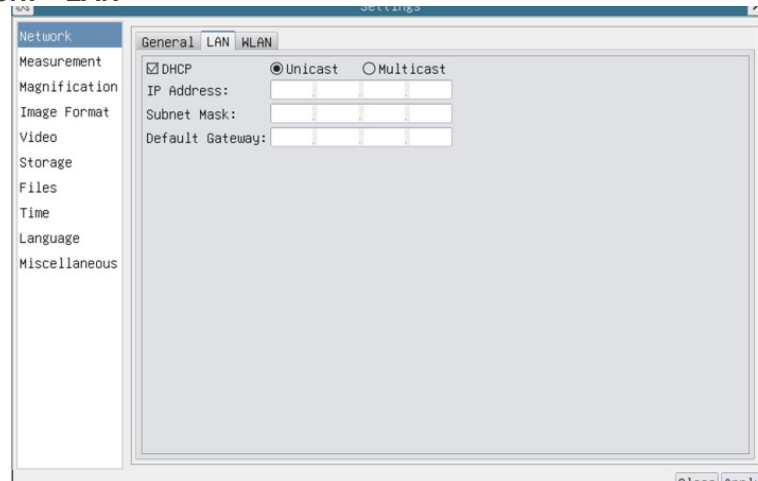| Name	The current camera name recognized as the network name

11.3.2 Setting > Network > LAN

Fig. 42 - LAN Network Settings Page

DHCP	Dynamic host control protocol allows DHCP server to automatically assign IP information to the camera. Only in Sec. 10.1.4 LAN networking this item should be checked, so that cameras can automatically get IP information from routers/switches to facilitate networking operation
Unicast/Multicast	By default, *Unicast* function is used. Only in Sec. 10.1.5 networking environment, when the router/switch has *Multicast* function, camera can switch to multicast mode, which can save the network bandwidth consumed by the camera and facilitate the connection of more cameras in the same network
IP Address	Every machine on a network has a unique identifier. Just as you would address a letter to send in the mail, computers use the unique identifier to send data to specific computers on a network. Most networks today, including all computers on the Internet, use the TCP/IP protocol as the standard for how to communicate on the network. In the TCP/IP protocol, the unique identifier for a computer is called IP address. There are two standards for IP address: IP Version 4 (IPv4) and IP Version 6 (IPv6). All computers with IP addresses have an IPv4 address, and many are starting to use the new IPv6 address system as well. Users must manually configure their IP addresses on the camera side and computer side. The IP addresses set on the camera side and computer side should be in the same network segment. The specific settings are shown. Fig. 13: It's usually a private address. Private address is a non-registered address used exclusively within an organization. The internal private addresses retained are listed below: • Class A 10.0.0-10.255.255; • Class B 172.16.0-172.31.255.255; • Class C 192.168.0-192.168.255.255. The suggested *IP address* is Class C
Subnet Mask	Subnet Mask is used to distinguish network domain from host domain in 32-bit IP address
Default Gateway	A default gateway allows computers on a network to communicate with computers on another network. Without it, the network is isolated from the outside. Basically, computers send data that is bound for other networks (one that does not belong to its local IP range) through the default gateway. Network administrators configure the computer's routing capability with an IP range's starting address as the default gateway and point all clients to that IP address.

Uncheck the *DHCP* and select the *Unicast* item, user still need to set the *IP address*, *Subnet ma*sk and *Default Gateway* as shown below:
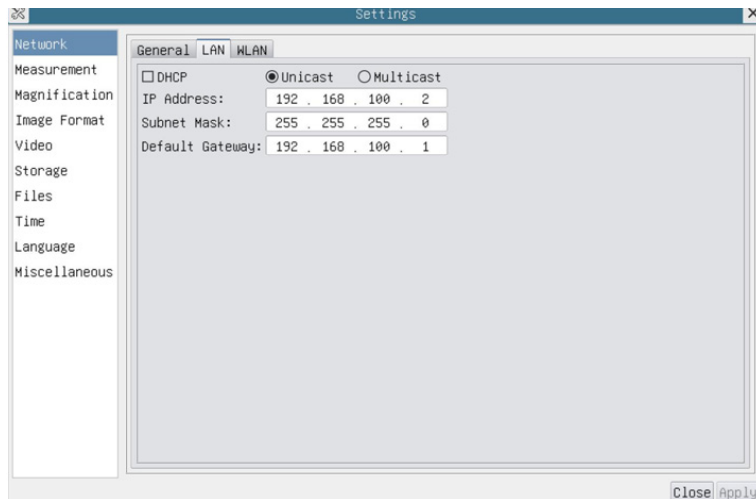

Fig. 43 - Manual DHCP in Unicast Settings Page

Uncheck the *DHCP* and select the *Multicast* item, user still need to set the *IP address*, *Subnet Mask* and *Default Gateway* as shown below:
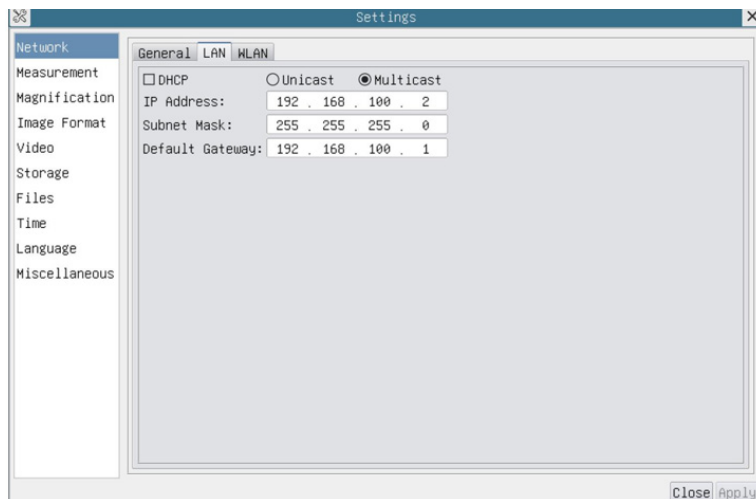

Fig. 44 - Manual DHCP in Multicast Settings Page
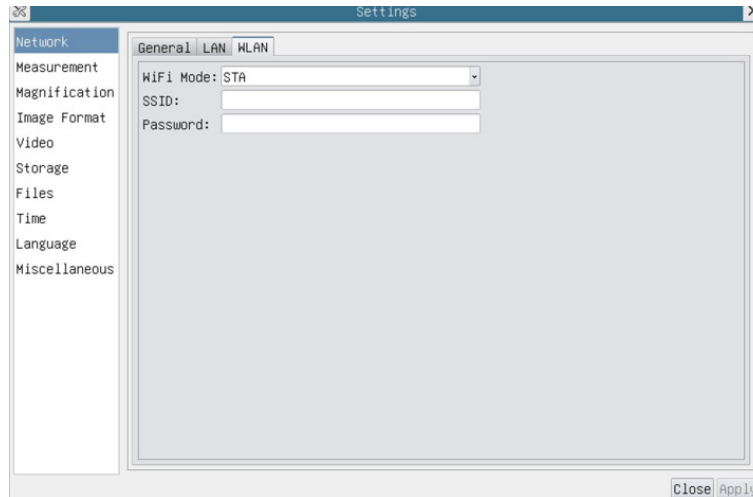
11.3.3 Setting > Network > WLAN

Fig. 45 - WLAN Network Settings Page

WiFi Mode	AP/STA mode to select
Channel/SSID	Channel for the AP mode and SSID for the STA mode. Here, the SSID is the router's SSID
Password	Camera Password for the AP mode. Router Password for the STA mode

11.3.4 Setting > Measurement

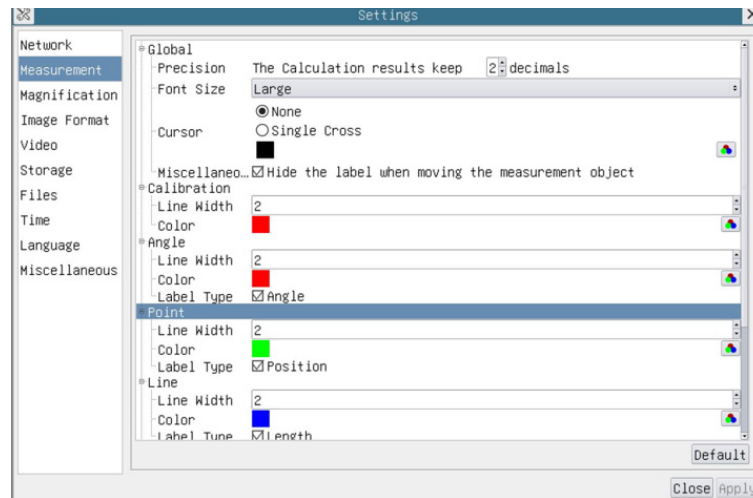This page is used for the definition of the *Measurement Object* properties.

Fig. 46 - Measurement Settings Page

Global	Used for setting digits behind the decimal point for measurement results		
Calibration	Line Width	Used for defining width of the lines for calibration	
	Color	Used for defining color of the lines for calibration	
	EndPoint	Type:	Used for defining shape of the endpoints of lines for calibration
		Null:	Means no endpoints
		Rectangle:	Means rectangle type of endpoints. It makes alignment more easily
Point, Angle, Line, Horizontal Line, Vertical Line, Rectangle, Circle, Ellipse, Annulus, Two Circles, Polygon, Curve:			
Left-click the ⊞ beside the measuring patterns mentioned above will unfold the corresponding attribute settings to set the individual property of the measuring objects			

11.3.5 Setting > Magnification

This page's items are formed by the *Measurement Toolbar --> Calibration* command.
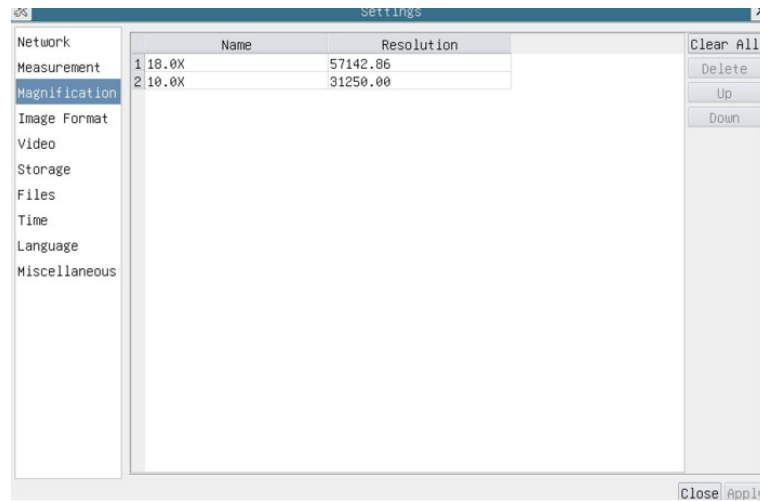

Fig. 47 - Magnification Settings Page

Name	Names such as 4X, 10X, 18X are based on magnification of the digital microscope.
Resolution	Pixels per meter. Devices like microscopes have high resolution value
Clear All	Click the Clear All button will clear the calibrated magnifications and resolutions
Delete	Click Delete to delete the selected item for specific resolution
Up	Click *Up* to move up the selected magnification
Down	Click *Down* to move down the selected magnification

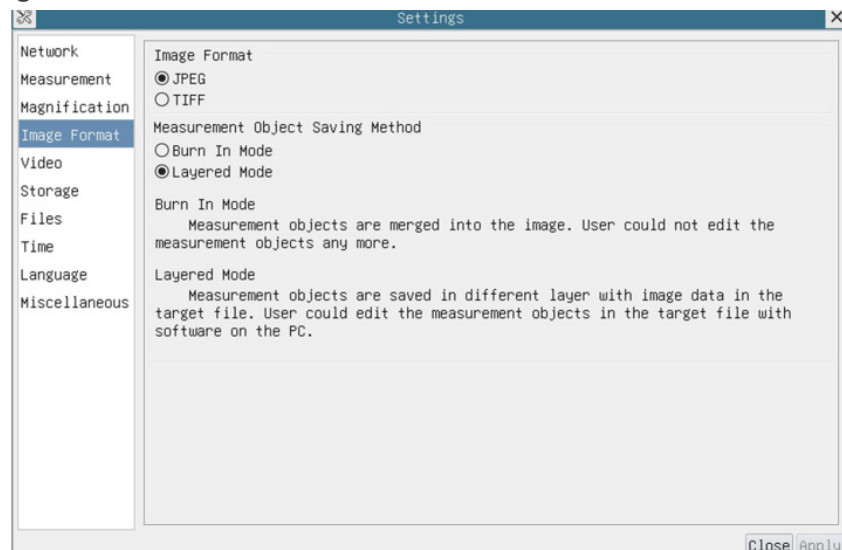### 11.3.6 Setting > Image Format

Fig. 48 - Image Format Settings Page

| Image Format	JPEG	A JPEG file can get very high compression rate and display very rich and vivid images by removing redundant images and color data. In other words, it can get better image quality with the least disk space. If measurement objects are available, the measurement objects will be burned into the image and the measurement cannot be edited.
	TIFF	Flexible image format mainly used to store images including photos and artistic images
Measurement Object Save Method	Burn in Mode	The measurement objects are merged into the current image. User could not edit the measurement objects anymore. This mode is not reversible.
	Layered Mode	The measurement objects are saved in different layer with current image data in the target file. User could edit the measurement objects in the target file with some software on the PC. This mode is reversible.

11.3.7   Setting > Video
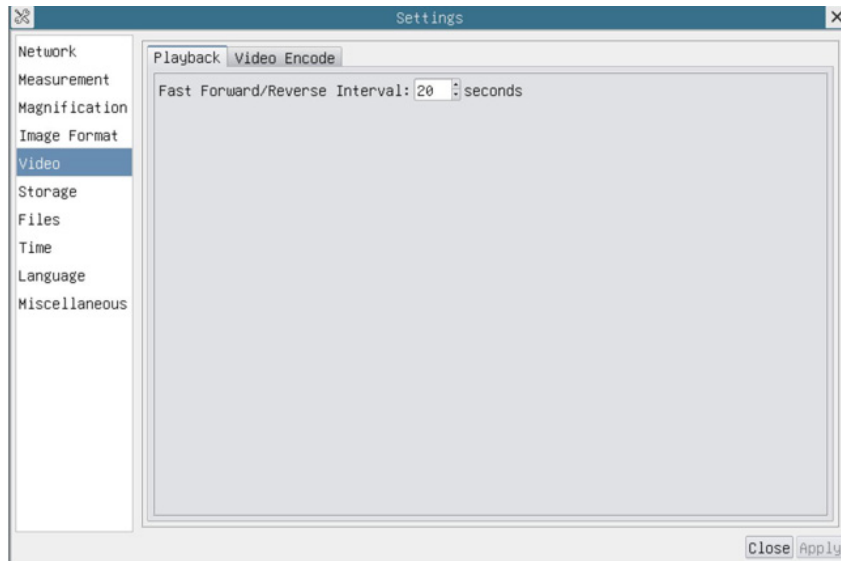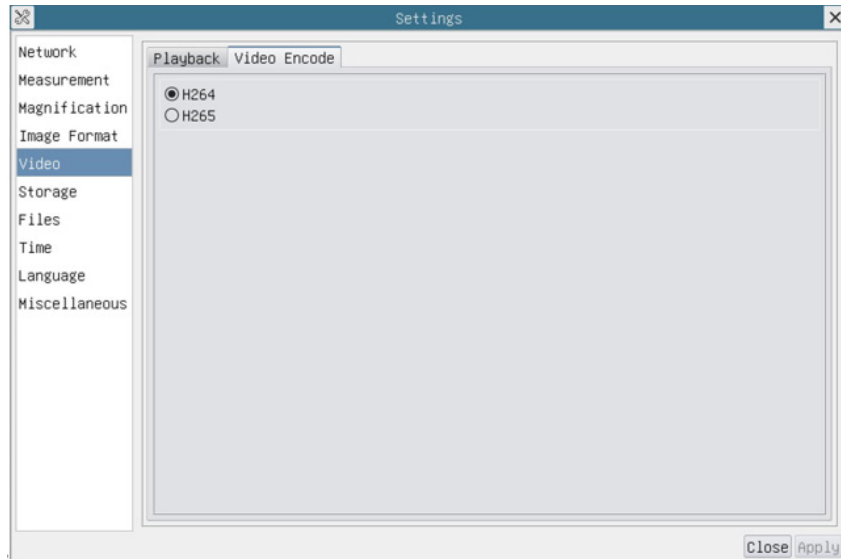

Fig. 49a - Video Settings Page - Playback

Fig. 49b - Video Settings Page - Video Encode

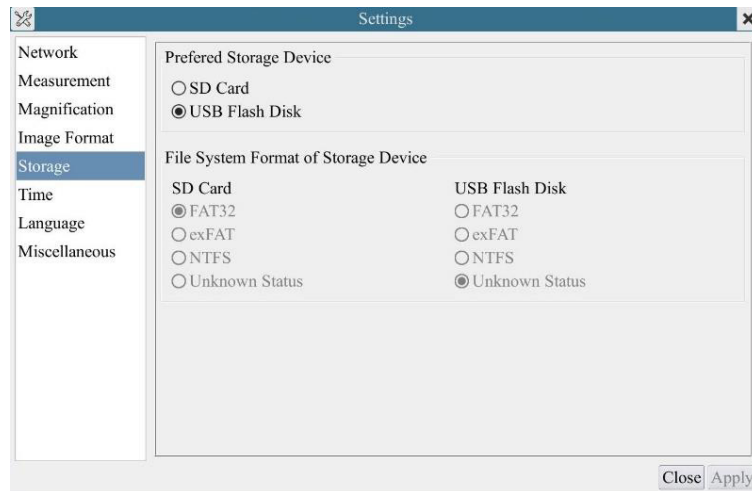| Playback	Fast Forward/Reverse interval in second units for Video Playback
Video Encode	Select the Video Encode format. It can be H264 or H265. Compared with H264, H265 has a higher H265 compression ratio which is primarily used to further reduce the design flow rate, in order to lower the cost of storage and transmission

11.3.8   Setting > Storage

Fig. 50 - SD Card / USB Flash Disk Settings Page

|	List the file system format of the current storage device	
File System Format of the Storage Device	*FAT32*	The file system is FAT32. The maximum file size of single file is 4GB
	exFAT	The file system is exFAT. The maximum file size of single file is 16EB
	NTFS	The file system is NTFS. The maximum file size of single file is 2TB.
	Unknown Status	SD card / USB Flash Disk not detected or the file system is not identified

11.3.9   Setting > Files
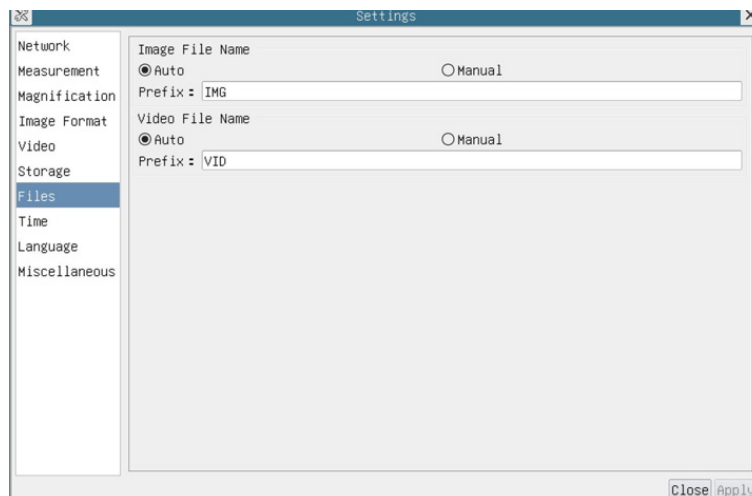
Fig. 51 - File Name Settings Page

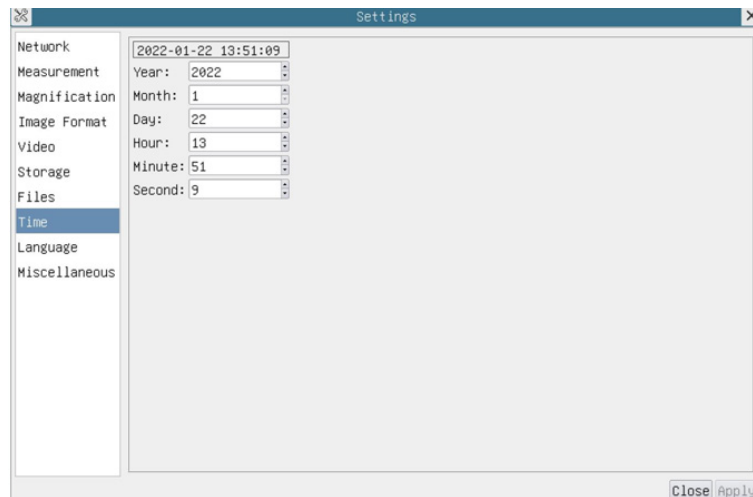|	
Image or Video File Name Paradigm	Provide Auto or Manual naming paradigm for Image or Video file
Auto	With specified name as the prefix, HDMIPRO will add digits after the prefix for the Image or Video file
Manual	A file dialog will pop up to enter the Image or Video file name for the captured Image or Video

11.3.10 Setting > Time

Fig. 52 - Time Settings Page

Time	User can set *Year*, *Month*, *Day*, *Hour*, *Minute* and *Second* in this page

11.3.11 Setting > Language

Fig. 53 - Language Settings Page

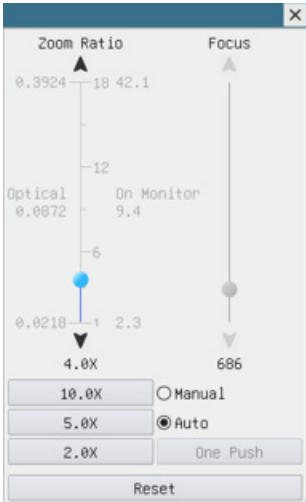| English	Set language of the whole software into English
Simplified Chinese	Set language of the whole software into Simplified Chinese
Traditional Chinese	Set language of the whole software into Traditional Chinese
Korean	Set language of the whole software into Korean
Thailand	Set language of the whole software into Thai
French	Set language of the whole software into French
German	Set language of the whole software into German
Japanese	Set language of the whole software into Japanese
Italian	Set language of the whole software into Italian
Russian	Set language of the whole software into Russian

11.3.12 Setting > Miscellaneous
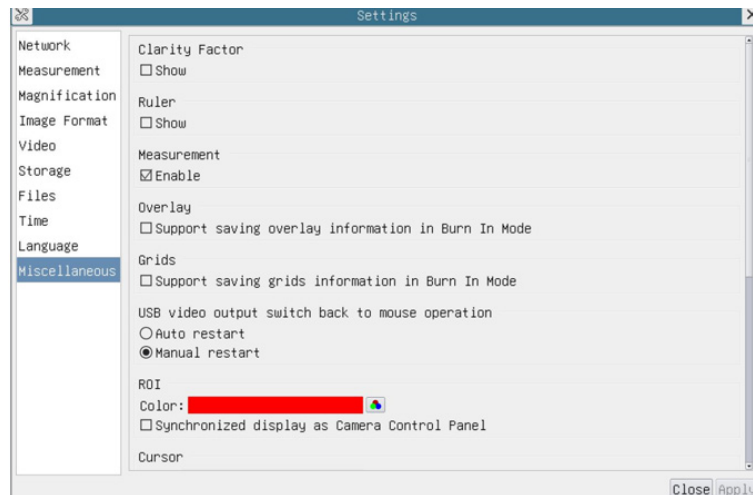

Fig. 54 - Miscellaneous Settings Page

Clarity Factor	Check this to show the *Clarity Factor* on the video window screen and inform if the camera is correctly focused or not
Ruler	Select to display the ruler in the video window, otherwise not to display the ruler
Measurement	Select to display the measurement toolbar in the video window, otherwise not to display the measurement toolbar
Overlay	Select to support saving graphics overlay information in fusion mode, otherwise it will not support
Grids	Select to support saving grids information in fusion mode, otherwise not to support
USB video output switch back to mouse operation	Select automatic restart or manual restart when switching from USB video output to mouse operation
ROI Color	Choosing the *ROI* rectangle line color
Cursor	Choosing the *Cursor* size according to the screen resolution or personal preference
Auto Exposure	Define the maximum automatic exposure time
Auto Exposure Region	Select the AE (Auto Exposure) reference area
Camera Parameters Import	Import the Camera Parameters from the SD Card or USB flash drive to use the previously exported Camera Parameters
Camera Parameters Export	Export the Camera Parameters to the SD Card or USB flash drive to use the previously exported Camera Parameters
Reset to factory defaults	Restore camera parameters to its factory status

11.4 The Auto Focus Control Panel

The *Auto Focus Control Panel* controls the autofocus performances of the camera. It will pop up automatically when mouse cursor is moved to the right side of the video window.

Control Panel	Function	Description
	Zoom Slider	Move the *Zoom Slider* to change the *zoom ratio*, the value will be displayed below the slider. It can be edited to set the desired *zoom ratio.*
	Zoom Button	There are 3 *zoom buttons*, users can set specific zoom ratio for the quick control.
	Optical Magnification	The designed lens magnification.
	Digital Magnification	The object length on the monitor divided by the actual object length.
	Focus Slider	Move the *Focus s*lider to change the focus lens position. The focus lens position value will be displayed below the slider. It can be edited to set the desired focus lens position.
	Manual Focus	When *Manual Focus* check box is checked, users can move the *Focus Slide*r to change the focus objective position to get a clear image. The position value of the focus objective below the slider can be set by the user.
	Autofocus	When *Autofocus* check box is checked, the system will automatically focus the object under the camera and the focus lens position value in the *Focus* slider will be refreshed in real-time. When the *ROI* or *Object* status is changed, the camera will perform the *Auto Focus* operation automatically.
	One Push	Clicking *One Push* button will perform an *Autofocus* operation at a time.
	Reset	Click *Reset* button to reset *Zoom* and *Focus* modules. After the process is finished, *Zoom* is set to 18X normalized magnification, and *Focus* is fixed at the standard working distance. If the object (such as a ruler for *Calibration*) is not sharp, adjust the stand bracket to move the object to the standard working distance. • Note: see *Measurement Toolbar > Calibration* for details.

11.4.1 Focus Region On The Video Window
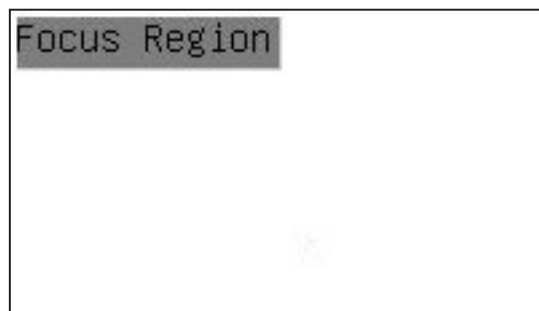
• The *Focus Region* is used for selecting the region of interest for *Auto Focus* operation.
1. When user clicks the button 🔲 on the *Camera Control Toolbar*, the *Focus Region* will pop up as well with the *Auto Focus Control Panel*.
2. Users can click any part of the video window to select the focus region for *Auto Focus* operation.
• When users close the *Auto Focus Control Panel*, the *Focus Region* will be automatically closed.

Equipment disposal

Art.13 Dlsg 25 July 2005 N°151. "According to directives 2002/95/EC, 2002/96/EC and 2003/108/EC relating to the reduction in the use of hazardous substances in electrical and electronic equipment and waste disposal."

The basket symbol on equipment or on its box indicates that the product at the end of its useful life should be collected separately from other waste. The separate collection of this equipment at the end of its lifetime is organized and managed by the producer. The user will have to contact the manufacturer and follow the rules that he adopted for end-of-life equipment collection. The collection of the equipment for recycling, treatment and environmentally compatible disposal, helps to prevent possible adverse effects on the environment and health and promotes reuse and/or recycling of materials of the equipment. Improper disposal of the product involves the application of administrative penalties as provided by the laws in force.