

**ESC**<sup>®</sup>  
MEDICAMS



USER MANUAL **FHD-LP-4000R**

 **IMPORTANT** 

**IMPORTANT SAFETY NOTICE:** Before operating this device, please read this operating manual thoroughly and carefully. When using this device with a light source, fire and/or severe injury may result to the patient, user, or inanimate objects if the instructions in this manual are not followed. All light sources can generate significant amounts of heat at the scope tip, the scope light post, the light cable tip, and/ or near the light cable adapter. Higher levels of brightness from the light source result in higher levels of heat. Always adjust the brightness level of the camera and the monitor before adjusting the brightness level of the light source. Adjust the brightness level of the light source to the minimum brightness necessary to adequately illuminate the surgical site. In addition, adjust the internal shutter of the camera higher in order to run the light source at a lower intensity. Avoid touching the scope tip or the light cable tip to the patient, and never place them on top of the patient, as doing so may result in burns to the patient or user. In addition, never place the scope tip, the scope light post, the light cable adapter, or the light cable tip on the surgical drapes or other flammable material, as doing so may result in fire. Always place the light source in standby mode whenever the scope is removed from the light cable or the device is unattended. The scope tip, scope light post, light cable adapter, and light cable tip will take several minutes to cool off after being placed in standby mode, and therefore may still result in fire or burns to the patient, user, or inanimate objects.

## **WARNINGS**

To avoid potential serious injury to the user and the patient and/or damage to this device, please note the following warnings:

1. Read this operating manual thoroughly, especially the warnings, and be familiar with its contents before connecting and using this equipment.
2. Be a qualified physician, having complete knowledge of the use of this equipment.
3. Test this equipment prior to a surgical procedure. This unit was fully tested at the factory before shipment. Never use this equipment in the presence of flammable or explosive gases.
4. Avoid disassembling any part of the camera head, as doing so may break the seals, causing leakage and/or electric shock.
5. Avoid removing covers on the control unit, as doing so may cause damage to electronics and/or electric shock.
6. To minimize electromagnetic interference that may impact functionality of the Camera, position any active electrosurgical generator and its cables at least 12 inches (30 cm) away from the camera console. When the electrosurgical generator is placed on a boom with the camera console, it is advised to position the generator on the lowest shelf.
7. Pay close attention to the care and cleaning instructions in this manual. Any deviation may cause damage.
8. Never sterilize the camera console, because the delicate electronics cannot withstand this procedure.
9. Before each use, check the outer surface of the endoscope to ensure that there are no rough surfaces, sharp edges, or protrusions.
10. To avoid the risk of electric shock, this equipment must only be connected to a supply mains with protective earth ground.
11. Portable multiple socket-outlets shall not be placed on the floor. Additional portable multiple socket-outlets or extension cords shall not be used with the equipment.

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### 1 General Information & Features

#### 1.1 Product Introduction



ESC introduces Full HD 2.4 Megapixel Laparoscopy & Endoscopy Camera FHD-LP-4000R with very rear to find 60 fps technology and Full HD Recorder which can capture and record images in full hd format directly in USB Drive connected to backside of control unit. It is one of the most advanced technology in industry by any company. It is packed with powerful Korean processor which helps it to deliver sharp high definition images even in challenging conditions. Its high sensitive sensor allows to work even at low intensity light source which prevents heating problem which occurs due to high intensity of light source.



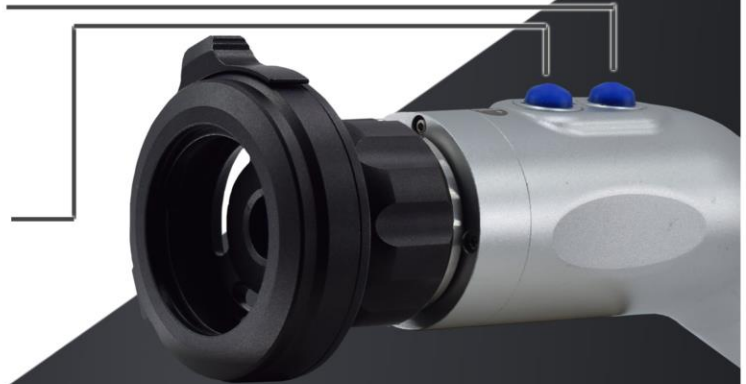
### 1.2 Features

#### IMAGE FREEZE

Camera head features freeze button. With one press it pause the live video which helps examine the patients clearly

#### WHITE BALANCE

White Balance helps the camera to adjust the colors of the image according to the intensity of the light source being used to make image look natural



#### HIGH 2X SENSITIVITY SENSOR

High Sensitivity helps it to work even at low intensity light source which eliminates heating problem to patient due to light source.



#### USB DRIVE INPUT

Record high definition videos and capture images directly into USB drive



#### 2.4 MEGAPIXEL FULL HD 1080P

High Resolution imaging with sharper details at 1920 x 1080P full HD 2.4 Megapixel resolution

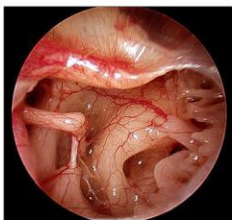


#### 5x DIGITAL ZOOM BUTTON

Control Unit has Zoom In (Up) & Zoom out (Down) Button to examine patient into depth.

#### 60 FPS SMOOTH VIDEO

- For surgical use, 60 fps is must needed feature as it gives realtime pictures preventing any delay in live video which makes it very safe for surgical use.
- It prevents any blur in the captured images.



60 FPS



30 FPS



### 1.2 Features



#### PC INPUT

Directly connect the control unit to PC / Laptop and view the video in software provided with camera.



#### ANTI-REFLECTION COATED LENS

Camera head is equipped with German made glass lens with special anti reflection coating to prevent glares from liquids.



#### FULL HD 1080P RECORDING & IMAGE CAPTURE

Record Full HD videos at 60fps with just one-press button on front panel directly into USB drive.



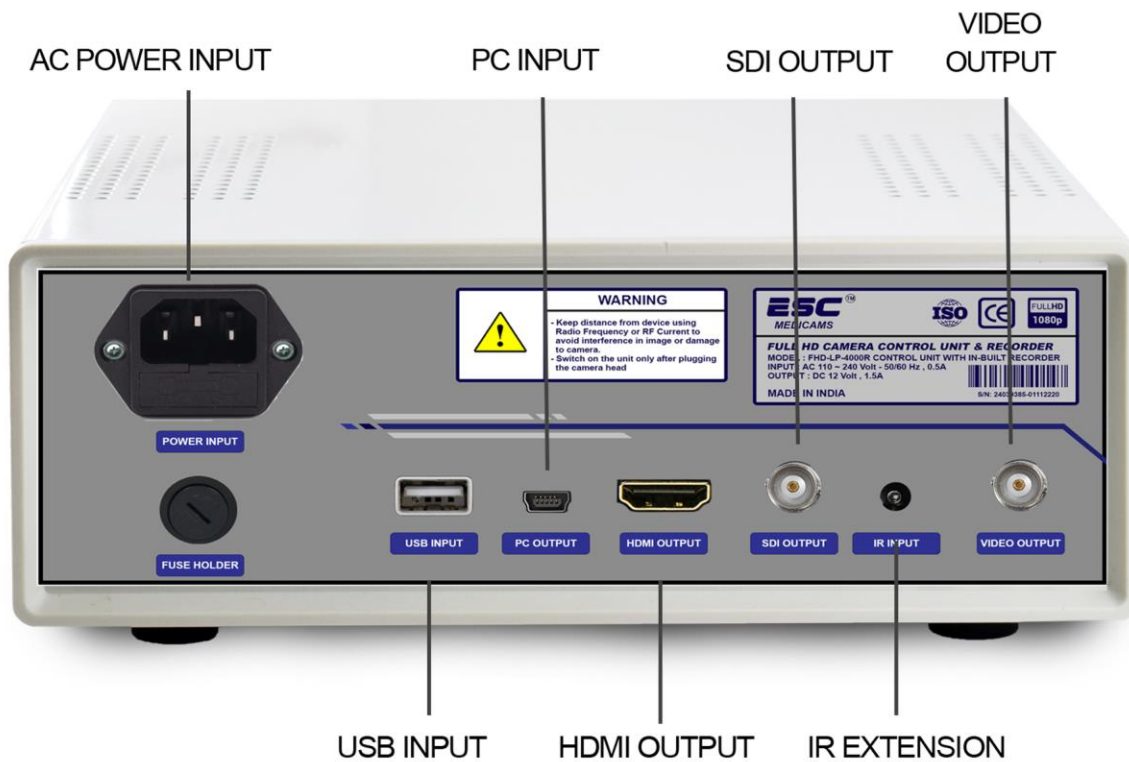
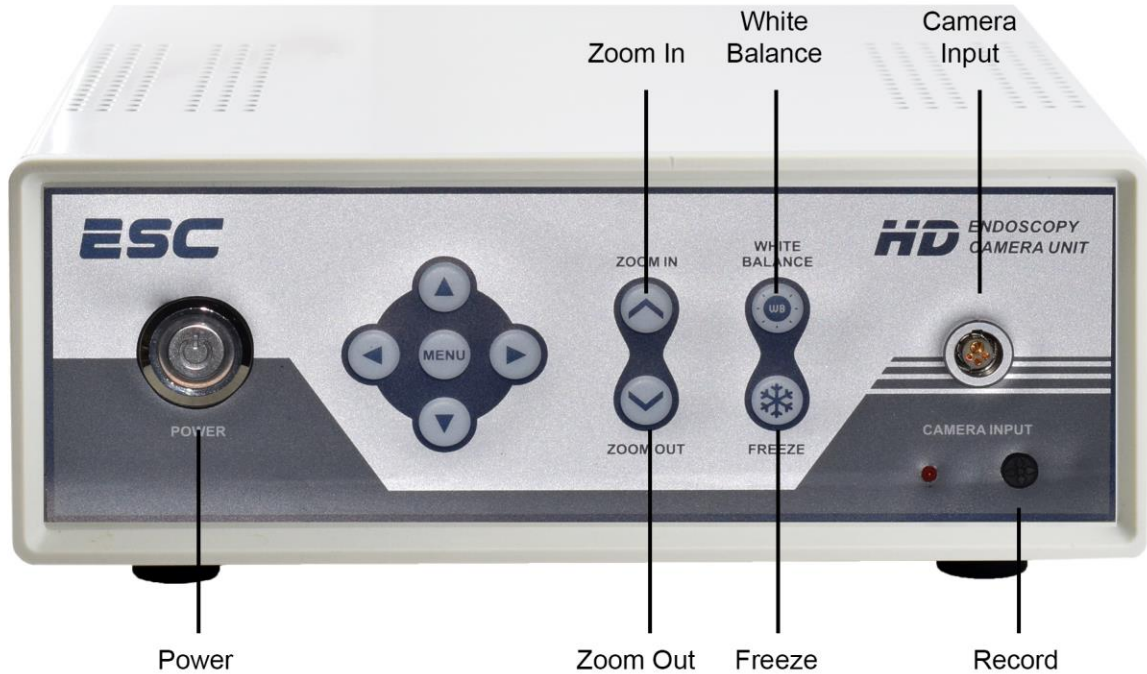
#### REMOTE CONTROL FOR RECORDING

Use remote control to capture images and videos by connecting IR Extension Cable provided along with camera.



### 2 Illustration

#### 2.1 Control Unit



## 2.2 Camera Head



### 3 Set-Up

#### 3.1 Preparation

 **NOTE !**

*It might cause malfunctions to disconnect and connect the camera plug during operation. Disconnect and connect after powering off. Power on after confirming properly connected the camera head.*

 **IMPORTANT !**

*This Camera head must be connected only to the FHD-LP-4000R Controller. Do not combine camera head with other camera controller.*

 **IMPORTANT !**

*Make sure the protection cap is installed if you don't want to use this camera in a short time.*

*Do not squeeze, compress or pinch, pull or kink the camera cable.*

 **IMPORTANT !**

*This camera carries high speed HDMI Signal @ 60fps. Some old Monitor might not be able to support such signal. In that case, kindly use latest monitors or LCD which can support high speed signals.*

 **WARNING !**

***HF current may interfere with video images. To prevent such interference, HF equipment and video imaging equipment should be connected to different power supply circuits.***

### 3 Set-Up

#### 3.1 Preparation



**WARNING !**

***TRY TO KEEP THE CAMERA HEAD CONNECTOR PLUGGED INTO THE CONTROL UNIT. DO NOT REMOVE AND INSERT IT AGAIN AND AGAIN AS IT CAN DAMAGE THE PINS OF THE CONNECTOR. ONCE PLUGGED, REMOVE ONLY WHEN REQUIRED.***



**WARNING !**

***Be sure that this instrument is not used adjacent to or stacked with other equipment (other than the components of this instrument or system) to avoid electromagnetic interference.***

***• Electromagnetic interference may occur to this instrument when it is placed near equipment marked with the following symbol or other portable and mobile RF communications equipment such as cellular phones. If radio interference occurs, mitigation measures may be necessary, such as reorienting or relocating this instrument or shielding the location.***



### 3.2 Connecting Control Unit to Monitor



Connect the camera controller to a video monitor using the HDMI cable provided along with the unit.

Connect one side of HDMI cable to HDMI Output port on the rear panel of control unit.

Connect other side of HDMI cable to HDMI Input port in Monitor / LCD / LED.

Connect Power Cord to AC power socket.



**IMPORTANT !**

***This camera carries high speed HDMI Signal @ 60fps. Some old Monitor might not be able to support such signal. In that case, kindly use latest monitors or LCD which can support high speed signals.***

***Only use high speed HDMI cable to connect control unit with monitor. Do not use PC input if you don't have adequate system requirement.***



### 3.3 Connecting Control Unit to Monitor - Using SDI Output



Connect the camera controller to a video monitor using the SDI cable provided along with the unit.

Connect one side of SDI cable to SDI Output port on the rear panel of control unit.

Connect other side of SDI cable to SDI Input port in Monitor / LCD / LED.

Connect Power Cord to AC power socket.



#### **IMPORTANT !**

***This camera carries high speed 1080p Signal @ 60fps. Which gives 3G-SDI Output format. Some old Monitor might not be able to support such signal.***

***Go to Camera menu to adjust the resolution to 1080i @ 50/60p , which will give output in HDSDI Format***

***Make sure to use ORIGINAL 75 OHM HDSDI CABLE.***

***This SDI Output Cannot be used as video output.***

### 3.4 Connecting Camera to Control Unit



Connect the camera head connector to control unit connector as shown in the above picture.

Please find the red dot marked on camera connector align it with red dot on the control unit connector, then insert the connector until it is locked.

To detach the camera from control unit, pull the lock of the connector first then pull out the connector from control unit

 **WARNING !**

***TRY TO KEEP THE CAMERA HEAD CONNECTOR PLUGGED INTO THE CONTROL UNIT. DO NOT REMOVE AND INSERT IT AGAIN AND AGAIN AS IT CAN DAMAGE THE PINS OF THE CONNECTOR. ONCE PLUGGED, REMOVE ONLY WHEN REQUIRED.***

Do not plug or unplug the camera connector while control unit is switched ON.

### 3.5 Setting-up the camera



#### **IMPORTANT !**

*Before connecting the endoscope to the camera, confirm the lens surface and endoscope surface are dry and clean. Remove any contamination or soiling with optical cleaning paper or cleanroom cloth soaked with alcohol.*

Pull the latch on the camera lens adapter to fit the rigid endoscope into the camera.

#### **WARNING !**

*Do not remove the lens on the camera head as camera sensor can catch the dust. Remove only if required*

### 3.6 Switching on the system

Switch on the power socket where control unit power cord is connected

Switch On the power switch on the front panel of control unit.

The image will be shown on the monitor. If not, confirm that illumination for imaging is enough OR Freeze button is not pressed.

## 4 Using the camera

### 4.1 Focusing the camera

Adjust the focus ring of the lens to get sharp images.



*To get the best result adjust the focus before performing any surgery. Keep any object at a distance from endoscope tip at which you want to observe the patient. For example, if distance of observation of patient from endoscope tip is 1 cm., then keep the object at 1 cm and adjust the focusing knob to get the sharp focussed image.*

### 4.2 White Balance

To obtain a natural image, make sure you carry out a white balance procedure properly after each change of light source.

Make sure the light source is on and the output of the light is stable. (Normally the light source need several minutes to stabilize after it switch on, for more details of the stabilization time, please check the manual of the light source.

Connect the endoscope and light source to the camera, direct the endoscope tip to the white surface, and make sure the white surface have covered the whole image area.

Briefly press the white balance button on the camera head for 1 second and leave the button. Do not move the camera. It will display AWB Setting, **Till the time AWB Setting is displayed on screen, DO NOT MOVE THE CAMERA from white surface.**



## 4.2 White Balance



### **WARNING !**

*Do not press white balance button while performing surgery.*

*During Operation of the camera, do NOT touch patient and any signal connector of the camera, such as video output connectors.*

*Take care not to expose the distal end of the endoscope to external light while performing white balance.*



### **NOTE !**

*When the light source is changed, normally white balance has to be re-performed. If the color temperature of the two light sources is significantly different, you may need to perform two times white balance adjustment to get the best color rendering.*

## 4.3 Freeze

Freeze button is used to pause the live image.

Press the freeze button on camera head or control unit once to pause the live image and press it again resume the live video.



### **NOTE !**

*Upon startup, if image is not displaying or it is showing black screen, then try pressing the freeze button once to get image.*



#### 4.4 Recording Set-up

To use the remote control for recording and snapshot, Connect the IR cable provided along with recorder to IR Input port at backside of control unit.



*Keep the IR attached at the IR cable on the front side on control unit so that remote can be pointed toward it*

Connect USB Drive into USB Input port at backside of control unit. Allow one minute for control unit to recognize the USB Drive.

Format the pen drive before connecting.

Press the record button on the front panel of control unit at bottom corner or press Record button on the remote control pointing toward IR attached to control unit.

Indicator will turn red which indicates that recording has been started.

To STOP the recording, press the recording button once on control unit or recording button on remote control. Indicator will blink red light 4-5 times and turn off which means recording has been stopped.



*Do not remove the USB Drive while indicator is flashing to save the video.*

Press Snapshot button on remote control pointing towards IR Cable. Indicator will blink once to indicate that snapshot has been saved.

**Snapshot cannot be taken while video is recording.**

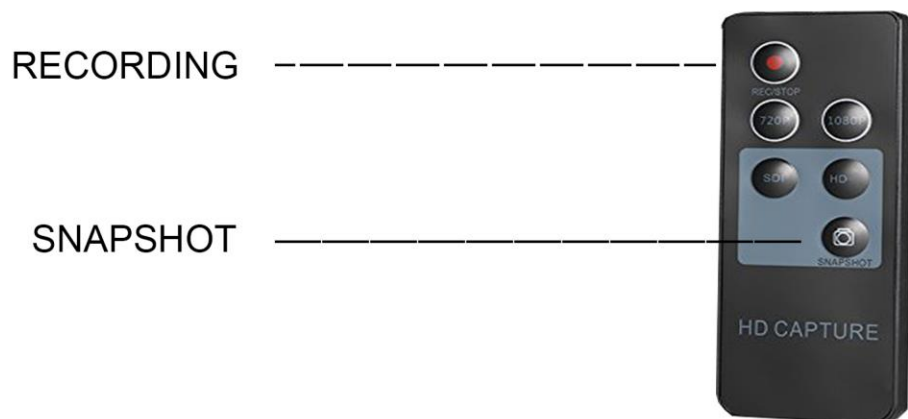
### 4.5 Using Remote Control



To use the remote control for recording and snapshot, Connect the IR cable provided along with recorder to IR Input port at backside of control unit.

#### NOTE !

*Keep the IR attached at the IR cable on the front side on control unit so that remote can be pointed toward it*



#### WARNING !

**DO NOT PRESS ANY OTHER BUTTON EXCEPT RECORDING & SNAPSHOT BUTTON ON REMOTE CONTROL.**

## 5 Image Optimization

### 5.1 Exposure

#### 5.1.1 Brightness

Click on Menu Button on control unit. Choose Exposure and press enter.

Adjust the brightness according to your light source intensity.

If the image is too bright or showing reflection, then either decrease the brightness or decrease light source intensity.

If the image is dull or showing dark images, then either increase the brightness or increase light source intensity.



*To best adjust the brightness, Keep the endoscope tip at a distance from certain object, at which you will observe it inside the patient.*

*For example, if your scope tip will be at a distance of 2 cm. from the patients's body while operating then keep any object at a distance of 2 cm., from your scope tip.*

*If image is showing bright reflection in the center then decrease the brightness or light source intensity till bright reflection disappears.*

*If image is dull or dark at the center then increase the brightness or light source intensity till just one step before it start showing reflection.*

### 5.1.1 Brightness



*Since these full HD Camera have CMOS Sensor Technology , it requires more light than conventional analog technology which uses CCD sensor. It is recommended to use only fiber optic professional light source. Low intensity or Portable light source can not be used with these cameras*

If image is Noisy, that means camera is not getting enough light from the light source. Either Increase the light source intensity or use light source with higher wattage.

Increasing the brightness to more than required level, can cause reflection.

### 5.1.2 AGC ( Auto Gain Control )

AGC helps to electrically amplified when the light is inadequate due to the distal end of the endoscope being too far from the object.

Adjust the AGC according to the distance of the object you want observe.

If object is little far from the tip of the endoscope or if depth of the area under observation is such that farther object are showing dark, then increase the AGC until object illuminates.



Normally it is suggested to keep the gain at zero when all objects in the image are at almost same distance.

If AGC is increased then colors of the object nearer to the tip will increase.

### 5.1.3 Color Gain

Color Gain is used to adjust the overall color of the image.

Go to “Color”. Then use Color Gain to adjust the colors.  
If colors in the image are too high, decrease the colors.



*Colors setting are different according to different screens or monitor.  
Default color settings might not match according to the customer's screen.  
It is not necessary that if one camera is showing accurate color on your  
screen, then other camera will work same.*

*It is therefore advised to adjust the settings of your monitor / screen. It is  
recommended to adjust color,brightness,contrast,hue of your screen to  
get the accurate color otherwise your monitor will display inaccurate color  
which will lead to wrong diagnoses.*

To calibrate the monitor color, camera has color bar for testing.  
Go to “System” -> “Color Bar” . Color bars will appear on your screen.  
Confirm that all colors of the color chart are displayed properly.

If the colors do not appear properly, adjust them according to the  
instruction manual of the monitor.



**MAKE SURE TO PERFORM WHITE BALANCE BEFORE CHECKING  
FOR COLOR CALIBERATION.**



#### 5.1.4 Sharpness

Sharpness can be adjusted to sharpen the image details.

Go to “Image” after opening the menu, choose “Sharpness”.

Increase the sharpness according to the scope and monitor used.



*In some cases, Increase in sharpness might cause noise to appear.*

*It is suggested to keep sharpness to minimum level when using semi-rigid endoscopes, nephroscopes or fiberoscope to reduce Moire effects caused due to these scopes.*

*Decrease in sharpness will cause blurness of image.*

## 6 Cleaning and Maintenance

### 6.1 Cleaning



#### **WARNING !**

*Do not use the camera and its controller in high humidity environment.  
Danger of electric shock.*

*Before cleaning the camera or control, switch it off completely and disconnect it from the power supply.*

*Never immerse or sterilize the camera console as this will damage the camera and void the warranty.*

Clean the device with a soft cloth moistened with surface disinfectant, alcohol or spirit



#### **NOTE !**

*Only camera heads marked autoclavable can withstand steam sterilization. Autoclaving camera heads that do not bear this marking will result in product damage.*

*Make sure that no humidity enters the device.*

*After cleaning with flammable liquids, leave the equipment to dry for one hour, before it is switched on again. For instance, there is danger that an alcohol-air explosive mixture could have been formed after cleaning.*

*Do NOT expose the camera head with camera cable to temp. above 60c.*

*Do NOT bring camera head connector in contact with water or any liquid as it is not waterproof.*

**7 Troubleshoot**

<b>Problem</b>	<b>Possible Reason</b>	<b>Remedy</b>
Device does not work or Blue light is not ON.	Power Cable not connected	Connect power cable
Image out of focus	Focusing not set	Adjust focus knob
	Camera lens or Scope is not cleaned properly	Clean lens or scope with alcohol soaked soft paper.
	Sharpness is set to low value.	Increase the sharpness in "Image" Settings
No Image	Light Source not ON	Switch on the light source
	Monitor Setting or frequency does not match the with camera	Change monitor seting Use different HDMI Cable with high speed
Incorrect color	Color Gain in the camera is incorrect	Adjust the color gain settings in camera
	White Balance Incorrect	Perform white balance
	Monitor Setting wrong	Adjust monitor color setting or saturation

**7 Troubleshoot**

<b>Problem</b>	<b>Possible Reason</b>	<b>Remedy</b>
Poor Resolution or Noisy Image	Light Source not ON	Switch on the light source
	Light Intensity is not apt.	Increase the light source intensity or use light source with higher power.
	“DNR” in camera set to OFF	Keep “DNR” to High
Reflection in Image	Brightness of camera is set to high value	Reduce the Brightness of the camera
	Light source intensity is too high.	Reduce the light source intensity.
Object in depth is dark	AGC of the camera is set to low value.	Increase the AGC from the “exposure” settings of the camera.
Image is not centered	Horizontal or Vertical value in the camera “setting” is not adjusted.	Adjust the Horizontal & Vertical value from the camera “image” setting
Moire or Mesh formation when using flexible scopes.	Sharpness of camera is high	Reduce the sharpness in “image” setting of the camera to Zero.

**7 Troubleshoot**

<b>Problem</b>	<b>Possible Reason</b>	<b>Remedy</b>
SDI Output not working	SDI Cable is defective or not 75 ohm cable.	Use only 75 ohm cable for SDI Output
	Monitor does not support 3G-SDI Signal that comes from 1080P resolution of this camera	Change the camera resolution to 1080i to get HD-SDI signal to support on monitor
	Cable has been plugged in VIDEO input port.	SDI Output works only with SDI Input monitor.
Inaccurate Color	Colors of the monitor is not calibrated properly	Adjust the monitor colors
		Use color bar from the camera to adjust
Image is vibrating	There is strong magnetic field near the monitor.	Move the source of the magnetic field away from the monitor.



## 8. Specifications

### SPECIFICATIONS

Model	FHD-LP-4000R	
Signal System	PAL	NTSC
Image Sensor	1/1.9" Sony CMOS Full HD 1080p Sensor	
Total Pixels	2000 (H) x 1241 (V) approx. 2.48M pixels	
Unit Cell Size	3.75 $\mu$ m (H) x 3.75 $\mu$ m (V)	
Scanning Frequency	H: 15.625 KHz / V: 50 Hz	H: 15.734 KHz / V: 59.94 Hz
Frame Rate	50 Fps @ 1080p	60 Fps @ 1080p
Sensor Resolution	2.13 Megapixel 1080p	
Effective Pixels	1945 (H) x 1097 (V) approx. 2.13M pixels	
Focal Length of Lens	22 mm. (ENT) / 28 mm. (Laparoscopy)	
Gain Control (AGC)	0 - 10 Steps	
Brightness Control	0 - 20 Steps (Adjust according to light source intensity)	
Output	1 HDMI , 1 3G-SDI	
Input	1 USB Input ( Upto 128 GB Pen Drive ) 1 PC Input ( Windows )	
Recording Resolution	1080p Full HD @ 60 fps	
Snapshot Resolution	1920 x 1080 Pixels	
Digital Zoom	1x- 10x	
Recording Mode	Via USB Pen Drive	
Min. System Requirement for PC	OS : Windows 7,8,10 , Ram : 16 Gb , Intel i5 / i7 , Memory : 512 Gb , Graphics: 2 Gb	
Sharpness	0-10	
Color	0-10	
White Balance	PUSH LOCK	
Camera Cable Length	3 Meters Ultra Soft Silicon Cable	
HDMI Cable Length	2 Meters Ultra Slim	
Power Cable Length	1 Meter	
Supported Endoscope	Rigid Endoscopes / Flexible Endoscope (Optional)	
Connector	Push Pull Type	
Power Voltage	12VDC (Camera Head) , AC110V-240V (Control Unit)	
Power Consumption	Max. 2W / 170mA	
Operating Temperature	-10°C ~ +50°C	
Operating Humidity	30% ~ 80% RH	
Dimensions	275 (L) x 220 (W) x 80 (H) mm. (Control Unit) , $\varnothing$ 38 mm. x 97.7 mm. (Camera Head)	
Weight (Net)	Approx. 2225 g. ( Control Unit ) , Approx. 150 g. ( Camera Head without Cable and lens )	