TOVIS®
Total Visual & Interface Solution

32″ 4K-UHD Surgical Monitor

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GDWEB DESIGN
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User Guide

L32HJAG0TV

L32HJAG0TV-12G

Table of Contents

"This user manual is subject to change without prior notice to improve quality"

1. Warning and Cautions

Please read this manual and follow its instructions carefully. The words warning, caution, and note carry special meanings and should be carefully reviewed:

Warning	Indicates the guidelines to be followed to prevent potential serious injuries that may occur to users and patients.
Caution	Indicates the guidelines to be observed to prevent minor injury or damage to the user or equipment.
Note	Clarifies guidelines or provides additional useful information.

Warning

Please strictly observe the following warnings to prevent potential serious injuries to users and patients.

- Read this manual thoroughly and be familiar with its contents prior to using this device.
- Adhere to all warnings on the device and in this user manual.
- Carefully unpack the device and check if any damage occurred during shipment.
- This device is non-sterile and therefore should not be placed in the sterile field.
- Do not place the device or any other heavy object on the power cord. Damage to the cable can cause fire or electric shock.
- This device should not be used adjacent to or stacked with other equipment. If adjacent or stacked use is necessary, the device should be observed to verify normal operation in the configuration in which it will be used.
- Test this device prior to a surgical procedure. This device was fully tested at the factory before shipment.
- Do not modify this equipment without authorization of the manufacturer.
- Do not insert any objects into the monitor. If this occurs, unplug the device and have it checked by qualified personnel before operating it any further.
- Use appropriate caution to prevent contact with fluids if the device is being used with a power supply in patient environments.
- The use of cables and/or other accessories with this device, other than those specified, may result in increased emissions or decreased immunity of this device.
- AC adapter is not protected against water. DO NOT expose AC adapter to water
- The protective screen is made of tested impact resistant materials. Nonetheless there is the possibility that it may crack if subject to strong impacts. Evaluate and prevent the risk of possible breakages of the protective screen by correctly handling and positioning the display in the operating room.
- To avoid risk of fire, do not use the device in the presence of flammable anesthetics
- To avoid risk of electric shock, this equipment must only be connected to a supply mains with protective earth.

Caution

- Use the cable included in the accessory box to connect the monitor. Cables longer than 2 m may result in unstable images.
- Do not expose the device to moisture or apply liquid cleaners directly to the screen. Spray the cleaning solution onto a soft cloth and clean gently. For further detail, refer to the "Cleaning and Maintenance" section of this manual.
- Allow adequate air circulation to prevent internal heat buildup. Do not place the device on surfaces (rugs, blankets, etc.) or near materials (curtains, draperies) that may block the ventilation slots.
- Do not touch the patient while handling signal input or output connectors. Equipment with SIP/SOP connectors should either comply with IEC 60601-1 and/or IEC 60601-1-1 harmonized national standards or the combination should be evaluated for safety.
- Connect the device to an AC adapter connected to a hospital grade power cord ensuring the power cord is plugged into a grounded power outlet to achieve grounding reliability.
- Do not sterilize the device, as the delicate electronics cannot withstand this procedure.
- Use only the monitor power supply included in the accessory box with the display.
- Completely secure the connection between the DC power cord and the extension cord.
- Never operate the device immediately after transportation from a cold location to a warm location.
- When using overseas, please use a power cord that is compatible with the power outlet standards of that country.
- Unplug the device if it is not to be used for an extended period of time. To disconnect the cord, unscrew the plug first, then pull the cord out by the plug. Never pull the cord itself.
- To ensure electromagnetic compatibility, refer to the “Electromagnetic Compatibility” section of this manual. This monitor must be installed and operated according to the EMC information provided in this manual.
- Pay close attention to the cleaning instructions in this manual. A deviation may cause damage.
- Do not install the device near sunlight, excessive dust, mechanical vibration, or shock.
- Do not position the device so that it is difficult to disconnect the power cord from the supply mains.
- Do not operate with the glass device screen facing downward.
- Handle the device with care. Do not strike or scratch the screen.
- If the device is altered or modified without the explicit approval of the Compliance Officer, the product warranty may be voided.
  This device does not have a power switch. To disconnect the main power, you must unplug the external power supply.

1. Warning and Cautions

Note

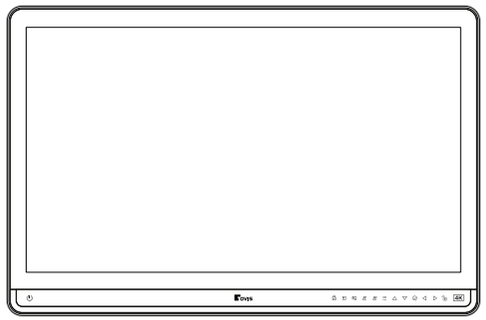
- All devices connected to the unit must be certified or compliant according to IEC 60601-1, IEC 60950-1, IEC 62368-1 and IEC 60065 standards and other IEC/ISO standards applicable to the devices. Furthermore, the system as a whole must comply with IEC 60601-1 standards.
- All peripheral devices connected to the signal input/output sections of the unit constitute the medical-use system, and therefore, the user is responsible for ensuring that the system as a whole complies with IEC 60601-1 standards. If in doubt, consult qualified service representative.
- Connecting the unit to other devices may increase the leakage current.
- For all peripheral devices connected to the unit that operate on commercial power supplies and do not comply with IEC 60601-1 standards, incorporate an isolation transformer that complies with IEC 60601-1 standards and connect to the commercial power supply via the transformer.
- The unit generates, uses, and may radiate radio frequency energy. If it is not installed and used in accordance with the instruction manual, it may cause interference on other devices. If the unit causes interference (which can be determined by disconnecting the power cord from the unit), try the following.

  - Relocate the unit with respect to the affected devices.
  - Connect the unit and the affected devices to different branch circuits.

- For more information, consult qualified service representative.
- The warranty is void if any of these warnings or cautions is disregarded.
- This product contains electrical waste or electronic equipment. It must not be disposed of as unsorted municipal waste and must be collected separately
- This device is not intended to be connected to an IT network in the clinical environment.

2. About Your Device

32" 4K Surgical Monitor



2.1 Overview

This product is a 32-inch Ultra High Definition (UHD) surgical monitor designed for use in endoscopic imaging systems and integrated operating room environments. It supports a wide color gamut and achieves accurate color reproduction through advanced color correction algorithms, providing optimal performance in environments requiring real-time precision imaging.
This monitor is classified as follows depending on whether it supports SDI signals:

Model	Descriptions
L32HJAG0TV	Basic Model
L32HJAG0TV-12G	Basic Model + 12G-SDI module

2.2 Intended Use and Indications for Use

This device is intended for displaying images from endoscopes or other compatible medical systems. It is suitable for use in hospital operating rooms, surgical centers, and similar medical environments. However, it is not intended for diagnostic use.

2.3 Intended Conditions for Use

This monitor is intended to be used in the near-patient environment.

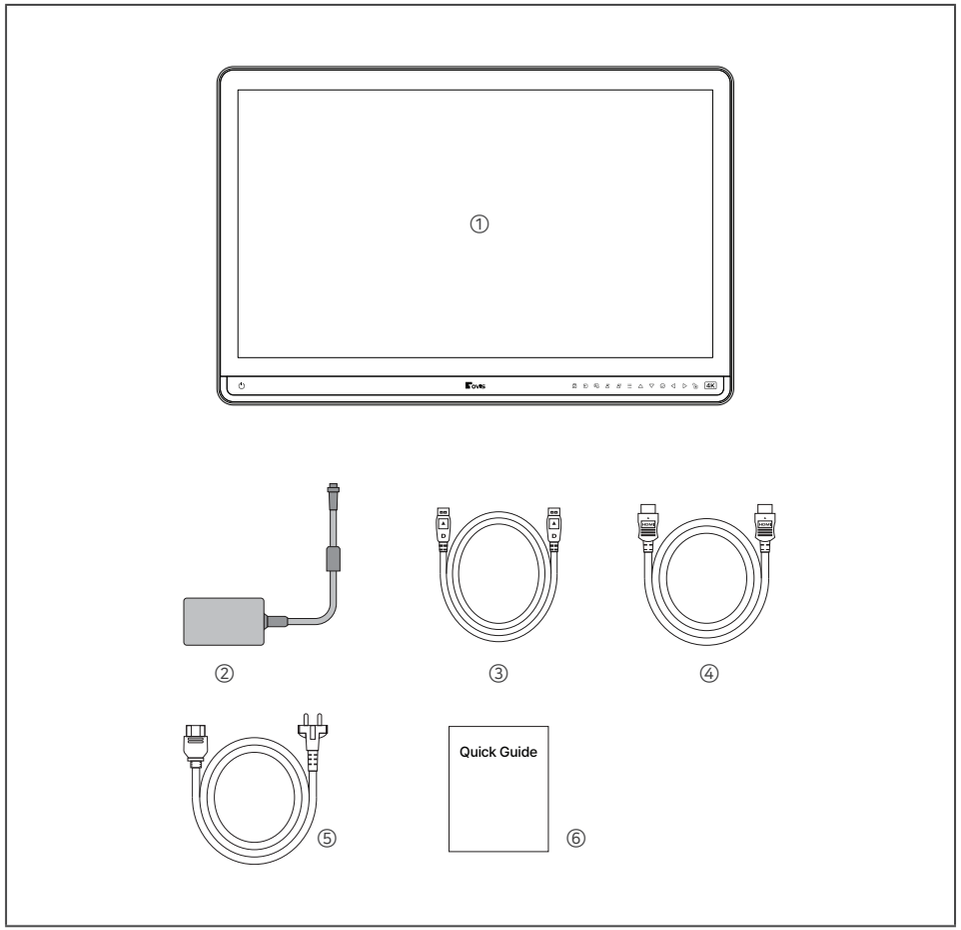
2.4 Contraindications:

This monitor is not intended to be used for direct diagnosis and therapeutic interventional radiology.

2.5 Intended users:

This monitor is intended to be used by trained medical practitioners.

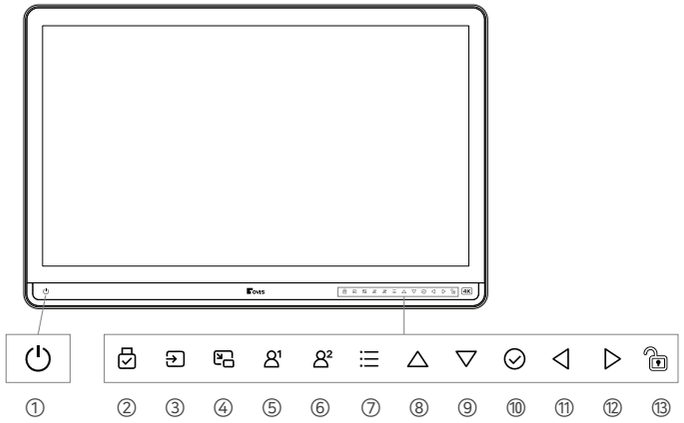
3. Packaging Contents



① 1x 32” 4K-UHD Surgical Monitor
② 1x External Power Supply
③ 1x DisplayPort Cable
④ 1x HDMI Cable
⑤ 1x AC Power Cord
⑥ 1x Quick Guide

4. Product overview

4.1 Front panel



■ Front Control Buttons

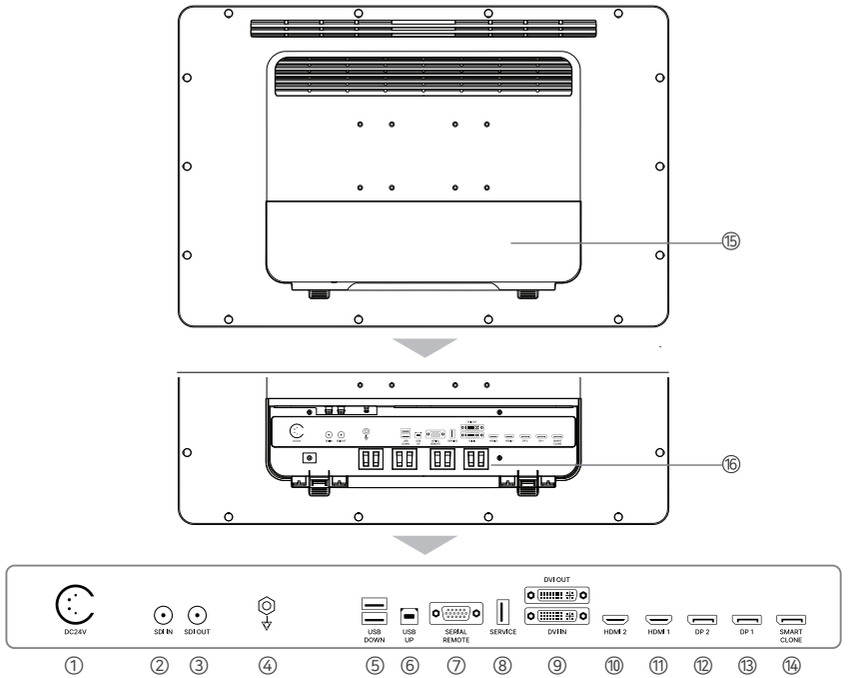
① Power button : Turns the system power on or off.
② Service Port status : Indicates the connection status of the USB memory stick.
- Icon lights up(Green) : USB memory stick connected properly
- Icon is inactive : USB memory stick not recognized

③ Input Source : Select the main input source.
④ Multi window : Select 1P/PIP (Picture-In-Picture)/PBP (Picture-By-Picture) mode
⑤ User Key1 : Recall the menu assigned to user key1.
⑥ User Key2 : Recall the menu assigned to user key2.
⑦ Menu : Activate OSD main menu exits OSD menu
⑧ Up : Navigate up
⑨ Down : Navigate down
⑩ Select : Select menu items.
⑪ Left : Navigate Left or decrease the value of the selected setting.
⑫ Right : Navigate Right or Increase the value of the selected setting.
⑬ Key Lock : Locks or unlocks all keys on the front except the power button.
Press and hold the key for 2 seconds to activate it.
- Icon lights up(Orange) : All buttons work normally.
- Icon light off: All buttons are locked

Note : Only the front LED control buttons that are lit (activated) will work. Buttons that are not lit will not work.

4. Product overview

4.2 Rear panel

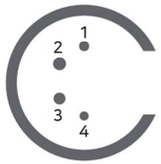


(1) DC-Power Input
(2) 12G-SDI Input (Optional)
(3) 12G-SDI Output (Optional)
(4) Equipotential Connector
(5) USB Downstream Connector (5V/1A power supply)
(6) USB Upstream Connector
(7) RS-232C Connector for remote control serial protocol
(8) Service Port for Firmware upload with USB memory stick
(9) DVI-D Input / Output
(10) HDMI-2(HDMI2.0)Input
(11) HDMI-1(HDMI2.0)Input
(12) DP-2(DisplayPort1.2SST)Input
(13) DP-1(DisplayPort1.2SST)Input
(14) Smart Clone (Displayport 1.2SST output)
(15) Cable Cover
(16) Cable Holder

* Smart Clone function is supported only when the main signal is HDMI / DisplayPort / SDI.

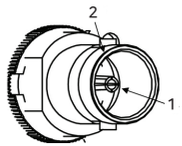
4.3 Connector Pin Assignment

(1) DC-Power Input



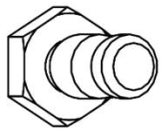
PIN	Signal Assignment
1	VCC
2	VCC
3	GND
4	GND

(2) SDI-IN/OUT Connector

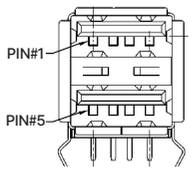


PIN	Signal Assignment
1	SDI Signal
2	GND

(3) Equipotential Connector

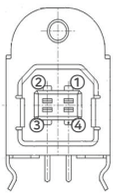


(4) USB Downstream Connector



PIN	Signal Assignment	PIN	Signal Assignment
1	V-BUS_#1	5	V-BUS_#2
2	USB_DM_#1	6	USB_DM_#2
3	USB_DP_#1	7	USB_DP_#2
4	GND_#1	8	GND_#2

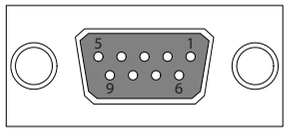
(5) USB Upstream Connector



PIN	Signal Assignment
1	V-BUS
2	USB-DM
3	USB-DP
4	GND

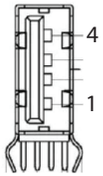
4. Product overview

(6) RS-232C connector



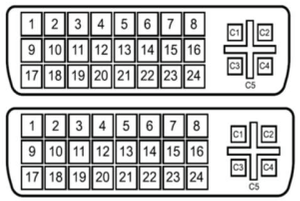
PIN	Signal Assignment	PIN	Signal Assignment
1	NC	6	NC
2	RXD	7	NC
3	TXD	8	NC
4	NC	9	NC
5	GND		

(7) Service Port (USB-A)



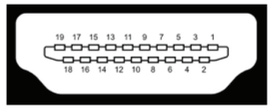
PIN	Signal Assignment
1	V-BUS
2	USB-DM
3	USB-DP
4	GND

(8) DVI IN/OUT Connector



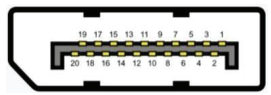
PIN	Signal Assignment	PIN	Signal Assignment	PIN	Signal Assignment	PIN	Signal Assignment
1	T.M.D.S. Data2-	9	T.M.D.S. Data1-	17	T.M.D.S. Data0-	C1	NC
2	T.M.D.S. Data2+	10	T.M.D.S. Data1+	18	T.M.D.S. Data0+	C2	NC
3	T.M.D.S. Data2 Shield	11	T.M.D.S. Data1 Shield	19	T.M.D.S. Data0 Shield	C3	NC
4	NC	12	NC	20	NC	C4	NC
5	NC	13	NC	21	NC	C5	GND
6	DDC Clock	14	+5V Power	22	T.M.D.S. Clock Shield		
7	DDC Data	15	Ground(for +5V)	23	T.M.D.S. Clock+		
8	VSYNC	16	Hot Plug Detect	24	T.M.D.S. Clock-		

(9) HDMI Connector



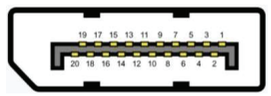
PIN	Signal Assignment	PIN	Signal Assignment	PIN	Signal Assignment
1	T.M.D.S. Data2+	8	T.M.D.S. Data0 Shield	15	DDC_SCL
2	T.M.D.S. Data2 Shield	9	T.M.D.S. Data0-	16	DDC_SDA
3	T.M.D.S. Data2-	10	T.M.D.S. Clock+	17	DDC/CEC GND
4	T.M.D.S. Data1+	11	T.M.D.S. Clock Shield	18	+5V POWER
5	T.M.D.S. Data1 Shield	12	T.M.D.S. Clock-	19	Hot Plug Detect
6	T.M.D.S. Data1-	13	NC		
7	T.M.D.S. Data0+	14	NC		

(10) Display port connector



PIN	Signal Assignment	PIN	Signal Assignment	PIN	Signal Assignment
1	ML_Lane3(n)	8	GND	15	AUX CH(p)
2	GND	9	ML_Lane1(p)	16	GND
3	ML_Lane3(p)	10	ML_Lane0(n)	17	AUX CH(n)
4	ML_Lane2(n)	11	GND	18	Hot plug
5	GND	12	ML_Lane0(p)	19	Return
6	ML_Lane2(p)	13	CONFIG1	20	DP_POWER
7	ML_Lane1(n)	14	CONFIG2		

(11) Smart Clone

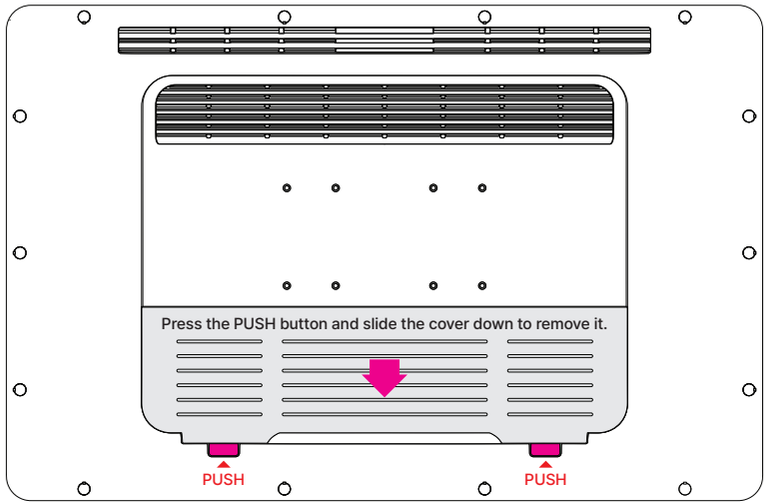


PIN	Signal Assignment	PIN	Signal Assignment	PIN	Signal Assignment
1	ML_Lane0(p)	8	GND	15	AUX CH(p)
2	GND	9	ML_Lane2(n)	16	GND
3	ML_Lane0(n)	10	ML_Lane3(p)	17	AUX CH(n)
4	ML_Lane1(p)	11	GND	18	Hot plug
5	GND	12	ML_Lane3(n)	19	Return
6	ML_Lane1(n)	13	CONFIG1	20	DP_POWER
7	ML_Lane2(p)	14	CONFIG2		

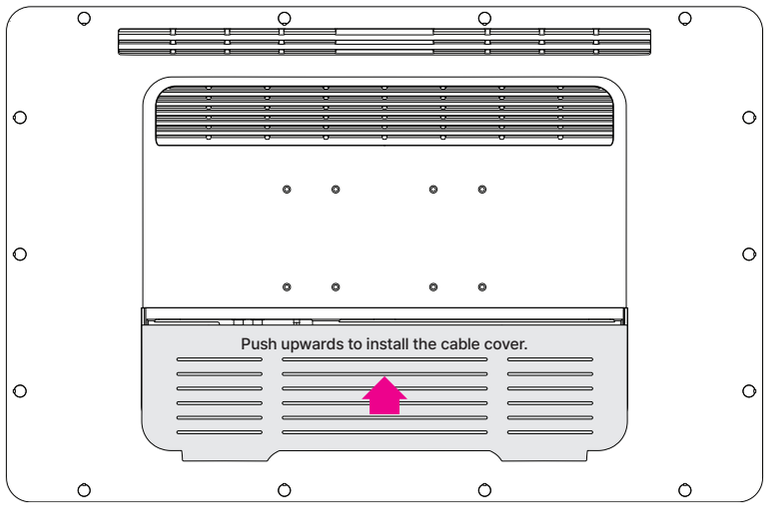
4. Product overview

4.4 Cable Cover

■ Removing the Cable Cover

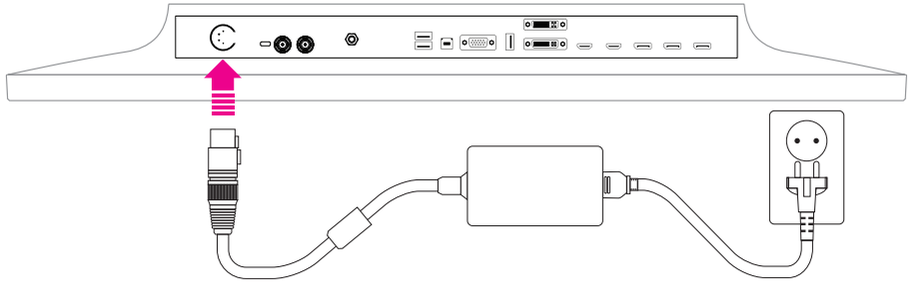


■ Installing the Cable Cover



5. Connecting

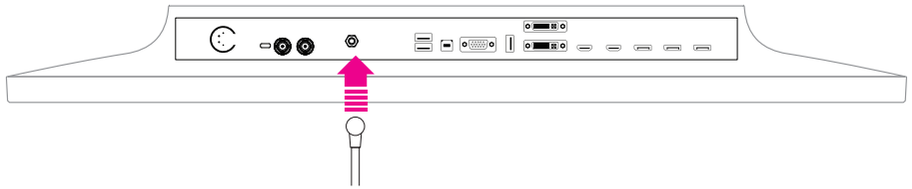
5.1 Connecting the power supply



(1) Connect the supplied DC power supply unit to the DC-Power input of Monitor
(2) Plug the other end of the DC power supply into a grounded power outlet by means of the supplied AC power cord

Note When connecting the power, always connect the DC power to the monitor first, then connect the AC power to the external power supply.

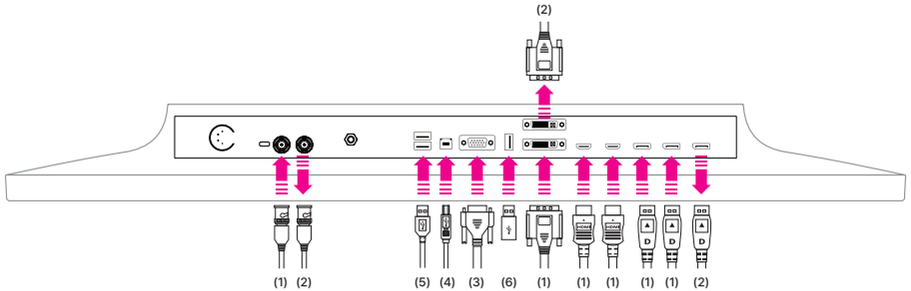
5.2 Potential equalization



(1) To reduce the risk of electric shock by equalizing the potential between the monitor and other devices, connect the equipotential connector to the other device as follows.

5. Connecting

5.3 Connecting the Video interface



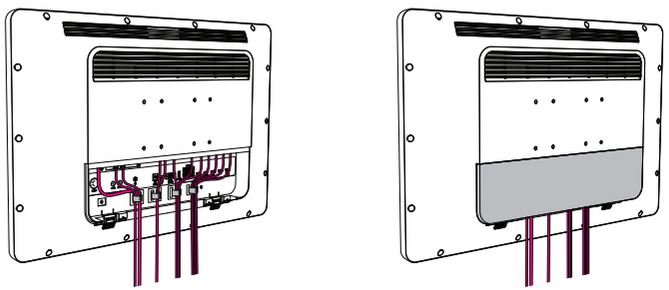
(1) You can display one or more video input signals by connecting them to the monitor as shown in the figure. Video input signals can be connected in the following four ways:
- 1x 12G-SDI Input
- 2x DisplayPort Input
- 2x HDMI Input
- 1x DVI Input

(2) To duplicate or output the current video image to another monitor or device, use the following connectors.
- 1x 12G-SDI Output
- 1x DVI Output
- 1x Smart Clone

(3) Connect the RS-232C connector to use the Remote control protocol.
(4) Connect a USB Type-B cable to the host device for remote control communication and upstream USB connection.
(5) Connect a USB Type-A cable, use it as a downstream port.
(6) Connect the USB memory stick to the Service port to upload the firmware.

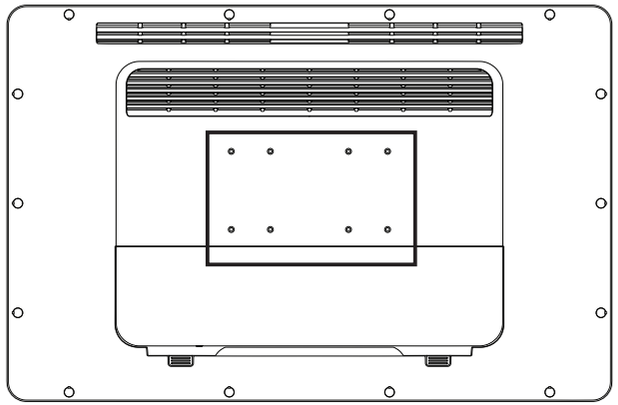
5.4 Cable routing

After routing the cables as shown in the figure below, organize the cables using the provided Velcro cable ties.

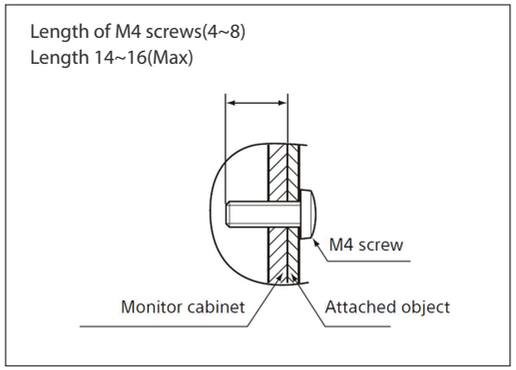


5.5 VESA mount installation

The monitor can be mounted on a VESA 100mm x 100mm or 200mm x 100mm arm or stand.



The provided screws are designed to fit mounts with a thickness of M4 x L14~L16mm (Max). When attaching to a bracket, please refer to the figure below and use the screws suitable for the object.



Unit: mm (inches)

⚠ Caution Use an arm that is in compliance with VESA requirement.
The monitor VESA interface has been designed for a safety factor 6(to support 6 times the monitor weight) in the medical system, use an arm with suitable safety factor(IEC60601-1)

6. Operation

6.1 On/Off switching

(1) When the power is connected, press and hold the power button for 2 seconds.
When the power is turned on, the ambient light turns on and the logo screen will be displayed.

Note : The ambient light and logo screen may not turn on depending on the OSD settings.

(2) With the power on, press and hold the power button for 2 seconds again to turn the power off.

(3) The LED on the power button indicates the product's power status as follows:

■ Power button LED Status according to power status

Power Status	LED status
Power on	Power key LED light Green All other keys' LEDs are activated and operate according to the OSD
Power Saving	In power saving mode, Power key LED blinks green All other key LEDs turn off. Press and hold the lock button for more than 2 seconds to return to normal mode.
Power off	In power off mode, the power button LED blinks Orange All buttons except the power button are disabled.

6.2 Front control button locking/unlocking

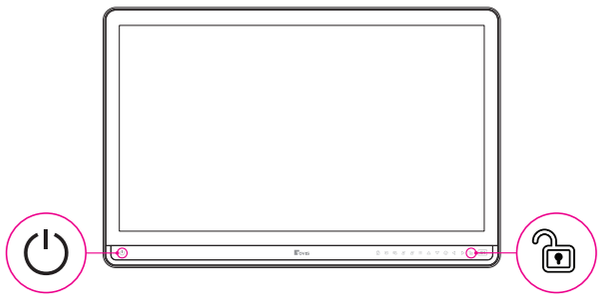
In order to avoid unwanted or accidental activation of the key button, a lock/unlock function has been implemented. So always ensure the key lock button is unlocked before operating any buttons. By default, all keys except the power key are locked when the monitor is powered on.

How to unlock the front control button

(1) Press and hold the lock button for 2 seconds or more.
The lock button LED lights up orange, and the available control button LED is activated, allowing you to use the button.

How to lock the front control buttons

(2) To reactivate the lock function, press the lock button again for 2 seconds or more.
The lock button LED turns off, and all buttons except the power button switch to the locked state.



6.3 Operating On-Screen Display

■ Changing the Input Source

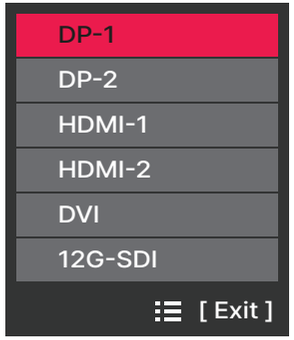
(1) Press the Input source button ( )

(2) Use the Up and Down (▲/▼) button to select the input

(3) Select the input source using the Select buttons ( )

Note : The available input source for your Monitor are:

- DisplayPort-1
- DisplayPort-2
- HDMI-1
- HDMI-2
- DVI
- 12G-SDI (L32HJAG0TV-12G version only)

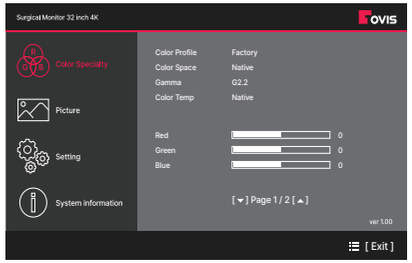


■ Using the OSD Menu

(1) Press the Menu button ( ), then the OSD main menu appears

(2) Use the Up (▲) and Down (▼) buttons to navigate the Main menu

(3) Select the Main menu, enter the sub menu and adjust the desired value.



■ Using the Hot key

Provides hot key functions as follows so that users can quickly access desired functions in the OSD menu.

(1) Multi window ( )

Press the Multi window button ( ), in the front control buttons at the bottom of the monitor.
Using the Left and Right button, can select the desired multi window function (1P/ PIP / PBP)

(2) User Button1,2

Press the user button ( ), in the front control buttons at the bottom of the monitor, a quick menu appears.
In the assigned functions as follows, users can select the desired function and use it quickly.

User Key 1 User Key 2	**Color Profile / Color space / Gamma / Brightness / Contrast / Image Flip**

6. Operation

■ OSD Menu Function

The screen of this monitor consists of the following items

Menu	Sub-menu	Item	
Color specialty	Profiles	Factory / Laparo / Arthro / Endo / User1 / User2	
	Color Space	Native / BT.709 / BT.2020	
	Gamma	GS1 / GS2 / G1.9 / G2.0 / G2.2 / G2.4 / DICOM / HLG	
	Color Temp	6500K / 7500K / 9300K / Native / User	
		User: Red / Green / Blue (Range -128 ~ +127)	
	Brightness	Range 0 - 100	
	Contrast	Range 0 - 100	
	Saturation	Range 0 - 100	
	Sharpness	Range 0 - 10	
	Ultra Vivid	OFF / LOW / MIDDLE / HIGH	
	User Backlight	Range 0-100	
Picture	Scale mode	Fill All / Origin(1:1) / Ver Fill / Fill / Fill Aspect	
	Flip mode	Disable / Mirror / H/V Flip	
	Freeze Frame	OFF / ON	
	PxP	1P(OFF) / PIP / PBP	
		Source	DP-1 / DP-2 / HDMI-1 / HDMI-2 / DVI / (option: 12G-SDI)
		Swap	
		PIP Size	Small / Medium / Large / Maximum
		PIP Position	Top Right / Top Left / Bottom Left / Bottom Right
		PIP Transparency	Range 0 – 10
	Zoom	OFF / Step1 / Step2 / Step3	
	Pan	Horizontal	Range 0 – 100
		Vertical	Range 0 – 100

Menu	Sub-menu	Item	
Configura-tion	Main input	DP-1 / DP-2 / HDMI-1 / HDMI-2 / DVI / (option: 12G-SDI)	
	Failover input	NONE / DP-1 / DP-2 / HDMI-1 / HDMI-2 / DVI / (option: 12G-SDI)	
	Clone out	OFF / ON	
	OSD	Style	Dark / Normal
		Language	English (can be added other ones)
		Timeout	20 / 30 / 60 sec.
		Position	Bottom Right / Bottom Left / Center / Top Right / Top Left
	Recall Profile	Factory / Laparo / Arthro / Endo / User1 / User2	
	Save Profile	User1 / User2	
	Reset Profile	User1 / User2	
	Assign User Keys	User Key-1	Color Profile / ColorSpace / Gamma / Bright-ness / Contrast / Flip mode
		User Key-2	Color Profile / ColorSpace / Gamma / Bright-ness / Contrast / Flip mode
	Boot Logo	Logo OFF / ON	
	Power Saving	OFF / 5 Min. / 30 Min. / 60 Min.	
	LED Bar	Mode	OFF / Only on Boot / Always On
		Color	Red / Green / Blue / White / Cyan / Magenta / Yellow
		Brightness	Range 0 – 100
Information	Operation room name	Can be modified 8 characters	
	Descriptions	Main Input / Sub Input / Product S/N / Run Time / Temperature / 12G-SDI Version	

7. Advanced function

7.1 Profile

Selecting the Profile function allows you to load preset image parameters such as brightness, contrast, and saturation.
Users can temporarily change the settings of the default profile, and the modified settings can be saved to User 1 or User 2. While Factory, Laparo, Arthro, and Endo profiles can be temporarily modified, the default values themselves cannot be edited.
You can restore the default values at any time if necessary.
The profiles provided by this monitor are as follows:

- Factory
- Laparo
- Arthro
- Endo
- User 1/2

■ To select the Profile in OSD menu

(1) Navigate the Color specialty in OSD menu

(2) Enter the Profile submenu.

(3) Select the desired profile and press the Select button.

7.2 Image Scale control

The available image scales for your monitor are:

- Fill All : Change the image's aspect ratio to fill the screen to its maximum size.
- 1:1: Native image, no scaling
- Ver Fill : Fills the screen vertically without changing the image's aspect ratio.
- Hor Fill : Fills the screen horizontally, without changing the image's aspect ratio.
- Fill Aspect : Fill the screen on largest dimension, without changing the image's aspect ratio.

■ To select the Image scale in OSD menu

(1) Navigate the Image picture in the Main menu
(2) Enter the image scale in the SUB menu.
(3) Selecting the desired aspect ratio, press the Select button.

7.3 Image flip function

The function allows you to flip the image on your Monitor. The available options are:

- Disabled : no image flip applied
- Mirror : flips the image horizontally, making the left content appear on the right and vice versa
- Rotation : rotates the image 180° = Hor + Ver flip

■ To select the Image flip in OSD menu

(1) Navigate the Image picture in the Main menu
(2) Enter the image Flip in the SUB menu.
(3) Select one of the available options and confirm.

7.4 Multi-Window Function

Users can use the following Multi-image configuration from the OSD menu of the Display

- PIP : Displays a sub-screen as an inserted window inside the main screen.
- PBP : Displays the main screen (left) and sub-screen (right) side by side without overlapping.

■ To select the Multi-Window in OSD menu

(1) Navigate the Image picture in the Main menu

(2) Enter the PxP in the SUB menu.

(3) Select the desired value from the PxP menu.

■ The available Main input /Secondary input combinations can be found in the following table:

Main Input	Secondary Input					
	DP-1	DP-2	HDMI-1	HDMI-2	DVI	12G-SDI
DP-1	NO	Yes	Yes	Yes	Yes	Yes
DP-2	Yes	NO	Yes	Yes	Yes	Yes
HDMI-1	Yes	Yes	NO	Yes	Yes	Yes
HDMI-2	Yes	Yes	Yes	NO	Yes	NO
DVI	Yes	Yes	Yes	Yes	NO	Yes
12G-SDI	Yes	Yes	Yes	NO	Yes	NO

7. Advanced function

7.5 Failover Function

This function allows automatic switching to defined backup source when the main input signal is missing or unstable. The Monitor will automatically restore to the main input as soon as the main input signal is restored and stable.

■ To select the Failover input in OSD menu

(1) Navigate the Configuration in the Main menu
(2) Enter the Failover input in the SUB menu.
(3) Select one of the available failover input

■ The available main input / failover input combinations can be found in the following table:

Main Input	Secondary Input					
	DP-1	DP-2	HDMI-1	HDMI-2	DVI	12G-SDI
DP-1	NO	Yes	Yes	Yes	Yes	Yes
DP-2	Yes	NO	Yes	Yes	Yes	Yes
HDMI-1	Yes	Yes	NO	Yes	Yes	Yes
HDMI-2	Yes	Yes	Yes	NO	Yes	NO
DVI	Yes	Yes	Yes	Yes	NO	Yes
12G-SDI	Yes	Yes	Yes	NO	Yes	NO

Note : The failover function does not work when PIP/PBP mode is enabled.

7.6 Power Saving function

If there is no input signal (main input and auxiliary input), this function automatically switches the monitor to low-power (power saving) mode.
When an input signal is detected, the monitor exits power saving mode and displays the image normally.
Additionally, pressing and holding the lock button for 2 seconds activates the LED control button, which switches the monitor to normal mode.

■ To select the Power saving function in OSD menu

(1) Navigate the Configuration in the Main menu
(2) Enter the Power saving in the SUB menu.
(3) Set the time to enter power saving mode. (OFF/ 5Min. / 30Min. / 60Min.)

Note : When entering power-saving mode, the power button LED will blink green.

7.7 Smart Clone function

This function duplicates the input signal of the main screen and outputs the same video signal through the DisplayPort output terminal.
The screen duplication output function is supported only when the main input source is one of the following:

- HDMI-1 / HDMI-2
- DisplayPort-1 / DisplayPort-2
- 12G-SDI (Optional)

■ To select the Smart Clone function in OSD menu

(1) Navigate the Configuration in the Main menu
(2) Enter the Clone out in the SUB menu.
(3) Enable / Disable Smart clone function as desired.

7.8 Ambient light bar function

This product provides a sophisticated and luxurious visual effect by offering an LED bar located at the bottom of the monitor that gradually turns on or off when the power is turned on or off.

■ To select the Ambient light function in OSD menu

(1) Navigate the Configuration in the Main menu
(2) Select the LED Bar in the SUB menu.
(3) Set each function to the desired value.

Mode	• Only on Boot : The ambient light turns on gradually only during booting. • Always On : Ambient light bar stays on regardless of screen. • Off : Ambient light bar function does not work
Color	Ambient light bar's color can be changed to 7 colors (Red/Green/Blue/White/Cyan/Magenta/Yellow)
Brightness	Ambient light bar's brightness can be adjusted from 0 to 100

8. Troubleshooting

Please check the following information before reporting a malfunction.

Problem description	Action
Screen is black and the power button LED is off	Check if the external power supply is properly connected to the monitor. Please refer to "5.1 Connecting Power"
Screen is black and the power button LED blinks green	Power saving mode is active. Please check if the input signal is properly connected and if the supported resolution is correct. Refer to "5.3 Connecting Video Signals" / "13. Supported Timing".
Screen is black and the power button LED blinks Orange	The power is off. Please press the power button for 2 seconds. Please refer to "6.1 Turning Power On/Off".
“No Support” is displayed	Please check if the input signal is correct by referring to "13. Supported Timing".
“No Signal” is displayed	Please check that the cable connection status and input source selection are correct. Check "6.3 Change Input Source".
The screen is unstable and shaking.	Check that the input cable is properly connected and use the accessory cable provided with the product.
Black bars visible on upper and lower or left and right positions of the Monitor	This may occur if the aspect ratio of the input signal and the screen are different. Please refer to "7.2 Image scale control" to adjust the aspect ratio.
The monitor cannot be operated even when you press the buttons.	The key lock function may be enabled. Refer to 6.2 Front control button Locking/Unlocking.

9. Cleaning and Maintenance

⚠ Warning

- To avoid electric shock, unplug the Monitor and power supply from the electrical outlet before cleaning.
- Never use solvents such as benzene or thinner, or acid, alkaline or abrasive detergent, or chemical cleaning cloth for cleaning or disinfection, as they will damage the protection plate surface/ monitor surface

⚠ Caution

- Do not spray cleaning liquid directly onto the Monitor or the power supply as product damage may result. Spray on the cloth before wiping the unit.
- Do not immerse the Monitor or power supply in any liquid as product damage will result.
- Do not use corrosive cleaning solutions to clean the Monitor or power supply as product damage may result.
- Do not sterilize the Monitor or power supply as product damage may result.
- The protection plate surface is specially treated to reduce reflection of light.
  Do not use the following products on the protective screen or monitor surface:
  - Organic solvents such as benzene or thinner
  - Acidic, alkaline, or abrasive detergents
  - Chemical cleaning cloths

  Using these products may degrade monitor performance or damage the surface coating.

9.1 Cleaning

Note : Take extra care when cleaning the Monitor screen. Excess liquid that enters the Monitor housing, connectors, or controls may result in product damage.

Note : User shall decontaminate (e.g. clean, disinfect as appropriate) all potentially contaminated devices prior to returning them.

■ To clean the Monitor

- Apply a cleaning or disinfectant to a soft, lint-free cloth, such as a microfiber cloth or gauze, and gently wipe the monitor surface. Wipe the entire surface evenly for a set period of time to achieve a sufficient cleaning effect.
- The following cleaning/disinfecting agents may be used:
  - 70% Isopropanol
  - 70% Ethanol
  - Water or chlorine-based cleaning/disinfecting agents

9.2 Preventive Maintenance

With the Monitor disconnected from mains perform the following periodical check:

- Check the integrity of the power cord and inspect its routing, so that it is not under the risk of being punched or cut.
- Clean the ventilation slot of the Monitor, dust can obstruct the air flow and cause temperature increase of the electronics.
- Clean the area around the power plug, dust and liquids may result in fire.

10. Important EMC notices

This product requires special precautions to ensure electromagnetic compatibility (EMC) with other electrical medical devices.
To maintain EMC performance, install and operate the monitor in compliance with the EMC-related information provided in this manual.
This monitor has been designed and tested to comply with IEC 60601-1-2 requirements regarding electromagnetic compatibility with other equipment.

⚠ Warning

When this device is connected with other electrical equipment, leakage currents may increase.
To minimize total leakage current; ensure that all systems are installed according to the requirements of IEC 60601-1-1

⚠ Caution

Portable and mobile RF communications equipment may affect the normal function of the Monitor.
Do not use cables or accessories other than those provided with the Monitor, as this may result in increased electromagnetic emissions or decreased immunity to such emissions.
If the Monitor is used adjacent to or stacked with other equipment, observe and verify normal operation of the Monitor in the configuration in which it will be used prior to using it in a surgical procedure. Consult the tables below for guidance in placing the Monitor.

Guidance and Manufacturer's Declaration: Electromagnetic Emissions

32" 4K-UHD Surgical Monitor is intended for use in the electromagnetic environment specified below.
The customer or the user of the Monitor should ensure it is used in such an environment.

Emissions test	Compliance	Electromagnetic Environment - guidance
RF emissions CISPR 11	Group 1	The monitor uses RF energy only for its internal function; therefore, their RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class B	The Monitor is suitable for use in all establishments other than domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes, provided the following warning is heeded: **Warning:** This system is intended for use by health care professionals only. This system may cause radio interference or may disrupt the operation of nearby equipment. It may be necessary to take mitigation measures, such as reorienting or relocating the system or shielding the location.
Harmonic emissions IEC61000-3-2	Class D	
Voltage Fluctuations/ flicker emissions IEC61000-3-3	Complies	

Guidance and Manufacturer's Declaration: Electromagnetic Immunity

This product is designed for use in the electromagnetic environments specified below.
The customer or the user of the Monitor should ensure that it is used in such an environment.

Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment Guidance
Electrostatic Discharge (ESD) IEC61000-4-2	± 8kV contact ± 15kV air	± 8kV contact ± 15kV air	Floors should be wood, concrete, or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC61000-4-4	± 2kV for power supply lines ± 1kV for input/output lines	± 2kV line to ground ± 1kV line to line	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC61000-4-5	± 1kV differential mode ± 2kV common mode	± 1kV differential mode ± 2kV common mode	Mains power quality should be that of a typical commercial or hospital environment
Voltage dips, short interruptions and voltage variations on power supply input lines IEC61000-4-11	0% UT 0.5 cycle 0% UT 1 cycle 70% UT 25 cycles 0% UT 5 Sec Supplementary information: If the Rated voltage range <25% of the lowest rated input voltage, one rated input voltage. Otherwise, minimum and maximum rated voltage. EUT powered at one of the Nominal input frequencies. ME EQUIPMENT and ME SYSTEMS with power input voltage selection by transformer taps shall be tested at only one tap setting.	0% UT 0.5 cycle 0% UT 1 cycle 70% UT 25 cycles 0% UT 5 Sec Supplementary information: If the Rated voltage range <25% of the lowest rated input voltage, one rated input voltage. Otherwise, minimum and maximum rated voltage. EUT powered at one of the Nominal input frequencies. ME EQUIPMENT and ME SYSTEMS with power input voltage selection by transformer taps shall be tested at only one tap setting.	Mains power quality should be that of a typical commercial or hospital environment. If the user of the transmitter requires continued operation during power mains interruptions, it is recommended that the Wireless Transmitter be powered from an uninterruptible power supply or a battery.
Power frequency (50/60Hz) magnetic field IEC 61000-4-8	30 A/m	30 A/m	Power-frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

Note: UT is the AC mains voltage prior to application of the test level.

10. Important EMC notices

Guidance and Manufacturer's Declaration: Electromagnetic Immunity

This product is designed for use in the electromagnetic environments specified below.
The customer or the user of the Monitor should ensure that it is used in such an environment.

Immunity Test	IEC 60601 Test level	Compliance Level	Electromagnetic Environment - Guidance
			Portable and mobile RF communications equipment should be used no closer to any part of the Monitor, including their cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended Separation Distance: d = 1.17√P d = 1.17√P 80 MHz to 800 MHz d = 2.33√P 800 MHz to 2.5 GHz where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey (a), should be less than the compliance level in each frequency range(b). Interference may occur in the vicinity of equipment marked with the following symbol: 
Conducted RF IEC 61000-4-6	3 Vrms (6 Vrms in ISM bands) 150 kHz to 80 MHz	3 Vrms (6 Vrms in ISM bands)	
Radiated RF IEC 61000-4-	3 V/m 80MHz to 2.5 GHz	3 V/m	

NOTE 1 : At 80 MHz and 800 MHz, the higher frequency range applies.
NOTE 2 : These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, and people.

(a) Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast, and TV broadcast, cannot be predicted theoretically with accuracy.
To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which 32" 4K Surgical Monitor is used exceeds the applicable RF compliance level above, the Monitor and transmitter should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the Monitor.

(b) Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.

Guidance and manufacturer's declaration – electromagnetic immunity

This product is designed for use in electromagnetic environments where radiated RF disturbances are controlled.
Portable RF communications equipment should be used no closer than 30 cm (12 inches) to any part of the Monitor.
Otherwise, degradation of the performance of this equipment could result.

Test frequency (MHz)	Band (MHz)	Service	Modulation	Maximum power (W)	Immunity test level (V/m)
385	380-390	TETRA 400	Pulse modulation 18 Hz	1.8	27
450	430-470	GMRS 460, FRS 460	FM ± 5 kHz deviation 1 kHz sine	2	28
710	704 - 787	LTE Band 13, 17	Pulse modulation 217 Hz	0.2	9
745					
780					
810	800-960	GSM 800/900, TETRA 800, iDEN 820, CDMA 850, LTE Band 5	Pulse modulation 18 Hz	2	28
870					
930					
1720	1700-1990	GSM 1800; CDMA 1900; GSM 1900; DECT; LTE Band 1, 3, 4, 25; UMTS	Pulse modulation 217 Hz	2	28
1845					
1970					
2450	2400-2570	Bluetooth, WLAN, 802.11 b/g/n, RFID 2450, LTE Band 7	Pulse modulation 217 Hz	2	28
5240	5100-5800	WLAN 802.11 a/n	Pulse modulation 217 Hz	0.2	9
5500					
5785					

Note : Do not use portable RF communication equipment within 30cm of this monitor.
Otherwise, degradation of the performance of this equipment could result.

11. Symbols and Definitions

The following symbols appear on the product, its labeling, or the product packaging. Each symbol carries a special definition, as defined below:

	Information
Rx ONLY	Federal law (USA) restricts this device to use by, or on order of, a physician
	Date of manufacture
	Legal manufacturer
REF	Product catalog number
SN	Product serial number
QTY	Quantity
Made in Korea	Country of Origin
CE	The device meets European Union medical device requirements.
MD	Medical device in the European Union
EC REP	Authorized representative in the European Community
UDI	Unique Device Identification
	Do Not Get Device Wet
3	Maximum Stacking
	Fragile
	This Side Up
	Indicates that the box should not be cut with a knife, a cutter or any other sharp object.
+10°C +35°C	Indicates the temperature limits to which the device can be safely exposed when being stored.
30% 95%	Indicates the range of humidity to which the device can be safely exposed when being stored.

1060hPa 500hPa	Indicates the range of atmospheric pressure to which the device can be safely exposed when being stored.
	Indicates this device must not be thrown in the trash but must be recycled, according to the European WEEE (Waste Electrical and Electronic Equipment) directive.
	No user-serviceable parts
	Direct Current
	Indicates Alternating Current (AC).
	DC Power Control Switch
	Equipotentiality
	Protective earth (ground)
	For Indoor Use Only
PS E	Indicates the device is approved according to the PSE regulations.
c US	UL Functional Safety Recognized Component
	China Compulsory Certificate Mark
CLASSIFIED c UL us	Medical Equipment is in accordance with ANSI/AAMI ES60601-1 (2005) + AMD 1 (2012) and CAN/CSA-C22.2 No. 60601-1 (2014) in regards to electric shock, fire hazards, and mechanical hazards.
VCCI	Indicates the device is approved according to the VCCI regulations.
KC	Indicates the device is approved according to the KC regulations.
	Indicates the device is approved according to the BIS regulations.
	Device recycling code (applicable in China)
	Caution (consult instructions for use)
	Warning: dangerous voltage

12. Technical Specifications

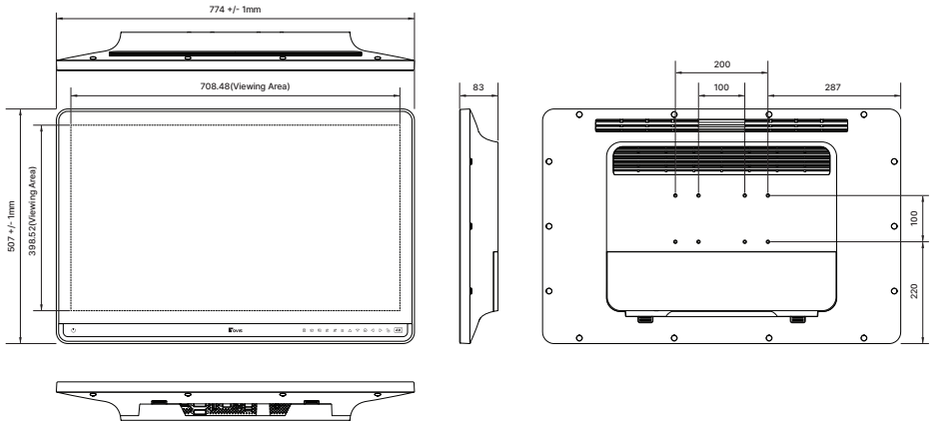
Item		Description	
Model		L32HJAG0TV / -12G	
Display	Screen size	32.0 inch diagonal.	
	Active Area	708.48(H) x 398.52(V)	
	Resolution	3840 x 2160	
	Display color	10bit, 1,073,741,824 colors	
	Color gamut	NTSC 100%, Switchable to BT.709 & BT.2020	
	Brightness	Native : 850 cd/m2 / Stabilized : 400cd/m2	
	Contrast	Typ 1500:1	
	Viewing angle	178° Hor & Ver	
Signal Input / Output		Input	Output
		DVI x 1 HDMI2.0 x 2 DP1.2 SST x 2 12G-SDI x 1	DVI x 1 DP1.2(Smart clone) x 1 12G-SDI x1
Communication & Service		USB-A x 1 for firmware update with Memory stick USB-B x 1 (Upstream) / USB-A x 2(Downstream) RS-232 x 1	
Front protection Screen		Anti-reflective glass (hardness > 6H) with anti-fingerprint coating	
Temperature & Humidity	Operating	10°C ~ 40°C (Humidity 10~80%)	
	Storage	-20°C ~ 60°C (Humidity 10~90%)	
Power	Input	DC 24V ± 10 %	
	Output	USB-A (x2ea) : 5V/1A	
	Consumption	Max < 140W Power saving : < 0.5W Power-off: < 0.5W	
Weight		≤12kg	
Unit Dimension		774mm(H) x 507mm(V) x 83mm(D) +/- 1mm	
IP grade		Front : IP45 / back : IP21	

13. Supported Timings

Video format	SDI	DVI	HDMI-1/-2	DP-1/-2
640x480@60hz	N	Y	Y	Y
720x480p@59.94Hz	N	Y	Y	Y
720x480p@60.00Hz	N	Y	Y	Y
720x576p@50.00Hz	N	Y	Y	Y
800x600@60.00Hz	N	Y	Y	Y
800x600@75.00Hz	N	Y	Y	Y
1024x768@60.00Hz	N	Y	Y	Y
1024x768@70.00Hz	N	Y	Y	Y
1024x768@75.00Hz	N	Y	Y	Y
1152x864@75.00Hz	N	Y	Y	Y
1280x720p@50.00Hz	Y	Y	Y	Y
1280x720p@59.94Hz	Y	Y	Y	Y
1280x720p@60.00Hz	Y	Y	Y	Y
1280x1024p@60.0Hz	N	Y	Y	Y
1400x1050p@60.00Hz	N	Y	Y	Y
1600x1200p@60.00Hz	N	Y	Y	Y
1680x1050p@60.00Hz	N	Y	Y	Y
1920x1080p@29.97Hz	Y	Y	Y	Y
1920x1080p@30.00Hz	Y	Y	Y	Y
1920x1080p@50.00Hz	Y	Y	Y	Y
1920x1080p@59.94Hz	Y	Y	Y	Y
1920x1080p@60.00Hz	Y	Y	Y	Y
1920x1200p@60.00Hz	N	Y	Y	Y
2560x1440p@60.00Hz	N	N	Y	Y
2560x1600p@60.00Hz	N	N	Y	Y
3840x2160@25.00Hz	Y	N	Y	Y
3840x2160@30.00Hz	Y	N	Y	Y
3840x2160@50.00Hz	Y	N	Y	Y
3840x2160@60.00Hz	Y	N	Y	Y

14. Product Dimensions

Dimensions



Memo

Memo

Memo