UX7 Series *4K&NIR&3D*

Endoscope Camera System

Vision beyond Imagination

This brochure can be applicable to the following models:

Monitor:
LMD-XH320T/LMD-XH550T/S3180P

Trolley:
TV-500/TV-300

Endoscope Camera System:
UX7/UX7-TEC

Endoscope Light Source:
HB500R/HB500

4K 3D Video Endoscope:
G 31030A/G 31000A/M 31030A/M 31000A

Camera Head:
CH5-SR100/CH5-SR110/CH5-SW100/CH5-SW110

Rigid Endoscope:
G 01030A/G 01000A/G 00530A/G 00500A/G 10530A/
G 10500A/M 01030A/M 01000A

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Location: Moldova
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www.mindray.com

P/N: ENG-UX7 Series 4K&NIR&3D Endoscope Camera System-210285X12P-20241205

healthcare within reach

Full-chain Independent R&D

The advancement of minimally invasive technology has significantly generates the demand for precision surgeries. This has led to increased requirements for the resolution, real-time navigation, and accurate restoration of 3D structures within the cavity.

Based on full-chain independent R&D, Mindray's new generation UX Series Endoscope Camera System has been innovatively integrated with 4K fluorescence and 3D technologies. It provides a comprehensive enhancement in imaging performance and operational experience, enabling clinical breakthroughs in complex surgical procedures.

With various configuration options suitable for multiple departments, it is a truly "all in one imaging platform" for the operating room.

4K Monitor
Options of 32 inch and 55 inch
Options of 2D and 3D
• Recommend: LMD-XH320T/LMD-XH550T

Master Control Trolley
One-touch to start the entire set of equipment on the trolley
• Recommend: TV-500

Endoscope Camera System
Integrated with 4K Fluorescence and 3D Technologies
• Recommend: UX7

Endoscope Light Source
White Light/Fluorescence
• Recommend: HB500R

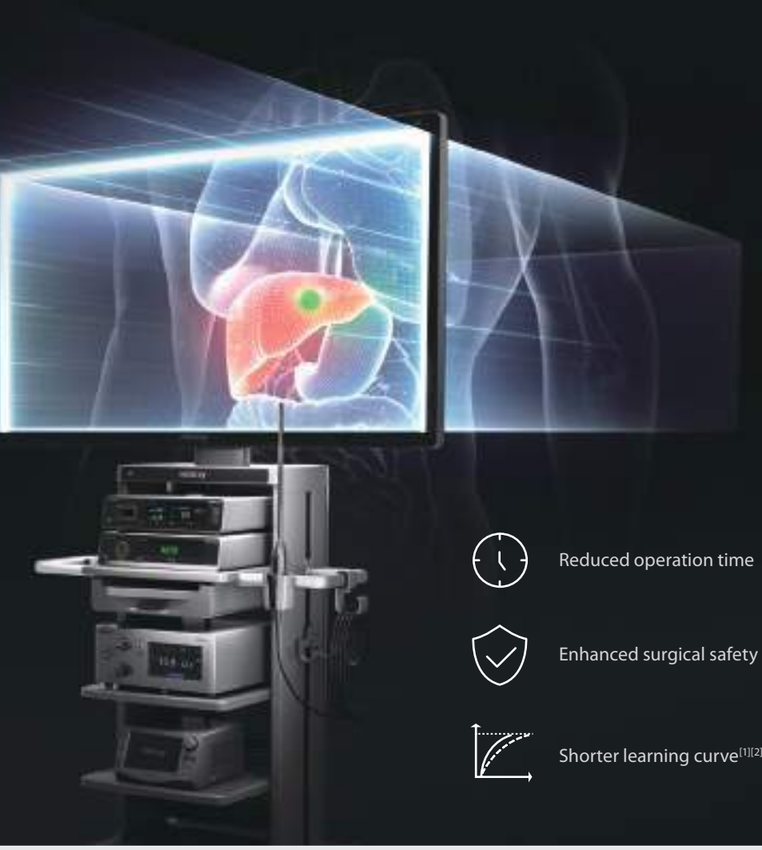
4K 3D Video Endoscope
White Light/Fluorescence
Selectable viewing angles of 0° and 30°
• Recommend: G 31030A

Camera Head
Multiple focal lengths available
White light camera head weight: 190 g
Fluorescence camera head weight: 240 g
• Recommend: CH5-SR100/CH5-SR110

Rigid Endoscope
Selectable diameters of 10 mm, 5 mm and 3 mm
• Recommend: G 01030A

Medical Digital Video Recorder
Access to hospital PACS system
Available to record dual-channel simultaneously
• Recommend: UR-NEXT4KHC

3D Intelligent Bionics,
Natural Space Perception



Dual Chips True 4K
Dual-4K 3D imaging reproduces the structure in the cavity, making the surgery safer and more efficient.

5.6 mm Large Pupil Distance
Enhanced depth of 3D vision can discern small depth differences for more precise surgical positioning.

3D Fluorescence Imaging
Stable stereo fluorescence navigation makes surgical operations more precise.

- Reduced operation time
- Enhanced surgical safety
- Shorter learning curve[1][2]

AutoRotate Correction
Built-in high-precision attitude sensor secures real-time perception of the endoscope movement
AutoRotate Correction of the endoscope enables all-around view observation

Enhanced Anti-Fog
The Chip-on-Tip design achieves active heating and defogging, dramatically reducing the frequency of intraoperative lens wipes

Focus-Free Design
The large depth of field eliminates the need to focus, while presenting clear image for a smoother surgical process

Autoclave Available
A new breakthrough in sterilization processes with a high reliability
The whole Video Endoscope supports Autoclave/Low Temperature Plasma/EO Sterilization

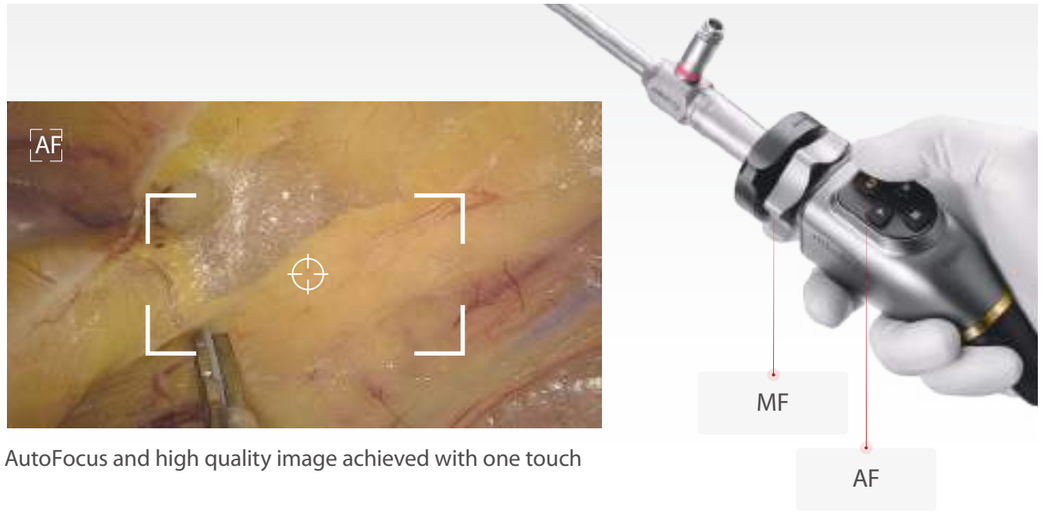
Weighs only 420 g
Titanium alloy handle, sturdy yet lightweight, allowing for easy maneuverability

[1] Arezzo A et al. The use of 3D laparoscopic imaging systems in surgery: EAES consensus development conference 2018.

[2] Velayutham V, Fuks D, Nomi T, Kawaguchi Y, Gayet B. 3D visualization reduces operating time when compared to high-definition 2D in laparoscopic liver resection: a case-matched study. Surg Endosc. 2016 Jan;30(1):147-53. doi: 10.1007/s00464-015-4174-1. Epub 2015 Mar 25. PMID: 25805241.

Smart View Exceptional Image Quality

Integrated auto and manual focus

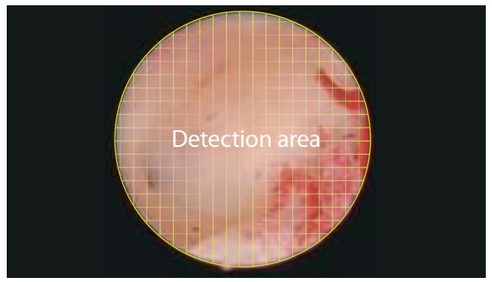


AutoFocus and high quality image achieved with one touch

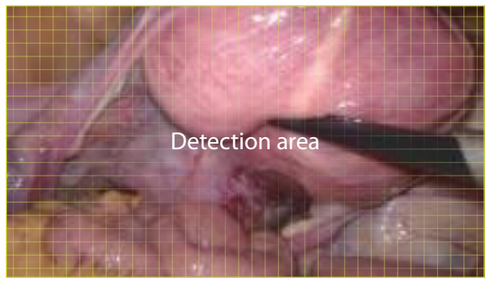
Automatic scene recognition

Smart exposure: Determine different detection areas according to different scenes, and accurately match the exposure parameters without the need to manually switch department modes.

Automatic dimming: The camera system can automatically adjust the intensity of the light source in real time based on the current exposure requirements, ensuring optimal brightness at all times.



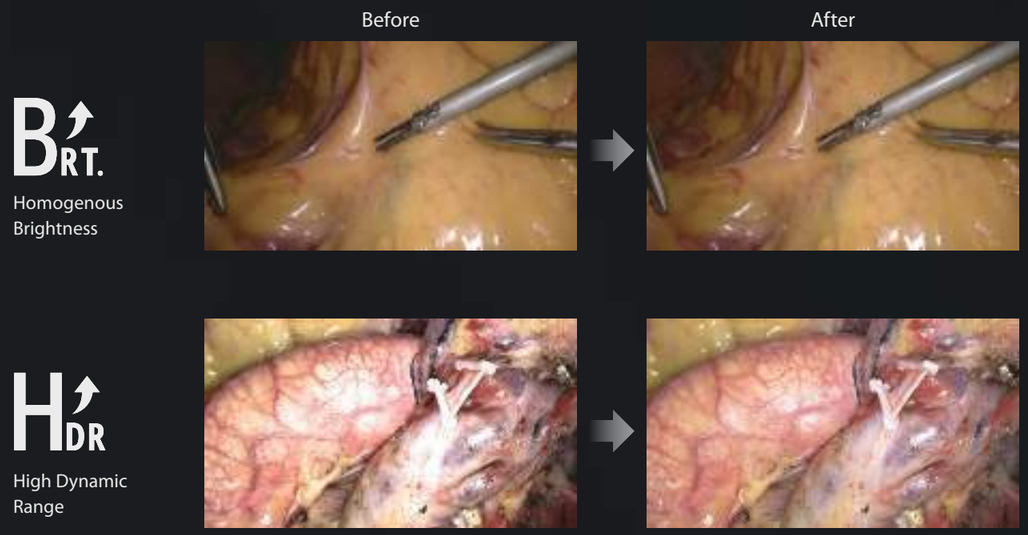
Small diameter scope scene (e.g. hysteroscope)



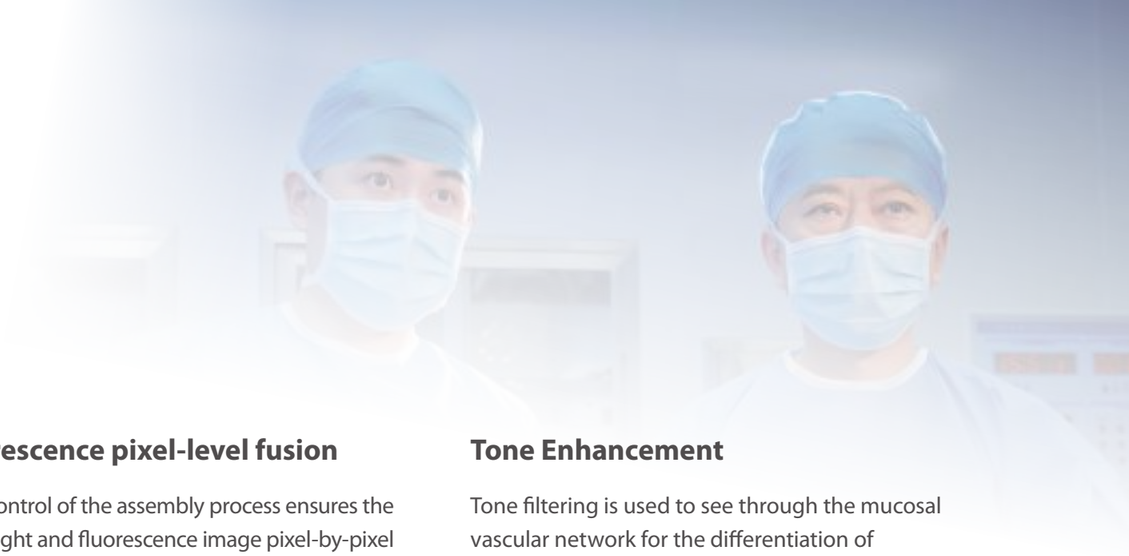
Laparoscope scenario

eImage Intelligent Image Algorithm, Even in Extreme Circumstances

A variety of post-processing image algorithms make up for any uneven lighting, local overexposure, thick fog and other inherent physical defects in specific situations, to deliver clear, structured, and layered images, even in extreme circumstances.



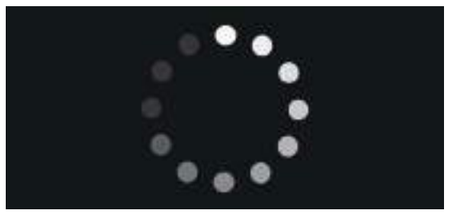
Sensitive Perception, Precise Navigation



eFluo The fluorescence technology significantly boosts detection sensitivity and fluorescence imaging stability, leading to more precise navigation

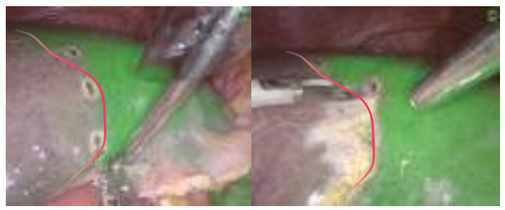
Ultra-high fluorescence sensitivity

Dual optimization of the excitation and imaging pathways achieves fluorescence signal capture sensitivity as low as nmol levels, which helps the clinical detection of low-dose micro-metastases and offers greater penetration capability at equivalent doses.



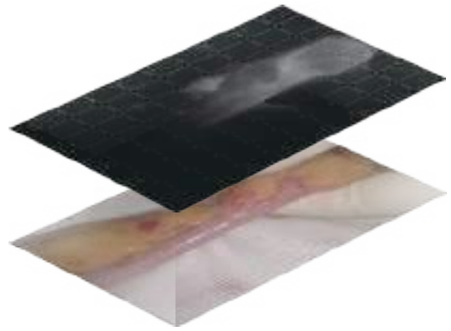
eFlo stabilization algorithm

Accurately reproduces the distribution of the contrast agent, effectively avoiding signal attenuation caused by distance and angle variations. This significantly enhances fluorescence stability, ensuring consistent boundary delineation.



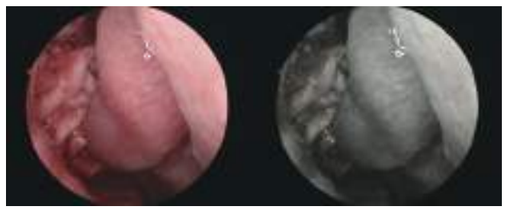
Fluorescence pixel-level fusion

Strict control of the assembly process ensures the white light and fluorescence image pixel-by-pixel alignment and fusion. The fluorescence image with white light texture details can also help with the entire fluorescence-guided surgical process.



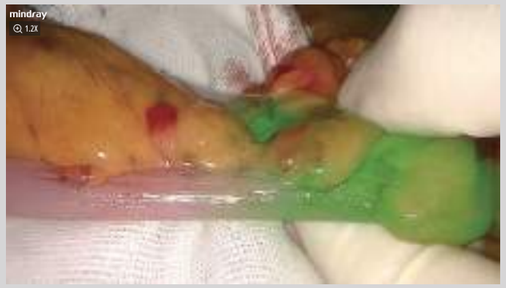
Tone Enhancement

Tone filtering is used to see through the mucosal vascular network for the differentiation of anomalous vessels to assist in clinical diagnosis.

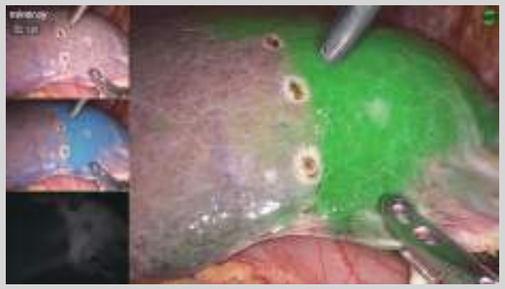


Clinical Cases

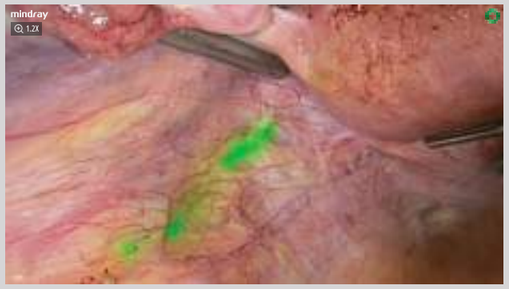
Evaluation of colorectal anastomotic blood supply



Laparoscopic liver watershed resection



SLN mapping in endometrial cancer



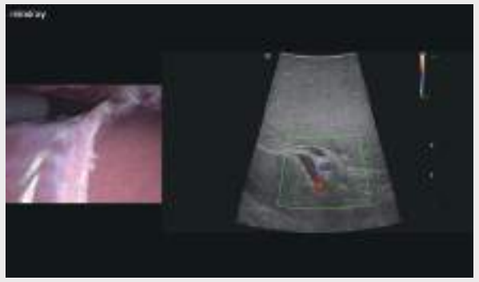
Anatomic subpulmonary lobe resection

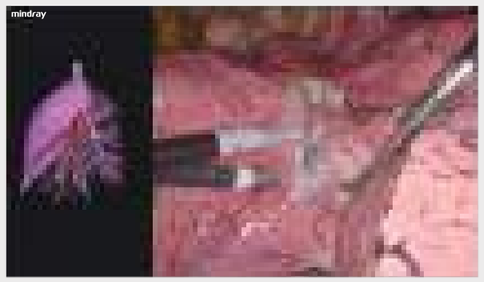
MIS Ecosystem
Unlimited Possibilities

Multimodal Image Fusion

The real-time display of ultrasound images on the endoscope screen helps the surgeon localize the hidden lesion. Simultaneous recording of ultrasound and endoscope images on the same screen makes teaching and sharing more efficient.

The endoscope can display a 3D reconstruction of the organs' structure, together with the surgical view on the same screen, to assist the surgeon with real-time correction needed during the procedure.





Vital Sign Data Sharing

The patient's vital signs data can be customized and displayed on the endoscope screen, allowing the surgeon to evaluate them timely during surgery.

Digital OR, Upgraded Management

The UX7 Endoscope Camera System can be integrated into the Mindray digital operating room for centralized information management, enhancing the overall quality and efficiency of surgical procedures.

Future-proof UX7 Endoscope Camera System, Unstoppable Innovation and Exploration Journey

Flexible endoscope, pendulum camera head, multispectral fluorescence, quantitative fluorescence...

Opening up possibilities for more cutting-edge applications.

UX4/UX410/UX420/UX430/UX450/UX460/ UX470

UX5/UX510/UX520/UX530/UX550/UX560/ UX570/UX5–SIM/UX5–NOR/UX5–TEC

UX7/UX7-TEC/UX7-NOR/ UX7-SIM

Endoscope Camera System

Operator's Manual

■ Release time: 2024-11

■ Revision: 1.0

- **When using the system for body checking, avoid contact between metal parts of the accessories such as endoscope and other metal parts. Otherwise, unintended current may flow through the patient body.**
- **To avoid risk of electric shock, make sure the connecting parts between the endoscope to be used with the system and the camera head are insulated.**
- **When energized endoscopes are used with energized endotherapy devices, patient leakage currents may be additive. It should be noted if a type CF applied part endoscope is used, in which case a type CF applied part energized endotherapy device should be used in order to minimize total patient leakage current.**
- **When a defibrillator is discharged, the image displayed on the monitor may be interfered with for less than 1s.**
- **Do not disconnect the power cord or turn off the equipment during the surgery.**
- **Check if the equipment and accessories (such as connecting cords of instruments) are intact prior to each use. Do not use them if any damage is detected. Replace defective accessories with new ones, and contact Mindray for damaged equipment.**

1.1.2 Cautions

CAUTION

- **The endoscope camera system and monitor are suitable for use within the patient environment. Devices connected to the equipment must meet the requirements of the applicable IEC standards (e.g. IEC 60950 safety standards for information technology equipment and IEC 60601-1 safety standards for medical electrical equipment). The system configuration must meet the requirements of the IEC 60601-1 and the IEC 60601-2-18. Any personnel who connects devices to the equipment's signal input/output port is responsible for providing evidence that the safety certification of the devices has been performed in accordance with the IEC 60601-1 and the IEC 60601-2-18. If you have any questions, contact Mindray.**
- **The equipment shall only be connected to mains power with protective earth. Do not use a power socket that is not grounded.**
- **Do not use multiple portable socket outlets, which might cause interference, electric shock, or equipment damage.**
- **To avoid the interference of high frequency electrosurgery unit (ESU), do not connect the equipment and ESU to the same power socket. Besides, keep the equipment away from ESU as much as possible.**
- **The weight of objects stacked on the equipment should not exceed 20 kg.**
- **Use only endoscopes, and light source specified by Mindray. Using accessory or equipment that is not compatible with the equipment may cause injury to the**

patient, damage to the equipment or deterioration in performance. Contact Mindray in case of any questions concerning equipment compatibility.

- **Prior to putting the equipment into clinical operation and inspection, read this manual carefully and make sure all contents are fully understood, to ensure the correct operation of the equipment and safety of the patients and operators.**
- **This equipment must be operated by skilled/trained clinical professionals.**
- **The system is only supplementary in clinical examinations. The doctors shall carry out diagnosis and treatments based on the clinical manifestations of patients.**
- **This manual does not contain contents relating to clinical examination technologies. Examination approach should be selected based on medical knowledge and clinical experiences.**
- **Before the endoscopic surgery, prepare a backup endoscope camera system to avoid surgery interruption due to possible system failure.**
- **An ESU may interfere with the image display of the monitor, resulting in disordered image tone.**
- **Do not plug or unplug the system or its accessories when the power is on, otherwise it will cause system damage.**
- **Do not pull, bend, or twist the connecting cords with excessive force to avoid cord or equipment damage.**
- **Do not press the connectors with excessive force, or the connectors might be damaged.**
- **Do not block the ventilation outlet. Otherwise the equipment may overheat, which might trigger system self-protection or cause equipment damage or fire.**
- **Do not pour liquid on the equipment or let any liquid enter the interior of the equipment, or there will be risks of electric shock or equipment damage. If liquid is spilled on the equipment, disconnect the power supply, dry the equipment and contact your service personnel.**
- **Dispose of the package material as per the applicable waste control regulations. Keep the packing material out of children's reach.**
- **At the end of its service life, the equipment, as well as its accessories, must be disposed of in compliance with the local or hospital's guidelines regulating the disposal of such products, to avoid contaminating or infecting the environment, other persons, or equipment.**

1.1.3 Notes

NOTE

- **Keep this manual in the vicinity of the equipment so that it can be obtained conveniently when needed.**

(9) External control extension connector: connects an external video recorder, and supports starting/stopping recording and taking screenshots.

(10) USB connector 3: connects a USB drive for system software upgrade, supporting USB 2.0 protocol.

(11) MSB (Mindray Serial Bus) connector: connects to a light source, controlling the brightness of the light source.

(12) Network connector 1: supports software upgrade.

(13) Network connector 2: reserved.

(14) CAN (Controller Area Network) connector 1: connects external devices other than light source.

(15) CAN connector 2: connects external devices other than light source.

(16) 3G/12G SDI (Serial Digital Interface) out: connects a high definition/4K video device for high definition/4K video output, such as monitor.

2.9.3 Endoscope Camera Head

This system is compatible with the following models of camera head:

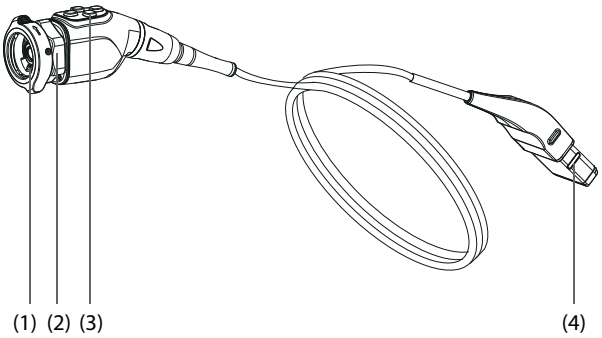
Model	Standard Cable Length	Function
CH5-SW100	4.5m	Supports white light imaging.
CH5-SW110	3m	Supports white light imaging.
CH5-SR100	4.5m	Supports white light and fluorescence imaging.
CH5-SR110	3m	Supports white light and fluorescence imaging.

2.9.3.1 Working Principle of Endoscope Camera Head

The camera head is used together with the CCU to receive 400 nm to 880 nm visible and near-infrared light, supporting visible and near-infrared light imaging.

It provides dual progressive scan CMOS (including a 1/1.8-inch native 4K BSI CMOS) for white light and fluorescence imaging, supporting 4K output display. By using the camera head, you can observe fluorescent images outside the body cavity of patients.

2.9.3.2 Front View of the Camera Head



(1) Endoscope coupler: connects and secures the endoscope.

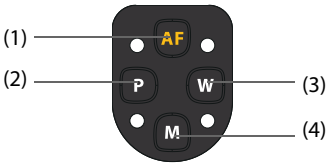
(2) Focusing ring: rotate the ring to focus the camera head.

(3) Camera head buttons: four functional buttons.

(4) CCU connector: connects the CCU.

2.9.3.3 Camera Head Buttons

There are four buttons on the camera head, and three of them can be set to perform different functions. After the camera head is connected to the CCU, the button functions are displayed on the monitor. After a button is pressed, the function prompt disappears. More descriptions are shown below:



(1) AF: press to perform autofocus.

(2) P: short press to take photos and long press to record videos by default. This button can also be set to other functions. For details, refer to ***5.5.2 Setting Button Functions***.

(3) W: short press to zoom the image and long press to perform white balance by default. This button can also be set to other functions. For details, refer to ***5.5.2 Setting Button Functions***.

(4) M:

- for fluorescence camera head, short press to switch display modes circularly and long press to display external input source by default;
- for white light camera head, short press to switch tone enhancement modes and long press to display external input source by default.

This button can also be set to other functions. For details, refer to ***5.5.2 Setting Button Functions***.

is installed in a chassis, sufficient space shall be left in front and behind of the chassis to facilitate operation or maintenance. To maintain good ventilation, sufficient space, i.e. at least 2 inches (5 cm), shall be left for each side of the equipment.

When the equipment is moved from one place to another, condensation may occur as a result of temperature or humidity difference. In this case, wait until the condensation disappears before using the equipment.

3.5 Installation of the Main Unit

The system can be installed as follows:

- On a flat surface
- On a medical supply unit
- On a trolley

NOTE

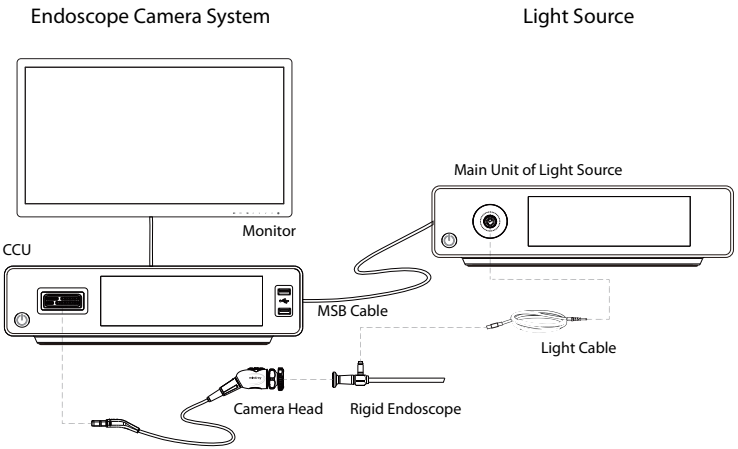
- **You are advised to install the main unit on a stable trolley rather than on the floor.**
- **If the equipment is to be used with a trolley, there will be risks of falling or collision during movement. For more safety instructions, refer to the instructions for use accompanied with the trolley.**
- **If the equipment is installed on a trolley, make sure the capacity of the trolley is higher than the total power consumption of all the equipment connected to the mains outlet of the trolley. If the power supply voltage is reduced due to insufficient capacity, tripping may occur, turning off the main unit and all other equipment connected to the trolley.**

3.6 Device Connection

Read this operator's manual carefully before using the system. Familiarize yourself with its function and operation, and observe the warnings and cautions included in the manual.

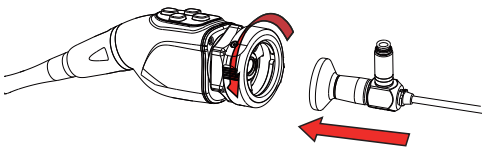
3.6.1 System Connection

The equipment can be connected with endoscopes, light sources and monitors to provide high definition images through denoise in multiple dimensions combining spatial and time domains. The connection of the modular-designed system is shown as below:



To connect devices in the diagram, follow the procedure below:

1. Connect a monitor to a correct video output connector on the back of the CCU with a video cable. Select a video cable that matches the video output connector. More than one monitors can be connected simultaneously to the CCU.
2. Connect a light source to the MSB connector on the back of the CCU with a MSB cable (System Ctrl Cable-Light Source).
3. Plug the connector of the camera head to the camera head connector on the front panel of the CCU.
4. To connect the camera head and endoscope, follow the procedure below:
   a Rotate the endoscope coupler as indicated by the arrow on it.
   b Align the eye piece of the endoscope with the endoscope coupler on the camera head.



   c Push the endoscope to the camera head and release the endoscope coupler.
   d Pull the endoscope slightly to check if the endoscope is secured.

To remove the endoscope, follow the procedure below:

1. Hold the camera head with one hand, and the endoscope with the other.

- **Before connecting the equipment to the AC mains, check that the voltage and frequency ratings of the power supply are the same as those indicated on the equipment's label or in this manual.**

3.6.5 Connecting USB Drive

Images and videos can be stored in USB drives connected to the CCU. Before recording, plug USB drives to the USB connector on the front panel. You can connect two USB drives simultaneously. The system detects the status of the USB drives automatically and displays on the touchscreen. Besides, if one USB drive is out of memory, images and videos will be stored to the other USB drive.

Select NTFS, FAT32, or exFAT USB drives from a qualified manufacturer. The CCU supports connecting hard drives with memory greater than or equal to 6 TB. You are advised to choose a USB drive with memory greater than 32 GB. The following are the recommended USB drives:

Video Quality	Recommended Manufacturer
4K quality, HD High Quality	SanDisk Z25 series SSD Samsung T7 series SSD
HD Standard Quality	SanDisk CZ600 series U disk SanDisk CZ880 series U disk

You are advised to format the USB drive before use. For details about formating USB drives, refer to ***5.6.3 Formatting USB Drive***.

You are advised to use the PotPlayer or KMPlayer to play videos stored in the USB drives.

CAUTION

- **Select USB drives from qualified manufacturers. Otherwise file corruption or system failure could result. It is not recommended that you use a card reader instead of an USB drive.**
- **Formatting a USB drive will clear all data stored in it. Make sure a backup of data you need is made.**

3.7 Using the Touchscreen

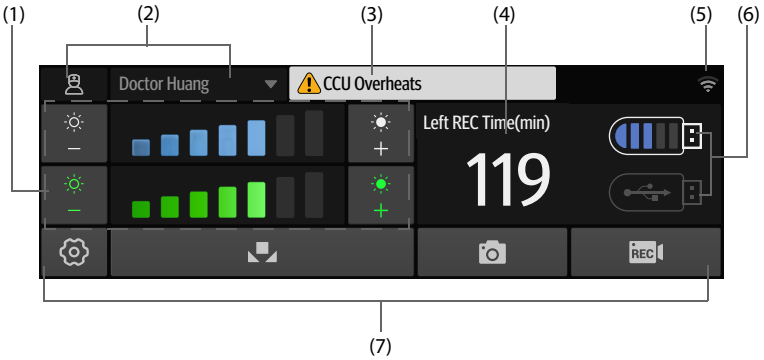
The equipment is configured with a LCD touchscreen on which you can operate and set the equipment, and view operation information.

NOTE

- **Dry the equipment immediately in case of rain or water spray.**

3.7.1 Operation Screen Introduction

The following figure shows the operating screen of the equipment:



(1) Brightness setting area: displays the current brightness level and fluorescence intensity. Select a button to set the brightness of the image displayed or the fluorescence intensity. There are 7 levels that can be adjusted.

(2) User configuration area: displays the current user configuration. Select the User configuration button to customize the configuration.

(3) Error message area: displays error messages.

(4) Left REC Time (min): indicates the estimated recording time (in minutes) the current connected USB drive supports.

(5) System status area: displays the network connection status.

(6) USB status area: indicates the current status of the USB drive connected to the USB connector on the front panel.

NOTE: Keep observing the Left REC Time (min) value and replace the USB drive if necessary.

(7) Button area: displays available buttons. For detailed introduction of the buttons, refer to ***3.7.3 Available Buttons***.

3.7.2 On-screen Symbols

The following table lists the on-screen symbols displayed on the main screen:

Symbol	Description	Symbol	Description
	No USB drive is connected.		About 0% memory is occupied.
	About 20% memory is occupied.		About 40% memory is occupied.
	About 60% memory is occupied.		About 80% memory is occupied.
	(Yellow) The USB drive is nearly full.		The USB drive is already full.
	Identifying USB drive.		Failed to identify the USB drive.
	Wireless network is connected. The solid part indicates network signal strength.		Wireless network is not connected.
	The CCU is matched with a location.		Failed to match the location.
	The touchscreen is unlocked		The touchscreen is locked

3.7.3 Available Buttons

The following table lists the available buttons displayed on the main screen:

Button	Description	Button	Description
	Setup button: select to display the setup menu.		White balance button: select to adjust the white balance.
	Camera button: select to capture images.		Record button: select to start/ stop recording.

4.5 Check Before Operation

It is required to check and ensure that the equipment works properly. After turning on the equipment, check the following items:

- The system does not emit abnormal noise, smell, or excessive heat.
- Put a hand near the ventilation outlet and check that there is air flowing out.
- The touchscreen displays and functions correctly.
- Aim the tip of the endoscope to an object and check that the image quality displayed on the monitor is normal.

CAUTION

- **Do not put the system in use before the system is checked and works normally.**
- **In case of any failure, stop and remove equipment from use. Otherwise, injury to the patient or operator or damage to the equipment might result.**

4.6 Setting Interconnected Light Source

After the CCU is correctly connected to the Mindray light source, if the light source is in auto mode, the CCU can automatically adjust the light brightness based on the current surgical field of view to ensure a clear surgical field of view and balanced light brightness.

You can turn on or off the light source by pressing the camera head button. For details about how to set the functions of camera head buttons, refer to ***5.5 Setting Camera Head Functions***.

4.7 Selecting User Configuration

Through the user configuration function, you can save some customized parameters in the setup menu. For details about the list of customized parameters, refer to ***C Default Settings***.

Select the drop-down list in the user configuration area on the main screen to select a saved user configuration.

To update the current user configuration, or delete a saved user configuration, refer to ***5.2 Setting User Configuration***.

4.8 Performing White Balance

The white balance function is used to calibrate the color of the image displayed on the monitor.

It has be to performed:

- before starting the surgery;

- after the light source is changed; and,
- when the color of the image is anomalous.

To perform white balance, follow the procedure below:

1. Ensure that the connected light source is emitting light. If **Smart Light** is enabled, skip this step. For details about how to set **Smart Light**, refer to ***5.7.2.2 Setting Switches of Interconnection Functions***.
2. Point the camera head or endoscope to a white gauze or any white object, and make sure your sight is filled with white. Do not shake the camera head or the endoscope in the process.
3. Adjust the brightness to an appropriate level and avoid overexposure.
4. Long press the W button on the camera head to start white balance. You can also press the white balance button on the main screen to start the function.
5. Check the prompt message on the monitor. If white balance is indicated to be failed, repeat the procedure.

When the white balance is successfully performed, the displayed image color becomes natural. If the white balance is not performed, the white balance parameters set last time are used by default.

The long-press function of W button on the camera head is set to **White Balance** by default. The long-press function of P or M button can also be customized to **White Balance**. For details about how to customize the button function, refer to ***5.5 Setting Camera Head Functions***.

4.9 Adjusting Image Brightness

Select the brightness increase button + or brightness decrease button − on the main screen to adjust the image brightness. The brightness slider in the middle indicates the current brightness level. You can also drag the slider to the left or right to adjust the brightness.

In addition, if the short-press function of P, W, or M button on the camera head is set to **WL Brightness**, you can short press the button to adjust the brightness. For details about how to set the functions of camera head buttons, refer to ***5.5 Setting Camera Head Functions***.

4.10 Adjusting Fluorescence Intensity

After the CCU is correctly connected to the Mindray light source (HB500R/HB500R-TEC), you can select the fluorescence increase button + or fluorescence decrease button − on the main screen to adjust the fluorescence intensity. The fluorescence slider in the middle indicates the current fluorescence intensity. You can also drag the slider to the left or right to adjust the fluorescence intensity.

In addition, if the short-press function of P, W, or M button on the camera head is set to **Fluor Intensity**, you can short press the button to adjust the fluorescence intensity. For details about how to set the functions of camera head buttons, refer to ***5.5 Setting Camera Head Functions***.

4.11 Adjusting Image Focus

Camera heads compatible with the CCU does not support detachable lenses. The focal length of the camera heads is 25 mm ± 20%.

You can press the AF button on the camera head to perform autofocus, or rotate the focusing ring to perform manual focus.

4.12 Zoom In/Out

In the setup menu, select **Image Zoom** to zoom in/out on the displayed image. For detailed setting method, refer to ***5.3.1 Adjusting Image View***.

In addition, if the function of P, W, or M button on the camera head is set to **Image Zoom**, you can press the button to adjust the image magnification. For details about how to set the functions of camera head buttons, refer to ***5.5 Setting Camera Head Functions***.

4.13 Switching Display Modes

The system provides the following display modes:

- WhiteLight: displays the visible light image.
- Overlay: detected near-infrared light (NIR) signal is overlaid on white light image in green.
- Monochromatic: displays the NIR signal without white light.
- Intensity Map: detected NIR signal is overlaid on white light image in pseudo color.
- WL-Quad Screen: the monitor displays in split-screen mode, by default with WhiteLight image on the right, Monochromatic image on the top left, Intensity Map image on the middle left, and Overlay image on the bottom left.
- OL-Quad Screen: the monitor displays in split-screen mode, by default with Overlay image on the right, WhiteLight image on the top left, Intensity Map image on the middle left, and Monochromatic image on the bottom left.
- Mono-Quad Screen: the monitor displays in split-screen mode, by default with Monochromatic image on the right, WhiteLight image on the top left, Intensity Map image on the middle left, and Overlay image on the bottom left.
- IS-Quad Screen: the monitor displays in split-screen mode, by default with Intensity Map image on the right, WhiteLight image on the top left, Monochromatic image on the middle left, and Overlay image on the bottom left.

When different camera head or 3D video endoscope is connected to the CCU, the supported display modes are as follows:

CCU Model	Camera Head or 3D Video Endoscope	Display Mode
UX4 series	Fluorescence camera head	All modes
	White light camera head 3D video endoscope	**WhiteLight** only
UX5 series	Fluorescence camera head	All modes
	White light camera head 3D video endoscope	**WhiteLight** only
UX7 series	Fluorescence camera head G series 3D video endoscope	All modes
	White light camera head M series 3D video endoscope	**WhiteLight** only

You can customize the short-press function of P, W, or M button on the camera head to **Mode Cycle**, and short press the button to switch the display mode. For details about how to set the functions of camera head buttons, refer to ***5.5 Setting Camera Head Functions***.

In addition, you can switch modes on the **Display Mode** page. For detailed setting method, refer to ***5.3.3 Setting External Input Source***.

4.14 Taking Photos or Recording Videos

During surgery, you can press the buttons on the touchscreen or press the camera head buttons to take photos or record videos. The images and videos can be stored in the USB drives or an external video recorder. The specification of images and videos are as follows:

Item	Storage Format	Performance
Image	.jpeg	Highest storage resolution: 4K
Video	MP4	Frame rate: 60 fps Bit width: 10bit or 8bit Encoding standard: H.265

After startup, set the storage location and video quality by referring to ***5.6 Setting Recording Function***.

After setting, when you take photos or videos for the first time, a new file directory will be generated under the storage location, and images and videos recorded during this surgery will be saved to this file directory.

The name of a file directory shows the time of the corresponding surgery, and the name of a video screenshot indicates the name of the corresponding video. The name formats of file directory, video and image are as follows:

5 Changing Settings

5.1 Overview

This chapter introduces the software settings of the system.

You can set the user configuration on the main screen. After selecting the Setup button on the main screen to access the setup menu, you can also set the screen display, image mode, camera head functions, recording function, and system information.

5.2 Setting User Configuration

To add a new user configuration, follow the procedure below:

1. On the main screen, select the User configuration button → **Save As New Config**.
2. Select the Edit button next to **Config Name** and enter a name for the new configuration in the pop-up window.
3. Select **OK** in the pop-up window to return to the **Save As New Config** page.
4. Select **OK** to save the current configuration as the entered name.

After selecting the User configuration button , you can also select **Store** to update the current user configuration. Or you can follow the procedure below to delete a user configuration:

1. On the main screen, select the User configuration button → **Delete Current Config**.
2. Select an user configuration as needed and then select **Delete**.

5.3 Setting Screen Display

Select the Setup button on the main screen to access the setup menu. The **Display** tab is displayed. On this tab, you can set the image view, display mode, external input source, and the 3D view effects.

5.3.1 Adjusting Image View

To adjust the image view, follow the procedure below:

1. In the setup menu, select **Display** → **View Setup**.
2. Set **Image Zoom**. Press the + or - icon to adjust the magnification of the image on the monitor. The slider between the + and - icons indicates the current magnification. You can also move the slider to zoom in or out on the image.

- Select **Mode 1** to display the external input image in the main window on the right and the image captured by the system in the small window on the left.
- Select **Mode 2** to display the image captured by the system in the main window on the right and the external input image in the small window on the left.

4. If two monitors are connected, you can select **Dual-Screen Display**, and set **Dual-Screen Display**.
   - When **Close** is selected, the monitors will display only image captured by the system.
   - Select **Dual-Screen Display** to display the external input image and the image captured by the system on each of the two monitors.

5.3.4 Setting 3D View Effects

When connecting a 3D video endoscope, to set the 3D view effects, follow the procedure below:

1. In the setup menu, select **Display** → **3D Setup**.
2. Set **View Mode** to **2D**, **2D AutoRotate**, **3D**, or **3D AutoRotate.**
   - 2D: displays 2D image.
   - 2D AutoRotate: displays 2D image. Image can automatically rotate.
   - 3D: displays 3D image.
   - 3D AutoRotate: displays 3D image. Image can automatically rotate.
3. Select **Advanced Setup** to enter the **Advanced Setup** page.
4. Select the + or - icon to set **Parallax Setup** or select **Reset** to restore the factory defaults.
5. Select the + or - icon to set **Autoswitch Angle** and **Set Transition Angle.**
6. Switch on or switch off **Direction Indication Arrow.**
   - If it is switched on, an arrow is displayed to indicate the actual forward direction in 2D AutoRotate or 3D AutoRotate mode.
   - If it is switched off, no arrow is displayed.

NOTE

- **To select a 3D view mode, set the monitor to 3D display mode in advance.**
- **For details about the view modes, refer to the operator's manual of the 3D video endoscope.**

5.4 Setting Image Mode

Select the Setup button on the main screen to access the setup menu. Select the **Image** tab. On this tab, you can perform image optimization, adjust image color, set fluorescent image, and set specialist image.

5.4.1 Performing Image Optimization

To perform image optimization, follow the procedure below:

1. In the setup menu, select **Image** → **Image Opt.**.
2. Switch on or switch off **Detail Enhancement**, **Color Enhancement**, **Homogenous Brightness** and **Anti-fog**.
3. When connecting a camera head, switch on or switch off **HDR.**

NOTE

- **After Anti-fog is switched on, the equipment applies algorithms to implement image defogging.**

5.4.2 Adjusting Image Color

To adjust the image color, follow the procedure below:

1. In the setup menu, select **Image** → **Color Setup**.
2. Set **Color Style**. For detailed introduction of the options, refer to ***2.7 Differences Among Models***.
3. Select the + or - icon to set **Saturation**, **Red Gain**, or **Blue Gain**. Or select **Reset** to restore the factory defaults.

5.4.3 Setting Fluorescent Image

When connecting a fluorescence camera head or G series 3D video endoscope, you can set fluorescent image. Follow the procedure below:

1. In the setup menu, select **Image** → **Fluorescence**.
2. Set **Fluorescence Sensitivity**.
   - Select **Level 1**, **Level 2** or **Level 3(Autofluorescence)**.
   - Select **Level 0**, high-sensitivity processing is not performed.

5.4.4 Setting Image Parameters for Special Departments

To set image parameters for special clinical departments, follow the procedure below:

1. In the setup menu, select **Image** → **Specialty**.
2. When connecting a camera head, switch on or switch off **De-grid Optimization** and **Anti-laser Optimization** under **Special Function**.

3. Switch on or switch off **Tone Enhancement**. After switching on it:
   - Set **Tone Enhancement Mode** to **Mode R** or **Mode G** as needed. After setting, the system enhances the image color contrast by color inversion.
   - Set **Display Mode** to **Full Screen** or **Dual Split** as needed.

5.5 Setting Camera Head Functions

Select the Setup button on the main screen to access the setup menu. Select the **Camera Head** tab. On this tab, you can set functions of the P, W, and M buttons to performing white balance, taking photos, recording, or controlling the brightness of light.

5.5.1 Introduction to Short-press/Long-press Functions

The following table lists the short-press functions that you can set for the buttons:

Short-Press Function	Description
Capture	Short press the button to capture the image displayed on the monitor.
Mode Cycle	Short press the camera head button to cycle through display modes.
Image Zoom	Short press the button to zoom in or out of the image displayed on the monitor.
WL Brightness	Short press the button to increase or decrease the image brightness.
Fluor Intensity	Short press the button to increase or decrease the fluorescence intensity.
3D/2D Switching (with 3D video endoscope)	Short press the button to cycle through 3D view modes.
External Source	Short press the button to display the external input source on the monitor.
Interconnection	Short press the button to display parameters of interconnected devices on the monitor.
Tone Enhancement	Short press the button to cycle through the tone enhancement modes.
Counter	Short press the button to start/stop timing or reset the timer. The recorded time is displayed on the monitor.
Smoke Evacuation	Short press the button to turn on or off the smoke exhaust function of the interconnected insufflator.
Anti-fog	Short press the button to turn on or off the image defogging function.

Short-Press Function	Description
Image Flip	Short press the button to switch the image flip mode.
No Function	Short-press of the button will not activate any function.

The following table lists the long-press functions that you can set for the buttons:

Long-Press Function	Description
Capture	Long press the button to capture the image displayed on the monitor.
REC	Long press the button to start/stop recording video displayed on the monitor.
White Balance	Long press the button to start white balance.
3D/2D Switching (with 3D video endoscope)	Long press the button to cycle through 3D view modes.
External Source	Long press the button to display the external input source on the monitor.
Interconnection	Long press the button to display parameters of interconnected devices on the monitor.
Tone Enhancement	Long press the button to cycle through the tone enhancement modes.
Counter	Long press the button to start, stop timing or reset the timer. The recorded time is displayed on the monitor.
Insufflator Switch	Long press the button to turn on or off the inflation function of the interconnected insufflator. Prompts of insufflation status and insufflator parameters will be displayed on the monitor.
Smoke Evacuation	Long press the button to turn on or off the smoke exhaust function of the interconnected insufflator.
Light Switch	Long press the button to stop the interconnected light source from emitting light or turn on the brightness automatic adjustment.
Anti-fog	Long press the button to turn on or off the image defogging function.
Image Flip	Long press the button to switch the image flip mode.
No Function	Long-press of the button will not activate any function.

5.5.2 Setting Button Functions

To set the functions of the camera head buttons, follow the procedure below:

1. In the setup menu, select **Camera Head**.
2. On the **P Key** page, set the short-press function and long-press function of the P button.
3. On the **W Key** page, set the short-press function and long-press function of the W button.
4. On the **M Key** page, set the short-press function and long-press function of the M button.
5. If the short-press function is set to **Mode Cycle**, set **Display Mode Selection** as needed.
6. If the short-press function is set to **Image Zoom**, set **Image Zoom Selection** as needed.
7. If the short-press or long-press function is set to **External Source**, set **Display External Source** as needed. For detailed introduction of the display modes, refer to***5.3.3 Setting External Input Source***.
8. If the short-press or long-press function is set to **Tone Enhancement**, set **Tone Enhancement Mode Selection** as needed.
9. If the short-press or long-press function is set to **Counter**, set **Reminder Interval** as needed.

5.6 Setting Recording Function

Select the Setup button on the main screen to access the setup menu. Select the **REC** tab. On this tab, you can set recording or screenshot function, or format USB drives.

5.6.1 Setting Recording Function

To set the recording function, follow the procedure below:

1. In the setup menu, select **REC** → **REC Setup**.
2. Set **Storage Location**.
   - **Internal Recorder**: Videos and images are saved to USB drives by default.
   - **External Recorder**: Videos and images are saved to the external video recorder.
   - **Internal&External Recorder**: Videos and images are saved to USB drives and the external video recorder at the same time.
3. Select **Video Segment** to set the size of each video saved to USB drives.
4. Select **Video Quality** to set the quality of the videos saved to USB drives.
   - **4K HQ**: Record video at 120 Mbps.

4. To ensure the EO residues remain at a level that does no harm to the human body, the sterilized equipment should go through a 12-hour resolution or longer in a well-ventilated room at 55°C before reuse.

7.4.6 Low Temperature Plasma Sterilization

Validate the sterilization procedure of the low temperature hydrogen-peroxide plasma sterilizer in accordance with the operating instructions of the sterilizer.

To perform low temperature plasma sterilization, follow the procedure below:

1. Clean and disinfect the camera head and its cable as instructed in the previous sections.
2. Place the container into the sterilizer, and ensure:
   - ◆ The container is adequately exposed in the hydrogen peroxide plasma.
   - ◆ Do not allow any object to contact the inner sides of the sterilizer.
3. Sterilize the equipment following the instructions for use of the sterilizer. You are advised to use the following low temperature hydrogen peroxide plasma sterilizer that has been tested:

Manufacturer	Product	Cycle Mode
Advanced Sterilization Products (ASP)	STERRAD™ 100NX Sterilizer with ALLClear™ Technology	Standard circulation (Full period)

After sterilization, cool the equipment down to room temperature before use. If not, the lens might fog or the camera head be damaged.

CAUTION

- **Without compromising the efficacy of sterilization, select a method that would least corrode the camera head.**
- **Make sure the camera head works normally before use. In case of any damage, remove it from use immediately, or patient or operator injury might result.**

NOTE

- **After long time of sterilization, the color of part of the camera head might fade. It is natural and will not affect the sealability or performance of the camera head.**

A.8 Product Performance

Image transfer pixels	3840*2160 or 4096*2160 ultra high definition
Equipment noise	≤ 55 dBA
Defibrillation recovery time	1s

A.9 Wireless Network Specifications

Wi-Fi connector	
Protocol	IEEE 802.11 a/b/g/n/ac
Operating frequency	2412MHz to 2472MHz, 5180MHz to 5320MHz, 5500MHz to 5700MHz, 5745MHz to 5825MHz
Data security	Standards: WPA/WPA2-PSK, WPA/WPA2-Enterprise, WPA/WPA2 CCKM EAP method: LEAP, EAP-TTLS, EAP-TLS, EAP-FAST, PEAP-MsChapV2, PEAP-GTC, PEAP-TLS Encryption method: TKIP and AES
Modulation mode	BPSK, QPSK, 16QAM, 64QAM, 256QAM
Output power	< 20 dBm (CE requirement, detection mode: RMS) < 30 dBm (FCC requirement, detection mode: peak power)
UWB connector	
Protocol	IEEE 802.15.4-2015, IEEE 802.15.4z
Operating frequency	UWB CH5 (center frequency: 6489.6 MHz) & UWB CH9 (center frequency: 7987.2 MHz)
Data security	AES encryption
Modulation mode	BPM/BPSK
Output power spectral density	≤ -41.3 dBm/MHz

G 31030A/G 31000A/G 31030PA/G 31000PA

4K 3D Video Endoscope

Operator's Manual

CE 1639

■ Release time: 2024-11

■ Revision: 1.0

2.6 Contra-indications

The use of the video endoscope is contraindicated if, in the opinion of the attending physician, the surgical method as such is contraindicated or if the patient is not able to undergo surgery or anesthesia due to his or her general condition.

The video endoscope must not be used for interventions in direct contact with the central nervous system (CNS) and central cardiovascular system.

2.7 Clinical Benefits

4K 3D Video Endoscope is anticipated to shorten the operative time and reduce the amount of blood loss during laparoscopic and thoracoscopic surgery by helping surgeon's visualization.

2.8 Applied Part

The applied part of the equipment is the video endoscope itself.

2.9 Differences Among Models

Model[a]	Imaging Bands (nm)	Direction of View	Light Cable Adapter
G 31030A	400 - 760, 800 - 880	30°	Yes
G 31000A	400 - 760, 800 - 880	0°	Yes
G 31030PA	400 - 760, 800 - 880	30°	No
G 31000PA	400 - 760, 800 - 880	0°	No

[a]: "A" in the model indicates that products of this model can be autoclave sterilized.

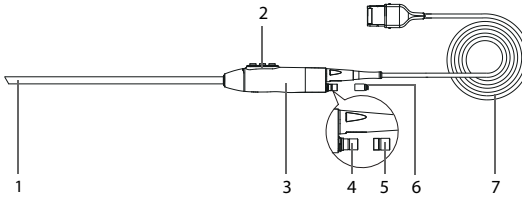
2.10 Product Components

This product consists of the tip, insertion portion, handle, and video connecting cable.

NOTE

- **4K 3D video endoscope is hereinafter referred to as "video endoscope".**

2.10.1 Front View of the Video Endoscope



(1) Tip: includes two 1/3-inch 4K CMOS image sensors and two sets of imaging light paths.

(2) Buttons: press to control the functions of camera control unit (hereinafter referred to as "CCU").

(3) Handle: hold during use.

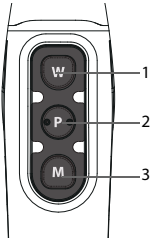
(4) Light cable connector: available for ACMI/Olympus Pro light cables.

(5) Light cable adapter: available for Mindray/Richard Wolf light cables.

(6) Light cable adapter: available for STORZ light cables.

(7) Video connecting cable: connects the CCU.

2.10.2 Video Endoscope Buttons



(1) W button: short press to switch view modes and long press to perform white balance by default. For details about view modes, refer to *3.6.3.2 Selecting View Mode*.

(2) P button: short press to take photos and long press to record videos by default.

(3) M button: short press to switch display modes circularly and long press to display external input source by default.

NOTE

- **The video endoscope has active anti-fog function, which can effectively prevent fogging of the optical window at its tip.**
- **The focus-free design of the video endoscope allows you to skip manual focus.**
- **You can customize the functions of the video endoscope buttons on the CCU. For the detailed setting method, refer to the operation's manual of the CCU.**

- Irreversible damage to a patient's tissues or unnecessary coagulation may occur.
- Surgical instruments (such as surgical drapes, plastic materials, etc.) may be combusted or burnt.
- If the light source is damaged during use, it may be a danger to patients. Therefore, a backup light source should be provided or a light source with extra bulbs is used.

WARNING

- **After long time light emitting, the surface temperature on the light cable connector and metal hood of the eyepiece end may exceed 41°C. Do not contact with these parts to avoid burns.**

3.6.3 Connecting Video Endoscope to CCU

Connect the video connecting cable of the endoscope to the CCU specified by Mindray. The equipment is applicable to the UX4/UX410/UX420/UX430/UX450/UX460/UX470/UX5/UX510/UX520/UX530/UX550/UX560/UX570/UX5-TEC/UX5-NOR/UX5-SIM/UX7/UX7-TEC/UX7-NOR/UX7-SIM camera system only.

3.6.3.1 Checking Image Quality

1. Place a piece of paper with texts about 50 mm in front of the tip of the endoscope.
2. Observe whether image blurring, loss of focus, or dark area exists in your field of view. If yes, replace the endoscope.

3.6.3.2 Selecting View Mode

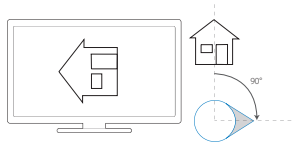
You can select one of the following view modes by setting on the CCU or by pressing a video endoscope button after customizing its function.

- 2D: displays 2D image.
- 2D AutoRotate: displays 2D image. Image can automatically rotate.
- 3D: displays 3D image.

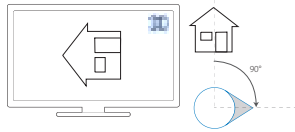
■ 3D AutoRotate: displays 3D image. Image can automatically rotate.

The following are examples of image rotation in different view modes at the viewing angle of 90°.

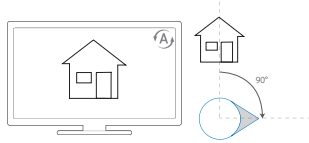
2D:



3D:



2D AutoRotate:



3D AutoRotate:

You can also set the functions of **Autoswitch Angle**, **Parallax Setup** and **Image Zoom** on the CCU. For details about the setting method, refer to the operator's manual of the CCU (UX4/UX410/UX420/

UX430/UX450/UX460/UX470/UX5/UX510/UX520/UX530/UX550/UX560/UX570/UX5-TEC/UX5-NOR/UX5-SIM/UX7/UX7-TEC/UX7-NOR/UX7-SIM).

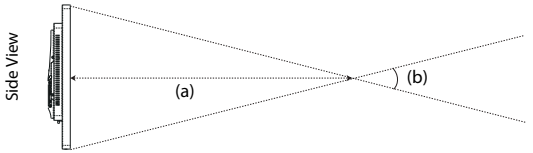
NOTE

- **In 3D mode, switch to 2D mode in case of any eye discomfort.**
- **Wear 3D glasses to view the images in the 3D or 3D AutoRotate mode.**
- **Replace the 3D glasses in case of any problems during the operation.**

3.6.3.3 Optimal Visual Zone of 3D Images

If you select the 3D mode, consult recommendations below to select a visual zone:

■ The recommended viewing distance is 3 times the height of the monitor screen.



(a) Recommended viewing distance (b) Vertical viewing angle

Monitor Model	Recommended Viewing Distance	Vertical Viewing Angle
32 inches	≥ 0.69m	32°
55 inches	≥ 1.0m	37°

■ In horizontal direction, the recommended viewing range of the monitor is 45° left to 45° right.

WARNING

- **Sapphire of the optical window at the tip of the endoscope can be wiped with 75% alcohol. When wiping, exercise caution to prevent sharp objects from scratching the front windows.**

4.5 Manual Cleaning

4.5.1 Flushing

To flush the equipment, follow the procedure below:

1. Flush the equipment with running water for 1 to 2 minutes to remove contaminations from the equipment surface.
2. Use a pressure washing gun to flush the equipment parts with complex structures, such as screw threads and gaps.

CAUTION

- **The water temperature during flushing should be 15°C to 30°C, and the maximum temperature shall not exceed 45°C. High temperature may cause denaturation and coagulation of blood or protein, increasing cleaning difficulty.**
- **Do not use a pressure washing gun to flush the eyepiece, objective lens, and light cable connector, so as not to damage these optical components.**

4.5.2 Washing

To wash the equipment, follow the procedure below:

1. Fully immerse the equipment in enzyme-containing cleanser. For requirements about immersing time, temperature, and concentration, refer to the instructions for use of the cleanser. Below is enzyme-containing cleansers of which the efficacy has been tested:

Product Name	Manufacturer	Concentration	Immersing Time
neodisher® MediClean forte	Dr. Weigert	5-20 mL/1L water	10 -30 min

2. Use a syringe with a volume of at least 10 ml to aspirate the cleanser and thoroughly flush the equipment parts with complex structures, such as screw threads and gaps. Repeat this step 5 to 10 times.
3. While immersing the equipment, use a soft brush to clean all accessible surfaces, especially parts with complex structures, such as screw threads and gaps. Brush the surfaces for 1 to 2 minute until no residue remains.
4. Use a cotton swab or a lint-free cloth soaked with 75% alcohol to wipe the surfaces of the optical components such as the eyepiece, objective lens, and light cable connector.

NOTE

- **Choose an enzyme-containing cleanser for use. Mixing cleansers may reduce the cleaning effect.**

4.5.3 Rinsing

After preliminary cleaning, follow the procedure below to rinse the equipment:

1. Rinse all accessible surfaces of the equipment thoroughly with running water. Repeat this step 3 times.
2. Flush all surfaces of the equipment, especially parts with complex structures, such as screw threads and gaps, with a pressure washing gun. Repeat this step 3 times.

For rinsing, use purified water.

4.5.4 Disinfection

Disinfect the equipment as required in the local or your hospital's servicing schedule. Clean the equipment before disinfection.

You can use the following verified disinfectant for disinfection:

Disinfectant	Method	Disinfection time
Ethanol, 75%	Wiping	1 - 3 min

NOTE

- **After disinfection, the equipment still needs to be sterilized before use.**

4.5.5 Drying

Dry the equipment with a disinfected lint-free cloth or an air gun.

NOTE

- **After manual cleaning and disinfection, check the equipment surface for stains. Repeat the cleaning procedure if necessary.**

4.6 Automated Cleaning

You can also use an automated cleaning and disinfection machine to clean and disinfect the endoscope. The tested machine is as follows:

Brand	Model	Manufacturer
Steris	AMSCO 3052	STERIS Corporation

Disassemble the equipment before putting it into the cleaning and disinfection machine. Refer to the instructions for use of the machine for cleaning method and parameters.

Enzyme-containing cleanser is recommended for automated cleaning. The tested cleaning parameters are as follows:

Procedure	Temperature	Time	Water Quality	Cleanser
Pretreating	Room temperature	2min	Tap water	/
Cleaning	55°C	10min	5 mL/1 L purified water	neodisher® MediClean forte (Dr. Weigert)

Procedure	Temperature	Time	Water Quality	Cleanser
Rinsing 1	Room temperature	2min	Purified water	/
Rinsing 2	Room temperature	2min	Purified water	/
Rinsing 3	Room temperature	1min	Purified water	/
High temperature disinfection	9 0°C	5min	Purified water	/
Drying	82.2°C (Low Mode)	25min	/	/

NOTE

- **Select an automated cleaning and disinfection machine that is certified and meet local regulations.**
- **Maintain and inspect the cleaning and disinfection machine regularly.**
- **Put the equipment in a meshed tray to ensure all parts can be flushed.**
- **For moist heat disinfection, use purified water.**
- **After automated cleaning and disinfection, check the equipment surface for stains. Repeat the cleaning procedure if necessary.**
- **After disinfection, the equipment still needs to be sterilized before use.**

4.7 Sterilization

Recommended sterilization methods that have been verified are as follows:

- Autoclave sterilization
- Low temperature plasma sterilization
- Ethylene oxide (EO) sterilization

CAUTION

- **Clean and disinfect the equipment before sterilization.**
- **Perform sterilization in accordance with the methods described in this chapter. Otherwise, sterilization may fail.**
- **Before cleaning and disinfecting the equipment, put on the protection cover of the plug, and remove the cover before sterilization. Otherwise, contaminations might get inside the plug.**
- **Autoclave sterilization must be performed with purified water that meets the requirements of the medical institution and relevant standards.**
- **Use one of the recommended methods consistently on the same equipment. Using different sterilization methods may change equipment appearance.**
- **After autoclave sterilization, allow the equipment to naturally cool down to room temperature. Quick cooling down may damage the equipment.**
- **The equipment is very sensitive to impacts at high temperature. Therefore, avoid impacting and vibrating the equipment at high temperature.**
- **After each reprocessing, make sure that the equipment has been taken out of the sterilizer. In other cases, the equipment in the sterilizer shall not be considered sterilized.**

4.7.1 Maintenance, Inspection and Testing Before Sterilization

Before sterilization, follow the method in ***3.5 Inspection*** to check the equipment. Ensure the equipment is intact and functions normally. If there are visible signs of wear, the equipment should no longer be reused.

In addition, lubricate the equipment by applying water-based lubricant to its moving parts or joints.

4.7.2 Packaging Before Sterilization

Place the equipment in a proper container and double wrap the container with sterile sheet or any other sterile packing materials,

preventing equipment contamination during storage and transportation.

Recommended specifications of the sterile sheet are as follows:

Dimension	Gram Weight	Materials
1.2m x 1.2m	45g	100% polypropylene, 5-layer SMMMS laminates

4.7.3 Autoclave Sterilization

As the sterilizer and its operating conditions may affect sterilization, it is recommended that the sterilization process be reconfirmed and monitored before sterilization in accordance with related international standards (for example, ISO 17665), national standards, or hospital management rules.

To perform autoclave sterilization, follow the procedure below:

1. Place the packaged container into the sterilizer.
2. Sterilize the equipment following the instructions for use of the sterilizer.

Sterilization parameters of autoclave sterilizer are as follows:

Device	Temperature	Required minimum time
Pre-vacuum	132°C	4min
	134°C	

CAUTION

- **After autoclave sterilization, do not use liquid to forcibly cool the endoscope. Otherwise, the endoscope may be damaged.**

4.7.4 Low Temperature Plasma Sterilization

You are advised to use the following low temperature hydrogen peroxide plasma sterilizer that has been tested:

CAUTION

- **Use the equipment only in environment that meets the specific requirements. Otherwise, the equipment may not meet the performance specifications or unexpected consequences, e.g. damage to the equipment, could result. If the performance of the equipment is degraded due to aging or environmental conditions, contact your service personnel.**

A.3 Physical Specifications

Weight (insertion portion & handle)	≤ 420 g
Dimension	Length (insertion portion & handle): 470±10mm Width (handle): 32±3mm Hight (handle): 43±3mm

A.4 Basic Parameters

Field of view, 2W (°)	80 ± 15%
Direction of view, θ (°)	G 31030A/G 31030PA: 30 ± 10 G 31000A/G 31000PA: 0 ± 10
Working length (mm)	325 ± 3%
Maximum width of the insertion portion (mm)	10.45
Diameter of the insertion portion (mm)	10 ± 0.45

A.5 Optical Performance

On-axis angular resolution $r_a(d)$ (white light imaging mode)	9.02 C/(°), tolerance -10%. **Note**: It can be converted to 13.68 lp/mm.

Range of effective depth of field	3 - 200 mm

A.6 Image Performance

Signal to noise ratio	Nominal value: 30 dB, tolerance -20% Peak value: 82 dB, tolerance -20%
Static image tolerance	300, tolerance -20%
Image display pixels	Dual-channel 4K CMOS, supporting 3840 x 2160 and 4096 x 2160 pixels UHD image display **Note**: The pixel product is about 8.29 million and 8.85 million.
Video display pixels	Dual-channel 4K CMOS, supporting 3840 x 2160 and 4096 x 2160 pixels UHD video display **Note**: The pixel product is about 8.29 million and 8.85 million.
Video output frequency	50 Hz/60 Hz
3D image performance	Time difference between left and right images: 0, tolerance +10 ms Vertical parallax between left and right images: 0, tolerance +2%

A.7 Operating Environment

Hardware configuration	Processor: FPGA Flash: 256M

mindray

4K 3D Video Endoscope

Vision beyond Imagination

This brochure can be applicable to the following models:

G 31030A/G 31000A/M 31030A/M 31000A

www.mindray.com

P/N: ENG- 4K 3D Video Endoscope -210285X4P-20241126

mindray

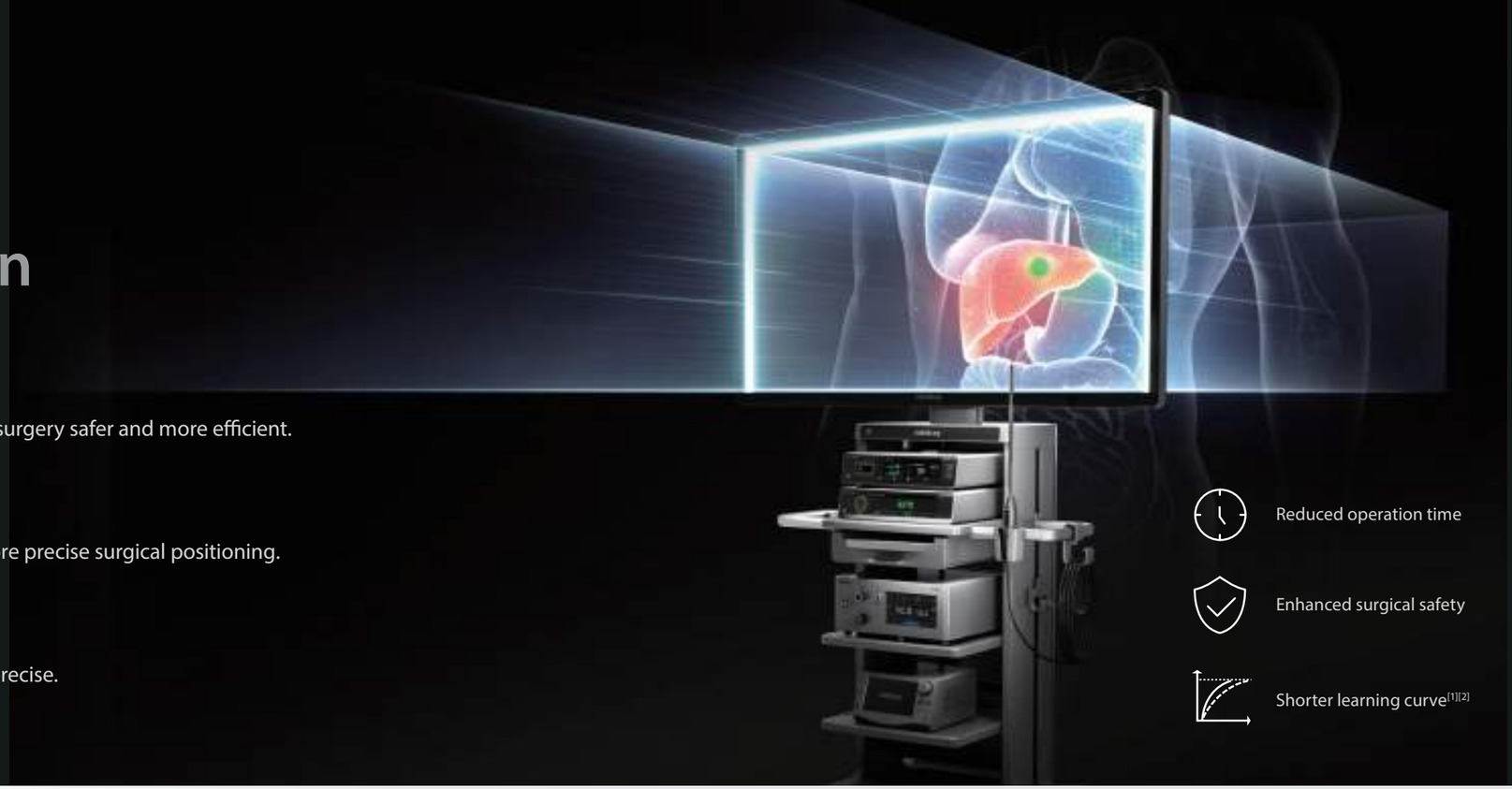
healthcare within reach

3D Intelligent Bionics,
Natural Space Perception

Dual Chips True 4K
Dual-4K 3D imaging reproduces the structure in the cavity, making the surgery safer and more efficient.

5.6 mm Large Pupil Distance
Enhanced depth of 3D vision can discern small depth differences for more precise surgical positioning.

3D Fluorescence Imaging
Stable stereo fluorescence navigation makes surgical operations more precise.



- Reduced operation time
- Enhanced surgical safety
- Shorter learning curve[1][2]

AutoRotate Correction
Built-in high-precision attitude sensor secures real-time perception of the endoscope movement
AutoRotate Correction of the endoscope enables all-around view observation

Enhanced Anti-Fog
The Chip-on-Tip design achieves active heating and defogging, dramatically reducing the frequency of intraoperative lens wipes

Focus-Free Design
The large depth of field eliminates the need to focus, while presenting clear image for a smoother surgical process

Autoclave Available
A new breakthrough in sterilization processes with a high reliability
The whole Video Endoscope supports Autoclave/Low Temperature Plasma/EO Sterilization

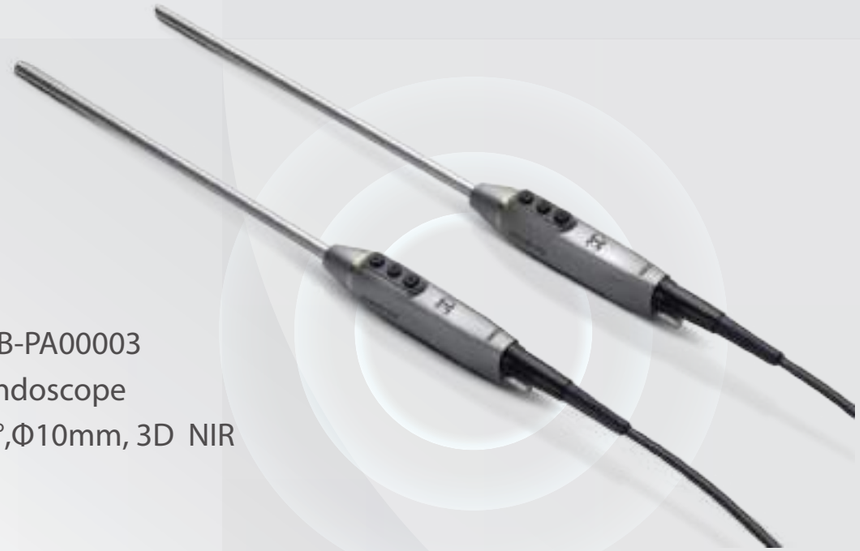
Weighs only 420 g
Titanium alloy handle, sturdy yet lightweight, allowing for easy maneuverability

[1] Arezzo A et al. The use of 3D laparoscopic imaging systems in surgery: EAES consensus development conference 2018.

[2] Velayutham V, Fuks D, Nomi T, Kawaguchi Y, Gayet B. 3D visualization reduces operating time when compared to high-definition 2D in laparoscopic liver resection: a case-matched study. Surg Endosc. 2016 Jan;30(1):147-53. doi: 10.1007/s00464-015-4174-1. Epub 2015 Mar 25. PMID: 25805241.

Model: M31030A
Order PA Code: F21EB-PA00005
Name: 4K 3D Video Endoscope
Descripcion: DOV 30°,Φ10mm, 3D white light

Model: M31000A
Order PA Code: F21EB-PA00006
Name: 4K 3D Video Endoscope
Descripcion: DOV 0°,Φ10mm, 3D white light



Model: G31030A
Order PA Code: F21EB-PA00003
Name: 4K 3D Video Endoscope
Descripcion: DOV 30°,Φ10mm, 3D NIR

Model: G31000A
Order PA Code: F21EB-PA00004
Name: 4K 3D Video Endoscope
Descripcion: DOV 0°,Φ10mm, 3D NIR

Order PA Code: 115-098836-00
Name: 3D Glasses
Descripcion: 3D Glasses(On-Ear,Large,5EA)

Order PA Code: 115-098837-00
Name: 3D Glasses
Descripcion: 3D glasses (Clip-on, Large, 5EA)

www.mindray.com

P/N:ENG-Rigid Endoscope-210285X4P-20230822

mindray

healthcare within reach

mindray

Rigid Endoscope

Small Diameter, Big Vision

Small Diameter, Big Vision

The heatable front end provides effective anti-fogging, which helps deliver smooth surgery.

The Standard 300mm and Lengthened 450mm Type are adaptable for use in various surgeries.

A large depth of field of 3-200mm provides consistently clear views, eliminating the need for repeated refocusing.

The control body has been specially polished to retain grease more easily, allowing for smooth entry and exit of trocars.

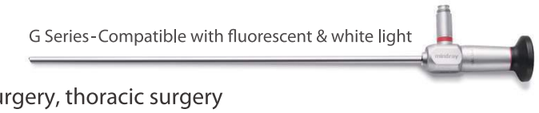
A channel diameter of Φ5.45mm ensures greater luminous flux while smoothly passing through a variety of 5mm-size trocars.

The format size is consistent with that of the Φ10mm endoscope, which enables easy full-screen view.

Rigid Endoscope

Standard 5mm Type

G Series-Compatible with fluorescent & white light

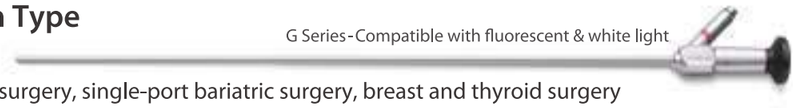


Recommended Surgery: Single-port gynecologic surgery, thoracic surgery

Product	Diameter	Working Length	Field of View	Code
0°	5.45mm	300mm	85°	G 00500A
30°	5.45mm	300mm	85°	G 00530A

Lengthened 5mm Type

G Series-Compatible with fluorescent & white light



Recommended Surgery:
Single-port gynecologic surgery, single-port bariatric surgery, breast and thyroid surgery

Product	Diameter	Working Length	Field of View	Code
0°	5.45mm	450mm	85°	G 10500A
30°	5.45mm	450mm	85°	G 10530A

G Series-Compatible with fluorescent & white light

Standard 10mm Type

M Series-Applicable with white light

Recommended Surgery: General Surgery

Product	Diameter	Working Length	Field of View	Code
0°	10mm	321mm	80°	M 01000A / G 01000A
30°	10mm	321mm	80°	M 01030A / G 01030A

Rigid Endoscope Tray

Product Name	Placed Items	Dimensions (mm)	Code
Small Rigid Endoscope Tray	Standard 5 or 10mm Rigid Endoscope	496×90×44	X TR500944
Long Rigid Endoscope Tray	Lengthened 5mm or 3D Electronic Endoscope	643×158×75	X TR641675

Rigid Endoscope

Operator's Manual

(M 01030A/M 01000A/M 01030PA/M 01000PA/G 01030A/G 01000A/G 01030PA/G 01000PA/M 00530A/G 00530A/M 00500A/G 00500A/M 10530A/G 10530A/M 10500A/G 10500A/M 00530PA/G 00530PA/M 00500PA/G 00500PA/M 10530PA/G 10530PA/M 10500PA/G 10500PA)

CE 0123

■ Release time: 2023-5

■ Revision: 1.0

preventing equipment contamination during storage and transportation.

Recommended specifications of the sterile sheet are as follows:

Dimension	Gram Weight	Materials
1.2m x 1.2m	45g	100% polypropylene, 5-layer SMMMS laminates

4.7.3 Autoclave Sterilization

NOTE

- **As the sterilizer and its operating conditions may affect sterilization, it is recommended that the sterilization process be reconfirmed and monitored before sterilization in accordance with related international standards (for example, ISO 17665), national standards, or hospital management rules.**

To perform autoclave sterilization, follow the procedure below:

1. Place the packaged container into the sterilizer.
2. Sterilize the equipment following the instructions for use of the sterilizer.

Sterilization parameters of autoclave sterilizer are as follows:

Device	Temperature	Required minimum time
Pre-vacuum	132°C	4min
	134°C	

CAUTION

- **After autoclave sterilization, do not use liquid to forcibly cool the endoscope. Otherwise, the endoscope may be damaged.**

HB500R/HB500R-TEC/HB500/HB500-TEC

Endoscope Light Source

Operator's Manual

CE 0123

CE

■ Release time: 2023-10

■ Revision: 2.0

For endoscopic interventions, the responsible physician must decide whether the prescribed application is admissible based on the general condition of the patient.

2.6 Differences Among Models

The differences among models are shown below:

Model	Levels of Light Intensity	Output Light
HB500R	12	Output of white light and near infrared light is provided.
HB500R-TEC	10	
HB500	12	Output of white light is provided.
HB500-TEC	10	

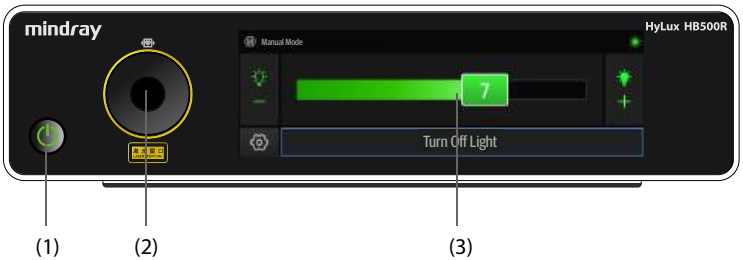
2.7 Applied Part

Light cable is considered as type CF applied part except the proximal end connected to the main unit of light source.

2.8 System Components

The light source consists of a main unit and cables.

2.8.1 Front View of the Main Unit



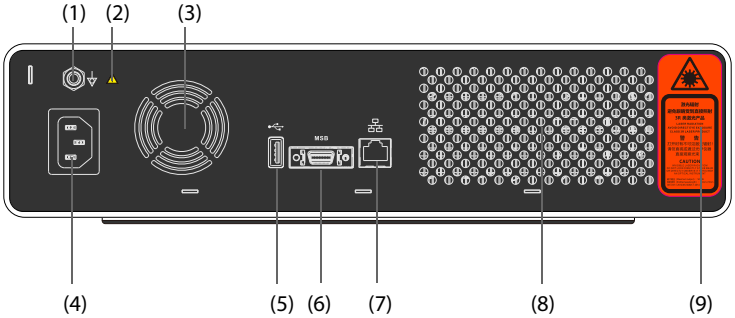
(1) Power switch: turns on or off the main unit. The switch also has an embedded light that indicates the power status of the main unit:

- Off: AC (Alternating Current) power is not connected.
- Orange: AC power is connected, but main unit is off.
- Green: the main unit is on.

(2) Light outlet and light cable connector: the light outlet, used to connect a light cable.

(3) Touchscreen: displays equipment status and changes settings.

2.8.2 Back View of the Main Unit



(1) Equipotential grounding terminal: when using the equipment together with other devices, connect their equipotential grounding terminals together to eliminate potential difference.

(2) General warning sign

(3) Ventilation outlet: used for heat dissipation.

(4) AC power input: connects the AC Mains.

(5) USB connector:connects a USB drive for system upgrade.

(6) MSB (Mindray Serial Bus) connector: connects to a camera control unit (CCU).

(7) Network connector: supports software upgrade.

(8) Ventilation outlet: used for heat dissipation.

(9) Laser warning label: read the messages carefully to avoid any possible safety risks.

WARNING

- **When connecting or disconnecting the equipotential line, turn off the equipment power supply. Or an electrical shock will occur.**

3.6.3 Connecting the AC Mains

The equipment is powered by AC power supply. Before connecting the equipment to the AC mains, check that the voltage and frequency ratings of the power line are the same as those indicated beside the AC power input.

To use the AC power source, follow the procedure below:

1. Connect the female end of the power cord to the AC input on the back of the equipment.
2. Connect the other end of the power cord with an AC outlet.
3. When the AC mains is correctly connected, the power switch indicator is illuminated in orange.

WARNING

- **Always use the power cord delivered with the equipment.**
- **Ensure that the equipment is supplied with continuous electric power during work. Sudden power failure may cause data loss or system failure.**
- **If the power supply is unstable, the system might not work properly. It is recommended that an uninterrupted power supply be used.**
- **The equipment shall only be connected to mains power with protective earth. Do not use multiple portable socket outlets, which might cause interference, electric shock or equipment damage. Do not use a power socket that is not grounded.**
- **The equipment also can be connected to a separate power supply. Ensure that the rated output of the power supply matches the input of the equipment. The power supply and this equipment constitute an ME SYSTEM together, meeting the requirements of IEC 60601-1.**
- **Before connecting the equipment to the AC mains, check that the voltage and frequency ratings of the power supply are the same as those indicated on the equipment's label or in this manual.**

3.7 Using the Touchscreen

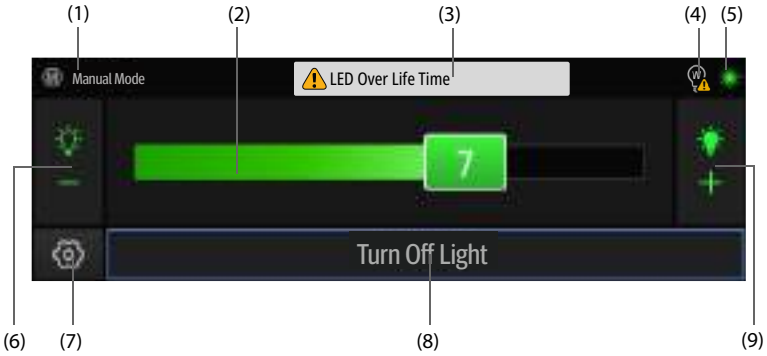
The equipment is configured with a LCD touchscreen on which you can operate and set the equipment, and view operation information.

NOTE

- **Dry the equipment immediately in case of rain or water spray.**

3.7.1 Operation Screen Introduction

The following figure shows the operating screen of the equipment:



(1) Mode area: indicates the current mode. Select this area to switch between the manual mode and auto mode.

(2) Brightness indication area: indicates the current brightness of light. Move the slider to adjust the brightness of light. If the equipment is in the auto mode, "AUTO" is displayed in this area.

(3) Error message area: displays error messages.

(4) Bulb status symbol: indicates the service life status of the bulb. For detailed introduction of the symbols, refer to ***3.7.2 On-screen Symbols***.

(5) Laser diode (LD) status symbol: indicates the status of LD output. This symbol is dimmed when the LD is off. For detailed introduction of the symbols, refer to ***3.7.2 On-screen Symbols***.

(6) Brightness decrease button : select to decrease the brightness of light (the illumination intensity of the light source).

(7) Setup button : select to display the setup menu.

(8) Light control button: select to turn on/off the light output.

necessary. Turn the LD off immediately after the fluorescence observation is completed.

NOTE

- **After a compatible CCU is interconnected, if you press the white balance button, the light source begins emitting light automatically and quickly adjusts the brightness to a proper level. If you press any other camera head button, the light source begins emitting light as well, but in slower way to minimize damage to the operator's eyes. Once the endoscope is withdrawn from the patient, the light will automatically dim. For detailed setting method, refer to the operator's manual of the CCU.**

4.8 Adjusting the Brightness of Light

In manual mode, you can press the Brightness decrease button — or Brightness increase button + on the main screen to decrease or increase the brightness of light, meeting the brightness requirements of different clinical operations. You can also move the slider in the Brightness indication area to the left or right to adjust the brightness.

NOTE

- **Always adjust the equipment to the minimum brightness necessary for the observation, to avoid the risk of burns.**
- **Do not use strong light for a long time.**

4.9 Changing Settings

4.9.1 Changing Function Setup

Select the Setup button on the main screen to access the setup menu. The **Light Source** tab is displayed. In this tab, you can set **Upper Limit**. For HB500R/HB500R-TEC, you can also switch on or switch off **NIR**.

NOTE

- **If the white light is not turned on, the switch of NIR is unavailable.**

CAUTION

- **Use the equipment only in environment that meets the specific requirements. Otherwise, the equipment may not meet the performance specifications or unexpected consequences, e.g. damage to the equipment, could result. If the performance of the equipment is degraded due to aging or environmental conditions, contact the service personnel.**

A.3 Power Supply Specifications

Working power supply	100-240VAC (±10%), 50/60 Hz (±3 Hz)
Input power	260VA

A.4 Physical Specifications

Dimension	Depth: 380 ± 5 mm Width: 350 ± 5 mm Height: 80 ± 5 mm (excluding the rubber feet)
Weight	≤ 10 kg

A.5 Hardware Specifications

Display type (CCU)	Touchscreen
Display size (CCU)	7.8 inches
Device interfaces	Power socket: 1, connecting the AC Mains
	MSB connector: 1, supporting serial communication protocol
	USB connector: 1, supporting USB 2.0 protocol. Fixed time synchronization pulse specified by the USB protocol
	Network connector: 1, RJ45 interface, supporting 100BASE-TX protocol. Calibration protocol of TCP/IP
	Light cable connector: 1, connecting the light cable
Bulb type	HB500R/HB500R-TEC: LED, which outputs white light, and semiconductor lasers (class 3R), which output near-infrared light HB500/HB500-TEC: LED, which outputs white light

Service life of bulb	LED: over 60000 hours Semiconductor lasers: over 15000 hours
Bulb specification	LED: 3.5 V, 27 A Semiconductor lasers: 4 V, 8.5 A
Diameter of light outlet	Φ7.2 ± 0.5 mm

A.6 Performance Specifications

Maximum central illumination	≥ 3000000 Lux
Color temperature	3000K - 7000K
Color rendering index	≥90, in the white light mode
Maximum noise	≤ 55 dBA
Defibrillation recovery time	1s

A.7 Laser Performance (for HB500R/HB500R-TEC)

Laser wavelength	780nm ± 10nm ; Full width at half maximum (FWHM): 5 nm ± 5nm
Beam divergence angle	70° ± 10°
Classification	3R
Test value of laser output safety sign	≤ 50 mW

A.8 Operating Environment

Hardware configuration	CPU: 500 MHz RAM: 2 Gb Flash: 4 GB
Software environment	LINUX

NOTE: The above is the minimum requirements of operating environment.

LC0005S/LC0003S Light Cable Instructions for Use

Statement

SHENZHEN MINDRAY BIO-MEDICAL ELECTRONICS CO., LTD. (hereinafter called Mindray) owns the intellectual property rights to this product and this manual. Disclosure of the information in this manual in any manner whatsoever without the written permission of Mindray is strictly forbidden.

This manual provides the instructions necessary to operate the product in accordance with its function and intended use. Observance of this manual is a prerequisite for proper performance and correct operation, and ensures patient and operator safety.

Mindray is responsible for the effects on safety, reliability and performance of this product, only if:

(1) this product is used in accordance with the instructions for use.

(2) this product is not damaged by human factors. Human factors refer to unintentional falling, intentional damaging, etc.

In the event that it becomes necessary to return a unit to Mindray, please contact the Mindray Service Department and obtain a Mindray Customer Service Authorization Number. The Mindray Customer Service Authorization Number must appear on the outside of the shipping container. Return shipments will not be accepted if the Mindray Customer Service Authorization Number is not clearly visible. Please provide the model number, serial number, and a brief description of the reason for return. The customer is responsible for freight charges when this product is shipped to Mindray for service (including any relevant customs fees or other freight related charges).

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The issue date of this manual is 2021-5.

Notification of Adverse Events

As a health care provider, you may report the occurrence of certain events to SHENZHEN MINDRAY BIO-MEDICAL ELECTRONICS CO., LTD., and possibly to the competent authority of the Member state in which the user and/or patient is established.

These events, include device-related death and serious injury or illness. In addition, as part of our Quality Assurance Program, SHENZHEN MINDRAY BIO-MEDICAL ELECTRONICS CO., LTD. requests to be notified of device failures or malfunctions. This information is required to ensure that SHENZHEN MINDRAY BIO-MEDICAL ELECTRONICS CO., LTD. provides only the highest quality products.

Important Information

1. It is the customer's responsibility to maintain and manage the product after delivery.
2. The warranty does not cover the following items, even during the warranty period:
   (1) Damage or loss due to misuse or abuse.
   (2) Damage or loss caused by force majeure such as fires, earthquakes, floods, and lightning.
   (3) Damage or loss involving the product purchased from a channel other than Mindray or its authorized agency.
3. This product shall not be modified without permission.
4. In no event shall Mindray be liable for the damage caused by alteration, modification, or repair performed by personnel other than those designated by Mindray.
5. At the end of the service life of the product, please contact Mindray or its agency. Mindary shall not be liable for the result if you do not consult Mindray or its agency about disposal of the product.
6. This manual contains warnings regarding foreseeable potential dangers, but you shall always be alert to dangers other than those indicated as well.
7. Mindray shall not be liable for damage or loss that results from negligence or from ignoring the precautions and operating instructions described in this manual.
8. This manual shall always be kept properly so that it can be obtained conveniently as needed.

I. Intended Use

The light cable is used to transmit light during the endoscopic diagnosis and treatment. In the medical field, it is used with the cold light source of endoscopes.

NOTE

- According to the conclusion of clinical evaluation and residual risk evaluation, for the intended patients, there is no known side effects that can occur during or after the use of the medical device. And there is no need for the operator to make extra preparations. Thus, no residual risk associated with using the medical device should be disclosed due to the risk management report.

II. Specifications

Model	LC0005S	LC0003S
Length of light cable	3000 mm ± 10%	
Diameter of exit optical fiber	Φ4.8 mm ± 0.1mm	Φ3.5 mm ± 0.1mm
Minimum bending radius	50mm	

III. Introduction

1. Connector (to light source)
2. Light source adapter
3. Connector sleeve
4. Anti-bending device
5. Connector (to endoscope)

IV. Safety Precautions

⚠ WARNING

Risk of patient injury

- Ensure that all endoscopic equipment is properly connected and functioning before inserting the endoscope into a patient.
- Use this product only along with the endoscopic device specified by Mindray.

⚠ CAUTION

Risk of patient injury

Light source produces a lot of heat, causing a high temperature at the connector and front end of the endoscope. It may result in the following risk:

- ➢ Scalding the patient (for example, when the small cavity of the lumen is exposed to excessive lighting, or the front end of the endoscope is close to the tissue).
- ➢ Burn of the patient or user's skin.
- ➢ Combustion or burning-out of surgical instruments (such as surgical drapes, and plastic materials).

- It is forbidden to place the endoscopic equipment on the patient's skin, flammable materials, or temperature-sensitive materials.
- Adjust the output power of the light source to make the minimum brightness required to illuminate the target area. Avoid excessive exposure to strong light.

⚠ CAUTION

Risk of user injury

When the light source is on, do not look straight at the endoscopic connector of the light cable because that may cause eye injury.

V. Removal After Use

⚠ CAUTION

Risk of user injury

Touching the light cable connector when its temperature is high may cause scalding.

- Cool the light cable after use.

INSTRUCTION

Risk of product damage

Sudden change in temperature may cause damage to the product.

- Cool the light cable after use.
- It is forbidden to use liquid to cool the light cable.

INSTRUCTION

Risk of product damage

Pulling the cable may damage the product.

- To unplug the light cable from the light source, grasp the plastic shell of the connector.

VI. Cleaning, Disinfection, and Sterilization

Clean, disinfect and sterilize this product regularly based on the local or hospital's regulations related to cleaning, disinfection, and sterilization.

A protective cap is provided together with the product before delivery, as shown in the following figure. Remove the protector before cleaning, disinfection, and sterilization.

1. Cleaning and Disinfection

(1) Disconnect the light cable from the devices, including light source and endoscope.

(2) Use a soft cloth dipped in an appropriate amount of water to remove leftover on the surface of the light cable.

(3) Use a clean soft cloth dipped in an appropriate amount of ethanol (75%) to wipe the surface of the light cable.

(4) Use a dry soft cloth to wipe off detergent on the surface of the light cable, and place the light cable in a ventilated and cool environment to air dry it.

2. Sterilization

The recommended sterilization method is pressure steam sterilization. For loading method of pressure steam sterilization, please refer to the corresponding sterilizer operation instructions.

The procedure is as follows:

(1) Remove the light source adapter from the light cable.

(2) Put the product in a sterilization box, and wrap two layers of sterile sheets to prevent contamination during storage and transportation after sterilization.

(3) Perform pressure steam sterilization as instructed in the manual for using the sterilizer.

The pressure steam sterilization parameters are as follows:

Sterilization process	Temperature	Minimum required time
Pulsation vacuum	132°C - 134°C	4min

⚠ WARNING

Risk of patient/medical staff injury

Improper or inadequate cleaning, disinfection, and sterilization may result in infection of the patient or medical staff or product damage.

- Clean, disinfect, and sterilize the product for the first use and before each use.
- Clean, disinfect and sterilize the product properly according to this manual.

VII. Warranty

If a user or unauthorized person repairs or modifies the product privately, the warranty of the Mindray becomes invalid. The product damage caused by improper use is not covered by the warranty.

VIII. Operating Environment

1. Temperature: 0°C - +35°C
2. Humidity: 30% - 85% RH, non-condensing
3. Atmospheric pressure: 70 kPa - 106 kPa

IX. Storage and Transportation Environment

1. Temperature: -20°C - +60°C
2. Humidity: 30% - 95% RH, non-condensing
3. Atmospheric pressure: 70 kPa - 106 kPa

Put clean and disinfected products in packages capable of isolating the products from bacteria, and store them in a dark, cool, and well-ventilated room.

X. Equipment Symbols

Symbol	Description
MD	Medical Device
	Manufacturer
	Date of manufacture
	TYPE CF APPLIED PART
LOT	Batch code
	Temperature limit
	Humidity limitation
	Atmospheric pressure limitation
CE	The product bears CE mark indicating its conformity with the provisions of the Council Directive 93/42/EEC concerning medical devices and fulfils the essential requirements of Annex I of this directive. Note: The product complies with the Council Directive 2011/65/EU.
	Refer to instruction manual/booklet
EC REP	Authorized representative in the European community
	Comply with the requirements of Directive 2012/19/EU Waste Electrical & Electronic Equipment

Company Contact

Manufacturer:	Shenzhen Mindray Bio-Medical Electronics Co., Ltd.
Address:	Mindray Building, Keji 12th Road South, High-tech Industrial Park, Nanshan, Shenzhen 518057, P.R.China
Website:	www.mindray.com
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Tel:	+86 755 81888998
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EC-Representative:	Shanghai International Holding Corp. GmbH (Europe)
Address:	Eiffestraβe 80, 20537 Hamburg, Germany
Tel:	0049-40-2513175
Fax:	0049-40-255726

mindray

LC0005S/LC0003S

导光束
使用说明书

Light Cable
Instructions for Use

046-020513-00(3.0)

声明

本说明书详细地介绍了产品的用途、功能和操作使用。使用本产品之前，请认真阅读并理解本说明书中的内容，以保证能够正确地使用本产品，并确保病人和操作者安全。在下列条件都满足的情况下，迈瑞公司将对产品的安全性、可靠性和性能负责：

(1) 按照《使用说明书》使用本产品。

(2) 非人为因素造成的产品损坏。人为因素是指不小心摔落、蓄意破坏等。

确实需要向迈瑞公司退货时，请联系迈瑞公司售后服务部，告知产品型号和系列号，并简述原因。若产品的系列号模糊不可辨认，退货请求将不予接受。

说明书编制日期：2021 年 5 月

重要信息

1. 购买本产品后，客户对产品的维护和管理负全部责任。
2. 即使在保修期内，对下列情况迈瑞将不负责保修：
   (1) 由于操作不当或故意损坏造成的损坏。
   (2) 由于不可抗力如火灾、地震、洪水、闪电等造成的损坏。
   (3) 不是从迈瑞公司或指定的分销商手中购买的迈瑞产品，如果发生损坏，将不予保修。
3. 禁止擅自对本产品做任何改动。
4. 非迈瑞公司指定人员对设备进行的重新改装、改动或维修造成的损坏，迈瑞将不负任何责任。
5. 产品报废处理前请联系迈瑞公司或其代理机构。未向迈瑞公司或其代理机构咨询而对产品进行处理，迈瑞公司不对其所产生的后果负责。
6. 本说明书对可以预见的危险做出了警告。但请在任何时间保持警惕以防出现其他危险。
7. 由于疏忽没有按照说明书中的指引而产生的问题，迈瑞公司将不对此负责。
8. 请妥善保管本说明书，以确保管理和操作人员可以随时查阅。

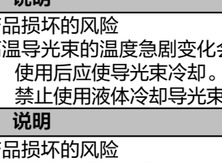
一、预期用途

导光束用于在内窥镜诊断和治疗中传输光线。医学领域中，它与医用内窥镜冷光源配套使用。

二、主要技术参数

型号	LC0005S	LC0003S
导光束长度	3000 mm ± 10%	
出射端光纤直径	Φ4.8 mm，允差 ±0.1mm	Φ3.5 mm，允差 ±0.1mm
最小可弯曲半径	50mm	

三、导光束结构



1. 导光束接头（光源侧）
2. 导光束光源适配套
3. 接头套管
4. 防折弯装置
5. 导光束接头（内窥镜侧）

四、安全注意事项

⚠ 警告

患者受伤的风险

- 将内窥镜插入患者体内之前，应始终正确连接内窥镜设备。
- 本产品仅可与迈瑞指定的内窥镜设备配合使用。

⚠ 小心

患者受伤的风险

光源会产生大量热量，导致内窥镜接头与先端部温度升高。可能会存在以下风险：

- ➢ 患者组织烫伤（例如，管腔较小的腔隙暴露在过强的照明下，或内镜先端部与组织距离过近）。
- ➢ 患者或用户皮肤烧伤。
- ➢ 手术器械燃烧或烧毁（例如，手术铺巾，塑料材料等）。

- 禁止将内窥镜设备放置在患者皮肤、可燃性材料或对温度敏感的材料上。
- 调节光源的输出功率，达到照亮目标区域所需的最低亮度。避免强光的过度暴露。

⚠ 小心

用户受伤的风险

在光源打开的情况下，直视导光束的内镜接头可能导致眼睛损伤。因此，光源打开的情况下，禁止直视导光束的内镜接口。

五、使用后拆卸

⚠ 小心

用户受伤的风险

导光束上的接头温度过高时，触摸接头可能会导致烫伤。

- 使用后应使导光束冷却。

说明

产品损坏的风险

高温导光束的温度急剧变化会损伤产品。

- 使用后应使导光束冷却。
- 禁止使用液体冷却导光束。

说明

产品损坏的风险

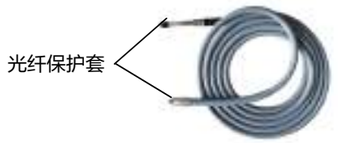
拉拽缆线会损坏产品。

- 从光源上拔下导光束时，应拉动接头的塑料外壳。

六、清洗、消毒和灭菌

请根据当地或医院关于医疗设备清洁消毒的规定定期对本产品进行清洁、消毒和灭菌。

本产品出厂时配送光纤保护套，如下图所示，清洁消毒及灭菌前请先取下保护套。



1. 清洁和消毒

(1) 断开导光束与光源、内窥镜等设备的连接。
(2) 使用一块软布蘸取适量的水除去导光束表面的残留物。
(3) 使用干净的软布蘸取适量乙醇（75%）擦拭导光束表面。
(4) 用干的软布擦去导光束表面的清洁剂，并将导光束置于通风阴凉的环境下风干。

2. 灭菌

推荐使用经验证过的灭菌方法：压力蒸汽灭菌。

压力蒸汽灭菌的装载方法，请参照相应灭菌器的操作说明。

步骤如下：

(1) 卸下导光束光源适配套。
(2) 将产品放置在灭菌盒中，并包裹两层无菌单，以防止灭菌后在存放、运输过程中染菌。
(3) 参照灭菌器的使用说明书执行压力蒸汽灭菌。

压力蒸汽灭菌器灭菌参数如下：

设备类别	温度	所需最短时间
预真空式	132ºC ~ 134ºC	4min

⚠ 警告

患者 / 医务人员受伤的风险

清洗、消毒和灭菌不当或不充分可能导致患者或医务人员感染和产品损坏。

- 首次及此后每次使用产品之前，应该进行清洗、消毒和灭菌。
- 按照本说明书，正确进行产品清洗、消毒和灭菌。

七、保修

如果用户或未经授权的人员私自维修或改造产品，则迈瑞公司的保修将失效。因使用不当导致的产品损坏不在保修范围之内。

八、工作环境

1. 温度：0ºC ~ +35ºC
2. 湿度：30% ~ 85% RH（无凝露）
3. 大气压：70 kPa ~ 106 kPa

九、存储和运输环境

1. 温度：-20ºC ~ +60ºC
2. 湿度：30% ~ 95% RH（无凝露）
3. 大气压：70 kPa ~ 106 kPa

将清洗和消毒处理后的产品置于能隔离细菌的包装中，存放在避光、阴冷、通风良好的室内。

十、符号

符号	说明
	注意！查阅随机文件
	生产日期
	CF 型应用部分
	批次代码
	温度极限
	湿度极限
	大气压力极限
	电子产品环保使用年限（20 年）

售后服务单位

单位名称：深圳迈瑞生物医疗电子股份有限公司
单位地址：深圳市南山区高新技术产业园区科技南十二路迈瑞大厦
邮政编码：518057
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24 小时服务热线：4007005652
电话：+86 755 81888998
传真：+86 755 26582680

mindray

HS-50F

50L High Flow Insufflator

Ultimate Experience
Intelligent Control

HS-50F

Main features

High Speed Insufflation

The HS-50F offers an increased maximum flow rate of 50L per minute. In addition, the display mode provides clear visualization of the pressure, flow rate and volume in real time for monitoring the status of the HS-50F.

Gas Heating Functions

Using a heated insufflator tube (optional) can maintain the output gas at approximately 37°C, reducing telescope fogging and minimizing the need for the surgeon to frequently wipe the telescope.

100 times autoclavable, outer diameter-12mm, inner diameter-8mm

Multi-modes available

The equipment provides the following operating mode:

Operating mode	Description	Pressure(mmHg)	Flow(L/min)
High Flow	Designed for laparoscopies performed on normal weight adult patients.	1 - 30	1 - 45
Pediatric	Designed for laparoscopies performed on children.	1 - 15	0.1 - 20
Bariatric	Designed for laparoscopies performed on obese adult patients.	1 - 30	1 - 50
RetroPeritonenum	Designed for laparoscopies performed in retroperitoneum.	1 - 30	1 - 20
Custom	You can customize the operating mode as necessary.	1 - 30	0.1 - 50

Automatic Smoke Evacuation

If there is too much smoke in the abdominal cavity during the surgery, the foot switch can be treaded to exhaust smoke quickly to ensure a clear surgical field.

User-friendly design

HS-50F features 7-inch touch screen with a user-friendly interface, and it provides audible and visible alarm messages to promptly alert the surgeon of high pressure situations and etc., thereby ensuring the safety of the surgery.

With the Auto Leakage Compensation function, if there is a gas leakage, the machine automatically replenishes the gas to maintain stable abdominal pressure.

Specifications

Dimension	Length (front to back): 380 mm Width (left to right): 350 mm Height (top to bottom): 141 mm (excluding the rubber feet)
Weight	10 kg
Mechanical noise	≤ 50dBA
Gas source	Gas supply with gas cylinder / Central gas supply / Connection using reducing valve
Pressure range	0.4-16 Mpa
Gas type	CO_2
Gas flow	Max 50 L/min
Input voltage	AC 100 -240V~
Rated frequency	50/60 Hz
Maximum current	0.75A-0.35A
Fuse	T3.15AH250V

www.mindray.com

P/N:ENG-HS-50F-210285X2P-20240723

mindray
healthcare within reach

HS-50F, HS-50V, HS-50H, HS-50S, HS-30S

Insufflator

Operator's Manual

CE 0123

■ Release time: 2021-5

■ Revision: 5.0

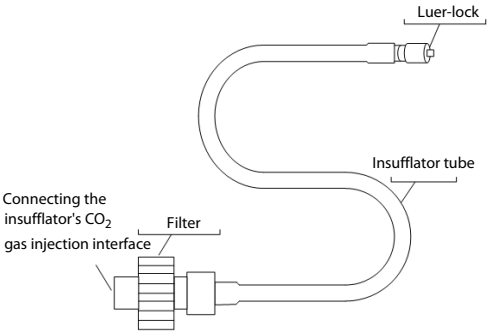


Figure 4-7 Installed insufflator pipe fitting (using filter)

3. Connect the installed pipe fitting to the CO_2 gas injection joint of the product. Guarantee that the interface is well inserted. As shown in Figure 4-8.

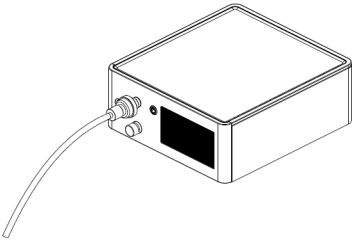


Figure 4-8 The insufflator pipe fitting connects with the insufflator (using filter)

WARNING

- **The Luer-lock can only be used to connect the pipe fitting. Never use the Luer-lock to connect other accessories.**

4.1.6.2 Connecting the Heating Insufflator Tube (only for HS-50F/HS-50H models)

1. Connect the sterilized pipe fitting to the sterilized Luer-lock. As shown in Figure 4-6.
2. Please install the filter between the insufflator tube and the insufflator's CO_2 gas injection interface. As shown in Figure 4-9.

3. Connect the installed pipe fitting to the CO_2 gas injection joint of the product. Guarantee that the interface is well inserted.
4. Connect the heating joint to the insufflator tube heating joint on the front panel of the product.

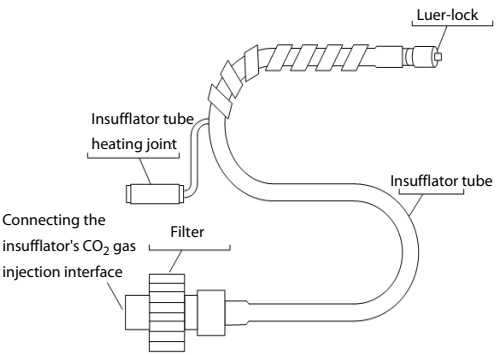


Figure 4-9 Installed heating insufflator pipe fitting (using filter)

4.1.7 Connecting the Suction Tube (only for HS-50F/HS-50V models)

1. Connect the Luer-lock, transparent hose, adapter tube, and slime tube. As shown in Figure 4-10.

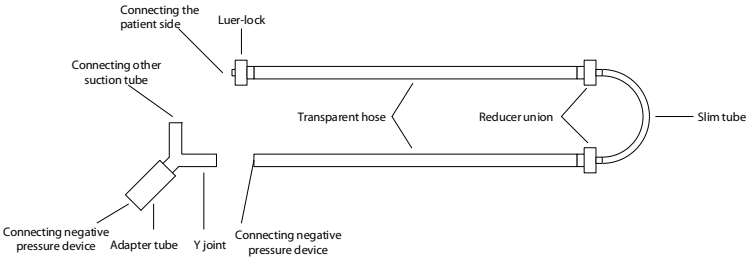


Figure 4-10 Installation of the suction pipe fitting

2. Connect the Luer-lock of the sterilized suction tube to the joint of the perforator near the part where smog generates.
3. Clip the slim tube into the groove of the smog exhaust control valve on the insufflator's front panel. To prevent the pipe fitting from collapsing, clip the middle of the Φ5 slim tube into the pinch valve and avoid twisting the suction tube. As shown in Figure 4-11.

4. Install the transparent hose into the suction bottle of the suction device. To connect multiple suction tubes in a negative-pressure suction device, connect the transparent hose and adapter tube to the Y joint as shown in Figure 4-10. (The adapter tube should be connected to the straight end of the Y joint.) In this way, the adapter tube can be connected to the negative-pressure suction device, and the other end of the Y joint can be connected to other suction tubes. See Figure 4-10.

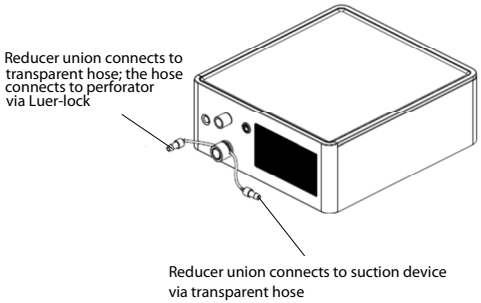


Figure 4-11 Connection diagram of the suction tube

NOTE

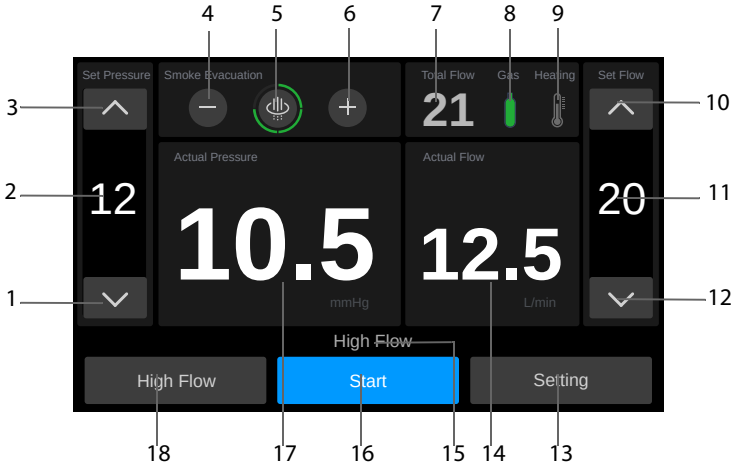
- **It is suggested to adjust the pressure range of the suction device within 0.04MPa-0.06Mpa. If the negative pressure is too high, the exhaust will be too fast to maintain the abdominal pressure; if the negative pressure is too low, the exhaust will be too slow.**

5. The installed insufflator system with smog exhaust function is as shown in Figure 4-12.

4.2 Use

4.2.1 Using the Touchscreen

The insufflator is configured with a touchscreen on which you can operate and set the equipment. Below is an introduction of content displayed on the touchscreen:



(1)	Decrease CO_2 pressure
(2)	CO_2 pressure setting
(3)	Increase CO_2 pressure
(4)	Decrease smog exhausting rate
(5)	Smog exhausting indicator
(6)	Increase smog exhausting rate
(7)	Total CO_2 exhaust (press to clear the value)
(8)	Gas source indicator
(9)	Heating indicator
(10)	Increase CO_2 flow
(11)	CO_2 flow setting
(12)	Decrease CO_2 flow

(13)	Enters the **Setup** menu
(14)	Actual CO_2 flow
(15)	Message area
(16)	Start/stop insufflation
(17)	Actual CO_2 pressure
(18)	Current work mode (press to select the work mode)

4.2.2 Operating Modes

The equipment provides the following operating mode:

Operating mode	Description
High Flow	Designed for laparoscopies performed on normal weight adult patients.
Pediatric	Designed for laparoscopies performed on children.
Bariatric	Designed for laparoscopies performed on obese adult patients.
RetroPeritonenum	Designed for laparoscopies performed in retroperitoneum.
Custom	You can customize the operating mode as necessary.

4.2.3 Use in Surgery

After startup self-inspection and inspection process pass, the insufflator can be put to use.

1. Based on the type of the targeted patient, choose required pneumoperitoneum mode.
2. Adjust and set the flow and pressure. Each mode has its default upper limit and lower limit for flow and pressure, and adjustment cannot be made when it reaches the limits.
3. Tap the **[Start]** button and the insufflator starts to inflate; if you choose veress needle for first inflation, remember to take down the needle before starting the surgery officially, to avoid insufficient inflation during surgery to maintain pneumoperitoneum.
4. If there is too much smog in the abdominal cavity, the foot switch can be treaded to exhaust smog; if smog exhaust is not needed, get off the switch in time. Do not tread the switch for a long time.

Symptom	Possible cause	Solution
Prompt tone of insufficient gas supply rings continuously	Valve of the gas cylinder is closed.	Open the gas cylinder valve.
	Remaining gas in the gas cylinder is not enough.	Replace a new gas cylinder.
	The filter at the gas inlet is blocked.	Replace the filter at the gas inlet.
	The high pressure tube or medical gas pipeline hose is not connected.	Correctly connect the high pressure tube or medical gas pipeline hose.
	The pressure of CO_2 central gas source is too low.	Restore the CO_2 central gas supply.
Self-inspection failure	The internal system of the insufflator is faulty, and the screen prompts nothing listed above.	Turn off the insufflator and open it again. If prompt tone rings continuously, please contact Mindray.
LCD screen prompts gas temperature exceeds standard	The heating insufflator tube is faulty.	Disconnect the heating port of the heating insufflator tube immediately. And discard this heating insufflator tube after surgery.
LCD screen prompts other faults	Peripheral equipment is not connected properly, or there is fault inside the insufflator.	Resolve the faults according to the LCD screen prompts. If the issue can't be solved, turn off the insufflator and open it again. If prompt shows up continuously, please contact Mindray.

6.2 Common Prompts and Their Triggering Conditions

"Audio prompt" in the table below indicates times the buzzer rings;

"Text prompt" indicates text information shown on the display screen.

Text prompt	Triggering condition	Audio prompt
OverPressure	Pressure exceeds the set value, 5mmHg.	Yes
Gas Supply ?	Cylinder supply mode: Pressure is lower than 1Mpa. Central gas supply: Pressure is lower than 0.1Mpa.	Yes

Text prompt	Triggering condition	Audio prompt
Occlusion	The insufflator tube is bended, or the valve of veress needle or perforator is closed.	Yes
Over Temperature	Temperature of the sensor for the heating insufflator tube exceeds 40°C.	Yes
Contamination	Liquid enters the device from the inflation port.	Yes
Overpressure Relief	Pressure exceeds the set value, 5mmHg.	Yes

6.3 Return for Repair of the Insufflator

NOTE

- **For human injury and device damage caused by non Mindray or Mindray-authorized maintenance staff's trying to repair, Mindray bears no responsibility.**

Before the device is returned for repair, please contact Mindray. When returning for repair, attach instructions regarding device faults or damage and the warranty card.

7 Accessories

WARNING

- **Use accessories specified in this chapter. Using other accessories may cause damage to the device or not meet the claimed specifications.**
- **Single use accessories are not designed to be reused. Reuse may cause a risk of contamination and affect the measurement accuracy.**

CAUTION

- **The accessories may not meet the performance specifications if stored or used outside the specified temperature and humidity ranges. If accessory performance is degraded due to aging or environmental conditions, contact your service personnel.**
- **Check the accessories and their packages for any sign of damage. Do not use them if any damage is detected.**
- **Use the accessories before the expiry date if their expiry date is indicated.**

Part No.	Description
0020-20-12524	Power cord (EU, 2.5 m)
0020-20-12522	Power cord (International, 250 V, 10 A, 2.5 m)
0020-20-12523	Power cord (US, 110 V, 13 A, 2.5 m)
009-000567-00	Power cord (US, 110 V, 13 A, 2.5 m)
009-001075-00	Power cord (Brazil, 250 V, 10 A, 3 m)
DA8K-10-14453	Power cord (UK)
0000-10-10903	Power cord (India, 1.8 m)
009-001791-00	Power cord (South Africa, 250 V, 16 A, 3 m)
009-004940-00	Power cord (Australia)
009-008233-00	Serial port cable
1000-21-00122	Grounding cable

Part No.	Description
M07-00130F---	FUSE Time-lag 250V 3.15AD5X20
040-003541-01	Heating insufflator tube
115-050308-00	Reusable insufflator tube
115-050309-00	Reusable suction tube
082-002806-00	Central gas supply pipe (German)
082-002807-00	Central gas supply pipe (DISS)
082-002808-00	Central gas supply pipe (Japan)
040-001571-00	Disposable bacterial filter, large size
082-002970-00	Reducing valve filter kit, 5um
095-003190-00	Wrench
009-008492-02	Foot switch
009-011909-00	Foot switch extension cord
040-004013-00	Reusable connector, straight, 22-10
082-003735-00	CO_2 hight pressure tube (CGA320)
082-003736-00	CO_2 hight pressure tube (DIN477)
082-003737-00	CO_2 hight pressure tube (YORK940)
082-003738-00	CO_2 hight pressure tube (ISO5145)
082-003784-00	CO_2 hight pressure tube (BS341)
082-003739-00	Pressure regulator, 452C-150 (CGA320)
082-003740-00	Pressure regulator, 452C-150 (DIN477)
082-003742-00	Pressure regulator, 452C-150 (YORK940)
082-003743-00	Pressure regulator, 452C-150 (ISO5145)
082-003785-00	Pressure regulator, 452C-150 (BS341)
082-003734-00	CO_2 low pressure tube (DISS)

捷锐企业（上海）有限公司

JL-07-243
版次：A/2

产品规格书

产品规格型号明细					
产品名称	胶管组件	**型号**	34I-C02-GS/7/16-8	**商标**	**GENTEC**
品号	216466030	**客户物料编码**	082-002806-00	**版本**	A1
客户名称	深圳迈瑞生物医疗电子股份有限公司				

技术参数			
产品标准	ISO 5359	**适用气体**	C02
接头一	德式接头	**接头标准**	DIN 13260
接头二	7/16 UNF	**接头标准**	/
胶管长度	8±0.1m	**耐压**	200psi
胶管外径	Φ13.8±0.2mm	**胶管内径**	Φ8±0.2mm
工作条件	温度-10℃~40℃，湿度 15~95%	**储存环境**	温度-20℃~60℃，湿度 10~95%
工作寿命	10 年	**包装**	密封包装
外观	金属无明显脏污、生锈、碰伤、划伤等现象，注塑件无裂纹、缺损		

产品照片

审批 / 日期	缪立峰 2025/02/11	制表 / 日期	周金佳 2025/02/11

以下由客户填写：

☐同意执行
☐不同意执行，原因：

签名：

HP100G/

HP200G/HP200L/HP200D

Fluid Management System

Operator's Manual

CE 1639

■ Release time: 2023-8

■ Revision: 3.0

2.7 Applied Part

The applied part of the system is the endoscope that connect with the system.

2.8 Function Differences Among Models

Models	Hysteroscopic Modes	Laparoscopic Modes	Roller Quantity
HP100G	√	×	1
HP200G	√	×	2
HP200L	×	√	2
HP200D	√	√	2

NOTE

- **"√" indicates "configured" while "x" indicates "not configured".**

2.9 System Components

This product consists of a main unit and power cords. A reusable irrigation tubing set, a reusable suction tubing set, and a foot switch are provided as well.

2.9.1 Front View of the Main Unit

■ The front view of HP100G is as follows:

(1) Touchscreen: displays equipment status and changes settings.

10 Accessories

The accessories listed in this chapter comply with the requirements of IEC 60601-1-2 when in use with the system.

WARNING

- **Use accessories specified by Mindray. Using other accessories may cause damage to the system or failure to meet the claimed specifications.**
- **The accessories listed below must be used with this system. The operator shall read this manual and the instructions for use of the accessories or contact Mindray to check the compatibility between the system and the accessories. Or patient injury might result.**

CAUTION

- **The accessories may not meet the performance specifications if stored or used outside the specified temperature and humidity ranges. If the performance of the accessories is degraded due to aging or environmental conditions, contact your service personnel.**
- **Check if the accessories and their packages are intact. Do not use them if any damage is detected.**
- **Use the accessories before the expiry date.**

Model	Description
FS200	Two-Pedal Footswitch-HyPump
IR100R	Reusable irrigation tubing set
SU100R	Reusable suction tubing set
TP100	Trolley for Fluid Management System

Data interfaces	USB connector: 1, USB 2.0 protocol. Fixed time synchronization pulse specified by the USB protocol
	Network connector: 1, standard RJ45 interface, supporting wired network 10/100Mbps, and complied with technical standard IEEE802.3. TCP/IP protocol Calibration protocol of TCP/IP The intended information flow is from the equipment to the server in the client site.
	CAN connector: 2, PS/2 interfaces, complied with CAN 2.0 standards.
Other interfaces	Foot switch connector (optional): 1, used for transmitting analog signal from Mindray specified foot switch, complied with Mindray internal standard
Signal output	Alarm tune volume: 45 dBA - 65 dBA (within 1m away from the main unit)

A.6 Product Performance

Irrigation flow rate in the hysteroscopic modes (for HP100G/HP200G/HP200D)	Adjustment range: ≥ 0 - 500 mL/min Adjustment step: ≥ 10 mL/min
Suction flow rate in the hysteroscopic modes (for HP100G/HP200G/HP200D)	Adjustment range: ≥ 0 - 200 mL/min Adjustment step: ≥ 10 mL/min
Irrigation/Suction flow rate in the laparoscopic modes (for/HP200L/HP200D)	Adjustment range: ≥ 100 - 1300 mL/min Adjustment step: ≥ 100 mL/min
Flow rate accuracy	Flow rate tolerance: ± 10% when flow rate ≥ 100 mL/min; ± 10 mL/min when flow rate < 100 mL/min
Pressure limit in the hysteroscopic modes	Adjustment range: ≥ 0 - 200 mmHg Adjustment step: 1,2,5, or 10 mmHg
Accuracy of preset pressure limit	Pressure limit tolerance: ± 5% when pressure limit ≥ 50mmHg; ± 2.5 mmHg when pressure limit < 50 mmHg

SONY

LMD-XH550MT

55-inch 4K 3D/2D LCD medical monitor

Label : specifications

Picture Performance	
Panel	TFT Active Matrix LCD
Picture Size (Diagonal)	1387.8 mm (54 3/4 inches)
Effective Picture Size (H x V)	1209.6 x 680.4mm (47 5/8 x 26 7/8 inches)
Pixel pitch	0.315 x 0.315 mm (0.0124 x 0.0124 inches)
Resolution (H x V)	3,840 x 2,160 pixels
Aspect	16:9
Pixel Efficiency	99.99%
Backlight	LED
Panel Technology	LCD with IPS
Luminance (Panel Specification)	550cd/m2 (Typical) 1500cd/m2 (Typical, Peak)

Contrast Ratio	1,000,000:1 (typical)
Colors	10 bit colors (1,073,741,824)
Panel Frame Rate	50/60 Hz
Viewing Angle (Panel Specification)	89°/89°/89°/89° (up/down/left/right contrast > 10:1)
Vertical Viewing Angle (3D Mode)	37°at a viewing distance more than 1,000mm, crosstalk ratio less than 7% (Typical)
Gamma	1.8, 2.0, 2.2, 2.4, 2.6, DICOM, Highlight, HLG

Input	
HDMI Input	HDMI connector (x1), HDCP 2.3 correspondence
DVI-D Input	DVI-D (x1) (TMDS single link, HDCP 1.4 correspondence)
SDI Input	BNC (x2) 12G/3G/HD-SDI BNC (x1) 3G/HD/SD-SDI
Display Port	Display Port (x1) (SST HDCP 1.3 correspondence)
	D-sub 9-pin (RS-232C) (x1), RJ-45

Serial Remote (LAN)	(x1) (Ethernet, 10BASE-T/100BASE-TX)
Remote	Stereo mini jack (x1)
AC input	AC input connector (x1) AC 100-240 V, 50/60 Hz
DC Input	-

Output

SDI Output	BNC (x2) 12G/3G/HD-SDI BNC (x1) 3G/HD/SD-SDI
CLONE Output	BNC (x1), 12G/3G-SDI
DC 5 V / 12 V Output	5 V Output (x1) 2.0 A max 12 V Output (x1) 2.5 A max

General

Power Requirements	AC IN: 100 V - 240 V, 50/60 Hz, 3.1 A - 1.1 A
Power Consumption	Approx. 290 W (max.)
Operating Temperature	0°C to 40°C (32°F to 104°F)
Operating Humidity	30% to 85% (no condensation)

Storage/Transport Temperature	-20°C to +60°C (-4°F to +140°F)
Storage/Transport Humidity	20% to 90%
Operating/Storage/Transport Pressure	700 hPa to 1060 hPa
Dimensions (W x H x D)	1249.6 x 763.3 x 92.8 mm (49 1/4 x 30 1/8 x 3 3/4 inches)
Mass	Approx. 27 kg (Approx. 59 lb 8.4 oz)
Mounting pattern (W x H)	200 x 200 mm 400 x 200 mm
IP Code	IP45 (front)/IP32 (others)

Supplied Accessories

AC power cord (1)
Plug holder for the supplied AC power cord (2)
Before Using This Unit (1)
CD-ROM (including the Instructions for Use) (1)
Service Contact List (1)
M6 x 12 mm Screw (4)
3D Eye Shield Kit: CFV-E30SK (1)

Instructions for Use of the 3D Eye Shield Kit (1)

Optional Accessories

3D Eye Shield Kit: CFV-E30SK
2D Eye Shield Kit: CFV-E20SK
3D Eye Shield: CFV-E30D
2D Eye Shield: CFV-E20D
Shield Cover: CFV-50SC
Shield Frame: CFV-B100
Foot Switch FS-24

Related products

LMD-XH320MT

32-inch 4K 3D/2D LCD medical monitor

LMD-XH550MD

55-inch 4K 2D surgical monitor

HVO-4000MT

4K 2D/3D medical recorder

MCC-1000MD

Two-piece Full HD surgical video camera

Gallery






TV-300/TV-300T(220V)/TV-300T(110V)/

TV-500/TV-500T(220V)/TV-500T(110V)

Mobile Trolley

Operator's Manual

■ Release time: 2023-5

■ Revision: 1.0

2 Product Introduction

2.1 Intended Purpose

This product is used to carry endoscopic surgical devices, including monitor, endoscope camera system, light source, insufflator, hysteroscopy pump, video recorder, ultrasonic surgical & electrosurgical energy platform, light cable, footswitch, and cables. Except TV300, the mobile trolley can turn on or off mounted devices by pressing the power switch on the trolley.

2.2 Differences Among Models

Model	Applicable Monitor	110V Isolation Transformer	220V Isolation Transformer	Power Switch On the Trolley
TV-300	32-inch	×	×	×
TV-300T(200V)	32-inch	×	√	√
TV-300T(110V)	32-inch	√	×	√
TV-500	32-inch/55-inch	×	×	√
TV-500T(200V)	32-inch/55-inch	×	√	√
TV-500T(110V)	32-inch/55-inch	√	×	√
Note: The shelf materials of the TV -300 series are different from that of the TV-500 series.				

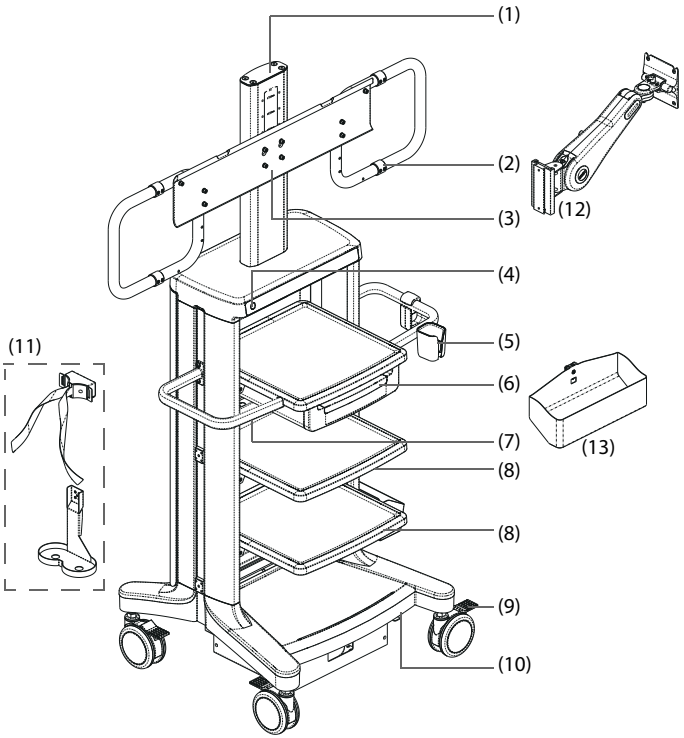
NOTE

- **√ indicates "configured" while × indicates "not configured".**

2.3 System Components

This product consists of shelves, open storage space, closed storage space, cable management box, handles, columns, castors, base plate, etc. Monitor arm, CO2 holder assembly, keyboard tray, and footswitch holder are also available for this product.

2.3.1 Front View of the Mobile Trolley



(1) Monitor column: supports a monitor stand. For details about the monitor stands of different sizes for different models, refer to ***3.5 Fixing Position of the Monitor Stand***.

(2) Monitor stand handle: hold to adjust the monitor position, available only for 55-inch monitor stands.

(3) Monitor stand: secures a monitor screen.

(4) Power switch: press to turn on/off all powered medical devices on the trolley.

- Orange: AC power is properly connected to the trolley with isolation transformer, but the power switch is off.
- Green: AC power is properly connected, and the power switch is on.

(5) Camera head holder: holds camera head.

(6) Drawer: stores accessories, including keyboard tray (optional).

(7) Drawer handle: hold to move the trolley.

(8) Shelves: used to place main units, such as insufflator and light source.

(9) Castor brake: apply the castor brake to lock or unlock the castors.

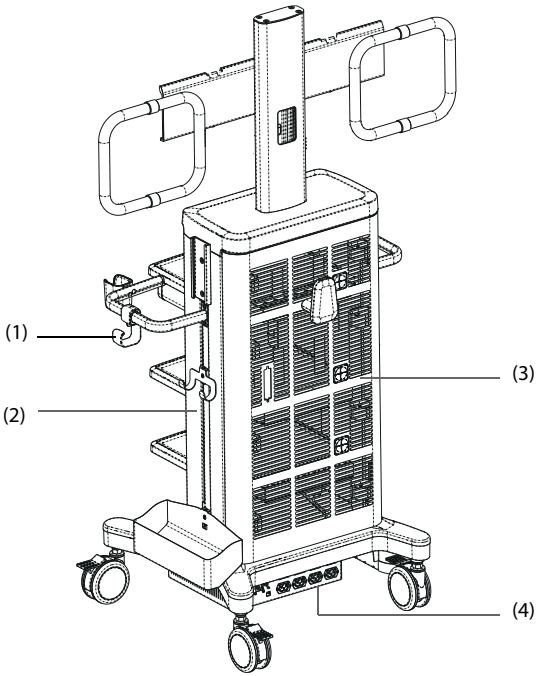
(10) Base plate: an isolation transformer (if configured) is installed under the base plate.

(11) CO2 holder assembly (optional): holds CO2 cylinders, and includes a cylinder strap rack and a cylinder holder.

(12) Monitor arm (optional): secures a side-screen monitor.

(13) Footswitch holder: stores footswitches.

2.3.2 Back View of the Mobile Trolley



(1) Hook: holds light cables and other cables.

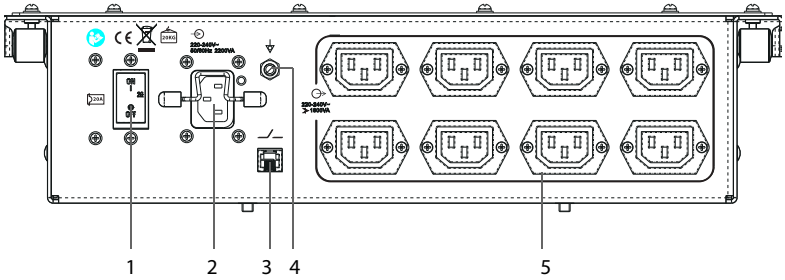
(2) Trolley column: accessories such as the monitor arm and footswitch holder are secured on the slide rail of the trolley column.

(3) Rear door: lock it when moving the trolley.

(4) Isolation transformer: if the trolley is equipped with an isolation transformer, you can connect the power connectors of the mounted devices to the output power sockets of the isolation transformer.

2.3.3 Back View of the Isolation Transformer

Taking TV-300T(220V)/ TV-500T(220V) as an example, the back view of the isolation transformer is as follows:



(1) Circuit breaker: used to protect the circuit. It is turned on in normal status.

(2) Input power socket: connects the AC Mains.

(3) RJ11 connector: used to supply power to the power switch of the trolley.

(4) Equipotential grounding terminal: when using the isolation transformer together with other devices on the trolley, connect their equipotential grounding terminals together to eliminate potential difference.

(5) Output power socket: connects the devices on the trolley.

WARNING

- **Stop using the equipment if you find that the equipment housing has signs of broken. Contact the service personnel for help in that case.**

4.4 Using the Mobile Trolley

You can use the trolley to convey or transport devices. Take proper measures to prevent all devices on the trolley from moving, tipping, or falling. For example, you can use accessories such as straps to secure a device.

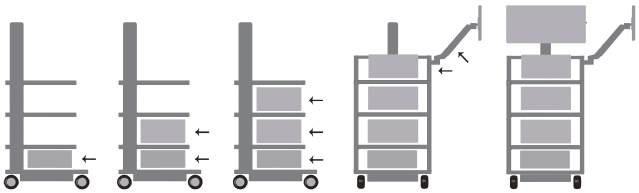
CAUTION

- **Load and install devices onto the trolley only after they are powered off.**

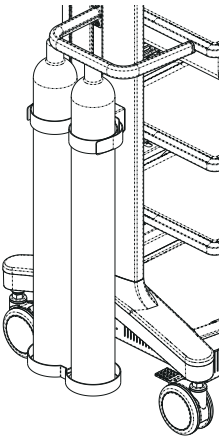
4.4.1 Loading Devices onto the Trolley

To load devices onto the trolley, follow the procedure below:

1. Place the trolley on a flat surface and lock all castors.
2. Load the trolley from bottom to top. For the load capacity of its each part, refer to ***A.4 Physical Specifications***.
3. Mount the monitor arm and monitors. The following figure shows the loading sequence:



4. If a CO2 holder assembly is equipped, place the cylinders on the cylinder holder and fasten the straps, as shown in the following figure:



The optional CO2 holder assembly can support 2 E-size cylinders of 865 mm height and 102 mm diameter.

It is recommended that heavy components be loaded onto the trolley by 2 people. Note that the gravity center of the system will vary with the load weight on the trolley.

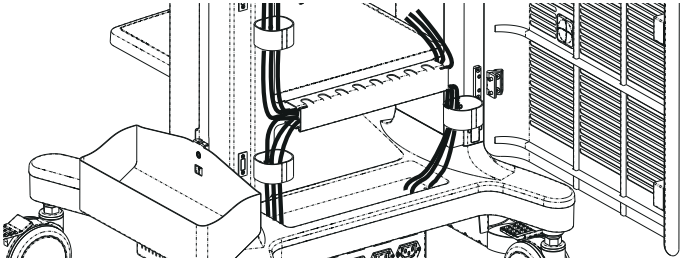
WARNING

- **Do not install or use the monitor arm and monitors on an empty trolley. Otherwise, the trolley may lose stability and fall over, causing equipment damage or injury to personnel.**
- **Before using the medical devices on the trolley for medical purposes, check their electromagnetic compatibility.**

4.4.2 Routing Device Cables

To route cables of the devices on the trolley, follow the procedure below:

1. Place the trolley on a flat surface and lock all castors.
2. Open the rear door.
3. Connect cables of the mounted devices. Route the cables through the cable management box on the rear side of shelves, and secure the cables using cable ties on the trolley column, as shown in the following example:



4. Connect the mounted devices to the AC mains. For detailed operation, refer to ***4.4.3 Connecting the Equipotential Line***.
5. Lock the rear door.

Pay attention to the following items when routing cables:

- The cable must be long enough to avoid cable damage or device failure when the trolley moves.
- When rotating the monitor arm, avoid contacting other connected cables.
- Do not pull or drag sagging cables.
- When adding or removing cables, avoid contacting other connected cables to avoid accidental power interruption.

4.4.3 Connecting the Equipotential Line

An equipotential terminal is used to balance the electric potential of the protective grounding between the electrical equipment in the system. If an isolation transformer is used in the system, connect the equipotential line to each equipotential terminal of the mounted devices and the isolation transformer, or an electrical shock will occur.

WARNING

- **When connecting or disconnecting the equipotential line, turn off the equipment power supply. Or an electrical shock will occur.**

4.4.4 Connecting the AC Mains

The electrical devices on the trolley are powered by AC power supply. Before connecting the devices to the AC mains, check that the voltage and frequency ratings of the power lines are the same as those indicated beside the AC power input of the devices.

For TV300 and TV500 trolleys, to connect the AC mains, follow the procedure below:

1. Place the trolley on a flat surface and lock all castors.

UP700/UP700B/UP700C/UP700D

Ultrasonic Surgical & Electrosurgical Energy Platform

Operator's Manual

CE 1639

- Release time: 2024-4
- Revision: 6.0
- Software Version: 02.xx.xx.xx

2 Product Introduction

2.1 Intended Purpose

Ultrasonic Surgical & Electrosurgical Energy Platform supplies energy to the ultrasonic surgical Instrument and electrosurgical instruments.

NOTE

- **According to the conclusion of residual risks evaluation, for the intended patients, these are several residual risk: perforation, bun injury, thermal injury; for the users, the safety information which used as risk control measures have been included in the manual. So, residual risk associated with using the medical device should be disclosed in the manual.**

2.1.1 Indication for Use

Ultrasonic Surgical & Electrosurgical Energy Platform provides radio frequency power to drive electrosurgical instruments that are used during open or laparoscopic surgery to cut and seal vessels and to cut, and dissect tissues. In addition, the generator provides power to drive ultrasonic surgical instruments that are indicated for soft tissue incisions when bleeding control and minimal thermal injury are desired.

Electrosurgical and ultrasonic surgical instruments, when used with the Generator, have not been shown to be effective for sterilization procedures or tubal coagulation. Do not use these instruments for these procedures.

2.1.2 Intended Patient Populations

In electrosurgery mode, it can be applicable for adults, pediatric patients and neonates. In ultrasonic mode, it can be applicable for adults. The attending physician must decide whether the foreseen application is admissible based on the general condition of the patient.

2.1.3 Intended Users

This equipment is for use only by qualified medical personnel trained in the use of ultrasonic surgery or electrosurgery. Inappropriate use of the equipment by untrained medical personnel may result in hazardous electrical output.

2.1.4 Intended Medical Conditions

The Ultrasonic Surgical & Electrosurgical Energy Platform is used in medical institutions.

2.1.5 Contraindications

For the surgical treatment, the responsible physician of radio frequency or ultrasonic surgery must decide whether the prescribed application is admissible based on the general condition of the patient.

The instruments are not indicated for incising bone.

The instruments are not indicated for tubal coagulation.

2.2 Clinical Benefits

Compared with traditional surgical instruments, the product can reduce operation time and bleeding in clinical use.

2.3 Applied Part

The applied parts of the system are as follows:

- HF instruments
- Return electrode
- Jaws and shaft sleeve of the ultrasonic surgical instrument
- HF instrument cords and plugs
- HF instrument sockets on the generator and patient circuit

2.4 Function Differences Among Models

Generator Model		Activation Count			Monopolar Mode
		Ultrasonic Mode	Monopolar Mode	Bipolar Mode	
UP700 series	UP700	★	★	★	★
	UP700B	☆	★	★	★
	UP700C	★	☆	★	★
	UP700D	★	★	☆	★

NOTE

- **★ indicates "configured" while ☆ indicates "not configured".**

2.5 System Components

The system consists of the following components:

- A generator

■ A transducer (optional)

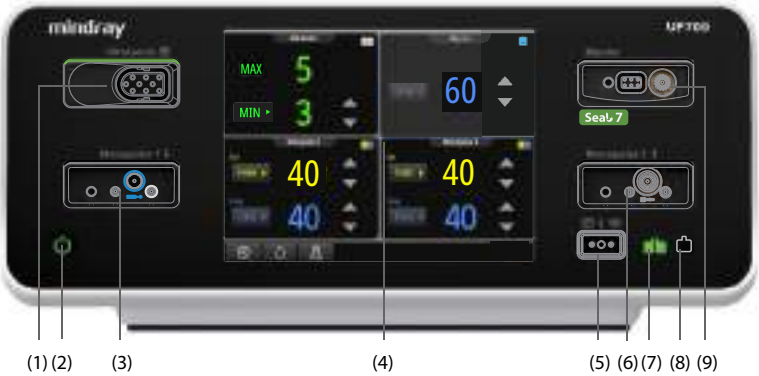
NOTE

- **Your product may not contain all of these components. For details about the availability of components, contact Mindray.**

2.5.1 UP700 Series Generator

UP700 series generator supplies electrical energy for ultrasonic assembly and bipolar instruments.

2.5.1.1 Front View of the Generator



(1) Ultrasonic socket (applied part): connects a transducer.

(2) Power switch: turns on or off the generator.

(3) Monopolar socket 1 (applied part): connects a monopolar instrument.

(4) Touchscreen: displays equipment status and changes settings.

(5) Return electrode socket: connects a return electrode.

(6) Monopolar socket 2 (applied part): connects a monopolar instrument.

(7) Split return electrode indicator: indicates the connection status of the split return electrode. When the indicator is green, the split return electrode is properly connected.

(8) Non-split return electrode indicator: indicates the connection status of the non-split return electrode. When the indicator is green, the non-split return electrode is properly connected.

(9) Bipolar socket (applied part): connects a bipolar instrument.

2.7 Audio Indicators of the Generator

Audio Indicator	Volume	Remarks
Activation tone for coagulation mode of HF instrument	Lowest volume ≥ 45 dB(A) Highest volume ≥ 65 dB(A) (1m away from the rear of the generator)	The tone persists throughout the duration of activation.
Activation tone for cutting mode of HF instrument		
Activation tone for ultrasonic assembly		
Activation tone for electrode surgical instrument for Seal 7	≥ 45 dB(A) (1m away from the generator)	The tone persists throughout the duration of activation.
Coagulation success tone for electrode surgical instrument for Seal 7		/
Coagulation failure tone for electrode surgical instrument for Seal 7		
Information signals	Not higher than that of the system alarm of low priority	Simultaneously play the following tones: 365Hz±5%, 730Hz±5%, 1095Hz±5%, 1460Hz±5%, 1825Hz±5% Last for 165 ms±5%
System alarm tone	≥ 45 dB(A) (1m away from the generator)	This audio indicator complies with IEC 60601-1-8.
Return electrode alarm tone	≥ 65 dB(A) (1m away from the rear of the generator)	This audio indicator complies with IEC 60601-2-2 and IEC 60601-1-8.

CAUTION

- **The alarm tone is different from the prompt tone.**
- **Make sure that the volume of alarm tones and activation tones are adjusted to a level that can be clearly heard by the surgical team. For detailed setting methods, refer to *4.11 Setting Volume*.**

- Surface of the equipment and peripheral devices have no signs of distortion, damage, or contamination.
- The coating of the blade is not peeled or damaged.
- The parts of surgical instruments that will be put inside the patient have no rough surface, sharp edges, or protrusions.
- No tissue residues are on the surgical instruments. All cords are intact and well routed.
- Connectors or plugs are not loose, distorted, damaged, contaminated, or blocked.
- All instruments and adapters are correctly connected and metal parts on connectors are not exposed
- No irrelevant objects are on top of the equipment and the ventilation outlet is not covered by dust or other objects
- No obstacles are in the movement range of the system or near the ventilation outlet.

CAUTION

- **If using instruments not specified by Mindray, check its compatibility and especially insulation performance. Make sure that the output voltage of the generator does not exceed the rated voltage of the instruments.**

4.4 Starting the System

Press the power switch on the front panel to turn on the generator. After startup, the power indicator changes from orange to green.

4.5 Check Before Operation

It is required to check and ensure that the system works properly. After turning on the system, check the following items:

- During startup, a normal startup tone is heard.
- The system self check passes and no alarm is generated.
- After startup, the indicator lights and the color is correct.
- The touchscreen displays correctly.
- The system does not emit abnormal noise, smell or excessive heat.
- Put a hand near the ventilation outlet and check that there is air flowing out.

- Select **MIN** to set the MIN mode. Adjust the power level by pressing the Power Level Increase button ▲ or the Power Level Decrease button ▼.
- Select **EVS** to enable the EVS function, which uses advanced algorithms to adjust the power level in real time. You cannot manually adjust the power level. To turn off the function switch, refer to *4.7.4.2 Setting Advanced Features*.

3. Activate the MAX or MIN mode or the EVS function by pressing the buttons on the ultrasonic surgical instrument or using the footswitch. You can set the activation method by referring to *4.7.4.1 Setting Activation Type*.

4.7.4 Function Settings for Ultrasonic Assembly

On the touchscreen of the generator, you can set the activation type and advanced features, as well as perform the transducer test.

4.7.4.1 Setting Activation Type

To set the activation type for the ultrasonic assembly, follow the procedure below:

1. Select the Setup button ⚙ to display the setup menu.
2. Select **Ultrasonic**.
3. Set **Activation Type**.

4.7.4.2 Setting Advanced Features

To set the advanced features for the ultrasonic assembly, follow the procedure below:

1. Select the Setup button ⚙ to display the setup menu.
2. Select **Ultrasonic** → **Advanced Features**.
3. Switch on or switch off **STS(Smart Tissue Sensing)**.
4. Switch on or switch off **EVS(Enhanced Vessel Sealing)**.
5. Switch on or switch off **Activation Tone Change**.

4.7.4.3 Performing Transducer Test

You can perform the transducer test to check the transducer function. To perform the transducer test, follow the procedure below:

1. Select the Setup button ⚙ to display the setup menu.
2. Select **Ultrasonic** → **Transducer Test**.
3. Select **Test**, and then follow the screen prompts to assemble the test tip and transducer for the transducer test.

After test, if the transducer function is normal, the prompt "Test complete, transducer is functioning normally.", as well as remaining use times, phase margin, impedance, and other information of the transducer will be displayed.

The password must be 6 or less digits.

4.12.6 Setting Instrument Detection

To set the instrument detection function, follow the procedure below:

1. On the **User** menu, select **Settings** → **Instrument Detection**.
2. Switch on or switch off desired detection function.

The instrument detection function is enabled by default. If the instrument detection function is disabled, all instruments are considered as connected, and power levels and modes in the main screen are highlighted.

4.12.7 Setting Power Failure Protection

To set the power failure protection function, follow the procedure below:

1. On the **User** menu, select **Settings** → **Setting Memory**.
2. Select settings to be saved after power failure.

Restart the system for the settings to take effect. After the system is restarted, the main screen displays mode settings for HF instruments before the last shutdown.

4.12.8 Restoring Factory Settings

To restore factory settings of the system, follow the procedure below:

1. On the **User** menu, select **Settings** → **Factory Default**.
2. Select **Restore Factory Default**.
3. Select **OK** in the displayed dialog box and follow the prompted instructions.

4.12.9 Checking Configuration Information

On the **User** menu, select **System Information** → **Configuration information** to check the software version, generator ID, generator model, transducer model, remaining available times of the transducer, and ultrasonic surgical instrument model.

4.12.10 Checking Activation Times

On the **User** menu, select **System Information** → **Activation Number** to check the activation time of each socket.

4.12.11 Viewing History Records

The generator will save key operations as history records during use. On the **User** menu, you can select **History Record** to view operation records such as history mode and power settings.

5 System Alarm

5.1 Overview

This chapter describes the alarm function of the generator and lists error messages related to the ultrasonic assembly and HF instruments.

5.2 Introduction to Alarm Function

The system provides technical alarms only. Alarms are classified into high priority and low priority based on the alarm severity.

The alarm system only provides one alarm preset basing on electrical parameters. The alarm limits and algorithms cannot be changed. There is also a complete set of programs for monitoring operations of the generator and accessories. When an alarm generates, the generator gives alarm tones and displays error messages to alert the operator.

A system log of the generator records error messages and system power-off time. The generator can store 5000 history records in the log, and earlier data are overwritten by later ones if the memory is full.

The alarm system consists of latching alarms and non-latching alarms:

- A latching alarm continues to be displayed when the triggering event no longer exists and disappears after the generator is restarted.
- A non-latching alarm disappears when the triggering event no longer exists.

NOTE

- **The delay inherent in the determination of the alarm condition is less than 1s.**
- **Alarm settings and system log are maintained when the system is power down. The duration of power interruption has no effect on the stored alarm information.**

5.3 Alarm Indicators

When an alarm occurs, the equipment indicates it to you through visual or audible alarm indications. For details, see the following table:

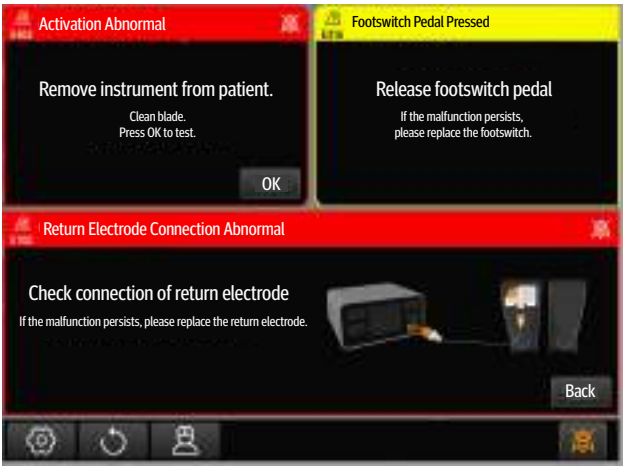
Alarm Priority	Audible Tone Pattern	Alarm Message	Symbol
High	Except return electrode alarms: Repeat pattern of 2 x 5 beep tones	White text and symbol inside a red box	
	Return electrode alarms: Low-pitched 3-beep tones		
Low	2-beep tones	Black text and symbol inside a yellow box	

NOTE

- **When a return electrode alarm occurs, the indicator on the return electrode socket lights up in red.**
- **When multiple error messages occur simultaneously in the same area, the message of the highest priority is displayed preferentially. You can view other error messages by swiping to turn pages.**
- **When multiple alarms of different priority levels occur simultaneously, the system selects the alarm of the highest priority to issue the alarm tone.**

5.4 Alarm Screen

An alarm provides a pop-up window that contains messages or pictures to help you identify the cause of the alarm, as shown in the following figure:



6 Energy Output Modes of Generator

6.1 Overview

This chapter introduces all energy output modes of the generator, including applicability, output parameters, and characteristic diagrams of each mode. For the values stated in the diagrams:

- Maximum output voltage includes tolerances.
- Resistance measurement accuracy is within 2.5%.
- Output power is measured by using Mindray-specified instruments only.

6.2 Ultrasonic Modes

The ultrasonic assembly can be used in the MAX or MIN mode. Their applicability is as follows:

- The MIN mode is applicable to cutting and sealing of vessels up to and including 5 mm in diameter or of other soft tissue.
- The MAX mode is applicable to cutting of soft tissue when bleeding control and minimal thermal injury are needed.

After setting on the generator, you can use the following functions:

- Smart Tissue Sensing (STS): By using STS, the ultrasonic surgical instrument automatically senses changes in tissue status, and the generator adjusts energy output accordingly with sound feedback. Using this mode can improve cutting efficiency and reduce the thermal injured area, thereby making surgical procedure safer and more efficient.
- Enhanced Vessel Sealing (EVS): By using EVS, energy output is adjusted in real time based on advanced algorithms, and tissue status automatically sensed by the instrument. This can significantly enhance the sealing effect on vessels.

The EVS function is disabled by default. To use the function, switch it on. For detailed setting methods, refer to *4.7.4 Function Settings for Ultrasonic Assembly*.

6.2.1 Output Parameters of Ultrasonic Modes

Output parameters of the two modes on the generator are as follows.

Power	≥ 60 W (unless otherwise specified in the instrument's instructions for use)

Frequency	30 - 80 kHz (typical value: 55.5 kHz, unless otherwise specified in the instrument's instructions for use)

6.2.2 Selection of Ultrasonic Power Level

The power level of the MIN mode can be adjusted from 1 to 5 and the power level of the MAX mode is fixed to 5. You can select power levels by following suggestions below:

- For vascular tissue: As the power level increases, the cutting efficiency increases. The maximum power level is usually used to cut tissue containing small vessels. Cutting larger vessels by using the MIN mode is less efficient. However, considering the sealing effect and cutting time, you are advised to select the power level 3 to cut and seal vessels in normal cases. To seal large vessels, you can use the EVS function for optimal sealing even though the cutting efficiency is further reduced.
- For tissue such as muscle, liver, and mesentery: As the power level increases, the cutting efficiency increases. You are advised to select the power level 5 to cut for efficient surgical operation.

6.3 Monopolar Cutting Modes

The equipment provides two monopolar cutting modes: Pure Cut and Blend Cut. Their applicability is as follows:

- The Pure Cut mode is applicable to smooth and precise cutting of soft tissue with little or without hemostasis.
- The Blend Cut mode is applicable to slow and dry cutting of soft tissue with significant hemostasis.

NOTE

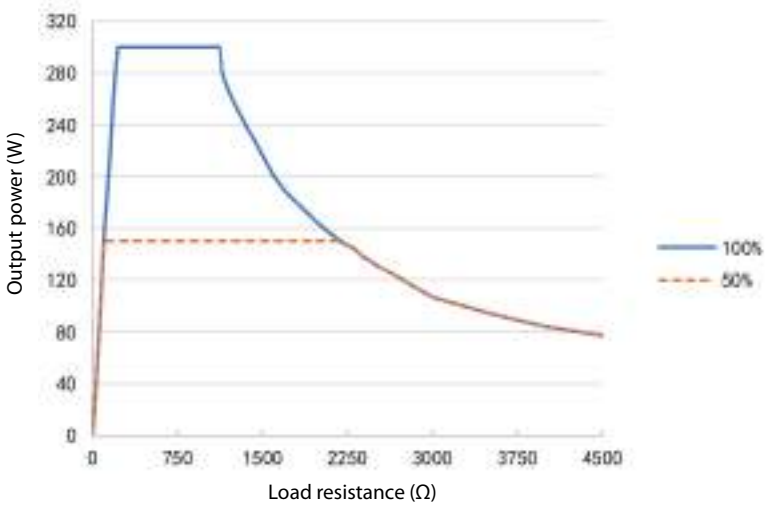
- **Any associated equipment and active accessories used in the Blend Cut mode must be rated to withstand the combination of actual voltage and crest factor.**

6.3.1 Technical Parameters of Monopolar Cutting Modes

Parameter	Pure Cut	Blend Cut
Operating frequency	434 kHz ± 10%	434 kHz ± 10%
Modulation frequency	/	27.7 kHz ± 10%
Duty cycle	100%	50% ± 10%
Rated load	300 Ω	300 Ω
Rated power	300 W ± 15%	200 W ± 15%
Maximum output voltage	1287 V_p	2178 V_p

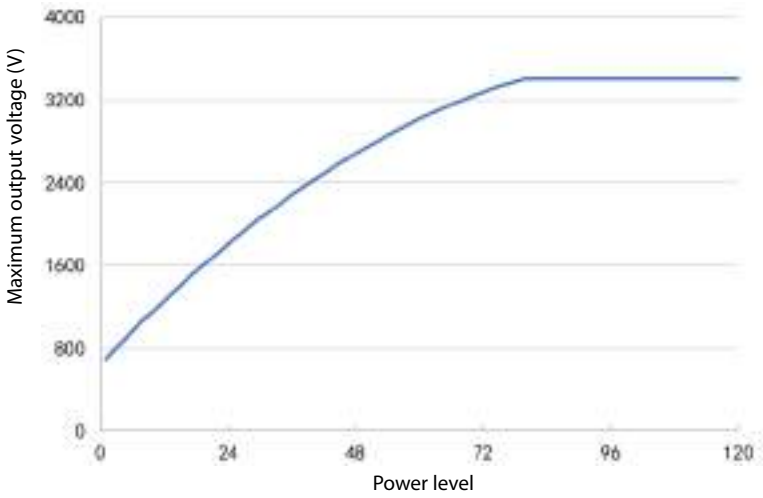
Parameter	Pure Cut	Blend Cut
Maximum output current	1.32A	1.05A
Crest factor (rated load)	1.5 ± 0.3	2.3 ± 0.3
Power ranges and step	--; 1 - 40 W (step: 1 W); 40 - 100 W (step: 5 W); 100 - 300 W (step: 10 W)	--; 1 - 40 W (step: 1 W); 40 - 100 W (step: 5 W); 100 - 200 W (step: 10 W)

6.3.2 Characteristic Diagrams of Pure Cut Mode



6.4.1 Technical Parameters of Monopolar Coagulation Modes

Parameter	Soft Coag	Fulgurate Coag	Spray Coag
Operating frequency	434 kHz ± 10%	434 kHz ± 10%	434 kHz ± 10%
Modulation frequency	/	27.7 kHz ± 10%	21.1 kHz ± 10%
Duty cycle	100%	6.25% ± 10%	4.76% ± 10%
Rated load	100 Ω	500 Ω	500 Ω
Rated power	120 W ± 15%	120 W ± 15%	120 W ± 15%
Maximum output voltage	264 V_p	3448 V_p	3932 V_p
Maximum output current	1.71A	1.05A	1.05A
Crest factor (rated load)	1.5 ± 0.3	5.3 ± 0.3	6.1 ± 0.3
Power ranges and step	--; 1 - 40 W (step: 1 W); 40 - 100 W (step: 5 W); 100 - 120 W (step: 10 W)	--; 1 - 40 W (step: 1 W); 40 - 100 W (step: 5 W); 100 - 120 W (step: 10 W)	--; 1 - 40 W (step: 1 W); 40 - 100 W (step: 5 W); 100 - 120 W (step: 10 W)



6.5 Bipolar Coagulation Modes

The generator provides four bipolar coagulation modes: Precise Coag, Standard Coag, Macro Coag, and Bipolar Soft Coag. The applicability is as follows:

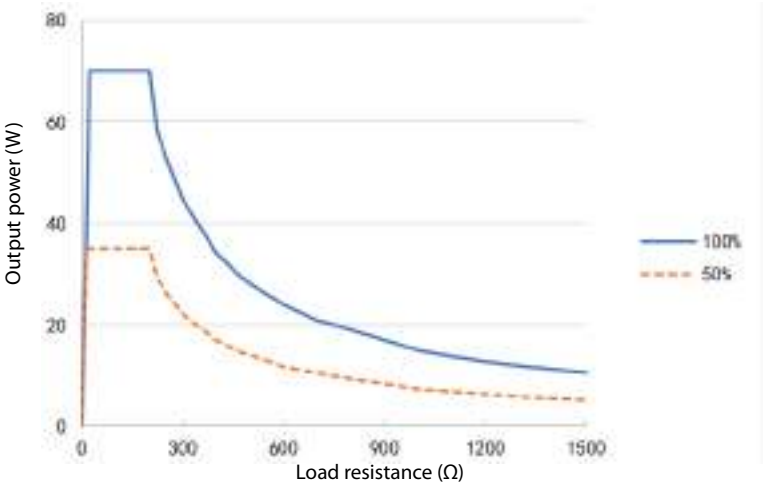
- The Precise Coag mode is applicable to low-voltage and fine coagulation of tissue. Using this mode prevents the generation of sparks and eschars and precisely controls the coagulation effect.
- The Standard Coag mode is applicable to most low-voltage bipolar coagulation of tissue. Using this mode prevents the generation of sparks and eschars and achieves consistent coagulation effect.
- The Macro Coag mode is applicable to bipolar cutting and rapid coagulation. Compared with other bipolar modes, Macro Coag delivers higher voltage and greater power.
- The Bipolar Soft Coag mode is applicable to slow and deep bipolar coagulation with no sparks. Using this mode causes practically no tissue carbonization or adhesions.

6.5.1 Technical Parameters of Bipolar Coagulation Modes

Parameter	Precise Coag	Standard Coag	Macro Coag	Bipolar Soft Coag
Operating frequency	434 kHz ± 10%	434 kHz ± 10%	434 kHz ± 10%	350 kHz ± 10%

Parameter	Precise Coag	Standard Coag	Macro Coag	Bipolar Soft Coag
Duty cycle	100%	100%	100%	100%
Rated load	100 Ω	100 Ω	100 Ω	50 Ω
Rated power	70 W ± 15%	70 W ± 15%	70 W ± 15%	70 W ± 15%
Maximum output voltage	284 V_p	415 V_p	530 V_p	150 V_p
Maximum output current	1.98A	1.98A	1.87A	2.2A
Crest factor (rated load)	1.6 ± 0.3	1.6 ± 0.3	1.8 ± 0.3	1.48 ± 0.3
Power ranges and step	--; 1 - 40 W (step: 1 W); 40 - 70 W (step: 5W)	--; 1 - 40 W (step: 1 W); 40 - 70 W (step: 5W)	--; 1 - 40 W (step: 1 W); 40 - 70 W (step: 5W)	--; 1 - 10 W (step: 1 W); 10 - 70 W (step: 2W)

6.5.2 Characteristic Diagrams of Precise Coag



9.2 Ultrasonic Surgical Instruments

Model				Description
F14/P14 series	**F23/P23 series**	**F36/P36 series**	**F45/P45 series**	
FC-14	FC-23	FC-36	FC-45	Ultrasonic Surgical Instrument
FCH-14	FCH-23	FCH-36	FCH-45	
FOK-14	FOK-23	FOK-36	FOK-45	
FOM-14	FOM-23	FOM-36	FOM-45	
PC-14	PC-23	PC-36	PC-45	
PCH-14	PCH-23	PCH-36	PCH-45	
POK-14	POK-23	POK-36	POK-45	
POM-14	POM-23	POM-36	POM-45	
POS-14	POS-23	POS-36	POS-45	
PCT-14	PCT-23	PCT-36	PCT-45	
FOS-14	FOS-23	FOS-36	FOS-45	
FCT-14	FCT-23	FCT-36	FCT-45	
FO-14	FO-23	FO-36	FO-45	

9.3 Footswitches

Model	Description
FS-U	Footswitch for ultrasonic surgical instrument
FS-D	Double-pedal footswitch for HF instrument
FS-S	Single-pedal footswitch for HF instrument

9.4 Carts

Model	Description
CT-01	Cart (standard)
CT-02	Cart (available for smoke module)
CT-03	Cart (available for smoke module&pump)

10	3.8	6.4	3.8	7.3
100	12	20	12	23

For transmitters at a maximum output power not listed above, the recommended separation distanced in meters (m) can be determined using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

Note1: 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.

TABLE EMC-7

No.	Name	Cable Length (m)	Shield or Not	Remarks
1.	AC power cable	5.0	Not shield	/
2.	Transducer Cable (TD55)	3.3	Shield	/
3.	Transducer Cable (TD55T)	3.0	Shield	/
4.	Bipolar Cable	3.0	Not shield	/
5.	Monopolar Cable	3.0	Not shield	/
6.	Return Electrode	3.0	Not shield	/
7.	Footswitch (FS-U)	5.0	Shield	/
8.	Footswitch (FS-D)	5.0	Shield	/
9.	Footswitch (FS-S)	5.0	Shield	/
10.	Cable of electrode surgical instrument for Seal 7	3.1	Not shield	/

Note: Select the above typical accessories cable for EMC verification.

C Default Settings

C.1 Default System Settings

Parameter	Items/Options	Default Setting
Brightness	/	7
Activation/Button Volume	/	7
Alarm Volume	Low, Medium, High	Medium

C.2 Default Ultrasonic Assembly Settings

Parameter	Items/Options	Default Setting
Activation Type	Both Hand and Foot, Only Hand, Only Foot	Both Hand and Foot
Advanced Features	STS(Smart Tissue Sensing)	ON
	EVS(Enhanced Vessel Sealing)	ON
	Activation Tone Change	ON

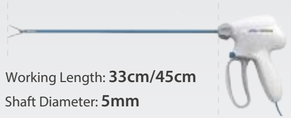
C.3 Default HF Instruments Settings

Parameter	Items/Options	Default Setting
Return Electrode	Neonatal Return Electrode Monitoring	OFF

C.4 Default User Maintenance Settings

Instrument Specifications

Disposable Bipolar Surgical Instruments



Working Length: **33cm/45cm**
Shaft Diameter: **5mm**

Blunt Grasper
Sealing Length **12.7mm**

Maryland
Sealing Length **16.9mm**

Maryland Fine
Sealing Length **16.9mm**

Reusable Bipolar Surgical Instruments

Working Length: **36cm/43cm**
Shaft Diameter: **5mm**

Blunt Grasper
Sealing Length **12.7mm**

Maryland Fine
Sealing Length **12.7mm**

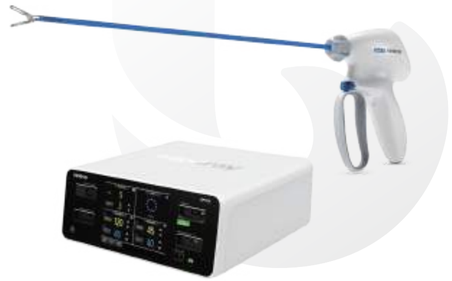
Energy Generator

UP700

Ultrasonic + Seal 7 Mode + Bipolar +
Monopolar Maximum power: **300W**

UP510

Ultrasonic + Seal 7 Mode
+ Bipolar Maximum power: **135W**

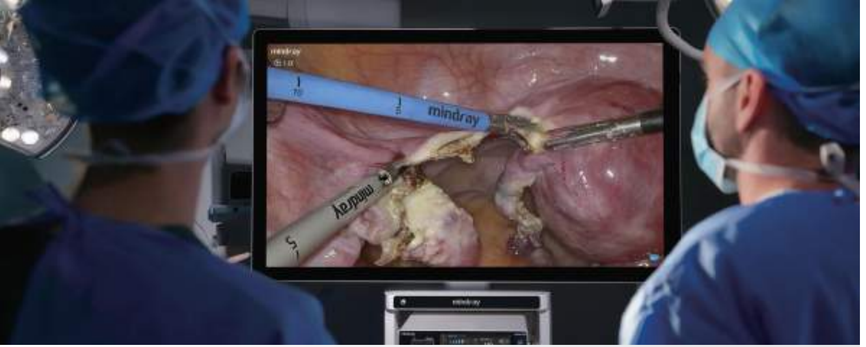


mindray
healthcare within reach

mindray
healthcare within reach

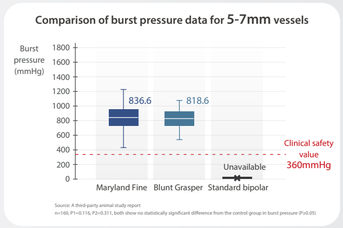
Disposable Bipolar Dissecting Forceps

Precise Coagulation
Advanced Intelligence



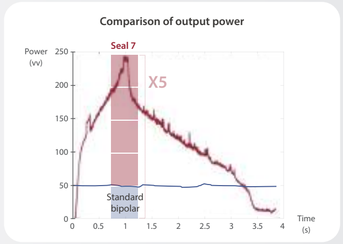
7mm Vessel Sealing

Seal 7™ uses intelligent coagulation algorithm to sense tissue changes and regulate the energy output in real time to ensure thorough coagulation and closure of thick tissues, and the sealing of vessels up to 7mm. It maintains a burst pressure more than 2 times higher than the safety value.



Rapid Hemostasis

Provides over 5 times the peak power of a standard bipolar system (up to 250w+)*, delivering instantaneous focused energy for rapid wound contraction and hemostasis.



*Compared with 40-50w, the power of bipolar.

Advanced Accurate Energy Regulation

Seal 7 intelligently recognises the mode of operation and matches different output algorithms

Safer for Clamped Sealing

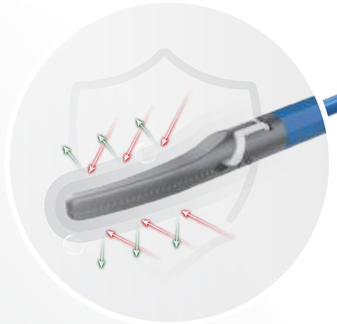
Limits lateral heat diffusion to reduce additional thermal injury.
Lateral thermal range: approx. **1.5mm**

Stronger for Lateral Contact Coagulation

Improves the energy range to ensure effective coagulation and closure of deeply buried vessels.
Longitudinal thermal range: approx. **5mm**

More Reliable Coating

Seal 7™ Anti-stick Nano-coating reduces the adhesions during surgery and guarantees the effects of coagulation.



*According to a third-party animal study report, the incidence of carbonization adhesion is **0%**.
The experimental sites included blood vessels with diameters of **1-3mm**, **3-5mm**, and **5-7mm**, as well as pulmonary vessels and thoracic ducts.

More Comfortable to Operate

Designed with clinical ergonomics, making it intuitive and easy to handle.
Activating by finger is more comfortable, avoiding leg fatigue caused by pedaling.
It has both grasping and dissection functions, reducing the need to change instruments and ensuring the surgical process.

Position of Thumb Support

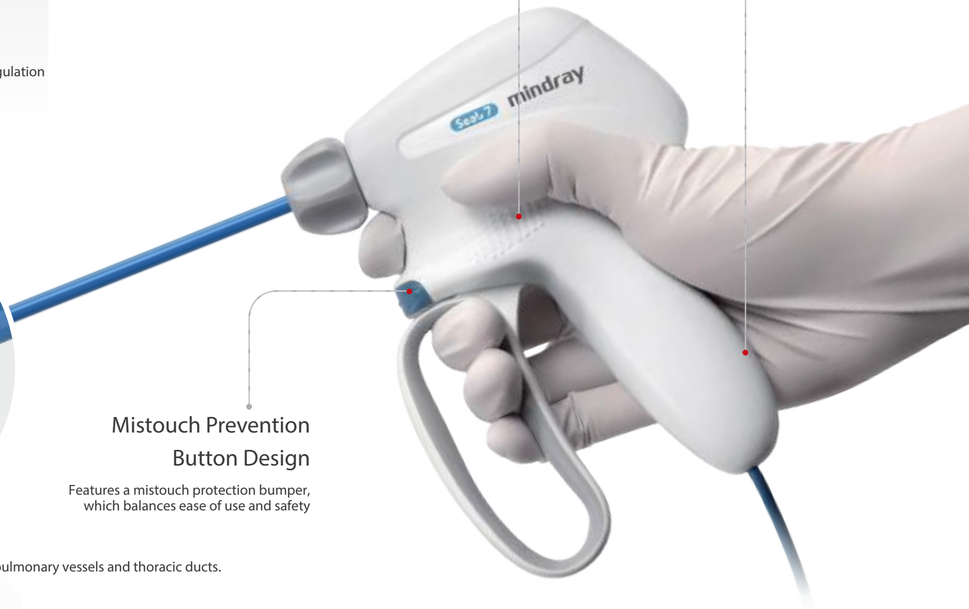
Spreading for blunt dissection is more convenient and includes an anti-slip texture for more precise manipulation

Palm Fitting Surface

Minimizes discomfort during gripping with a larger contact area with the palm

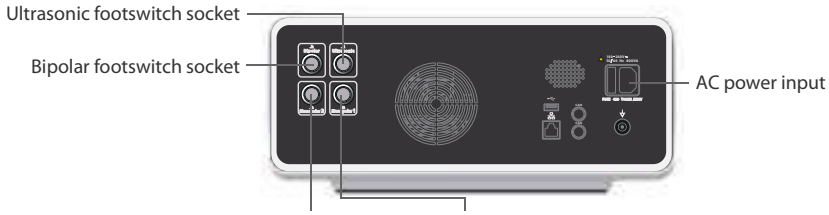
Mistouch Prevention Button Design

Features a mistouch protection bumper, which balances ease of use and safety



UP700 Series Generator Quick Start Guide

Product Overview



Note: Multiple instruments can be connected to the generator at the same time, but they cannot be activated simultaneously.

Using the Touchscreen

Using the EVS Function

When using an ultrasonic assembly, you can switch between the EVS function and the MIN mode in the ultrasonic area. **EVS(Enhanced Vessel Sealing)** is switched on by default.

Press the MIN button on the ultrasonic surgical instrument or press the left pedal of footswitch to activate the EVS function.

Enabling Neonatal Return Electrode Monitoring

When using a monopolar instrument, you can switch on **Neonatal Return Electrode Monitoring** in the setup menu.

Then the neonate symbol is displayed in the monopolar area, indicating that the return electrode monitoring for neonate is enabled.

Setting Procedure

Select the Procedure button on the touchscreen to display the **Select Procedure** page.

On the **Select Procedure** page, you can either add a Procedure, or edit or select a saved one.

A maximum of 500 Procedures can be added.

Setting Seal 7 Mode

Connect the electrode surgical instrument for Seal 7 to the generator. The generator automatically identifies the instrument and enter the Seal 7 mode.

The prompt tone will change when the sealing is finished.

Troubleshooting

Symptom	Attemptable Solution
There is no energy output when the instrument is activated.	Set the power level and reactivate the instrument.
	Properly connect the instrument to the generator. Make sure that the relevant instrument tests have been performed according to the on screen prompts.
When the generator is activated, the operation of other devices is interfered.	Keep the generator and cords connected to the generator away from other electronic devices.

Note: If the problem persists, remove the system from use immediately. Contact your service personnel.

Recommended Power Levels

GI Surgery  Monopolar: Blend 40W Monopolar: Fulgurate 40W	**Hepatobiliary Surgery**  Monopolar: Blend 40W Monopolar: Fulgurate 40W Monopolar: Spray 80W (Optional) Bipolar: Standard 50W	**Gynecological Surgery**  Monopolar: Blend 40W Monopolar: Fulgurate 40W Bipolar: Standard 50W	**Thyroid Surgery**  Monopolar: Blend 30W Monopolar: Fulgurate 30W Bipolar: Precise 10W
Breast Surgery  Monopolar: Blend 40W Monopolar: Fulgurate 40W	**Esophageal and Lung Surgery**  Monopolar: Blend 30W Monopolar: Fulgurate 35W	**Spine Surgery**  Monopolar: Blend 40W Monopolar: Fulgurate 40W Bipolar: Standard 12W	**Brain Surgery**  Monopolar: Pure 30W Bipolar: Precise 8W
Arthroscopic Surgery  Monopolar: Blend 25W Monopolar: Fulgurate 25W	**ENT Surgery** 	**Cardiothoracic Surgery** 	
Ophthalmic Surgery  Bipolar: Precise 2W	**ENT (Needle Electrode)** Monopolar: Fulgurate 15W **ENT (Blade Electrode)** Monopolar: Fulgurate 30W	**Cardiothoracic (Heart Surface)** Monopolar: Fulgurate 10W **Cardiothoracic (Vessels)** Monopolar: Blend 30W Monopolar: Fulgurate 25W	**Cardiothoracic (Coronary Artery Bypass)** Monopolar: Fulgurate 20W **Cardiothoracic (Sternum)** Monopolar: Spray 75W

Note: The listed recommended power levels were derived from clinical feedback for reference only. The actual power level applied may vary significantly due to the surgery situation, patient differences, or electrode type. You are advised start with a low power level and increase it cautiously for optimal effect.

To obtain more maintenance information:

046-025723-00(1.0)

www.mindray.com

P/N:ENG-Ultrasonic Surgical & Electrosurgical Energy Platform-210285X8P-20240410

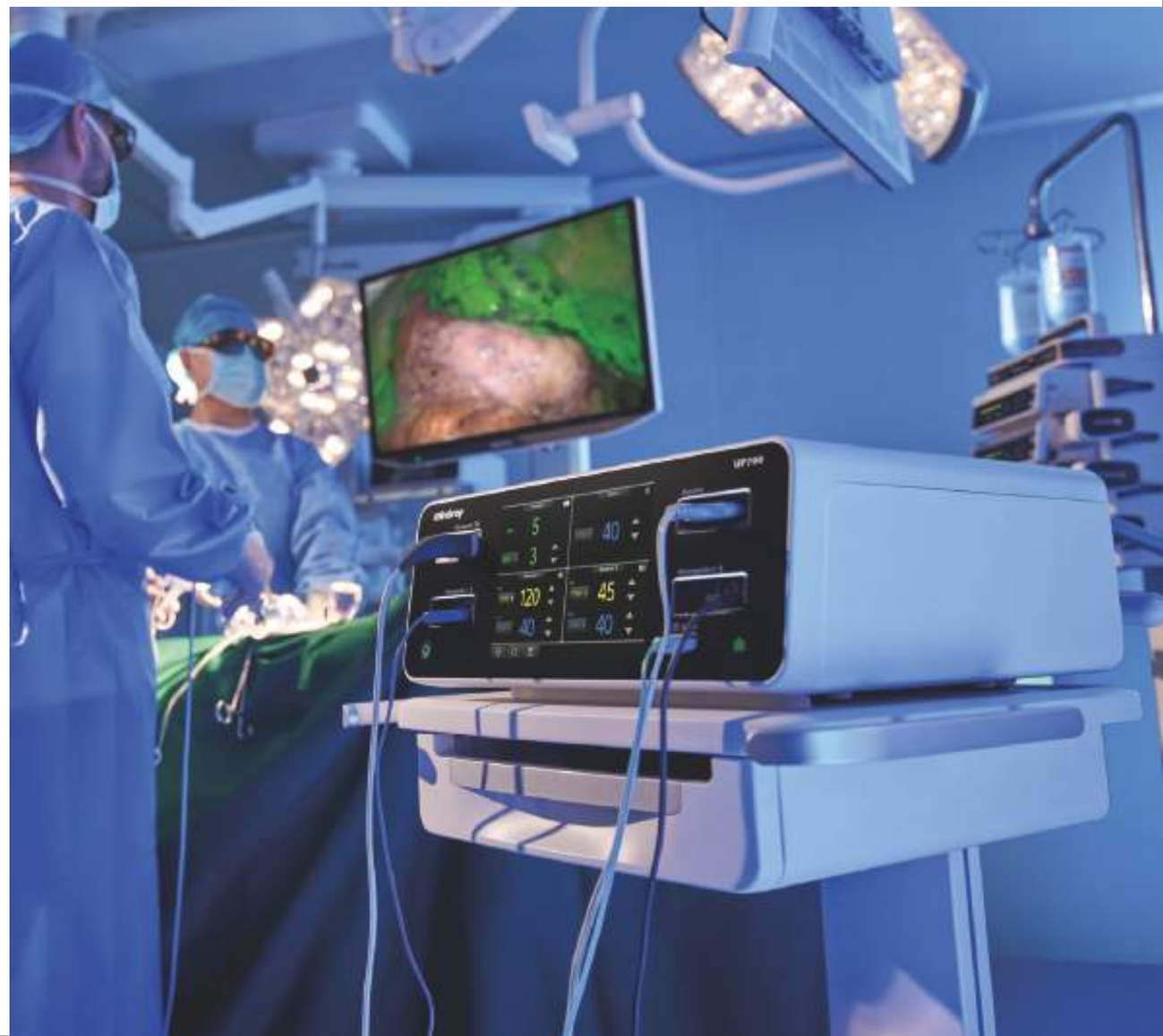
mindray

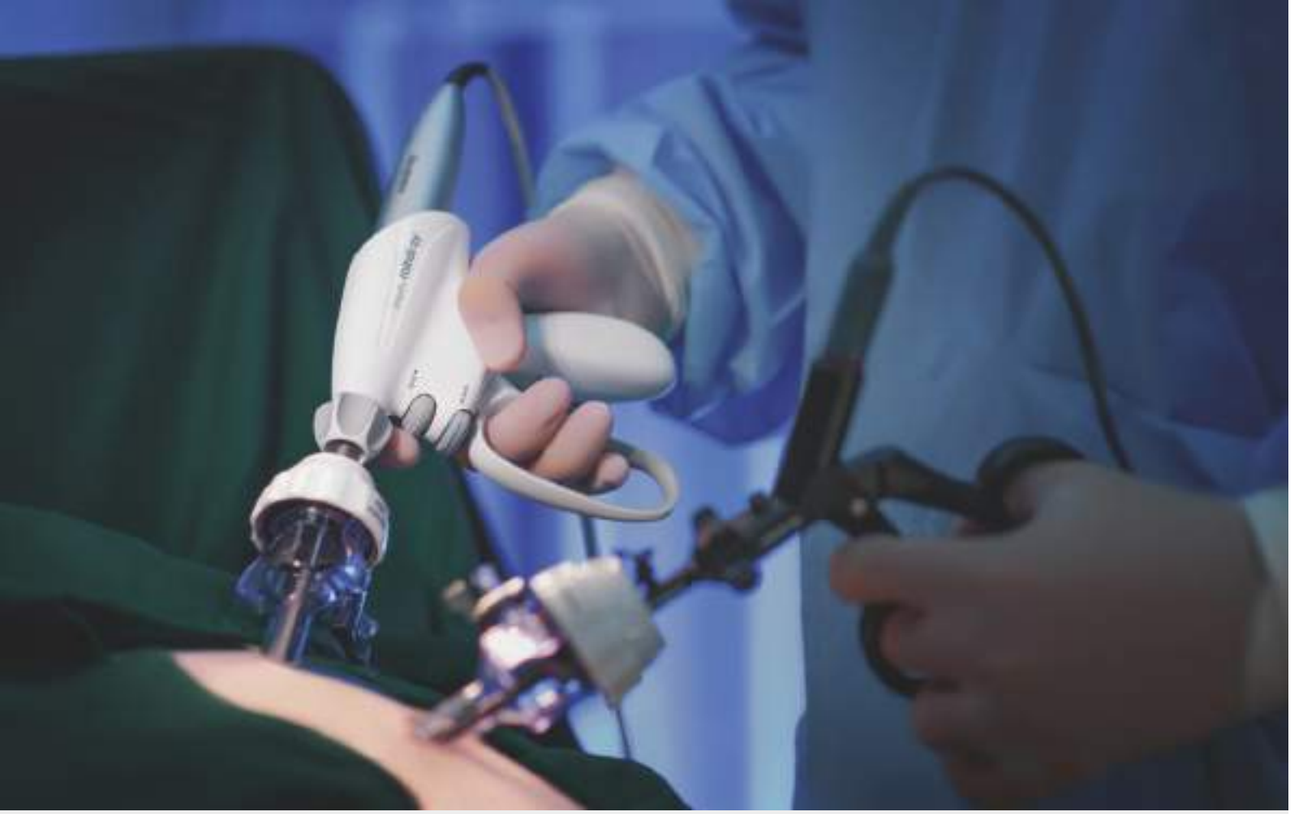
healthcare within reach

mindray

Ultrasonic Surgical & Electrosurgical Energy Platform

Higher Precision, Easier Operation





Energy devices are an integral part of surgery.
How can they provide added value to surgeons and patients?

Tapping into the needs of healthcare, focusing on clinical pain points, and breaking through technology blockades to create Advanced compact, Advanced accurate and Advanced precise surgical equipment.

Advanced Compact

Integrated ultrasonic surgical and HF instruments free up more space in the OR and require less maintenance

One generator for multiple energy devices

Mode switching and power level adjustment in one simple tap

Flat Menu Design

4-Quadrant Interactive UI

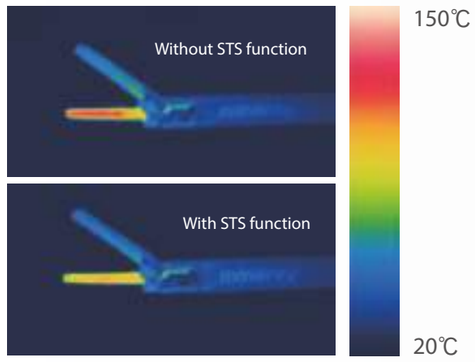
Simplified and Intuitive

Advanced Accurate

Ultrasonic Module

STS™ (Smart Tissue Sensing)

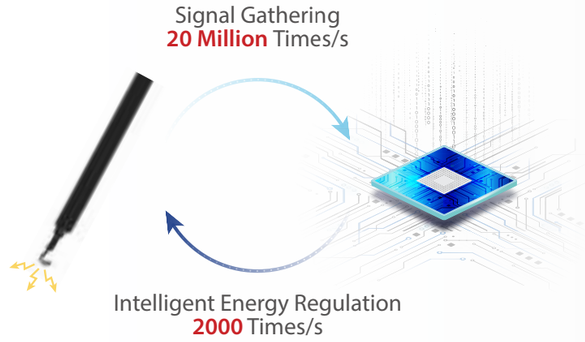
Comparison of Heat Maps of Forceps
(1 second after disconnection)



Automatic reduction of output power after tissue disconnection means less risk of accidental scalding from ultrasonic surgical instrument.

HF Electrosurgical Module

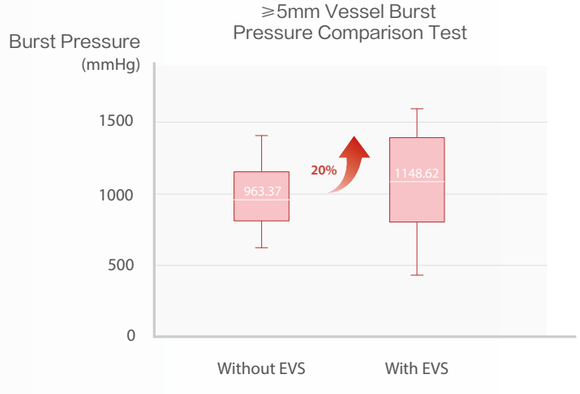
Precise Energy Control Algorithm



Real-time precise energy regulation based on tissue characteristics ensures smooth cutting of different tissues with HF instrument.

EVS™ (Enhanced Vessel Sealing)

Precise output of energy based on the status of the blood vessel, providing firmer and safer 5mm vessel sealing.



Extraordinary Energy Compensation Algorithm

By compensating for transmission loss, the advanced algorithm ensures consistent energy delivery to tissues aligned with your settings, to eliminate attenuation over time.

Advanced Precise

Thin and narrow design more for greater manoeuvrability in tight spaces

20% Thinner
Compared to Original Design

20% Narrower
Compared to Original Design

Rounded edges and corners to avoid scratching the blood vessels. All-round coating to reduce adhesion and wiping during surgery.

Anti-Adhesion Coating

Anti-Scratch Blade Tip

Energy Platform Generator

Different combinations of functions for specific clinical scenarios

UP700

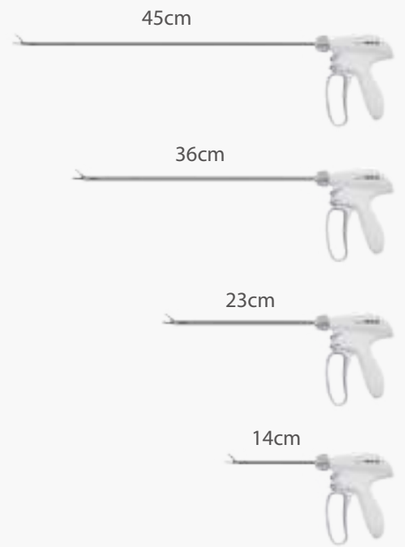
Ultrasonic + Bipolar + Monopolar

UP510

Ultrasonic + Bipolar

Ultrasonic Surgical Instrument

Different lengths for various types of surgery



Trolley

Fixed position structure for generator and self-locking wheel design

Transducer

Supports 100 operations

Foto POM-36


Model: POM-36
P/N (1PCS)
125-000732-00
x5
P/N
045-004930-00
LOT
136494
2026-02-23
2031-02-22
UDI
(01)06903053078450
(11)260223
(17)310222
(10)136494
MD
CE 1639
EC REP
Shanghai International Holding Corp. GmbH(Europe)
Eiffestraße 80 20537 Hamburg Germany
813649403086

Foto Electrod Neutru

Foto Mâner monopolar

www.mindray.com

P/N:ENG-Reusable Laparoscopic Instruments-210285X20P-20241122

mindray

healthcare within reach

mindray

Reusable Laparoscopic Instruments

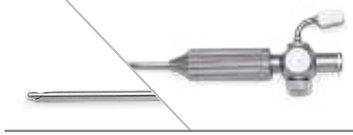
User Friendly & Future Proof

Trocars

Product	Description	Dimension	Code	
	Pyramidal Trocar	ϕ 5X95	221-51155	👍
		ϕ 10X95	221-01155	👍
		ϕ 12X95	221-81155	
		ϕ 5X150	221-53155	👍
		ϕ 10X150	221-03155	👍
		ϕ 12X150	221-83155	👍
	Auto Shield Trocar	ϕ 5X95	221-51255	
		ϕ 10X95	221-01255	
		ϕ 12X95	221-81255	
		ϕ 5X150	221-53255	
		ϕ 10X150	221-03255	
		ϕ 12X150	221-83255	
	Pyramidal Trocar with Screw	ϕ 5X95	221-51165	
		ϕ 10X95	221-01165	
		ϕ 12X95	221-81165	
	Auto Shield Trocar with Screw	ϕ 5X95	221-51265	
		ϕ 10X95	221-01265	
		ϕ 12X95	221-81265	

Trocars

- To avoid blood contamination when inserting the telescope and to reduce times of cleaning the tip of the telescope by controlling the sealing flap opening and closing.

Product	Description	Dimension	Code	
	Veress Needle	ϕ 2X120	221-21127	
		ϕ 2.7X150	221-27157	👍
	Reducer Sleeve	ϕ 10 - ϕ 5	221-01785	
		ϕ 12 - ϕ 5	221-81785	
	Sealing Cap	ϕ 5	221-50925	👍
		ϕ 10	221-00925	👍
		ϕ 12	221-80925	👍
	Reducer	ϕ 10 - ϕ 5	221-00725	👍
		ϕ 12 - ϕ 5	221-80725	👍
	Reducer	ϕ 10 - ϕ 5	221-00715	

The "Relia" Reusable Electrode Surgical Instruments

Safe

Insulated sleeve exposes a shorter metal base to avoid the accidental damage caused by electrical leakage.

Durable

Strictly selected materials plus special production processes greatly extend the product's life.

Ergonomic

One-click to disassemble into three parts for more thorough cleaning and sterilization.

Dissecting and Grasping Forceps

- **Diamond serration clamp teeth**
  Stronger grasping force with less tissue damage
- **Shorter metal base**
  Less unintentional electrical injury
- **No obvious bulge at the opening joint**
  Reduce blood and tissue residues, easy to clean and reduce cross infection

Product	Description	Dimension	Code	
 16mm	KELLY Dissecting and Grasping forceps, Maryland	ϕ 5X360	222-5S3013	👍
		ϕ 5X360, With Ratchet	222-5T3013	
		ϕ 5X430	222-5S4013	
		ϕ 5X430, With Ratchet	222-5T4013	
 22mm	KELLY Dissecting and Grasping forceps, long, Maryland	ϕ 5X360	222-5S3023	👍
		ϕ 5X360, With Ratchet	222-5T3023	
		ϕ 5X430, With Ratchet	222-5T4023	
 16mm	Dissecting and Grasping forceps, right-angled	ϕ 5X360	222-5S3123	👍
		ϕ 5X360, With Ratchet	222-5T3123	
		ϕ 5X430, With Ratchet	222-5T4123	
 23mm	Straight Dissecting and Grasping forceps, atraumatic	ϕ 5X360	222-5S3043	
		ϕ 5X360, With Ratchet	222-5T3043	
 43mm	Dissecting and Grasping forceps, atraumatic	ϕ 10X360	222-0S3103	
		ϕ 10X360, With Ratchet	222-0T3103	
 26mm	Dissecting and Grasping forceps, right-angled	ϕ 10X360	222-0S3133	👍
		ϕ 10X360, With Ratchet	222-0T3133	

Grasping Forceps


No Ratchet


With Ratchet

Product	Description	Dimension	Code	
 18mm	Bowel Grasper, fenestrated, short	ϕ 5X360	222-5S3213	👍
		ϕ 5X360, With Ratchet	222-5T3213	
 24mm	Atraumatic Grasping forceps	ϕ 5X360	222-5S3633	👍
		ϕ 5X360, With Ratchet	222-5T3633	
		ϕ 5X430, With Ratchet	222-5T4633	
 27mm	CROCE-OLMI Grasping forceps, atraumatic, curved	ϕ 5X360	222-5S3453	👍
		ϕ 5X360, With Ratchet	222-5T3453	
		ϕ 5X430, With Ratchet	222-5T4453	
 26mm	Grasping forceps, w specially fine atraumatic serration	ϕ 5X360	222-5S3473	
		ϕ 5X360, With Ratchet	222-5T3473	
		ϕ 5X430	222-5S4473	
		ϕ 5X430, With Ratchet	222-5T4473	
 37mm	Bowel Grasper, fenestrated	ϕ 5X360	222-5S3303	👍
		ϕ 5X360, With Ratchet	222-5T3303	
 18mm	BABCOCK Grasping forceps	ϕ 5X360	222-5S3553	
		ϕ 5X360, With Ratchet	222-5T3553	👍
 14mm	Grasping forceps, 2X4 teeth	ϕ 5X360	222-5S3393	
		ϕ 5X360, With Ratchet	222-5T3393	

Grasping Forceps

No Ratchet

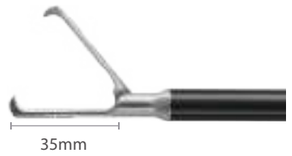
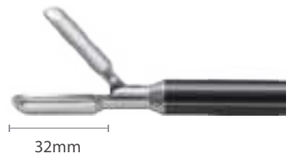
With Ratchet

Product	Description	Dimension	Code
 28mm	Grasping forceps, atraumatic	ϕ 5X360	222-5S3333
		ϕ 5X360, With Ratchet	222-5T3333
 15mm	VANCAILLIE Adhesion Forceps, one jaw fenestrated	ϕ 5X360	222-5S3493
		ϕ 5X360, With Ratchet	222-5T3493
 15mm	MANHES biopsy forceps	ϕ 5X360	222-5S3903
		ϕ 5X360, With Ratchet	222-5T3903
 14mm	MANHES Grasping forceps, "tiger-jaws", 2X4 teeth	ϕ 5X360	222-5S3363
		ϕ 5X360, With Ratchet	222-5T3363
 16mm	Claw forceps, 2X3 teeth, short	ϕ 10X360	222-0S3403
		ϕ 10X360, With Ratchet	222-0T3403
 34mm	SAWALHE Tissue Grasping forceps	ϕ 10X360	222-0S3423
		ϕ 10X360, With Ratchet	222-0T3423
 30mm	BABCOCK Grasping forceps	ϕ 10X360	222-0S3573
		ϕ 10X360, With Ratchet	222-0T3573

Grasping Forceps

No Ratchet

With Ratchet

Product	Description	Dimension	Code	
 35mm	Claw forceps, 2X3 teeth	ϕ 10X360	222-0S3413	
		ϕ 10X360, With Ratchet	222-0T3413	👍
 32mm	Spoon forceps	ϕ 10X360	222-0S4883	
		ϕ 10X360, With Ratchet	222-0T4883	👍
 13mm	VANCAILLIE Oviduct Forceps	ϕ 5X360	222-5S3583	👍
		ϕ 5X360, With Ratchet	222-5T3583	
 18mm	Dissecting and Grasping forceps, “alligator jaws”	ϕ 5X360	222-5S3773	
		ϕ 5X360, With Ratchet	222-5T3773	
 31mm	DeBAKEY Grasping forceps, curved and slender jaws	ϕ 5X360	222-5S3813	
		ϕ 5X360, With Ratchet	222-5T3813	
 19mm	Grasping forceps, atraumatic, spoon-shaped	ϕ 5X360	222-5S3223	
		ϕ 5X360, With Ratchet	222-5T3223	
 14mm	MANHES Dissecting and Grasping forceps, "duckbill"	ϕ 5X360	222-5S3283	
		ϕ 5X360, With Ratchet	222-5T3283	

Monopolar Scissors

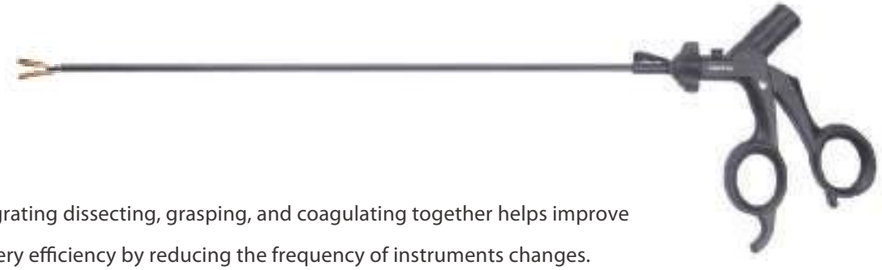
- **Sharp**
  The sharpest blade enables fast cutting.

- **Smooth**
  Involute design of blade line ensures more smooth cutting.

- **Durable**
  The vacuum heat treatment process makes sure that the metal hardness control accuracy reaches HRC1 (Rockwell hardness), increasing the metal life by 3-4 times compared with the traditional method.

Product	Description	Dimension	Code	
 15mm	METZENBAUM Scissors, curved	ϕ 5X360	222-5S3022	👍
		ϕ 5X430	222-5S4022	👍
 20mm	Scissors, spoon-shaped blades, serrated, curved	ϕ 5X360	222-5S3012	
		ϕ 5X430	222-5S4012	
 15mm	Scissors, straight	ϕ 5X360	222-5S3092	
		ϕ 5X430	222-5S4092	

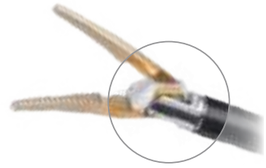
Bipolar Dissecting Forceps



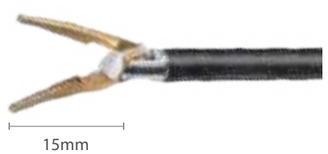
Integrating dissecting, grasping, and coagulating together helps improve surgery efficiency by reducing the frequency of instruments changes.

- **Innovative anti-sticking:**
  Sticking prevention with coated jaw.

- **Strong grasping:**
  Enhanced force with wider opening angle to achieve better grasping.



- **Guaranteed Safety:**
  Advanced insulation design guarantees the safety and reliability of bipolar coagulation.

Product	Description	Dimension	Code	
 15mm	Bipolar Straight Dissecting Forceps	ϕ 5X360	222-5S3011	👍
		ϕ 5X430	222-5S4011	👍
 15mm	Bipolar Curved Maryland Dissecting Forceps	ϕ 5X360	222-5S3021	👍
		ϕ 5X430	222-5S4021	

Monopolar Electrodes

Product	Description	Dimension	Code	
	Hook Tip Coagulation Electrode	ϕ 5X330	222-51110	👍
	Ball Tip Coagulation Electrode	ϕ 5X330	222-51220	
	Spatula Tip Coagulation Electrode	ϕ 5X330	222-51440	👍
	Rod Tip Coagulation Electrode	ϕ 5X330	222-51610	👍

Cables

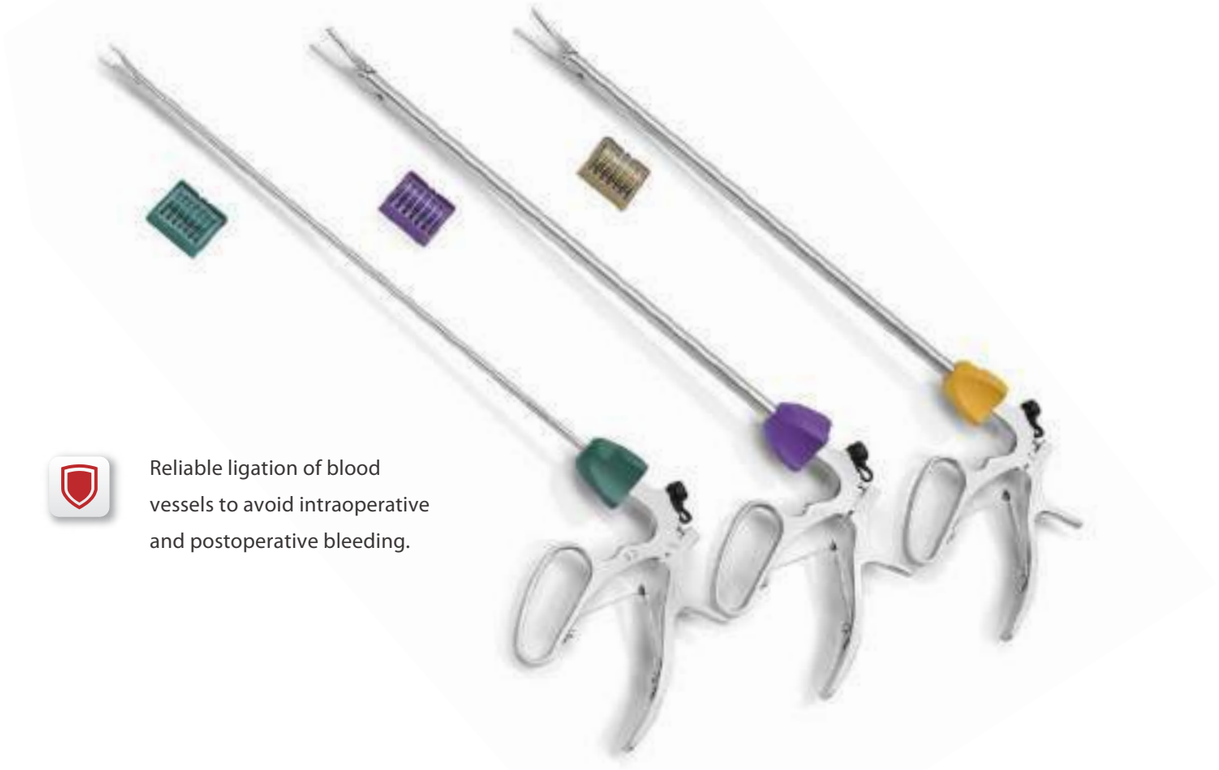
All cables are autoclavable.

Product	Description	Dimension	Code	
	Monopolar cable	3200mm	999-030	👍
	Bipolar Cable	3200mm	999-031	👍

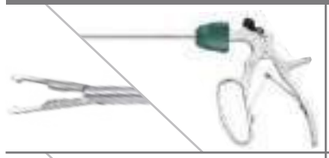
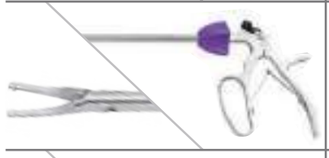
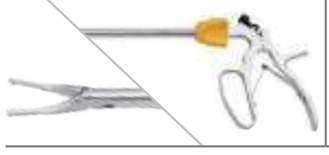
Instrument Trays

Product	Description	Dimension	Code	
	Double-decker Instrument Tray	540X250X100	X TR5425A0	
	Long Double-decker Instrument Tray	600X250X100	X TR6025A0	👍
	Long Three-decker Instrument Tray	600X250X140	X TR6025E4	

Clip Appliers



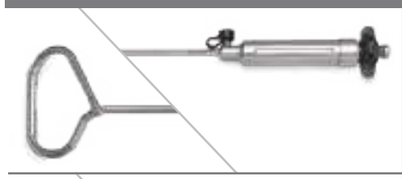
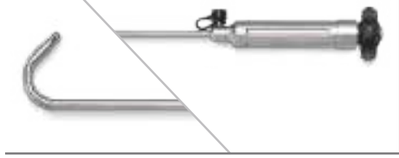
Reliable ligation of blood vessels to avoid intraoperative and postoperative bleeding.

Product	Description	Dimension	Code	
	Endo Applier for Medium Large polymer locking Clip	ϕ 5X330	221-55636	
	Endo Applier for Large polymer locking Clip	ϕ 10X330	221-05646	
	Endo Applier for Extra Large polymer locking Clip	ϕ 10X330	221-05656	

Clip Appliers

Product	Description	Dimension	Code	
	Endo Applier for Small Titanium Clip, Single action	ϕ 5X330	221-55116	
	Endo Applier for Medium Titanium Clip, Single action	ϕ 10X330	221-05126	
	Endo Applier for Medium Large Titanium Clip, Single action	ϕ 10X330	221-05136	
	Endo Applier for Large Titanium Clip, Single action	ϕ 10X330	221-05146	
	Open Surgery Applier for Small Titanium Clip	28 cm	221-00516	
	Open Surgery Applier for Small Titanium Clip	18 cm	221-01516	
	Open Surgery Applier for Medium Titanium Clip	28 cm	221-00526	
	Open Surgery Applier for Medium Titanium Clip	23 cm	221-01526	
	Open Surgery Applier for Medium Large Titanium Clip	28 cm	221-00536	
	Open Surgery Applier for Large Titanium Clip	28 cm	221-00546	

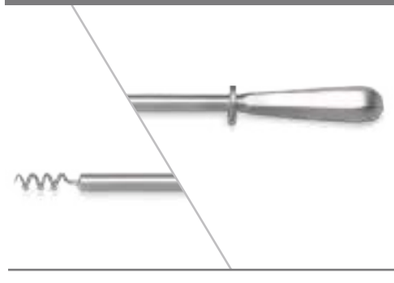
ENDO-Retractors

Product	Description	Dimension	Code	
	ENDO-Retractor	ϕ 5X360	221-53013	
	ENDO-Retractor	ϕ 5X360	221-53023	👍

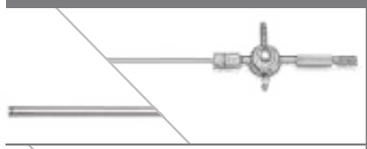
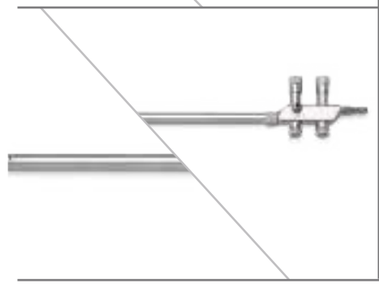
Fans Dissecting Forceps

Product	Description	Dimension	Code	
	3 Finger Retractor	ϕ 5X330	221-55923	
	5 Finger Retractor	ϕ 10X330	221-05923	👍

Myoma Drills

Product	Description	Dimension	Code	
	Myoma Drill	ϕ 5X330	221-53109	👍
		ϕ 5X420	221-54109	
		ϕ 10X330	221-03109	
		ϕ 10X420	221-04109	

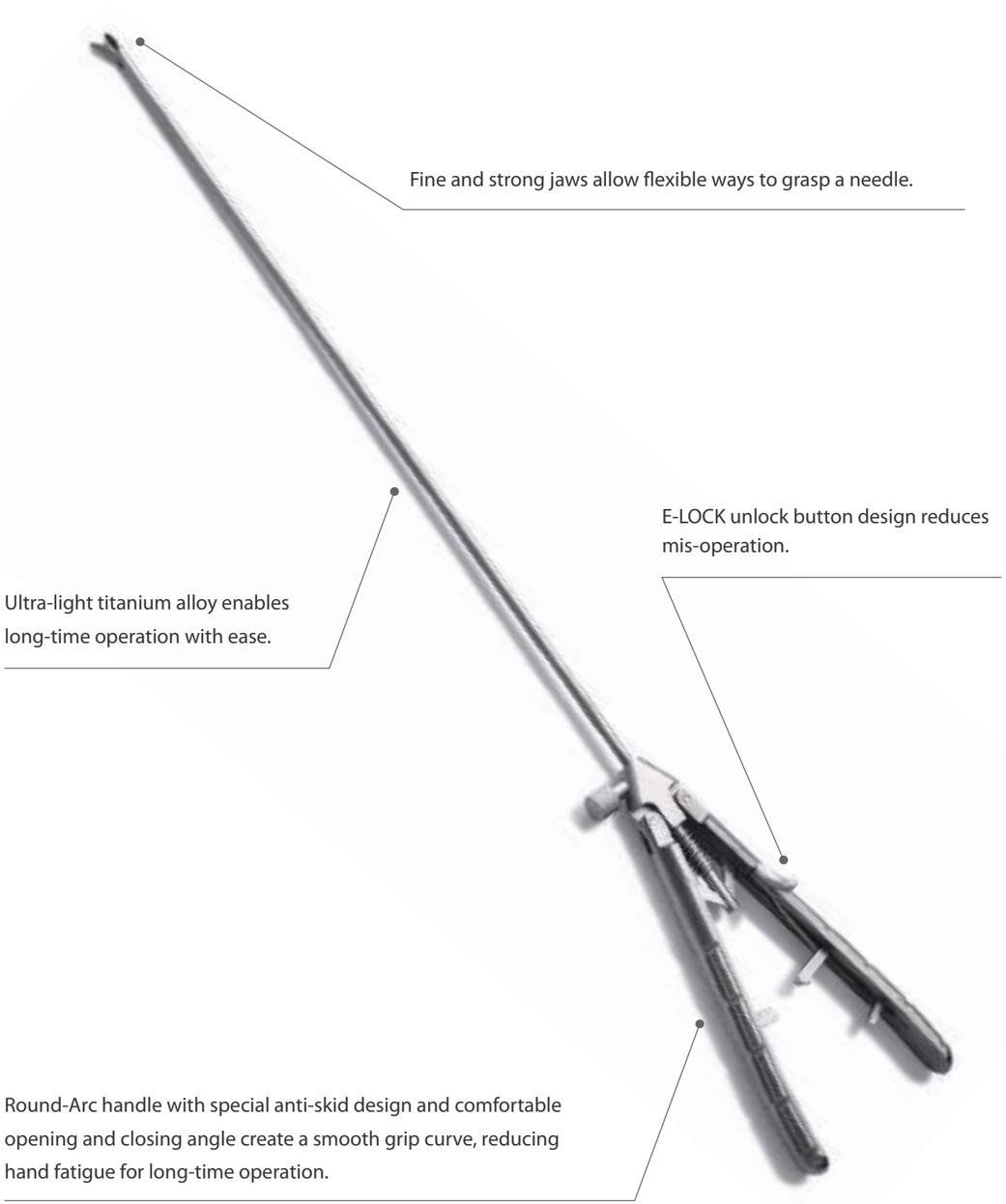
Suction & Irrigation Apparatus

Product	Description	Dimension	Code	
	Suction and irragation	ϕ 5X330	221-53114	
	Suction and irragation	ϕ 5X330	221-53224	👍
		ϕ 10X330	221-03224	

Puncture Injection Needles

Description	Pinhead	Dimension	Code	
Puncture Injection Needle（7#）	0.7mm	ϕ 5X330	221-53015	
Puncture Injection Needle（9#）	0.9mm	ϕ 5X330	221-53025	
Puncture Injection Needle（13#）	1.3mm	ϕ 5X330	221-53035	👍
Puncture Injection Needle（16#）	1.6mm	ϕ 5X330	221-53055	
Puncture Injection Needle（18#）	1.8mm	ϕ 5X330	221-53065	

Needle Holders



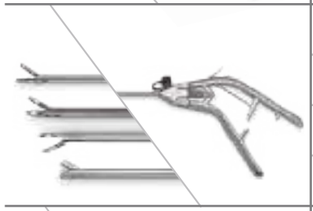
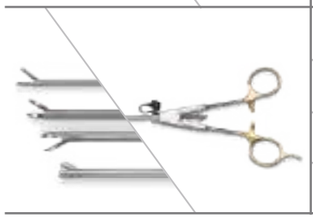
Fine and strong jaws allow flexible ways to grasp a needle.

E-LOCK unlock button design reduces mis-operation.

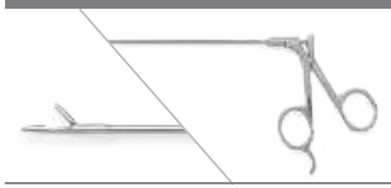
Ultra-light titanium alloy enables long-time operation with ease.

Round-Arc handle with special anti-skid design and comfortable opening and closing angle create a smooth grip curve, reducing hand fatigue for long-time operation.

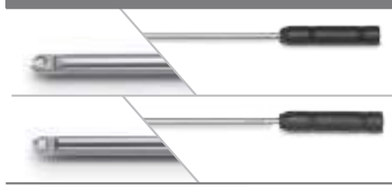
Needle Holders

Product	Description	Dimension	Code	
	V Handle Straight Needle Holder	ϕ 5X330	221-56416	
	V Handle Left Curved Needle Holder	ϕ 5X330	221-56426	👍
	Pistol Handle Straight Needle Holder	ϕ 5X330	221-56516	
	Pistol Handle Left Curved Needle Holder	ϕ 5X330	221-56526	
	Pistol Handle Right Curved Needle Holder	ϕ 5X330	221-56536	
	Pistol Handle Needle Holder with Reposition Function	ϕ 5X330	221-56546	
	O Handle Straight Needle Holder	ϕ 5X330	221-56816	
		ϕ 5X450	221-56876	
	O Handle Left Curved Needle Holder	ϕ 5X330	221-56826	
		ϕ 5X450	221-56886	👍
	O Handle Right Curved Needle Holder	ϕ 5X330	221-56836	
	O Handle Needle Holder with Reposition Function	ϕ 5X330	221-56846	

Suture Fascia Fix Forceps

Product	Description	Dimension	Code	
	Suture Fascia Fix Forceps	ϕ 3X200	221-32013	👍

Knot Pushers

Product	Description	Note	Dimension	Code	
	Knot Pusher	Half Ring	ϕ 4X330	221-43019	👍
		Full Ring	ϕ 4X330	221-43029	

Versatile Trays for Minimally Invasive Surgery

Versatile Trays for Minimally Invasive Surgery

Specifications

Name	Order code	Purpose	Model	Dimension	Net Weight	Gross Weight	Box Material	Handle, latch and fixing screw material
Long Rigid Endoscope Tray	115-096793-00	For Mindray 5mm lengthened telescope or 3D Videoendoscope	X TR641675	640*150*75mm	1840g	2140g	Aluminium 85%, Silicone 15%	Stainless steel, Silicone

Name	Order code	Purpose	Model	Dimension	Net Weight	Gross Weight	Box Material	Handle, latch and fixing screw material
Rigid Endoscope Tray	115-056312-00	For Mindray 5mm/10mm standard telescope	X TR500944	478*90*43.5mm	710g	910g	Aluminium 90%, Silicone 10%	Stainless steel

Name	Order code	Purpose	Model	Dimension	Net Weight	Gross Weight	Box Material	Handle, latch and fixing screw material
Camera Head Tray	115-070228-00	For Mindry 2D camera head	X TR372392	370*225*95mm	1770g	2250g	Aluminium 80%, Stainless steel 5%, Silicone 15%	Stainless steel, Silicone

Name	Order code	Purpose	Model	Dimension	Net Weight	Gross Weight	Box Material	Handle, latch and fixing screw material
Large Rigid Endoscope Tray	115-079977-00	Double layer For Mindray hysteroscope +outer sheath+inner sheath+instruments	X TR512182	490*206*82.5mm	2610g	2910g	Aluminium 90%, Silicone 10%	Stainless steel, Silicone
Resectoscope Tray	115-115072-00	Double layer For Mindray Resectoscope +outer sheath+inner sheath+instruments	X TR562185	510*210*85mm	3100g	3700g	Aluminium 90%, Silicone 10%	Stainless steel, Silicone

Name	Order code	Purpose	Model	Dimension	Net Weight	Gross Weight	Box Material	Handle, latch and fixing screw material
Double-decker Instrument Tray	120-030868-00	Can place 12 Mindray laparoscopic instruments	X TR5425A0	540*250*100mm	3525g	4225g	Aluminium 90%, Silicone 10%	Stainless steel
Long Double-decker Instrument Tray	120-030869-00	Can place 12 Mindray laparoscopic instruments	X TR6025A0	600*250*100mm	4660g	5600g	Aluminium 90%, Silicone 10%	Stainless steel
Long Three-decker Instrument Tray	120-030870-00	Can place 18 Mindray laparoscopic instruments	X TR6025E4	600*250*140mm	4855g	6586g	Aluminium 90%, Silicone 10%	Stainless steel

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