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

www.mindray.com

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

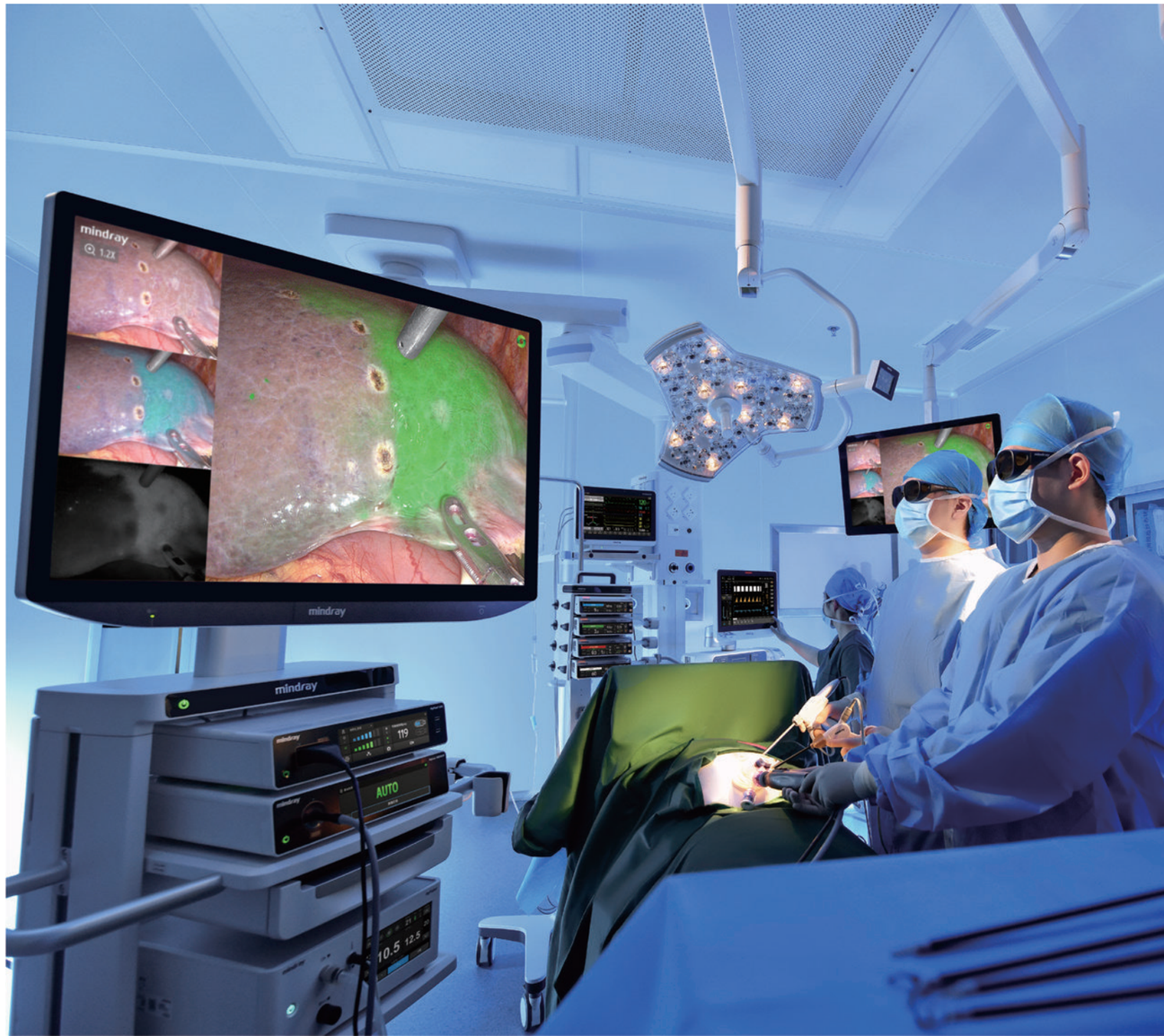
mindray
healthcare within reach

mindray

UX7 Series *4K&NIR&3D*

Endoscope Camera System

Vision beyond Imagination



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

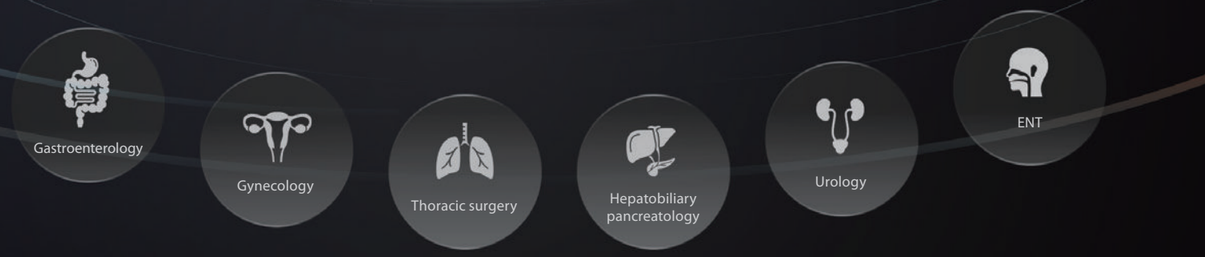
Endoscope Light Source
White Light/Fluorescence
• Recommend: HB500R

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

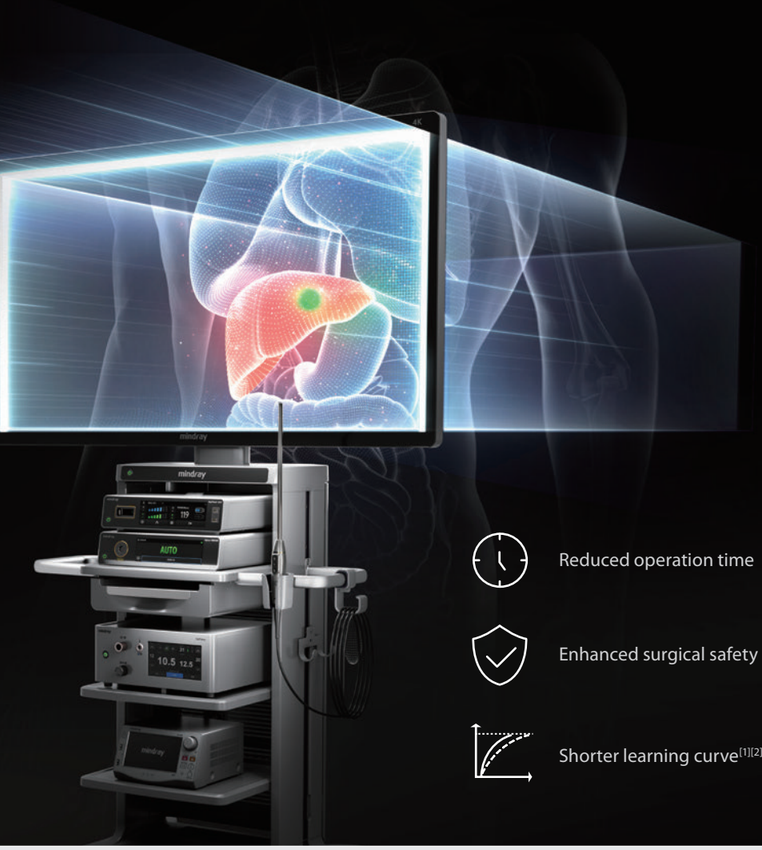


3D Intelligent Bionics,
Natural Space Perception

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

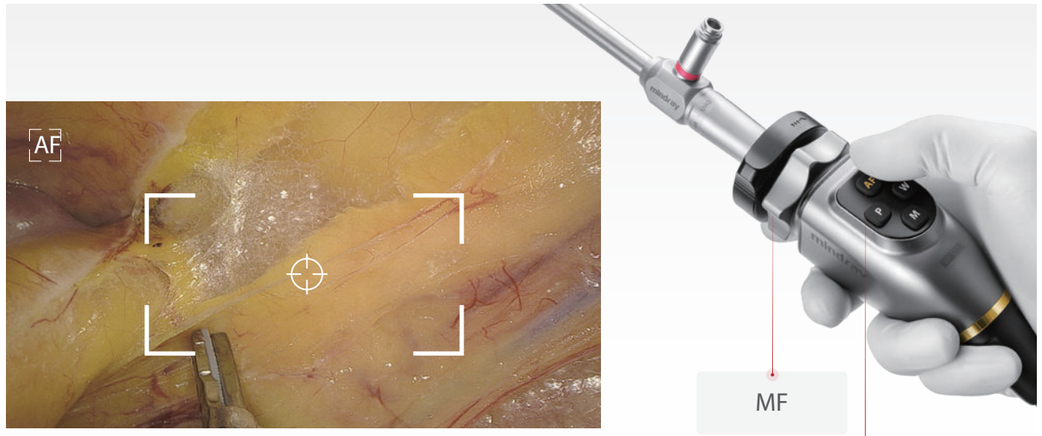
Weighs only 420 g
Titanium alloy handle, sturdy yet lightweight, allowing for easy maneuverability

[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

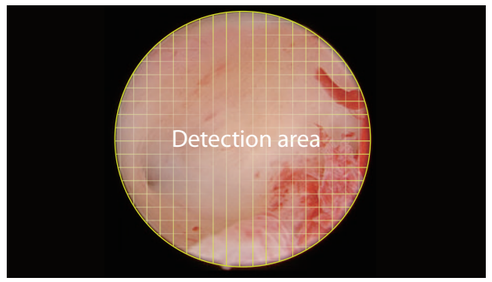


AutoFocus and high quality image achieved with one touch

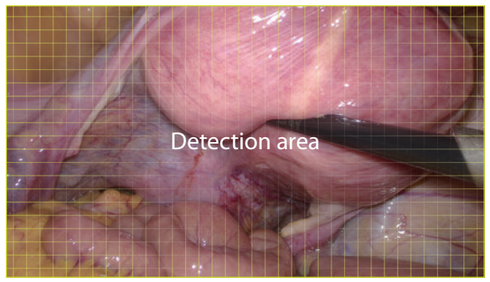
Automatic scene recognition

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.



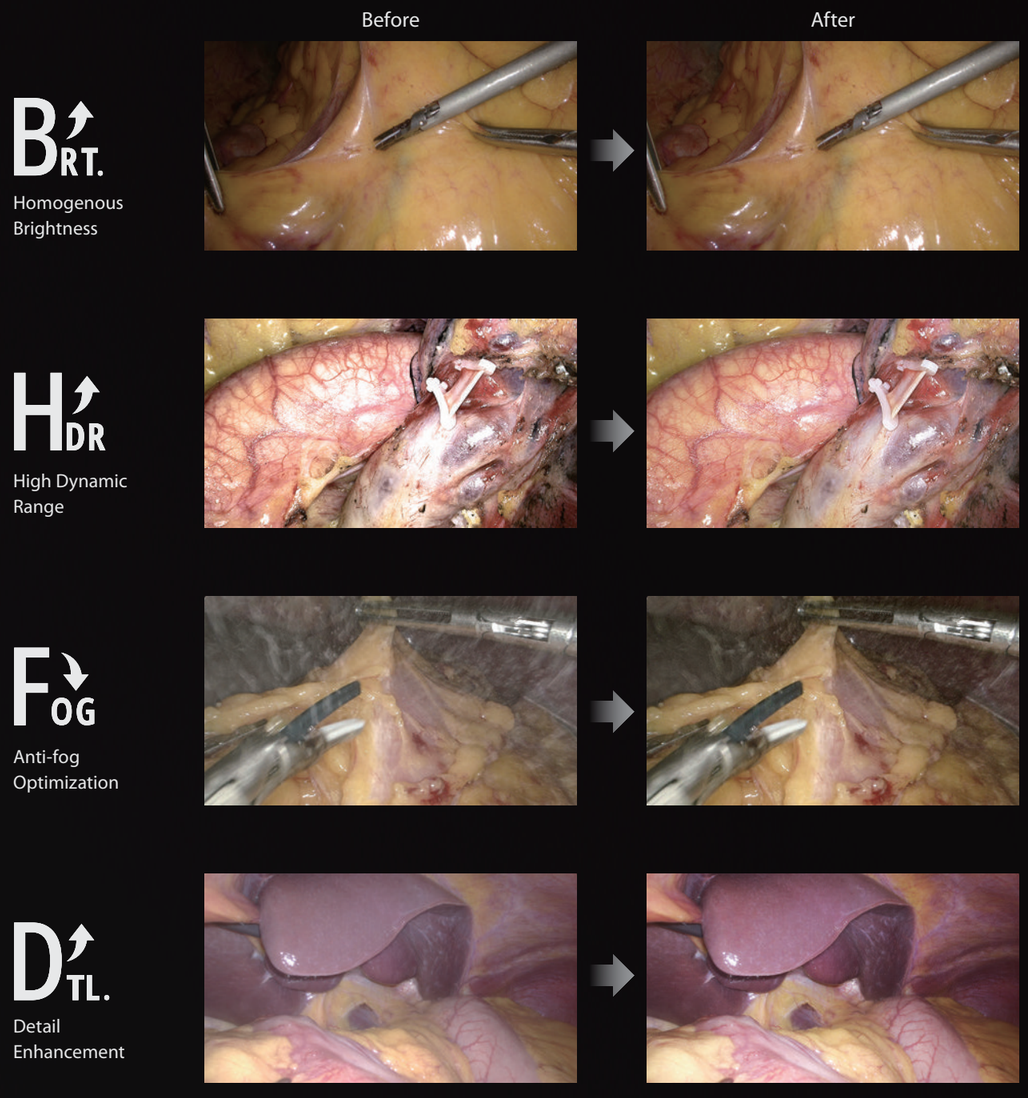
Small diameter scope scene (e.g. hysteroscope)



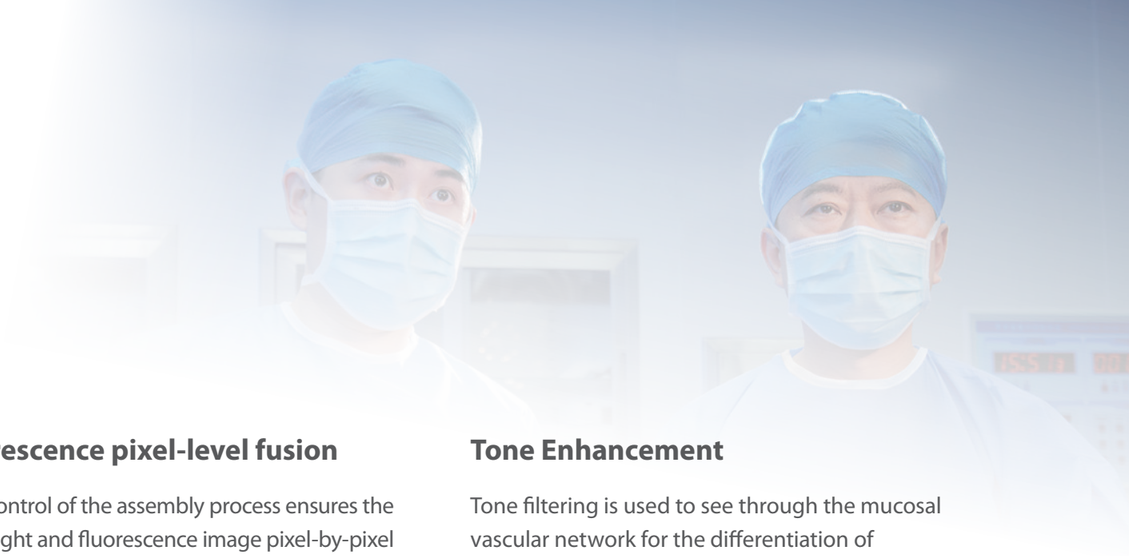
Laparoscope scenario

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



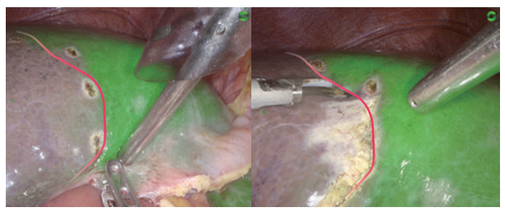
eFluo The fluorescence technology significantly boosts detection sensitivity and fluorescence imaging stability, leading to more precise navigation

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.

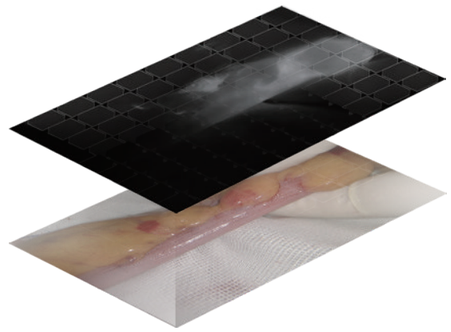
eFlo stabilization algorithm

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.



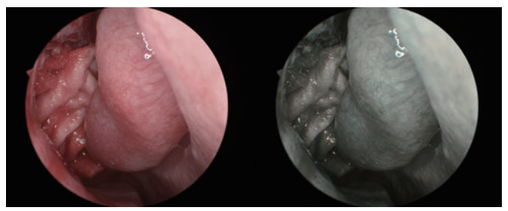
Fluorescence pixel-level fusion

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.



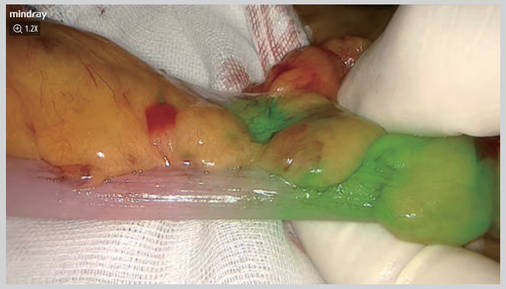
Tone Enhancement

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

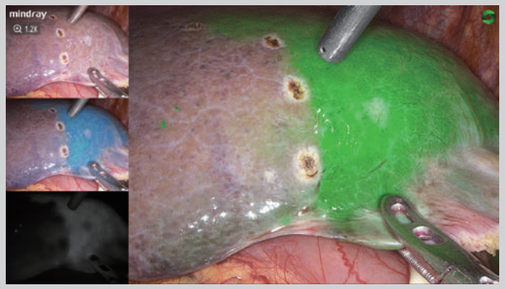


Clinical Cases

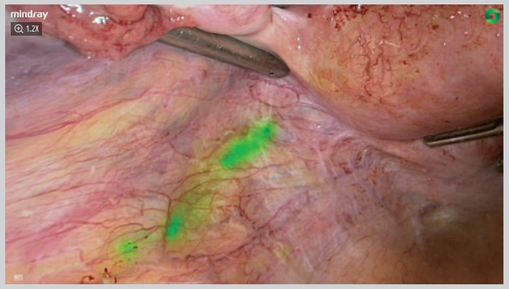
Evaluation of colorectal anastomotic blood supply



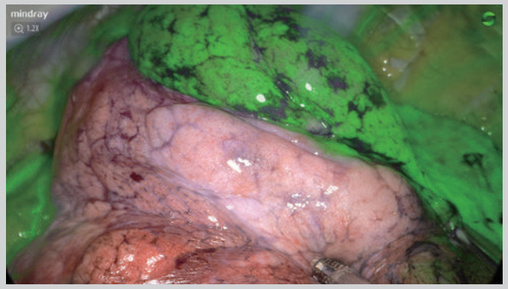
Laparoscopic liver watershed resection



SLN mapping in endometrial cancer



Anatomic subpulmonary lobe resection

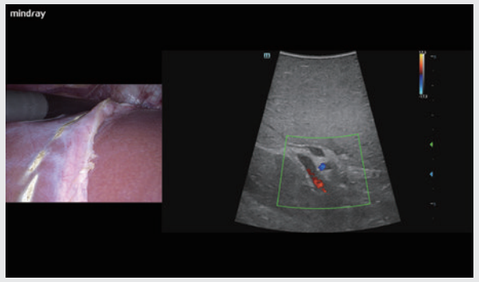


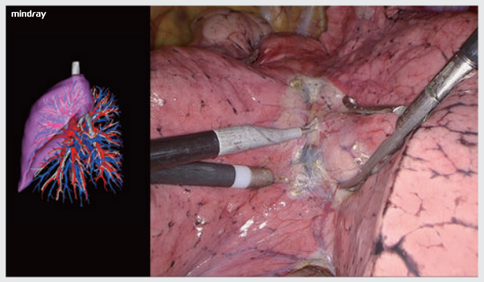
MIS Ecosystem
Unlimited Possibilities

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.

User Manual（用户手册）

S5580P

55” 4K Surgical Medical Display

55” 4K 手术医用显示器

6 Technical specification

Monitor characteristics：	
Panel	55”, TFT, color, LCD panel, anti-glare, hard coating
Active area（H x V）	1209.6±0.1 (H) x 680.4±0.1 (V) mm
Pixel pitch	0.315(H) x 0.315(V) mm
Resolution	3840 x 2160
Refresh rate	60 Hz
Color depth	10 bit
Contrast ratio (Typ. of panel)	1450:1
Viewing angle（CR > 10）	Horizontal: 178°
	Vertical: 178°
Luminance (Typ. of panel)	700cd/m^2
Backlight Type	WLED
Lifetime of backlight (Min.)	50000 hours
Response time (Typ.)	Ton:10ms, Toff:8ms
Power supply：	
Line voltage	AC100～240V
Current consumption	3.5 ~ 1.5 A
Power consumption (Max.)	<260W
Power consumption (Standby)	< 30W
Control and connection：	
Front	Power indicator Touch keypad
Bottom right	Control key
Back	DVI-IN *1/OUT *1 12G-SDI IN *1/OUT *1 3G-SDI IN *1/OUT *1 HDMI *1 RS232 *1 Ground stud*1 AC socket*1 Power switch*1
Mechanical characteristics：	
Housing components	metal
Ventilation openings	Natural heat dissipation
Protection level	Front IP45, Back IP20

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.				

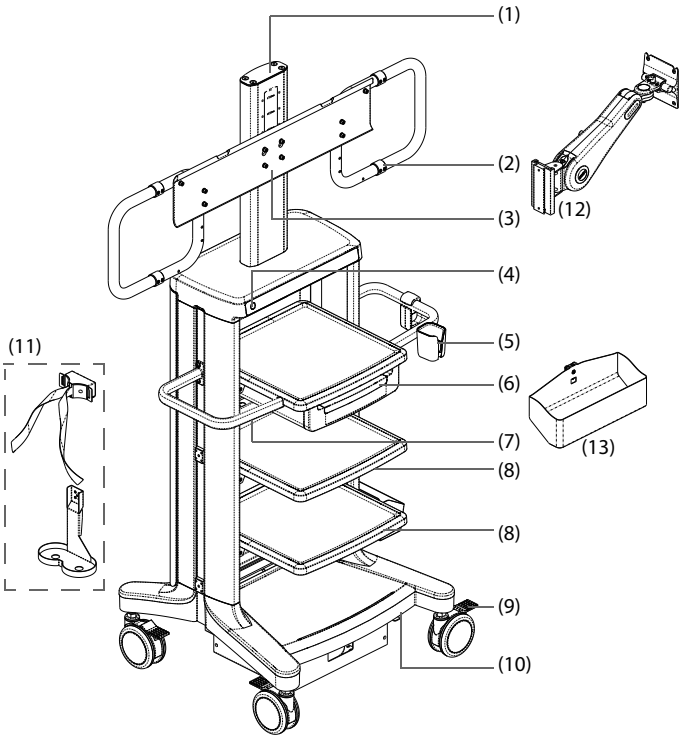
NOTE

- **√ 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.

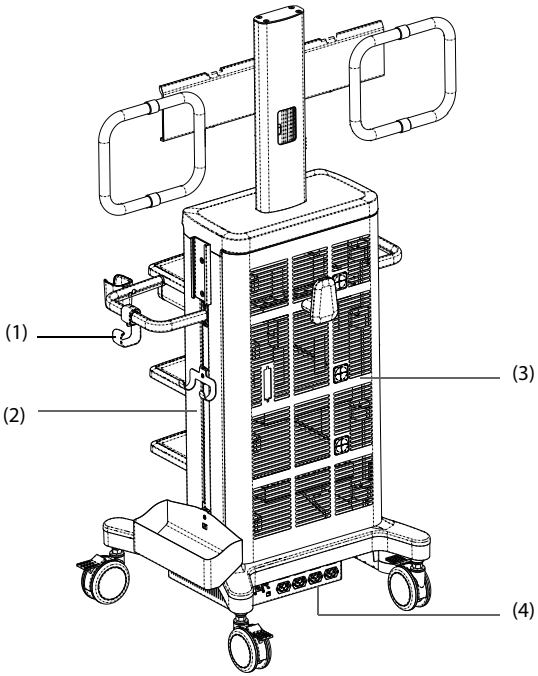
(10) Base plate: an isolation transformer (if configured) is installed under the base plate.

(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.

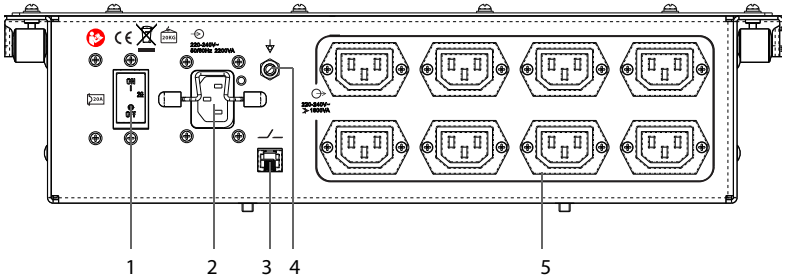
(2) Trolley column: accessories such as the monitor arm and footswitch holder are secured on the slide rail of the trolley column.

(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.

- **Keep the equipment dry. Do not move the equipment directly from a place of low temperature to a warm one, which may cause condensation or water drops, resulting in a short circuit.**

NOTE

- **Put the equipment in a location where you can easily view and operate the equipment.**
- **Keep this manual in the vicinity of the equipment so that it can be obtained conveniently when needed.**
- **Save the packing case and packaging materials for possible shipment or storage in the future.**

3.3 Unpacking and Checking

Before unpacking, examine the packing case carefully for signs of damage. If any damage is detected, contact the carrier immediately. Open the package and remove the equipment and accessories carefully. Check all materials against the packing list and check for any mechanical damage. Contact Mindray in case of any problems.

3.4 Environmental Requirements

The operating environment of the equipment must meet the requirements specified in this manual.

The environment where the equipment is used should be reasonably free from noises, vibration, dust, as well as corrosive, flammable, and explosive substances.

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 Fixing Position of the Monitor Stand

The mobile trolley can be configured with one of the following monitor stands:

Model	32-Inch Monitor Stand (Without Pan/Tilt Functions)	32-Inch Monitor Stand (With Pan/Tilt Functions*)	55-Inch Monitor Stand
TV-300	√	√	×
TV-300T(200V)	√	√	×
TV-300T(110V)	√	√	×
TV-500	×	√	√

Model	32-Inch Monitor Stand (Without Pan/Tilt Functions)	32-Inch Monitor Stand (With Pan/Tilt Functions*)	55-Inch Monitor Stand
TV-500T(200V)	×	√	√
TV-500T(110V)	×	√	√
*: The monitor stand provides up to 20° tilting movement and 75° panning movement.			

NOTE

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

You can select the position of the monitor stand as needed. A 32-inch monitor stand can be adjusted to the following 3 heights:

- 1600 mm (center of the monitor)
- 1650 mm (center of the monitor)
- 1700 mm (center of the monitor)

A 55-inch monitor stand can be adjusted to the following 2 heights:

- 1650 mm (center of the monitor)
- 1630 mm (center of the monitor)

3.6 Fixing Position of the Shelves

The mobile trolley has 4 layers of space. The distance between shelves (excluding the thickness of the shelves) is as follows:

- Layer 1: 202 ±5 mm
- Layer 2: 200 ±5 mm
- Layer 3: 200 ±5 mm
- Layer 4: 200 ±5 mm

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.

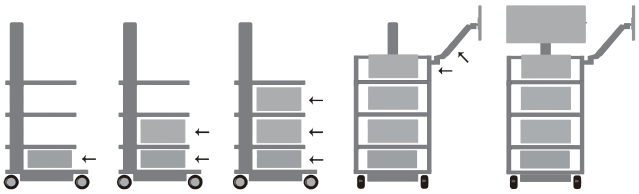
CAUTION

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

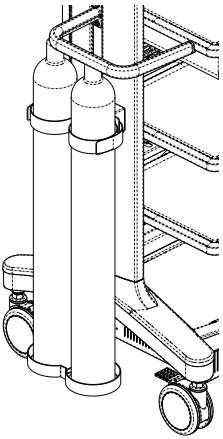
4.4.1 Loading Devices onto the Trolley

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.

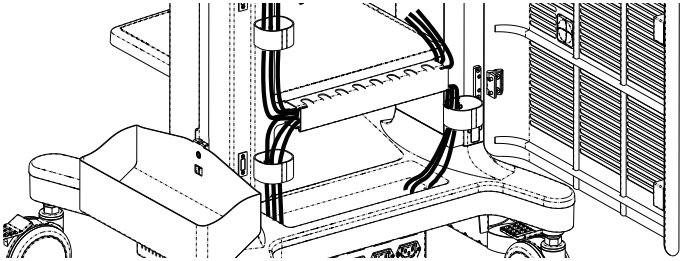
WARNING

- **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.

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:

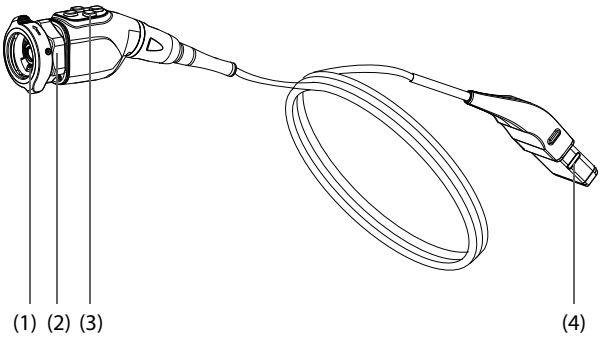
Model	Standard Cable Length	Function
CH5-SW100	4.5m	Supports white light imaging.
CH5-SW110	3m	Supports white light imaging.
CH5-SR100	4.5m	Supports white light and fluorescence imaging.
CH5-SR110	3m	Supports white light and fluorescence imaging.

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.

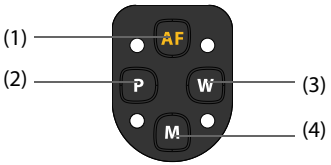
(2) Focusing ring: rotate the ring to focus the camera head.

(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

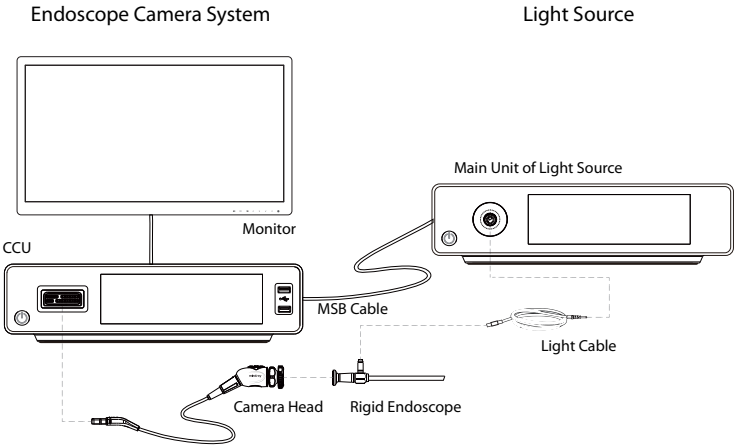
- **You are advised to install the main unit on a stable trolley rather than on the floor.**
- **If the equipment is to be used with a trolley, there will be risks of falling or collision during movement. For more safety instructions, refer to the instructions for use accompanied with the trolley.**
- **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.

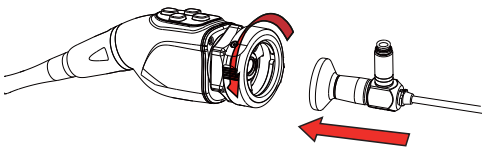
3.6.1 System Connection

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

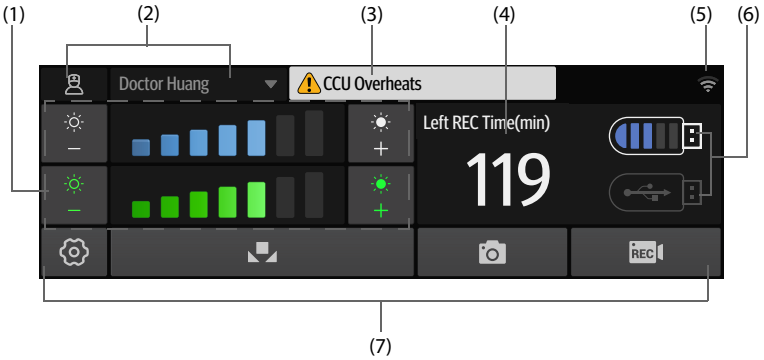
The equipment is configured with a LCD touchscreen on which you can operate and set the equipment, and view operation information.

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.

Button	Description	Button	Description
	(Green) Fluorescence decrease button: select to decrease the fluorescence intensity.		(Green) Fluorescence increase button: select to increase the fluorescence intensity.
	(White) Brightness decrease button: select to decrease the brightness of the image displayed.		(White) Brightness increase button: select to increase the brightness of the image displayed.
	User configuration button: select to display the user configuration menu.		

3.7.4 Using the On-Screen Keyboard

The on-screen keyboard enables information entry:

- Enter the information by selecting one character after another.
- Select the Switch key to switch the input method.
- Select the Space key to add space.
- Select the Caps Lock key to access uppercase letters.
- Select the Page turn key or to turn pages.
- Select the Special Character key **&%** to access the page of special characters.
- Select the Backspace key to delete single characters or select the Clear key to delete the entire entry.
- Select **OK** to confirm the entry and close the on-screen keyboard.

3.7.5 Locking/Unlocking the Touchscreen

The touchscreen can be automatically locked to avoid inadvertent operations. When this function is enabled, the touchscreen will be locked automatically if no operation is detected in one minute. For setting method, refer to ***5.7.1.3 Setting Lock Screen Function***.

When the touchscreen is locked, is displayed on the bottom of the touchscreen. To unlock the touchscreen, follow the procedure below:

1. Tap anywhere on the touchscreen. An unlocking bar is displayed:

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

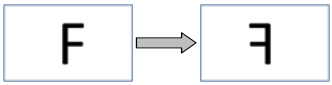
Select the brightness increase button + or brightness decrease button − on the main screen to adjust the image brightness. The brightness slider in the middle indicates the current brightness level. You can also drag the slider to the left or right to adjust the brightness.

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***.

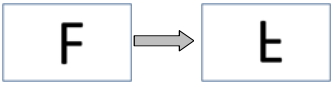
4.10 Adjusting Fluorescence Intensity

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.

3. Switch on or switch off **Horizontal Flip** or **Vertical Flip**. The horizontal and vertical flips are shown below:

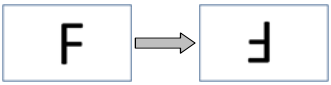


Horizontal flip



Vertical flip

4. Switch on or switch off **Rotate 180°**. An image that is rotated by 180° is shown below:



5. Switch on or switch off **Freeze**.
6. After connecting a camera head, switch on or switch off **Adaptive Zoom**.
   - If it is switched on, the adaptive image field function is enabled. The CCU automatically adjusts the image display mode according to the camera format.
   - If it is switched off, the adaptive image field function is disabled, and the image is centered on the monitor.

NOTE

- **The maximum magnification of images is 3.0x. To adjust the magnification threshold, refer to *5.7.1.4 Setting Image Zoom Threshold*.**

5.3.2 Setting Display Mode

To the display mode, follow the procedure below:

1. In the setup menu, select **Display → Display Mode**.
2. Select **WhiteLight**, **Overlay**, **Monochromatic**, **Intensity Map**, **WL-Quad Screen**, **OL-Quad Screen**, **Mono-Quad Screen**, or **IS-Quad Screen**.

For detailed introduction of each mode, refer to ***4.13 Switching Display Modes***.

5.3.3 Setting External Input Source

You can connect an external input source to the HDMI in 3 connector on the rear panel of the CCU. To set the external input source, follow the procedure below:

1. In the setup menu, select **Display → External Source**.
2. Set **Display External Source** to **Pic-In-Pic** or **Dual-Screen Display**.
3. If one monitor is connected, you can select **Pic-In-Pic**, and set **Real-Time Display**.
   - When **Close** is selected, the monitor will display only image captured by the system.

- 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.**

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.

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.

5.7.1.1 Setting Timer

To set the timer, follow the procedure below:

1. In the setup menu, select **System** → **General Setup**.
2. Switch on or switch off **Counter**.
   - If it is switched on, the timing information is displayed on the monitor.
   - If it is switched off, the timing information will not be displayed on the monitor.

If the function of a camera button is set to **Counter**, you can also press the button to start/stop timing, or reset the timer.

5.7.1.2 Setting Logo Display

To set the main screen display, follow the procedure below:

1. In the setup menu, select **System** → **General Setup**.
2. Switch on or switch off **Logo**.
   - If it is switched on, the Mindray logo is displayed on the top left of the monitor.
   - If it is switched off, the Mindray logo will not be displayed on the monitor.

5.7.1.3 Setting Lock Screen Function

To set the lock screen function, follow the procedure below:

1. In the setup menu, select **System** → **General Setup**.
2. Switch on or switch off **Screen Lock Function**.
   - If it is switched on, the lock screen function is enabled. When this function is enabled, the touchscreen will be locked automatically if no operation is detected in one minute.
   - If it is switched off, the screen will not be locked.

5.7.1.4 Setting Image Zoom Threshold

To set the image zoom threshold, follow the procedure below:

1. In the setup menu, select **System** → **General Setup**.
2. Set **Image Zoom Threshold** to 2.0x or 3.0x.

After setting, the threshold of **Image Zoom** on the **Display** tab is changed. When you zoom in on a photo, the magnification will not change when the threshold is reached.

5.7.1.5 Setting System Language

To set the system language, follow the procedure below:

1. In the setup menu, select **System** → **General Setup**.
2. Select **Setup** on the right side of **Language&Date&Time** to access the **Language & Time Settings** screen.

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

www.mindray.com

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

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healthcare within reach

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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.

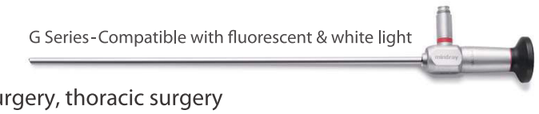
A channel diameter of Φ5.45mm ensures greater luminous flux while smoothly passing through a variety of 5mm-size trocars.

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

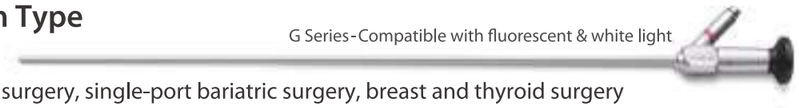


Recommended Surgery: Single-port gynecologic surgery, thoracic surgery

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

June 22, 2026

LETTER OF DECLARATION

To Whom It May Concern,

We, Nanjing Mindray Bio-Medical Electronics Co., Ltd., with registered office at 666# Middle Zhengfang Road, Jiangning, 211111, Nanjing, Jiangsu, People's Republic of China, as the manufacturer of the following Rigid Endoscope models:

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
collectively referred to as the "Rigid Endoscopes", hereby declare that the above-mentioned Rigid Endoscopes are designed and validated for steam sterilization by autoclaving.

Based on the manufacturer's validation and verification records, the Rigid Endoscopes are capable of withstanding a minimum of 500 autoclave sterilization cycles without impairment of their intended performance, safety, or essential functional characteristics.

For the avoidance of doubt, the actual service life of the Rigid Endoscopes may vary depending on use, handling, maintenance, reprocessing, and other relevant factors, of which steam sterilization is only one.

This declaration is issued upon request for the purpose of confirming the relevant technical characteristics of the above-mentioned devices.

Sincerely,

Han Le
Authorized Representative
Nanjing Mindray Bio-Medical Electronics Co., Ltd.

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	

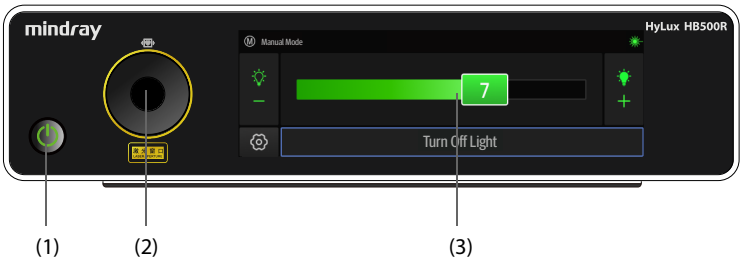
2.7 Applied Part

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



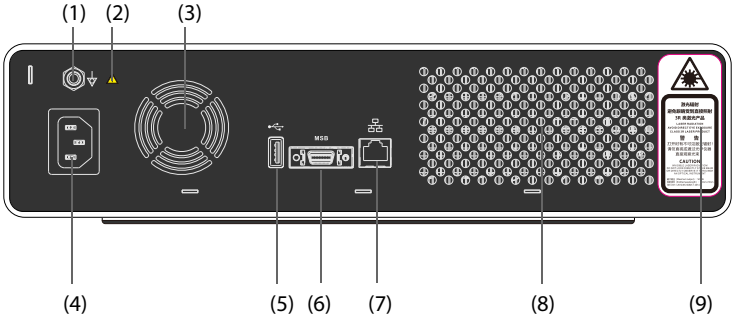
(1) Power switch: turns on or off the main unit. The switch also has an embedded light that indicates the power status of the main unit:

- 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

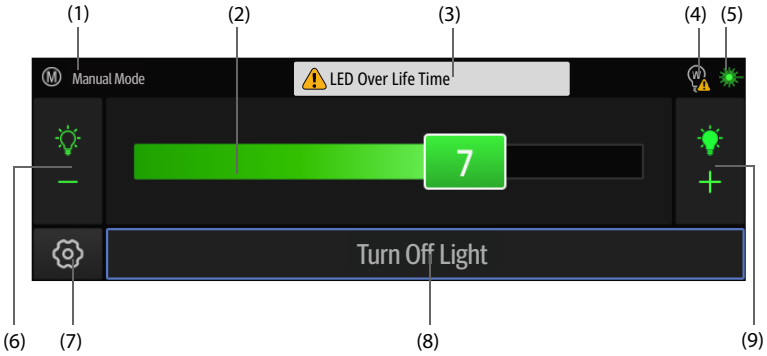
The equipment is configured with a LCD touchscreen on which you can operate and set the equipment, and view operation information.

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.

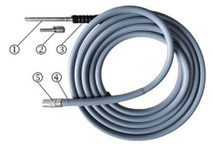
NOTE

- 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

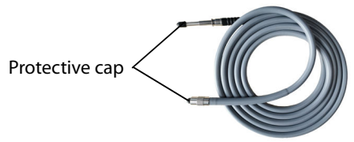
Pulling the cable may damage the product.

- 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
	Medical Device
	Manufacturer
	Date of manufacture
	TYPE CF APPLIED PART
	Batch code
	Temperature limit
	Humidity limitation
	Atmospheric pressure limitation
	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
	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.
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Website:	www.mindray.com
E-mail Address:	service@mindray.com
Tel:	+86 755 81888998
Fax:	+86 755 26582680
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

本产品及其使用说明书的知识产权属于深圳迈瑞生物医疗电子股份有限公司（以下简称迈瑞公司）。

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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

mindray和**迈瑞**是迈瑞公司的注册商标或者商标。

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。

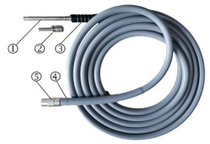
一、预期用途

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。

光纤保护套

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
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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

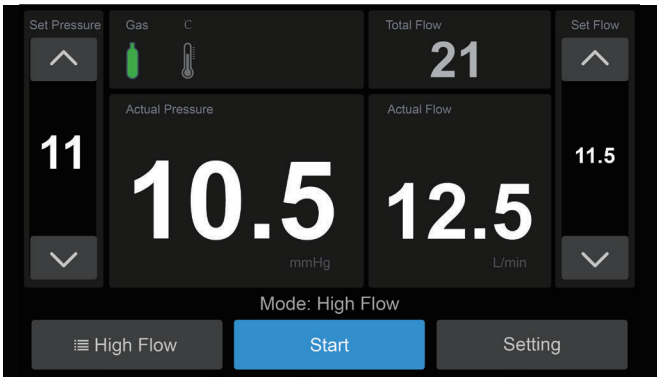
The equipment provides the following operating mode:

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

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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: 2022-6

■ Revision: 7.0

of the host power supply wire is disconnected accidentally, test data will be lost.

4.1.6 Connecting the Insufflator Tube

WARNING

- **The pipe fittings and joints are not sterile. Please clean and sterilize the pipe fitting according to local laws and regulations and infection control requirements.**
- **In order to prevent cross infection caused by the backflow of body fluid (such as blood) when the exhaust valve is opened, a bacteria filter must be used between the insufflator main machine and the insufflator tube. Please use eligible bacteria filter in accordance with the laws and regulations. Even if the exhaust valve is closed, Mindray also strongly suggests using the bacteria filter.**
- **Take the filter out of the package, and check if there is any damage. If any damage or anomaly is found, do not use the filter.**
- **Repeated uses of unsterilized bacteria filter might cause cross infection, so a repetitive bacteria filter shall be sterilized before each use. If a disposable bacteria filter is used, be sure to insert a new one before each use.**
- **Do not try to adjust the pipe fitting by cutting, adhering, or connecting multiple pipe fittings.**
- **If the pipe fitting is damaged, please replace a new one.**
- **The residual water drops on/inside the pipe fitting will damage internal sensors (such as causing short circuit) or lead to electric shock. Please dry the pipe fitting thoroughly before use.**
- **Do not bend the insufflator tube.**
- **Please use insufflator tubes that conform to biological compatibility.**

NOTE

- **For one insufflator, between the insufflator tube and the heating insufflator tube, only one of them can be chosen for connection.**
- **Be sure to use the bacteria filter inside the package, or purchase disposable filters that Mindray recommends: model 800-51800 of VADI brand (with a filtering aperture of 0.2um); please contact Mindray for details.**

4.1.6.1 Connecting the Insufflator Tube

1. Connect the sterilized pipe fitting to the sterilized Luer-lock.

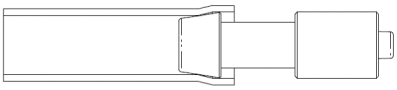


Figure 4-7 The pipe fitting connects with Luer-lock

2. Please install the filter between the insufflator tube and the insufflator's CO_2 gas injection interface. As shown in Figure 4-8.

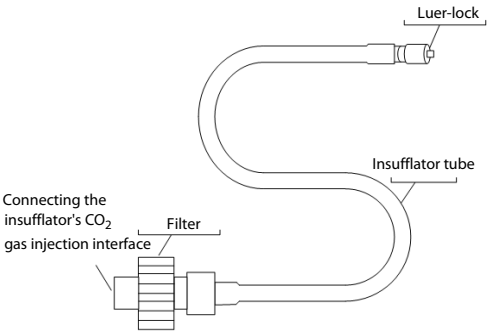


Figure 4-8 Installed insufflator pipe fitting (using filter)

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 4-9.

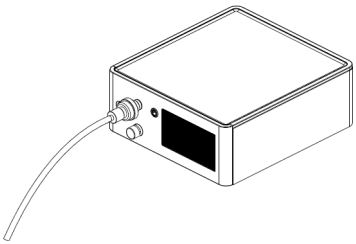


Figure 4-9 The insufflator pipe fitting connects with the insufflator (using filter)

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 4-7.
2. Please install the filter between the insufflator tube and the insufflator's CO_2 gas injection interface. As shown in Figure 4-10.
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.

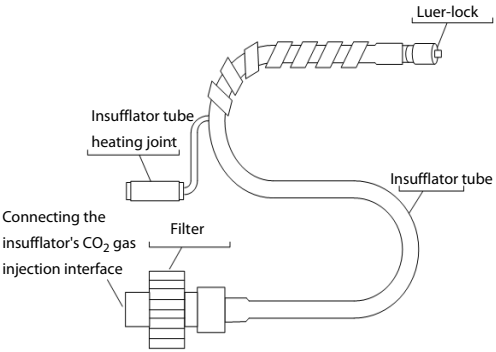


Figure 4-10 Installed heating insufflator pipe fitting (using filter)

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

1. Connect the Luer-lock, transparent hose, adapter tube, and slim tube. As shown in Figure 4-11.

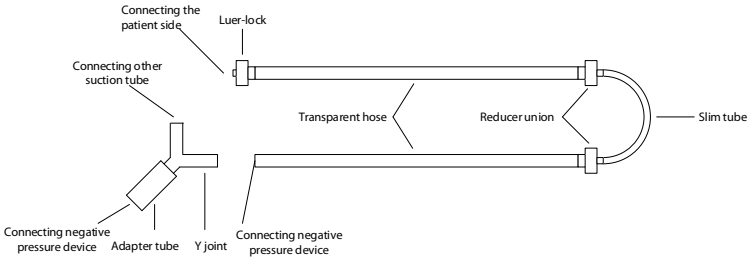


Figure 4-11 Installation of the suction pipe fitting

2. Connect the Luer-lock of the sterilized suction tube to the joint of the perforator near the part where smoke generates.

3. Clip the slim tube into the groove of the smoke 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 4-12.

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 4-11. (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 4-11.

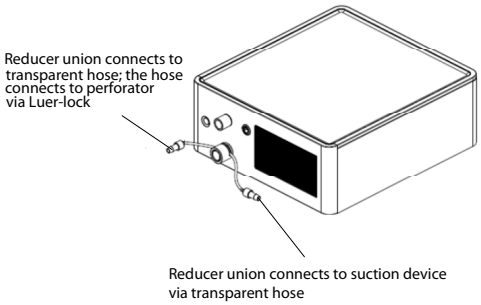


Figure 4-12 Connection diagram of the suction tube

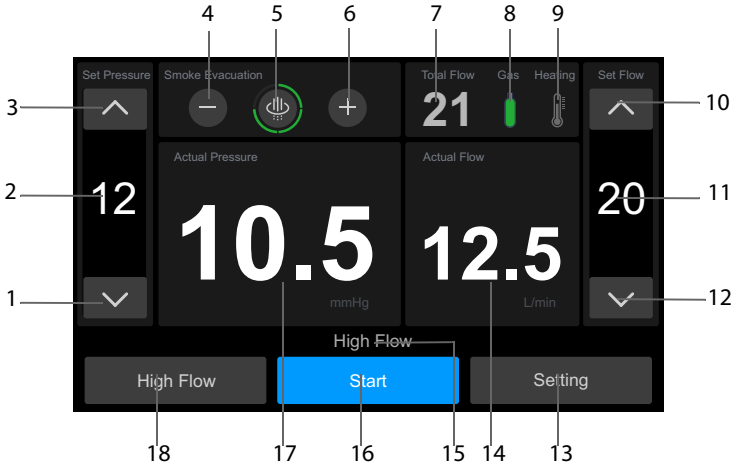
NOTE

- **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**

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 smoke exhausting rate
(5)	Smoke exhausting indicator
(6)	Increase smoke 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 smoke in the abdominal cavity, the foot switch can be treaded to exhaust smoke; if smoke 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.**

No.	Description
1	Power cord (EU, 2.5 m)
2	Power cord (International, 250 V, 10 A, 2.5 m)
3	Power cord (US, 110 V, 13 A, 2.5 m)
4	Power cord (US, 110 V, 13 A, 2.5 m)
5	Power cord (Brazil, 250 V, 10 A, 3 m)
6	Power cord (UK)
7	Power cord (India, 1.8 m)
8	Power cord (South Africa, 250 V, 16 A, 3 m)
9	Power cord (Australia)
10	Serial port cable
11	Grounding cable

No.	Description
12	FUSE Time-lag 250V 3.15AD5X20
13	Heating insufflator tube (2.9m)
14	Reusable insufflator tube (2.9m)
15	Reusable suction tube (2.9m)
16	Heating insufflator tube (4.5m)
17	Reusable insufflator tube (4.5m)
18	Reusable suction tube (4.5m)
19	Central gas supply pipe (German)
20	Central gas supply pipe (DISS)
21	Central gas supply pipe (Japan)
22	Disposable bacterial filter, large size
23	Reducing valve filter kit, 5um
24	Wrench
25	Foot switch
26	Foot switch extension cord
27	Reusable connector, straight, 22-10
28	CO_2 hight pressure tube (CGA320)
29	CO_2 hight pressure tube (DIN477)
30	CO_2 hight pressure tube (YORK940)
31	CO_2 hight pressure tube (ISO5145)
32	CO_2 hight pressure tube (BS341)
33	Pressure regulator, 452C-150 (CGA320)
34	Pressure regulator, 452C-150 (DIN477)
35	Pressure regulator, 452C-150 (YORK940)
36	Pressure regulator, 452C-150 (ISO5145)
37	Pressure regulator, 452C-150 (BS341)
38	CO_2 low pressure tube (DISS)

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

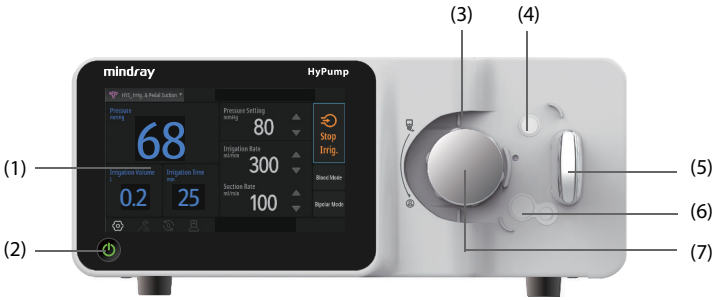
- **"√" indicates "configured" while "x" indicates "not configured".**

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.

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

Input voltage	100-240VAC
Frequency	50/60Hz
Input current	0.6-1.5A
Fuse	5HT10-R'(250V)

A.4 Physical Specifications

Width x Height x Depth (main unit, excluding rubber feet)	HP100G: 345 x 140 x 355 mm HP200G/HP200L/HP200D: 345 x 165 x 355 mm
Weight (main unit)	≤ 8.8 kg

A.5 Hardware Specifications

Display	7 inches touchscreen Resolution ≥ 800 pixels × 480 pixels