mindray

HS-50F

50L High Flow Insufflator

Ultimate Experience
Intelligent Control

HS-50F

Main features

High Speed Insufflation

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

Gas Heating Functions

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

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

Multi-modes available

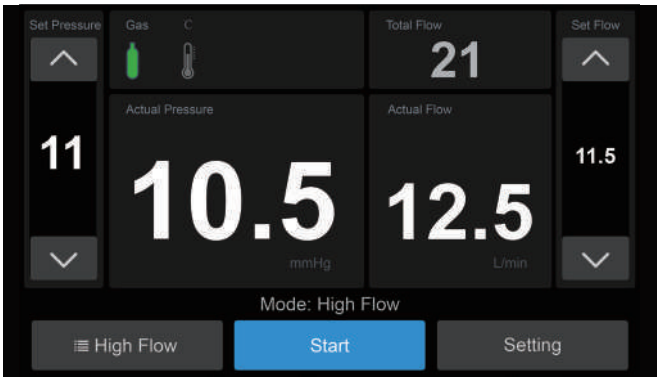
The equipment provides the following operating mode:

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

Automatic Smoke Evacuation

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

User-friendly design



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

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

Specifications

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

www.mindray.com

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

mindray
healthcare within reach

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

Insufflator

Operator's Manual

CE 0123

- Release time: 2024-12
- Revision: 13.0

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

4.1.6 Connecting the Insufflator Tube

WARNING

- **The tube sets and joints are not sterile. Please clean and sterilize the tube sets 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 reusable 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 tube sets by cutting, adhering, or connecting multiple tube sets.**
- **If a tube is damaged, please replace a new one.**
- **The residual water drops on/inside the tube sets will damage internal sensors (such as causing short circuit) or lead to electric shock. Please dry the tube sets 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. The insufflator can identify the connected heating insufflator tube.**
- **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 tube to the sterilized Luer-lock.

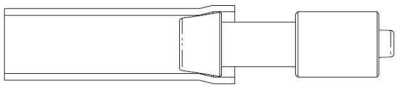


Figure 4-7 The tube connects with Luer-lock

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

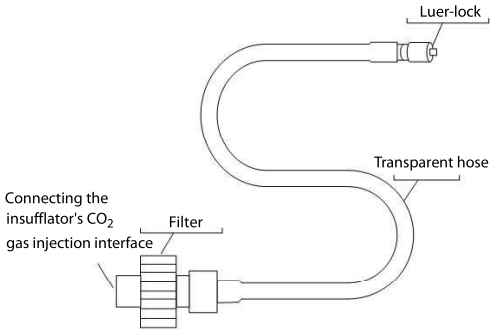


Figure 4-8 Installed insufflator tube (using filter)

3. Connect the installed tube to the CO_2 gas injection interface of the product. Guarantee that the interface is well inserted. As shown in Figure 4-9.

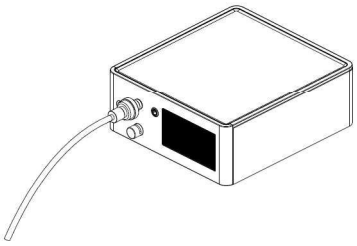


Figure 4-9 The insufflator tube connects with the insufflator (using filter)

WARNING

- **The Luer-lock can only be used to connect the tube. 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 tube 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 tube to the CO_2 gas injection interface of the product. Guarantee that the interface is well inserted.
4. Connect the heating joint to the heating interface on the front panel of the product.

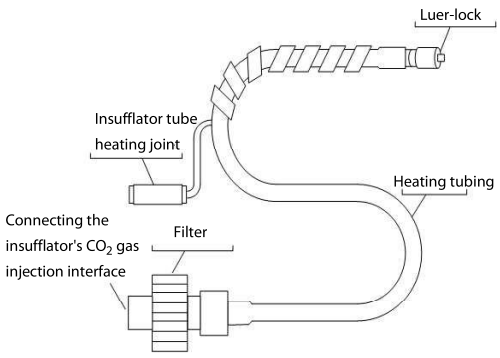


Figure 4-10 Installed heating insufflator tube (using filter)

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.

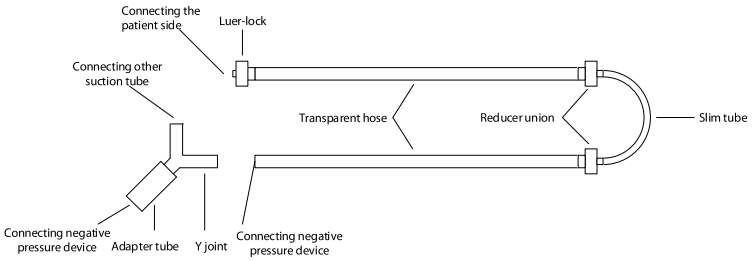


Figure 4-11 Installation of the suction tube

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

3. Clip the slim tube into the groove of the smoke exhaust valve on the insufflator's front panel. To prevent the tube 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.

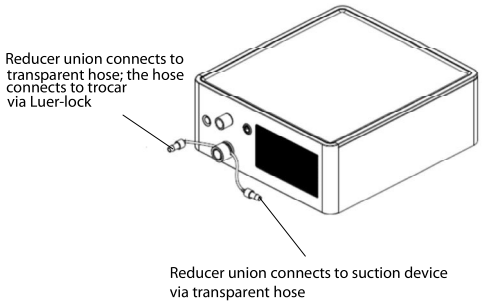


Figure 4-12 Connection diagram of the suction tube

NOTE

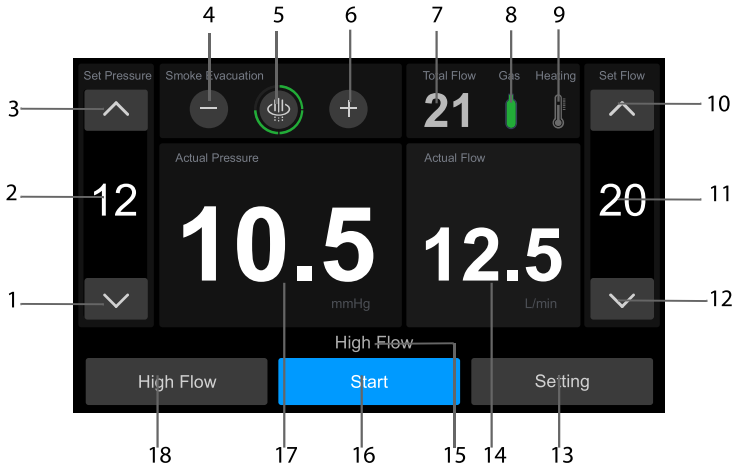
- **It is suggested to adjust the pressure range of the suction device within 0.04MPa-0.06MPa. If the negative pressure is too high, the exhaust will be**

- **After startup, test whether individual parts are working normally, such as functions of smoke exhaust, heating, and setting pressure and flow.**

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 gas consumption (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 operating 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.

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 mode: 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 trocar 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.

This page intentionally left blank.

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.**

7.1 Insufflator Accessories

No.	Accessory
1.	Reusable Insufflator Tube (2.9m)
2.	Reusable Insufflator Tube (4.5m)
3.	Heating Insufflator Tube (2.9m)
4.	Heating Insufflator Tube (4.5m)

7.2 Other Devices Also Compatible

The following medical devices are also compatible with the insufflator. To purchase these devices contact Mindray.

No.	Device
1.	Disposable Bacteria Filter, Large Size
2.	Foot Switch
3.	CO2 Reducing Valve (452C-150 GB)
4.	CO2 Reducing Valve (452C-150 CGA320)
5.	CO2 Reducing Valve (452C-150 DIN477)
6.	CO2 Reducing Valve (452C-150 CGA940)
7.	CO2 Reducing Valve (452C-150 ISO5145)
8.	CO2 Reducing Valve (452C-150 BS341)
9.	Reusable Suction Tube (2.9m)
10.	Reusable Suction Tube (4.5m)
11.	Central Gas Supply Pipe (German)
12.	Central Gas Supply Pipe (DISS)
13.	Central Gas Supply Pipe (Japan)
14.	Central Gas Supply Pipe (French)
15.	Central Gas Supply Pipe (British)
16.	Central Gas Supply Pipe (SYS)
17.	Central Gas Supply Pipe (Ohmeda)
18.	CO2 Low Pressure Tube (GB)
19.	CO2 Low Pressure Tube (DISS)
20.	CO2 High Pressure Tube (GB)
21.	CO_2 High Pressure Tube (CGA320)
22.	CO2 High Pressure Tube (DIN477)
23.	CO2 High Pressure Tube (CGA940)
24.	CO2 High Pressure Tube (ISO5145)
25.	CO2 High Pressure Tube (BS341)
26.	Straight Connector

HP100G/

HP200G/HP200L/HP200D

Fluid Management System

Operator's Manual

CE 1639

- Release time: 2023-8
- Revision: 3.0

2.7 Applied Part

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

2.8 Function Differences Among Models

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

NOTE

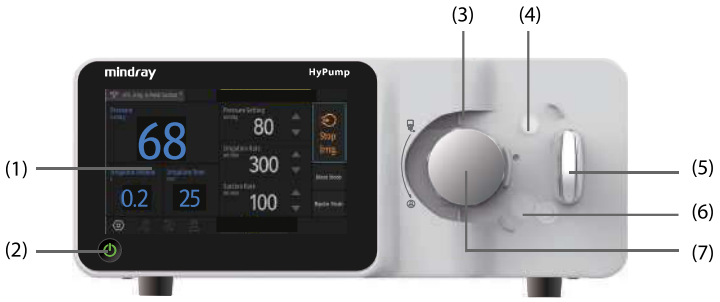
- **"√" indicates "configured" while "x" indicates "not configured".**

2.9 System Components

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

2.9.1 Front View of the Main Unit

■ The front view of HP100G is as follows:



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

10 Accessories

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

WARNING

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

CAUTION

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

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

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

A.6 Product Performance

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

EP300

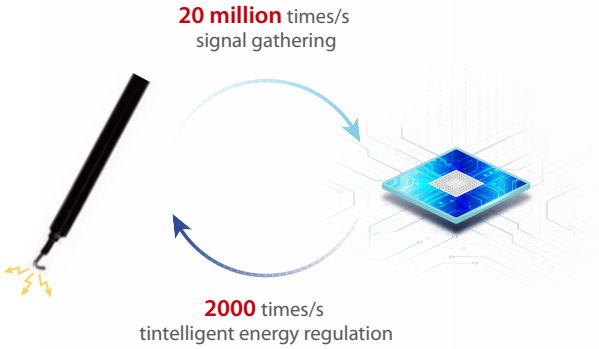
Electrosurgical Platform

Empower Your Experience with Smarter Algorithms

Better Compatibility

Socket	Compatible Plug
Monopolar sockets	4mm 3-pin banana plug
	4mm 1-pin banana plug
	8mm 1-pin monopolar plug
	9mm coaxial 2-pin monopolar plug
Bipolar socket	4mm 2-pin banana plug
	8mm coaxial 2-pin bipolar plug

Precise Energy Control



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

Extraordinary Energy Compensation

By providing precise compensation for transmission loss and remaining immune to aging attenuation, the exclusive algorithm ensures consistent energy delivery to tissues, maintaining a constant output energy value as set.

www.mindray.com

P/N:ENG-Electrosurgical Platform-210285X2P-20230719

mindray
healthcare within reach

EP300/EP300B/EP300C/EP300D

Electrosurgical Platform

Operator's Manual

CE 1639

- Release time: 2023-8
- Revision: 3.0

2.10.1.1 Front View of EP300 Series Generator

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

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

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

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

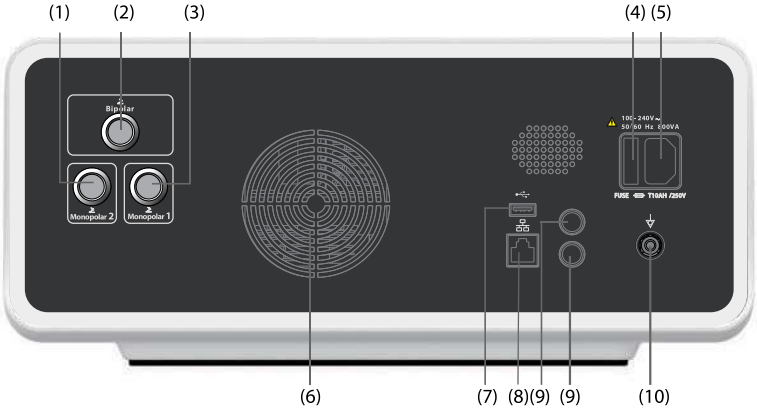
(5) Monopolar socket 2 (applied part): connects a monopolar instrument.

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

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

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

2.10.1.2 Back View of EP300 Series Generator



(1) Monopolar footswitch socket: connects a double-pedal footswitch for the HF instrument to control the activation of the monopolar instrument attached to monopolar socket 2.

(2) Bipolar footswitch socket: connects a single-pedal footswitch for the HF instrument to control the activation of the bipolar instrument, or connect a double-pedal footswitch for the HF instrument to control its right pedal (blue).

(3) Monopolar footswitch socket: connects a double-pedal footswitch for HF instrument to control the activation of monopolar instrument attached to monopolar socket 1.

(4) Fuse holder: a compartment that keeps the fuse.

(5) AC (Alternating Current) power input: connects the AC Mains.

(6) Ventilation outlet: is used for heat dissipation.

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

(8) Network connector: supports data transmission.

(9) CAN (Controller Area Network) connector: connects external devices.

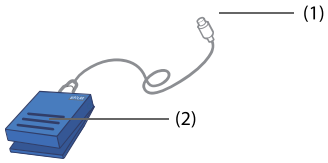
(10) Equipotential grounding terminal: when using the equipment together with other devices, connect their equipotential grounding terminals together to eliminate potential difference.

2.10.2 Footswitch

The product can be configured with the following types of footswitches:

- Single-pedal footswitch for HF instrument
- Double-pedal footswitch for HF instrument

2.10.2.1 Single-Pedal Footswitch for HF Instrument



(1) Generator connector: connects the generator

(2) Pedal: activates bipolar coagulation modes

2.10.2.2 Double-Pedal Footswitch for HF Instrument

(1) Generator connector: connects the generator

(2) Left pedal (yellow): activates monopolar cutting modes

(3) Right pedal (blue): activates monopolar/bipolar coagulation modes

2.11 Indicator Lights on the Generator

Indicator Light	Position	Color	Description
Power indicator	On the power switch	Orange	The system is connected to power supply.
		Green	The power switch is pressed.
Socket indicators	On the instrument sockets	White	The instrument is connected but not activated.
		Yellow	A cutting mode of HF instrument is activated.
		Blue	A coagulation mode of HF instrument is activated.

Indicator Light	Position	Color	Description
Return electrode indicators	On the right of the return electrode socket	Red	A failure occurs to the return electrode circuit.
		Green	The return electrode is correctly connected.

2.12 Audio Indicators of the Generator

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

CAUTION

- **The alarm tone is different from the prompt tone.**
- **Make sure that the volume of alarm tones and activation tones are adjusted to a level that can be clearly heard by the surgical team. For detailed setting methods, refer to *4.10 Setting Volume*.**

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

CAUTION

- **If using instruments not specified by Mindray, check its compatibility and especially insulation performance. Make sure that the output voltage of the generator does not exceed the rated voltage of the instruments.**
- **The weight of objects stacked on top of the equipment should not exceed 20 kg. Otherwise, equipment damage or personal injury may be caused.**
- **Regularly check that dust does not accumulate at the ventilation outlet and clean the dust to allow efficient heat dissipation.**

4.4 Starting the System

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

4.5 Check Before Operation

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

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

CAUTION

- **Do not put the system into 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 Using the Touchscreen

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

If HF instruments are connected, the touchscreen display of the EP300 series generator is as follows.

(1) Bipolar area: Power levels and modes in this area is highlighted if the bipolar instrument is connected. For detailed description, refer to *4.8.1 Operation Area for Bipolar Instrument*..

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

(3) Restore button : selects to restore the latest HF instrument settings after restart.

(4) Procedure button : select to display the Procedure menu.

(5) Monopolar area 1: Power levels and modes in this area is highlighted if the monopolar instrument is connected to the monopolar socket 1. The monopolar cutting area is highlighted in yellow, and the monopolar coagulation area is highlighted in blue. For detailed description, refer to *4.7.2 Operation Area for Monopolar Instrument*.

(6) Monopolar area 2: Power levels and modes in this area is highlighted if the monopolar instrument is connected to the monopolar socket 2. The monopolar cutting area is highlighted in yellow, and the monopolar coagulation area is highlighted in blue. For detailed description, refer to *4.7.2 Operation Area for Monopolar Instrument*.

(7) Alarm acknowledgment button : selects to turn off alarm tones. After an alarm is acknowledged, the symbol is displayed as .

4.6.1 Locking 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 *4.11.2 Setting Lock Screen Function*.

4.6.2 Unlocking the Touchscreen

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

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

2. Press and slide it to the position on the right. The touchscreen is unlocked.

4.7 Connecting Monopolar Instrument for Use

Connect a return electrode and a monopolar instrument to the generator. For detailed operation instructions of the return electrode and monopolar instrument, refer to their instructions for use.

4.7.1 Applying Return Electrode

To apply the return electrode, follow the procedure below:

1. Remove the return electrode from its package.
2. Peel the protective cover of the return electrode, and apply the return electrode to the patient body. The application area should be clean, muscular, well-perfused, and free of hair. Align the long edge of the return electrode towards the surgical site, as shown in the below examples:

4.9 Setting Brightness

To set the screen brightness, follow the procedure below:

1. Select the Setup button to display the setup menu.
2. Select **Settings**.
3. Select the Brightness Decrease button or the Brightness Increase button to adjust **Brightness**. The brightness slider indicates the current screen brightness level. You can also drag the slider to the left or right to adjust the brightness.

4.10 Setting Volume

To set the system volume, follow the procedure below:

1. Select the Setup button to display the setup menu.
2. Select **Settings**.
3. Select the Volume Decrease button or Volume Increase button to adjust **Activation/Button Volume**. The volume slider indicates the current volume level. You can also drag the slider to the left or right to adjust the volume.
4. Set **Alarm Volume**.

4.11 Performing User Maintenance

From user maintenance in the **User** menu, you can change the following settings:

- Changing system language and system time
- Changing user password
- Enabling or disabling instrument detection
- Selecting settings to be saved after power failure
- Restoring factory settings
- Checking system configuration, software version, and history record

User maintenance is password-protected and only available for authorized personnel. If you need the password to access the menu, contact relevant personnel.

To access user maintenance, follow the procedure below:

1. Select the Setup button to display the setup menu.
2. Select **Maintenance** → **User**.
3. Enter the user password.

4.11.1 Setting System Language

To set the system language, follow the procedure below:

1. On the **User** menu, select **Settings** → **Basic Settings**.

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

4.11.7 Restoring Factory Settings

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

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

4.11.8 Checking Configuration Information

On the **User** menu, select **System Information** → **Configuration Information** to check the software version, generator ID, and generator model.

4.11.9 Checking Activation Times

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

4.11.10 Viewing History Records

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

NOTE

- **A total loss of power has no impact on the history records.**

4.12 Setting Procedure

On the **Select Procedure** page, you can either add a Procedure or edit or select a saved one. Select the Procedure button on the touchscreen to display the **Select Procedure** page.

4.12.1 Adding Procedure

To add a Procedure, follow the procedure below:

1. On the **Select Procedure** page, select the **Add Procedure** window to access the **Add Procedure** page.
2. Enter a name for the Procedure and set its mode and power level.
3. Select **OK** to save the setting.

You can check the saved Procedure on the **Select Procedure** page.

4.12.2 Editing Procedure

To edit a saved Procedure, follow the procedure below:

1. On the **Select Procedure** page, select the Procedure window to be edited.
2. Select the Delete button or Edit button on the window to delete or edit the Procedure.

4.12.3 Selecting Procedure

To select a saved Procedure, follow the procedure below:

1. On the **Select Procedure** page, select a desired Procedure window.
2. Select **OK** to return to the homepage.

The selected parameter name appears behind the Procedure button on the homepage.

4.13 Removing the System from Use

To remove the system from use after the surgery or if system failure occurs, follow the procedure below:

1. Withdraw the surgical instruments from the patient.
2. Disconnect the instruments and footswitches from the generator.
3. Turn off the generator by pressing the power switch for more than 1s.
4. Reprocess the instruments, footswitches, and generator according to their instructions for use respectively.

Perform cleaning, disinfection, sterilization, and other maintenance as required by the local or your hospital's regulation.

NOTE

- **Do not shut down the generator if any HF instrument is activated. Disconnect all instruments from the generator before shutting down the generator.**

6 Energy Output Modes of Generator

6.1 Overview

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

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

6.2 Monopolar Cutting Modes

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

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

WARNING

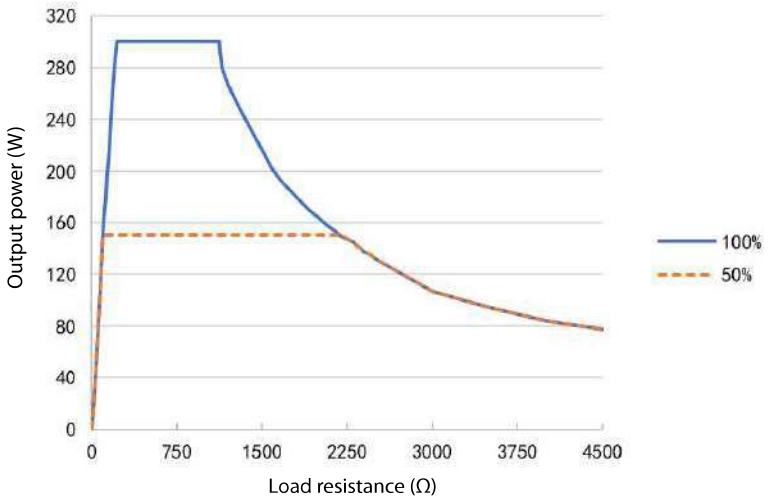
- **Any associated equipment and active accessories used in the Blend Cut mode must be rated to withstand the combination of actual voltage and crest factor.**

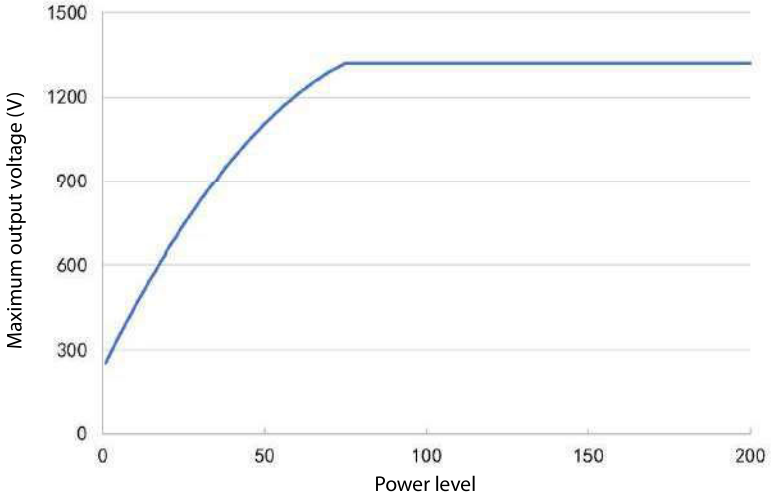
6.2.1 Technical Parameters of Monopolar Cutting Modes

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

Parameter	Pure Cut	Blend Cut
Maximum output current	1.32A	1.05A
Crest factor (rated load)	1.5 ± 0.2	2.3 ± 0.2
Power ranges and step	--; 1 - 40 W (step: 1 W); 40 - 100 W (step: 5 W); 100 - 300 W (step: 10 W)	--; 1 - 40 W (step: 1 W); 40 - 100 W (step: 5 W); 100 - 200 W (step: 10 W)

6.2.2 Characteristic Diagrams of Pure Cut Mode





6.3 Monopolar Coagulation Modes

The equipment provides three coagulation modes: Soft Coag, Fulgurate Coag, and Spray Coag. Their applicability is as follows:

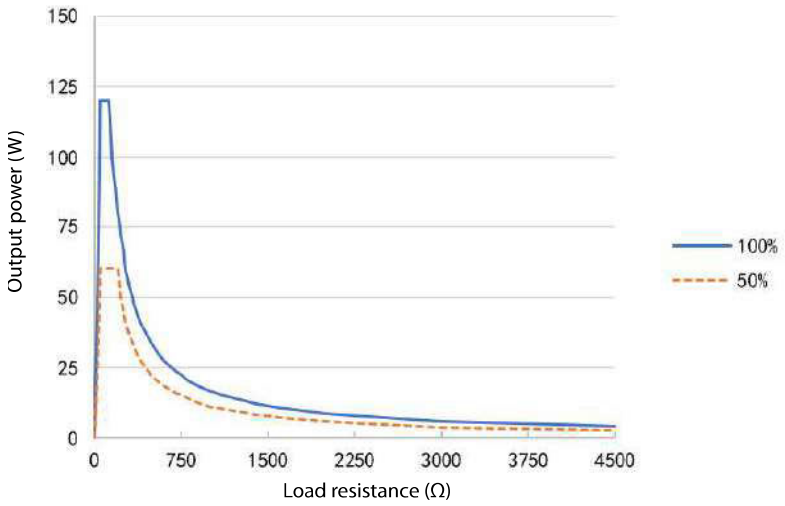
- The Soft Coag mode is applicable to slow and deep monopolar coagulation with no sparks. Using this mode causes practically no tissue carbonization or adhesions.
- The Fulgurate Coag mode is applicable to contact-free surface coagulation of tissue. This is achieved by using electrical sparks from the active electrode.
- The Spray Coag mode is applicable to contact-free surface coagulation of tissue. This is achieved by using electrical sparks from the active electrode. Compared with the Fulgurate Coag, the Spray Coag can affect larger tissue area and achieve shallower penetration depth.

6.3.1 Technical Parameters of Monopolar Coagulation Modes

Parameter	Soft Coag	Fulgurate Coag	Spray Coag
Operating frequency	434 kHz ± 10%	434 kHz ± 10%	434 kHz ± 10%
Modulation frequency	/	27.7 kHz ± 10%	21.1 kHz ± 10%
Duty cycle	100%	6.25% ± 10%	4.76% ± 10%
Rated load	100 Ω	500 Ω	500 Ω

Parameter	Soft Coag	Fulgurate Coag	Spray Coag
Rated power	120 W ± 15%	120 W ± 15%	120 W ± 15%
Maximum output voltage	264 V_p	3448 V_p	3932 V_p
Maximum output current	1.71A	1.05A	1.05A
Crest factor (rated load)	1.5 ± 0.2	5.3 ± 0.2	6.1 ± 0.2
Power ranges and step	--; 1 - 40 W (step: 1 W); 40 - 100 W (step: 5 W); 100 - 120 W (step: 10 W)	--; 1 - 40 W (step: 1 W); 40 - 100 W (step: 5 W); 100 - 120 W (step: 10 W)	--; 1 - 40 W (step: 1 W); 40 - 100 W (step: 5 W); 100 - 120 W (step: 10 W)

6.3.2 Characteristic Diagrams of Soft Coag Mode



- The Macro Coag mode is applicable to bipolar cutting and rapid coagulation. Compared with other bipolar modes, Macro Coag delivers higher voltage and greater power.

6.4.1 Technical Parameters of Bipolar Coagulation Modes

Parameter	Precise Coag	Standard Coag	Macro Coag
Operating frequency	434 kHz ± 10%	434 kHz ± 10%	434 kHz ± 10%
Duty cycle	100%	100%	100%
Rated load	100 Ω	100 Ω	100 Ω
Rated power	70 W ± 15%	70 W ± 15%	70 W ± 15%
Maximum output voltage	284 V_p	415 V_p	530 V_p
Maximum output current	1.98A	1.98A	1.87A
Crest factor (rated load)	1.6 ± 0.2	1.6 ± 0.2	1.8 ± 0.2
Power ranges and step	--; 1 - 40 W (step: 1 W); 40 - 70 W (step: 5W)	--; 1 - 40 W (step: 1 W); 40 - 70 W (step: 5W)	--; 1 - 40 W (step: 1 W); 40 - 70 W (step: 5W)

10	3.8	6.4	3.8	7.3
100	12	20	12	23

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

Note1: At 80 MHz and 800 MHz, the higher frequency range applies.

Note 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

TABLE EMC-7

No.	Name	Cable Length(m)	Shield or Not	Remarks
1.	AC power cable	5.0	Not shield	/
2.	Bipolar Cable	3.0	Not shield	/
3.	Monopolar Cable	3.0	Not shield	/
4.	Return Electrode	3.0	Not shield	/
5.	Footswitch (FS-D)	5.0	Shield	/
6.	Footswitch (FS-S)	5.0	Shield	/

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

Programe aplicații chirurgicale la unitatea electrochirurgicala EP300

Fig. EP300_1

Fig. EP300_2

Fig. EP300_3