

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

Insufflator

Operator's Manual



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- Release time: 2022-6
- Revision: 7.0



3 Functions and Parameters

3.1 Block Diagram of Overall Structure

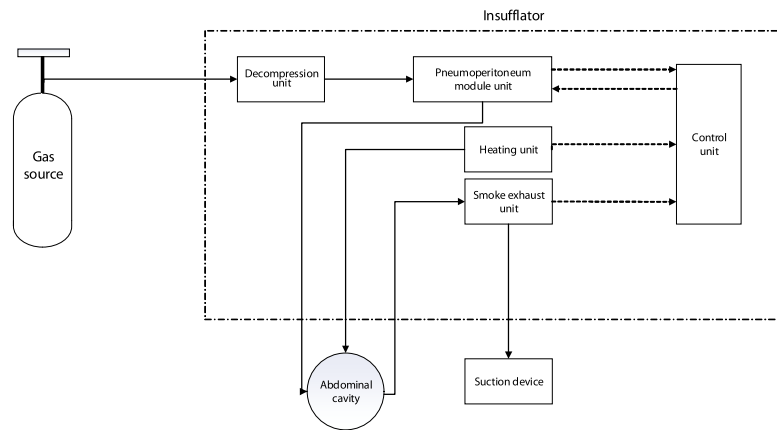


Figure 3-1 Block Diagram of Overall Structure

3.4 Description of system functions

The product is used to inject CO₂ into and exhaust smoke from the abdominal cavity in minimally invasive laparoscopic surgery, thus ensuring necessary space and view in the surgery and observation.

The main functions are as follows:

1. Gas injection
 - ◆ When the gas injection function is turned on for the insufflator, CO₂ gas sent from eligible gas source can be sent out stably through insufflator tube based on configured gas pressure and flow.
2. Gas pressure and flow monitoring
 - ◆ In the gas injection process, the insufflator always monitors gas pressure and flow, and ensures the pressure and flow remains within the configured range.
3. Gas heating (optional)
 - ◆ Using heating insufflator tube (optional) can keep the output gas at about 37°C.
4. Smoke exhaust (optional)
 - ◆ With the smoke exhaust function, smoke can be exhausted quickly from the abdominal cavity, while still maintaining proper gas pressure.

3.5 Usage environment

The intended usage environment is in an operating room for minimally invasive abdominal surgery, and the normal working power supply and environment conditions are as follows:

1. Environment temperature: 0°C - 40°C;
2. Relative humidity: 30% - 85%;
3. Atmospheric pressure: 700hPa - 1060hPa;
4. Power supply: overall input voltage: AC 100-240V~, allowable error ±10%; frequency: 50/60Hz;
5. Overall input current: 0.75 - 0.35A;
6. Fuse: T3.15AH250V
7. Gas source: CO₂
8. Gas pressure: 0.4~16MPa

3.6 On-screen Symbols

The symbols displayed on the main screen indicate the status of the gas supply, heating and smoke exhausting as follows:

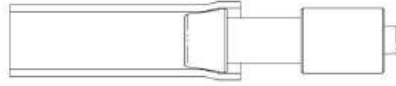


Figure 4-7 The pipe fitting connects with Luer-lock

2. Please install the filter between the insufflator tube and the insufflator's CO₂ gas injection interface. As shown in Figure 4-8.

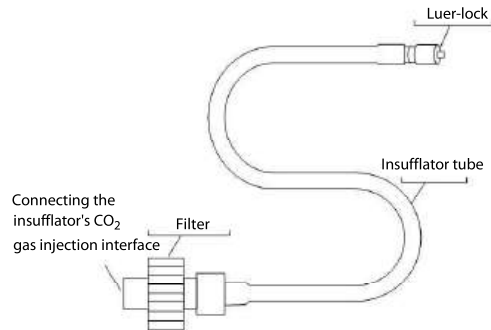


Figure 4-8 Installed insufflator pipe fitting (using filter)

3. Connect the installed pipe fitting to the CO₂ gas injection joint of the product. Guarantee that the interface is well inserted. As shown in Figure 4-9.

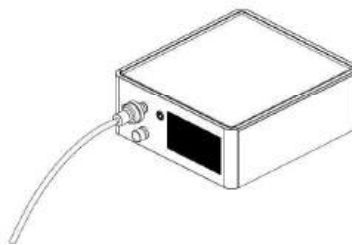


Figure 4-9 The insufflator pipe fitting connects with the insufflator (using filter)

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 CO₂ gas injection interface. As shown in Figure 4-10.
3. Connect the installed pipe fitting to the CO₂ 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.

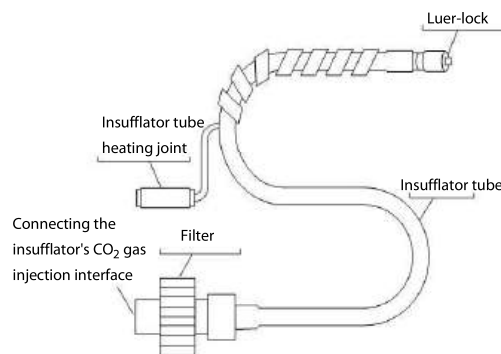


Figure 4-10 Installed heating insufflator pipe fitting (using filter)

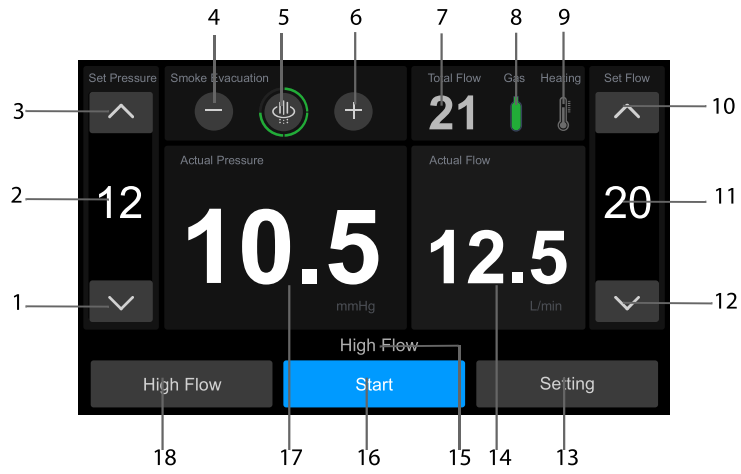
4.1.7 Connecting the Suction Tube (only for HS-50F/HS-50V models)

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

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)	Increase CO ₂ pressure
(2)	CO ₂ pressure setting
(3)	Decrease 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.
RetroPeritoneum	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.

3. Gently churn the pipe fitting, washing it thoroughly.
4. Take the pipe fitting out of the sterile water.
5. Install the injector on the pipe fitting, and inject air to eliminate water inside the pipe fitting. As shown in Figure 5-4.
6. Use sterile lint-free to wipe the outside surface dry.

5.3.2.7 Requirements for Sterilization

The disassembled parts of the pipe fitting need to be reassembled before sterilization.

The high-temperature and high-pressure sterilization supported for the pipe fitting meets the requirements of WS/T 367-2012 Technical Code of Disinfection for Medical Institutions.

Highest temperature	Sterilization time
134°C	4 min

NOTE

- **The time above refers to the sterilization time, excluding forevacuum time and time for drying and cooling after sterilization.**
- **Maximum temperature at any phase shall not exceed 134°C, otherwise it might cause damage to the pipe fitting or reduction of service life.**

5.3.2.8 Steps of Sterilization

1. Before sterilization, put the pipe fitting inside the sterilization box, and pack it with sterilization pouch or sterilization cloth.
2. According to regulations of the hospital, seal the pipe fitting that needs to be sterilized in a package suitable for high-temperature and high-pressure sterilization. It is recommended to choose dedicated surgical instruments to sterilized the sterilization cloth (pouch).
3. Perform high-temperature and high-pressure sterilization on the package in accordance with the sterilization requirements of the device and the operating manual of the sterilization instrument manufacturer.
4. After high-temperature and high-pressure sterilization, let all components cool to room temperature gradually.

5.3.2.9 Storage After Sterilization

NOTE

- **After cleaning and sterilization, the pipe fitting and contaminated devices need to be stored separately.**

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.

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第1章 Overview

1.1 Material Description

- 082-003735-00 CO2 High-Pressure Metal Connecting Pipe (CGA)
- 082-003736-00 CO2 High-Pressure Metal Connecting Pipe (DIN)
- 082-003737-00 CO2 High-Pressure Metal Connecting Pipe (YORK)
- 082-003738-00 CO2 High-Pressure Metal Connecting Pipe (ISO)

1.2 Explanation of the necessity of adding new materials

The company does not have materials with this standard.

082-003736-00 CO2 High Pressure Metal Connecting Pipe (DIN)

NO	MATERIAL SPECIFICATIONS/PROCESS CHARACTERISTICS	DESIGN REQUIREMENTS	SOURCE OF DEMAND	IS IT A CRITICAL SPECIFICATION OF THE MATERIAL?	FAILURE MODES AND EFFECTS	SEVERITY	REMARK
1.	working medium	CO2	Functional requirements	/	not available	7	/
2.	Pressure resistance	≥ 15 MPa	Functional requirements	/	Leakage affects the normal use of the insufflator .	8	/
3.	inner diameter	6 ± 0.5mm	Functional requirements	/	Affects the normal use of the pneumoperitoneum machine	7	/
4.	length	3 ± 0.1 m	Functional requirements	/	Affects the normal use of the pneumoperitoneum machine	7	/
5.	Entry link	DIN 477 nr .6	Regulations and Standards	•	Impact on regulatory security	9	/
6.	Export connection	7/16-20UNF 74° tapered flared connector	Functional requirements	•	not available	8	/

Quality weight: B

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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
RetroPeritonum	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

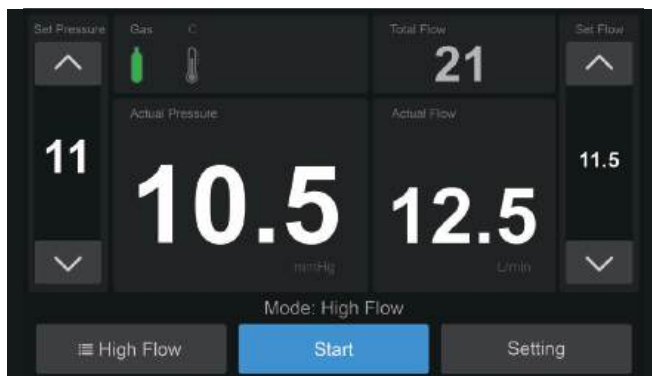
If there is too much smoke in the abdominal cavity during the surgery, the foot switch can be treaded to exhaust smoke quickly to ensure a clear surgical field.

www.mindray.com

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

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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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healthcare within reach



 Optional stand

LIFETIME SA02PT/SA03PT



Product Page

Designed to evacuate the fluid accumulated in the operated areas of the patients during the surgical operations.



Easy Operation

It is ready for use in a short time with one-button opening and sensitive adjustment knob.



Suitable for Clinical Use

Apart from home use, it is also suitable for use in clinics thanks to its high vacuum power.



Adjustment Knob

You can reach the desired pressure in the shortest time with the sensitive adjustment knob.



Ergonomic Design

Thanks to its compact design and handle, it provides ease of transport at home and in clinics.

Technical Specifications

Product Model	SA02PT	SA03PT
Compressor	Oilless Piston Pump	
Voltage	230 VAC \pm %10 , 50 Hz/60Hz	
Max. Vacuum	-640 mmHg \pm %5	
Max. Free Air Flow	15 lt/min \pm %10	30 lt/min \pm %10
Vacuum Setting	Yes	
Collection Jar	1-2 lt	1-2 lt
Vacuum Entrance	Single	Single
Float System	Yes	
Hydrophobic Filter	Yes	
Standard	ISO 10079 – 1 / CE	
Device Dimensions	29x17x25 cm	
Weight of Device	4.2 kg	6.3 kg
Warranty Period	2 years	
Stock Code	PT02B000	PT03B000

Foto furtun CO2 de 8 m





Low-Pressure Hose Assemblies
for use with Medical Gases

REF : 34I-CO2(GS/7/16-8)

Part No : 216466030(082-002806-00)

QTY : 1PCS

LOT : 61M-25020032



URL

: www.gentec.com

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1. Warning

- 1.1 Do not smoke in the area where oxygen is in use.
- 1.2 Make sure that the device and its gas source are not contaminated with oil.
- 1.3 The connectors of the hose assemblies adopt the standard gas outlet connectors, which are gas-specific and prevent interchangeability between different gases or the same gases with different pressure.
- 1.4 Do not over bend the hose while in use.
- 1.5 Do not put heavy objects on the hose.

2. Intended Use

- 2.1 This product is suitable for use in the medical gas pipeline systems to transport medical gas in a safe, reliable and effective manner. The connectors of the hose assemblies adopt the standard gas outlet connectors, which are gas-specific and prevent interchangeability between different gases or the same gases with different pressure.

3. Product Parameters

- 3.1 Hose assemblies are CE marked. Hose is made of medical grade PVC material that is toxicity and biocompatibility tested.
- 3.2 Connections are made of HPb59-1 brass or 304 stainless steel, with joints using a fixed casing. Maximum working pressure 200 psi (1.4 MPa) @ 70°F (21°C).

3X	X	-XXX	-XX	-XX	-X
Diameter Code:	Color Code:	Gas Code	Connector Code 1	Connector Code 2	Hose Length (m)
4: 1/4"	I: ISO				
5: 5/16"	U: USA G: GB				

4. Use Instructions

- 4.1 Check the exterior appearance of the hose and the cleanliness of the connectors prior to each use. Please stop use if any abnormality is detected.
- 4.2 Check the exterior appearance and expiration date of the hose before use. Please do not use if the hose is damaged or expired.
- 4.3 Make sure the gas meet the requirements.
- 4.4 Make sure the operating pressure meet pressure requirements.
- 4.5 Service Life: 3 Years.

医用气体低压胶管
Low-Pressure Hose Assemblies
for Use with Medical Gases

使用说明书
Instruction Manual



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说明书编号: 303163450 SM-3X A4
编制日期: 2020-3-13

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Website: www.gentec.com E-mail: info@gentec.com.cn
Instruction Manual No.: 303163450 SM-3X A4
Revision Date: 2020-3-13

Customer Service Hotline: 400-1898-322

使用前请认真阅读此说明书并妥善保管, 以便今后查阅
Read this manual thoroughly and carefully before using this product.
Retain this manual for future reference

FOTO insuflator HS-50F

Reglarea debitului de insuflație cu pas de 1 unitate și pentru Modul Pediatric avem pasul de 0.1 unitate





HP100G/

HP200G/HP200L/HP200D

Fluid Management System

Operator's Manual



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- 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

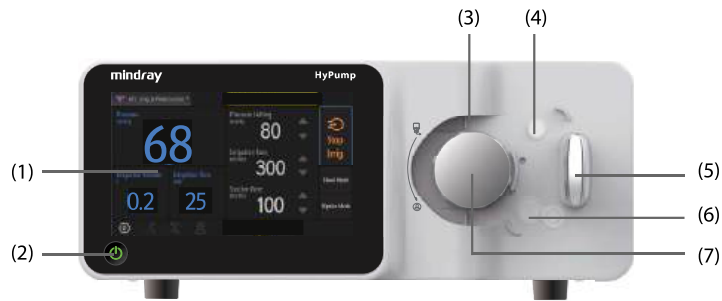
- “√” indicates “configured” while “×” indicates “not configured”.

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

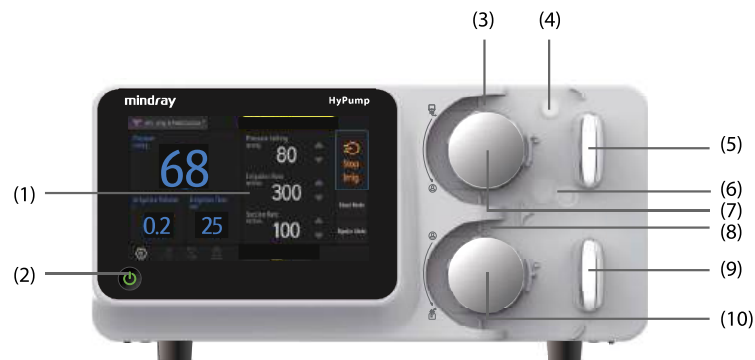
- The front view of HP100G is as follows:



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

- (2) 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 power is not connected.
 - Orange: AC power is connected, but main unit is off.
 - Green: the main unit is on.
- (3) Tubing channel: fixes the irrigation or suction tubing set.
- (4) Pressure sensor: detects the tube pressure.
- (5) Locking lever: locks or unlocks the irrigation or suction tubing set.
- (6) Pressure sensor: detects the tube pressure.
- (7) Pump roller for irrigation/suction

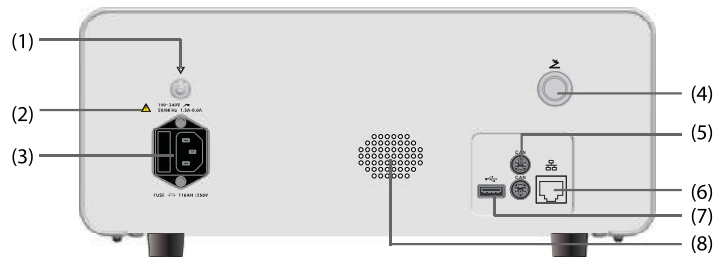
■ The front view of HP200G/HP200L/HP200D is as follows:



- (1) Touchscreen: displays equipment status and changes settings.
- (2) 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 power is not connected.
 - Orange: AC power is connected, but main unit is off.
 - Green: the main unit is on.
- (3) Irrigation tubing channel: fixes the irrigation tubing set.
- (4) Pressure sensor: detects the tube pressure.

- (5) Locking lever: locks or unlocks the irrigation tubing set.
- (6) Pressure sensor: detects the tube pressure.
- (7) Pump roller for irrigation
- (8) Suction tubing channel: fixes the suction tubing set.
- (9) Locking lever: locks or unlocks the suction tubing set.
- (10) Pump roller for suction

2.9.2 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) AC (Alternating Current) power input: connects the AC Mains.
- (4) Foot switch connector: connects the foot switch.
- (5) CAN (Controller Area Network) connector: connects external devices.
- (6) Network connector: supports software upgrade, for service personnel only.
- (7) USB connector: connects external devices, such as weighing system.
Note: Only FAT32 USB drives can be connected to this connector.
- (8) Speaker

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

UP700/UP700B/UP700C/UP700D

**Ultrasonic Surgical & Electrosurgical
Energy Platform**

Operator's Manual



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



- A transducer (optional)

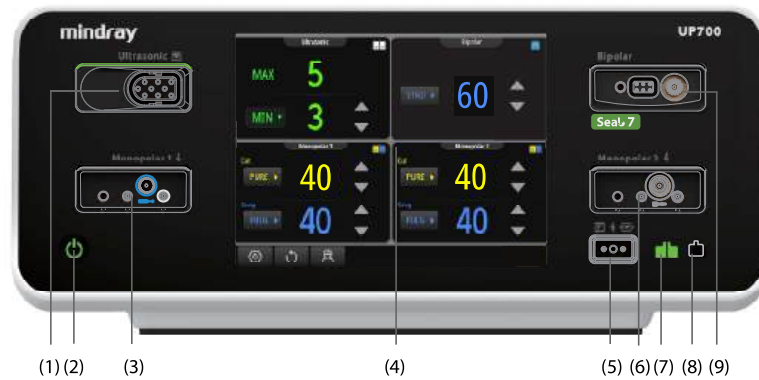
NOTE

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

2.5.1 UP700 Series Generator

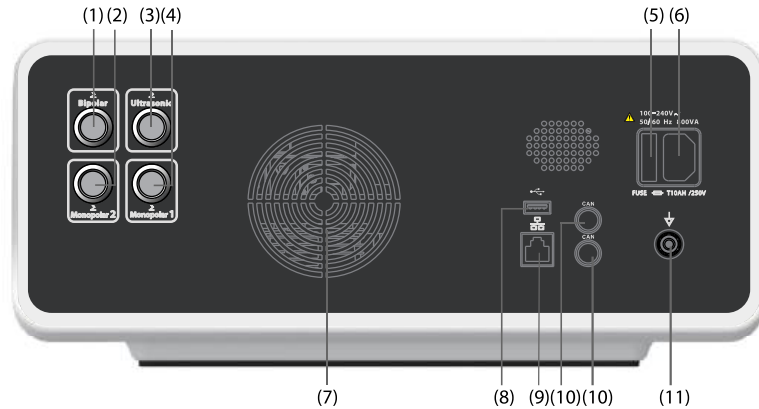
UP700 series generator supplies electrical energy for ultrasonic assembly and bipolar instruments.

2.5.1.1 Front View of the Generator



- (1) Ultrasonic socket (applied part): connects a transducer.
- (2) Power switch: turns on or off the generator.
- (3) Monopolar socket 1 (applied part): connects a monopolar instrument.
- (4) Touchscreen: displays equipment status and changes settings.
- (5) Return electrode socket: connects a return electrode.
- (6) Monopolar socket 2 (applied part): connects a monopolar instrument.
- (7) Split return electrode indicator: indicates the connection status of the split return electrode. When the indicator is green, the split return electrode is properly connected.
- (8) Non-split return electrode indicator: indicates the connection status of the non-split return electrode. When the indicator is green, the non-split return electrode is properly connected.
- (9) Bipolar socket (applied part): connects a bipolar instrument.

2.5.1.2 Back View of the Generator



- (1) 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).
- (2) 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.
- (3) Ultrasonic footswitch socket: connects a footswitch for ultrasonic surgical instrument to control the activation of ultrasonic assembly.
- (4) Monopolar footswitch socket: connects a double-pedal footswitch for HF instrument to control the activation of monopolar instrument attached to monopolar socket 1.
- (5) Fuse holder: a compartment that keeps the fuse.
- (6) AC (Alternating Current) power input: connects the AC Mains.
- (7) Ventilation outlet: is used for heat dissipation.
- (8) USB connector: connects a USB drive for system upgrade.
- (9) Network connector: supports data transmission.
- (10) CAN (Controller Area Network) connector: connects external devices.
- (11) Equipotential grounding terminal: when using the equipment together with other devices, connect their equipotential grounding terminals together to eliminate potential difference.

2.7 Audio Indicators of the Generator

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

CAUTION

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

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

CAUTION

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

4.4 Starting the System

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

4.5 Check Before Operation

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

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

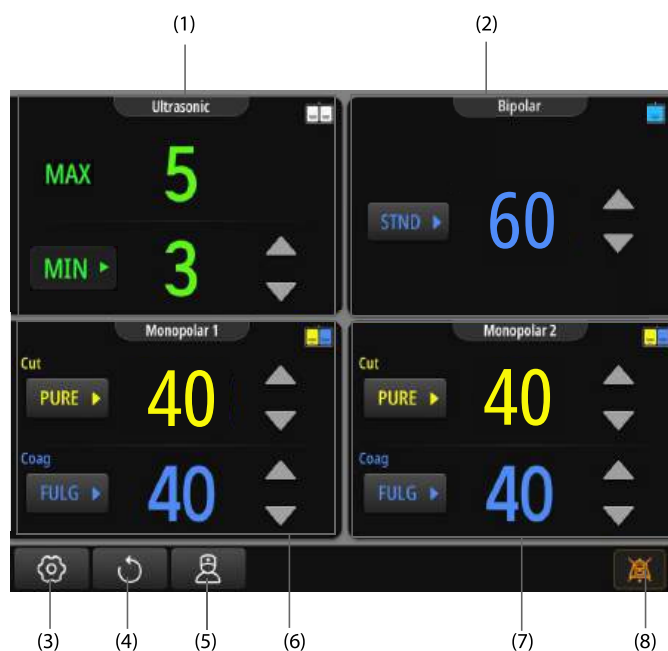
CAUTION

- **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 all HF instruments and ultrasonic assembly are connected, the touchscreen display of the generator is as follows.




- (1) Ultrasonic area: Power levels in this area is highlighted if the ultrasonic assembly is connected. For detailed description, refer to [4.7.3 Using Ultrasonic Assembly](#).
- (2) Bipolar area: Power levels and modes in this area is highlighted if the bipolar instrument is connected. For detailed description, refer to [4.9.1 Operation Area for Common Bipolar Instrument](#).

- (3) Setup button  : select to display the setup menu.
- (4) Restore button  : selects to restore the latest HF instrument settings after restart.
- (5) Procedure button  : select to display the Procedure menu.
- (6) 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 *4.8.2 Operation Area for Monopolar Instrument*.
- (7) 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 *4.8.2 Operation Area for Monopolar Instrument*.
- (8) 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 *4.12.2 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 Ultrasonic Assembly for Use

Connect the ultrasonic assembly to the generator. For detailed assembly procedure of transducer and ultrasonic surgical instrument, refer to the operator's manual of the ultrasonic surgical instrument.

4.7.1 Ultrasonic Surgical Instrument Test

When the ultrasonic assembly is connected to the generator, the generator automatically starts the ultrasonic surgical instrument test. Follow the on-screen instructions to perform the test.

- (4) Neonate symbol: indicates that return electrode monitoring function for the neonate is enabled.
- (5) Power Level Decrease button ▼ : press to decrease the power level used by the monopolar instrument for cutting.
- (6) Footswitch symbol: indicates the status of the footswitch.  indicates that the footswitch is correctly connected.
- (7) Mode Setting button: selects the coagulation mode. If the monopolar coagulation mode is activated, the monopolar coagulation area shows a blue background.
- (8) Power level: displays the power level currently used by the monopolar instrument for coagulation.
- (9) Power Level Increase button ▲ : press to increase the power level used by the monopolar instrument for coagulation.
- (10) Power Level Decrease button ▼ : press to decrease the power level used by the monopolar instrument for coagulation.

4.8.3 Using Monopolar Instrument

To use the monopolar instrument, follow the procedure below:

1. Connect the monopolar instrument to the generator.
2. Set the cutting mode or coagulation mode:
 - ◆ To set the cutting mode, press the Mode Setting button in the monopolar cutting area to select **Pure** or **Blend**. The default monopolar cutting mode is **Pure**. For technical parameters and description of each mode, refer to *6.3 Monopolar Cutting Modes*.
 - ◆ To set the coagulation mode, press the Mode Setting button in the monopolar coagulation area to select **Soft Coag**, **Fulgurate**, or **Spray**. The default monopolar coagulation mode is **Fulgurate**. For technical parameters and description of each mode, refer to *6.4 Monopolar Coagulation Modes*.
3. Set power level for the mode by pressing the Power Level Increase button ▲ or the Power Level Decrease button ▼ .
4. Activate the mode by using the footswitch or fingerswitch.

NOTE

- **After connecting a monopolar instrument with fingerswitch, you are advised to test the cutting and coagulation functions of the fingerswitch buttons. Make sure that the functions are normal by checking whether the corresponding areas of the main screen show correct background colors.**

The password must be 6 or less digits.

4.12.6 Setting Instrument Detection

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

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

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

4.12.7 Setting Power Failure Protection

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

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

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

4.12.8 Restoring Factory Settings

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

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

4.12.9 Checking Configuration Information

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

4.12.10 Checking Activation Times

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

4.12.11 Viewing History Records

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

5 System Alarm

5.1 Overview

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

5.2 Introduction to Alarm Function

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

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

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

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



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

NOTE

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

5.3 Alarm Indicators

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

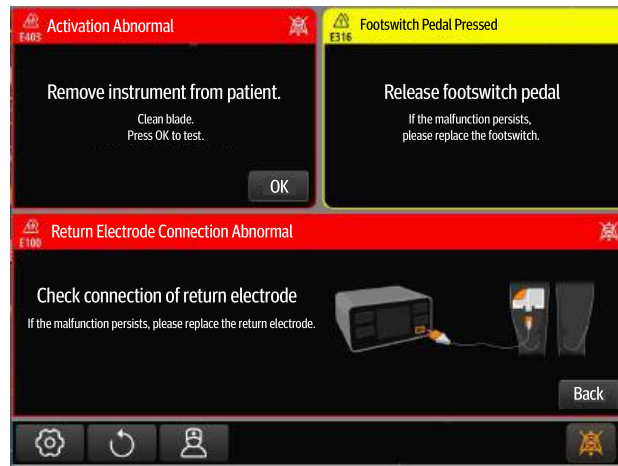
Alarm Priority	Audible Tone Pattern	Alarm Message	Symbol
High	Except return electrode alarms: Repeat pattern of 2 x 5 beep tones	White text and symbol inside a red box	
	Return electrode alarms: Low-pitched 3-beep tones		
Low	2-beep tones	Black text and symbol inside a yellow box	

NOTE

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

5.4 Alarm Screen

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



6 Energy Output Modes of Generator

6.1 Overview

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

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

6.2 Ultrasonic Modes

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

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

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

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

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

6.2.1 Output Parameters of Ultrasonic Modes

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

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

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

6.2.2 Selection of Ultrasonic Power Level

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

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

6.3 Monopolar Cutting Modes

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

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

NOTE

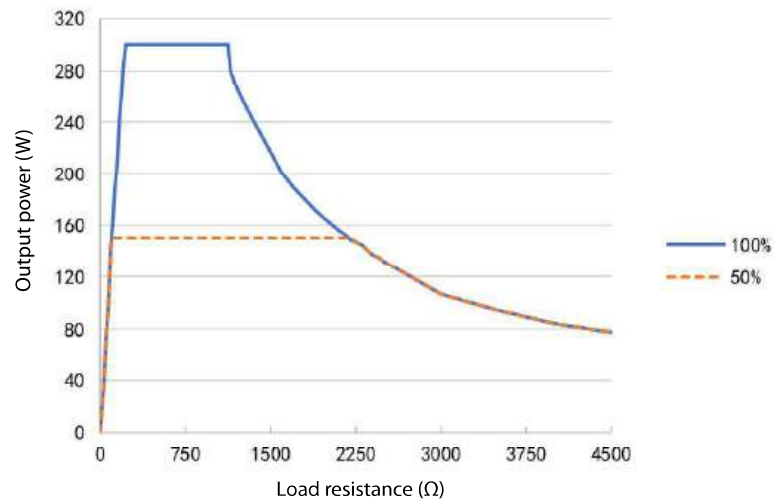
- **Any associated equipment and active accessories used in the Blend Cut mode must be rated to withstand the combination of actual voltage and crest factor.**

6.3.1 Technical Parameters of Monopolar Cutting Modes

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

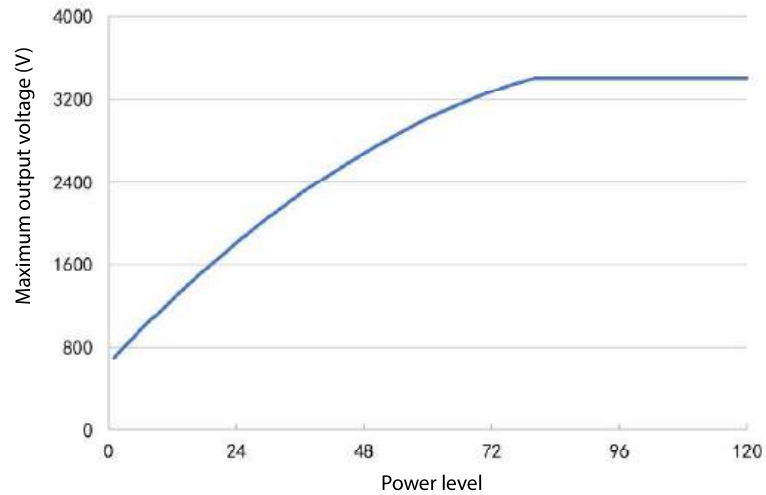
Parameter	Pure Cut	Blend Cut
Maximum output current	1.32A	1.05A
Crest factor (rated load)	1.5 ± 0.3	2.3 ± 0.3
Power ranges and step	--; 1 - 40 W (step: 1 W); 40 - 100 W (step: 5 W); 100 - 300 W (step: 10 W)	--; 1 - 40 W (step: 1 W); 40 - 100 W (step: 5 W); 100 - 200 W (step: 10 W)

6.3.2 Characteristic Diagrams of Pure Cut Mode



6.4.1 Technical Parameters of Monopolar Coagulation Modes

Parameter	Soft Coag	Fulgurate Coag	Spray Coag
Operating frequency	434 kHz \pm 10%	434 kHz \pm 10%	434 kHz \pm 10%
Modulation frequency	/	27.7 kHz \pm 10%	21.1 kHz \pm 10%
Duty cycle	100%	6.25% \pm 10%	4.76% \pm 10%
Rated load	100 Ω	500 Ω	500 Ω
Rated power	120 W \pm 15%	120 W \pm 15%	120 W \pm 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 \pm 0.3	5.3 \pm 0.3	6.1 \pm 0.3
Power ranges and step	--; 1 - 40 W (step: 1 W); 40 - 100 W (step: 5 W); 100 - 120 W (step: 10 W)	--; 1 - 40 W (step: 1 W); 40 - 100 W (step: 5 W); 100 - 120 W (step: 10 W)	--; 1 - 40 W (step: 1 W); 40 - 100 W (step: 5 W); 100 - 120 W (step: 10 W)



6.5 Bipolar Coagulation Modes

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

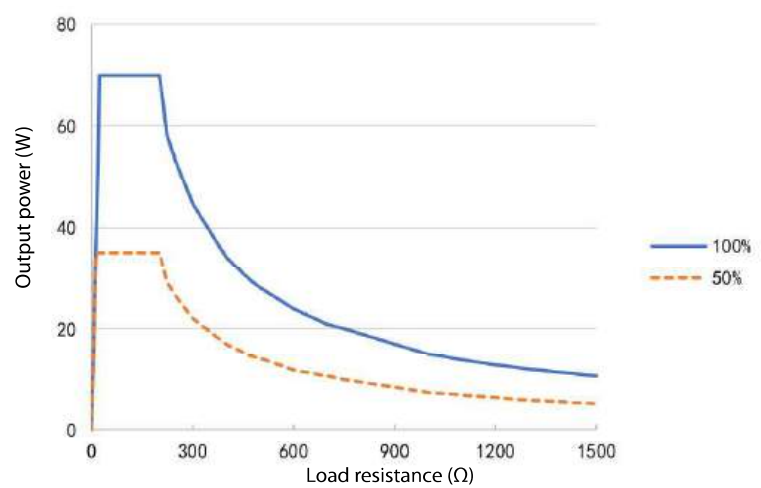
- The Precise Coag mode is applicable to low-voltage and fine coagulation of tissue. Using this mode prevents the generation of sparks and eschars and precisely controls the coagulation effect.
- The Standard Coag mode is applicable to most low-voltage bipolar coagulation of tissue. Using this mode prevents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

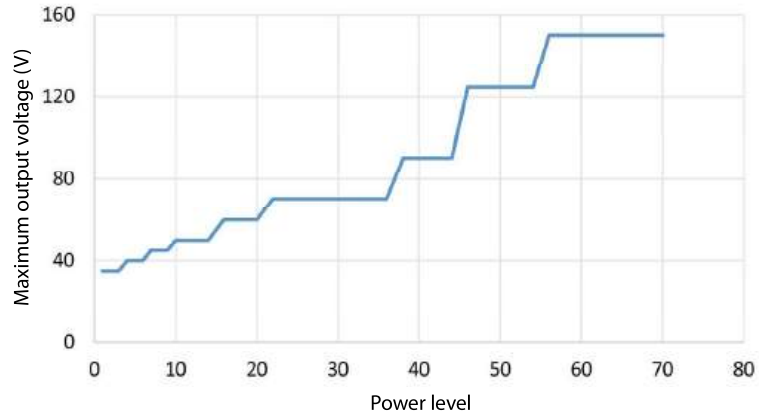
6.5.1 Technical Parameters of Bipolar Coagulation Modes

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

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

6.5.2 Characteristic Diagrams of Precise Coag





6.6 Seal 7 Mode

The applicability of the Seal 7 mode is as follows:

- The Seal 7 mode is applicable to sealing of arterial/venous vessels, lymph vessels, and tissue strands ≤ 7 mm in diameter using electrode surgical instrument for Seal 7 during surgery. The mode senses the change of tissue impedance through the ultrasonic surgical instrument to automatically control the HF energy output until the sealing is complete.

6.6.1 Technical Parameters of Seal 7 Mode

Parameter	Seal 7 (Effect 2)	Seal 7 (Effect 1)
Operating frequency	350 kHz \pm 10%	350 kHz \pm 10%
Rated load	25 Ω	25 Ω
Rated power	300 W \pm 15%	135 W \pm 15%
Maximum output voltage	220 V	220 V
Maximum output current	3.85 A	2.50 A
Crest factor (rated load)	1.4 \pm 0.3	1.4 \pm 0.3
Note: To set effects of the Seal 7 mode, contact Mindray service personnel.		

C Default Settings

C.1 Default System Settings

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

C.2 Default Ultrasonic Assembly Settings

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

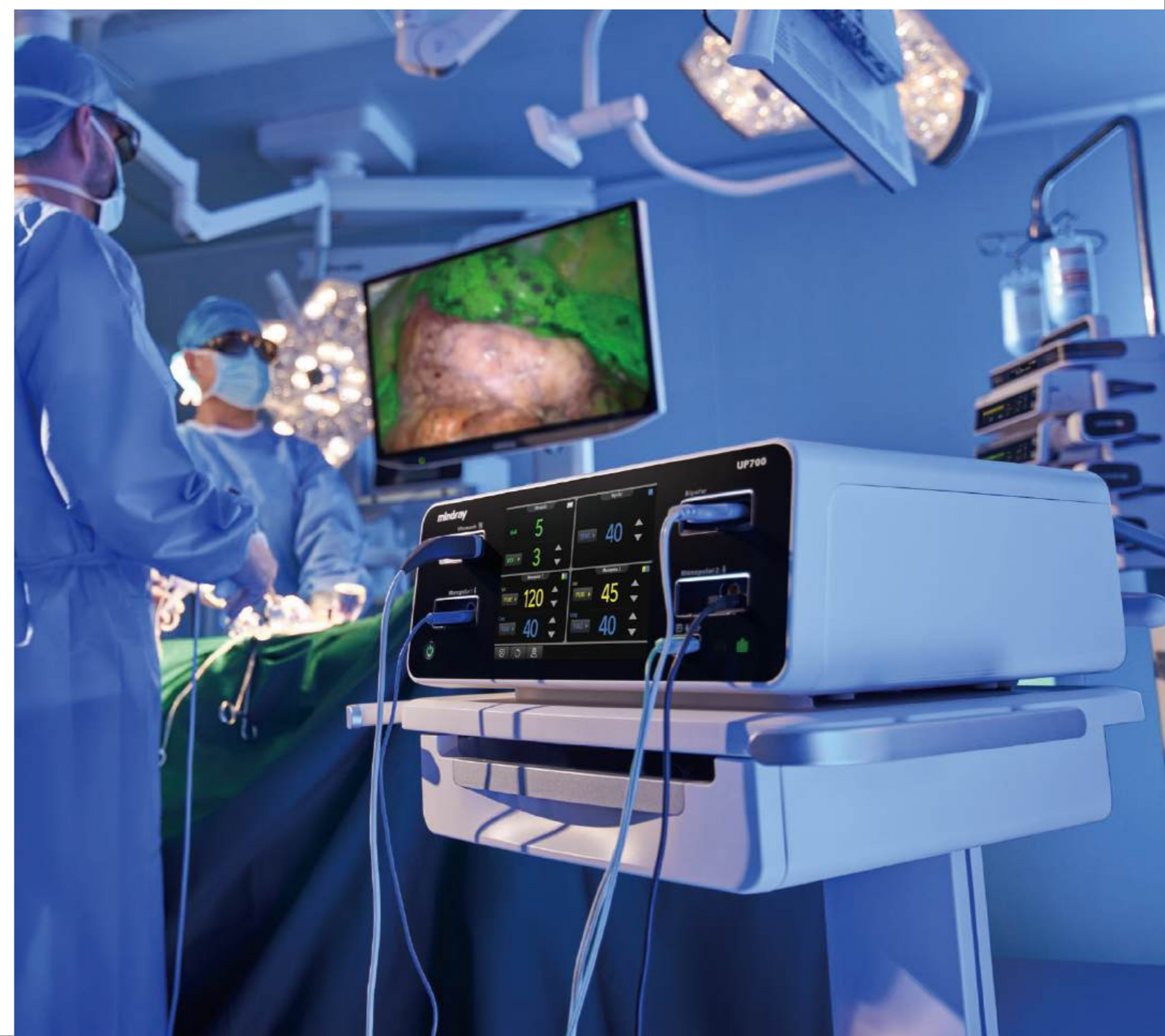
C.3 Default HF Instruments Settings

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

C.4 Default User Maintenance Settings

Ultrasonic Surgical & Electrosurgical Energy Platform

Higher Precision, Easier Operation





Advanced Compact

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



One generator for multiple energy devices

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

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



Mode switching and power level adjustment in one simple tap



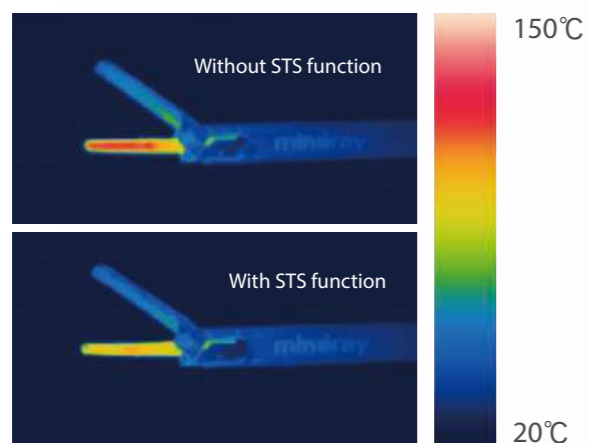
- Flat Menu Design
- 4-Quadrant Interactive UI
- Simplified and Intuitive

Advanced Accurate

Ultrasonic Module

STS™ (Smart Tissue Sensing)

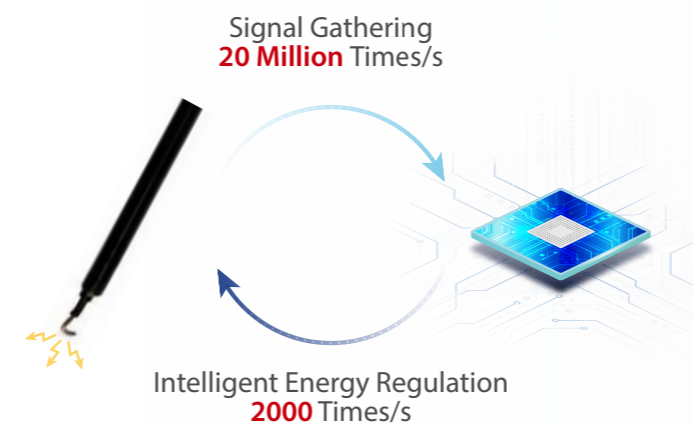
Comparison of Heat Maps of Forceps
(1 second after disconnection)



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

HF Electrosurgical Module

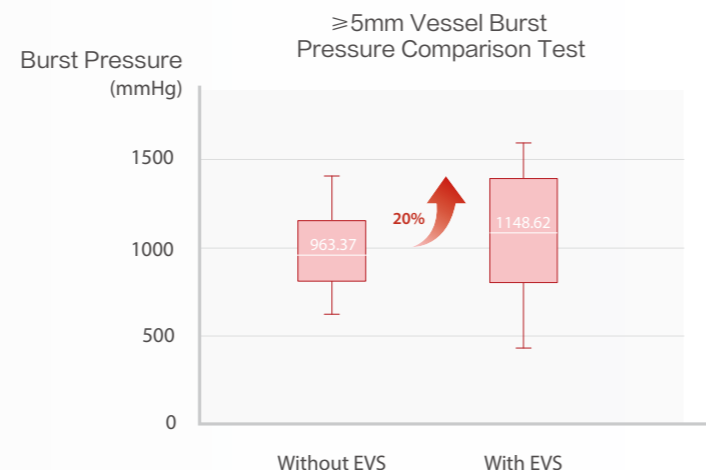
Precise Energy Control Algorithm



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

EVS™ (Enhanced Vessel Sealing)

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



Extraordinary Energy Compensation Algorithm

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



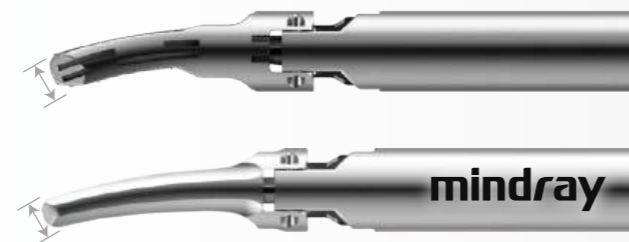
Advanced Precise

Thin and narrow design more for greater manoeuvrability in tight spaces

20% Thinner
Compared to Original Design



20% Narrower
Compared to Original Design



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

Anti-Adhesion Coating

Anti-Scratch Blade Tip



Energy Platform Generator

Different combinations of functions for specific clinical scenarios

UP700



Ultrasonic + Bipolar + Monopolar

UP510



Ultrasonic + Bipolar

Ultrasonic Surgical Instrument

Different lengths for various types of surgery

45cm



36cm



23cm



14cm



Trolley

Fixed position structure for generator and self-locking wheel design



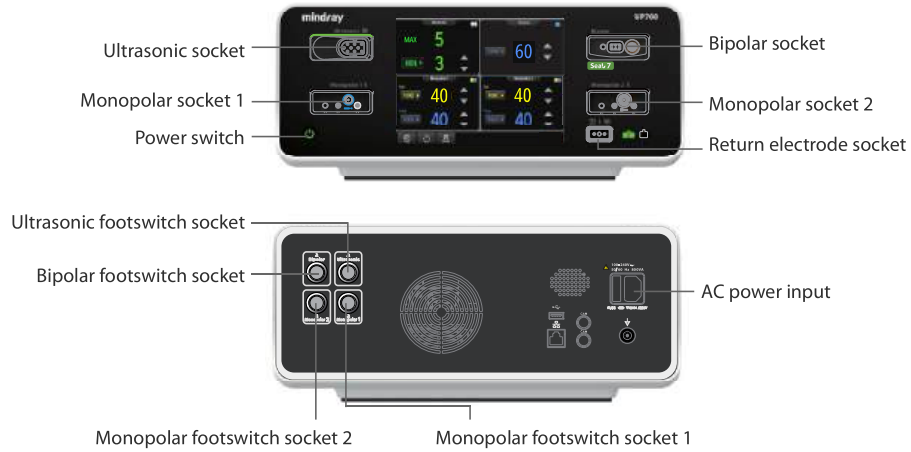
Transducer

Supports 100 operations



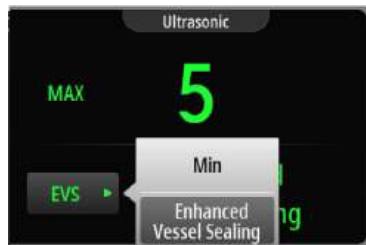
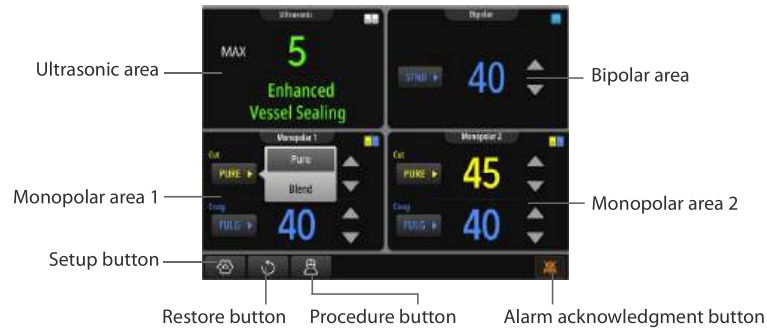
UP700 Series Generator Quick Start Guide

Product Overview



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

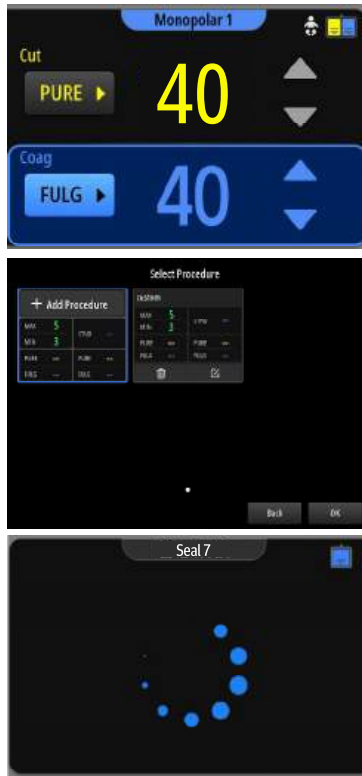
Using the Touchscreen



Using the EVS Function


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

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



Enabling Neonatal Return Electrode Monitoring

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

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

Setting Procedure

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

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

A maximum of 500 Procedures can be added.

Setting Seal 7 Mode

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

The prompt tone will change when the sealing is finished.

Troubleshooting

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

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



Ultrasonic Surgical & Electrosurgical Energy Platform

Higher Precision, Easier Operation

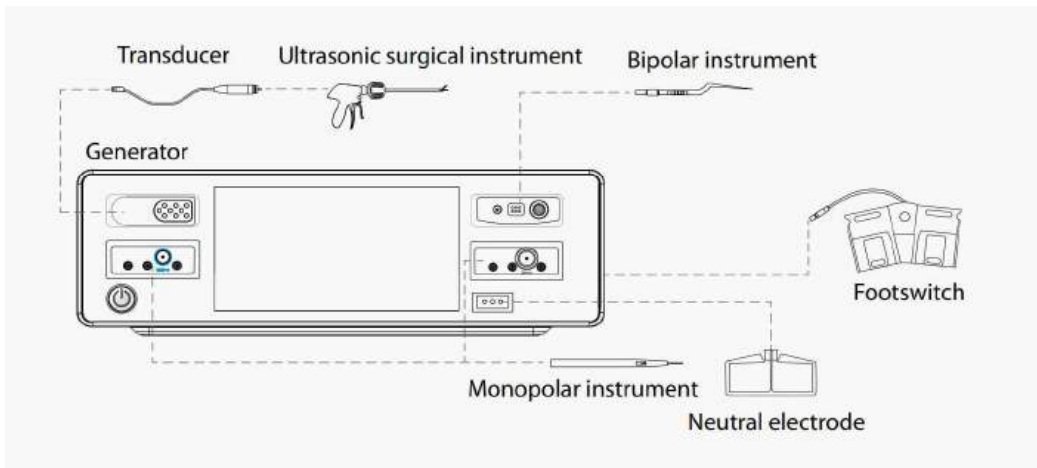


1. Indication for Use

The Ultrasonic Surgical & Electrosurgical Energy Platform is intended for use with monopolar and bipolar accessories for cutting and coagulating tissue. In addition, it can provide power to drive Ultrasonic Surgical Instrument, that are indicated for soft tissue incisions when bleeding control and minimal thermal injury are desired during open and endoscopic procedures, as well as for sealing vessels up to and including 5mm.

The instruments are not indicated for incising bone.

The instruments are not indicated for tubal coagulation.



2. Generator

2.1 Functions corresponding to the Generator model

Models	Ultrasonic	Monopolar	Bipolar
UP700	√	√	√
UP510	√	×	√

2.2 System Components

The system consists of the following components:

- ✓ A generator
- ✓ Footswitches
- ✓ Ultrasonic surgical instruments
- ✓ Transducers

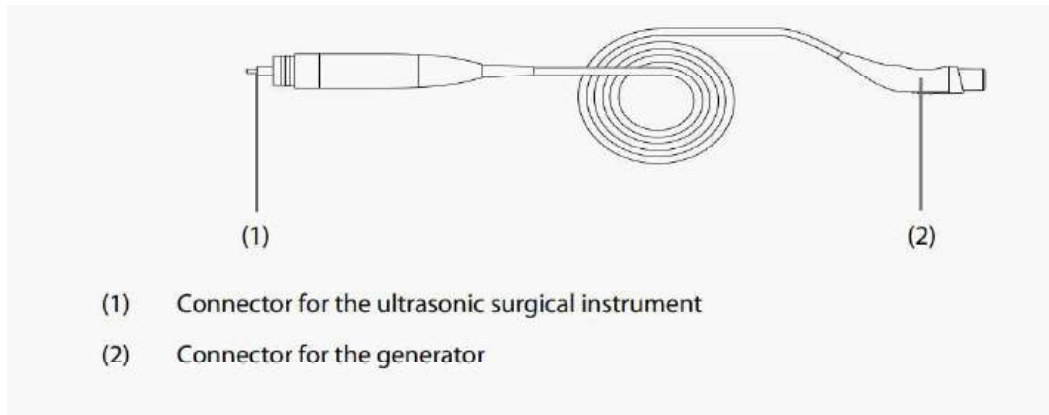
3.2 Physical Specifications

Item	Model	Dimension
Ultrasonic surgical instrument	F14/P14 series	Shaft length: 14± 1 cm Outer diameter: 5.5±0.5 mm
	F23/P23 series	Shaft length: 23±1 cm Outer diameter: 5.5±0.5 mm
	F36/P36 series	Shaft length: 36± 1 cm Outer diameter: 5.5±0.5 mm
	F45/P45 series	Shaft length:45± 1 cm Outer diameter: 5.5±0.5 mm

3.3 Parameters of Ultrasonic Modes

Gear adjustment	MIN mode gears can be set to 1~5, MAX mode gear is fixed to 5
Output Power	≥ 60W
Output Frequency	30 - 80 kHz (typical value: 55.5 kHz)
Reference primary tip vibration excursion	74±35%µm
Primary acoustic output area	≤3mm ²
Type of frequency control of the system	Continuous automatic tuning
Drive frequency	55.5 kHz ± 1.5%
Secondary transverse vibration sound output area	≤30mm ²
Power reserve index	> 3
Derived output acoustic power	< 5W
Scalpel tip coating	Black anti-adhesive coating on the tip of the blade to reduce intraoperative tissue adhesion and wiping time of forceps.
Scalpel tip size	The thickness of the blade tip is 1.5mm, making fine dissection easier.
Scale on scalpel shaft	There is scale on the scalpel shaft which can support the dimensional measurement function and enhance the efficiency of the procedure.

6. Transducer



6.1 Transducer specification

Model	Description
TD55	Cable length: 3.3±0.1 m

6.2 Service life

The transducer can be used for 100 times.

Regardless of the duration of surgery and the number of ultrasonic scalpel activations, the service life of the transducer is reduced only once after each completed surgery.

6.3 Cleaning, Disinfection, and Sterilization

■ Cleaning the Generator and Transducer

Below are cleansers of which the efficacy has been tested:

Product Name	Manufacturer
Water	/
Ethanol, 75%	/
3M Biofilm Removal Multi-Enzyme Cleaner	3M

■ Disinfecting the Generator and Transducer

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