

ZERONE Electrosurgical Unit

CE
0434

ZEUS-400 / 300 / 200

OPERATION MANUAL



ZERONE CO., LTD.

ZEUS-400 / 300 / 200 Operation manual



ZERONE CO., LTD

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1. Introduction

1.1 Prior Notice

● How to Contact Us

- Contact us on the following telephone numbers and address in order to receive our service and products.

**For Supplying
Products and
Ordering Supplies**



ZERONE Co., Ltd.
(Shinil IT UTO, Dangjeong-dong)
#810, LS-Ro 13, Gunpo-si, Gyeonggi-do, Korea
(zip 435-831)
Tel : + 82 31 427 2772
Fax : + 82 31 427 2332

For Repair Service

Tel : + 82 31 427 2772

**Technical
Assistance**

For technical inquiries, contact us with the following
telephone number.
Tel : + 82 31 427 2772

Homepage

URL : <http://www.01zeus.com>

**EUR
REPRESENTATIVE**



SC LIAMED SRL
Str. Tampei, Nr. 7, Bl. D9, Sc. C, Ap. 2 Brasov 500283,
Romania
Tel/Fax : + 40 268 327 490

- ※ If any faults or malfunctions, contact us, providing the model and serial number of the damaged product.

● Warranty Period

- This product was made under the strict quality control system and inspections.
- The warranty period is one year.
- If the product fails to operate during this period, our service center will provide free repair service to you.
- The manufacturer or agency does not take responsibility for any breakages or damages if malfunctions are caused by customer's improper use or careless treatment.

● Warning, Caution, Notice

This manual adopts several terms to draw your attention to what must be informed of or aware of. Please read carefully and be fully aware of them before you start operating the equipment.

Warning

Serious physical injury, death or property damage might occur to patients if this not observed.

Caution

Slight physical injury (not causing death) might occur if this is not observed.

Notice

Something important, not dangerous that might occur when users install, use and maintain the equipment.

● Signs



CAUTION :
Refer to the user guide.



TYPE BF APPLIED PART : BF-typed applied part



WARNING - HIGH VOLTAGE
Be careful of high voltage.



RF Isolated : Counter electrode isolated to an earth for high frequency













Grounding



Non-ionizing Radiation : This equipment intentionally supplies non-ionizing RF energy for physiological effect.

● Cautions

- Do not use/store this equipment under the following environments.

	<p>Wet hands or humid areas.</p>		<p>Direct rays.</p>
	<p>Out of these temperature and humidity ranges: T: 10°C ~ 40°C, H: 20% ~ 95%.</p>		<p>Near to electronic heaters.</p>
	<p>Areas with high humidity or ill ventilation.</p>		<p>Excessive shock or vibration.</p>
	<p>Areas contaminated with chemical materials or leaked gas.</p>		<p>Dust or metals that could be stuck.</p>
	<p>Taking to pieces. In this case, this company would not take any responsibility.</p>		<p>Plugging the installation uncompleted. In this case, the equipment can be damaged.</p>

2. Installation Notice

Please carefully read this (ZEUS-400/300/200) manual and follow it.

2.1 Before Application

Warning



If any malfunction or breakage, do not use it for patients and instead contact with medical equipment technicians or suppliers.

● About Accessories

Warning



Check the followings before using this product.

- ① Electric Shock
Don't connect wet accessories to the surgical unit; precisely connect all accessories to adapters; don't expose metal materials to the air.
- ② Check the linkage condition between all accessories and Electrosurgical Unit before using them. If the connection is bad, it can cause unintentional operation effects like spark or accessory malfunction.
- ③ Don't wrap up the accessory code or Patient Return Plate in metal materials. This can generate shock and fire, inflicting an injury on patients or operators.
- ④ Before using accessories, always check if reusable accessories and codes are not broken, cracked, scratched, etc. If this is not done, patients or operators can be injured or struck by electricity.
- ⑤ Connect accessories to the appropriate sockets because bad connection can cause dangerous situations. Unused accessories (active electrode) must not be placed on the patient body.
- ⑥ ZERONE Co., Ltd. Supplied accessories have appropriate for rating for. ZEUS-400/300/200 CE marked or UL approved components with more than Monopolar: 3000V, Bipolar: 1000V Rated voltage rating can be used as accessories. Safety hazard may occur if products with lower quality are utilized.
- ⑦ Connect Bipolar accessories to corresponding Bipolar sockets.

Caution

Check the followings before using this product.

- ① Don't throw away disposable accessories in a certain area where problems may occur. Keep in mind the environmental problem at any time and place.
- ② Use the “Disposable” accessories once. Don't use/sterilize them again.
When reusing, it may cause the equipment malfunction or unintended operation
Effect to injure doctors or patients
- ③ Before operation, check all the accessories to see if they are sterilized.
After operation, sterilize all reusable accessories and then store them.
“Disposable” accessories should be used after checking the validity period expiration date.

● Patient Return Plate**Warning**

Check the followings before using this product.

It is recommended that Patient Return Plate be applied to REM system of ZERONE Co., Ltd.

- ① Do not apply Patient Return Plate to Bipolar-only operation.
Otherwise, the effects of Electrosurgical Unit cannot be limited to the organization between Bipolar electrodes.
- ② Don't cut Patient Return Plate in half, which can make a patient burned.

● Electrical Safety**Caution**

Check the followings before using this product.

- ① Electric Shock : Connect the power code of the surgical unit to a grounded socket. Don't use Power Plug Adapter.
- ② Use the power code provided by the equipment supplier or a other test-completed product that has equal quality.
- ③ Don't use a extended code that has no ground connection.

Warning

Check the followings before using this product.

- ① Don't place any equipment on Electrosurgical Unit, which can prevent this unit from being cooled.
- ② Don't reduce the volume of display indication sound, which provides alarms to the operator during an operation of the surgical unit.
- ③ When using Smoke Evacuator connecting Electrosurgical Unit, keep them apart each other, and set up the output sound at the maximum level so that the output sound and the alarm indication sound can be heard well.
- ④ Electrosurgical Unit should be kept apart, as much as possible, from other electronic equipment because the use of the unit can have negative effects on other medical units that are using other electricity.
- ⑤ Check the linkage condition of equipment ground.
- ⑥ Impressed voltage (AC120V/230V) should be used in accordance with the rating. Before providing power, check an operation voltage and power frequency marked in the label on the back of the product. Inappropriate power could cause output fluctuation and a direct fault in the product. To prevent over-standard voltage fluctuation, it is recommended that Automatic Voltage Regulator (AVR) be used.

3. Application Notice

Electrosurgical Unit is supposed to generate high voltage and current for its application. To avoid exposing a patient, an operator and the third parties into a dangerous situation, operation should be carefully conducted, and safety rules should be strictly kept. If Electrosurgical Unit has a fault, unintentional other output power can be increased.

● About Patients

Warning

Check the followings before using this product.

- ① Eliminate or isolate all the patient's metal materials and handle them with special interests.
- ② A patient must be isolated from grounded metal materials. Be careful to see if they are contacted to the patient. The isolation status must be maintained even if a patient who is going through an operation is moved into other positions.

- ③ Do avoid skin-to-skin contact, including fingers touching legs.
Place dry gauze on patient's skin where possibilities of skin-to-skin contact is high, to avoid any skin burn.
- ④ Most sweated parts of human body (armpit, knee, skin-to-skin parts) can be burned when Patient Return Plate or other materials contacts with those parts, therefore, some dried and absorbable towels should be used to dry them.
- ⑤ Unused accessories should be stored in untouchable, electricity-isolated and conspicuous areas. Hot accessories just used can lead to a fire. Do not place them near to the inflammable materials.
- ⑥ Check if the output level of Electrosurgical Unit was arranged to the appropriate level for an operation. It is recommended that the output power be lowered as soon as possible, so that a user can expect possible problems generated from inappropriate location or connection of Patient Return Plate during ordinary output, and then slowly increase the output power.
- ⑦ Minimize the possibility of burning incidents by using Active Electrode for the time only required for wanted operation effects. In particular, apply this method to operations for such patients as infants, newborns and, those who are in small auxiliary institutes.
- ⑧ Avoid the use of inflammable anesthetics like N₂O and O₂. Electrosurgical Unit using high frequency can generate a flame at an always-operating electrode by contacting the anesthetics. Therefore, the materials should be completely evaporated for cleanliness and sterilization before using the unit. Naturally generated gases accumulated in intestines, the deep navel or vagina in human body can be also inflammable so that these liquefied gases must be eliminated before using the unit. After sterilizing the body with the dangerous anesthetics, it is necessary to ventilate them since the gases are likely to explode.
- ⑨ Neuromuscular can be stimulated. The stimulus can occur when low frequency current is generated from the supplier of low-frequency current or electrical arc located between the electrode and patient's organization. A spasm or muscular clamp is likely to be generated while arc is created during Cutting or Coagulation (contact/spray) is somewhat rectifying high-frequency current.
- ⑩ Extreme caution must be taken for patients with pacemaker or implantable electrode. Performance of devices may be temporarily affected which may cause ventricular fibrillation. In case of any doubts concerning safety of patient contact qualified and concerned pacemaker manufacturer or Cardiology department.

- ⑪ Do not use Active Electrode near to Electrocardiograph electrode. ESU electrode must be kept apart at least 150mm from ECG electrode. It is necessary to use Monitoring Electrode with protective resistors to survive high frequency. Do not use a needle-typed electrode.
- ⑫ Lower output or performance of electrical surgical device despite correct surgical setting may be caused due to incorrectly applied patient plate or bad connection. In this case, before setting a higher output, you must check the connection status.

● About Patient Return Plate

Warning



Check the followings before using this product.

- ① Plate Electrode should be near to an operation part of human body and adhere closely to the patient's body. Periodically check if the electrode firmly contacts to the body when moving the patient or performing a long operation.
- ② Contact Plate Electrode closely to the place whose direction is the opposite from the heart based on the operated part.
- ③ If Dispersive Electrode is not closely adherent to the patient body, he/she can get a burn sine high frequency current flows between Dispersive Electrode and the skin. When using Patient Plate, you should bind it by something like band, after putting gel all over the patient skin on which Patient Plate will be adhered in order it to be adhered to the patient skin completely.

Caution



Check the followings before using this product.

- ① Don't use Plate Electrode on implant, metal material, protruding bones and scars. Clean skin required for operation and eliminate the oil and hair on it.
- ② Make a short cut of the current path between Active Electrode and Dispersive.

4. Follow-Up Ways for Storage and Maintenance

- When removing a series of codes, don't unplug them at a time.
- Don't screw, bind or stack the cables.
- After performing an operation, sterilize all accessories and then store them.
- Turn off the power after using equipment and remove the power plug and store it when leaving the office or not using for a long time.

① About Cleaning

- Clean the main unit and foot switch with soft fabric which is wet with warm water or alcohol at least once a month. If you use the material is designated cleaning, you have to ask chemical manufacturer regarding effect of microbe.

Clean its external appearance with non-ignitable, non-explosive materials.

Don't use corrosive, easily-grinding materials that can damage it such as lacquer, thinner, ethylene and oxidizing agents, etc. Don't let the liquid into equipment.

- You should use 70% isopropyl alcohol or ethylalcohol when you clean accessories.

② About Sterilization

- Use the accessories that can be sterilized after sterilizing them.

Accessory	Sterilization	
	Auto Clave	E/O Gas
Reusable Monopolar Handle	- Gravity displacement - 121°C (250°F) for 20minutes	- Gas Mixtures : EO 20%+ CO2 80% - Exposure Temperature : 56°C (133°F) - Pressure : 1.5Kgf/cm ² - Exposure time :90 minutes - Aeration time : 7 hours
Reusable Bipolar Forceps		
Reusable Electrodes Tips		

Warning

Check the followings before using this product.

- ① During sterilization, don't increase temperature and pressure more than the standard, which can cause damage to the accessories.
- ② Constantly-sterilizing Auto Clave can easily wear a cable so that E/O gas sterilization is recommended.
- ③ Don't sterilize disposable accessories.

5. Configuration

5.1 Feature

- ① A DISPLAY window allows you to easily check output values, indicated as digits.

- ② One equipment provides such functions that are required to perform an operation as Functional Cutting (Pure Cut, Blend1, Blend2, Blend3), Coagulation (Spray Coagulation, Contact Coagulation), Bipolar Coagulation (Hand Bipolar, Foot Switch Bipolar).
- ③ Two Twin Button Handles provide remote-control function. (Select Cutting or Coagulation)
- ④ Foot Switch is available for Cutting and Coagulating.
- ⑤ Hand Bipolar(Auto Bipolar) can be used only by contacting Forceps.
- ⑥ Microprocessor can straighten, stabilize the output.
- ⑦ Operations of Cutting, Coagulation and Bipolar Coagulation can be distinct from each other by sound and indication lamp.
- ⑧ Each application mode (Cutting, Coagulation, Bipolar Coagulation) has a different sound, which enables you to easily distinguish an operation type.
- ⑨ If the area between a patient and the pad is not appropriate, REM(Return Electrode Monitoring) gives the alarm with a warning sound and stop an operation of the product to prevent a burning incident.
- ⑩ The level of alarm sound can be adjusted during an operation of application mode.

5.2 Safety Function

- ① A fuse built in a power circuit prevent an over current from flowing through the equipment.
- ② When the plate attached to the patient is separated from the equipment, the red alarm light begins flickering. Pressing the button of Twin Button Handle or the pedal of Cutting and Coagulation of Double Foot Switch will stop the alarm sound and the equipment.
- ③ REM (Return Electrode Monitoring) monitors the size of contacting area between a patient and the pad. If the size is inappropriate, it automatically blocks the high-frequency current to minimize the danger of burning incidents.
- ④ To protect a patient, the case is fully grounded so that a leakage current can flow into the earth.

5.3 Indication for use

Electrosurgical unit is a device to perform a medical operation like cut and coagulation in the biological tissue using high-frequency current

5.4 Configuration and Accessories

● Configuration

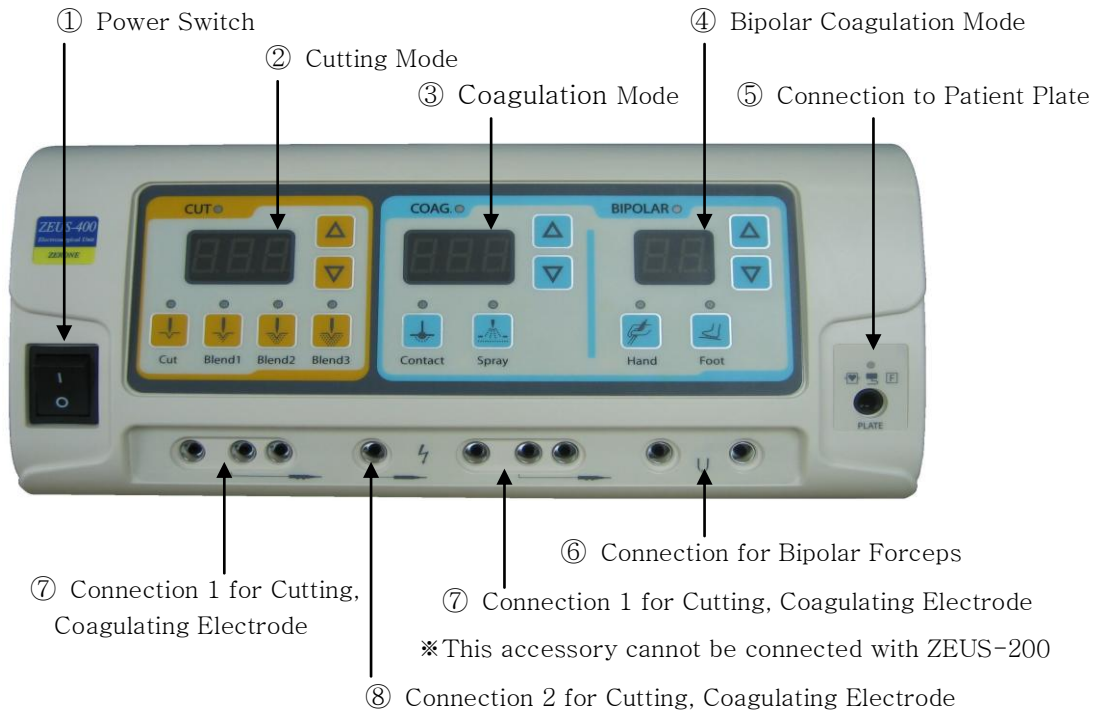
① Electrosurgical Unit	1EA
② Double Foot Switch	1EA
③ Single Foot Switch	1EA
④ Disposable Twin Button Handle	1EA
⑤ Reusable Monopolar Handle	1EA
⑥ Bipolar Cable	1EA
⑦ Disposable Patient Return Plate	2EA
⑧ Power Cord	1EA

● Accessories (Optional Products)

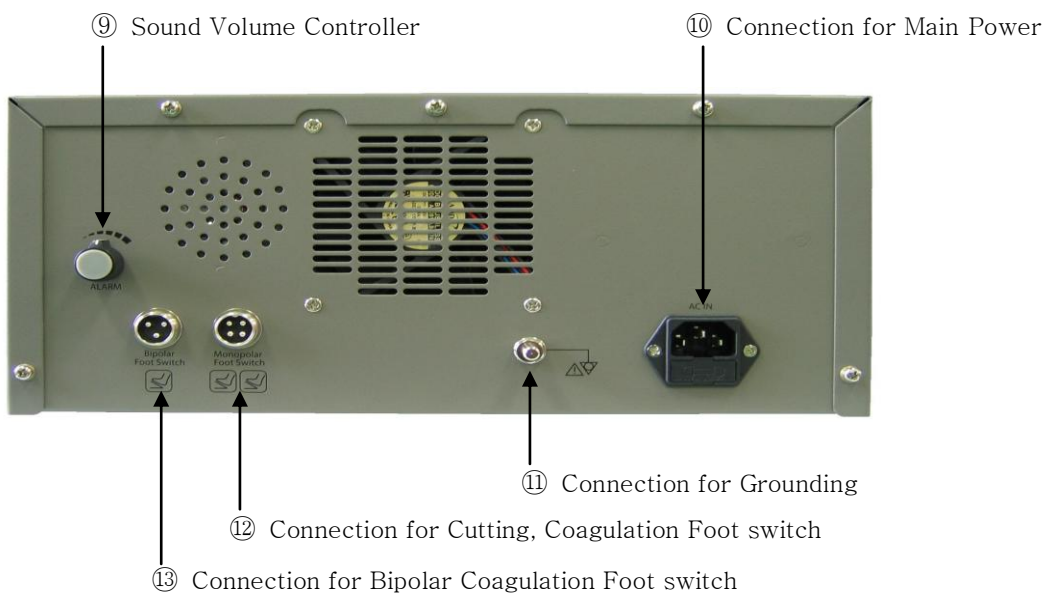
- ① Bipolar Forceps
- ② Knife Electrode
- ③ Needle Electrode
- ④ Needle Electrode (Angled)
- ⑤ Ball Electrode 5mm
- ⑥ Loop Electrode 6mm
- ⑦ Reusable Silicone Patient Plate

5.5 Name and Function of Each Part

● Front Side

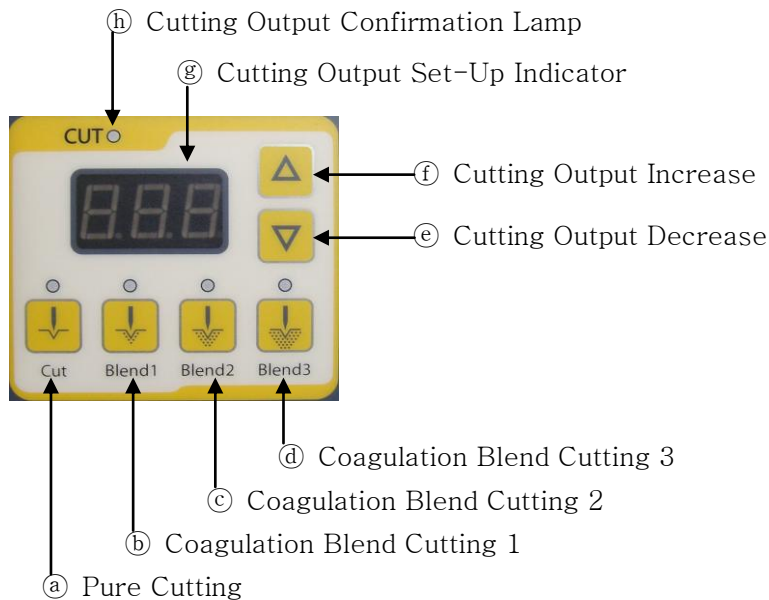


● Back Side



① Power ON / OFF Switch

② Cutting Mode



① Pure Cutting

Select this button for the cutting with the lowest level of arrest of bleeding.
If it is selected, the lamp above the button turns on.

② Coagulation Blend Cutting 1

Select this button for the cutting with the minimized level of arrest of bleeding.
If it is selected, the lamp above the button turns on.

③ Coagulation Blend Cutting 2

Select this button for the cutting with the intermediate level of arrest of bleeding.
If it is selected, the lamp above the button turns on.

④ Coagulation Blend Cutting 3

Select this button for the cutting with the maximized level of arrest of bleeding.
If it is selected, the lamp above the button turns on.

⑤ Cutting Output Decrease

This button decreases the output of selected mode. When this button is pressed one time, the output get reduced by 1Watt. Continuously-pressing leads the output to its lowest level.

⑥ Cutting Output Increase

This button increases the output of selected mode. When this button is pressed one time, the output get raised by 1Watt. Continuously-pressing leads the output to its highest level.

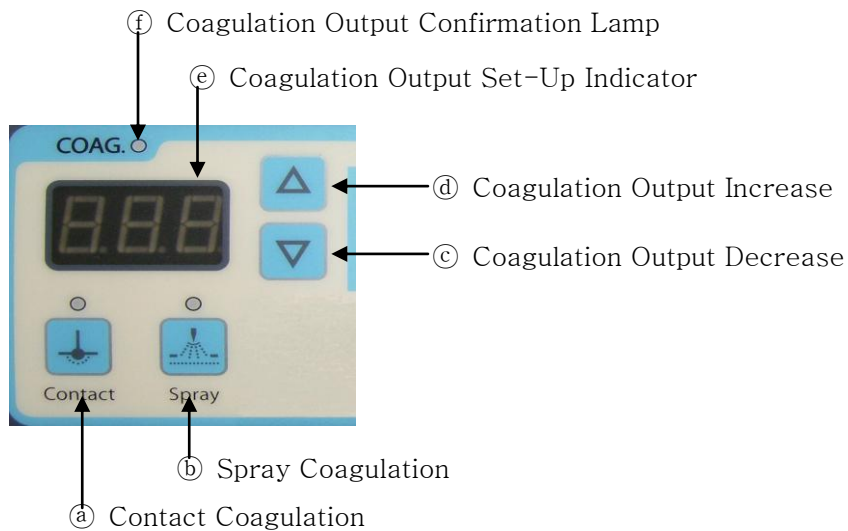
⑦ Cutting Output Set-Up Indicator

It displays Cutting and Blend Output as Watt.

⑧ Cutting Output Confirmation Lamp

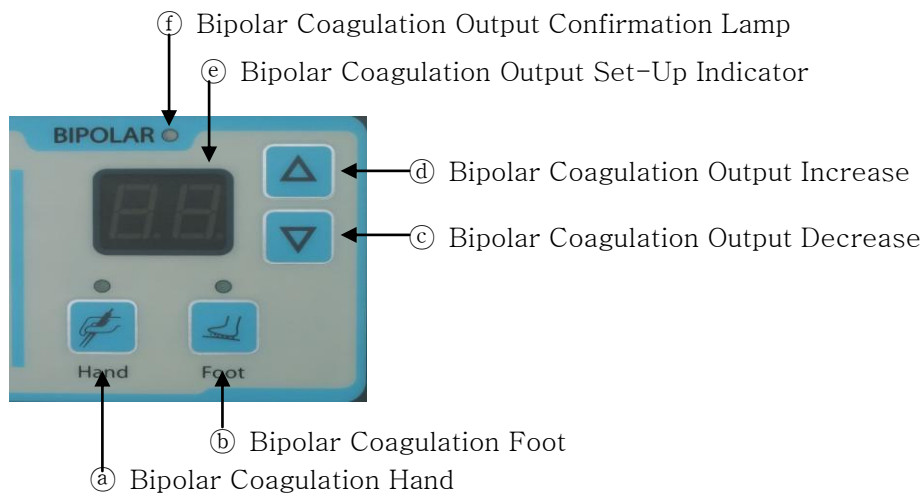
When a selected cutting mode is operated, the lamp turns on.

③ Coagulation Mode



- ① Contact Coagulation
Select this button for the coagulation with the minimized level of arrest of bleeding. If it is selected, the lamp above the button turns on.
- ② Spray Coagulation
Select this button for the coagulation with the maximized level of arrest of bleeding. If it is selected, the lamp above the button turns on.
- ③ Coagulation Output Decrease
This button decreases the output of selected mode. When this button is pressed one time, the output get reduced by 1Watt. Continuously-pressing leads the output to its lowest level.
- ④ Coagulation Output Increase
This button increases the output of selected mode. When this button is pressed one time, the output get raised by 1Watt. Continuously-pressing leads the output to its highest level.
- ⑤ Coagulation Output Set-Up Indicator
It displays Contact and Spray and Coagulation as Watt.
- ⑥ Cutting Output Confirmation Lamp
When a selected coagulation mode is operated, the lamp turns on.

④ Bipolar Coagulation Mode



① Bipolar Coagulation Hand

Pressing this button enable the bipolar arrest of bleeding without Foot Switch.
If it is selected, the lamp above the button turns on.

② Bipolar Coagulation Foot

Pressing this button enables to use Foot Switch for the bipolar arrest of bleeding.
If it is selected, the lamp above the button turns on.

③ Bipolar Coagulation Output Decrease

This button decreases the output of selected mode. When this button is pressed one time, the output get reduced by 1W. Continuously-pressing leads the output to its lowest level.

④ Bipolar Coagulation Output Increase

This button increases the output of selected mode. When this button is pressed one time, the output get raised by 1W. Continuously-pressing leads the output to its highest level.

⑤ Coagulation Output Set-Up Indicator

It indicates the using out as Watt.

⑥ Bipolar Cutting Output Confirmation Lamp

If a selected mode is operated, the lamp turns on.

⑤ Connection for Patient Plate

Use Patient Return Electrode when using Monopolar. If Patient Return Cable is not proper to use, the alarm sound rings and the lamp above is blinked.

- ⑥ Connection for Bipolar Forceps
Connection Terminal for Bipolar Forceps
- ⑦ Connection 1 for Cutting and Coagulation
Connection Terminal for Twin Button Handle
- ⑧ Connection 2 for Cutting and Coagulation
Connection Terminal for Monopolar Handle
- ⑨ Sound Volume Controller
Controls the sound volume of Cutting, Coagulation, Bipolar Coagulation.
- ⑩ Connection for Main Power
Connects with Main Power Code.
- ⑪ Connection for Grounding
Connection terminal to earth through Grounding Cable.
- ⑫ Connection for Cutting, Coagulation Foot switch
Double Foot Switch connection terminal using Monopolar Handle during an operation of Cutting and Coagulation.
- ⑬ Connection for Bipolar Coagulation Foot switch
Single Foot Switch connection terminal during an operation of Bipolar Coagulation Foot Switch mode

● Accessories

- ① Double Foot Switch



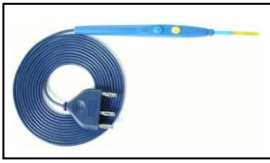
Connect it to 4pin Connector on the back side of the product. The yellow pedal is for Cutting and the blue one is for Coagulation.
4pin plug, Cable 4m

- ② Single Foot Switch



Connect it to 3pin Connector on the back side of the product during an operation of Bipolar function.
3pin plug, Cable 4m

③ Disposable Twin Button Handle



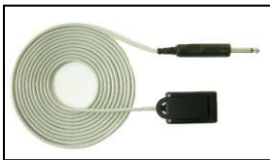
Connect it to the terminal of Connection 1 for Cutting and Coagulation Electrode. The yellow key operation is for Cutting and the blue is for Coagulation.
3pin Plug, Cable 3m, Rated Voltage(Umax):3000Vpp

④ Reusable Monopolar Handle



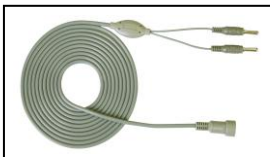
Coagulation Electrode. The yellow pedal is for Cutting and the blue is for Coagulation.
Cable 3m, Rated Voltage(Umax):3000Vpp

⑤ Reusable Patient Return Plate Cable



Connect it to the connection part of Patient Plate.
Connect Patient Return Plate to Clamp.
Cable 3m, Rated Voltage(Umax):3000Vpp

⑥ Bipolar Cable



Use it to link the Connection for Bipolar Forceps with Bipolar Forceps.
2pin Plug, Cable 3m, Rated Voltage(Umax):1000Vpp

⑦ Disposable Patient Return Plate

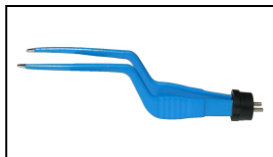


Connect it to the clamp of Patient Return Plate Cable.
180 * 120mm

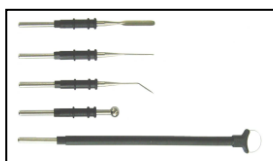
⑧ Power Cord



Connect it to Main Power Connection on the back side of the product.
Cable 1.8m

● Accessories (Optional Products)**① Bipolar Forceps**

Connect it to the connection terminal of Bipolar Cable.
Use it during Bipolar Coagulation.
Bayonet Forceps, 180mm, Tip 1mm
Rated Voltage(Umax):1000Vpp

② Electrodes

Use it during Cutting and Coagulation
Knife Electrode 2.4 * 70mm
Needle Electrode 2.4 * 70mm
Needle Electrode(Angled) 2.4 * 70mm
Ball Electrode 5mm
Loop Electrode 6mm

③ Reusable Silicone Patient plate

Connect it to the connection part of Silicone Patient Plate.
240*150mm, Cable 3m
Rated Voltage(Umax):3000Vpp

5.6 Using Method and Procedure

● Monopolar

- ① After confirming power and voltage (AC120V/230V), connect a ground power cable to the power connection part on the back side of Electrosurgical Unit. If there is no ground at Main Power, link an earth ground to the ground connection on the back side of the product.
- ② Turn on the Power Switch.
Check if Front Display indicates a number and then if REM alarm lamp flickers.
- ③ Connect Patient Return Plate Cable to the Patient Plate connection at the surgical unit.
 - Single Patient Plate
Connect Single Patient Plate to Patient Return plate Cable Clamp. Alarm lamp stops Flickering and the standby state starts. Attach Pad to a patient's body.
 - Double Patient Return Plate
Connect Double Patient Return Plate to Patient Return plate Cable Clamp. Attach Pad to a patient's body. Alarm lamp stops flickering and the standby state starts
- ④ Select Cutting Mode (Cut, Blend1, Blend2, Blend3) and set a wanted output (W) by using UP and DOWN buttons.
- ⑤ Select Coagulation Mode (Contact, Spray) and set a wanted output (W) level by using UP and DOWN buttons.
- ⑥ In case of using Twin Button Handle, connect it to the connection 1 for Cutting and Coagulation Electrode.
- ⑦ In case of using Foot Switch, connect Double Foot Switch Connector to Cutting, Coagulation Foot Switch connection. If pressing Foot Switch, output is generated from the Connection 2 for Cutting and Coagulation Electrode.

Notice

In the case of ZEUS-400/300, both two Twin Button Handle(3-pin) and one Monopolar Handle(1-pin) can be mounted on it. Although the unit can be used with the three accessories connected at the same time, output is not generated from them at the same time. Only first-selected connection can generate the output. It is recommended that unused accessories not be connected to the unit.

Notice

In the case of ZEUS-200, both one Twin Button Handle(3-pin) and one Monopolar Handle(1-pin) can be mounted on it. Although the unit can be used with the two accessories connected at the same time, output is not generated from them at the same time. Only first-selected connection can generate the output. It is recommended that unused accessories not be connected to the unit.

- ⑧ Press Twin Button Handle Switch or Double Foot Switch

● Bioplar**① Foot Mode**

- Connect Bipolar Single Foot Switch to Bipolar Foot Switch connection on the back of the product.
- Select Foot mode and set a wanted output (W) level by using UP and DOWN buttons.
- Connect Bipolar Cable to Bipolar Forceps connection.
- Press Single Foot Switch

② Hand Mode(Auto Bipolar)

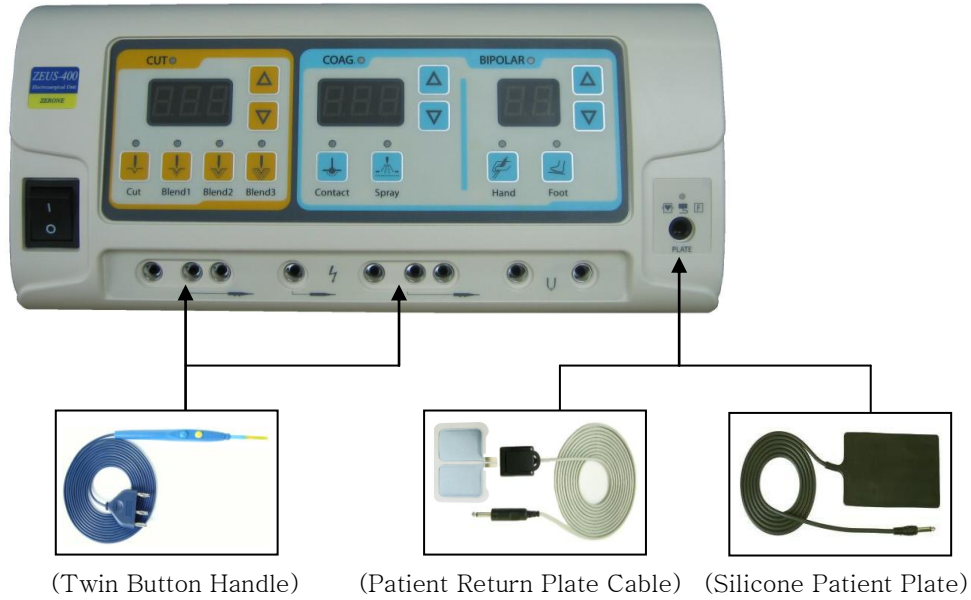
- Set a wanted output level by using UP and DOWN buttons.
- Connect Bipolar Cable to Bipolar Forceps connection.
- Select Hand Mode.

Caution

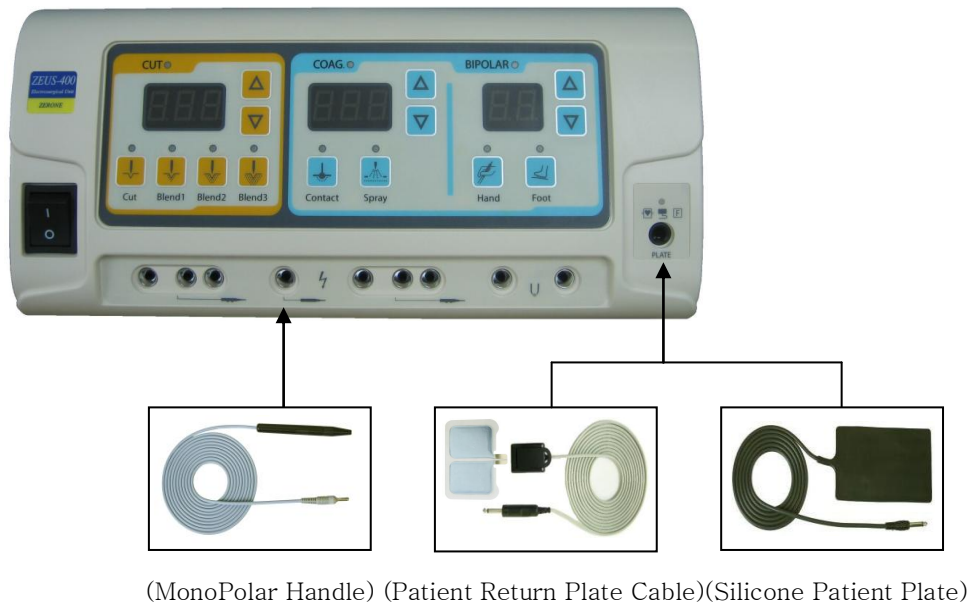
When using Forceps, don't activate this surgical unit until it makes contact with a patient.
Note that bipolar TIPS should not be short-circuited, each other to prevent a direct cause of product faults.

5.7 Accessory Diagram

● Diagram of Twin Button Handle and Patient Plate



● Diagram of Monopolar Handle and Patient Plate

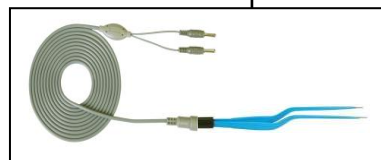
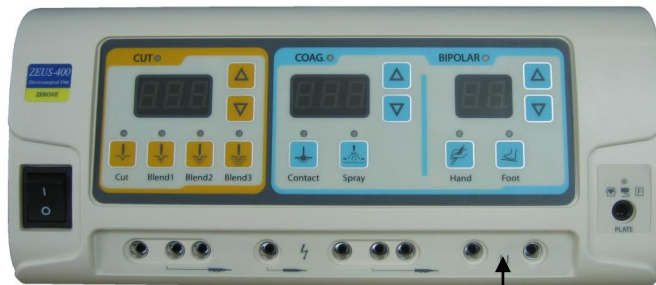


● Diagram of Double Foot Switches



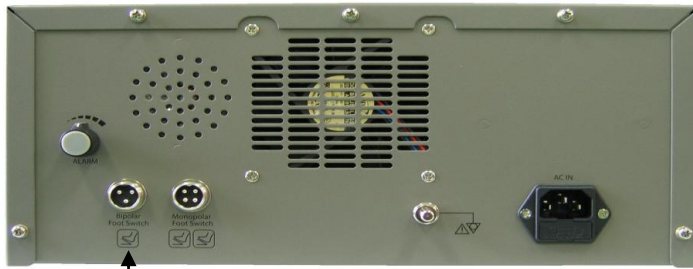
(Double Foot Switch)

● Diagram of Bipolar Forceps and Cable



(Bipolar Forceps)

● Diagram of Single Foot switches



(Single Foot Switch)

6. Technical Factors

6.1 Specification

Model Name	ZEUS-400	ZEUS-300	ZEUS-200
Rated Voltage	AC120V or AC230V		
Rated Frequency	50Hz or 60Hz		
Power Consumption	1200VA + 10%	1100VA + 10%	1000VA + 10%
Fuse	T10AH when AC120V or T6.3AL when AC230V		
Protection class	Class 1, Type CF		
Leakage current	in acc. with IEC601,Part2-2		
Carrier Frequency	400kHz, 500kHz		
Repeat Frequency	33kHz		
Size (W×D×H)	330mm × 455mm × 150mm		
Weight	13Kg		
Using Environment			
Operation temperature	10℃ to 40℃		
Storage temperature	-10℃ to 60℃		
Humidity	20% to 95% RH,		
Operation altitude	700mbar ~ 1060mbar		
Operation Cycle	10sec ON 30sec Idle		
Cooling	1 inner fan		

※ These parameters can be changed without notice.

6.2 Output

● ZEUS-400

Mode	output power	Carrier Freq.	Crest Factors	Tolerance : ±20%	
				Duty Rate	Repeat Freq.
Pure Cut	400W at 300ohm	400 kHz	1.6	100%	Continuous
Blend1	250W at 300ohm	400 kHz	2.0	80%	33 kHz
Blend2	200W at 300ohm	400 kHz	2.2	60%	33 kHz
Blend3	150W at 300ohm	400 kHz	2.4	50%	33 kHz
Contact coagulation	120W at 300ohm	400 kHz	3.3~1.5	10%	33kHz~153kHz
Spray coagulation	100W at 300ohm	400 kHz	4.5	8.0%	33 kHz
Bipolar coagulation	99W at 100ohm	500 kHz	1.5	100%	Continuous

※ These parameters can be changed without notice.

● ZEUS-300

Mode	output power	Carrier Freq.	Crest Factors	Tolerance : $\pm 20\%$	
				Duty Rate	Repeat Freq.
Pure Cut	300W at 300ohm	400 kHz	1.6	100%	Continuous
Blend1	230W at 300ohm	400 kHz	2.0	80%	33 kHz
Blend2	180W at 300ohm	400 kHz	2.2	60%	33 kHz
Blend3	120W at 300ohm	400 kHz	2.4	50%	33 kHz
Contact coagulation	100W at 300ohm	400 kHz	3.3~1.5	10%	33kHz~153kHz
Spray coagulation	80W at 300ohm	400 kHz	4.5	8.0%	33 kHz
Bipolar coagulation	80W at 100ohm	500 kHz	1.5	100%	Continuous

※ These parameters can be changed without notice.

● ZEUS-200

Mode	output power	Carrier Freq.	Crest Factors	Tolerance : $\pm 20\%$	
				Duty Rate	Repeat Freq.
Pure Cut	200W at 300ohm	400 kHz	1.6	100%	Continuous
Blend1	150W at 300ohm	400 kHz	2.0	80%	33 kHz
Blend2	120W at 300ohm	400 kHz	2.2	60%	33 kHz
Blend3	100W at 300ohm	400 kHz	2.4	50%	33 kHz
Contact coagulation	100W at 300ohm	400 kHz	3.3~1.5	10%	33kHz~153kHz
Spray coagulation	80W at 300ohm	400 kHz	4.5	8.0%	33 kHz
Bipolar coagulation	80W at 100ohm	500 kHz	1.5	100%	Continuous

※ These parameters can be changed without notice.

7. Standard Output Table by Surgery Part

Part	Cut Mode	Cut POWER(W)	Coagulation Mode	Coagulation POWER(W)	Bi-coag.
Skin Incision	Pure or Blend1	10~120 8~100			
Muscle Dessection	Pure or Blend1	Above 15 Above 15			
Tumor Excision	Blend2 Blend3	15~80 15~70	Spray	10~15	
Stomach, Intestine resection	Blend2 or Blend3	20 and Up 20 and Up			
Hemostasis			Pure Coagulation	10~65	3~22
Neuro Surgery	Blend2 or Blend3	Loop 20~80 20~70	Pure Coagulation	Ball 10~25	1~8
Massive Coagulation			Spray Coagulation	10~30	
Prostatic Resection	Pure or Blend1	65 and Up 55 and Up	Spray	15 and Up	
Bladder Fulguration			Spray	12~30	
Cervical Conization	Blend2	10~80	Pure Coagulation	25~70	
Bartholin and Skeneis	Blend3	15~30	Spray	12~22	
Tubal	Blend2	8~50			10~20
Proctologic	Blend3	8~40	Spray	10~22	
Abscess/Cyst	Blend3	10~80	Spray	10~15	
Rectal, Sigmoid	Blend3	Lancet 8~30 Loop 10~20	Pure	12~30	

8. Troubles and What to do with them

● There are no lights on the Display Number window.

1. Check if the power cord is connected to the power cord input plug on the back side of the surgery unit.
2. Check if the power switch of the surgery unit is on.
3. Check the fuse (AC120V: T10AH 250V/ AC230V: T6.3AL 250V) on the back side of the equipment.
4. If the trouble continues, use the auxiliary equipment.

● No output.

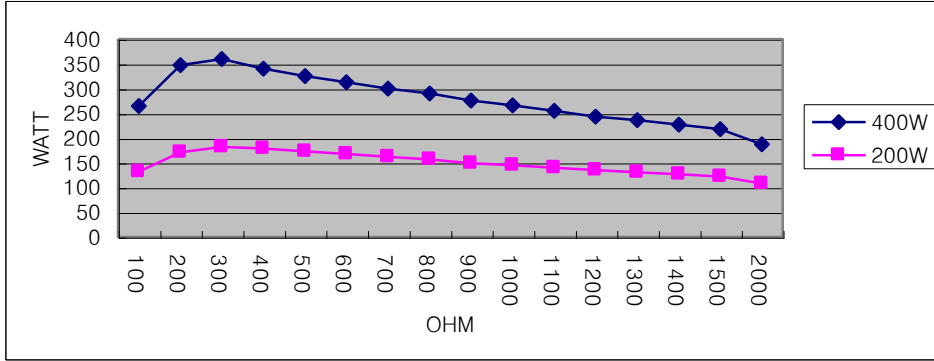
1. Check if the plug of patient return plate cable is connected to the surgery unit.
2. Check if the patient return plate is accurately connected with the patient.
3. Check if the accessories (Twin Button Handle, Monopolar Handle and Foot Switch) are connected.
4. Change the accessories such as Twin Button Handle, Monopolar Handle and Foot Switch and others.
5. Check if the output is set low.
6. If the trouble continues, use the auxiliary equipment.

● The alarm rings all the time.

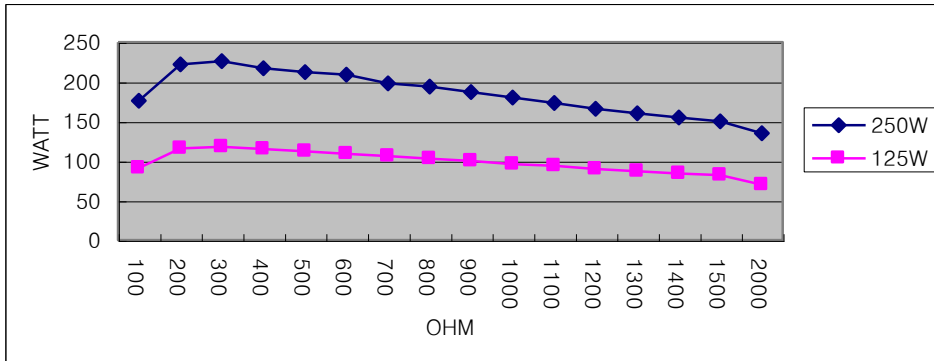
1. When the patient plate has troubles.
 - ① Check if the plug of patient plate cable is connected to the surgery unit.
 - ② Change the patient plate.
 - ③ If the trouble continues, use the auxiliary equipment.
2. When the patient return plate has troubles.
 - ① Check if the plug of patient return plate cable is connected to the surgery unit.
 - ② Check if the entire surface of patient return plate is adhered to the patient.
 - ③ Check if the patient return plate is connected to the patient return plate cable.
 - ④ Change the patient return plate cable.
 - ⑤ If the trouble continues, use the auxiliary equipment.

9. Load Regulation

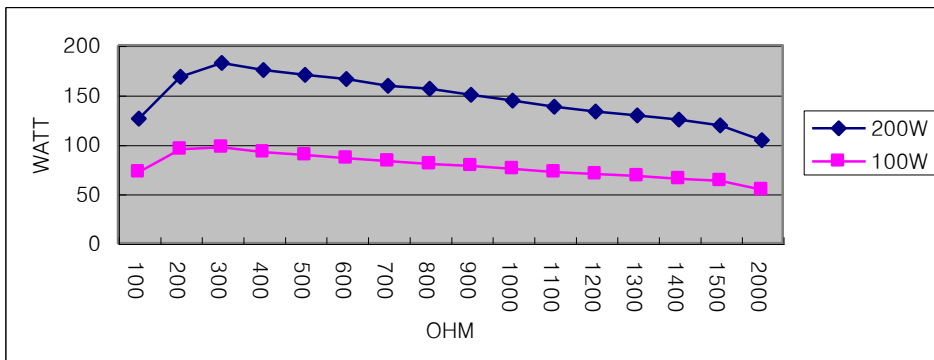
9.1 Pure Cutting



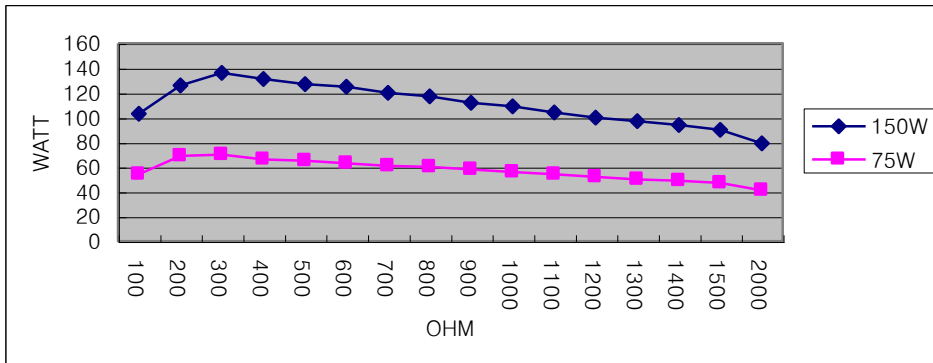
9.2 Blend1



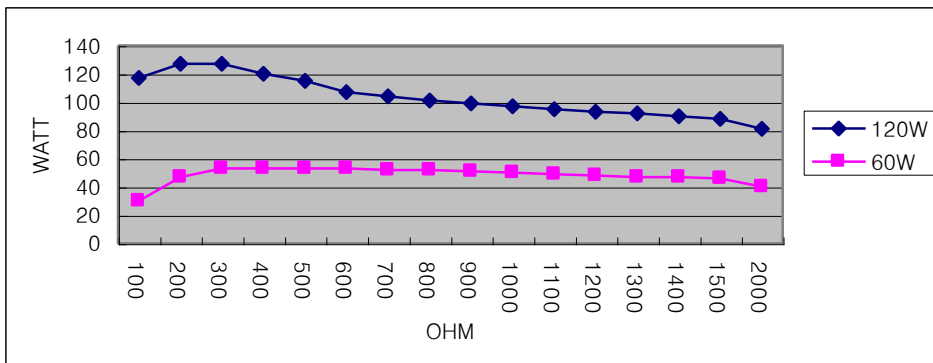
9.3 Blend2



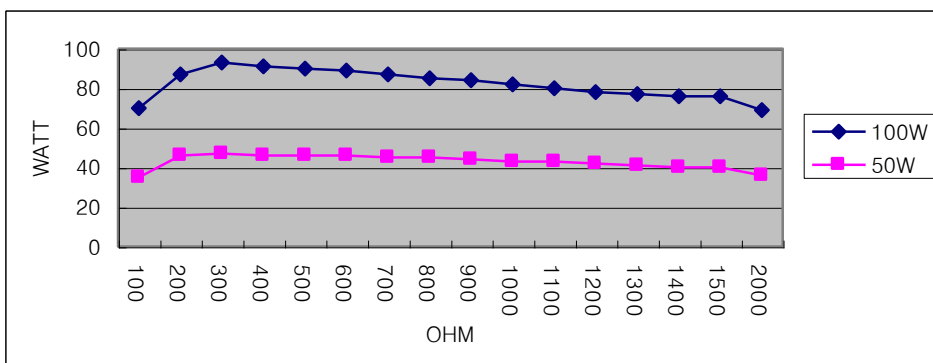
9.4 Blend3



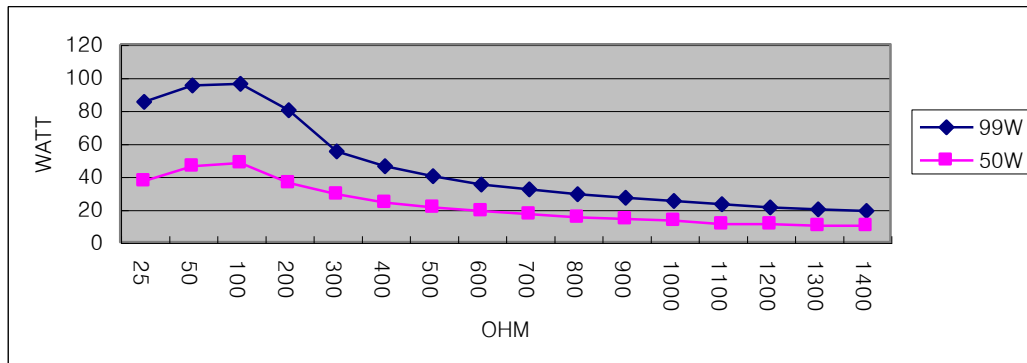
9.5 Contact Coagulation



9.6 Spray Coagulation



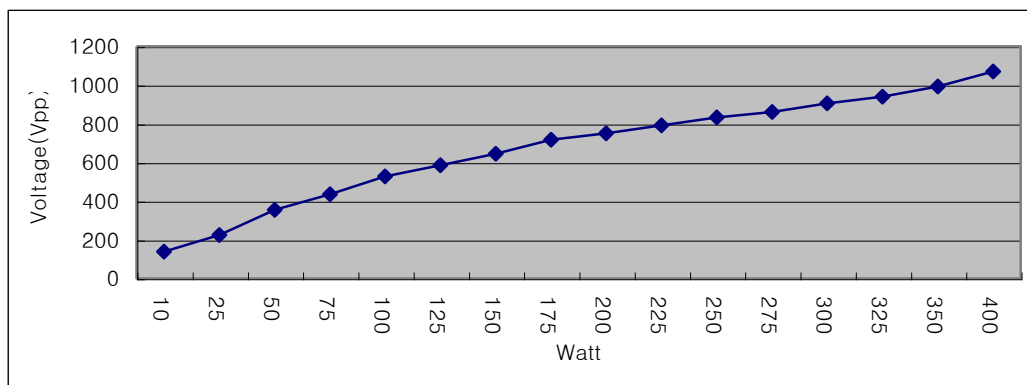
9.7 Bipolar Coagulation



10. Voltage Output Graphic

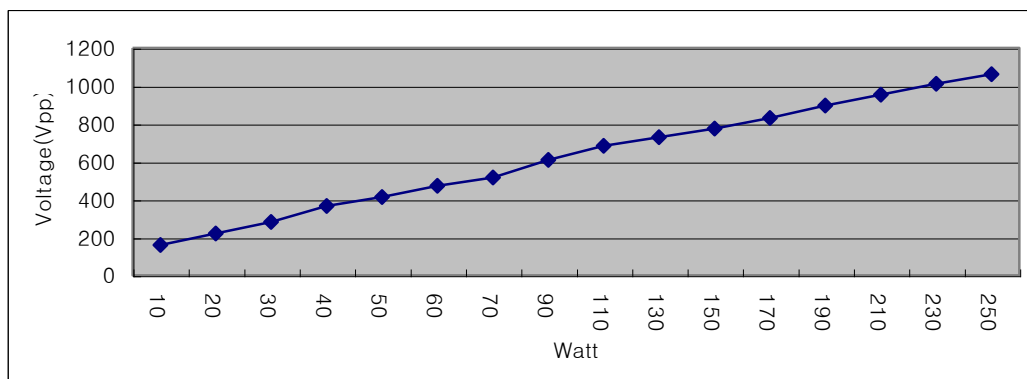
10.1 Pure Cutting (Load 300Ω)

Max Peak Output Voltage : 1070Vpp



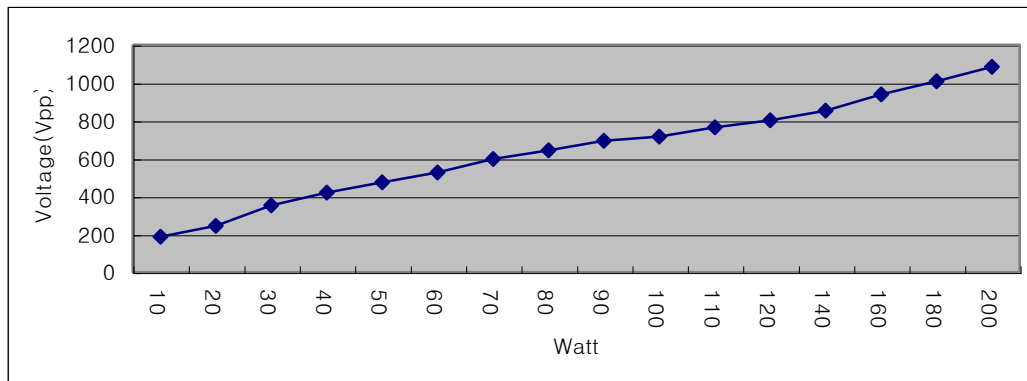
10.2 Blend1 (Load 300Ω)

Max Peak Output Voltage : 1061Vpp



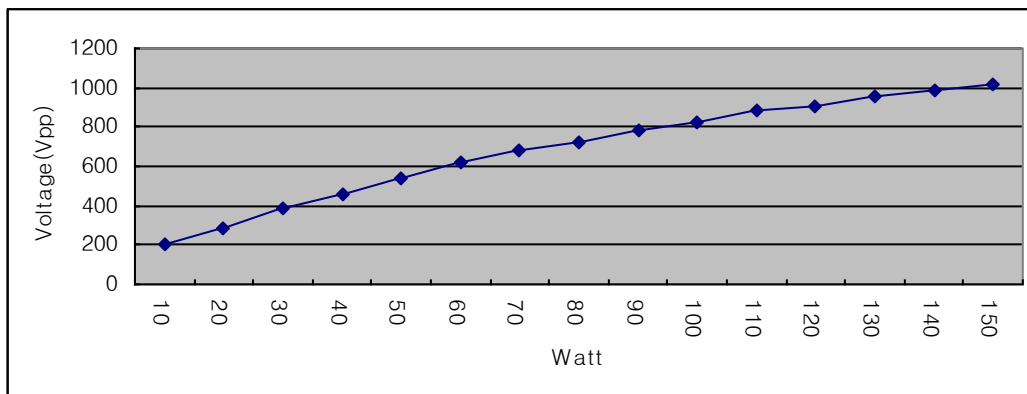
10.3 Blend2 (Load 300Ω)

Max Peak Output Voltage : 1083Vpp



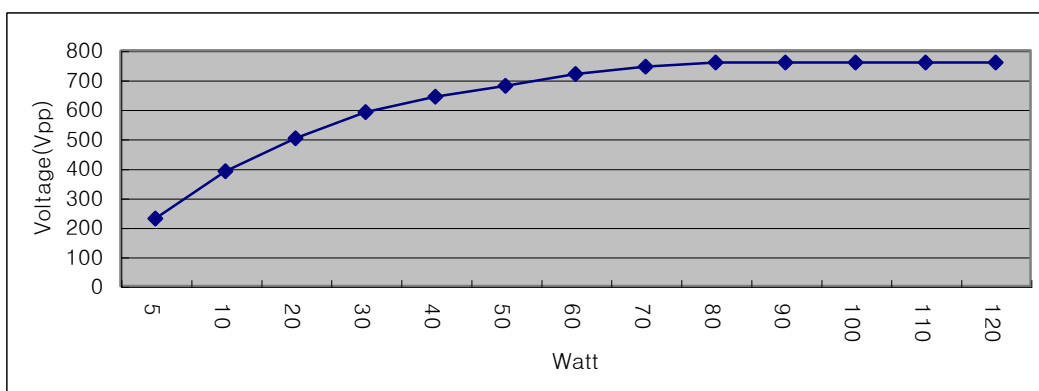
10.4 Blend3 (Load 300Ω)

Max Peak Output Voltage: 1014Vpp



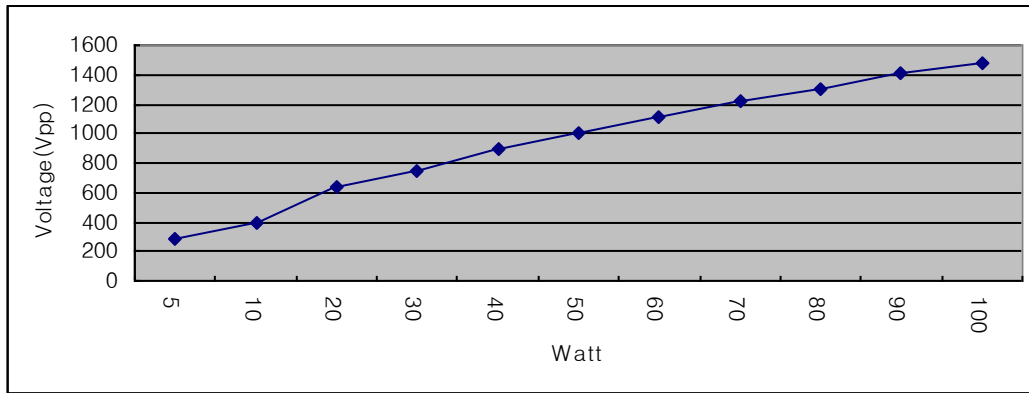
10.5 Contact Coagulation (Load 300Ω)

Max Peak Output Voltage : 759Vpp



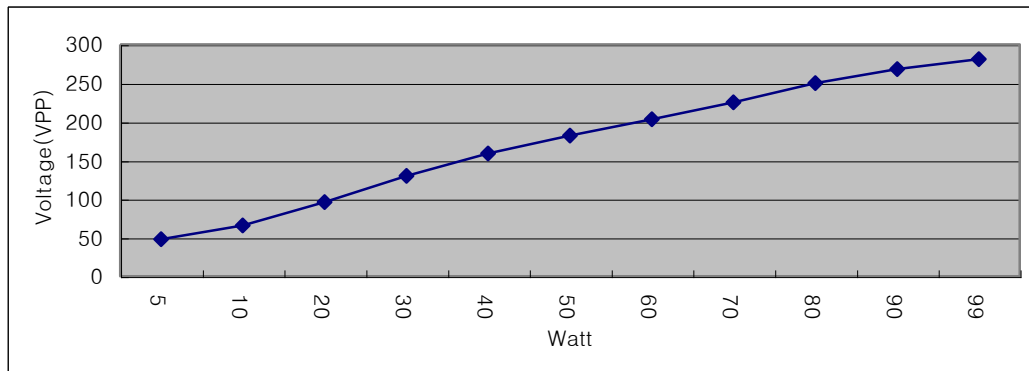
10.6 Spray Coagulation (Load 300Ω)

Max Peak Output Voltage : 1479Vpp



10.7 Bipolar Coagulation (Load 100Ω)

Max Peak Output Voltage : 281Vpp



11. Appendix

11.1 Electromagnetic Compatibility (EMC) Information

Warning



Check the followings before using this product.

- ① Medical electrical equipment needs special precautions regarding Electromagnetic Compatibility (EMC). Observe the EMC instructions in this appendix during installation and operation.
- ② The use of portable and mobile RF equipment may have an impact on this and other pieces of medical equipment.

NOTE: The tables and guidelines that are included in this Appendix provide information to the customer or user that is essential in determining the suitability of the equipment or system for the electromagnetic environment of use, and in managing the electromagnetic environment of use to permit the equipment or system to perform its intended use without disturbing other equipment and systems or non-medical electrical equipment. If this equipment does cause harmful interference with other devices, the user is encouraged to try to correct the interference by one or more of the following measures:

- reorient or relocate the receiving device
- increase the separation between the equipment
- connect the equipment into an outlet on a circuit different from that to which the other device(s) is connected.

Table 201 Guidance and manufacturer's declaration – electromagnetic emissions		
ZEUS-400/300/200 model is intended for use in the electromagnetic environment specified below. The customer or user of the ZEUS-400/300/200 model should ensure that it is used in such an environment.		
Emissions test	Compliance	Electromagnetic environment – guidance
RF emissions CISPR 11	Group 1	The ZEUS-400/300/200 model is suitable for usage in all establishments (e.g. hospitals and doctors' offices) except domestic establishments those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
RF emissions CISPR 11	Class A	
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations/flicker emissions IEC 61000-3-3	Complies	

Table 202			
Guidance and manufacturer's declaration – electromagnetic immunity			
ZEUS-400/300/200 model is intended for use in the electromagnetic environment specified below. The customer or user of the ZEUS-400/300/200 model should ensure that it is used in such an environment.			
Emissions test	EN/IEC 60601 test level	Compliance level	Electromagnetic environment – guidance
Electrostatic Discharge (ESD) IEC 61000-4-2	± 6 kV contact ± 8 kV air	Complies ± 6 kV contact ± 8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	± 2 kV for power supply lines ± 1 kV for input/output lines	Complies ± 2 kV for power supply Lines ± 1 kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment. If image distortion occurs it may be necessary to further filter the power quality by using a AC line filter.
Surge IEC 61000-4-5	± 1 kV differential mode ± 2 kV common mode	Complies ± 1 kV differential mode ± 2 kV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5% UT * (>95% dip in UT) for 0.5 cycle 40% UT (60% dip in UT) for 5 cycles 70% UT (30% dip in UT) for 25 cycles <5% UT (>95% dip in UT) for 5 sec	Complies <5% UT* (>95% dip in UT) for 0.5 cycle Complies 40% UT (60% dip in UT) for 5 cycles Complies 70% UT (30% dip in UT) for 25 cycles Complies <5% UT (>95% dip in UT) for 5 sec	Mains power quality should be that of a typical commercial or hospital environment. If the user of the equipment or system requires continued operation during power mains interruptions, it is recommended that the equipment or system be powered from an uninterruptible power supply or a battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	Complies 3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
* Note: <i>UT</i> is the a.c. mains voltage prior to application of the test level.			


<p align="center">Table 204 Guidance and manufacturer’s declaration – electromagnetic immunity – for equipment and systems that are not life-supporting</p>			
<p>ZEUS-400/300/200 model is intended for use in the electromagnetic environment specified below. The customer or user of the ZEUS-400/300/200 model should ensure that it is used in such an environment.</p>			
Emissions test	EN/IEC 60601 test level	Compliance level	Electromagnetic environment – guidance
<p>Conducted RF IEC 61000-4-6</p>	<p>3 Vrms 150 kHz to < 80 MHz</p>	<p>3 Vrms</p>	<p>Portable and mobile RF communications equipment should be used no closer to any part of the ZEUS-400/300/200 model, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance: $d = [3.5 / 3] P^{150 \text{ kHz to } < 80 \text{ MHz}}$</p>
<p>Radiated RF IEC 61000-4-3</p>	<p>3 V/m 80 MHz to 2.5 GHz</p>	<p>3 V/m</p>	<p>$d = [3.5 / 3] P^{80 \text{ MHz to } < 800 \text{ MHz}}$</p> <p>$d = [7 / 3] P^{800 \text{ MHz to } 2.5 \text{ GHz}}$</p> <p>Where P is the maximum output power rating of the transmitter in watts [W] according to the transmitter manufacturer and d is the recommended separation in meters [m]. Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey^a, should be less than the compliance level in each frequency range^b. Interference may occur in the vicinity of equipment marked with the following symbol:</p> 
<p>Note: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection by structures, objects and people.</p>			
<p>a Field strengths from fixed transmitters, such as base stations for radio [cellular/cordless] telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the unit is used exceeds the applicable RF compliance level above, the unit should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the unit.</p> <p>b Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.</p>			

Table 206			
Recommended separation distances between portable and mobile RF communications equipment and the ZEUS-400/300/200 model			
<p>The ZEUS-400/300/200 model is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or user of the unit can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the unit as recommended below, according to The maximum output power of the communications equipment.</p>			
Rated maximum output power of transmitter[W]	Separation distance <i>d</i> [m] according to frequency of transmitter		
	150 kHz to < 80 MHz <i>d</i> = 1.2√ <i>P</i>	80 MHz to < 800 MHz <i>d</i> = 1.2√ <i>P</i>	800 MHz to 2.5 GHz <i>d</i> = 2.3√ <i>P</i>
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.27
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23
<p>For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be estimated 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.</p> <p>Note: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.</p>			

Warranty

Name of product		Electrosurgical Unit
Model no.		ZEUS-400/300/200
License no.		
Product no.		
Term of guarantee		Within one year from the date of purchase
Customer Detail	Name of hospital	
	Address	
	Name	
	Phone	
Name of seller		
Name of manufacture		ZERONE Co., Ltd. (Shinil IT UTO, Dangjeong-dong) #810, LS-Ro 13, Gunpo-si, Gyeonggi-do, Korea (zip 435-831) Phone : + 82 31 427 2772 Fax : + 82 31 427 2332

- ※ Thanks for purchasing of ZEUS-400/300/200 from ZERONE Co., Ltd.
- ※ This product is made under thorough quality control and passed strict inspections.