# ZERONE Electrosurgical Unit

CE
2460

## *ZEUS-100/80*

OPERATION MANUAL

ZERONE CO., LTD.

# ZEUS-100 /80 Operation manual

ZERONE CO., LTD

# - Contents -

# 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. - Sales Dept.<br>(Shinil IT UTO Bldg., Dangjeong-dong)<br>#810, LS-Ro 13, Gunpo-si, Gyeonggi-do, Korea<br>(zip 435-831)<br>Tel : + 82 31 427 2772<br>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.<br>Tel : + 82 31 427 2772 |
| Homepage | URL : http://www.01zeus.com |
| EUR REPRESENTATIVE  | CMC Medical Devices & Drugs S.L.<br>C/ Horacio Lengo Nº 18, CP 29006, Málaga, Spain<br>Tel/Fax : + 34-661-416-622 |

※ 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.
- Compensation standard for repairs and replacement complies for “Guidelines for Consumer Protection” quoted by the Korean Economic Planning Board.
- 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

| No | Symbol | Description |
|---|---|---|
| 1 |  | Type BF Applied Part |
| 2 |  | RF Isolated : Earth referenced patient circuit for high frequency |
| 3 |  | Refer to the manual |
| 4 |  | Non-ionizing Radiation : This equipment intentionally supplies non-ionizing RF energy for physiological effect. |
| 5 |  | High Voltage Warning |
| 6 |  | Caution |
| 7 |  | Protective Earth |
| 8 |  | EU Representatives information |
| 9 |  | Manufacturer information |
| 10 |  | Made date |
| 11 |  | Serial number |
| 12 |  | Electronics Disposal Information |
| 13 |  | Do not re-use |
| 14 |  | Keep dry |
| 15 |  | Keep away from sunlight |

● Cautions

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

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

## 2. Installation Notice

This operating manual describes the function and handling of the Radio Frequency Surgery Equipment ZEUS-100/80. The manual serves as an instruction reference and should be read thoroughly before operating the equipment. Only then can the correct handling of the equipment be assured. In case of incorrect handling no liability will be taken on by the manufacturer

### 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-100/80. CE marked or UL approved components with more than Monopolar: 1800Vpp, Bipolar: 500Vpp rated voltage rating can be used as accessories.
If the rating of the accessory is lower than the max output of the applicable mode, set up the output as much as the rating of the applicable accessory.
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.

④ When disposing of this electrosurgical unit, or any of its components (such as fuses), follow all applicable national and local laws and guidelines.

⑤ This electrosurgical unit should be recycled separately from household waste. When this product reaches its end of life, follow the local laws and regulations of Disposal. The improper disposal of waste electronic equipment from consumer may be subject to fines.

⑥ For more information on repair, please refer to the service manual.

● 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. Monitors the size of contact 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.

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 Warning: To avoid the risk of electric shock, this equipment must only be connected to a supply mains with protective earth

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.

④ Connection for potential equalization : Connection pins for potential equalization cable between RF equipment and potential equalization bar in or room. The yellow-green potential equalization cable supplied by the manufacturer must be used.

**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 Do not leave any water container on the main system. If any water is spilled, wipe it up immediately, and never run the system if water is soaked into it.

③ 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.

④ Check the linkage condition of equipment ground.

⑤ Impressed voltage (AC120V/AC230V) 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.

⑥ Before you start surgical operation, check if the power output is correctly adjusted for your operation.

## 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.

● 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 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.

⑤ 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.

⑥ 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.

⑦ Avoid the use of inflammable anesthetics like $N_2O$ and $O_2$. 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.

⑧ 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.

⑨ 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.

⑩ 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.

⑪ 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.

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.

⑬ The output from electrodes may change during use.

⑭ A failure of the electrosurgical unit could result in an unintended increase of output power.

**Caution**

Check the followings before using this product.

① The patient leads should be positioned in such a way that contact with the patient or other leads is avoided. Temporarily unused electrodes should be stored in a location that is isolated from the patient.

② For surgical procedures where the HF current could flow through parts of the body having a relatively small cross sectional area, the use of BIPOLAR techniques may be desirable in order to avoid unwanted tissue damage.

● 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 Patient Plate 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 ('Use a gel for medical.') 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 |
| Reusable Bipolar Forceps | - Gravity Displacement (121℃(250°F))<br>: 30minutes<br>- Drying time<br>: 20 minutes |
| Reusable Electrodes Tips | |
| Reusable Monopolar Handle | - Gravity Displacement (121℃(250°F))<br>: 20minutes<br>- Drying time<br>: 20 minutes |

**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 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 This provides necessary functions like Pure Cut, Blend, Contact Coagulation, Bipoar Coagulation, under operation by one equipment

③ Holding the button for each mode for more than 3 seconds, the output ratio on Display will be changed to 1W to be facilitated to shift from the low to high output.

④ Twin Button Handles provide remote-control function. (Select Cutting or Coagulation)

⑤ Foot Switch is available for Cutting and Coagulating.

⑥ Bipolar coagulation of by Foot Switch.

⑦ Microprocessor can straighten, stabilize the output.

⑧ Operations of Cutting, Coagulation and Bipolar Coagulation can be distinct from each other by sound and indication lamp.

⑨ Each application mode (Cutting, Coagulation, Bipolar Coagulation) has a different sound, which enables you to easily distinguish an operation type.

⑩ 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.

⑪ The selected output ratio of Cut, Coagulation, and Bipolar Coagulation will displayed by reenergizing the device after power OFF.

## 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 pedal of 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

● Operator Profile

| Considerations | | Requirement description |
|---|---|---|
| Education | Minimum | A physician or medical personnel under the supervision of a physician |
| | Maximum | N/A |
| Language understanding | Minimum | Languages specified in the instruction for use |
| | Maximum | N/A |
| Experience | Minimum | A person who received sufficient training in electrosurgical procedures |
| | Maximum | N/A |
| Permissible impairments | N/A | |

● Intended Patient Population

| Considerations | Requirement description |
|---|---|
| Age | No limitation |
| Weight | Check a marking in kg indicating the maximum a patient weight on end use packaging for Disposable Patient Return Plate |
| Healthy | Except for patients who get an implantable pacemakers or implantable defibrillators transplant. |
| Nationality | No limitation |
| PATIENT state | A patient is not user : not relevant, unless patient is agitated |

## 5.4 Configuration and Accessories

● Configuration

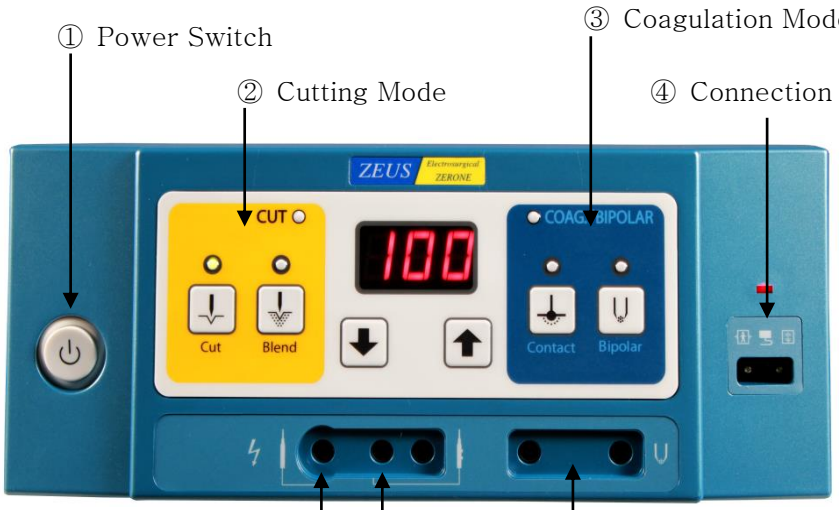
| | |
|---|---|
| ① Electrosurgical Unit | 1EA |
| ② single Foot Switch | 1EA |
| ③ Disposable Twin Button Handle | 1EA |
| ④ Power Cord | 1EA |
| ⑤ Knife Electrode 2.4 * 70mm | 1EA |
| ⑥ Needle Electrode 2.4 * 70mm | 1EA |
| ⑦ Needle Electrode (Angled) 2.4 * 70mm | 1EA |
| ⑧ Ball Electrode 5mm | 1EA |

● Accessories (Optional Products)

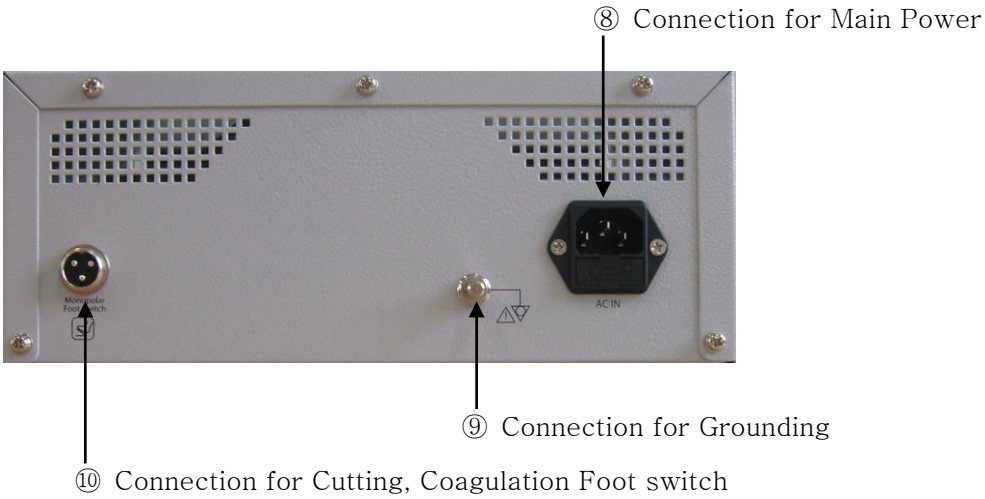
① Reusable Silicone Patient Plate

## 5.5 Name and Function of Each Part

● Front Side

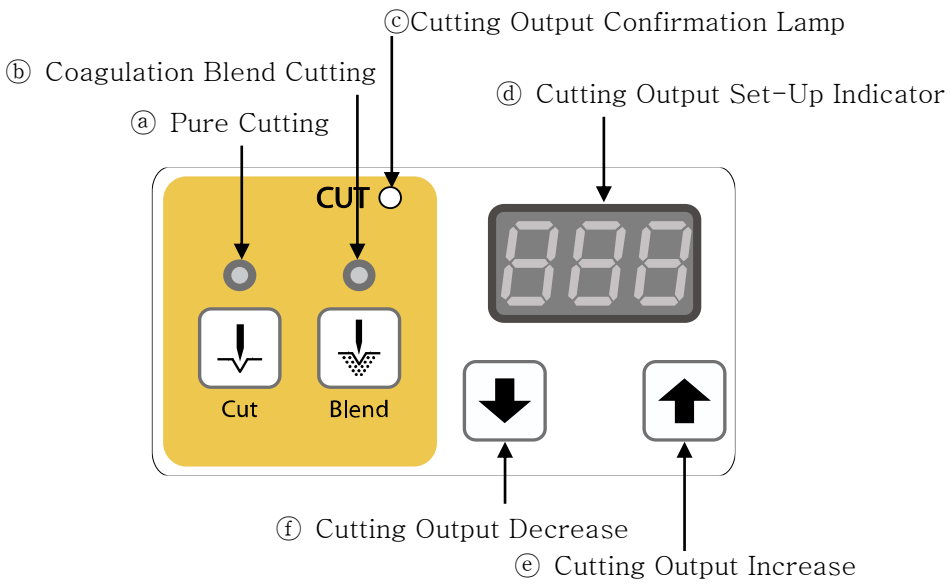



● Back Side



① Power ON / OFF Switch

② Cutting Mode




ⓐ 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.

ⓑ Coagulation Blend Cutting
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.

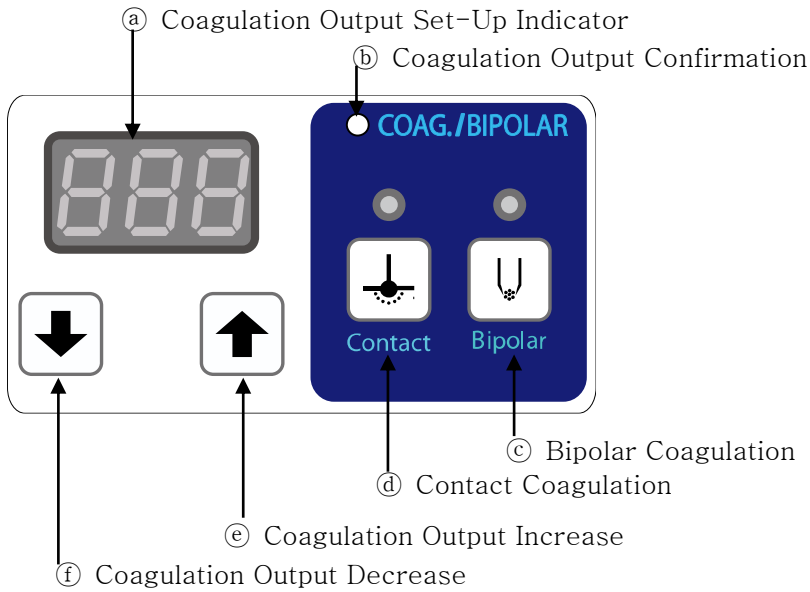
ⓒ Cutting Output Confirmation Lamp
When a selected cutting mode is operated, the lamp turns on.

ⓓ Cutting Output Set-Up Indicator
It displays Cutting and Blend Output as Watt.

ⓔ 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.

ⓕ 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.

③ Coagulation Mode




ⓐ Coagulation Output Set-Up Indicator
Coagulation and bipolar coagulation output is displayed in W.
ⓑ Coagulation Output Confirmation Lamp
When a selected coagulation mode is operated, the lamp turns on.
ⓒ Bipolar Coagulation
Bipolar hemostasis using Foot Switch.
If it is selected, the lamp above the button turns on.
ⓓ 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.
ⓔ 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.
ⓕ 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 Connection for Patient Plate-Applied part
Use Patient Return Electrode when using Monopolar.

⑤ Connection for Bipolar Forceps-Applied part
Connection Terminal for Bipolar Forceps

⑥ Connection 1 for Cutting and Coagulation-Applied part
Connection Terminal for Twin Button Handle

⑦ Connection 2 for Cutting and Coagulation-Applied part
Connection Terminal for Monopolar Handle

⑧ Connection for Main Power
Connects with Main Power Code.

⑨ Connection for Grounding
Connection terminal to earth through Grounding Cable.

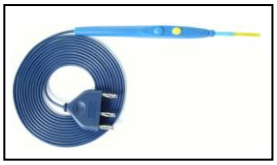
⑩ Connection for Cutting, Coagulation Foot switch
Single Foot Switch connection terminal using Monopolar Handle during an operation of Cutting and Coagulation.

## ● Accessories

① Foot Switch

Use cut and coagulation functions by connecting to 3 pin Connector in the back of equipment.
3pin plug, Cable 4m

② 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: 3000Vpp
Expiration date of Disposable Twin Button Handle: Check the packaging for Disposable Twin Button Handle

③ Power Cord

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

④ Electrodes

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

## ● Accessories (Optional Products)

② Reusable Silicone Patient Plate

Connect it to the connection part of Silicone Patient Plate.
165 * 90mm, Cable 2m
Rated Voltage: 3000Vpp

## 5.6 Using Method and Procedure

● Monopolar

① After confirming power and voltage (AC120V/AC230V), 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 Return 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' body. Alarm lamp stops flickering and the standby state starts.

④ Select Cutting Mode (Cut, Blend) and set a wanted output (W) by using UP and DOWN buttons.

⑤ Select Coagulation Mode (Contact) 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 Foot Switch to Monopolar Foot Switch connector in the back of equipment.
Output is generated from the Connection 2 for Cutting and Coagulation Electrode.

⑧ Press Twin Button Handle Switch or Foot Switch

● Bioplar

① Select the Bipolar mode and set the output(W) using UP and DOWN button.

② Connect Bipolar Cable to Bipolar Forceps connection.

③ Connect Foot Switch to Monopolar Foot Switch connector in the back of equipment.

④ Use it by step on Foot Switch.

**Caution**

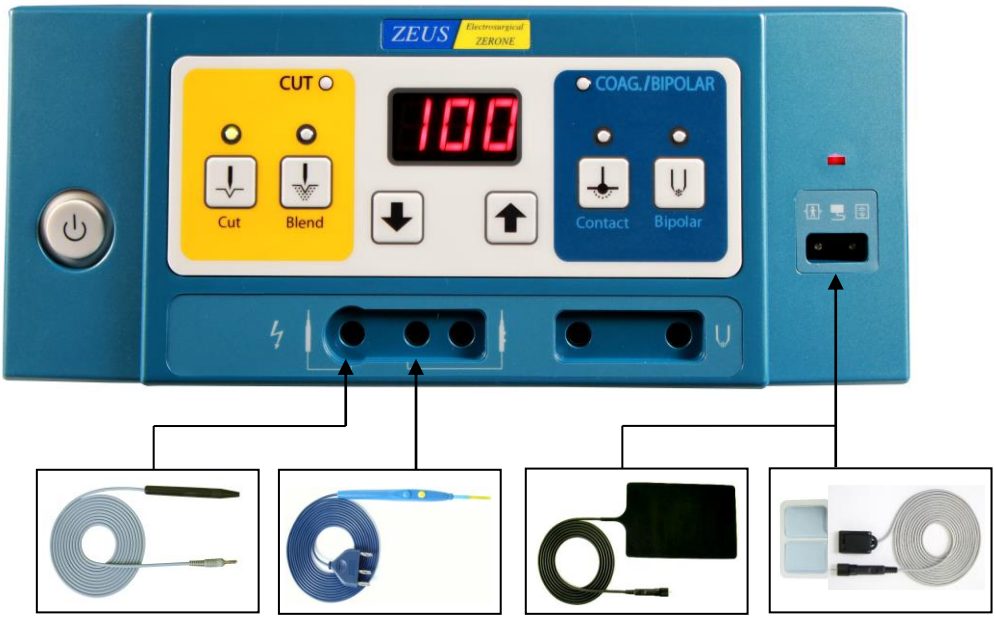
When using Forceps. don't activate this surgical unit until it makers contact with a patient.
Note that bipolar TIPs should not short-circuited. each other to prevent a direct cause of product faults.

● Power off : Turn the electrosurgical unit OFF and disconnect the power cord from the Receptacle(wall mains outlet).

● Make sure that the electrosurgical unit and foot switch are completely dry before storage.

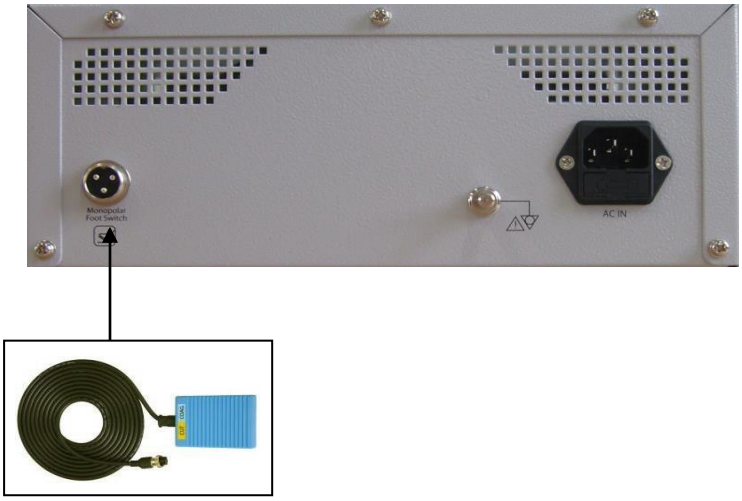
## 5.7 Accessory Diagram

● Diagram of Mnipolar Handle/Twin Button Handle and Patient Return Plate Cable




(Monopolar Handle) (Twin Button Handle) (Silicone Patient Plate) (Patient Return Plate Cable)

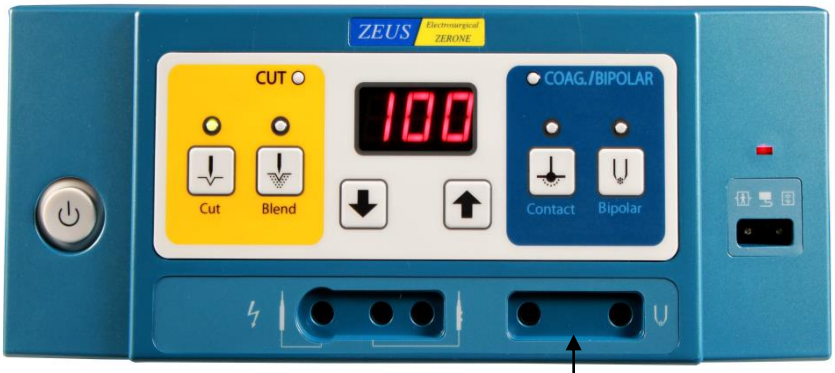
● Diagram of Foot Switches

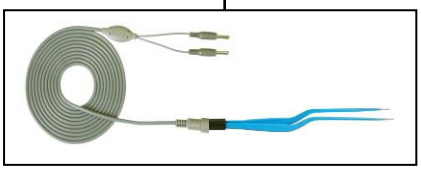





(Foot Switch)

● Diagram of Bipolar Forceps and Cable



(Bipolar Forceps)

## 6. Periodic Inspection

Every six months, visually inspect the ZEUS-100/80 Electrosurgical Generator for signs of wear or damage.

In particular, look for any of the following problems:

- ✓ Damage to the power cord
- ✓ Damage to the power cable receptacle
- ✓ Obvious damage to the unit
- ✓ Damage to any receptacle
- ✓ Accumulation of lint or debris in or around the unit

## 7. Technical Factors

### 7.1 Specification

- ● Name of Product : Electrosurgical Unit
- ● Model Name : ZEUS-100, ZEUS-80
- ● Rated Voltage : AC120V / AC230V
- ● Rated Frequency : 50Hz / 60Hz
- ● Power Consumption : 300VA + 10%
- ● Fuse : T4.0AL when AC120V / T2.0AL when AC230V
- ● Protection class : Class 1, Type BF
- ● Leakage current : in acc. with IEC601, Part2-2
- ● Carrier Frequency : 1.6MHz
- ● Repeat Frequency : 100Hz / 120Hz
- ● Size (Width × Depth × Height) : 270mm × 310mm × 110mm
- ● Weight : 6Kg
- ● 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

※ These parameters can be changed without notice.

7.2 Output

● ZEUS-100

Tolerance : ±20%

| Mode | output power | Carrier Freq. | Crest Factors | Duty Rate |
|---|---|---|---|---|
| Pure Cut | 100W at 300ohm | 1.6MHz | 1.6 | 100% |
| Blend | 100W at 300ohm | 1.6MHz | 2.2 | 60% |
| Contact coagulation | 60W at 300ohm | 1.6MHz | 2.5 | 30% |
| Bipolar coagulation | 80W at 100ohm | 1.6MHz | 1.6 | 100% |

※ These parameters can be changed without notice.

● ZEUS-80

Tolerance : ±20%

| Mode | output power | Carrier Freq. | Crest Factors | Duty Rate |
|---|---|---|---|---|
| Pure Cut | 80W at 300ohm | 1.6MHz | 1.6 | 100% |
| Blend | 80W at 300ohm | 1.6MHz | 2.2 | 60% |
| Contact coagulation | 50W at 300ohm | 1.6MHz | 2.5 | 30% |
| Bipolar coagulation | 70W at 100ohm | 1.6MHz | 1.6 | 100% |

※ These parameters can be changed without notice.

## 8. Standard Output Table by Surgery Part

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

# 9. 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: T4.0AL 250V/ AC230V: T2.0AL 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.

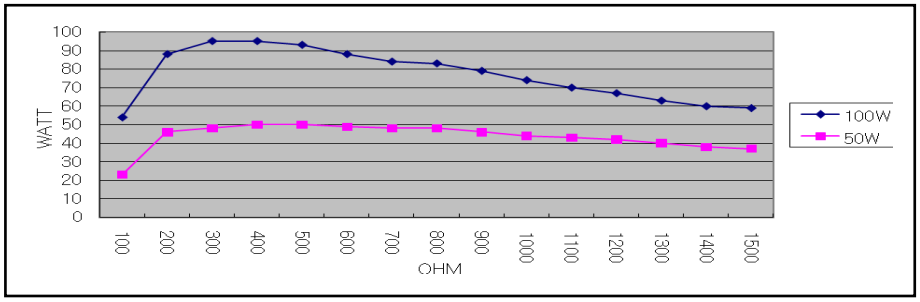
● The alarm rings all the time.

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.

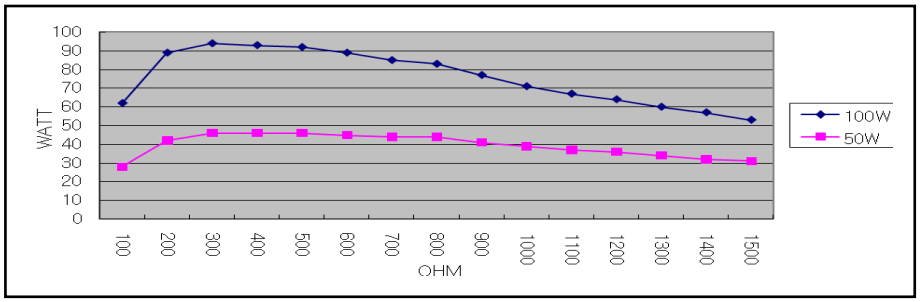
2. When the patient return plate has troubles.
   ① Check if the plug of patient return plate cable is connected to the surgery unit.
   ② Check if the entire surface of patient return plate is adhered to the patient.
   ③ Check if the patient return plate is connected to the patient return plate cable.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

# 10. Load Regulation

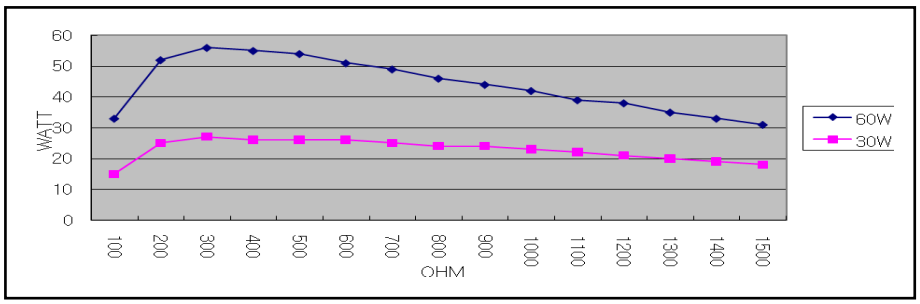
## 10.1 Pure Cutting



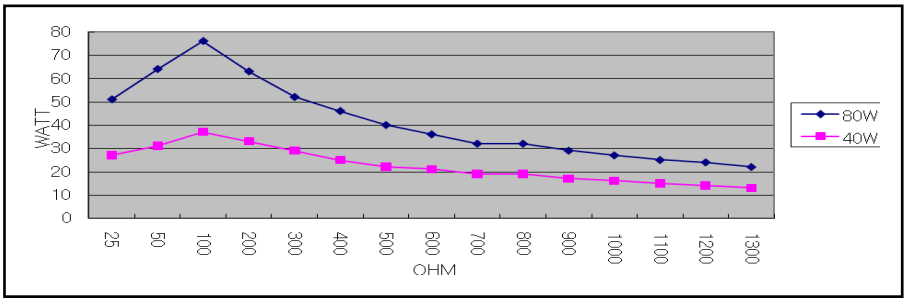

## 10.2 Blend




## 10.3 Contact Coagulation



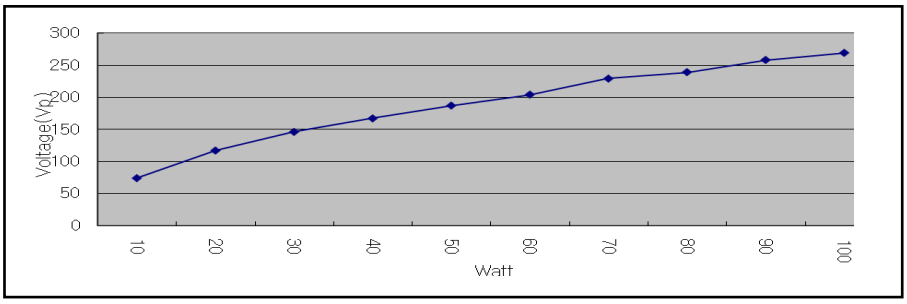
### 10.4 Bipolar Coagulation




## 11. Voltage Output Graphic

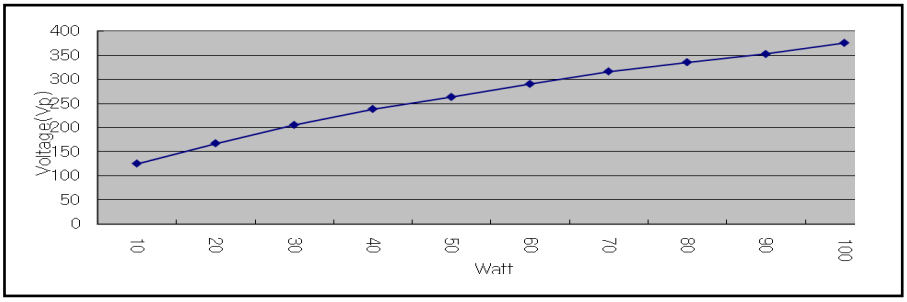
### 11.1 Pure Cutting (Load 300Ω)

Max Peak Output Voltage : 270Vp

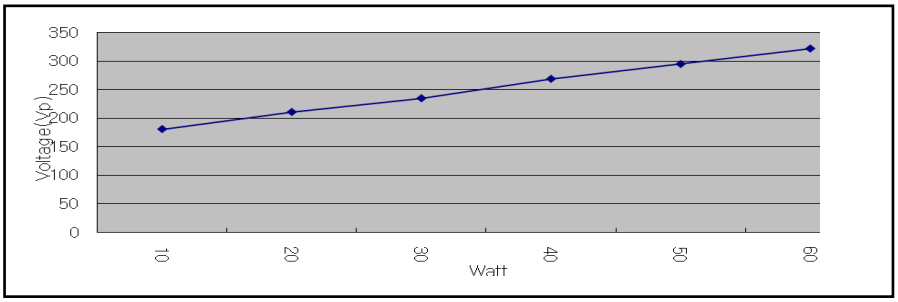



### 11.2 Blend (Load 300Ω)

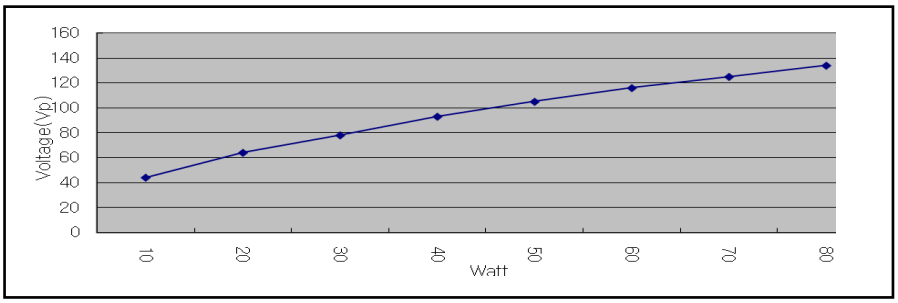
Max Peak Output Voltage : 375Vp



### 11.3 Contact Coagulation (Load 300Ω) Max Peak Output Voltage : 320Vp




### 11.4 Bipolar Coagulation (Load 100Ω) Max Peak Output Voltage : 135Vp



# 12. Appendix

## 12.1 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 th 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-100/80 model is intended for use in the electromagnetic environment specified below. The customer or user of the ZEUS-100/80 model should ensure that it is used in such an environment.

| Emissions test | Compliance | Electromagnetic environment - guidance |
|---|---|---|
| RF emissions<br>CISPR 11 | Group 1 | |
| RF emissions<br>CISPR 11 | Class A | The ZEUS-100/80 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. |
| Harmonic emissions<br>IEC 61000-3-2 | Class A | |
| Voltage fluctuations/flicker emissions<br>IEC 61000-3-3 | Complies | |

| Table 202<br>Guidance and manufacturer's declaration – electromagnetic immunity | | | |
|---|---|---|---|
| ZEUS-100/80 model is intended for use in the electromagnetic environment specified below. The customer or user of the ZEUS-100/80 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 | ± 8 kV contact<br>± 2 kV,± 4 kV,± 8 kV ,± 15 kV air | Complies<br>± 8 kV contact<br>± 15 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<br>100kHz repetition frequency | ± 2 kV<br>100kHz repetition frequency | Mains power quality should be that of a typical commercial or hospital environment. |
| Surge Line-to-line IEC 61000-4-5 | ± 0.5 kV,± 1 kV | ± 1 kV | Mains power quality should be that of a typical commercial or hospital environment. |
| Surge Line-to-ground IEC 61000-4-5 | ± 0.5 kV,± 1 kV, ± 2 kV | ± 2 kV | |
| Voltage dips IEC 61000-4-11 | 0% UT; 0.5 cycle<br>At 0°,45°,90°,135°, 180°,225°,270° and 315° | 0% UT; 0.5 cycle<br>At 0°,45°,90°,135°, 180°,225°,270° and 315° | Mains power quality should be that of a typical commercial or hospital environment.<br>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. |
| | 0% UT; 1 cycle<br>And 70% UT; 25/30 cycles single phase: at 0° | 0% UT; 1 cycle<br>And 70% UT; 25/30 cycles single phase: at 0° | |
| Voltage interruptions IEC 61000-4-11 | 0% UT; 250/300 cycle | 0% UT; 250/300 cycle | |
| RATED Power frequency (50/60 Hz) magnetic field IEC 61000-4-8 | 30 A/m | 30 A/m | Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment. |
| * Note: *UT* is the a.c. mains voltage prior to application of the test level. | | | |

**Table 204**
**Guidance and manufacturer's declaration – electromagnetic immunity –**
**for equipment and systems that are not life-supporting**

ZEUS-100/80 model is intended for use in the electromagnetic environment specified below. The customer or user of the ZEUS-100/80 model should ensure that it is used in such an environment.

| Emissions test | EN/IEC 60601 test level | Compliance level | Electromagnetic environment – guidance |
|---|---|---|---|
| Conducted RF<br>IEC 61000-4-6 | 3 Vrms<br>0.15 MHz-80 MHz 6V in ISM bands between 0.15 MHz and 80 MHz 80% AM at 1 kJHz | 3 Vrms<br>0.15 MHz-80 MHz 6V in ISM bands between 0.15 MHz and 80 MHz 80% AM at 1 kJHz | Portable and mobile RF communications equipment should be used no closer to any part of the ZEUS-100/80 model, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.<br>Recommended separation distance:<br>$d = \left[\frac{3,5}{V_1}\right]\sqrt{P}$<br>$d = \left[\frac{3,5}{E_1}\right]\sqrt{P}$ 80 MHz to 800 MHz<br>$d = \left[\frac{7}{E_1}\right]\sqrt{P}$ 800 MHz to 2.7GHz<br>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:<br>  |
| Radiated RF<br>IEC 61000-4-3 | 3 V/m<br>80 MHz – 2.7 GHz<br>80 % AM at 1 kHz | 3 V/m<br>80 MHz – 2.7 GHz<br>80 % AM at 1 kHz | |

Note: At 80 MHz and 800 MHz, the higher frequency range applies.
These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection by structures, objects and people.

**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.

**b** Over the frequency range 150 kHz to 80 MHz, field strengths should be less than [V1]V/m.

Table
Test specifications for Enclosure port immunty to RF wireless communications equipment

| Test frequency (MHz) | Band (MHz) | Service | Modulation | Maximum Power (W) | Distance (m) | Immunity Test level (V/m) |
|---|---|---|---|---|---|---|
| 385 | 380-390 | TETRA 400 | Pulse modulation 18Hz | 1,8 | 0,3 | 27 |
| 450 | 430-470 | GMRS 460, FRS 460 | FM ±5 kHz deviation 1 kHz sine | 2 | 0,3 | 28 |
| 710 | 704-787 | LTE Band 13,17 | Pulse modulation 217Hz | 0,2 | 0,3 | 9 |
| 745 | | | | | | |
| 780 | | | | | | |
| 810 | 800-960 | GSM 800/900, TETRA 800, iDEN820, CDMA 850, LTE Band 5 | Pulse modulation 18Hz | 2 | 0,3 | 28 |
| 870 | | | | | | |
| 930 | | | | | | |
| 1720 | 1700-1990 | GSM 1800; CDMA 1900; GSM 1900; DECT; LTE Band 1,3,4,25; UMTS | Pulse modulation 217Hz | 2 | 0,3 | 28 |
| 1845 | | | | | | |
| 1970 | | | | | | |
| 2450 | 2400-2570 | Bluetooth, WLAN, 802.11 b/g/n, RFID 2450, LTE Band 7 | Pulse modulation 217Hz | 2 | 0,3 | 28 |
| 5240 | 5100-5800 | WLAN 802.11 a/n | Pulse modulation 217Hz | 0,2 | 0,3 | 9 |
| 5500 | | | | | | |
| 5785 | | | | | | |

Note: If necessary to achieve the immunity test level, the distance between the transmitting antenna and the ME Equipmnet or ME System may be reduced to 1m test distance is permitted by IEC 61000-4-3.
a) For Some Services, Only the uplink frequncies are included.
b) The carrier shall be modulated using a 50% duty cycle square wave signal.
c) As an alternative to FM modulation, 50% pulse modulation at 18 Hz may be used because while it does not represent actual modulation, it would be worst case.

# Warrant

| | | |
|---|---|---|
| Name of product | | Electrosurgical Unit |
| Model no. | | ZEUS-100, ZEUS-80 |
| 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 Distributor | | |
| Name of manufacture | | ZERONE Co., Ltd.<br>(Shinil IT UTO Bldg., Dangjeong-dong)<br>#810, LS-Ro 13, Gunpo-si, Gyeonggi-do, Korea<br>Phone : +82-31-427-2772<br>Fax : +82-31-427-2332 |

※ Thanks for purchasing of ZEUS-100/80 from ZERONE Co., Ltd.
※ This product is made under thorough quality control and passed strict inspections.

## Document History

| REV.No | Edited Date | Corrections |
|---|---|---|
| 00 | 2008.06.08 | Initial issued |
| 01 | 2009.06.12 | Add 100 MODEL |
| 02 | 2012.04.25 | Change address and add section 11 |
| 03 | 2013.10.10 | Applied to 60601-1 3rd Edition. |
| 04 | 2016.06.16 | Add Caution |
| 05 | 2016.10.12 | Change of address (European agent) |
| 06 | 2016.11.10 | Add Caution |
| 07 | 2017.06.08 | Change CE number |
| 08 | 2019.03.02 | IEC 60601-1-2:2014 (4th Edition) |