OLYMPUS®

INSTRUCTIONS

ELECTROSURGICAL GENERATOR

ESG-400

USA: CAUTION: Federal Law restricts this device to use by, or on the order of, a physician.	CE 0197

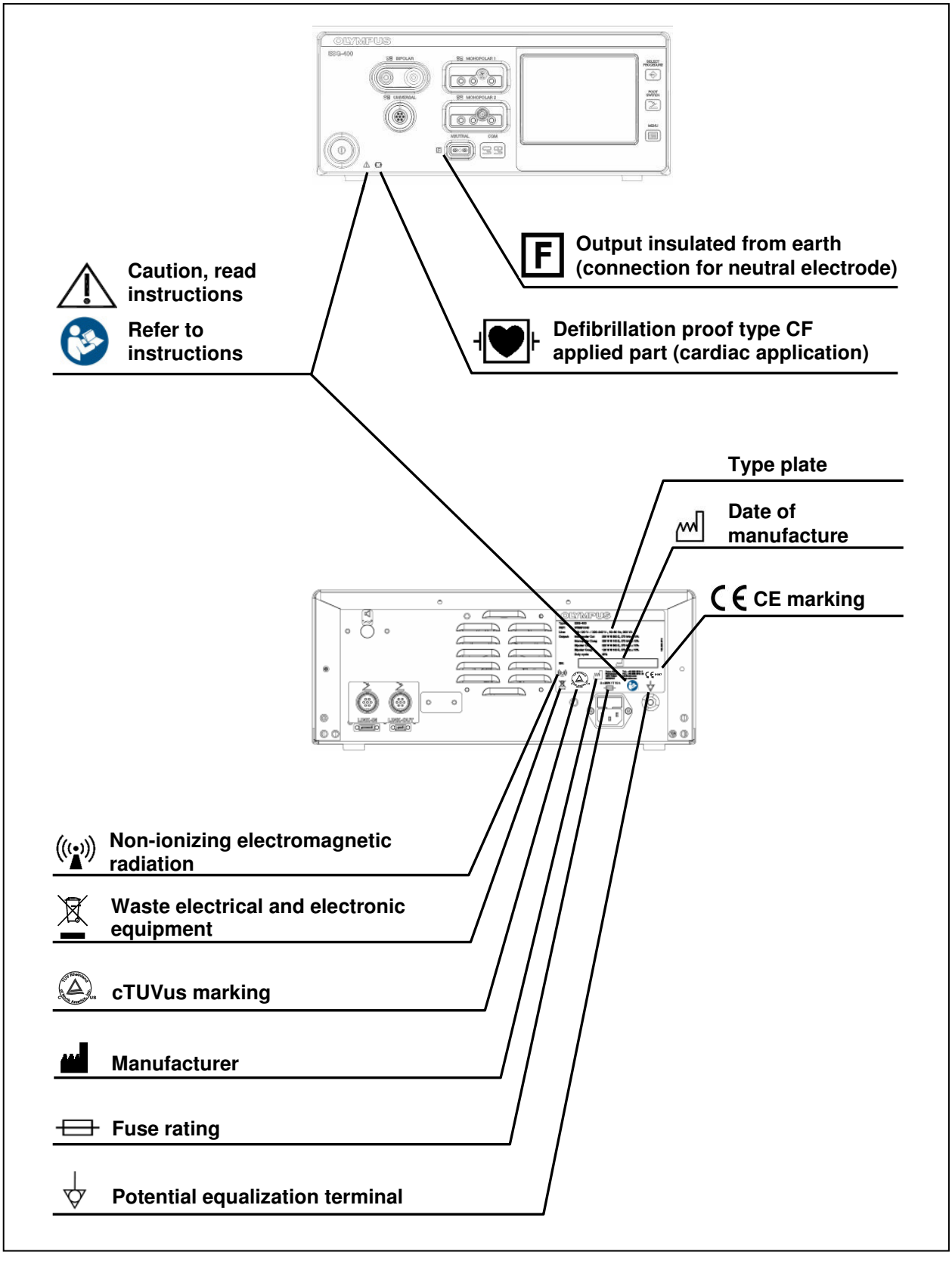
Contents

List of abbreviations

AC	Alternating Current
EMC	Electromagnetic Compatibility
ESG	Electrosurgical Generator
FSM	Fast Spark Monitor
HF	High Frequency
HPCS	High Power Cut Support
ICD	Implanted Cardioverter Defibrillator
IED	Implanted Electronic Device
RCAP	Resistance Controlled Automatic Power

Labels and Symbols

Safety-related labels and symbols are attached on the locations shown below. If labels or symbols are missing or illegible, contact Olympus. Function-related symbols are described in chapter 2.1, “Symbols and Descriptions”.



Important Information – Please Read Before Use

Intended use

The *ESG-400* is an electrosurgical generator intended for tissue cutting and coagulation in open, laparoscopic and endoscopic surgery in conjunction with electrosurgical accessories and ancillary equipment.

Contraindications:

Electrosurgical interventions are contraindicated if, in the judgment of the physician, tissue coagulation and cutting could have a negative effect on the state of the patient. Electrosurgical tissue coagulation and cutting may be contraindicated for patients with cardiac pacemakers, a weakened immune system or blood coagulation disorders.

Application of high frequency treatment

If there is an official standard on the applicability of high frequency treatment as defined by a national or local medical administration, or other institution, such as an academic society, follow that standard when performing the procedure.

Before performing any high frequency treatment, study the properties, purposes, effects and possible risks thoroughly (nature, extent, probability and imminence) associated with the planned treatment and any alternative therapeutic method that can be performed. Carry out high frequency treatment only when its benefits outweigh its risks. Fully explain to the patient the possible benefits and risks of high frequency treatment as well as those of any therapeutic method(s) that can be performed instead of electrosurgery, and perform high frequency treatment only after patient consent is granted. During high frequency treatment, continue to evaluate the potential benefits and risks, and stop the treatment if the risks become greater than the possible benefits to the patient.

Instruction manual

This instruction manual contains essential information on using this electrosurgical generator safely and effectively. Before use, thoroughly review this instruction manual and the instruction manual of all equipment which will be used during the procedure. Use the equipment as instructed. Keep this and all related instruction manuals in a safe, accessible location. If you have any questions or comments about any information in this instruction manual, please contact Olympus.

User qualifications

If there is an official standard that defines the qualifications required for medical personnel using electrosurgical generators as defined by a national or local medical administration or other institution, such as an academic society, follow this standard. If there is no such standard, the user must be a physician or medical personnel under supervision of a physician and must have received appropriate training in using this electrosurgical generator. This instruction manual, therefore, does not explain or discuss endoscopic or electrosurgical procedures.

In addition, the user must undergo an instruction / training for the use of this electrosurgical generator. The instruction / training will be provided by authorized representatives of Olympus during installation and commissioning.

Federal Law of the USA restricts this device to use by, or on the order of, a physician.

Electrosurgical generator compatibility

Refer to the “System chart” and “Specifications” in the Appendix to confirm that this electrosurgical generator is compatible with the ancillary equipment being used. Using incompatible equipment can result in patient injury and / or equipment damage.

For the electromagnetic compatibility (EMC), this electrosurgical generator complies with edition 3 of the EMC standard for medical electrical equipment (IEC 60601-1-2: 2007).

Repair and modification

This electrosurgical generator does not contain any user-serviceable parts. Do not disassemble, modify, or attempt to repair it; patient or user injury and / or equipment damage may result. Repairs must only be carried out by Olympus or a firm authorized by Olympus. Some problems that appear to be malfunctions may be corrected by referring to chapter 8, “Troubleshooting”. If the problem cannot be resolved using the information in chapter 8, contact Olympus.

Signal words

The following signal words are used throughout this instruction manual:

DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices or potential equipment damage.

NOTE

Indicates additional helpful information.

Dangers, warnings and cautions

High frequency leakage current or spark discharge may cause user and / or patient burns. Always prepare for an emergency operation in case of unintentional patient burn, bleeding and perforation.

Follow the dangers, warnings and cautions given below when handling this electrosurgical generator. This information is to be supplemented by the dangers, warnings and cautions given in each chapter.

User-related error prevention

WARNING **Improper use**

- The safety and effectiveness of electrosurgical interventions depend not only on the design of the equipment used, but also to a major extent on factors which are under the control of the user. It is therefore extremely important to read, understand and follow the instructions supplied with the electrosurgical generator and the accessories in order to ensure safety and effectiveness.
- Always use the electrosurgical generator as outlined in this instruction manual. Improper use will not only impede functions and prevent optimum performance, but may cause equipment damage and / or complications. Before each use, always inspect the equipment as outlined in this instruction manual.

CAUTION **Annual safety checks**

The electrosurgical generator and the footswitch must undergo a safety check in yearly intervals in accordance with the national statutory regulations (refer to chapter 8.3 “Periodic safety check”).

Environmental conditions

CAUTION **Interference with other equipment**

- Be sure that this electrosurgical generator is not used adjacent to or stacked with other equipment (other than the components of this electrosurgical generator or system) to avoid electromagnetic interference.
- Before use, thoroughly confirm the compatibility of all equipment.
- To ensure electrical safety, the electrosurgical generator should not be used in conjunction with:
  - Electrical equipment whose safety against leakage current is not guaranteed.
  - Electrosurgical equipment whose safety in combined use is not guaranteed.
- The electrosurgical generator complies with the electromagnetic compatibility (EMC) standard. Nevertheless, when the electrosurgical generator is active it may disturb neighboring

electronic equipment. If an auxiliary computer system is in use together with the electrosurgical generator and endoscopic imaging techniques, the image on the monitor might freeze or blackout. Follow the instructions in “Electromagnetic Compatibility (EMC) information” in the Appendix regarding electromagnetic ambient conditions.

- Never loop the cords (active cord, bipolar cord, neutral electrode cord) or bundle cords together with cords belonging to other medical equipment. The high frequency signals or spark discharge noise generated by the electrosurgical generator may interfere with the operation of other medical equipment.
- Do not use the electrosurgical generator in a location exposed to strong electromagnetic radiation (microwave or short-wave medical treatment equipment, magnetic resonance imaging, radio or mobile phone equipment). Electrosurgical generator malfunction can occur.

CAUTION **Unsuitable temperature and humidity**

The electrosurgical generator should only be used under the conditions as described in “Transport, storage and operating environment” in the Appendix. Use under other conditions may impede normal performance and / or result in equipment damage.

Accessories

WARNING **Mechanical stress**

Do not apply excessive bending, straining, or squeezing force to any cords. It may cause malfunction.

CAUTION **Damaged and non-compatible accessories**

- The electrosurgical generator shall only be used with compatible accessories. When connecting accessories (cords, electrodes, HF instruments) avoid output settings where the maximum output voltage of the electrosurgical generator may exceed the rated accessory voltage (refer to “Mode characteristics”, “Output characteristics” in the Appendix, and the instruction manual of the accessory). For a list of compatible neutral electrodes, refer to “Specifications” in the Appendix. For compatible

plugs and sockets, refer to chapter 3.8, “Connection of HF instruments”.

- Before use, the electrosurgical generator and accessories must be examined for damage. All cables and its plugs must be free of scratches and cracks. Cables and accessories with damaged insulation or connections must not be used.

Electric shock

WARNING **Grounding failure**

To prevent the risk of electric shock, the housing of the electrosurgical generator must be grounded. Always connect the power cord plug to a properly grounded wall outlet. Do not use a 3-pin / 2-pin adapter, as it can impair safe operation of the electrosurgical generator.

WARNING **User shock**

To prevent user shock, malfunction and damage of the electrosurgical generator, keep liquids away from all electrical equipment. If liquid gets on or into the electrosurgical generator, terminate operation immediately and contact Olympus.

CAUTION **Injury during servicing**

When the housing is opened, there is a danger of electric shock. The electrosurgical generator must only be serviced by authorized technicians.

Burns

WARNING **Patient and / or user**

- The maximum output voltage characteristics of the electrosurgical generator are shown in the diagrams in “Output characteristics” in the Appendix. When setting the power level, first set it to a low level and increase it gradually. If the output is initially set to a high level, the electrode’s insulation may be damaged and cause user and / or patient burns. However, certain modes may present an unacceptable risk at low output power settings. For example, with the PulseCut fast mode or PulseCut slow mode, the risk of an excessive thermal effect rises if the output power setting is too low. Therefore, it is recommended that you perform basic testing before using the electrosurgical

generator. If the instruction manual of the HF instrument to be used stipulate a rated voltage, the output should be set so that it does not exceed that voltage.

- Contact with the tip of the electrodes may cause burns when the electrosurgical generator is active.
- During operation, temporarily unused electrodes should be stored in an electrically insulated container. Unused electrodes or HF instruments should never be placed on the patient. Otherwise, it may cause patient and / or user burns.
- To prevent patient burns, the electrosurgical generator and ancillary cords should not come in contact with the patient or metal parts of the operating table. Furthermore, the patient should also be kept away from metallic parts of the operating table or other devices. Remove any metallic items from the patient (wristwatches, jewelry, etc.) before starting the procedure.
- If the electrosurgical generator is used in conjunction with another electrosurgical generator, never use both generators simultaneously. Keep the HF instrument connected to the not-used electrosurgical generator away from the target area while the other generator is in operation. Do not activate output of both generators simultaneously. Patient or user injury may occur due to the concentration of electric current.
- To prevent patient burns, the patient's skin surfaces should not touch each other (e.g. bare arm and side of chest) or any metal items in the procedure room.
- To prevent patient burns during high frequency treatment, the patient's clothes must be dry.
- During endoscopic treatment be sure that the distal end of the endoscope and / or HF instruments do / does not contact bridging fluids surrounding the target tissue. Electric current may flow to the surrounding tissue via the fluids and cause burns. This does not apply to instruments intended for use in conjunction with conductive fluids.
- The endoscopic treatment performed should not include an operation in which part of the treated tissue (polyp head, etc.) or part of the

endoscope distal end or endotherapy instrument is in contact with or close to surrounding tissue during high frequency exposure. Otherwise, current flows to the tissue through the part of the treated tissue, the metallic parts at the endoscope's distal end or endotherapy instrument and may cause burns.

- When using an electrocardiograph or other physiological monitoring equipment simultaneously with the electrosurgical generator on a patient, any monitoring electrodes should be placed as far away as possible from the electrodes used with the electrosurgical generator. If placed too close, high frequency signals or spark discharge noise from the electrosurgical generator may interfere with the operation of an electrocardiograph or other physiological monitoring equipment. Needle monitoring electrodes should not be used, as they may cause patient burns. Physiological monitoring equipment incorporating high frequency current limiting measures is recommended.
- To prevent burns, the user and assistant should wear surgical gloves during the procedure.

CAUTION **High frequency leakage current**

Wherever possible, the patient should not be able to come into contact with electrically conductive components that are grounded. Route all connecting cables so that they are not in direct contact with the patient or other cables. Capacitive coupling may occur.

Potential hazards for the heart

DANGER **Shock hazards to the heart**

- To prevent shock hazards, never apply the electrosurgical generator to the heart in combination with type B or BF applied parts.
- When using the electrosurgical generator on or in the vicinity of the heart, be sure to use it with the minimum necessary output. Spark discharge during operation may affect the heart.

DANGER **Pacemaker / Defibrillator malfunction**

The high frequency equipment, when applied to a patient with a cardiac pacemaker, an implanted cardioverter defibrillator (ICD) or other implanted electronic devices (IED), may cause malfunctioning or failure of the implanted electronic device and may seriously affect the patient. Always confirm that it is safe to proceed with a cardiologist or the manufacturer of the implanted electronic device before proceeding. If monopolar modes of the electrosurgical generator are used, position the neutral electrode so that the current pathway does not pass through or near the implanted electronic device and its lead system. The risk of malfunction or failure of an implanted electronic device is reduced by the use of a bipolar mode. A risk does exist, however, if the application is in close proximity to the implanted electronic device.

WARNING **Cardiac emergency**

Always keep a defibrillator ready in case of a cardiac emergency. During operation of the defibrillator, remove the endoscope and / or laparoscope and HF instruments from the patient.

Fire / Explosion

DANGER **Ignitable anaesthetics and gases**

The risk of flammable gases or other materials being ignited exists with any surgical application of electrical energy. Precautionary measures must be taken to keep flammable materials and substances away from the site of intervention (do not use flammable anaesthetics, nitrous oxide or oxygen). Otherwise, explosion or fire may result and cause serious injuries. This electrosurgical generator is not explosion-proof. Do not use the electrosurgical generator within an explosion zone.

WARNING **Ignitable gas in the gastro-intestinal tract**

If the intestines contain a flammable gas, replace this gas with air or a non-flammable gas before performing the operation, to minimize the risk of fire or explosion.

WARNING **Ignitable cleaning- and disinfection agents**

- Flammable agents used for cleaning and disinfection must be allowed to evaporate before the electrosurgical generator is used. Also ensure that flammable solutions are neither on the patient's skin (e.g. under neutral electrode) nor in the patient's body cavity when the electrosurgical generator is used.
- Non-flammable agents should be used for cleaning and disinfection wherever possible.

WARNING **Ignitable materials**

- If absorbent cotton or gauze is used during the procedure, it can be ignited by a spark generated in the normal operation of the equipment.
- When performing electrosurgery, sparks occur which could lead to burning or deflagration of combustible materials.
- Body hair is flammable. Water soluble surgical lubricating jelly may be used to cover hair close to the surgical site to decrease flammability.

WARNING **Risk of fire**

Disconnect the power plug before changing the fuses! Replace fuses as marked. The fuses must only be replaced by authorized technicians!

Procedural hazards and complications

DANGER **Procedural hazards and complications**

- The safety of electrosurgery will be greatly enhanced by a thorough knowledge of the medical literature on the subject. Study of specific information on the hazards and complications of the procedure in question is especially recommended.
- To respond to possible patient bleeding, prepare at least one of the following three haemostatic procedures: coagulation, clipping or local injection.
- To prepare for possible accidents, emergency equipment for life-saving, intubation and appropriate pharmaceuticals should be located in or near the procedure room.
- Always prepare a spare electrosurgical generator or an alternative procedure to avoid

interruption of treatment due to an unexpected electrosurgical generator failure during treatment.

- Should any abnormal output be suspected during operation, immediately terminate the use of the equipment by releasing the footswitch. If the footswitch does not react, switch off the electrosurgical generator. Otherwise, malfunction of the equipment may cause an unintended increase in output.
- Use physiological monitoring equipment throughout the entire procedure, for continuous observation of the patient's condition.
- For procedures where the high frequency electrical current could flow through parts of the body with a relatively small cross sectional area, the use of a bipolar mode may be desirable in order to avoid unwanted tissue damage.
- It is not recommended to use electrosurgery for circumcisions because of the risk of thermal injuries. The risk can be reduced if metal parts of any kind (e.g. clamps) and / or monopolar HF instruments are avoided.

WARNING

Safety measures during the procedure

- Wear personal protective equipment to guard against dangerous chemicals and potentially infectious material. During operation, wear appropriate personal protective equipment, such as eye wear, face mask, moisture-resistant clothing and surgical gloves that fit properly and are long enough so that your skin is not exposed.
- Studies have shown that smoke generated during electrosurgical procedures can be irritating and potentially harmful to surgical personnel. These studies recommend the use of surgical masks and adequate ventilation of smoke by the use of surgical smoke evacuators or other means.

WARNING **Output performance**

- If the electrosurgical generator fails and the output is stopped during treatment, it may be impossible to continue treatment due to tissue or coagulum build-up on the HF instrument or other similar condition.
- During endoscopic treatment never grasp the target tissue with non-insulated grasping forceps. Non-insulated grasping forceps will disperse the electric current and normal operation may be impeded.

WARNING **Electrical stimulation of nerves and muscles**

Nerves and muscles can be stimulated by low frequency electrical currents or intense high frequency electrical currents. Low frequency electrical currents may be generated by a partial rectification of intense high frequency electrical current, in particular when there is a spark discharge to the tissue or to another metallic object. Intense high frequency electrical currents can occur at the beginning of an electrosurgical cut or when using high output power settings. This may cause violent spasms or muscle contractions. Use the lowest appropriate power level and effect (e.g. effect 1 instead of effect 3). However, for certain modes a low output power setting may present an unacceptable risk for the patient. For example, with the PulseCut fast mode or PulseCut slow mode, the risk of an excessive thermal effect rises if the output power setting is too low.

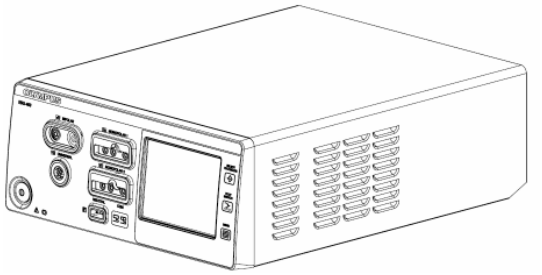
CAUTION **Generator defect**

- To prevent electrosurgical generator damage, never short-circuit electrodes (accessories, neutral electrodes).
- In the event of a defect or malfunction in the electrosurgical generator, an undesirably high output power may be emitted.

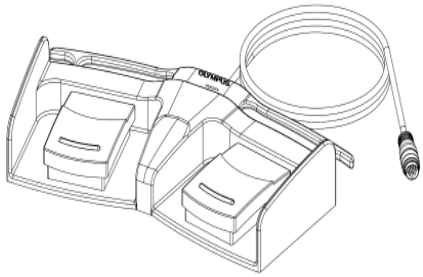
Legal information

Chapter 1 Checking the Package Contents

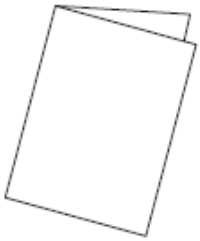
Verify that all items shown below are contained in the package. Inspect each item for damage. If the electrosurgical generator is damaged, a component is missing or you have any questions, do not use the electrosurgical generator and contact Olympus.



Electrosurgical generator (ESG-400)



Footswitch with cable (WB50402W)



Instruction manual

Chapter 2 Nomenclature and Functions

2.1 Symbols and descriptions

Front panel


Power on / off


Neutral electrode – non-split type


Neutral electrode – split type


Select procedure


Footswitch


Menu


BIPOLAR socket


MONOPOLAR 1 socket


UNIVERSAL socket


MONOPOLAR 2 socket

Touch-screen


Double footswitch


Single footswitch


Autostart


Plus

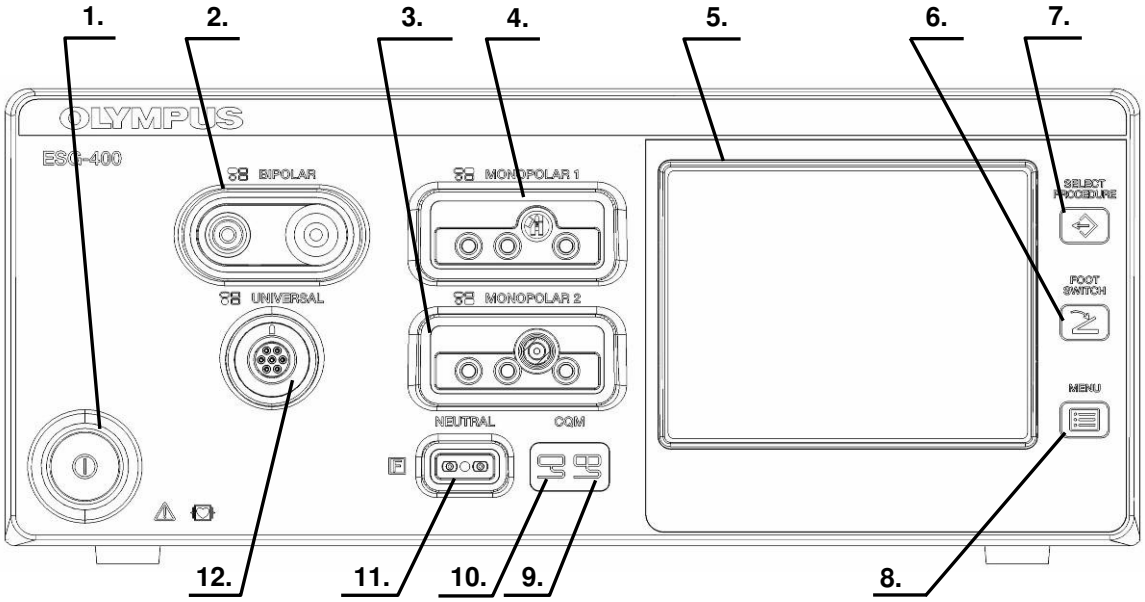
	Minus
	Return
	OK
	Cancel
	Save procedure
	Delete procedure
	Languages
	Touch tone on
	Touch tone off
	Software version
	Safety test
	Service
	Volume
	Brightness
	Select procedure (in title line)
	Menu (in title line)
	Toggle
	Previous
	Next
123	Numeric
ABC	Alphabetic

	Uppercase / lowercase
	Backspace
	Caution
	Communication indicator
	Reset
RCAP	Resistance Controlled Automatic Power
	Reference to BIPOLAR socket
	Reference to MONOPOLAR 1 socket
	Reference to UNIVERSAL socket
	Reference to MONOPOLAR 2 socket

- **Rear panel**

	Volume
	Footswitch
LINK-IN	LINK-IN socket
LINK-OUT	LINK-OUT socket

2.2 Front panel



1. **Power switch**
This switch turns the electrosurgical generator on and off.

2. **BIPOLAR socket**
This socket connects the plug of a bipolar HF instrument.

3. **MONOPOLAR 2 socket**
This socket connects the plug of a monopolar HF instrument.

4. **MONOPOLAR 1 socket**
This socket connects the plug of a monopolar HF instrument.

5. **Touch-screen**
Displays the connection status of the accessories and peripherals connected to the electrosurgical generator. It is also used to show and modify the output settings (e.g. mode, output power, effect) as well as to control other functions (e.g. save procedures, delete procedures).

6. **FOOTSWITCH push button**
This button is used to open the “Footswitch screen” to assign one or two footswitch(es) or the autostart function to a specific output socket.

7. **SELECT PROCEDURE push button**
This button is used to open the “Select Procedure screen” to recall saved settings.

8. **MENU push button**
This button is used to open the “Menu screen” to control several functions (save or delete a procedure, control the touch tone, output volume and brightness as well as other functions).

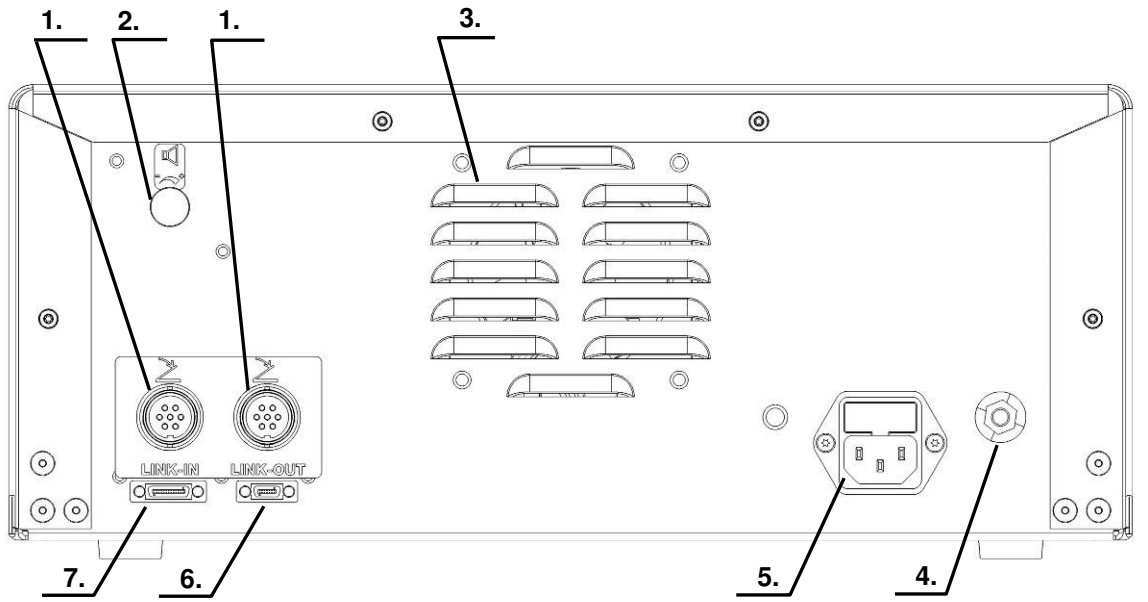
9. **Contact quality monitor indicator for split neutral electrode**
This indicator illuminates green if a split neutral electrode is connected and the contact resistance is within an acceptable range. The indicator illuminates red if the split neutral electrode is not connected or not applied properly (e.g. bad contact quality or partly dislocated) or no neutral electrode is connected (in both cases the activation of monopolar output is disabled).

10. **Contact quality monitor indicator for non-split neutral electrode**
This indicator illuminates green if a non-split neutral electrode is connected.

11. **Neutral electrode socket**
This socket connects the plug of a neutral electrode for monopolar application.

12. **UNIVERSAL socket**
This socket connects the plug of an Olympus HF instrument with HF instrument recognition.

2.3 Rear panel



1. **Footswitch sockets**
This socket connects the plug of a single or double pedal footswitch.

2. **Volume control**
This knob is used for adjusting the output volume.

3. **Ventilation hole**
Holes for air ventilation via a cooling fan; there are also ventilation holes on each side of the electrosurgical generator.

4. **Equipotential bonding point**
To increase electrical safety, this point is used for potential equalization. All equipment housings that come into contact with the patient are electrically connected in order to prevent low-frequency electrical currents from endangering the patient in the event of a defect in the conventional protective conductor system.

5. **AC power socket**
This socket serves as a connection to the mains power supply via a power cord.

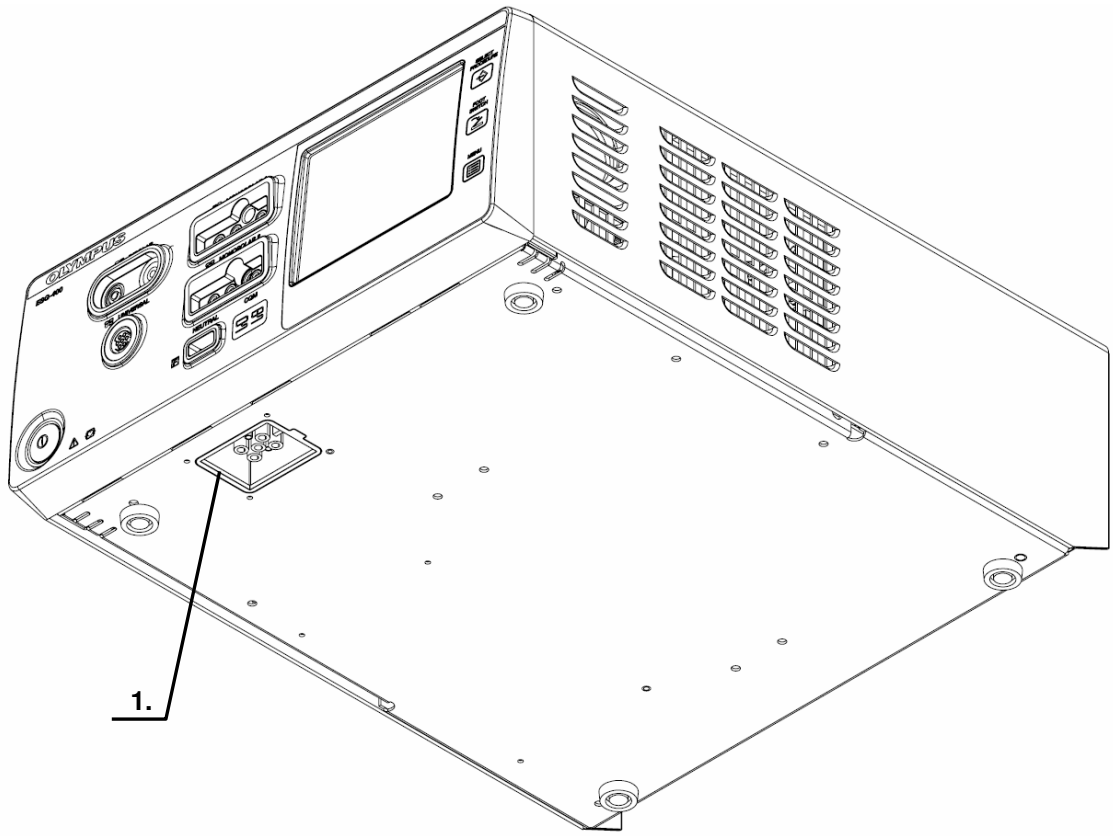
6. **LINK-OUT socket**
This socket connects the plug (14-pin) of a cable connected to peripheral equipment.

7. **LINK-IN socket**
This socket connects the plug (26-pin) of a cable connected to peripheral equipment.

NOTE

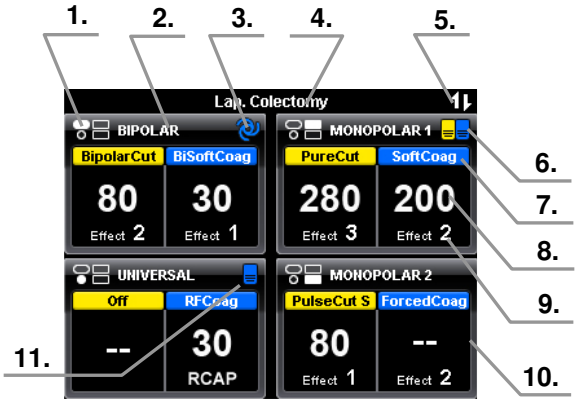
- The touch-screen messages may depend on the language setting of the electrosurgical generator.
- For a detailed explanation of the different types of sockets, refer to chapter 3.7 “Connection of neutral electrode” and chapter 3.8 “Connection of HF instruments”.

2.4 Bottom panel



1. **Docking socket**
This socket connects the plug (7-pin) of a docking connector to connect peripheral equipment.

2.5 All screen



1. **Reference to output sockets indicator**
This indicator shows the corresponding output socket where the same symbol is printed on the front panel.

2. **Output socket name**
The name of the corresponding output socket is displayed here.

3. **Autostart indicator**
This symbol indicates if the autostart function is assigned to the corresponding output socket. Blank if autostart or footswitch is not assigned. Refer to chapter 6.4, “Assign footswitch and autostart function”.

4. **Procedure name**
The name of the selected procedure is displayed here. Blank if no procedure is selected.

5. **Communication indicator**
This symbol indicates if communication with peripheral equipment connected to the docking socket is established.

6. **Footswitch indicator (double pedal)**
This symbol indicates if a connected double pedal footswitch is assigned to the corresponding output socket. Blank if autostart or footswitch is not assigned. Refer to chapter 6.4, “Assign footswitch and autostart function”.

7. **Output mode**
The name of the output mode as selected in the “Mode screen” is displayed here. If “Off” is selected, “--“ will be displayed instead of power level and effect.

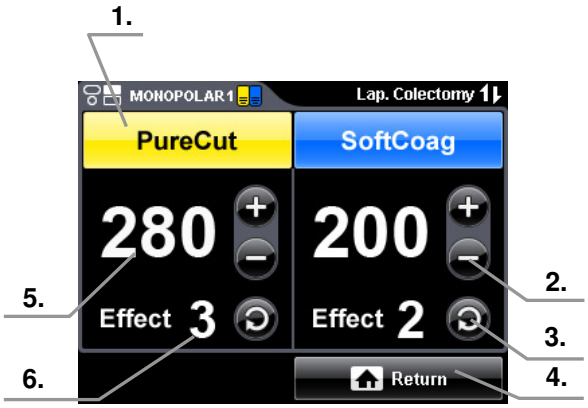
8. **Output power level**
The number shows the output power level as selected in the “Set screen”. If an output power level is set to zero, “--” will be displayed instead of numbers.

9. **Effect**
The number shows the effect as selected in the “Set screen”. For RFCoag mode the RCAP function can be selected instead of an effect (refer to chapter 5.4, “Output setting”).

10. **Button area**
Each button covers the entire area including all output socket related information as described above (3. to 10.). Press the button, to switch to the corresponding “Set screen” to select the mode, power levels and effects for the corresponding output socket.

11. **Footswitch indicator (single pedal)**
This symbol indicates if a connected single pedal footswitch is assigned to the corresponding output socket. Blank if autostart or footswitch is not assigned. Refer to chapter 6.4, “Assign footswitch and autostart function”.

2.6 Set screen



1. **Mode button**
The name of the output mode as selected in the “Mode screen” is displayed here. Press this button to switch to the “Mode screen”. If “Off” is selected, “--“ will be displayed instead of power level and effect.

2. **Plus button / Minus button**
These buttons increase / decrease the output power level.

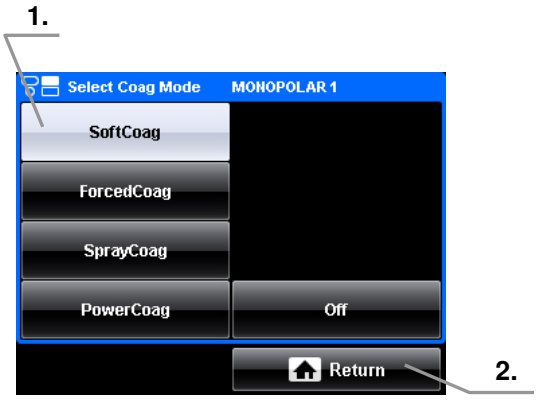
3. **Toggle button**
This button switches to the next effect.

4. **Return button**
Press this button to save the settings and to return to the “All screen.”

5. **Output power level**
The number shows the selected output power level. If an output power level is set to zero, “--” will be displayed instead of numbers.

6. **Effect**
The number shows the selected effect. For RFCoag mode the RCAP function can be selected instead of an effect (refer to chapter 5.4, “Output setting”)

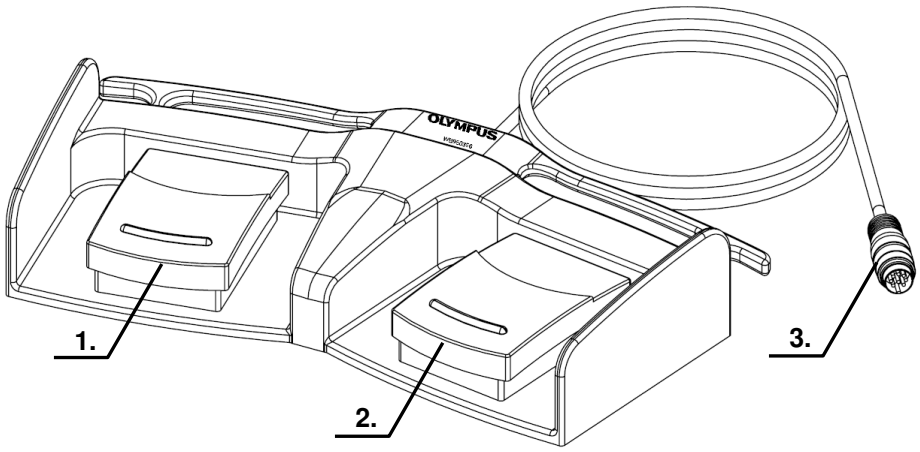
2.7 Mode screen



1. **Mode button**
   These buttons allow the mode selection for a corresponding output socket as shown in the title line. If a selection is already activated, this is indicated by a gray button. If no mode shall be selected, press the “Off button.”
2. **Return button**
   Press this button to return to the “Set screen.”

2.8 Footswitch with two pedals

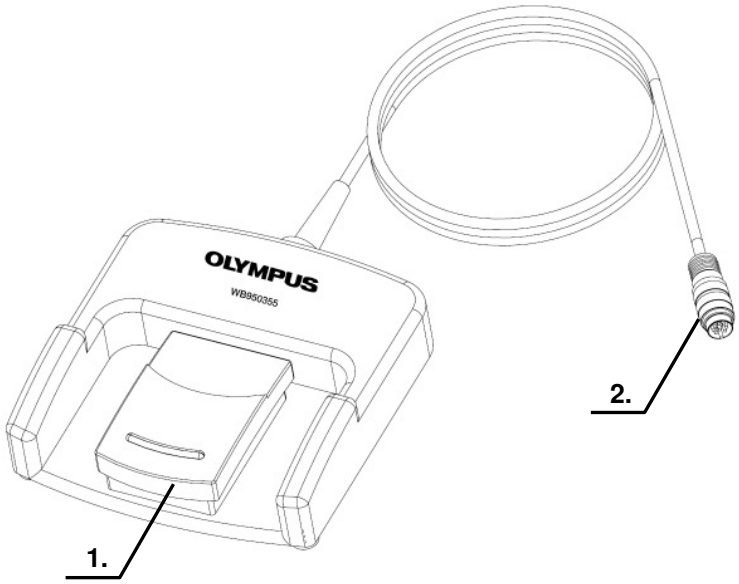
The footswitch with two pedals (Olympus REF: WB50402W) is included in delivery.



1. **Cut pedal (yellow color)**
   This pedal is used to activate the selected cutting mode.
2. **Coagulation pedal (blue color)**
   This pedal is used to activate the selected coagulation mode.
3. **Footswitch plug**
   Connects the footswitch with the electrosurgical generator on the rear panel.

2.9 Footswitch with one pedal (optional)

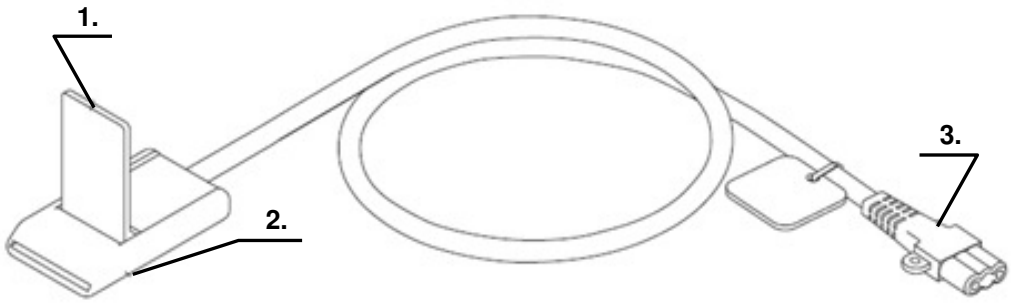
The footswitch with one pedal (Olympus REF: WB50403W) is an optional item which may be purchased separately.



1. **Coagulation pedal (blue color)**
   This pedal is used to activate the selected coagulation mode.
2. **Footswitch plug**
   Connects the footswitch with the electrosurgical generator on the rear panel.

2.10 Neutral electrode cable “P-cord” (optional)

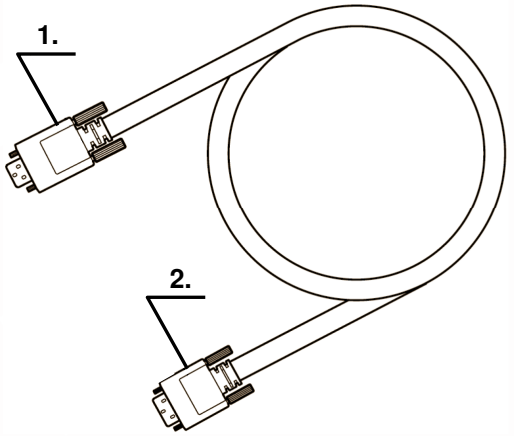
The neutral electrode cable “P-cord” (Olympus REF: MAJ-814) is an optional item for the connection with a neutral electrode which may be purchased separately.



1. **Lever-locking arm**
   This arm secures the connector of the neutral electrode with the clamp.
2. **Clamp**
   This clamp connects the neutral electrode to the “P-cord”.
3. **Plug on the electrosurgical generator side**
   This plug connects the “P-cord” to the electrosurgical generator.

2.11 Communication cable 0.25 m (MAJ-1871, optional, this cable is required for the connection with the compatible ultrasonic generator)

The communication cable 0.25 m (Olympus REF: MAJ-1871) is a separate accessory and connects the electrosurgical generator with the compatible ultrasonic generator.

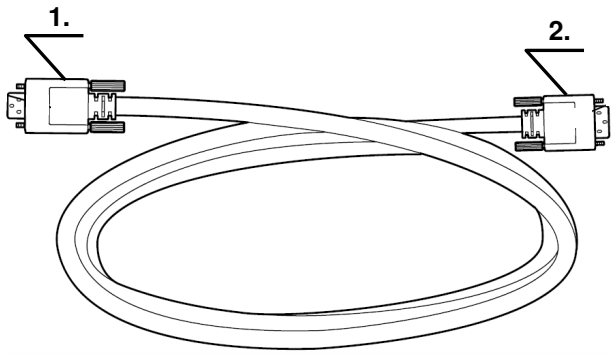


1. **Communication cable 0.25 m LINK-OUT plug**
This plug connects the communication cable 0.25 m either to the LINK-OUT socket of electrosurgical generator or to the LINK-OUT socket of the compatible ultrasonic generator.

2. **Communication cable 0.25 m LINK-IN plug**
This plug connects the communication cable 0.25 m either to the LINK-IN socket of electrosurgical generator or to the LINK-IN socket of the compatible ultrasonic generator.

2.12 Communication cable 10 m (MAJ-1872, optional, this cable is required for the connection with the adapter for the compatible high flow insufflation unit (UHI-2/3))

The communication cable 10 m (Olympus REF: MAJ-1872) is a separate accessory and connects the electrosurgical generator with the adapter for the compatible high flow insufflation unit.



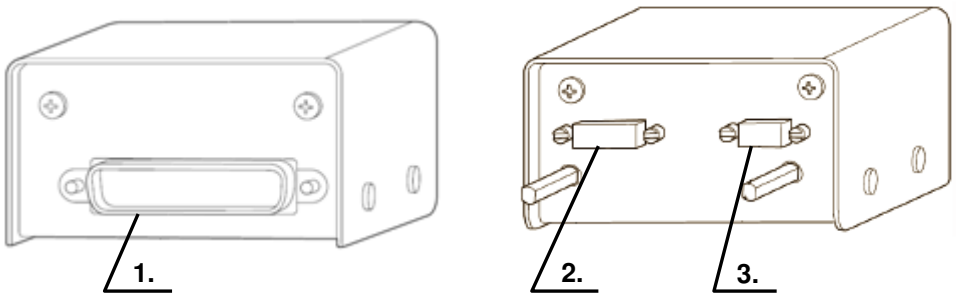
1. **Communication cable 10 m LINK-OUT plug**
This plug connects the communication cable 10 m either to the LINK-OUT socket of electrosurgical generator or to the LINK-OUT socket of the compatible high flow insufflation unit.

2. **Communication cable 10 m LINK-IN plug**
This plug connects the communication cable 10 m either to the LINK-IN socket of electrosurgical generator or to the LINK-IN socket of the compatible high flow insufflation unit.

2.13 Adapter for UHI-2/3 (MAJ-1873, optional, this adapter is required for the connection with the compatible high flow insufflation unit (UHI-2/3))

The adapter for UHI-2/3 (Olympus REF: MAJ-1873) is a separate accessory and connects the electrosurgical generator with the high flow insufflation unit.

Front **Rear**



1. **System plug**
   This plug connects the adapter for UHI-2/3 to the high flow insufflation unit socket.
2. **LINK-IN socket**
   This socket is used for communications with peripheral equipment (26-pin).
3. **LINK-OUT socket**
   This socket is used for communications with peripheral equipment (14-pin).

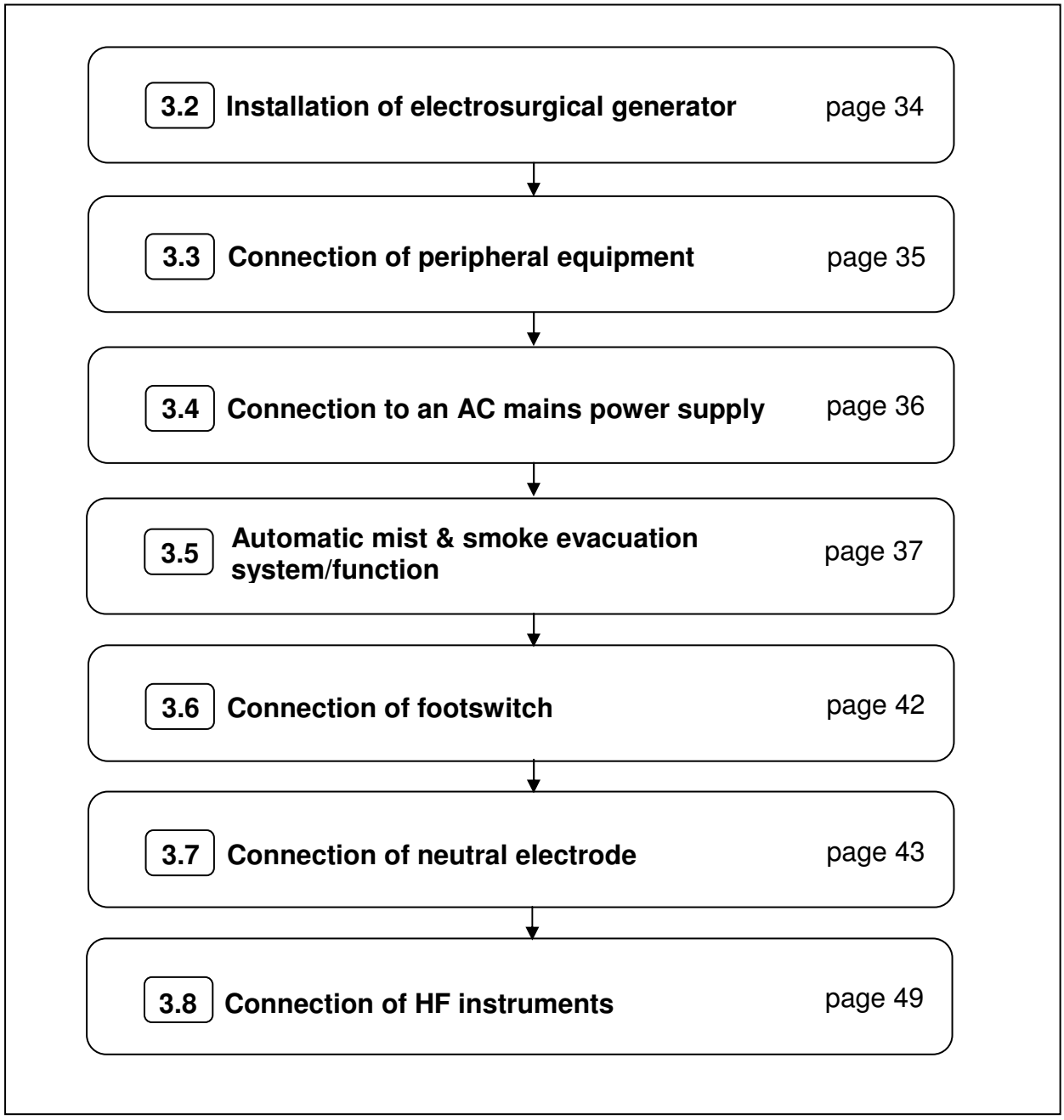
Chapter 3 Installation and Connections

The electrosurgical generator must be properly installed and commissioned by Olympus or by a person or firm commissioned and authorized by the manufacturer.

Prepare the electrosurgical generator and other equipment to be used with this electrosurgical generator before each use. Refer to the instruction manual of the equipment, to the “System chart” in the Appendix, and install and connect all equipment as described on the following pages.

3.1 Flow chart for installation work

The following is a flow chart for installation work. For details on each step, read the corresponding description.



3.2 Installation of electrosurgical generator

CAUTION

- Install the electrosurgical generator on a stable, level surface. Otherwise, the electrosurgical generator could fall, causing equipment damage and / or injury to the user or patient.
- If the electrosurgical generator is placed on a trolley, the trolley must be of adequate strength and size to hold the electrosurgical generator securely.
- Never place the electrosurgical generator on its side or upside down. Otherwise, the electrosurgical generator may not work correctly.
- To prevent malfunction, do not place the electrosurgical generator in the proximity of a wall or other equipment in a way that would block the ventilation openings.
- Always use the electrosurgical generator in compliance with the environmental conditions during normal operation specified in “Transportation, storage and operating environment” in the Appendix. Otherwise, the electrosurgical generator may not work correctly.
- If the electrosurgical generator is lifted up, do not hold the electrosurgical generator at the fuse holder at the rear panel. Otherwise, this may damage the electrosurgical generator.

NOTE

- Keep the instruction manual near the electrosurgical generator or in another easily accessible place.
- Before using an optional item, thoroughly review and understand the instruction manual provided with that item and check the compatibility with the electrosurgical generator.
- Specifications, design and accessories are subject to change without any notice or any obligation of the manufacturer.

3.3 Connection of peripheral equipment

Refer to the instruction manual of the peripheral equipment for the connection instructions.

WARNING

The electrosurgical generator and the peripheral equipment must be switched off before connecting to each other.

NOTE

- If the communication to the peripheral equipment is established and the peripheral equipment is switched on, the communication indicator is illuminated on the top right of the “All screen” or “Set screen” (see chapter 2.5, “All screen”).
- The threaded holes on the bottom left and right of the rear panel are left open intentionally to attach peripheral equipment with the electrosurgical generator via fixture plates.

3.4 Connection to an AC mains power supply

DANGER

Connect the power plug of the power cord directly to a grounded wall outlet or to a multiple power socket outlet equipped with an insulating transformer of protection class I, conforming to IEC 60601-1. In this case, observe the maximum permitted current or power loading of the multiple power socket outlet and the insulating transformer.

WARNING

Firmly plug in the power cord so it will not accidentally be dislodged during the operation.

CAUTION

- Always use the power cord provided with the electrosurgical generator or a cable of similar quality (see “Specifications” in the Appendix). Never attempt to modify the power cord.
- If the same circuit breaker is used to supply power to other electrical equipment, carefully consider the power requirements of the additional equipment and use circuit breakers that have ample capacity. Otherwise, the electrosurgical generator does not work correctly.
- Portable multiple power socket outlets must not be placed on the floor. Do not use an additional extension cable or other multiple power socket outlets that are not approved by the manufacturer for joint use.

NOTE

- Before connecting to the power supply, check that the supply voltage meets with the electrical data on the type plate of the electrosurgical generator.
- If the voltage of the facility is different from the voltage indicated on the type plate of the electrosurgical generator, contact Olympus.

1. Connecting the power cord
   Confirm that the power of the electrosurgical generator is off. Connect the power cord to the AC power socket of the electrosurgical generator (see figure 3.1).

2. Connecting to the power outlet
   Connect the power plug of the power cord directly to a grounded wall outlet which meets the power requirements indicated on the electrical rating plate on the rear panel of the electrosurgical generator (see figure 3.1).

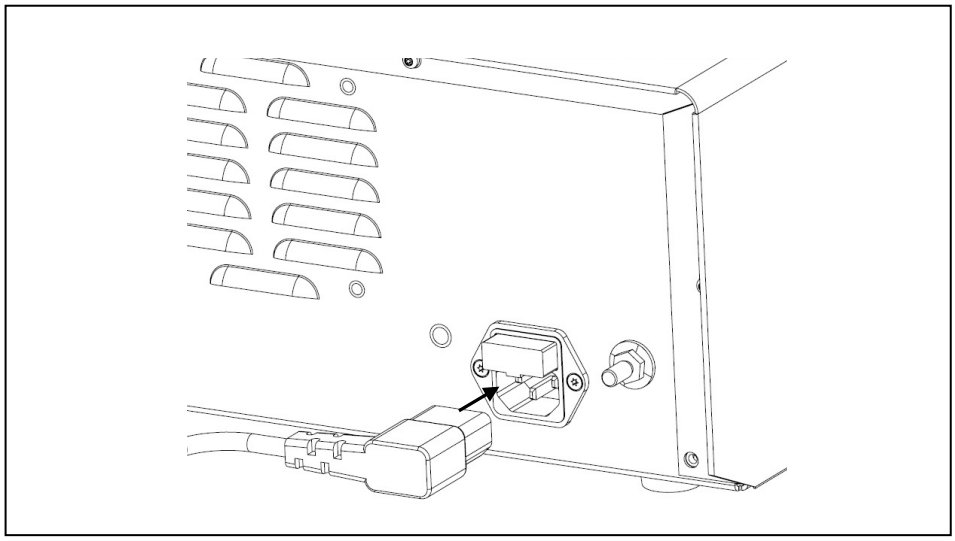


Figure 3.1

3.5 Automatic mist & smoke evacuation system/function (when using the compatible high flow insufflation unit)

When the electrosurgical generator is combined with an Olympus high flow insufflation unit (UHI-2/3) via a communication cable (MAJ-1871 or 1872), the smoke and mist produced in the abdominal cavity can be evacuated simultaneously with the electrosurgical output.

CAUTION

- When using the automatic mist & smoke evacuation system/function, also refer to the instructions for use of the compatible high flow insufflation unit (UHI-2/3).
- Avoid applying excessive force to the communication cable. Otherwise, wire disconnection or other failure may result.
- Do not use the 2-way cable (MAJ-1423) for aeration and the extension cable for aeration in combination with the electrosurgical generator.

- When using the electrosurgical generator with the compatible ultrasonic generator and the compatible high flow insufflation unit (UHI-2 or UHI-3) simultaneously, contact Olympus.

1. Preparation

   Prepare the adapter for UHI-2/3 and the communication cable
   The compatible high flow insufflation unit cannot be connected directly to the electrosurgical generator. Use the adapter for UHI-2/3 (MAJ-1873) and the communication cable (MAJ-1871 or 1872) to connect the UHI-2/3 with the electrosurgical generator.

2. Connecting the adapter for UHI-2/3

   Connect the system plug of the adapter for UHI-2/3 to the system connector on the rear panel of the compatible high flow insufflation unit (see figure 3.2).

3. Connecting the communication cable to the adapter for UHI-2/3

   Connect the LINK-IN or LINK-OUT plug of the communication cable 10 m to the LINK-IN or LINK-OUT socket of the adapter for UHI-2/3. After connection, secure each plug by pushing it in while turning the screws on both sides of the plug (see figure 3.2).

4. Connecting the communication cable to the electrosurgical generator

   Connect the other plug of the communication cable 10 m that has been connected to the adapter for UHI-2/3 to the LINK-IN or LINK-OUT connector of the electrosurgical generator. After connection, secure each plug by pushing it in while turning the screws on both sides of the plug (see figure 3.2).

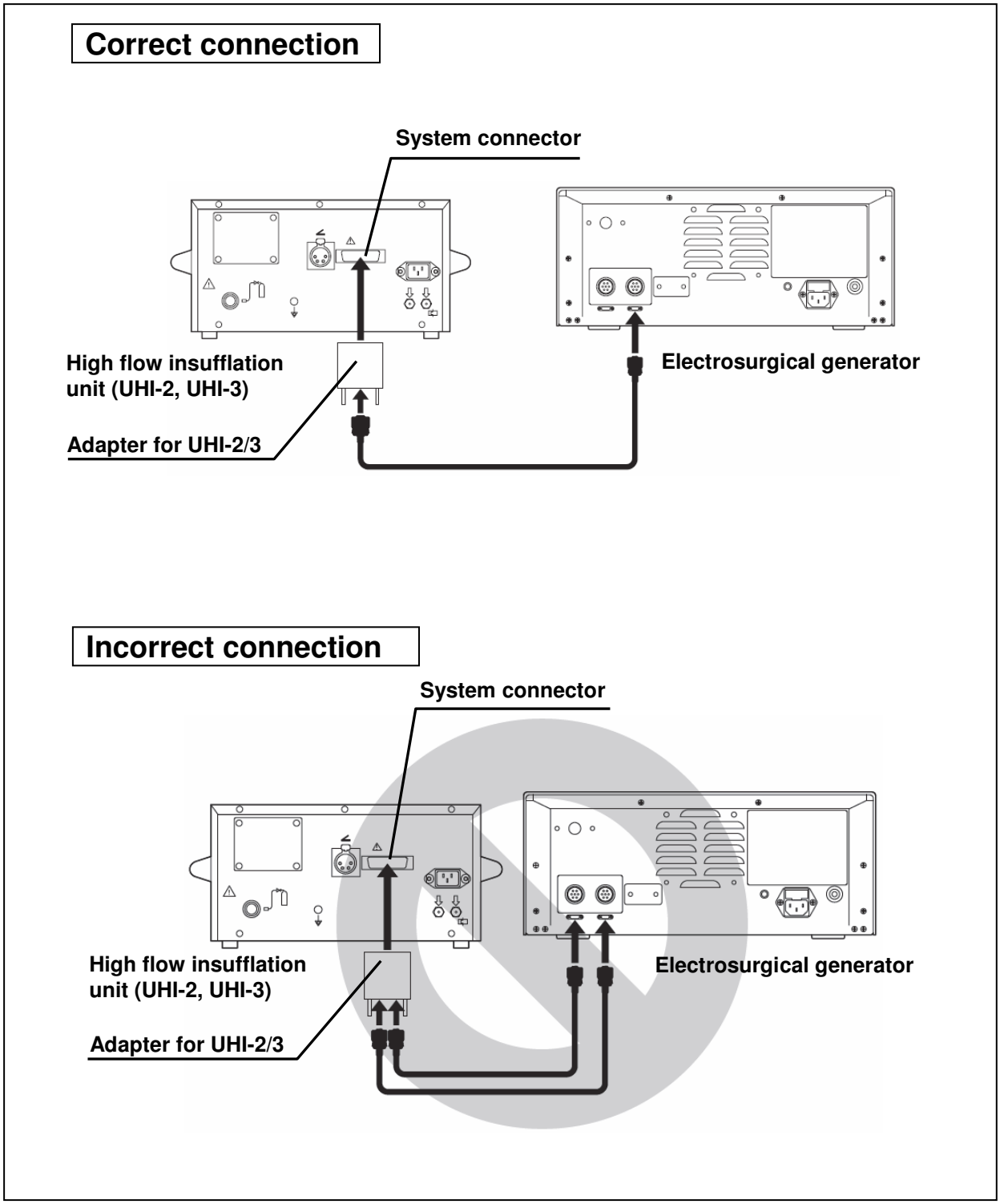

Correct connection
System connector
High flow insufflation unit (UHI-2, UHI-3)
Adapter for UHI-2/3
Electrosurgical generator
Incorrect connection
System connector
High flow insufflation unit (UHI-2, UHI-3)
Adapter for UHI-2/3
Electrosurgical generator

Figure 3.2

When adding the compatible ultrasonic generator to the compatible high flow insufflation unit and the electrosurgical generator

CAUTION

- To prevent malfunction connect either the compatible electrosurgical or ultrasonic generator to the compatible high flow insufflation unit. Do not connect both the compatible electrosurgical and ultrasonic generators to the insufflation at the same time.
- When connecting three devices or more, do not use two of communication cable 10 m. Otherwise, the communication may fail.

When you add the compatible ultrasonic generator to the compatible high flow insufflation unit and the electrosurgical generator that have been already connected, follow the steps below (see Figure 3.3).

1. Connecting the communication cable 0.25 m to the compatible electrosurgical generator
   Connect the plug of the communication cable 0.25 m to the LINK-IN or LINK-OUT connector of the compatible electrosurgical generator.
2. Connecting the communication cable 0.25 m to the compatible ultrasonic generator
   Connect the other plug of the communication cable 0.25 m to the LINK-IN or LINK-OUT connector of the ultrasonic generator.

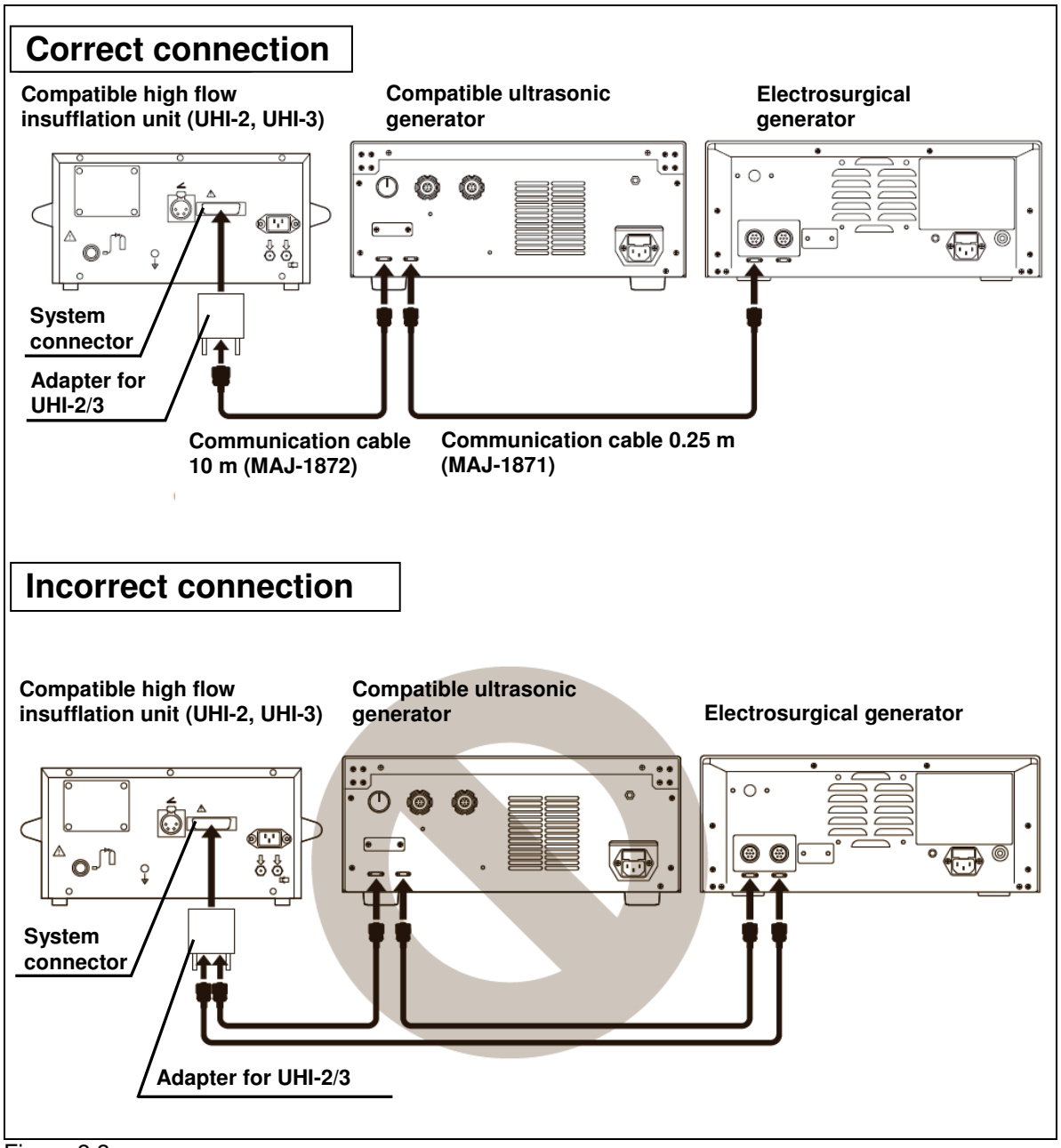

Correct connection
Compatible high flow insufflation unit (UHI-2, UHI-3)
Compatible ultrasonic generator
Electrosurgical generator
System connector
Adapter for UHI-2/3
Communication cable 10 m (MAJ-1872)
Communication cable 0.25 m (MAJ-1871)
Incorrect connection
Compatible high flow insufflation unit (UHI-2, UHI-3)
Compatible ultrasonic generator
Electrosurgical generator
System connector
Adapter for UHI-2/3

Figure 3.3

3.6 Connection of footswitch

There are two kinds of footswitches, the single pedal footswitch (optional) and the double pedal footswitch. This section describes how to connect these footswitches.

WARNING

- Connect the footswitch plug securely to the electrosurgical generator. Otherwise, output may not be activated. In this case, the HF instrument could cut the tissue mechanically, which could cause bleeding and / or perforation of the tissue.
- The footswitch plug is not waterproof, and liquid such as water must not get into the plug.
- When connecting or disconnecting the footswitch plug, always hold the plug. Pulling the cable may result in damaging of the wires.
- Do not connect products other than the footswitch for this electrosurgical generator to the footswitch socket. Otherwise, the footswitch might not function and may cause patient injury and / or damage of the equipment.

1. Checking the footswitch
   Confirm that the footswitch cable and footswitch plug is free of scratches and cracks and that the footswitch pedals are not damaged.

2. Checking the footswitch pedal function
   Press each pedal and confirm that it functions smoothly without being caught by anything.

3. Connecting the footswitch
   Align the footswitch plug so that the keying is facing down. Insert the footswitch plug into one of the footswitch sockets of the electrosurgical generator on the rear panel and rotate the fastener ring fully clockwise to tighten it (see figure 3.4).

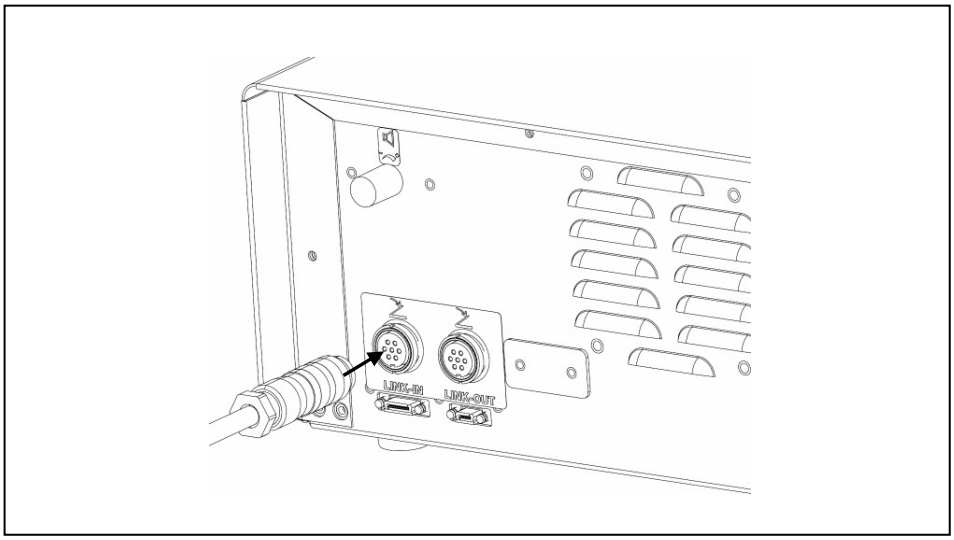


Figure 3.4

3.7 Connection of neutral electrode (for monopolar treatment only)

Split type neutral electrode

When a split type neutral electrode (patient grounding pad) is connected to the electrosurgical generator, it is possible to detect unintended detachment of the neutral electrode from the patient. Refer to “Specifications” in the Appendix for a list of compatible neutral electrodes.

If the contact between the neutral electrode and the patient’s skin is insufficient, the contact quality monitor indicator for split neutral electrodes illuminates red. Reattach the neutral electrode or use a new plate. The contact quality monitor indicator for split neutral electrode will only light green while the contact between the neutral electrode and the skin of the patient is within an acceptable resistance range (see “Specifications” in the Appendix).

WARNING

Always use compatible split type neutral electrodes. When using non-split electrodes the contact quality monitor does not work and no warning signal will occur in case of loss contact between the neutral electrode and the patient.

CAUTION

Always use split type neutral electrodes if possible. By using a non-split neutral electrode the contact quality monitor does not work. An unintended detachment of the neutral electrode will not be detected and this may result in patient burns.

Non-split neutral electrode

If a non-split type neutral electrode is connected to the electrosurgical generator, it is not possible to detect any detachment of the neutral electrode from the patient. The electrosurgical generator displays a confirmation window on the touch-screen if a non-split neutral electrode has been connected. A confirmation by the user is required. This is to avoid the use of non-split neutral electrodes which is not explicit intended by the user.

The contact quality monitor indicator for non-split neutral electrode will light green when detecting a non-split type neutral electrode (see “Specifications” in the Appendix).

CAUTION

No error message or audible signal will be generated if an unintended detachment of the non-split neutral electrode occurs. Therefore, it is not recommended to use non-split neutral electrodes.

Connection of the neutral electrode

Improper connection between the neutral electrode and the patient's skin surface may cause burns. Always attach the neutral electrode and consider the warning notes as described below. For further details on neutral electrodes, refer to the neutral electrode's instruction manual.

DANGER

When using neutral electrodes for infants (patient weight 0…15 kg) avoid output settings which exceed the maximum output power for the neutral electrode (refer to the instruction manual of the neutral electrode).

CAUTION

- Apparent low output power at normal operating settings may indicate a faulty application of the neutral electrode or poor contact in its connections. Check the connections before selecting a higher output power level.
- Use the largest neutral electrode that will fit to the patient, especially for obese patients. Otherwise, patient burns may result. The use of large neutral electrodes is strongly recommended, particulary if high output power levels will be used.
- To avoid compression necrosis use only self-adhesive neutral electrodes.
- Do not use capacitive coupling neutral electrodes as a return path for the high frequency current to avoid incorrect operation of the contact quality monitor and to prevent patient burns.
- Use only original packed neutral electrodes and check the expiration date of the neutral electrode intended to use. If expired neutral electrodes are used the adhesive may fail to maintain contact with the patient's skin. Patient burns may result.
- Do not use the neutral electrode if it has been damaged, modified or has sharp edges. This may cause patient burns.
- This electrosurgical generator should be used in combination with one of the neutral electrodes shown in "Specifications" in the Appendix.

- Never attach the neutral electrode in the vicinity of a metal implant. The tissue in the vicinity of the metal implant may get burned.
- To avoid air entrapment, do not fold or wrinkle the neutral electrode and make sure that its surface is smooth. The entire surface of the neutral electrode should be in direct contact with the patient's skin. Incomplete contact between the neutral electrode and patient's skin may result in patient burns.
- Apply the neutral electrode onto patients skin with the long edge towards the surgical site.
- The site where the neutral electrode is intended to be attached must be clean, dry and free of hair. Otherwise the neutral electrode can loose contact. Improper contact between the neutral electrode and the patient's skin surface may cause patient burns. If necessary, remove all hair from the area to which the neutral electrode will be attached.
- When the patient is moved after the neutral electrode has been attached, confirm that the neutral electrode is still in proper contact with the patient. Otherwise, it may cause patient and / or user burns.
- Avoid placing the neutral electrode over bony prominences or scar tissue as proper contact might not be obtainable. This may cause patient burns.
- The neutral electrode should not be reused or repositioned.
- If the contact quality monitor indicator for split neutral electrodes indicates red either because the neutral electrode has not been attached correctly or detached, output may not be activated. In this case the touch-screen will display an error window ("Insufficient neutral electrode contact", with error no: E202).
- If a neutral electrode failure is indicated and an HF instrument is already placed at the treatment site, mechanical tissue cutting by the HF instrument may occur and cause patient bleeding or perforation.

NOTE

- In case a contact quality monitor alarm arises during a procedure, an audible signal can be heard and the output stops automatically.
- For the removal of the neutral electrode, do not peel off the neutral electrode by pulling the cable. Start the plate removal at a corner. Slowly peel back the plate. Otherwise, skin injury may result.

1. Checking the contact quality monitor indicator

   Before connecting any neutral electrode to the electrosurgical generator, make sure the contact quality monitor indicator for split neutral electrodes illuminates red and the contact quality monitor indicator for non-split neutral electrodes is off.

2. Preparation of the neutral electrode

   Peel off the protective liner from the neutral electrode and attach the plate to the patient's body according to the neutral electrode manufacturer's instruction manual.

3. Connecting the neutral electrode
   - For neutral electrodes with a pre-attached cable consider the following procedure*:* Insert the neutral electrode plug into the neutral electrode socket (suitable for 2 pin plugs with 2.5 mm pin diameter and pin spacing 10 mm, US standard) on the front panel of the electrosurgical generator (see figure 3.5).
   - For neutral electrodes without a pre-attached cable consider the following procedure: Lift the lever-locking arm of the neutral electrode cable "P-cord", and then position the neutral electrode tab evenly between the clamp jaws. Lock the clamp by fully pressing down the lever-locking arm (see figure 3.6). Insert the "P-cord" plug on the electrosurgical generator side into the neutral electrode socket (suitable for 2 pin plugs with 2.5 mm pin diameter and pin spacing 10 mm, US standard) on the front panel of the electrosurgical generator (see figure 3.5).

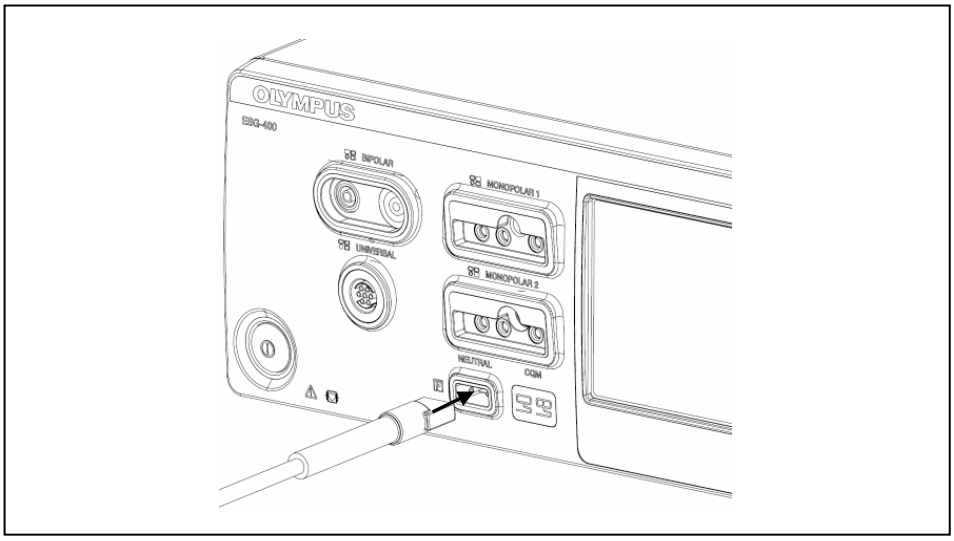


Figure 3.5

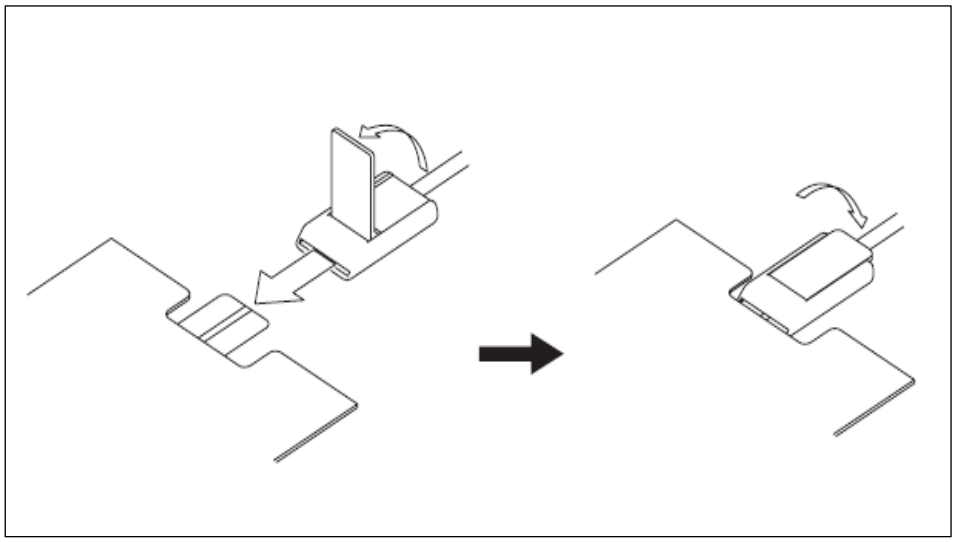


Figure 3.6

4. Verifying the contact quality monitor indicator

- If a split neutral electrode has been connected, verify that the contact quality monitor indicator for split neutral electrodes illuminates green.
- If a non-split neutral electrode has been connected, a confirmation window according to figure 3.7 will appear. Press the “OK button” to continue and the display returns to the last used screen. Verify that the contact quality monitor indicator for non-split neutral electrodes illuminates green.

Confirmation window

Figure 3.7

3.8 Connection of HF instruments

The electrosurgical generator can be used with monopolar cutting and coagulation instruments as well as with bipolar cutting and coagulation instruments. The HF instruments must have an appropriate plug to connect either into the monopolar sockets or the bipolar socket or the universal socket (see socket description below). When connecting HF instruments avoid output settings where the maximum output voltage of the electrosurgical generator may exceed the rated HF instrument voltage (refer to “Mode characteristics” and “Output characteristics” in the Appendix, and the instruction manual of the HF instrument).

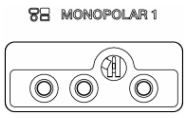
WARNING

Securely connect the HF instrument. Otherwise, insufficient output might occur during treatment and, in this case, mechanical tissue cutting by the HF instrument may occur and cause bleeding or perforation of the patient.

CAUTION

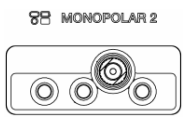
Olympus HF instruments should be used for electrosurgical procedures. For details, refer to the instruction manual of the HF instrument. If you have any questions concerning the applicability of your HF instrument, please contact Olympus.

MONOPOLAR 1 socket



Suitable for 3 pin monopolar plugs with 4 mm pin diameter (Valleylab standard) and coaxial monopolar plugs with 8 mm pin diameter (Bovie standard).

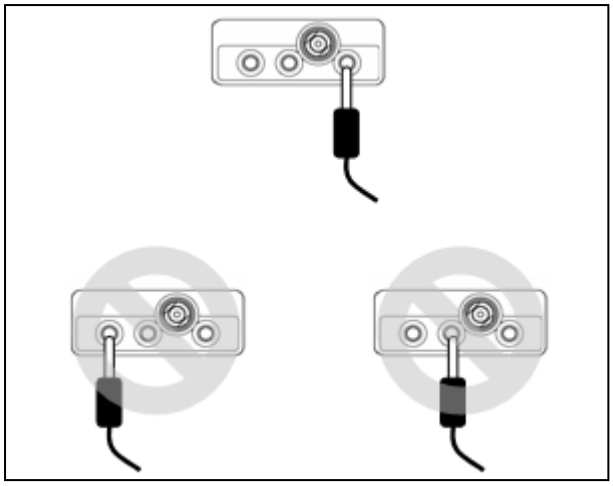
MONOPOLAR 2 socket



Suitable for 3 pin monopolar plugs with 4 mm pin diameter (Valleylab standard) and coaxial monopolar plugs with 9 / 5 mm pin diameter (Erbe standard).

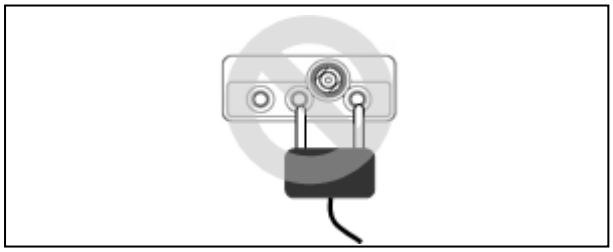
WARNING

A connection of a 1-pin 4 mm plug to any other receptacle except the right-hand-side receptacle of the MONOPOLAR 1 socket and the MONOPOLAR 2 socket may destroy the socket during activation.

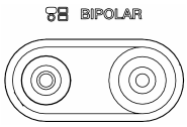


WARNING

Do not connect a 2-pin 4 mm plug (e.g. from monopolar hand-switch activated forceps) to the MONOPOLAR 1 socket or to the MONOPOLAR 2 socket. Connecting this type of instrument may damage the generator.



BIPOLAR socket



Suitable for 2 pin bipolar plugs with 4 mm pin diameter (Valleylab standard), pin spacing 28.8 mm and coaxial bipolar plugs with 8 / 4 mm pin diameter (Erbe standard).

UNIVERSAL socket

Suitable for 7 pin bipolar multifunctional plugs (Olympus standard) and offers HF instrument recognition. For a detailed description, refer to chapter 5.4, “Output setting”.

1. Checking the HF instrument

   Confirm that the HF instrument cable and HF instrument plug are not damaged.

2. Connecting the HF instrument

   Insert the HF instrument plug into the appropriate socket on the front panel of the electrosurgical generator.

Chapter 4 Inspection

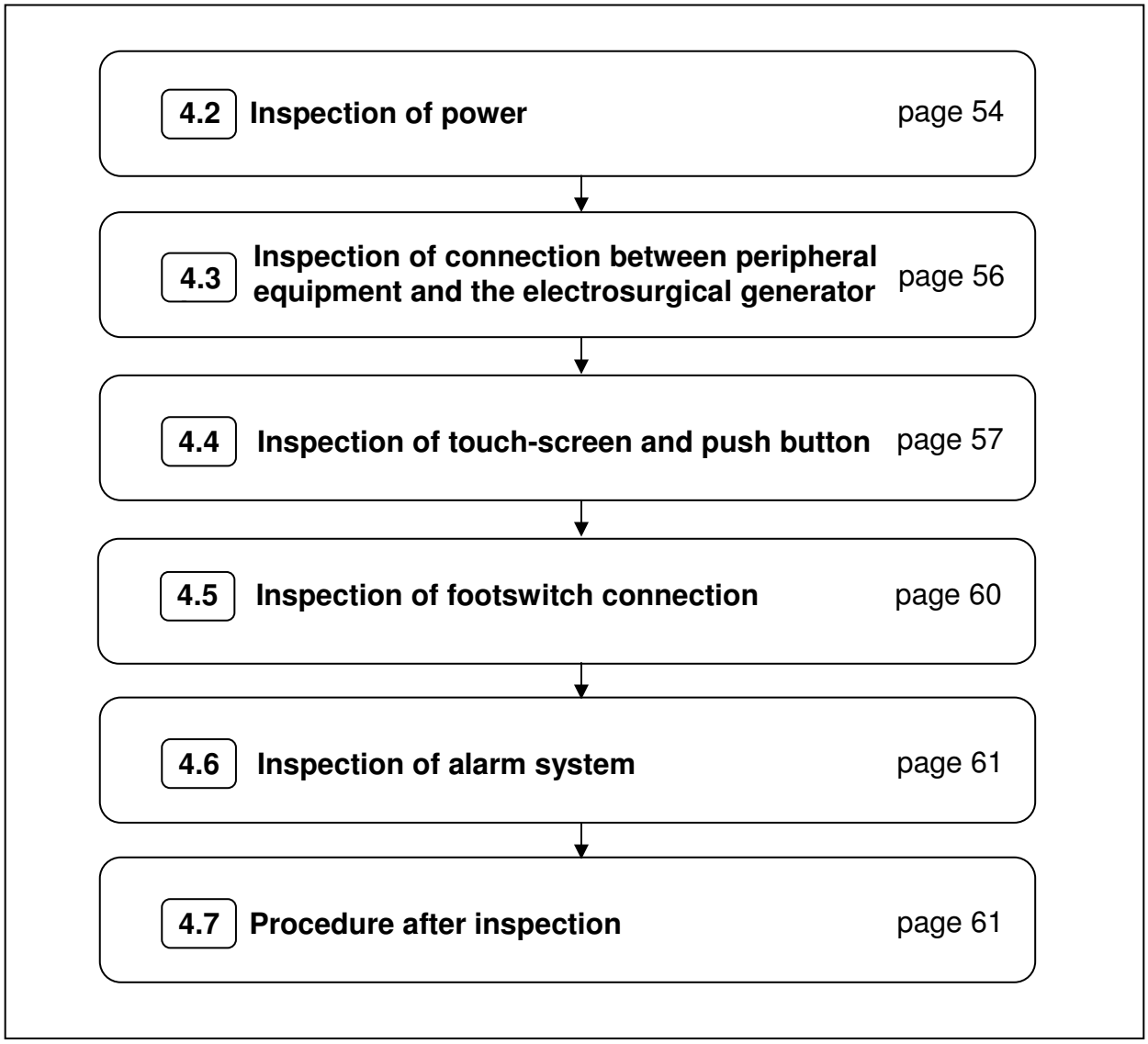
The inspection of this electrosurgical generator and other equipment to be used with this electrosurgical generator is recommended before every operation. Refer to the respective instruction manual for each item. Refer to the instruction manual of the equipment and inspect all equipment as described on the following pages.

WARNING

Before each use, inspect this electrosurgical generator as instructed below. Inspect other equipment to be used with this electrosurgical generator as instructed in their respective instruction manual. Should the slightest irregularity be suspected, do not use the electrosurgical generator and refer to chapter 8, “Troubleshooting”. If the irregularity is still suspected after consulting chapter 8, contact Olympus. Damage or irregularity may compromise patient or user safety and may result in more severe equipment damage.

4.1 Flow chart for inspection work

The following is a flow chart for inspection work. For details on each step, read the corresponding description.



4.2 Inspection of power

WARNING

- If the electrosurgical generator fails to start up (no indicators illuminates and the touch-screen is off), confirm that the power cord is connected securely to a grounded wall outlet and the AC power socket on the electrosurgical generator and confirm that the grounded wall outlet is powered. If it still fails to start up, remove the power cord from the grounded wall outlet and contact Olympus. Equipment damage or malfunction may have occurred and fire or electric shock can result.
- If the output is activated and the output tone can be heard but no output indicators illuminates or the touch-screen are off, stop the procedure immediately, switch off the electrosurgical generator. Otherwise, it may cause perforation, bleeding and user and / or patient burns.

Inspection of the power switch, touch-screen and push buttons

Switch on the electrosurgical generator with the power switch.

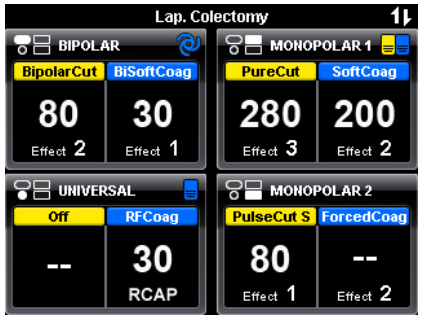
- The power switch illuminates.
- The touch-screen lights up.
- The push buttons illuminates.
- The contact quality monitor indicator for split neutral electrodes illuminates.

Inspection of start screen and start tone

- Confirm that the “Start screen” (see figure 4.1) is shortly displayed on the touch-screen, then the “All screen” (output settings with the recall of the last settings of all corresponding output sockets, see figure 4.2) is displayed and the electrosurgical generator is ready for use.
- Confirm that a tone can be heard at the same time as the “Start screen” is displayed.

Start screen

Figure 4.1



All screen

Figure 4.2

4.3 Inspection of connection between peripheral equipment and the electrosurgical generator

When the communication indicator is illuminated

If the communication indicator illuminates, the connection between peripheral equipment and electrosurgical generator is established (see figure 4.3).

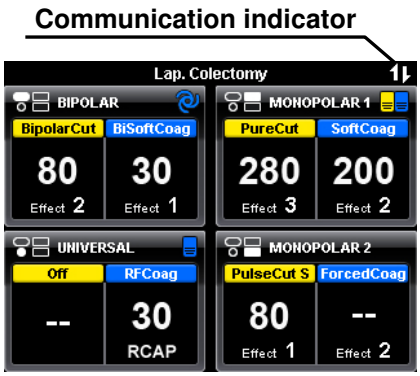


Figure 4.3

If the communication indicator does not illuminate

The communication indicator does not illuminate when the peripheral equipment and the electrosurgical generator is not properly connected.

1. Confirm that the peripheral equipment and the electrosurgical generator are connected properly.
2. Confirm that the generators are switched on.

   If the communication indicator does not illuminate even after the above check, contact Olympus.

4.4 Inspection of touch-screen and push buttons

The touch-screen displays control buttons which can be activated by touching the corresponding part on the screen.

CAUTION

- To prevent malfunction, do not press more than one part on the touch-screen simultaneously.
- Touching the touch-screen from an oblique direction may cause malfunction. Always control the touch-screen by viewing from the straight forward direction.
- Unintended contact of the touch-screen may cause malfunction. Before activating the output confirm that the present setting is correct.
- To prevent malfunction or damage to the touch-screen, do not apply an excessive load on its surface.
- Do not control the touch-screen with a pointed object (such as a pen). Otherwise, malfunction or damage may result.
- Deposition of dirt and dust between the touch-screen and the front panel may cause malfunction of the touch-screen. To prevent this, wipe the touch-screen with a cloth to remove dirt and dust.
- After pressing the “Plus button” / “Minus button”, confirm that the output level is changed accordingly. Otherwise, inappropriate output can cause burns to the patient and / or user, patient bleeding and / or perforation.

Inspection of touch-screen operation

1. Press the “MONOPOLAR 1 button” on the marked area as shown in figure 4.4.
   A “Set screen” appears, showing all settings of the corresponding output socket.

2. Press the “Plus button” / “Minus button”.
   - Pressing the “Plus button” increases the power level.
   - Pressing the “Minus button” decreases the power level.
   - For a significant change of the power level continuously press the “Plus button” / “Minus button”.

3. Press the “Toggle button”.
   Pressing the “Toggle button” changes the effect.

4. Press the “Return button”.
   The screen changes from the “Set screen” to the “All screen” (see figure 4.4).

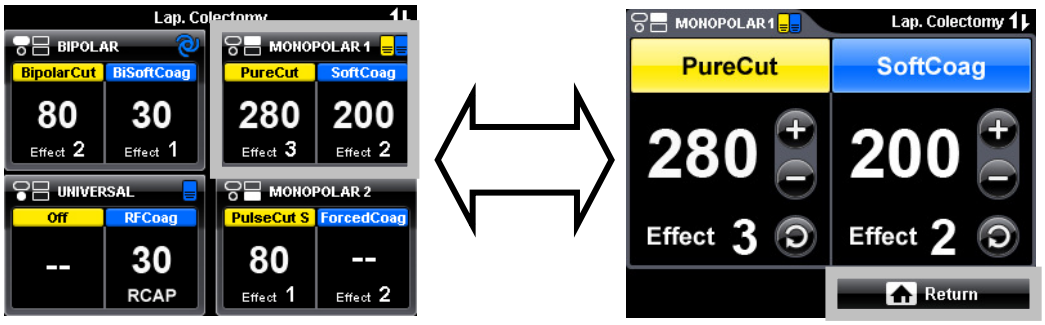


Figure 4.4

Inspection of push button operation

1. Press the “MENU push button” on the right side of the touch-screen as shown in figure 4.5.
   The “Menu screen” appears showing different control buttons.

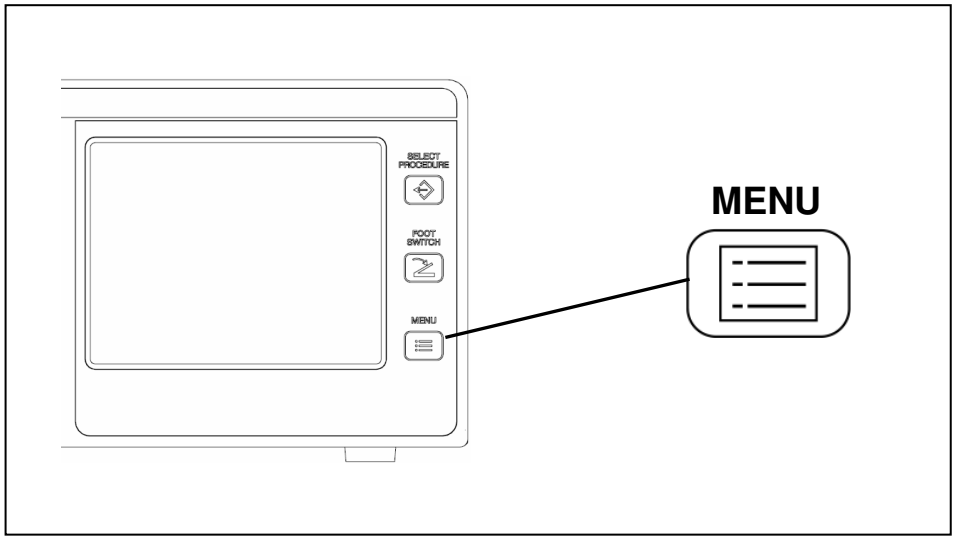


Figure 4.5

2. Press the “Return button”.
   The screen changes from the “Menu screen” to the “All screen” as shown in figure 4.6.

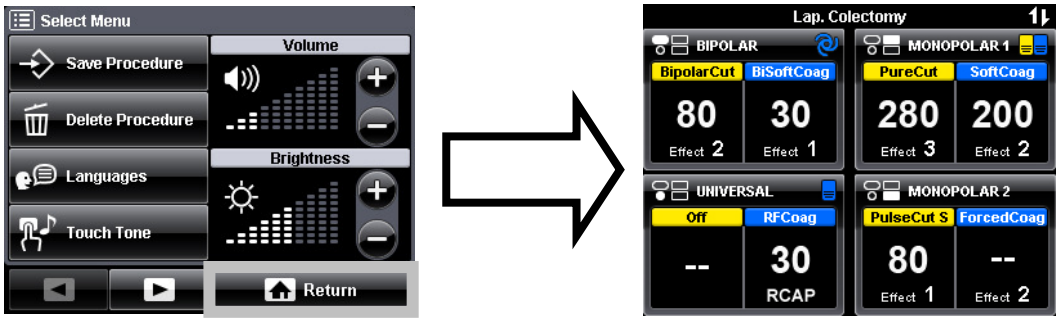


Figure 4.6

4.5 Inspection of footswitch connection

1. Connect a footswitch (e.g. double pedal footswitch) with the electrosurgical generator on the rear panel according to chapter 3.6, “Connection of footswitch”.

2. Press the “FOOTSWITCH push button” on the right side of the touch-screen as shown in figure 4.7.
The “Footswitch screen” appears.

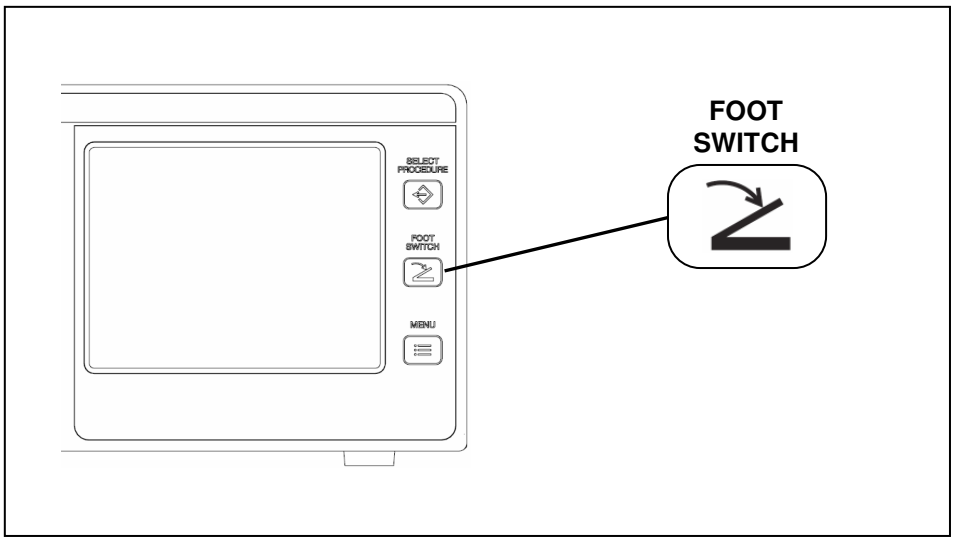


Figure 4.7

3. Press the “Double footswitch indicator” of the “MONOPOLAR 1 output socket” (see figure 4.8).
The “Double footswitch button” changes to gray which indicates the connection of the double pedal footswitch at the “MONOPOLAR 1 output socket.”

4. Disconnect the footswitch plug from the electrosurgical generator.
The “Double footswitch button” is black again.

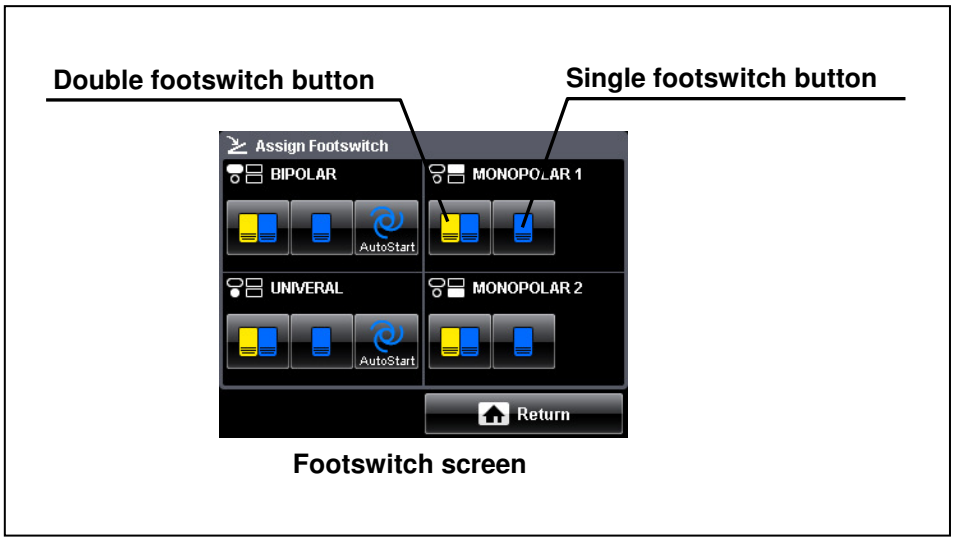


Figure 4.8

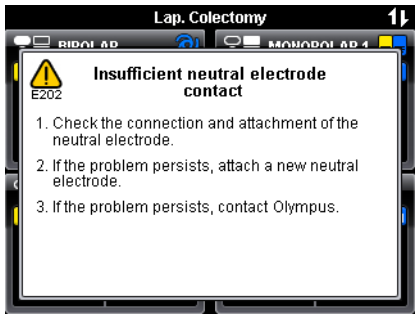
4.6 Inspection of alarm system

WARNING

Be sure to inspect the alarm function before use. If the alarm function is not normal, the electrosurgical generator might fail to detect an equipment error and this may result in unexpected burns, perforation and / or bleeding.

Inspection of neutral electrode warning

1. Make sure that no neutral electrode is connected to the neutral electrode socket of the electrosurgical generator.
   Try to activate any monopolar mode by pressing the corresponding footswitch pedal. The contact quality monitor indicator for split neutral electrodes illuminates red and the output cannot be activated.
2. Confirm that an error window (E202, see figure 4.9) is displayed and an audible signal can be heard.
3. The audible signal stops and after a few seconds the error window (E202) disappears.



Error window
(E202: Insufficient neutral electrode contact)

Figure 4.9

4.7 Procedure after inspection

Switch off the electrosurgical generator with the power switch.

- The illumination of the power switch is off.
- The touch-screen is off.
- The illumination of the push buttons is off.
- The contact quality monitor indicator for split neutral electrodes is off.

Chapter 5 Operation

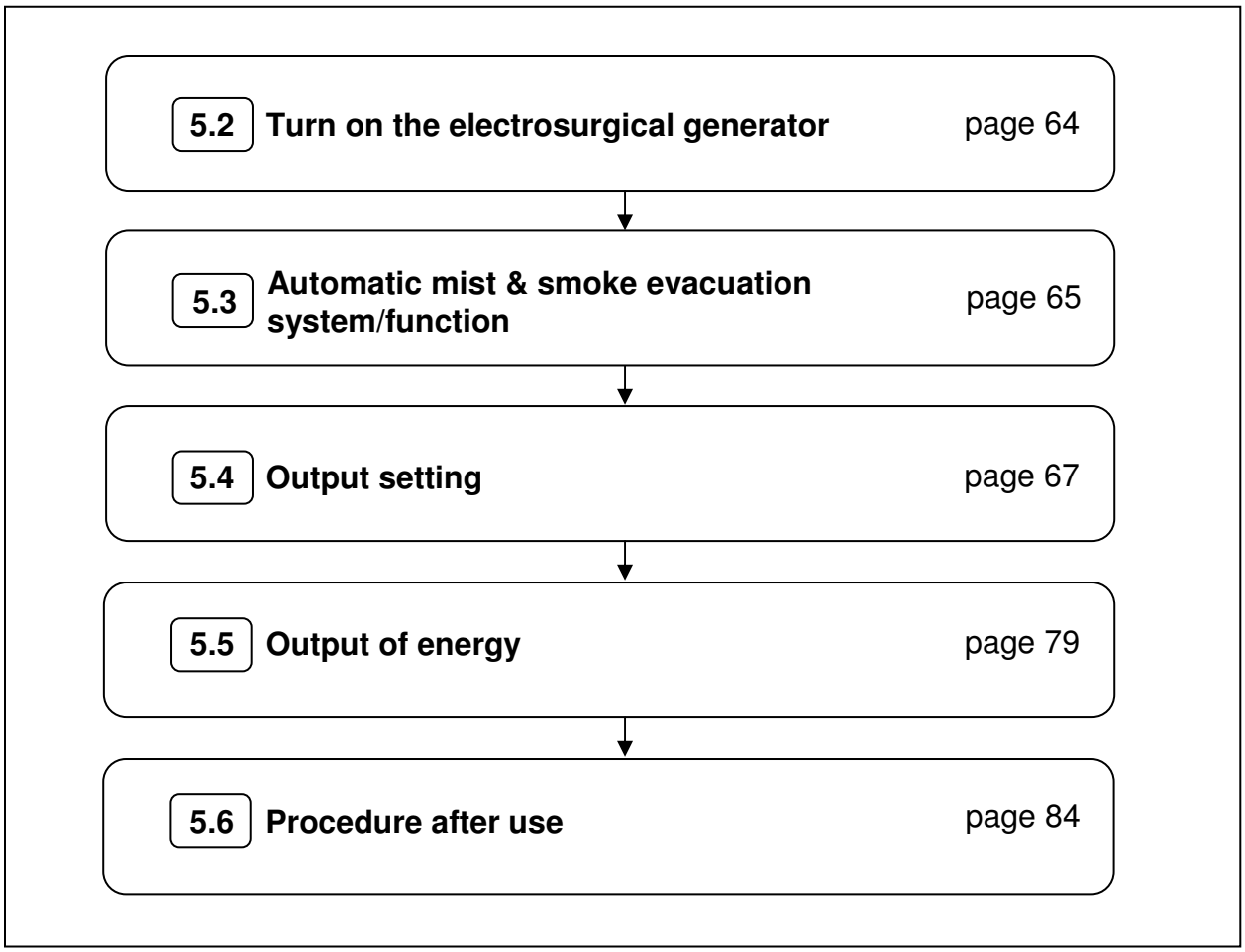
Before starting an operating procedure, confirm that the connections of the power cord, footswitch, neutral electrode and HF instruments are secure and correct.

DANGER

If during operation any irregularity will be suspected, do not use the electrosurgical generator and refer to chapter 8, “Troubleshooting”. If the irregularity is still suspected after consulting chapter 8, contact Olympus. Damage or irregularity may compromise patient or user safety and may result in more severe equipment damage.

5.1 Flow chart for operation work

The following is a flow chart for operation work. For details on each step, read the corresponding description.



5.2 Turn on the electrosurgical generator

NOTE

- By using the electrosurgical generator for the first time there will be a default setting of the assigned modes, output power settings and the effects.
- By switching between the modes, the electrosurgical generator automatically recalls the settings used for each mode individually.
- By switching on the electrosurgical generator after one or more procedures have been done, the last used mode, effect and output power is presented at the “All screen”. Before starting the procedure, confirm the correctness of the settings.

1. Checking the connections

   Confirm that all HF instruments and peripheral equipment required for the procedure are connected properly and securely.

   - For the connection method refer to chapter 3, “Installation and Connections”.
   - For the connection check method refer to chapter 4, “Inspection”.

2. Turn the power on.

   Press the power switch of the electrosurgical generator.
   For the “power on” check method, refer to chapter 4.2, “Inspection of power”.

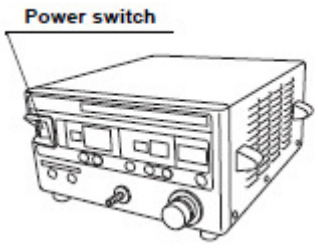
5.3 Automatic mist & smoke evacuation system/function (when using the compatible high flow insufflation unit)

CAUTION

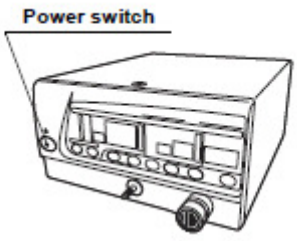
- When using the automatic mist & smoke evacuation system/function, also read the instruction manual for the compatible high flow insufflation unit (UHI-2 or UHI-3).
- If exhaust does not stop 5 seconds after stopping the output, the compatible high flow insufflation unit may be malfunctioning. Disconnect the communication cable and contact Olympus.
- Confirm that the electrosurgical generator is turned ON. Otherwise, the automatic mist & smoke evacuation system/function of the compatible high flow insufflation unit will not work.

Press the power switch of the compatible high flow insufflation unit (see Fig. 5.1).

- While the handswitch or footswitch pedal is pressed, the automatic mist & smoke evacuation system/function of the UHI-2 or UHI-3 is activated simultaneously as the output. The exhaust continues for 5 seconds even after the output is stopped.
- For the connection method, see chapter 3.5, “Automatic mist & smoke evacuation system/function (when using the compatible high flow insufflation unit)”.



High flow insufflation unit (UHI-2)



High flow insufflation unit (UHI-3)

Figure 5.1

NOTE

- While the handswitch or footswitch pedal is held pressed, the automatic exhaust function of the UHI-2 or UHI-3 is activated at the same time as the output. The exhaust continues for about 5 seconds even after the output is stopped. In the following cases, however, the safety function disables the automatic exhaust function even during output.
  - When the abdominal cavity pressure is below 3 mmHg.
  - When the air flow mode of the UHI-2/UHI-3 is “Low.”
  - When the UHI-2/UHI-3 is in the air flow stop mode.

5.4 Output setting

Set the mode, the output power and the effect displayed on the touch-screen according to the procedure to be performed.

WARNING

The output power selected should be as low as possible for the intended purpose. Certain modes or accessories may present an unacceptable risk at low output power settings. For example, with the PulseCut fast mode or PulseCut slow mode, the risk of an excessive thermal effect rises if the output power setting is too low. It is recommended to do appropriate examinations before using on a human body. Inappropriate output can cause burns to the patient and / or user, patient bleeding and / or perforation.

CAUTION

High current densities can cause nerve and muscle stimulation. High current densities may occur when modes with High Power Cut Support (HPCS) are used. Nerve and muscle stimulations may cause discomfort or pain in patients without sedation, pain medication or general anesthesia. To reduce the probability of nerve and muscle stimulations use modes without HPCS.

NOTE

- The power level displayed in the “All screen” or “Set screen” is the maximum power (watts) which can be applied during the activation of the electrosurgical generator. The actual applied power depends on the tissue characteristics (e.g. resistance).
- If the power level of any mode is below the minimum allowable value, the “Set screen” or the “All screen” shows “--” in the power level area. In this case, the power output is set to zero watts. Each mode has a different minimum power level (refer to “Mode characteristics”, in the Appendix).
- If a mode has been switched off (“Off” was selected) in the “Mode screen”, the “Set screen” or the “All screen” shows “--” instead of power level and effect setting.
- The mode, power level and effect setting cannot be changed while output is activated.

- All cutting modes (except BlendCut) are supported by the High Power Cut Support (HPCS). The HPCS optimizes the start of the cutting procedure by applying high power to the tissue to support immediate spark ignition and reduce the risk of mechanical cutting.

1. Checking the output settings

   Confirm that the mode, the output power level and the effect displayed on the touch-screen correspond with the procedure to be performed.

   - If no change is required for the output settings, go to chapter 5.5, “Output of energy”.
   - If the output settings have to be changed, go to step no. 2 below.

2. Choose the power and effect settings

   If the touch-screen shows the “All screen”, press on the appropriate button connected to the output socket which settings shall be changed e.g. “MONOPOLAR 1 button” (see figure 5.2).

   - The display changes from the “All screen” to the “Set screen”.
   - When the “Set screen” is displayed, the output power level and effect settings can be changed.
   - Set the output power level by pressing the “Plus button” / “Minus button” and the effect setting by pressing the “Toggle button”. The impact of power level and effect setting on tissue for all modes is described in table 5.1, “Overview of all modes”.

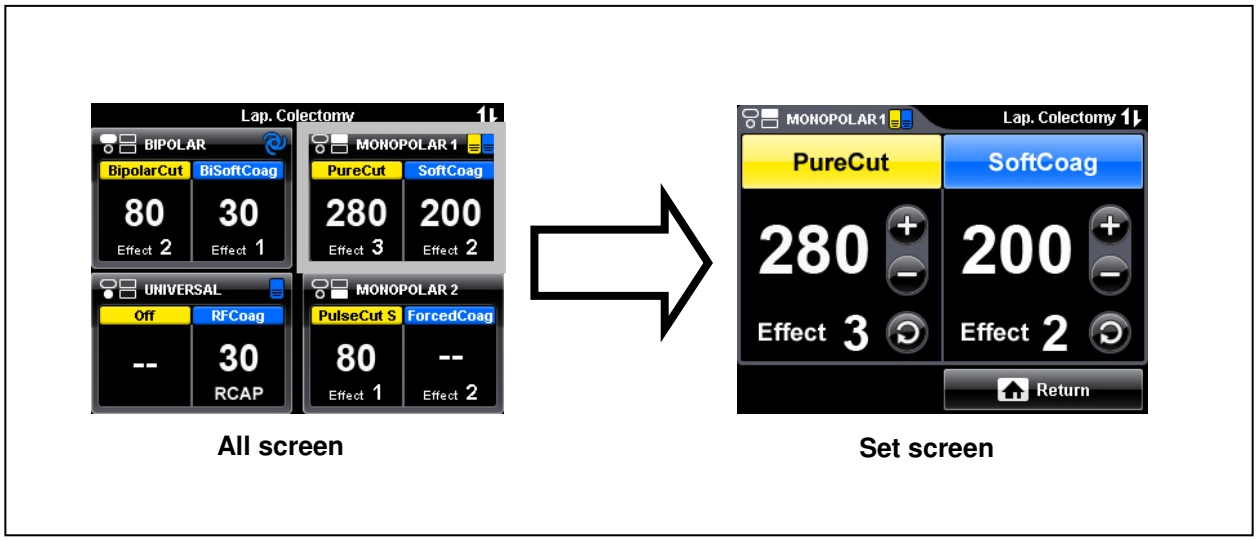


Figure 5.2

3. Choose the output mode

To change the mode, press the “Mode button” in the “Set screen”, e.g. “SoftCoag button” (see figure 5.3).

- The display changes from the “Set screen” to the “Mode screen”.
- When the “Mode screen” is displayed, a specific mode can be selected.
- Set a mode by pressing the appropriate button. Pressing the “Off button” will inactivate the corresponding cut or coagulation function. Select a mode in accordance with the type of procedure to be performed and the HF instruments to be used. For the applications / HF instruments and specific technical features of the different modes refer to table 5.1, “Overview of all modes”.

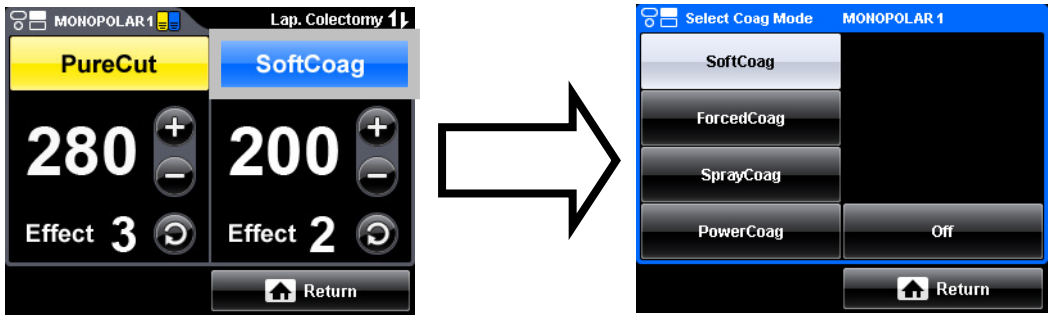


Figure 5.3

HF instrument recognition (available only via the UNIVERSAL socket)

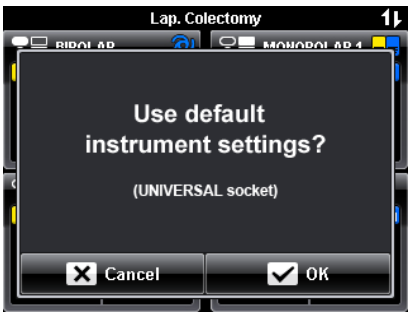
The electrosurgical generator is equipped with an UNIVERSAL socket that allows the user to connect Olympus HF instruments or cables with HF instrument recognition capabilities. Such HF instruments have stored information about:

- instrument name (will be displayed instead of “UNIVERSAL” in the “All, Set or Mode screen”.),
- default settings and safety margins for mode, power level and effect.

For detailed information about the settings, refer to the instructions for use of the HF instruments or cables.

The next paragraph describes the display changes if an Olympus device with HF instrument recognition capabilities will be connected via the UNIVERSAL socket as depending on the current settings of the electrosurgical generator.

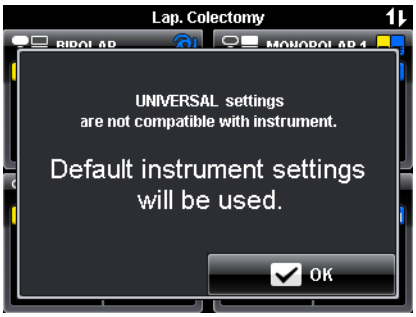
- If the current displayed settings of mode, power level and effect are within the allowed range of the connected Olympus HF instrument but not the default instrument settings, a confirmation window according to figure 5.4 will appear. Press the “OK button” to use the default instrument setting and the display switches to the “All screen” or press the “Cancel button” to continue without changing the current settings and the display returns to the last used screen.



Confirmation window

Figure 5.4

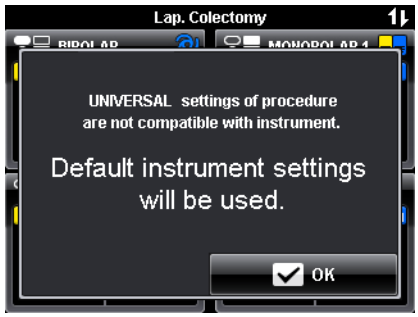
- If at least one displayed setting of mode, power level or effect is out of range of the allowed Olympus HF instrument settings, a confirmation window according to figure 5.5 will appear. Press the “OK button” to continue. The default instrument settings will be taken and the display returns to the “All screen”.



Confirmation window

Figure 5.5

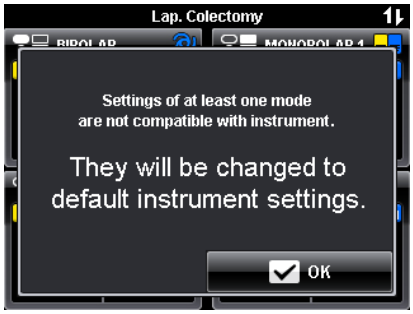
- If a procedure will be selected from the “Select Procedure screen” and at least one of the stored procedure settings are out of range of the allowed Olympus HF instrument settings, a confirmation window according to figure 5.6 will appear. Press the “OK button” to continue. The default instrument settings will be taken and the display returns to the “All screen”.



Confirmation window

Figure 5.6

- If the displayed settings are allowed for the Olympus HF instrument but at least one setting of power level or effect of an unselected mode is out of range of the allowed Olympus HF instrument settings, a confirmation window according to figure 5.7 will appear. Press the “OK button” to continue. Just the permitted settings will be changed to the default instrument settings and the display returns to the “All screen”.



Confirmation window

Figure 5.7

Bipolar cut / coagulation mode – SalineCut / SalineCoag

CAUTION

Use an electroconductive physiological saline solution. Do not use a non-conductive solution because this cause an error message and output is disabled.

NOTE

- Saline solution means 0.9 % sodium chloride irrigation.
- A neutral electrode is not required if performing a bipolar cutting in a conductive fluid.

Bipolar coagulation mode – RFCoag

CAUTION

- During RFCoag with RCAP mode an automatic termination of the procedure (indicated by an intermittent audible signal) only occurs if the electrode is withdrawn from the tissue or if the tissue is totally desiccated after a long treatment time. For that reason it is essential when using RFCoag with RCAP mode that the procedure should be stopped by the user on the basis of the applied energy, the duration of application and the coagulation progress.
- Before using any bipolar HF instrument which does not have a cutting function reduce the power level of the bipolar cutting modes to "--" (zero) or switch "Off" the cut mode in the "Mode screen." Otherwise an unintended activation of the cut mode (cut pedal is pressed) may cause HF instrument damage, patient burns, perforation and bleeding.

NOTE

- If the procedure is not finished after 999 minutes and 59 seconds ("999:59"), the counter restarts from "00:00."
- The energy counter changes as follow: "0.00 kJ"..."9.99 kJ", "10.0 kJ"..."99.9 kJ", "100 kJ"..."999 kJ". After exceeding an energy of "999 kJ" the counter changes to "> 1 MJ" (Mega joules).

In the deactivated state of the electrosurgical generator, the “Set screen” shows an application time counter in minutes:seconds and an energy counter in Kilojoules (see figure 5.8), indicating previous treatment parameters. Both counters can be set to zero (“00:00”, “0.00 kJ”) either by switching off the electrosurgical generator or by pressing the “Reset button”.

During activation of the electrosurgical generator, the total amount of energy emitted is constantly updated in the energy counter and the total duration of power application is constantly updated in the time counter, either in the “Set screen” or in the “All screen” (see figures 5.8 and 5.9 respectively).

Without RCAP

The medical purpose of RFCoag without RCAP (“Resistance Controlled Automatic Power”) mode is to achieve controlled tissue coagulation. To select the RFCoag without RCAP mode, press the “RCAP button” until the “RCAP button” is not in gray color.

During activation, the electrosurgical generator provides audible feedback of the coagulation status. The frequency of the output tone is proportional to the tissue resistance at any particular moment. As the measured tissue resistance increases, the frequency of the audible feedback tone also increases. This permits audible monitoring of the coagulation status, since the latter is directly connected with the tissue resistance.

Energy is applied until the tissue resistance exceeds a limit value (see “Specifications” in the Appendix). Then the power output is automatically stopped because the coagulation process is completed due to desiccation of the tissue (see “Output characteristics” in the Appendix). This is indicated by an intermittent audible signal.

With RCAP

The medical purpose of RFCoag with RCAP mode is used to achieve deep tissue coagulation without significant tissue desiccation. To activate the RFCoag with RCAP mode, press the “RCAP button” until the “RCAP button” is in gray color.

Once the tissue resistance increases significantly, which indicates beginning tissue desiccation, the power is reduced automatically. This enables the tissue to rehydrate, resulting in normal electrical resistance of the tissue after a few seconds. Detecting this decrease of resistance, the electrosurgical generator automatically increases the power again to the preset level and continues the heating process. This cycle will be repeated until the activation is stopped or the tissue resistance exceeds a limit value. In the latter case, the power output is automatically stopped. This is indicated by an intermittent audible signal.

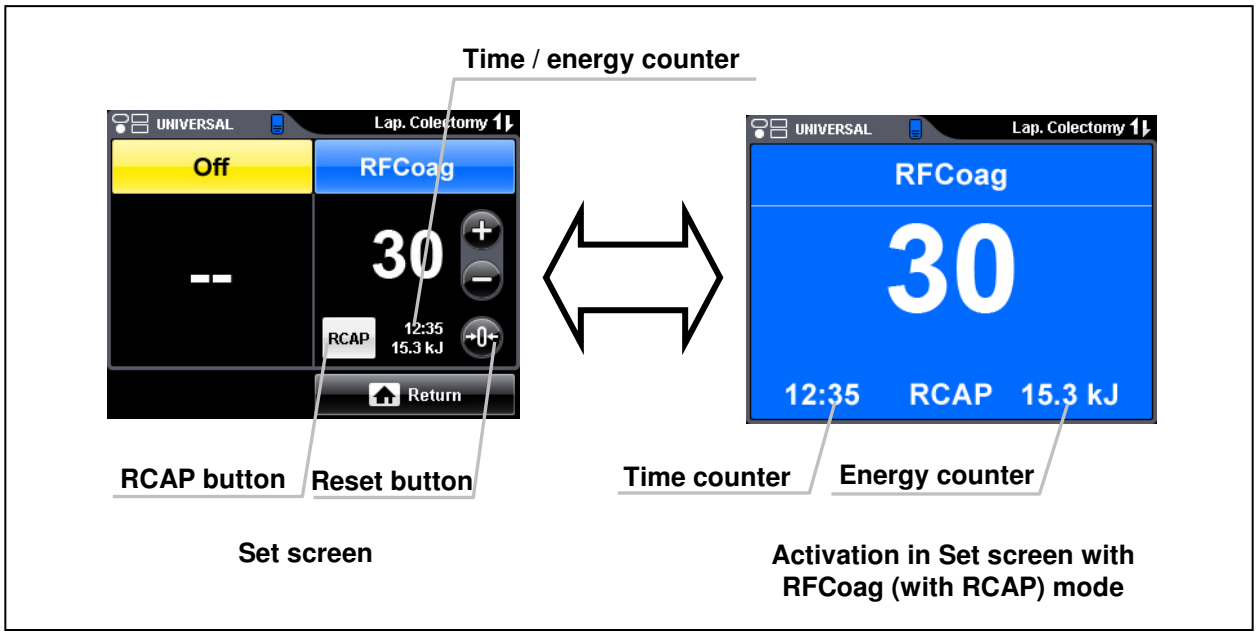


Figure 5.8

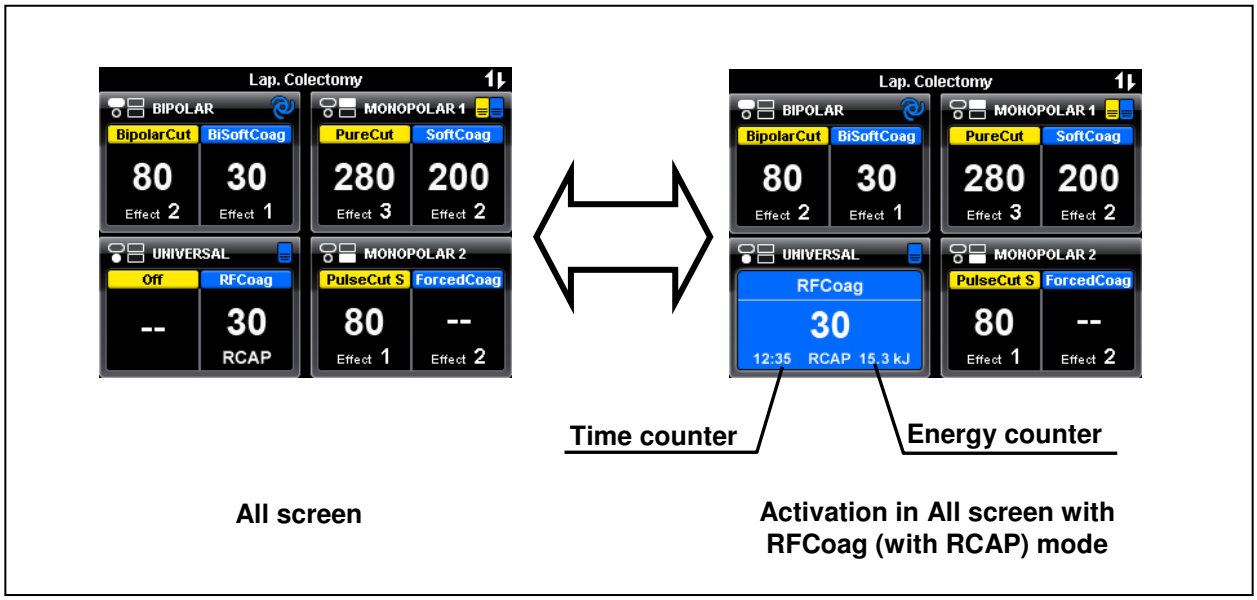


Figure 5.9

Overview of all modes

Table 5.1: Application / HF instruments and specific technical features of the different modes

Mode	Mode name	Effect	Application / HF instruments	Specific technical features
Monopolar cut	PureCut	1, 2, 3	– Cutting of varying tissue structures – Monopolar cutting electrodes, e.g. needle electrodes, pencil electrodes, loop electrodes	– High Power Cut Support (HPCS) – Fast Spark Monitor (FSM) ensures smooth and reproducible cutting in varying tissue (e.g. muscle and fat)
	BlendCut	1, 2, 3	– Cutting of varying tissue structures with increased coagulation capabilities – Monopolar cutting electrodes, e.g. knife electrodes, loop electrodes, pencil electrodes	– Increased crest factor
	PulseCut slow PulseCut fast	1, 2, 3 1, 2, 3	– Intermittent cutting (e.g. for endoscopic operations) – Monopolar cutting electrodes, e.g. needle electrodes, snare electrodes	– Two pulse timings for controlled cutting, slow = moderate speed, fast = higher speed – High Power Cut Support (HPCS) – Fast Spark Monitor (FSM) ensures smooth and reproducible cutting in varying tissue (e.g. muscle and fat)
Monopolar coagulation	SoftCoag	1, 2, 3	– Coagulation of tissue with little sticking and carbonization – Monopolar coagulation electrodes, e.g. coagulation forceps, ball electrodes	– Little carbonization and adhesion
	ForcedCoag	1, 2, 3	– Fast and effective coagulation – Monopolar coagulation electrodes, e.g. coagulation forceps, ball electrodes	– Spark allows coagulation also with relatively small electrodes

Table 5.1: to be continued

Table 5.1: continued

Mode	Mode name	Effect	Application / HF instruments	Specific technical features
	SprayCoag	1, 2, 3	– Contact-free surface coagulation with low penetration depth – Monopolar coagulation electrodes, e.g. knife electrodes, ball electrodes	– Spark allows coagulation also with relatively small electrodes
	PowerCoag	1, 2, 3	– Fast and effective coagulation with increased dissection capabilities – Monopolar coagulation electrodes, e.g. pencil electrodes	– Spark allows coagulation also with relatively small electrodes
Bipolar cut	BipolarCut	1, 2, 3	– All bipolar cutting procedures of tissue structures – Bipolar cutting electrodes, e.g. needle electrodes	– High Power Cut Support (HPCS)
	SalineCut (available only via the UNIVERSAL socket with Olympus HF instruments)	1, 2, 3	– Cutting in conductive fluid – Bipolar cutting electrodes, e.g. loop electrodes	– High Power Cut Support (HPCS) – Automatic detection of conductive fluid
Bipolar coagulation	BiSoftCoag	1, 2, 3	– Coagulation of tissue with little sticking and carbonization – Bipolar coagulation electrodes, e.g. coagulation forceps	– Little carbonization and adhesion – Automatic start of procedure (Autostart) selectable
	AutoCoag	1, 2, 3	– Coagulation of tissue with little sticking and carbonization – Bipolar coagulation electrodes, e.g. coagulation forceps	– Little carbonization and adhesion – Automatic end of procedure detection

Table 5.1: to be continued

Table 5.1: continued

Mode	Mode name	Effect	Application / HF instruments	Specific technical features
	SalineCoag (available only via the UNIVERSAL socket with Olympus HF instruments)	1, 2, 3	– Coagulation in conductive fluid – Bipolar coagulation electrodes, e.g. loop electrodes, ball electrodes	– Automatic detection of conductive fluid
	HardCoag	1, 2, 3	– Controlled tissue coagulation – Bipolar coagulation electrodes, e.g. bipolar forceps	– Automatic end of procedure detection
	RFCoag	with or without RCAP	– Controlled deep tissue coagulation – Bipolar coagulation electrodes, e.g. bipolar forceps	– Automatic end of procedure detection – With Resistance Controlled Automatic Power (RCAP) premature tissue desiccation is avoided – Audible feedback
	FineCoag	1	– Coagulation of tissue with little sticking and carbonization – Bipolar coagulation electrodes, e.g. bipolar forceps	– Little carbonization and adhesion

Table 5.1: end

Table 5.2: Change of the power level with the resulting tissue effects

Mode	Mode name	Increasing / decreasing of the effect	Increasing / decreasing of the power level
Monopolar cut	PureCut BlendCut PulseCut slow PulseCut fast	Results in increase / decreased thermal effect.	Results in increased / decreased thermal effect and increased / decreased cutting capability.
Monopolar coagulation	SoftCoag	Results in increased / decreased coagulation speed.	Results in increased / decreased coagulation depth for short time application. Nevertheless, to achieve the full potential coagulation depth a long application time with a low power setting is necessary.
	ForcedCoag SprayCoag	Results in increased / decreased coagulation speed.	Results in increased / decreased thermal effect.
	PowerCoag	Results in increased / decreased coagulation / dissection capability.	Results in increased / decreased thermal effect.
Bipolar cut	BipolarCut SalineCut	Results in increased / decreased thermal effect.	Results in increased / decreased thermal effect and increased / decreased cutting capability.
Bipolar coagulation	BiSoftCoag AutoCoag	Results in increased / decreased coagulation speed.	Results in increased / decreased coagulation depth for short time application. Nevertheless, to achieve the full potential coagulation depth a long application time with a low power setting is necessary.
	SalineCoag	Results in increased / decreased thermal effect.	Results in increased / decreased thermal effect.
	HardCoag	Results in increased / decreased automatic end of procedure detection time.	Results in increased / decreased thermal effect.
	RFCoag FineCoag	N/A	Results in increased / decreased coagulation depth for short time application. Nevertheless, to achieve the full potential coagulation depth a long application time with a low power setting is necessary.

5.5 Output of energy

Activate all cutting modes by pressing the footswitch cut pedal or the handswitch cut button of the HF instrument. Activate all coagulation modes by pressing the footswitch coagulation pedal or the handswitch coagulation button of the HF instrument. The BiSoftCoag mode can be activated also via autostart function (if assigned, refer to chapter 6.4, “Assign footswitch and autostart function”).

DANGER

If inadequate output is observed, stop the procedure immediately. Use the power switch as emergency stop for malfunctions (e.g. in case the footswitch or handswitch of the HF instrument does not react).

WARNING

- If the autostart function is assigned to an output socket, avoid unintended tissue contact of electrodes. Otherwise, it may cause user and / or patient burns.
- Before starting a procedure using a snare, select a wire diameter which is appropriate for the size of tissue to be removed and close the snare loosely to avoid mechanically stress at the operation site. Otherwise, perforation / bleeding can occur. Be sure to activate the output before operating the snare.
- Always use compatible accessories and control equipment for treatment. Do not use damaged or used disposable accessories. Electrical injury hazard due to projecting wire parts and mechanical injury hazards could result. Pay attention to the dimensions of the accessories to prevent unintended injury to the patient.
- When repeatedly using HF instruments designed for reprocessing, check the HF instruments for contamination before use and, if necessary, clean the HF instruments. Otherwise, this may result in insufficient treatment effects.
- To prevent patient burns, perforation and bleeding, be sure that you see the tip of the HF instrument in the endoscopic image during activated output in endoscopic procedures.
- Do not bring the tip of the HF instrument close to a metal clip or other accessories. The tissue around the metal clip or the HF instrument may be burned.

- If output is not required, keep the foot away from the pedal and / or the finger away from the handswitch to prevent accidental pressing. Otherwise, it may cause user and / or patient burns.
- When the footswitch or the handswitch of the HF instrument are not operated and the output indicator lights or the output tone can be heard, stop the procedure immediately, switch off the electrosurgical generator. Otherwise, it may cause perforation, bleeding and user and / or patient burns.
- If there is a malfunction at the footswitch or handswitch of the HF instrument, continuous output may cause unintended burns, bleeding and / or perforation of the patient and / or user. If the output is not active during the procedure, the HF instrument may cut the tissue mechanically, cause bleeding and / or perforation.
- If the output does not stop when the user's foot is released from the footswitch pedal or the user's finger released from the handswitch of the HF instrument, immediately switch off the electrosurgical generator to prevent patient burns, perforation and bleeding.
- Do not increase the electrosurgical generator's output if a function is not working as expected; doing so could cause patient injury, burns, bleeding and / or perforation. In this case, inspect the cord connections, the contact of the neutral electrode and the settings of the electrosurgical generator for any abnormalities.
- Ensure to press the correct footswitch pedal or handswitch button of the HF instrument before starting the procedure. Otherwise, it may cause perforation, bleeding and patient burns.

CAUTION

- Patients may feel a neuromuscular stimulus when a spark discharge from the HF instrument occurs during activation. The neuromuscular stimulus is caused by low frequency components generated during discharging. To prevent this, minimize the discharge by selecting a lower effect and power level or by activating the output when the electrode is in good contact with the tissue to be cauterized. However, for certain modes a low output power

and effect setting may present an unacceptable risk for the patient. For example, with the PulseCut fast mode or PulseCut slow mode, the risk of an excessive thermal effect rises if the output power or effect setting is too low.

- Always confirm the power level, effect and mode on the touch-screen of the electrosurgical generator before each application. Verify that the setting of mode, power level and effect is appropriate for the intended treatment.

NOTE

- Mode, power level and effect settings cannot be changed while the output is activated.
- Activation of output is only possible if the touch-screen shows the “All screen” or “Set screen.”
- To avoid patient injury or other damages during (unintended) activation of the electrosurgical generator the maximum application time is limited to 60 seconds (for the HardCoag mode the limit is 20 seconds). After exceeding the time limit, an error window (E115) appears, an alarm signal can be heard and the output is deactivated. To continue the procedure, release the footswitch pedal or handswitch button of the HF instrument and the electrosurgical generator can be reactivated again. The application time limit does not apply to RFCoag, FineCoag and SalineCut mode.
- If the cut and / or coagulation power levels are set to “--” (zero) and the assigned footswitch pedal or handswitch button of the HF instrument is pressed, an alarm signal can be heard and an error window (E141) appears.

1. Before activating the output

Confirm that the settings as indicated are correct and make sure to use the intended footswitch pedal only (cut or coagulation). If an HF instrument with a handswitch is connected, make sure to use the intended handswitch button only (cut or coagulation). It is only possible to activate a cutting or coagulation mode when the power and the effect settings are visible on the touch-screen (“All screen” and the “Set screen”, see figure 5.10).

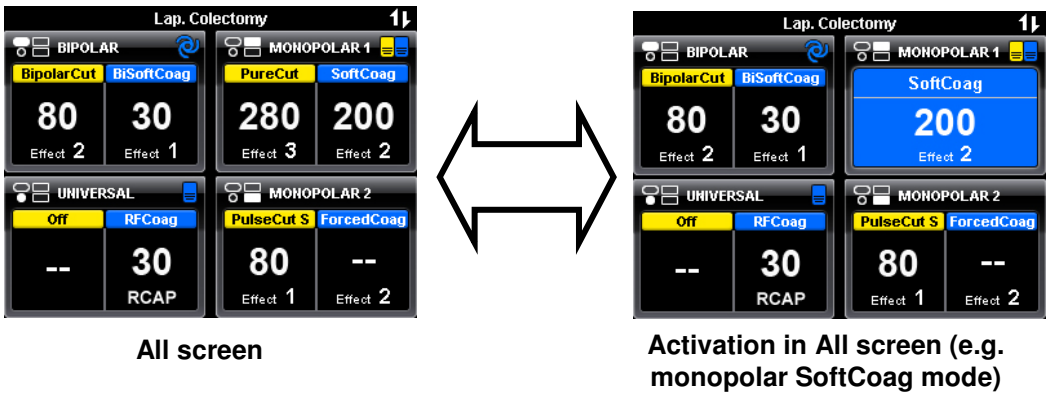


Figure 5.10

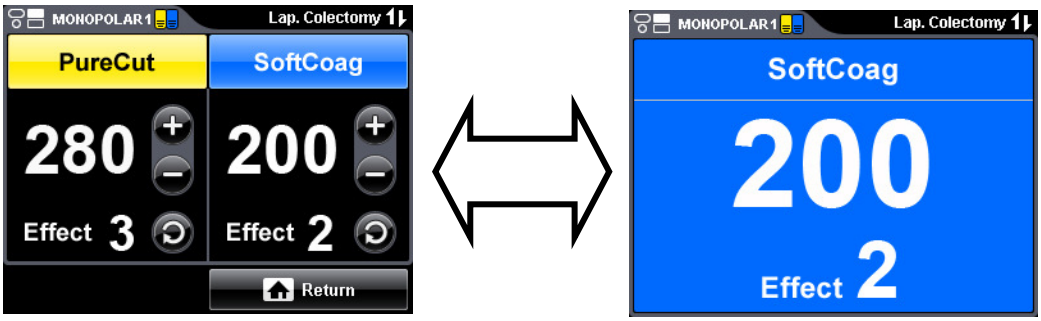
2. Activating the output

By pressing the cut pedal or cut handswitch button, cut output will occur. By pressing the coagulation pedal or coagulation handswitch button, coagulation output will occur.

- The output is activated as long as the footswitch or the handswitch button is pressed.
- If the BiSoftCoag mode is selected and the autostart function is assigned to the corresponding output socket, the output will occur after a preset autostart delay time (see chapter 6.5, “Menu - Autostart setup”) when the HF instrument has contact with the tissue.
- During activation an output tone can be heard.
- If the electrosurgical generator was activated from the “All screen”, the setting area of the corresponding button will change its background color according to the used mode (see figure 5.10).
- If the electrosurgical generator was activated from the “Set screen”, the background color will change according to the used mode (see figure 5.11).
- The background color of the activation in “All screen” or “Set screen” will be blue for all coagulation modes and yellow for all cutting modes.

3. Deactivating the output

The output will stop when the footswitch pedal or the handswitch button is released. If the autostart function is used, the output will stop when the HF instrument will be removed from the tissue.



Set screen

Activation in Set screen (e.g. monopolar SoftCoag mode)

Figure 5.11

5.6 Procedure after use

WARNING

Always discard used disposable neutral electrodes and HF instruments. Reprocessing single use devices may lead to changes in material characteristics such as metallic corrosion and dulled edges, ceramic and plastic deformation or splitting which may impact the strength of the device and compromise device performance. Reprocessing of single use devices can also cause cross-contamination leading to patient infection. These risks may potentially affect patient safety.

CAUTION

- When disconnecting plugs of HF instruments or power cords, always hold the plug. Pulling the cable may result in damaging of the wires.
- For disposal of the neutral electrode and used HF instruments or the cleaning of reusable accessories refer to the instruction manual of these products.

1. Switch off the electrosurgical generator

   Press the power switch to turn off the electrosurgical generator.
   - The illumination of the power switch is off.
   - The touch-screen is off.
   - The illumination of the push buttons is off.
   - The contact quality monitor indicator for split or non-split neutral electrodes is off.

2. Disconnecting the accessories

   Disconnect all bipolar or monopolar HF instruments from the electrosurgical generator and the patient. Disconnect the neutral electrode plug from the neutral electrode socket on the front panel and remove the neutral electrode from the patient.

3. Disconnecting the power cord

   If the electrosurgical generator is not used for a longer time period, disconnect the power cord plug from the grounded wall outlet.

4. Cleaning and storage

   Clean and store the electrosurgical generator by following the instructions in chapter 7, “Care, Storage and Disposal”.

Chapter 6 Push Button Functions

The electrosurgical generator is equipped with a user friendly touch-screen that allows the operator to select and modify various settings. Furthermore, push buttons right from the touch-screen provide a fast access to frequently used functions. This chapter describes all available functions of the electrosurgical generator.

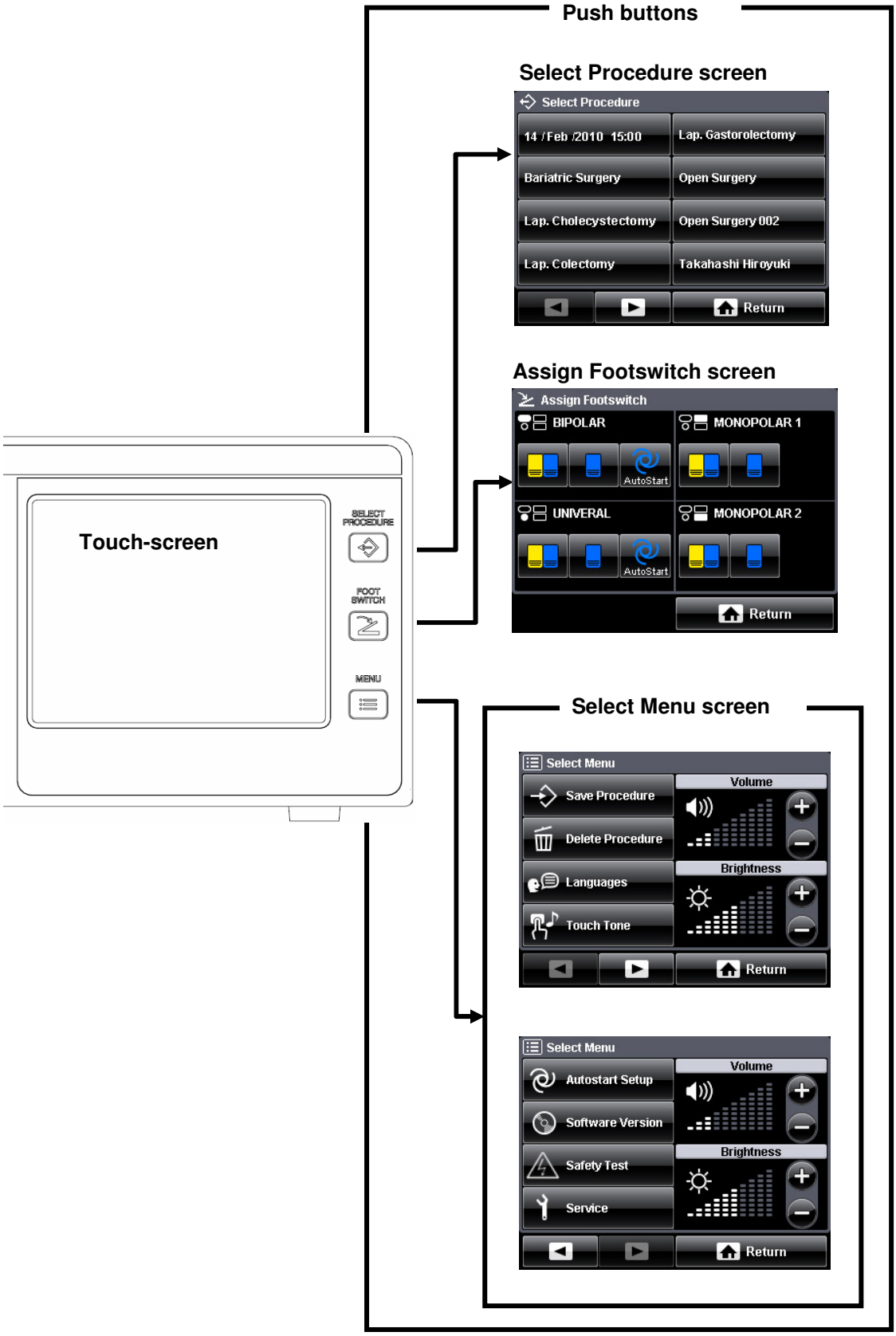
6.1 Function list

The table below gives a short summary about the available functions of the push buttons and the related screens.

Functions		Contents
Select Procedure		Selection of previously saved preferred settings
Footswitch		Assignment of footswitch and autostart function
Menu	Save Procedure	Saving / overwriting of output settings
	Delete Procedure	Deleting of previously saved settings
	Languages	Select Language Available languages: English, Japanese, German, Chinese, French, Italian, Spanish and Portuguese.
	Touch Tone	Activating / deactivating an audible feedback when a touch-screen button is pressed
	Autostart	Change of time delay before output in autostart mode
	Software Version	Shows information about the installed software version
	Safety Test	Open / close of the output relays (required for a periodic safety check)
	Service	Access to the “Service screen” for the technical service (password protected)
	Output Volume Control	Increase / decrease of the output volume
	Brightness Control	Increase / decrease of the brightness of the touch-screen

6.2 Push button hierarchy list

The push buttons allow an immediate access to the “Select Procedure screen”, “Assign Footswitch screen” and “Select Menu screen”. Refer to the next chapters for a detailed description.



6.3 Select procedure

The “SELECT PROCEDURE” function recalls one of the settings saved in memory.

1. Initiating the SELECT PROCEDURE function

   Press the “SELECT PROCEDURE push button” (see figure 6.1).

   - The display changes to the “Select Procedure screen”.
   - The list of procedures saved in memory is displayed.
   - If a procedure has already been selected, this is indicated by a gray button.
   - If no procedure has been saved, a “No procedure saved” message is displayed.

     To cancel the operation, press the “Return button” (see figure 6.1). The screen returns to the “All screen” or “Set screen”.

2. Selecting a procedure

   Press a button for a procedure to be recalled as shown in figure 6.2 (e.g. “Lap. Coletomy”).

   - The selected procedure is recalled.
   - The “All screen” shows the output settings saved for that procedure.
   - The name of the recalled procedure is shown in the headline of the “All screen”.

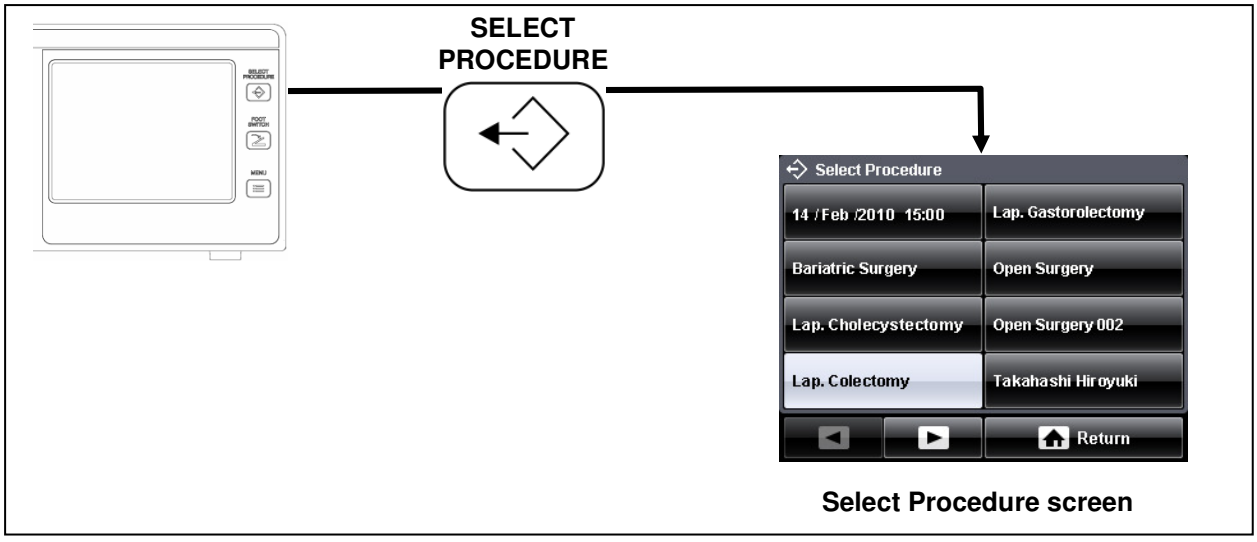


Figure 6.1

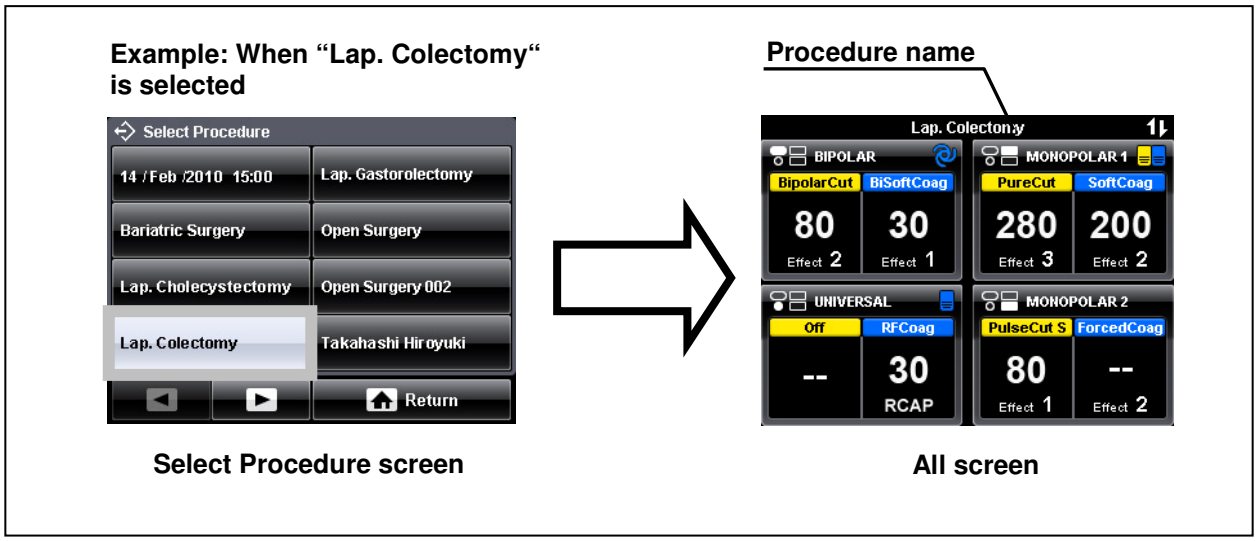


Figure 6.2

6.4 Assign footswitch and autostart function

The “FOOTSWITCH” function enables the assignment of a double and a single pedal footswitch to appropriate output sockets. Furthermore, the “Autostart” function can be assigned to an output socket as well. The autostart function permits automatic activation of the output power as soon as both electrodes touch the tissue and if the impedance is in a defined range.

NOTE

- The time delay for the autostart function can be changed within the “Select Menu screen” under “Autostart Setup button” (see chapter 6.5, “Menu - Autostart setup”).
- The autostart function can only be used for the BIPOLAR and UNIVERSAL socket in conjunction with the BiSoftCoag mode.
- The autostart function cannot be assigned to the UNIVERSAL socket before an instrument is connected.
- If the autostart function has been selected and the set power level is above 50, it will be reduced automatically to 50.
- The activation of the cut or coagulation output via a handswitch is also possible even if the autostart function is assigned.
- If a footswitch is not connected properly, the corresponding buttons are grayed out and an assignment of the footswitch is not possible.

1. Initiating the FOOTSWITCH function
   Press the “FOOTSWITCH push button” (see figure 6.3).
   - The display changes to the “Assign Footswitch screen”.

- All output sockets with available assignments of double, single pedal footswitches or autostart function are displayed.
- Only one assignment per output socket can be selected.

2. Confirming the assignment

Press a button to assign the appropriate footswitch or autostart function to an output socket. Repeat this step for further assignment to other sockets if needed.

To confirm the operation, press the “Return button” (see figure 6.3). The screen changes to the “All screen” or “Set screen”.

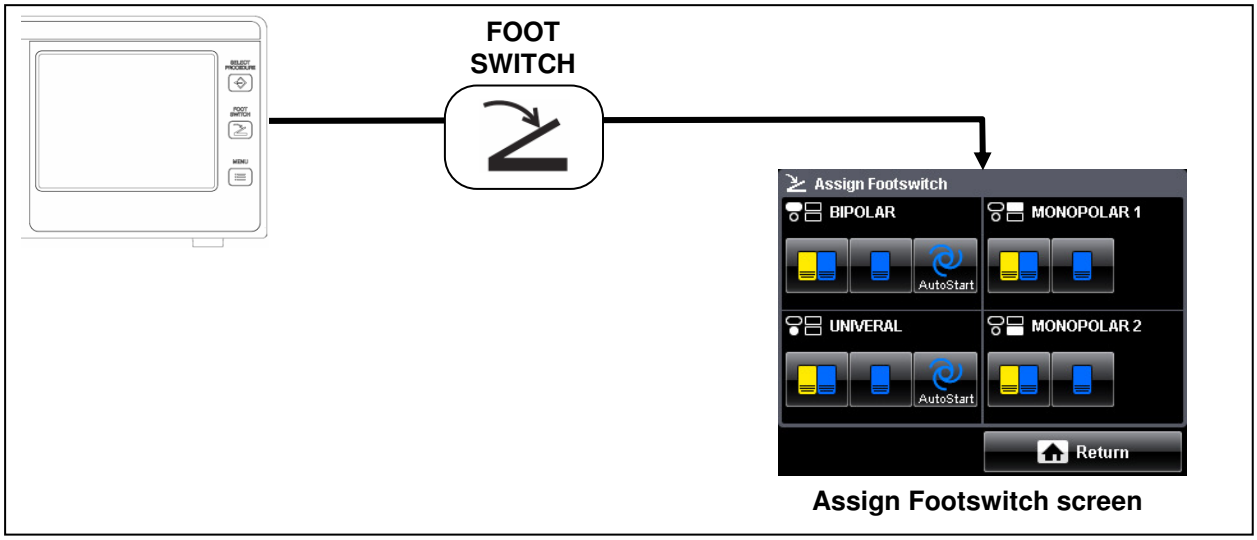


Figure 6.3

6.5 Menu

Press the “MENU push button” to display the “Select Menu screen” on the touch-screen. All available menu functions are displayed on two pages (see figure 6.4). To switch between the menu pages, press the “Previous button” / “Next button”. The different menu functions are described on the following pages.

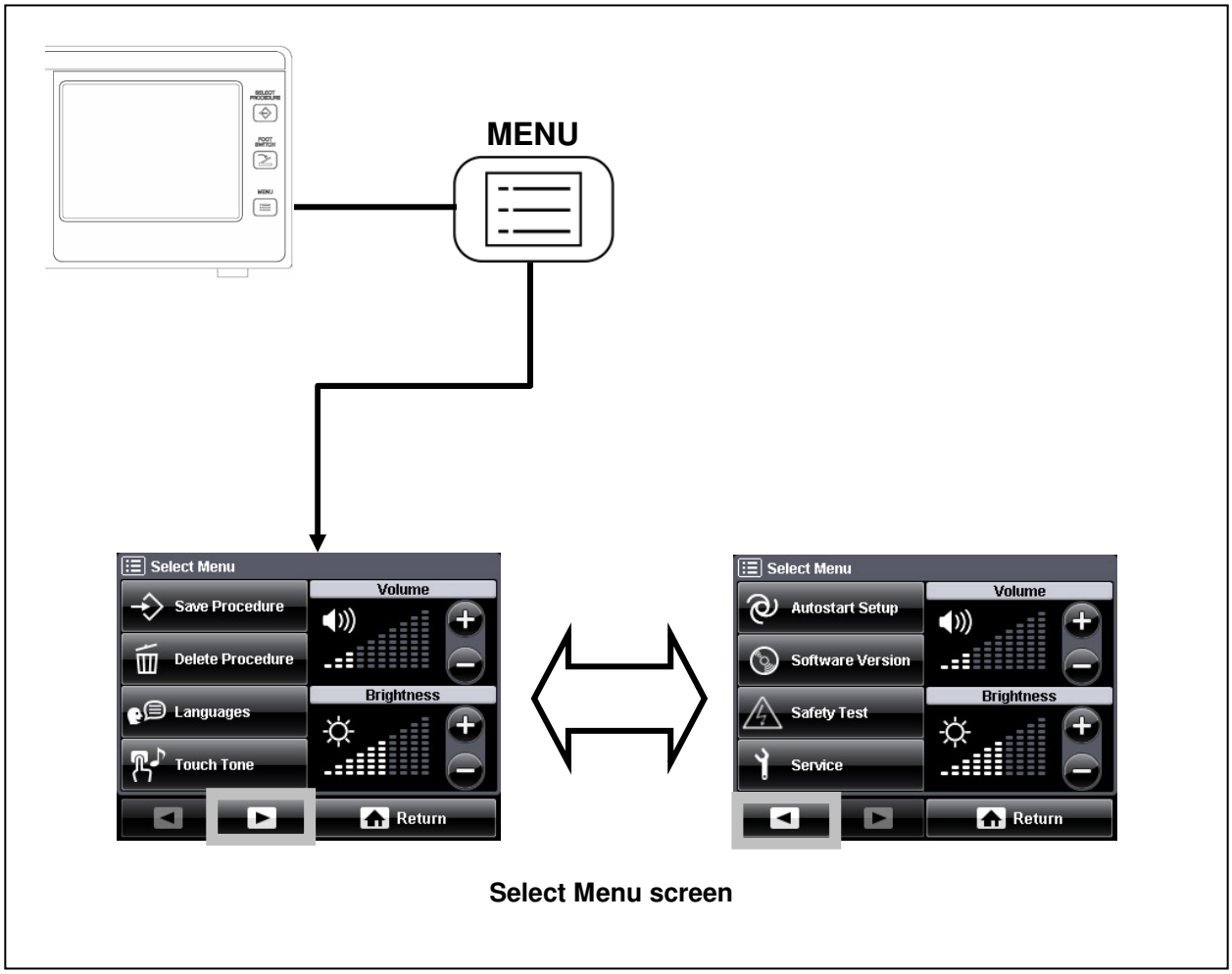


Figure 6.4

Save procedure: Saving / overwriting of output settings

The “Save Procedure” function saves the output settings displayed on the touch-screen for up to 39 different procedures. New procedures / settings can be saved and existing settings can be overwritten from this menu.

Saving a new procedure

1. Select Menu screen

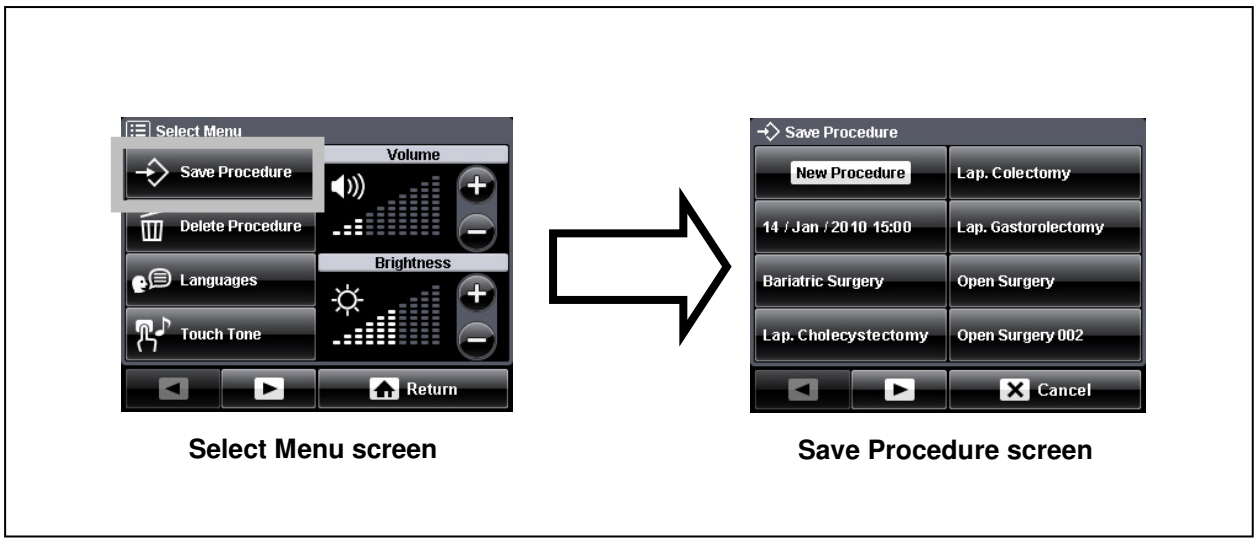
   After pressing the “MENU push button”, press the “Save Procedure button” on the “Select Menu screen” (see figure 6.5).

   The screen changes from the “Select Menu screen” to the “Save Procedure screen” (see figure 6.5).

2. Save Procedure screen

   Press the “New Procedure button” (see figure 6.5).

   The “Save Procedure screen” changes to the “Keyboard screen (uppercase)” (see figure 6.6).



Select Menu screen **Save Procedure screen**

Figure 6.5

3. Enter the procedure name (in alphanumeric characters)

   Enter the name of the procedure.

   - Enter the procedure name using the alphanumeric characters.

   Switching between alphabetic / numeric characters

   Press either the “Alphabetic button” or “Numeric button” to switch between the “Keyboard screen (uppercase / lowercase)” and “Keyboard screen (numeric)” (see figure 6.6).

   Switching between uppercase / lowercase characters

   Press the “Uppercase / lowercase button” to switch between the “Keyboard screen (uppercase)” and “Keyboard screen (lowercase)” (see figure 6.7).

Deletion of characters

Press the “Backspace button” to delete the last character being displayed in the procedure name area (see figure 6.7).

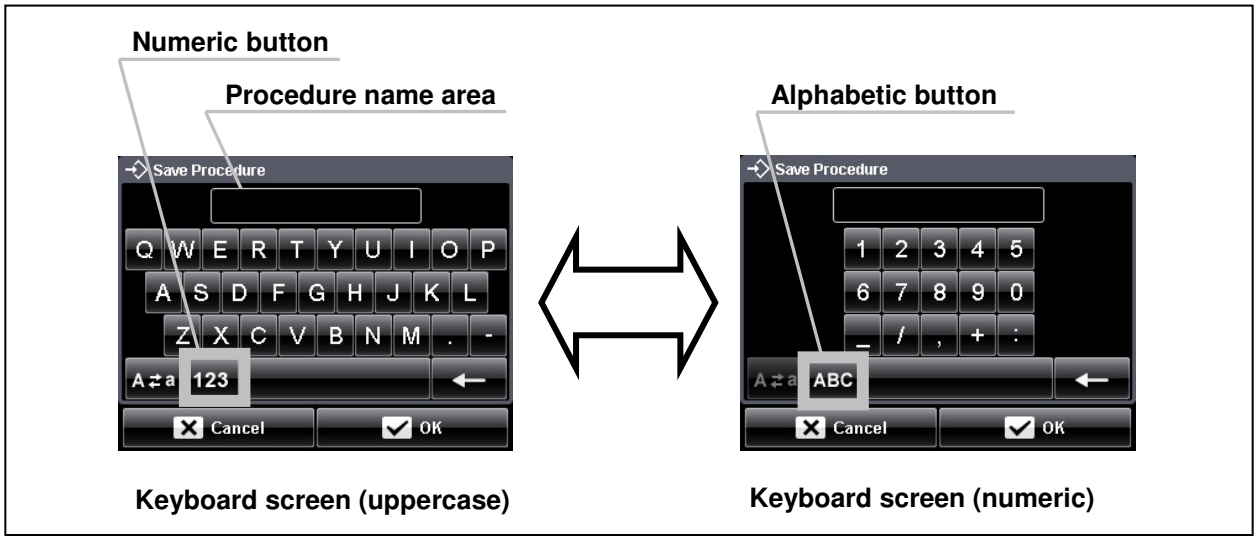


Figure 6.6

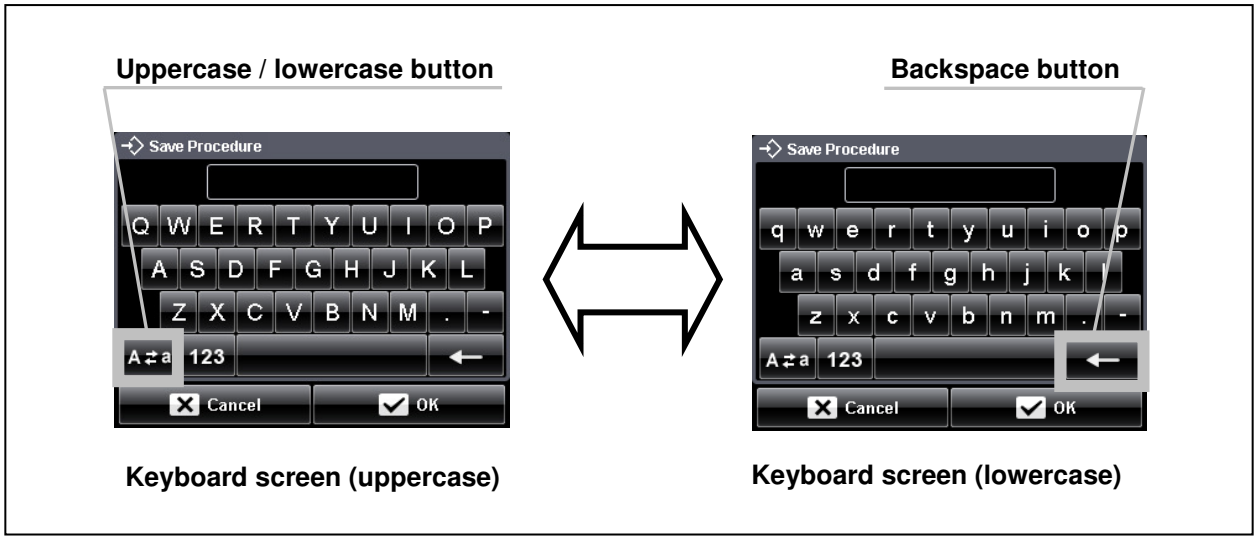


Figure 6.7

4. Saving the procedure name

Once the desired procedure name has been entered, press the “OK button” (see figure 6.8).

- An information window will appear for a few seconds confirming the procedure is being saved.
- After the information window disappears, the “All screen” will be displayed.

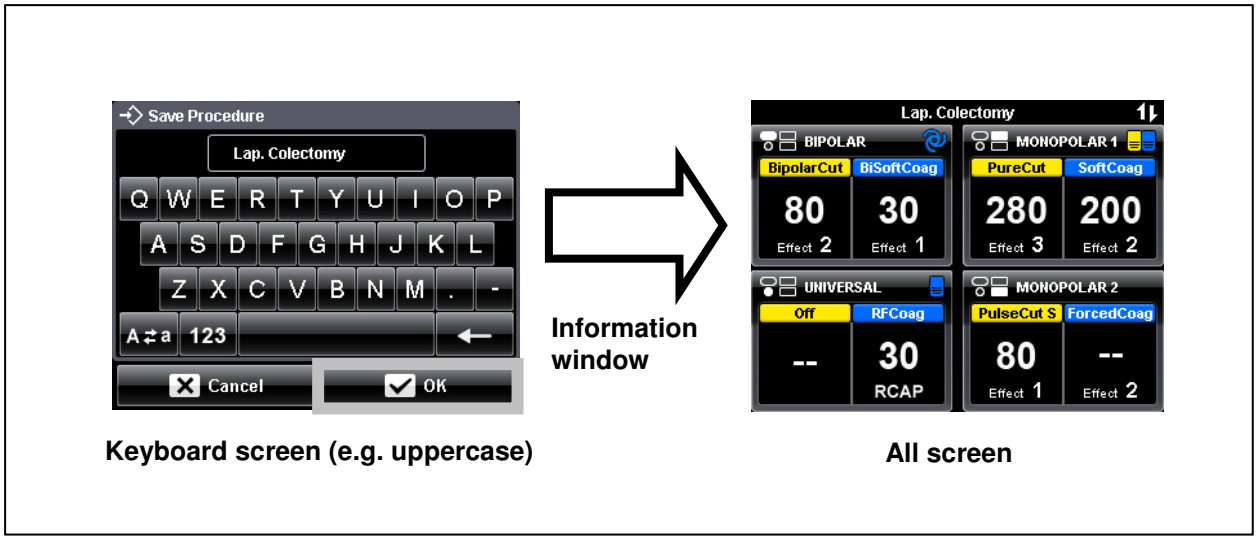


Figure 6.8

If the procedure name already exists.

- A confirmation window will appear and ask to overwrite the procedure.
- To overwrite the procedure, press the “OK button” (see figure 6.9).
- An information window will appear for a few seconds confirming the procedure is being overwritten.
- After the information window disappears, the “All screen” will be displayed.
- If an incorrect procedure name has been entered, press the “Cancel button”.
- The display returns either to the “Keyboard screen (uppercase / lowercase) or “Keyboard screen (numeric)”. Enter the correct procedure name and press the “OK button”.

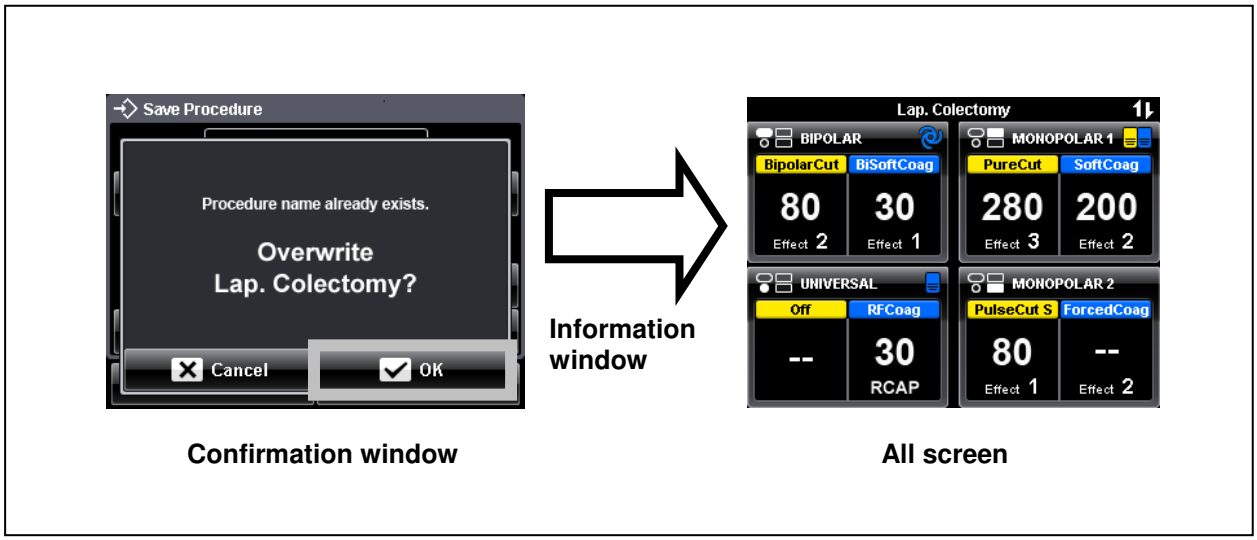
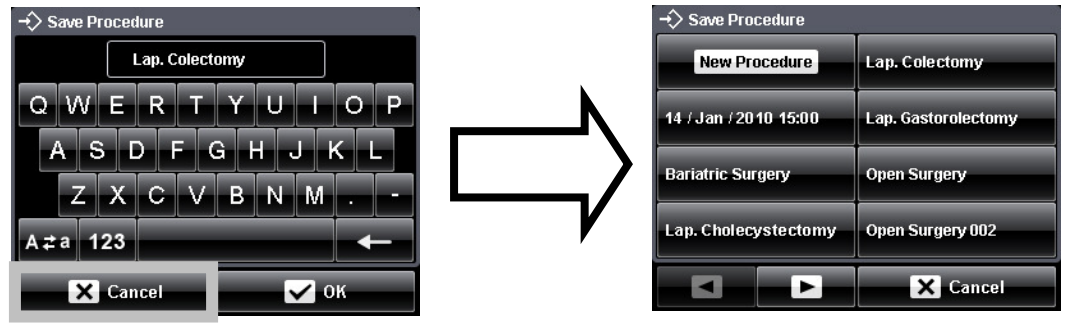


Figure 6.9

5. Cancellation of saving a procedure name

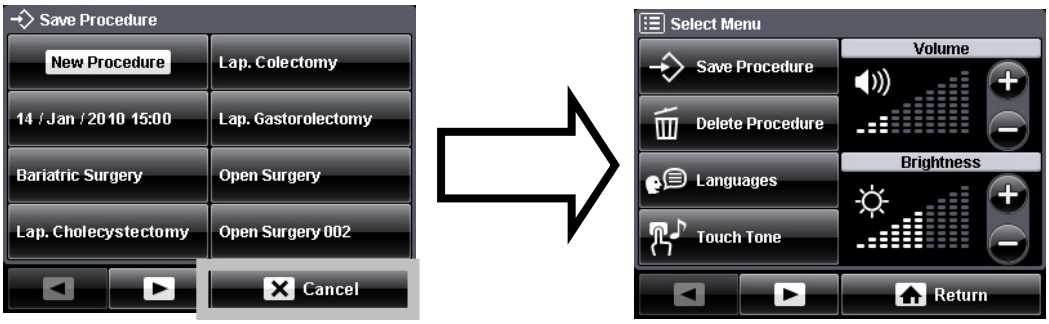
If a procedure should not be saved, press the “Cancel button”.

- The display returns to the “Save Procedure screen” (see figure 6.10).
- Press the “Cancel button” on the “Save Procedure screen” and the display returns to the “Select Menu screen” (see figure 6.11).



Keyboard screen (e.g. uppercase) **Save Procedure screen**

Figure 6.10



Save Procedure screen **Select Menu screen**

Figure 6.11

Overwriting an existing procedure

1. Select Menu screen

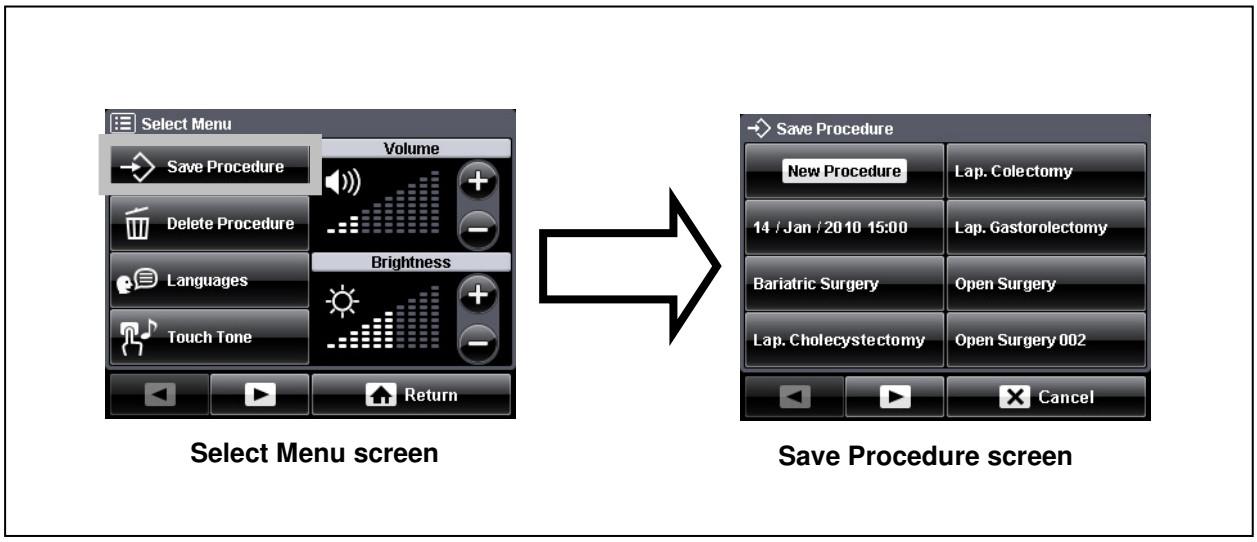
   After pressing the “MENU push button”, press the “Save Procedure button” on the “Select Menu screen” (see figure 6.12).

   The screen changes from the “Select Menu screen” to the “Save Procedure screen” (see figure 6.12).

2. Save Procedure screen

   Use the “Previous button” / “Next button” to switch to the screen where the procedure to be overwritten is displayed. Press the button of the procedure to be overwritten (see figure 6.12).

   A confirmation window will appear and ask to overwrite the procedure.



Select Menu screen **Save Procedure screen**

Figure 6.12

3. Confirming the procedure name

   If the procedure name to be overwritten is correct, press the “OK button” (see figure 6.13).

   - An information window will appear for a few seconds confirming the procedure is being overwritten.
   - After the information window disappears, the “All screen” will be displayed.

   If an incorrect procedure name is selected by mistake, press the “Cancel button”.

   - The confirmation window disappears and the “Save Procedure screen” is displayed.
   - Select the correct procedure to be overwritten and proceed as described above.

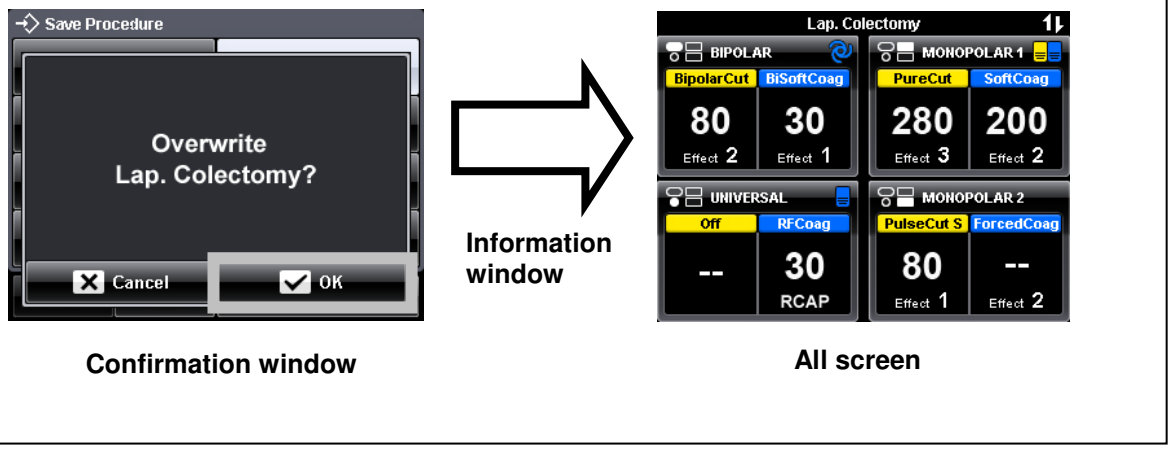


Figure 6.13

Delete procedure: Deleting a procedure

1. Select Menu screen

   After pressing the “MENU push button”, press the “Delete Procedure button” on the “Select Menu screen” (see figure 6.14).

   The screen changes from the “Select Menu screen” to the “Delete Procedure screen” (see figure 6.14).

2. Delete Procedure screen

   Use the “Previous button” / “Next button” to switch to the screen where the procedure to be deleted is displayed. Press the button of the procedure to be deleted (see figure 6.14).

   A confirmation window will appear and ask to delete the procedure.

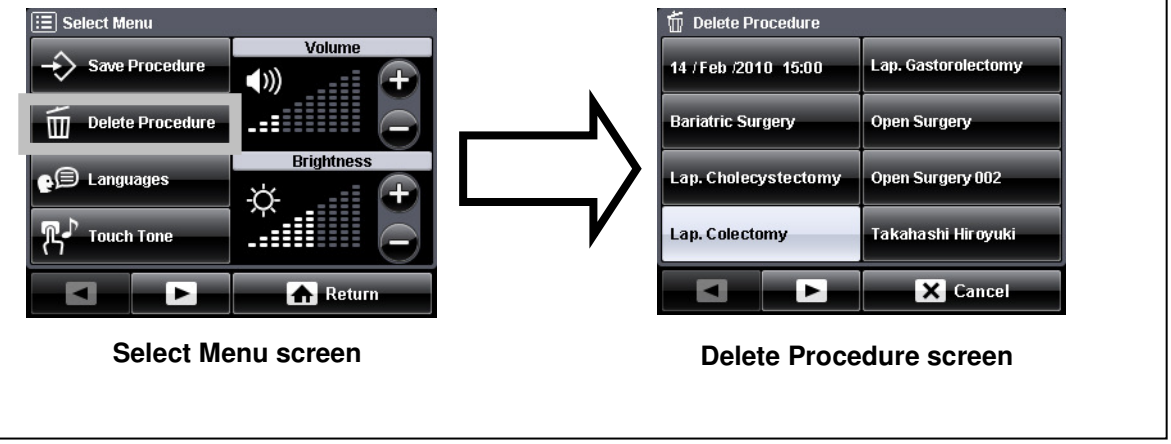


Figure 6.14

3. Confirming the procedure name

If the procedure name to be deleted is correct, press the “OK button” (see figure 6.15).

- An information window will appear for a few seconds confirming the procedure is being deleted.
- After the information window disappears, the “Select Menu screen” will be displayed.

If an incorrect procedure name is selected by mistake, press the “Cancel button”.

- The confirmation window disappears and the “Delete Procedure screen” is displayed.
- Select the correct procedure to be deleted and proceed as described above.

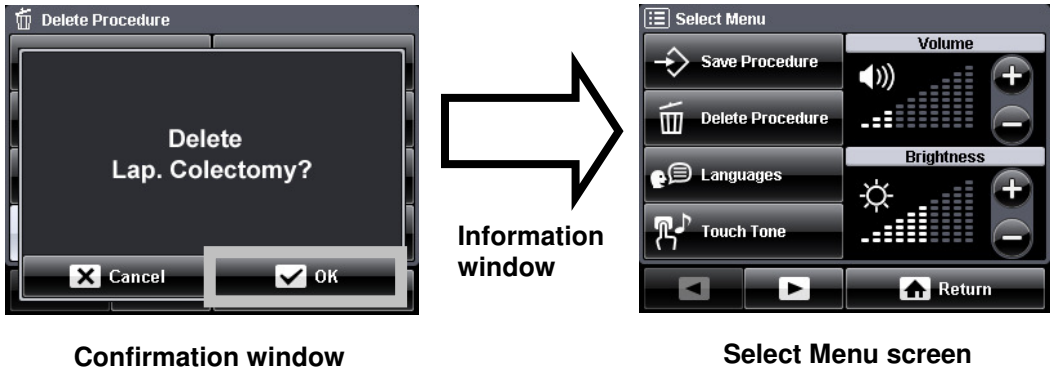


Figure 6.15

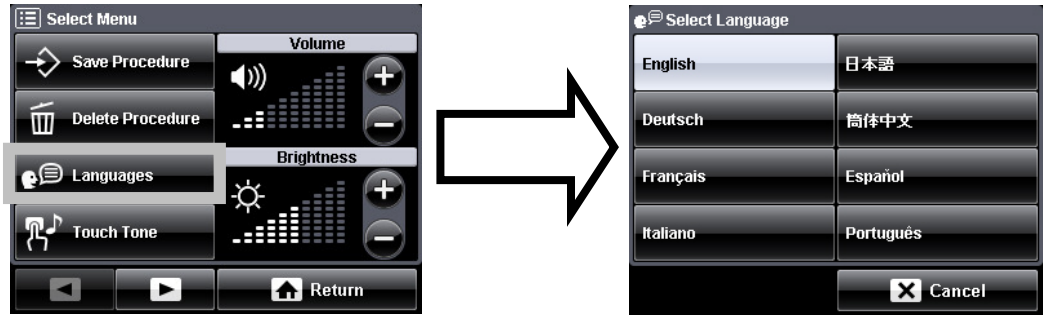
Languages

The touch-screen is capable of displaying 8 languages. This function is used to select the desired language.
Available languages: English, Japanese, German, Chinese, French, Italian, Spanish, and Portuguese.

1. Select Menu screen

After pressing the “MENU push button”, press the “Languages button” on the left side of the screen (see figure 6.16).

The screen changes from the “Select Menu screen” to the “Select Language screen” (see figure 6.16).



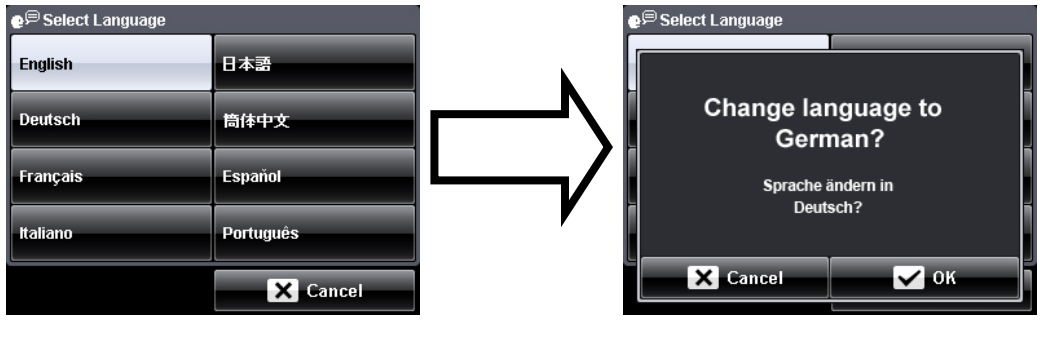
Select Menu screen **Select Language screen**

Figure 6.16

2. Select Languages screen

Press the desired “Language button” (see figure 6.17).

- The “Select Language screen” is displayed, in which the currently selected “Language button” is highlighted.
- After pressing the desired “Language button”, the confirmation window
- is displayed.



Select Language screen
Select Menu screen

Confirmation window
Select Language screen

Figure 6.17

3. Changing the language

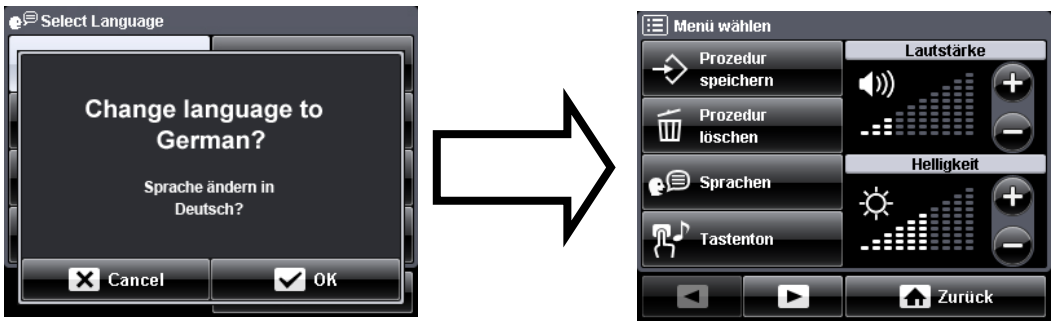
When the selected language is correct, press the “OK button” on the bottom

right of the screen (see Figure 6.24).

- The language is changed to the selected language.
- After the confirmation window disappears, the “Select Menu screen” is displayed.

If the incorrect language is selected in error, press the “Cancel button”.

- The confirmation window disappears and the “Select Language screen” is displayed.
- Select the correct language.



Confirmation window **Select Menu screen**

Figure 6.18

Touch tone

This function activates / deactivates an audible feedback tone when a touch-screen button is pressed.

1. Select Menu screen

After pressing the “MENU push button”, press the “Touch Tone button” on the “Select Menu screen” (see figure 6.19).

The screen changes from the “Select Menu screen” to the “Touch Tone screen” (see figure 6.19).

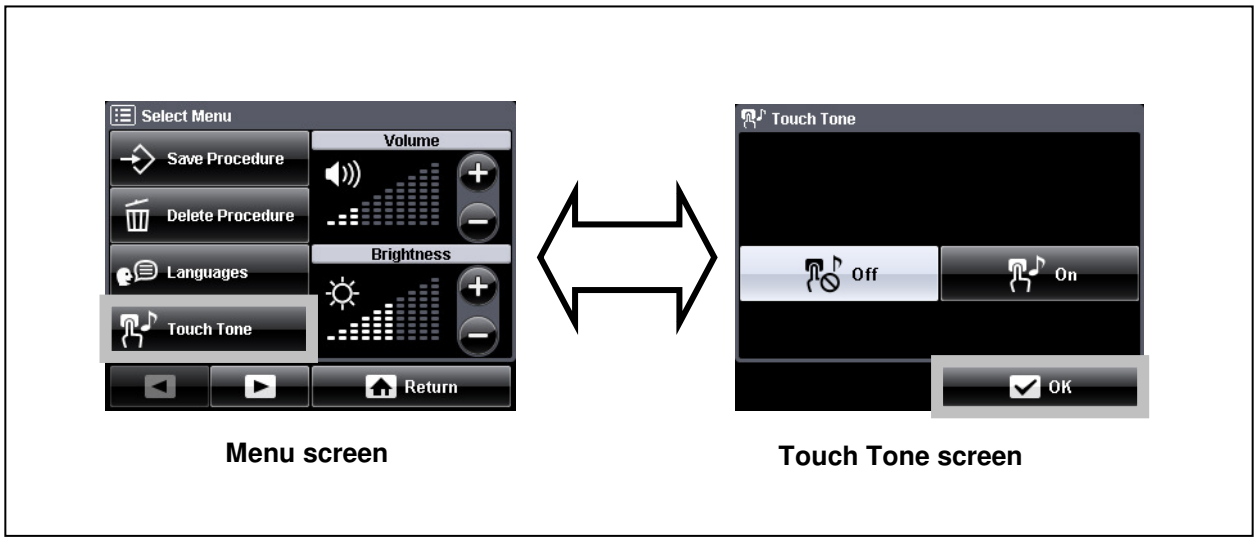


Figure 6.19

2. Touch Tone screen

Press either the “On button” or the “Off button” (see figure 6.19).

- Selecting the “On button” enables the touch tone.
- Selecting the “Off button” disables the touch tone.
- The default setting is a disabled touch tone (“Off button” is in gray color).

3. Saving the touch tone setting

Press the “OK button” to save the current setting (see figure 6.19).

The display returns to the “Select Menu screen”.

Autostart setup

This function is used to change the time delay before the electrosurgical generator will activate the output after the electrodes touch the tissue and if the autostart feature has been assigned to a corresponding output socket within the “Assign Footswitch screen” (see chapter 6.4, “Assign footswitch and autostart function”).

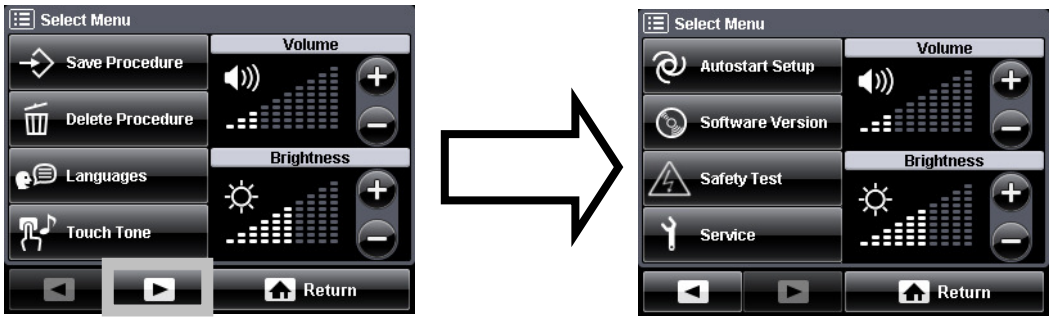
1. Select Menu screen

After pressing the “MENU push button”, press the “Next button” on the “Select Menu screen” (see figure 6.20).

The “Select Menu screen” switches to the next page.

Press the “Autostart Setup button” on the “Select Menu screen”.

The screen changes from the “Select Menu screen” to the “Autostart Setup screen” (see figure 6.21).



Select Menu screen

Figure 6.20

2. Autostart Setup screen

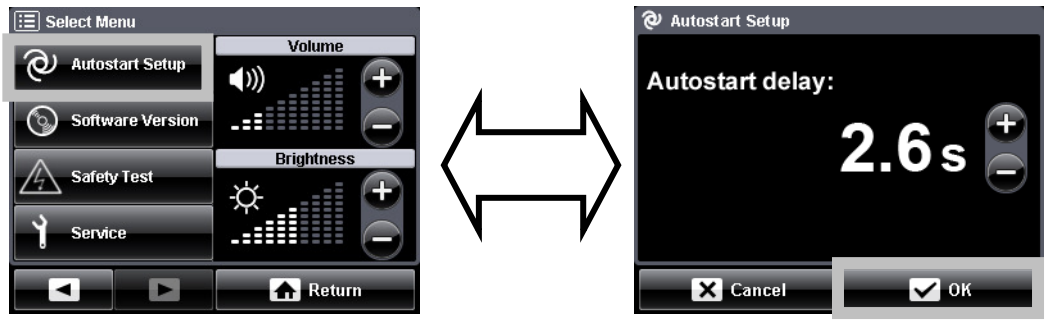
Press the “Plus button” or “Minus button” (see figure 6.21).

- The “Plus button” increases the time delay (in seconds).
- The “Minus button” decreases the time delay (in seconds).
- The time delay range is from 0.0 to 9.9 seconds.
- The default setting is 1.0 second.

3. Saving the autostart setting

Press the “OK button” to save the current setting (see figure 6.21).

The display returns to the “Select Menu screen”.



Select Menu screen **Autostart Setup screen**

Figure 6.21

Software version

This function displays the current installed software version of the electrosurgical generator.

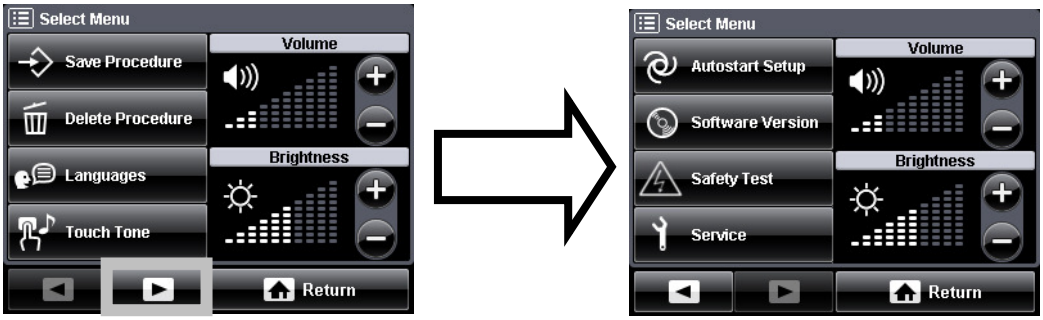
1. Select Menu screen

After pressing the “MENU push button”, press the “Next button” on the “Select Menu screen” (see figure 6.22).

The “Select Menu screen” switches to the next page.

Press the “Software Version button” on the “Select Menu screen”.

The screen changes from the “Select Menu screen” to the “Software Version screen” (see figure 6.23).



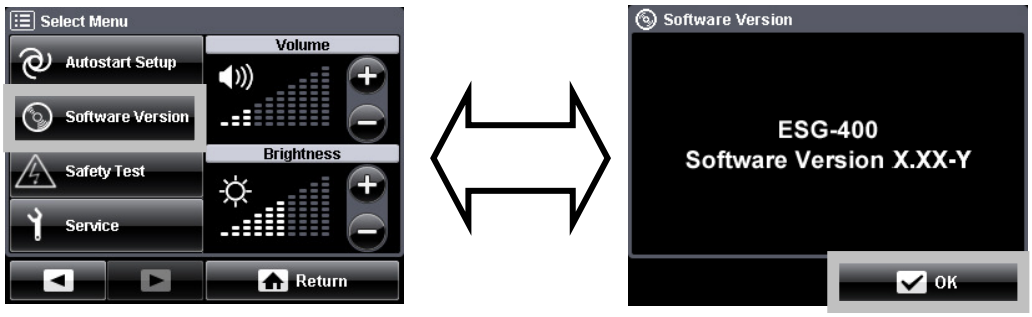
Select Menu screen

Figure 6.22

2. Software Version screen

The current installed software version of the electrosurgical generator is displayed on the screen. Press the “OK button” (see figure 6.23).

The display returns to the “Select Menu screen”.



Select Menu screen **Software Version screen**

Figure 6.23

Safety test

This function closes the output relays to perform the measurement(s) required during the periodic safety check. Activation of this function disables the electrosurgical generator for normal operation. Refer to the maintenance manual of the electrosurgical generator for a detailed safety test description.

NOTE

If the “Relays On button” will be pressed, the electrosurgical generator remains in this mode until the “Relays Off button” or “Cancel button” has been pressed again. This enables a measurement required by the periodic safety check.

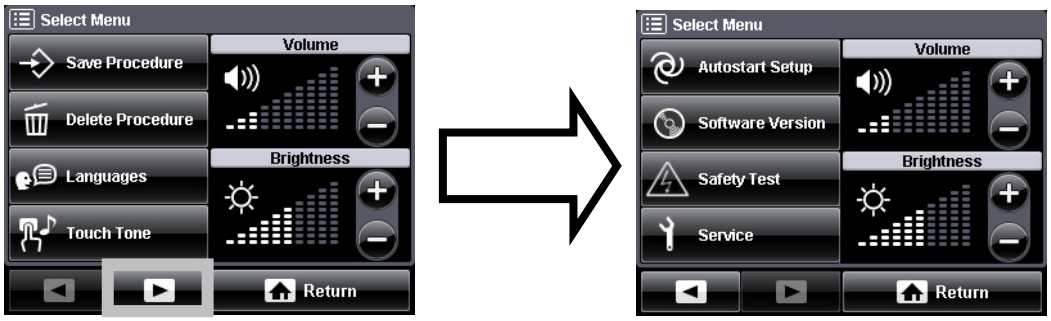
1. Select Menu screen

After pressing the “MENU push button”, press the “Next button” on the “Select Menu screen” (see figure 6.24).

The “Select Menu screen” switches to the next page.

Press the “Safety Test button” on the “Select Menu screen”.

The screen changes from the “Select Menu screen” to the “Safety Test screen” (see figure 6.25).



Select Menu screen

Figure 6.24

2. Safety Test screen

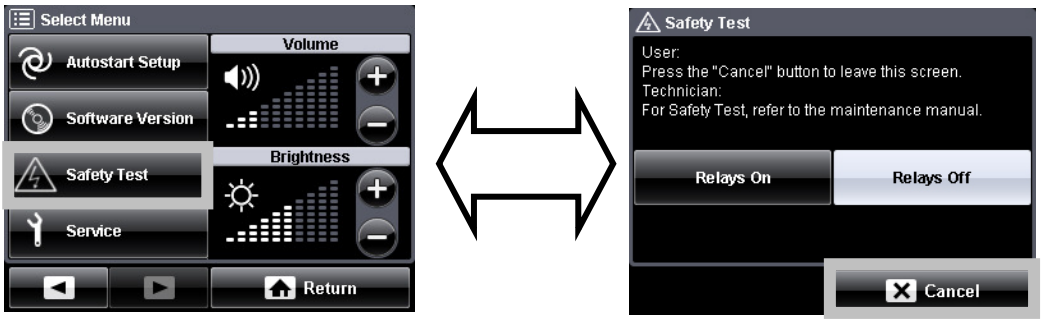
Press either the “Relays On button” or the “Relays Off button” (see figure 6.25).

- Selecting the “Relays On button” closes the relays.
- Selecting the “Relays Off button” opens the relays.
- The default setting is opened relays (“Relays Off button” is in gray color).

3. Return to normal operation

Press the “Cancel button” to return to the normal operation of the electrosurgical generator (see figure 6.25).

The display returns either to the “Select Menu screen” or to the “All screen”.



Select Menu screen **Safety Test screen**

Figure 6.25

Service

This function can be accessed by Olympus staff and service technician only. It is password protected and not intended for customer use.

Output volume control

This function controls the volume of the output tone.

WARNING

Because the output tones play an important role of noticing the output, do not lower the volume to an inaudible level. If the output tone is inaudible, output may not be detected by the user. This could cause patient injury.

NOTE

- The volume can be controlled either on the touch-screen or using the volume control on the rear panel of the electrosurgical generator.
- The volume control on the touch-screen is not available during output.
- To control the volume during output, use the volume control on the rear panel of the electrosurgical generator.
- The volume of the error tones (low, medium and high priority errors) are not adjustable. Refer to chapter 8, “Troubleshooting” for error information and to “Alarm information” and “Tone information” in the Appendix.

After pressing the “MENU push button”, press the “Plus button” or “Minus button” in the “Volume” section of the “Select Menu screen” (see figure 6.26).

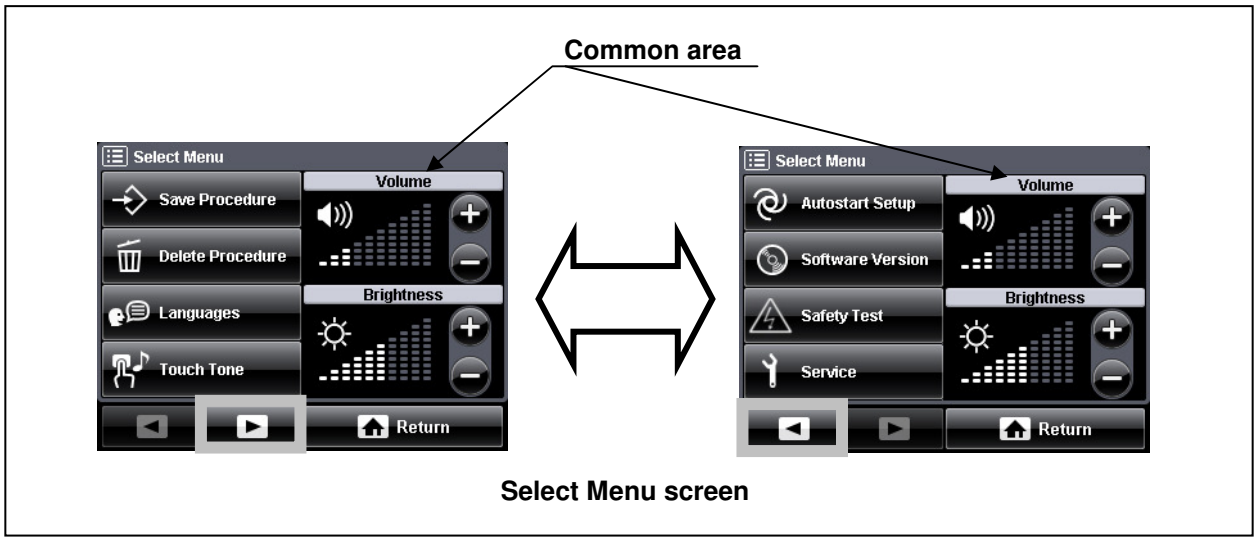


Figure 6.26

- The “Plus button” increases the output tone volume.
- The “Minus button” decreases the output tone volume.
- The volume level range is from 1 to 10.
- The default setting is a volume level of 7.
- The volume level is displayed in the common area for both menu screens so that it can be controlled from either screen.

Brightness control

This function controls the brightness of the touch-screen.

After pressing the “MENU push button”, press the “Plus button” or “Minus button” in the “Brightness” section of the “Select Menu screen” (see figure 6.27).

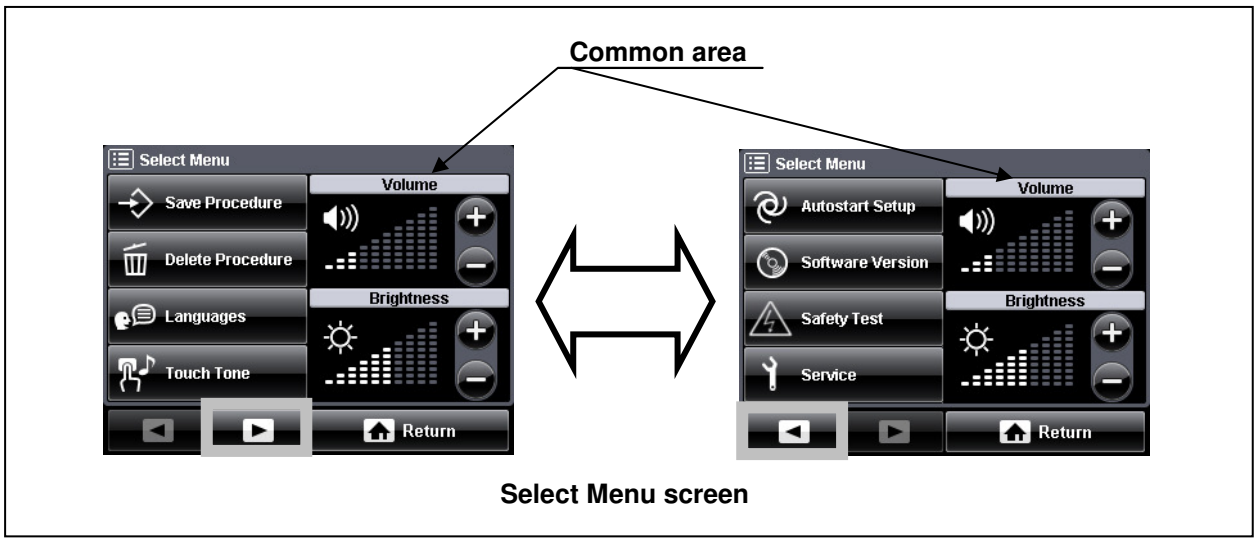


Figure 6.27

- The “Plus button” increases the brightness of the touch-screen.
- The “Minus button” decreases the brightness of the touch-screen.
- The brightness level range is from 1 to 10.
- The default setting is a brightness level of 5.
- The brightness level is displayed in the common area for both menu screens so that it can be controlled from either screen.

Chapter 7 Care, Storage and Disposal

7.1 Care

WARNING

- After cleaning the electrosurgical generator, dry it thoroughly before storage or using it again. If it is used while still wet, there is a risk of electric shock.
- Tissue debris and reprocessing chemicals are hazardous. During cleaning and disinfection, always wear appropriate personal protective equipment, such as eye wear, face mask, moisture-resistant clothing and surgical gloves that fit properly so that your skin is not exposed. Always remove contaminated protective clothing before leaving the reprocessing area.

CAUTION

- Never immerse the electrosurgical generator in water, clean or disinfect by immersion, gas sterilization or autoclaving. It may cause equipment damage.
- Do not clean the output sockets or the AC power socket, the footswitch sockets or the LINK-IN / LINK-OUT sockets. Cleaning them can deform or corrode the contacts, which could damage the electrosurgical generator.
- Do not wipe the external surface with hard or abrasive wiping material. The surface will be scratched.

After each use, perform the following cleaning procedures immediately. If cleaning is delayed, debris encrustation may become a source of infection. Encrustation may also result in malfunction of the electrosurgical generator. For maintenance and storage of other items than those described below, refer to the respective instruction manual.

1. Powering off

   Switch off the electrosurgical generator with the power switch.

   - The illumination of the power switch is turned off.
   - The touch-screen is turned off.
   - The illumination of the push buttons is turned off.
   - The contact quality monitor indicator for non-split neutral electrodes and for split neutral electrodes is turned off.

2. Disconnecting the accessories

   Disconnect the accessories, footswitches and cables from the electrosurgical generator.

3. Disconnecting the power cord

   Disconnect the power cord from the grounded wall outlet.

4. Cleaning

   To remove dust, dirt and non-patient debris, wipe the electrosurgical generator (including the touch-screen) and footswitch using a soft, lint-free cloth moistened with 70 % ethyl or isopropyl alcohol.
   If the equipment and / or accessories are contaminated with blood or other potentially infectious materials, first wipe off all gross debris using neutral detergent, and then wipe its surface with a lint-free cloth moistened with a surface disinfectant.

5. Drying

   After wiping with disinfecting alcohol, be sure to dry the electrosurgical generator completely prior to use.

7.2 Storage

CAUTION

- Do not store the electrosurgical generator in a location exposed to direct sunlight, x-rays, radioactivity, liquids or strong electromagnetic radiation (e.g. near microwave medical treatment equipment, short-wave medical treatment equipment, magnetic resonance imaging equipment, radio or mobile phones). Damage to the electrosurgical generator may result.
- Do not subject the electrosurgical generator to strong impacts during storage. Doing so will damage the electrosurgical generator.

1. Storage location

   Place the electrosurgical generator on a stable, level surface.

2. Storage environment

   Store the electrosurgical generator properly according to the environmental conditions described in the “Transportation, storage and operating environment” in the Appendix.

7.3 Disposal

When disposing of this electrosurgical generator, or any of its components (such as fuses), follow all applicable national and local laws and guidelines. The packaging materials can be separated for adequate recycling.

Waste electrical and electronic equipment

In accordance with European Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE), the product must not be disposed of as unsorted municipal waste, but should be collected separately.

Refer to Olympus or your distributor for return and / or collection systems available in your country.

Chapter 8 Troubleshooting

CAUTION

Repairs must only be carried out by Olympus or a firm authorized by Olympus.

1. If the electrosurgical generator does not functioning properly, immediately stop the procedure.
2. Check if any error window is displayed.
3. If an error window is displayed, use the information in section “What to do when an error code is displayed” of chapter 8.2, “Error screen, codes and measures” to identify and correct the malfunction.
4. If no error window is displayed, use the information in section “What to do when no error code is displayed” of chapter 8.2, “Error screen, codes and measures” to identify and correct the malfunction.
5. If the problem cannot be resolved by the above described remedial action, stop using the electrosurgical generator and contact Olympus for repair.

8.1 Neutral electrode operation

Check the following table, to identify or correct failures regarding the neutral electrode operation.

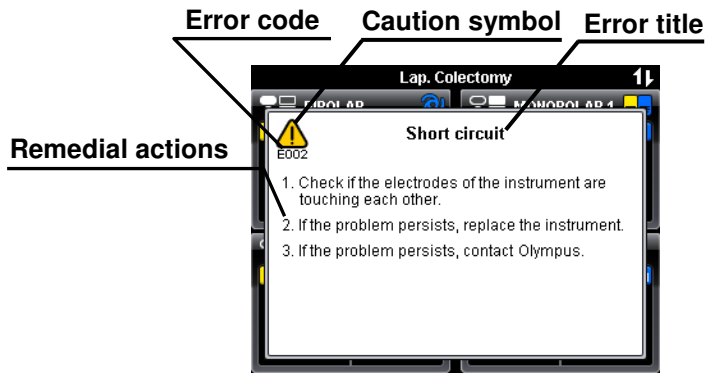
Contact quality monitor	Mode	Indication
Bipolar application	**Standby and activation**	  A neutral electrode is not required. Contact quality monitor indicator for split neutral electrode illuminates red.
Monopolar application	A non-split neutral electrode is connected. **Activation is possible.** Contact quality monitor detects connection of neutral electrode. **If a split neutral electrode is connected, it has a short circuit. Immediately replace the neutral electrode!**	  Contact quality monitor indicator for non-split neutral electrode illuminates green.
	A split neutral electrode is connected. **Activation is possible.** Contact quality monitor detects connection of neutral electrode and contact to patients' skin.	  Contact quality monitor indicator for split neutral electrode illuminates green.
	During standby: A split or a non-split neutral electrode is not connected or a split neutral electrode detaches. **Activation is disabled.** **During activation:** A split or a non-split neutral electrode has disconnected or a split neutral electrode detaches. **The activation is stopped.**	  Contact quality monitor indicator for split neutral electrode illuminates red. During activation an alarm signal can be heard and the touch-screen will display an error window (E202).

Legend:  Red illumination of the indicator

 Green illumination of the indicator

8.2 Error screen, codes and measures

Follow the troubleshooting advices in this chapter, to identify or correct failures. The error window is configured as shown in figure 8.1.



Error window
(Example: E002 Short circuit)

Figure 8.1

If an error occurs (see figure 8.1):

- An error window will appear and an alarm signal is audible.
- A short message with the error code, error title and a description of the remedial action will be displayed.
- The error code consists of an error number shown under the “caution” symbol.
- Depending on the error priority, the condition of the audible signal and the “caution” symbol are different (see table 8.1).
- Proceed with the described remedial action.
- The error window disappears after a few seconds, if the error is cleared.
- If the error window is still displayed, the error is not cleared. Proceed with the next remedial action if available.

Table 8.1: Error priorities and the corresponding indicator symbol condition

Error category	Error condition priority	Indicator (“caution”) symbol condition
High priority	Immediate user response is required	Flashes in red color
Medium priority	Prompt user response is required	Flashes in yellow color
Low priority	Awareness of the user is required	Constant on in yellow color

NOTE

The electrosurgical generator is equipped with an intelligent alarm system which determines alarm conditions on the base of multiple variables. Depending on the risk potential, alarms are classified in “high priority”, “medium priority” and “low priority” alarms. An alarm of higher priority overrides an existing alarm of lower priority. If more than one alarm situation of equal priority is determined, the one that occurred first is displayed only. This electrosurgical generator complies with the IEC 60601-1-8: 2006.

What to do when no error code is displayed

Perform the indicated remedial actions below. If the problem cannot be resolved by the described remedial action, contact Olympus.

Situation	Possible cause	Remedial action
The electrosurgical generator does not respond after pressing the power switch.	Improper connection of the power cord to the AC power socket on the rear panel of the electrosurgical generator or to the grounded wall outlet.	Check the power cord and the grounded wall outlet for correct connection.
	The grounded wall outlet has wrong or not output voltage.	Check the grounded wall outlet or use an alternative grounded wall outlet.
	The power cord is damaged.	Check the power cord for damages and, if necessary, replace the power cord.
	Malfunction of the electrosurgical generator.	Contact Olympus.
The touch-screen remains dark after switching the electrosurgical generator on (sound is audible after switching on).	Malfunction of the touch-screen.	Contact Olympus.
The touch-screen cannot be controlled.	An object is in contact with the touch-screen.	Remove the object.
	The touch-screen is not properly calibrated.	Contact Olympus.
	Malfunction of the touch-screen.	Stop using the electrosurgical generator and press the power switch to turn off the electrosurgical generator. Contact Olympus.
The electrosurgical generator does not react when a push button on the front panel is pressed during standby.	A push button is already pressed.	Release the push button.
	Malfunction of the electrosurgical generator.	Contact Olympus.
The electrosurgical generator does not react when a (push) button on the front panel is pressed during activation.	The (push) buttons are not available during activation.	Release the footswitch or handswitch to stop the activation.

Situation	Possible cause	Remedial action
No sound is audible during activation.	The volume is set to an inaudible level (e.g. due to high environmental noise).	Increase the volume either on the touch-screen within the “Menu screen” or use the volume control on the rear panel of the electrosurgical generator.
	Malfunction of the electrosurgical generator.	Stop using the electrosurgical generator and press the power switch to turn off the electrosurgical generator. Contact Olympus.
The volume can not be adjusted via the volume control within the “Menu screen” or at the rear panel.	The volume of the error-related audible signal is not adjustable.	No action required.
	Malfunction of the electrosurgical generator.	Contact Olympus.
The electrosurgical generator does not respond to footswitch or handswitch activation.	Improper connection of the footswitch to one of the footswitch sockets on the rear panel of the electrosurgical generator or the HF instrument to the output socket.	Check the footswitch and the HF instrument for correct connection.
	The footswitch or the handswitch of the HF instrument and / or the connection cable are damaged.	Check the footswitch or the handswitch of the HF instrument and / or the connection cable for damages and, if necessary, replace the footswitch, the HF instrument or the connection cable.
	The incorrect footswitch pedal or handswitch button is pressed.	Press the correct footswitch pedal or handswitch button of the HF instrument.
	The electrosurgical generator is not switched on.	Switch on the electrosurgical generator with the power switch.
	Another footswitch pedal or handswitch button of the HF instrument is pressed.	To activate the intended output, release the current pressed footswitch pedal or handswitch button of the HF instrument.
	The output is activated by the peripheral equipment.	If the output of the peripheral equipment is activated, the output of the electrosurgical generator cannot be activated simultaneously. Stop using the peripheral equipment.
	A window is displayed on the touch-screen.	Press the “OK button” or “Cancel button” to close the window or wait until the window disappears automatically after a few seconds.
	The “All screen” or “Set screen is not displayed on the touch-screen.	Return to the “All screen” or “Set screen”.

Situation	Possible cause	Remedial action
	The corresponding output mode has been deactivated in the “Mode screen” (“Off” is displayed) or the power level has been set to “--“.	Select an output mode in the “Mode screen” or increase the power level via the “Set screen” (refer to chapter 5.4, “Output setting”).
	Malfunction of the electrosurgical generator.	Contact Olympus.
If the autostart function is selected, the electrosurgical generator does not activate the output when the electrode has contact with the tissue.	The autostart function is assigned to another output socket.	Check the correct assignment of the autostart function (refer to chapter 6.4, “Assign footswitch and autostart function”).
	Long time delay of the autostart function has been selected in the “Autostart screen”.	Set a shorter time delay in the “Autostart screen” (refer to chapter 6.5, “Menu - Autostart setup”).
	Malfunction of the electrosurgical generator.	Contact Olympus.
If an HF instrument is connected to the UNIVERSAL socket, the electrosurgical generator does not recognize the connected HF instrument.	Improper connection of the Olympus HF instrument plug with the UNIVERSAL socket on the front panel of the electrosurgical generator.	Check the Olympus HF instrument plug for correct connection.
	The HF instrument does not support Olympus HF instrument recognition.	Confirm the use of an Olympus HF instrument with HF instrument recognition capabilities.
	The Olympus HF instrument and / or the connection cable is damaged.	Replace the Olympus HF instrument and / or the connection cable.
	Malfunction of the electrosurgical generator.	Contact Olympus.
Footswitch or handswitch of the HF instrument is pressed and activation sound is audible but no output power is delivered.	The footswitch is assigned to another output socket.	Check the correct assignment of the footswitch (refer to chapter 6.4, “Assign footswitch and autostart function”).
	Improper connection of the HF instrument plug with the output socket on the front panel of the electrosurgical generator.	Check the HF instrument plug for correct connection.
	Malfunction of the electrosurgical generator.	Contact Olympus.

Situation	Possible cause	Remedial action
No output power is delivered when RFCoag mode with or without RCAP is selected and end of activation signal is audible.	The electrode has no contact with the tissue.	Check that the electrode has contact with the tissue.
	Improper connection of the HF instrument plug with the output socket on the front panel of the electrosurgical generator.	Check the HF instrument plug for correct connection.
	Damaged HF instrument connection cable.	Replace the HF instrument connection cable.
	Malfunction of the electrosurgical generator.	Contact Olympus.
The output of the electrosurgical generator cannot be deactivated.	The autostart function is selected to the current used output socket and both electrodes touch the tissue.	Remove the electrode from the tissue.
	Malfunction of the footswitch or handswitch.	Immediately switch off the electrosurgical generator by pressing the power switch. Replace the footswitch or HF instrument with handswitch.
	Malfunction of the electrosurgical generator.	Contact Olympus.
The electrosurgical generator cannot be switched off.	Malfunction of the electrosurgical generator.	Disconnect the power cord plug from the AC power socket on the rear panel of the electrosurgical generator or from the grounded wall outlet. Contact Olympus.
Automatic mist & smoke evacuation system/function does not work.	The settings are erroneous.	Correct the settings of the compatible high flow insufflation unit.
	The communication cable is not connected.	Connect the communication cable. Refer to 3.5, “Automatic mist & smoke evacuation system/function (when using the compatible high flow insufflation unit)”.
	The connection of the communication cable is erroneous.	Reconnect the communication cable. Refer to Section 3.5, “Automatic mist & smoke evacuation system/function (when using the compatible high flow insufflation unit)”.
	Compatible high flow insufflation unit malfunction.	Contact Olympus.

What to do when an error code is displayed

If an error code is displayed, perform the indicated remedial actions below. If the problem cannot be resolved by the described remedial action, contact Olympus.

Error no.	Error message	Possible cause	Remedial action
E001	**Open circuit**		
	1. Check if the electrodes of the instrument have proper tissue contact.	Electrodes of the HF instrument may have no proper tissue contact.	Ensure that the electrodes of the HF instrument have proper tissue contact.
	2. If the problem persists, replace the instrument.	Malfunction of the HF instrument and / or the connection cable.	Replace the HF instrument and / or the connection cable.
	3. If the problem persists, contact Olympus.	Malfunction of the electrosurgical generator.	If the problem persists, contact Olympus.
E002	**Short circuit**		
	1. Ensure the instrument electrodes do not come into contact with each other.	Electrodes of the HF instrument may touch each other.	Ensure that the electrodes of the HF instrument do not touch each other.
	2. If the problem persists, replace the instrument.	Malfunction of the HF instrument and / or the connection cable.	Replace the HF instrument and / or the connection cable.
	3. If the problem persists, contact Olympus.	Malfunction of the electrosurgical generator.	If the problem persists, contact Olympus.
E006	**Non-conductive fluid**		
	1. Ensure conductive fluid is used for bipolar resection.	Use of non-conductive fluid during a bipolar cutting procedure. The active and / or neutral electrode is within an air environment.	Ensure that conductive fluid is used during bipolar resection procedure. Always immerse the active and / or neutral electrode within the conductive fluid.
		The bipolar Olympus HF instrument has not been properly connected to the UNIVERSAL socket or damaged connection cable.	Check the connection of the bipolar Olympus HF instrument to the connection cable and the connection of the connection cable to the UNIVERSAL socket and / or replace the connection cable.
	2. If the problem persists, contact Olympus.	The electrode might be contaminated and encrusted.	Check the electrodes for contamination and encrustation before use and, if necessary, clean the electrodes.
		Malfunction of the electrosurgical generator.	If the problem persists, contact Olympus.

Error no.	Error message	Possible cause	Remedial action
E019	**Footswitch combination**		
	1. Connection of only one single pedal and / or only one double pedal footswitch is allowed.	Two single pedal or two double pedal footswitches have been connected.	Ensure that only one single pedal and / or only one double pedal footswitch are connected.
	2. If the problem persists, contact Olympus.	Malfunction of the electrosurgical generator.	If the problem persists, contact Olympus.
E103	**Push button pressed**		
	1. Release the push button to continue.	A push button is pressed while switching on.	Release the push button.
	2. If the problem persists, contact Olympus.	Malfunction of the electrosurgical generator.	If the problem persists, contact Olympus.
E104 … E107	**Footswitch pedal pressed**		
	1. Release the footswitch pedal to continue.	The footswitch pedal is pressed while switching on.	Release the footswitch pedal.
	2. If the problem persists, contact Olympus.	Malfunction of the footswitch.	Replace the footswitch.
		Malfunction of the electrosurgical generator.	If the problem persists, contact Olympus.
E108 … E113	**Handswitch pressed**		
	1. Release the handswitch of the instrument to continue.	The handswitch of the HF instrument is pressed while switching on.	Release the handswitch of the HF instrument.
	2. If the problem persists, contact Olympus.	Malfunction of the HF instrument.	Replace the HF instrument.
		Malfunction of the electrosurgical generator.	If the problem persists, contact Olympus.
E114	**Touch-screen pressed**		
	1. Do not touch the screen.	The screen is touched while switching on.	Release the finger from the screen.
	2. If the problem persists, contact Olympus.	Malfunction of the electrosurgical generator.	If the problem persists, contact Olympus.
E115	**Application time limit exceeded**		
	1. Release the footswitch or handswitch and reactivate to continue.	The maximum time limit for the application has been exceeded.	Release the footswitch or handswitch and activate again by repressing the footswitch or handswitch.
	2. If the problem persists, contact Olympus.	Malfunction of the electrosurgical generator.	If the problem persists, contact Olympus.

Error no.	Error message	Possible cause	Remedial action
E135	**Single pedal footswitch not assigned**		
	1. Assign the single pedal footswitch to the designated output socket.	The single pedal footswitch has not been assigned to the corresponding output socket.	Assign the single pedal footswitch via the “Assign Footswitch screen” (refer to chapter 6.4, “Assign footswitch and autostart function”).
	2. If the problem persists, contact Olympus.	Malfunction of the electrosurgical generator.	If the problem persists, contact Olympus.
E136	**Double pedal footswitch not assigned**		
	1. Assign the double pedal footswitch to the designated output socket.	The double pedal footswitch has not assigned to the corresponding output socket.	Assign the double pedal footswitch via the “Assign Footswitch screen” (refer to chapter 6.4, “Assign footswitch and autostart function”).
	2. If the problem persists, contact Olympus.	Malfunction of the electrosurgical generator.	If the problem persists, contact Olympus.
E140	**No mode selected**		
	1. Select a mode.	No mode has been selected while activating.	Select a mode via the “Mode screen” (refer to chapter 5.4, “Output setting”).
	2. If the problem persists, contact Olympus.	Malfunction of the electrosurgical generator.	If the problem persists, contact Olympus.
E141	**Power set to zero (--)**		
	1. Set a valid power level.	The power level for the chosen mode is set to zero.	Increase the power level via the “Set screen” (refer to chapter 5.4, “Output setting”).
	2. If the problem persists, contact Olympus.	Malfunction of the electrosurgical generator.	If the problem persists, contact Olympus.
E131 E147 … E149 E151 … E154 E159 E166 E167	**Unknown instrument**		
	1. Reconnect the instrument to the UNIVERSAL socket.	An Olympus HF instrument has not been properly connected to the UNIVERSAL socket.	Check the connection of the Olympus HF instrument to the UNIVERSAL socket.
	2. If the problem persists, replace the instrument.	Malfunction of the HF instrument and / or the connection cable.	Replace the HF instrument and / or the connection cable.
	3. If the problem persists, contact Olympus.	Malfunction of the electrosurgical generator.	If the problem persists, contact Olympus.

Error no.	Error message	Possible cause	Remedial action
E179 E181 E396 E398	**Temperature below limit** 1. Switch off ESG-400 and wait until operating temperature is reached.	The electrosurgical generator has fallen below the minimum operating temperature.	Switch off the electrosurgical generator and wait until it has reached the specified operating temperature (refer to "Transportation, storage and operating environment" in the Appendix).
	2. If the problem persists, contact Olympus.	Malfunction of the electrosurgical generator.	If the problem persists, contact Olympus.
E180 E182 E397 E399	**Temperature above limit** 1. Switch off the ESG-400 and wait until it has cooled down.	The maximum temperature has been exceeded.	Switch off the electrosurgical generator and wait until it has cooled down or reached the specified operating temperature (refer to "Transportation, storage and operating environment" in the Appendix).
	2. If the problem persists, contact Olympus.	Malfunction of the electrosurgical generator.	If the problem persists, contact Olympus.
E187	**Increased HF leakage current**		
	1. Check if an instrument, the neutral electrode or patient is unintentionally grounded.	The high frequency leakage current has exceeded the limit of 150 mA for monopolar application or 100 mA for bipolar application.	Check if the electrosurgical generator or the patient is grounded unintentionally.
	2. If the problem persists, contact Olympus.	Malfunction of the electrosurgical generator.	If the problem persists, contact Olympus.
E188	**Excessive HF leakage current**		
	1. Check if an instrument, the neutral electrode or patient is unintentionally grounded.	The high frequency leakage current has exceeded the limit of 300 mA for monopolar application or 200 mA for bipolar application.	Check if the electrosurgical generator or the patient is grounded unintentionally.
	2. If the problem persists, contact Olympus.	Malfunction of the electrosurgical generator.	If the problem persists, contact Olympus.

Error no.	Error message	Possible cause	Remedial action
E202	**Insufficient neutral electrode contact**		
	1. Check the connection and attachment of the neutral electrode.	The contact resistance of the neutral electrode is too high or the neutral electrode is not connected.	Check the connection / attachment of the neutral electrode.
	2. If the problem persists, attach a new neutral electrode.	Malfunction of the neutral electrode and / or the neutral electrode cable.	Replace the neutral electrode and / or the cable.
	3. If the problem persists, contact Olympus.	Malfunction of the electrosurgical generator.	If the problem persists, contact Olympus.
E214	**Low battery**		
	If the problem persists, contact Olympus.	Malfunction of the electrosurgical generator.	If the problem persists, contact Olympus.
E390 E394 E409 E411 E490 E515 E516	**Communication error**		
	1. Check all communication cables are connected correctly.	Improper connection of the communication cables to the LINK-OUT / LINK-IN socket on the rear panel of the electrosurgical generator or to the peripheral equipment.	Check the connection of the communication cables to the electrosurgical generator and / or to the peripheral equipment for correct connection.
	2. Check all cables for damage. If necessary, replace the cables.	Malfunction or damage of the communication cables.	Check the cables for damages and, if necessary, replace the cables.
	3. If the problem persists, contact Olympus.	Malfunction of the electrosurgical generator.	Contact Olympus.
E438	**Procedure data error**		
	1. One or more procedures have been deleted. Press OK to continue.	One or more saved procedures have been deleted.	Press the “OK button” to close the error window and to continue.
	2. If the problem persists, contact Olympus.	Malfunction of the electrosurgical generator.	Contact Olympus.
E441	**Device setting error**		
	Device settings have been set to default.	All settings of the electrosurgical generator have been set to default.	The electrosurgical generator is ready to use after the error window disappeared.
	If the problem persists, contact Olympus.	Malfunction of the electrosurgical generator.	Contact Olympus.

Error no.	Error message	Possible cause	Remedial action
E486	**No instrument connected**		
	1. Connect an instrument to the UNIVERSAL socket.	An Olympus HF instrument and / or connection cable has not been properly connected to the UNIVERSAL socket.	Ensure the proper connection of the Olympus HF instrument and / or the connection cable to the UNIVERSAL socket.
	2. If the problem persists, replace the instrument.	Malfunction of the Olympus HF instrument and / or the connection cable.	Replace the Olympus HF instrument and / or the connection cable.
	3. If the problem persists, contact Olympus.	Malfunction of the electrosurgical generator.	If the problem persists, contact Olympus.
E###	**Error**		
	ESG-400 will automatically restart.	Malfunction of the electrosurgical generator.	The electrosurgical generator will automatically restart.
	If the problem persists, contact Olympus.		If any error occurs permanently or repetitively, contact Olympus.

8.3 Periodic safety check

The electrosurgical generator and the footswitch must undergo a periodic safety check in yearly intervals in accordance with the national statutory regulations. Preventive maintenance (inspection / periodic safety check) must only be carried out by a qualified person / technician.

8.4 Returning the electrosurgical generator for repair

CAUTION

- Before returning the electrosurgical generator for repair, disinfect it as described in chapter 7, “Care, Storage and Disposal”. Otherwise cross-contamination of the surrounding environment may result.
- Olympus will not assume any liabilities for human injuries or equipment damage caused as a result of servicing or repairs by a person other than the Olympus qualified service personnel.

When returning the electrosurgical generator for repair, contact Olympus. With the electrosurgical generator, include a description of the malfunction or damage and the name and the telephone number of a contact person.

Repairs must only be carried out by Olympus or a firm authorized by Olympus. Service documents such as circuit diagrams, parts lists, equipment descriptions and setting instructions are available from Olympus for technicians who are authorized to carry out maintenance and repair.

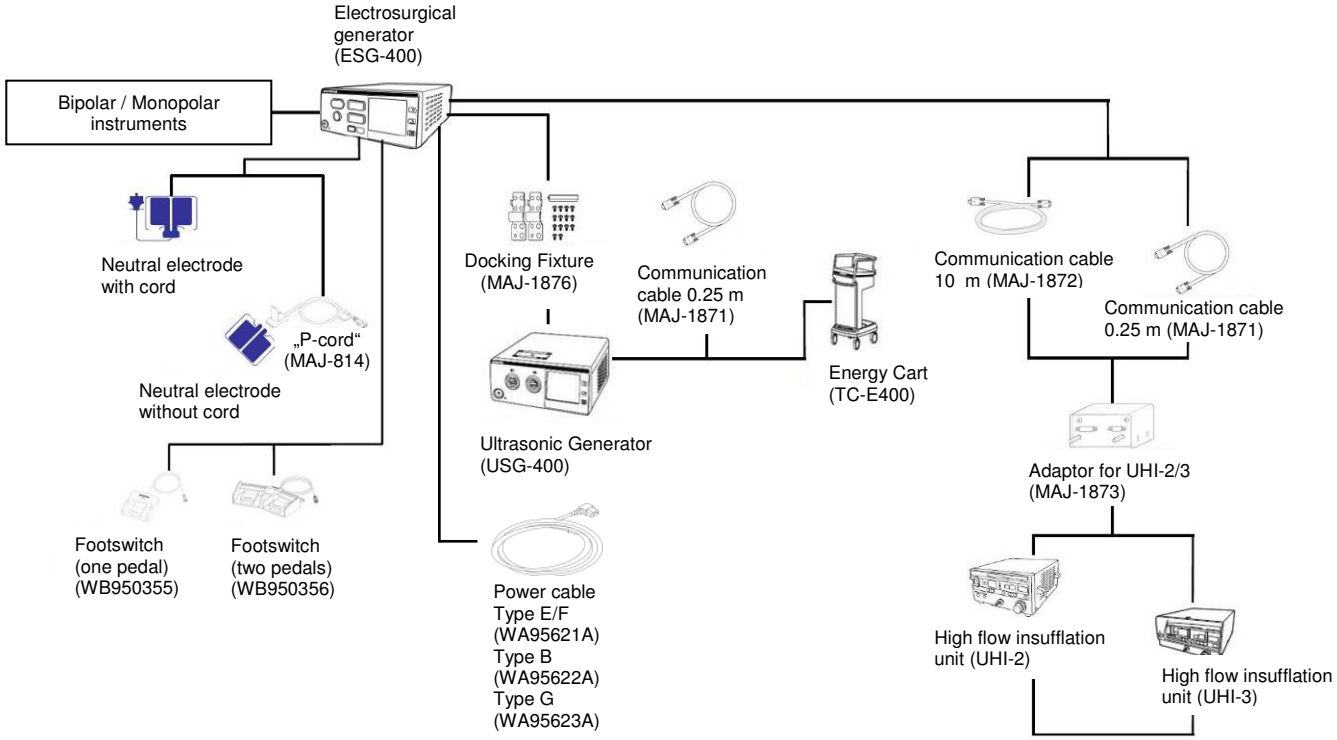
Appendix

System chart

The recommended combinations of ancillary equipment and accessories that can be used with the electrosurgical generator are listed in the system chart below. In addition, new products released after the introduction of this product may also become compatible with this electrosurgical generator. For further details, contact Olympus.

WARNING

If combinations of equipment other than those shown below are used, the full responsibility is assumed by the medical treatment facility.



Mode characteristics

Mode	Touch-screen	Crest factor* at rated load	Default power level	Min.** power level [W]***	Max.** power level [W]***	Default effect	Num-ber of effects	Rated load [Ohm]	Max.** output voltage [V_p]	Waveform
Monopolar cut	PureCut	N/A	180	10	300	2	3	500	740	Continuous sinusoidal alternating current
	Blend Cut	3.0…4.5	150	10	200	2	3	500	1400	Modulated (15 kHz) sinusoidal alternating current
	Pulse Cut slow Pulse Cut fast	N/A	80	20	150	2	3	500	800	Intermittent sinusoidal alternating current PulseCut slow: t_1 = 800 ms pulse delay time (see figure 9.1) PulseCut fast: t_1 = 550 ms pulse delay time (see figure 9.1)
Monopolar coagulation	Soft Coag	N/A	80	5	200	2	3	50	220	Continuous sinusoidal alternating current
	Forced Coag	5.0…6.5	80	5	120	2	3	500	2000	Modulated (15 kHz) sinusoidal alternating current
	Spray Coag	7.5…9.0	60	5	120	2	3	500	4300	Modulated (15 kHz) sinusoidal alternating current
	Power Coag	4.0…6.0	120	5	120	2	3	500	2500	Modulated (15 kHz) sinusoidal alternating current
Bipolar cut	Bipolar Cut	N/A	40	5	100	2	3	500	700	Continuous sinusoidal alternating current
	Saline Cut	N/A	200	10	320	2	3	75	700	Continuous sinusoidal alternating current

Mode	Touch-screen	Crest factor* at rated load	Default power level	Min.** power level [W]***	Max.** power level [W]***	Default effect	Num-ber of effects	Rated load [Ohm]	Max.** output voltage [V_p]	Waveform
Bipolar coagulation	BiSoft Coag	N/A	55	1	120	2	3	75	220	Continuous sinusoidal alternating current
	Auto Coag	N/A	50	1	120	2	3	75	220	Continuous sinusoidal alternating current
	Saline Coag	N/A	120	10	200	2	3	75	230	Continuous sinusoidal alternating current
	Hard Coag	N/A	50	1	120	2	3	25	220	Continuous sinusoidal alternating current
	RFCoag	N/A	30	1	50	w/o RCAP	w/ RCAP	75	220	Continuous sinusoidal alternating current
	Fine Coag	N/A	40	1	40	1	1	50	220	Continuous sinusoidal alternating current

*Crest factor at rated load specified for modulated sinusoidal alternating current modes only.

**min. = minimum; max. = maximum

***The power level is the maximum power (watts) which can be applied during the activation of the electrosurgical generator. The actual applied power depends on the tissue characteristics (e.g. resistance).

All cutting modes (except BlendCut) are supported by the High Power Cut Support (HPCS) according to figure 9.1. The high power cut support optimizes the start of the cutting procedure by applying high power to the tissue to support immediate spark ignition and reduces the risk of mechanical cutting.

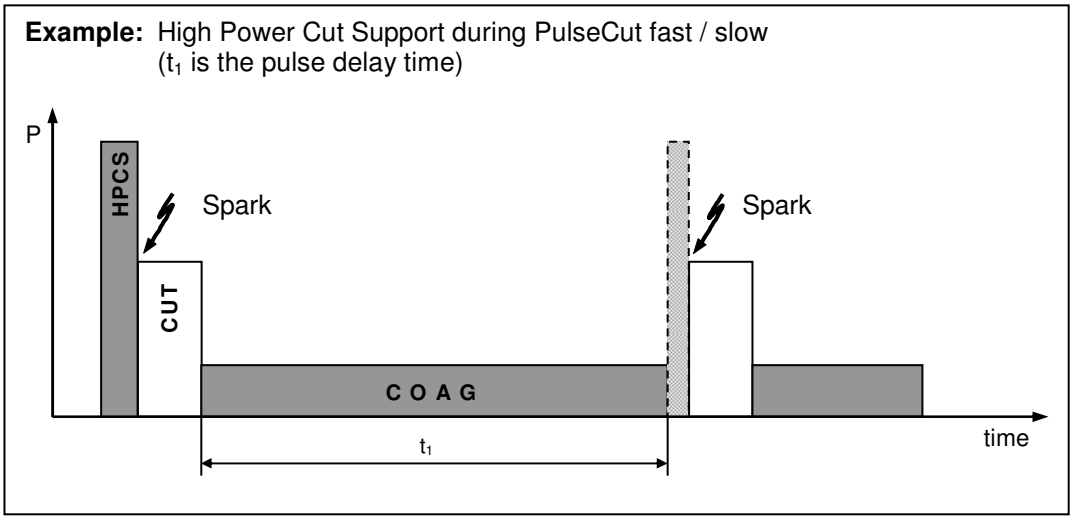


Figure 9.1

Output characteristics

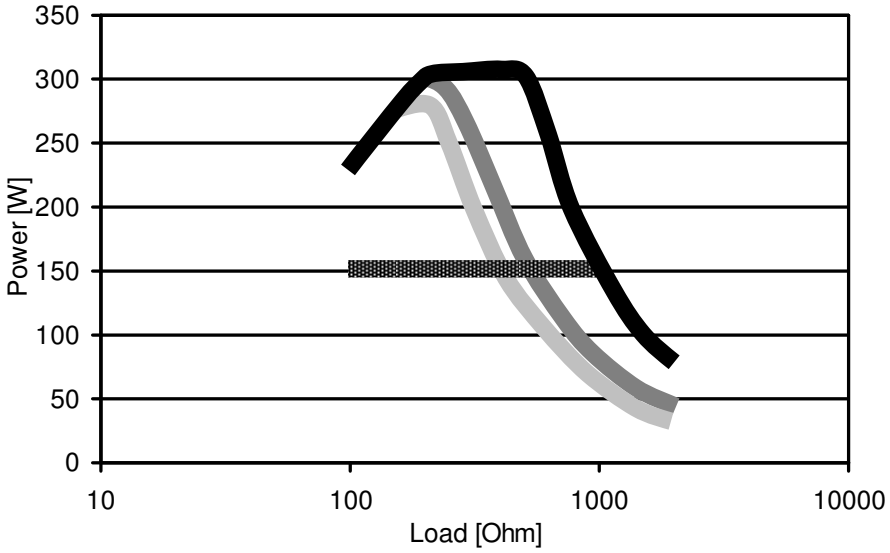
The power output data of this electrosurgical generator for all modes are shown below. Table 9.1 shows the legend of the diagrams.

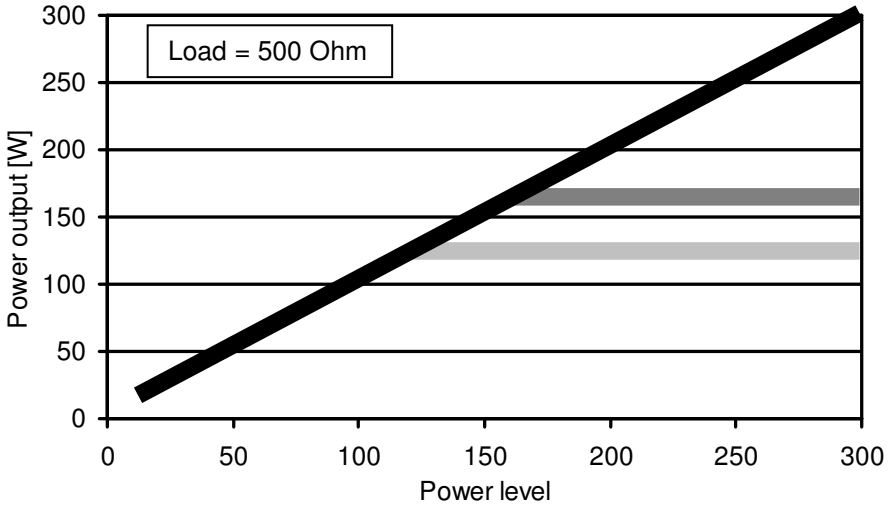
Full output power setting	
	Effect 3
	Effect 2
	Effect 1
Half output power setting	
	Effect 3
	Effect 2
	Effect 1

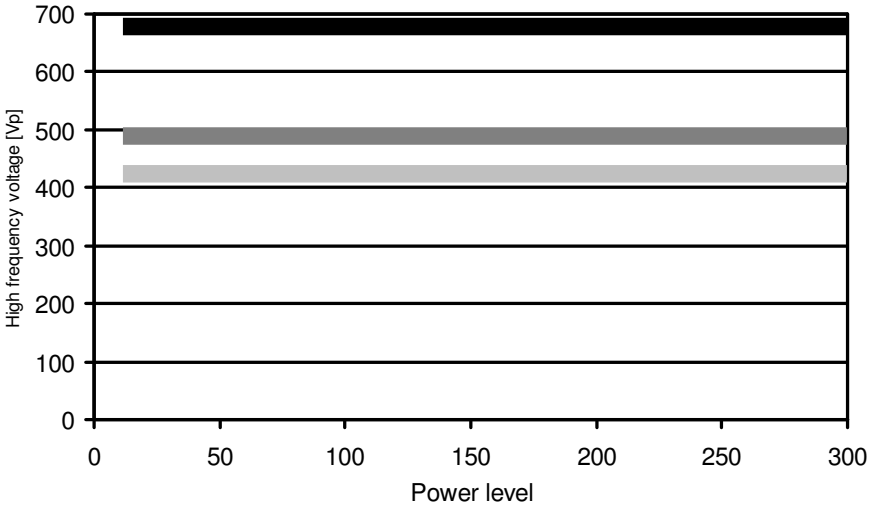
Table 9.1

Please note that the half-power lines in the power diagrams may lay over each other. In this case, only effect 3 is visible.

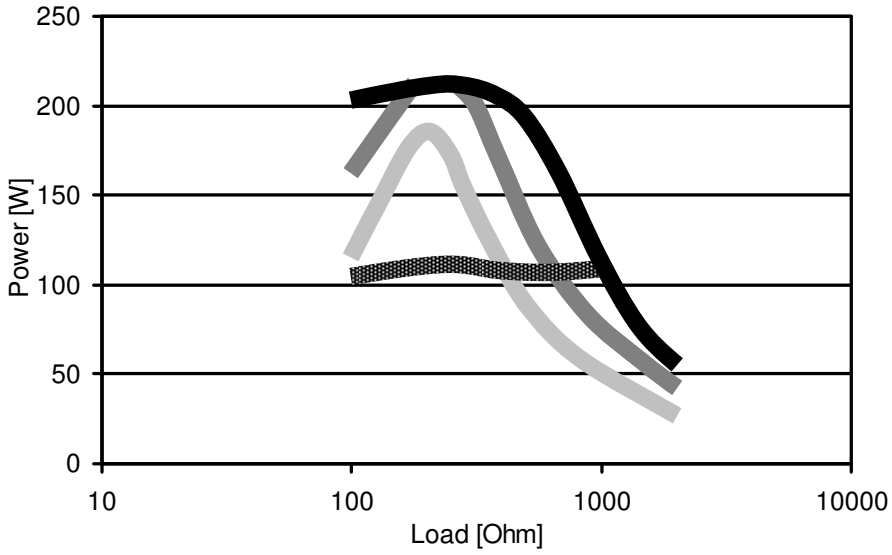
Monopolar PureCut

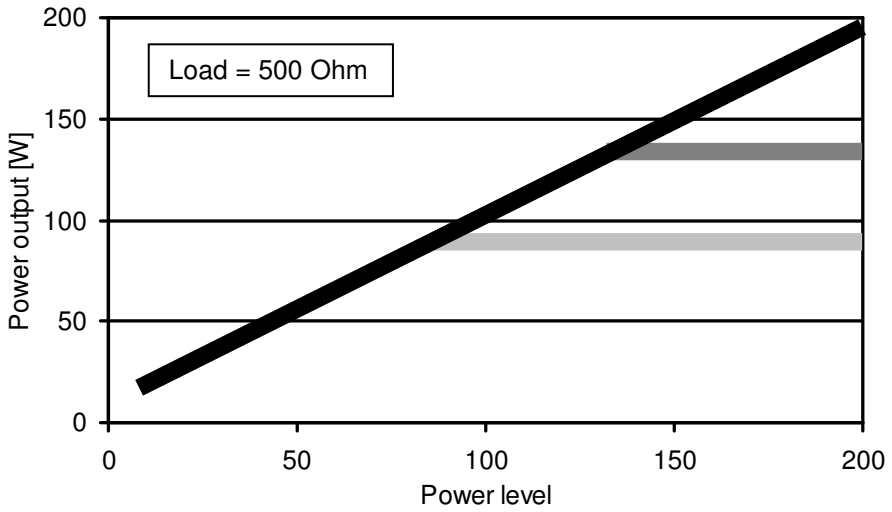


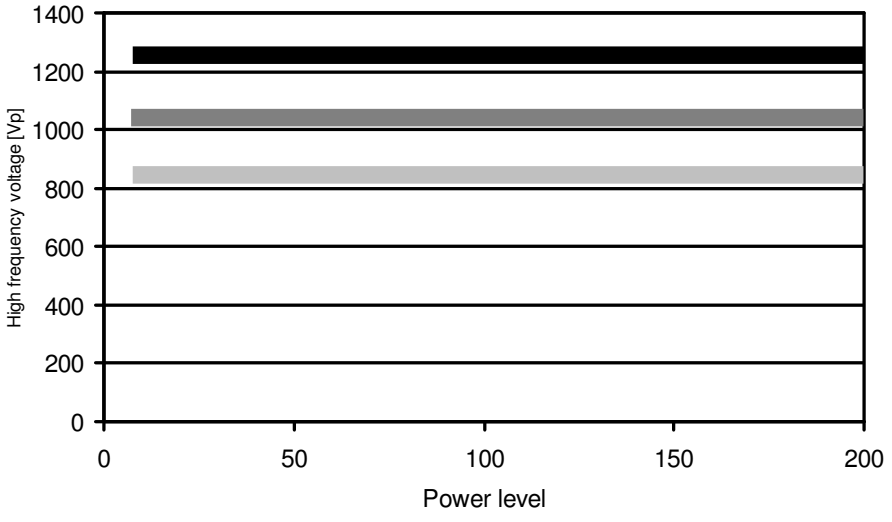




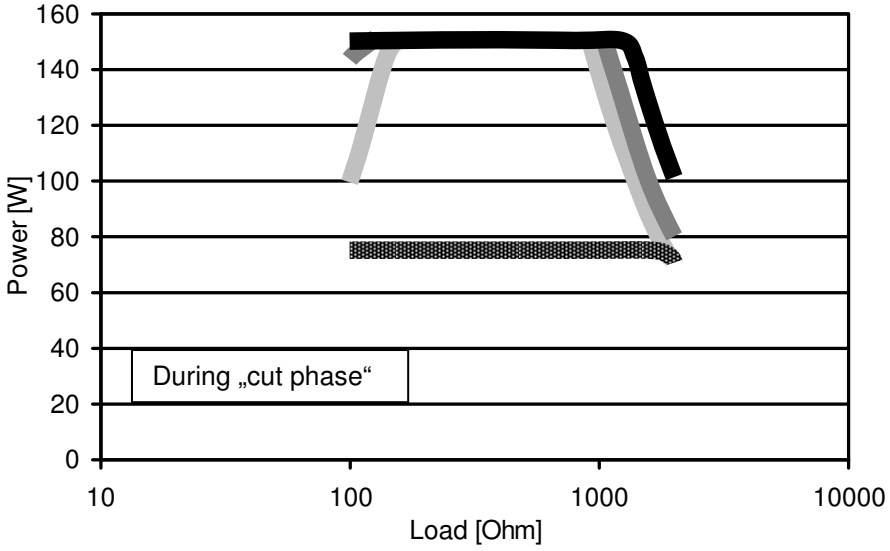
Monopolar BlendCut



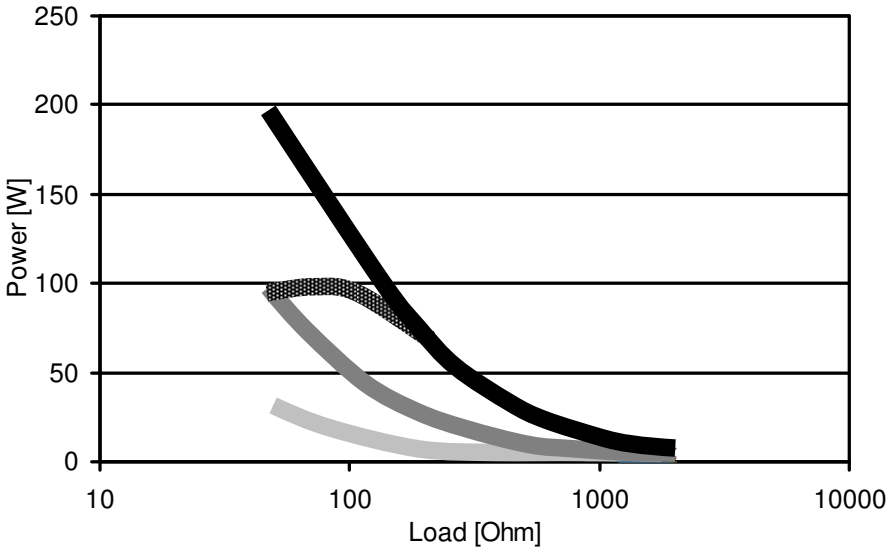


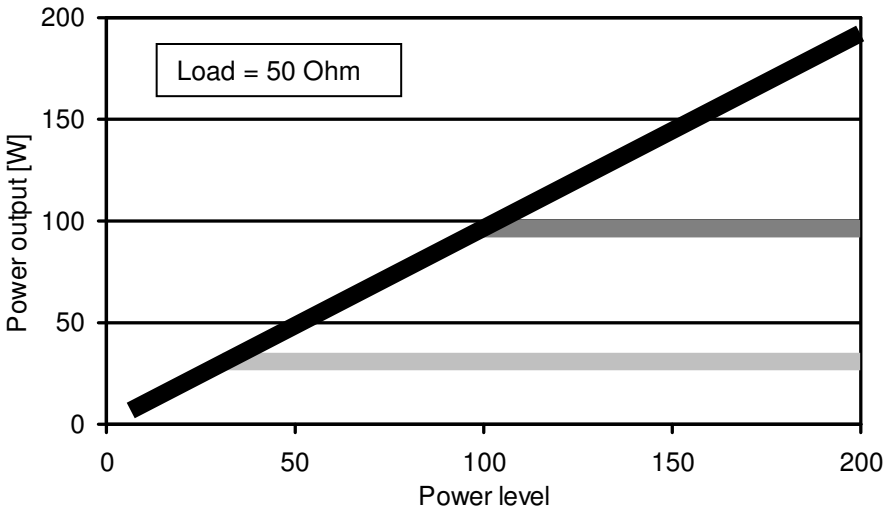


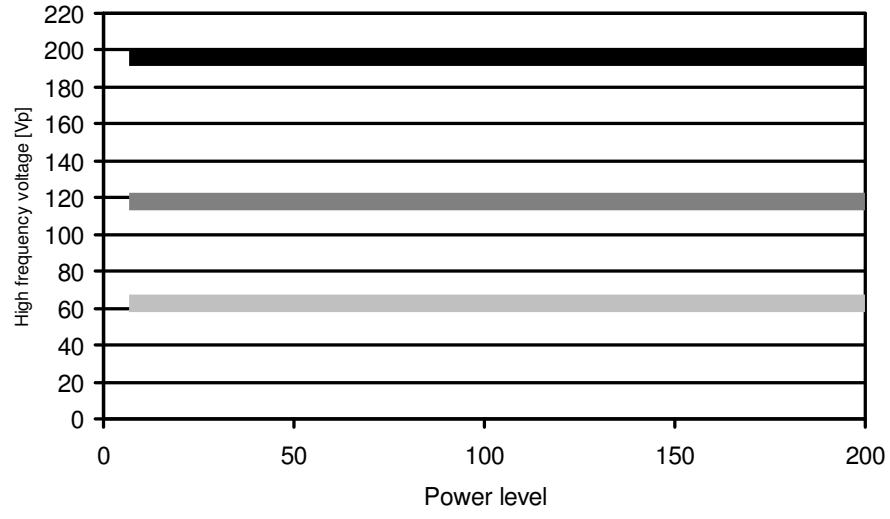
Monopolar PulseCut slow / fast



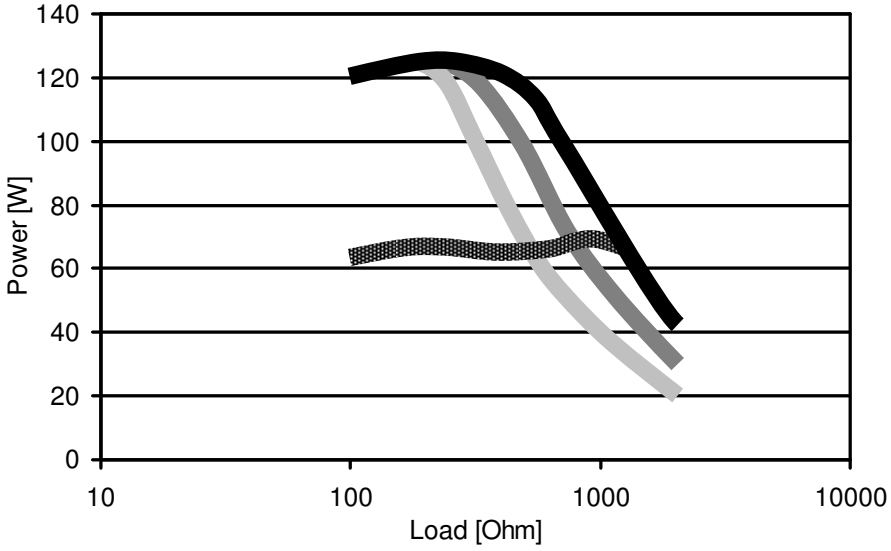
Monopolar SoftCoag

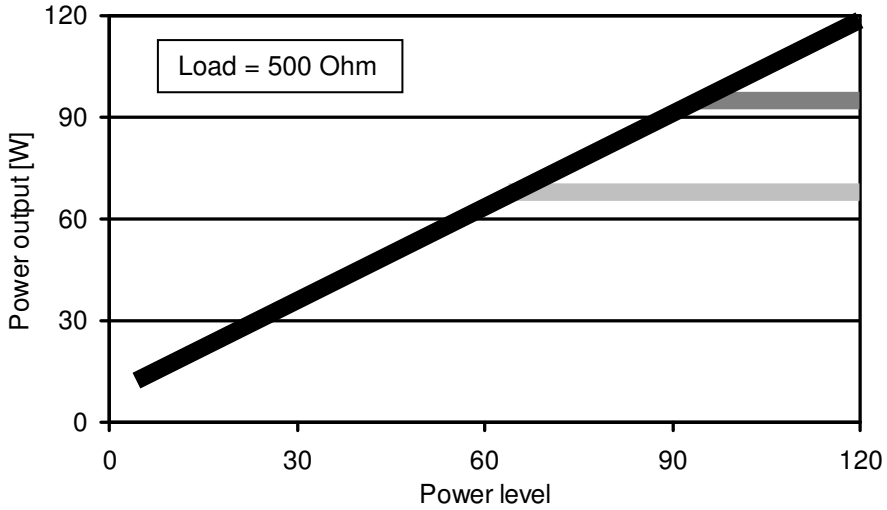


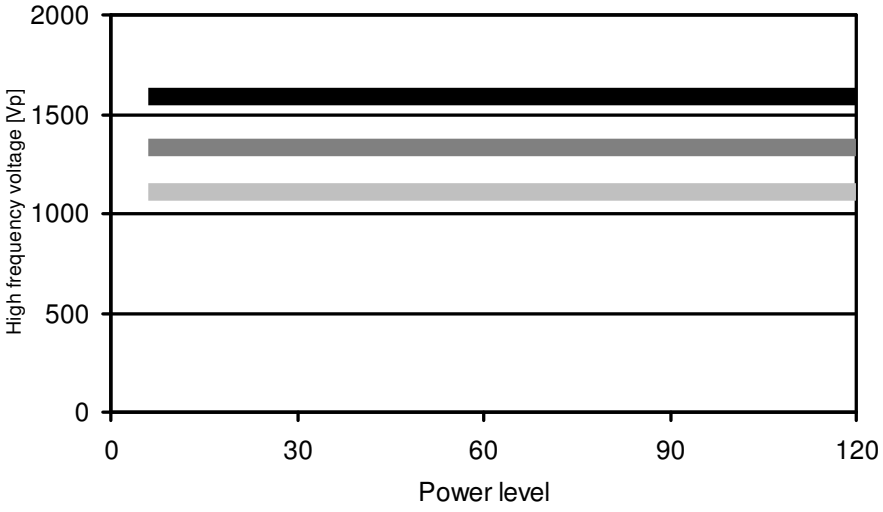




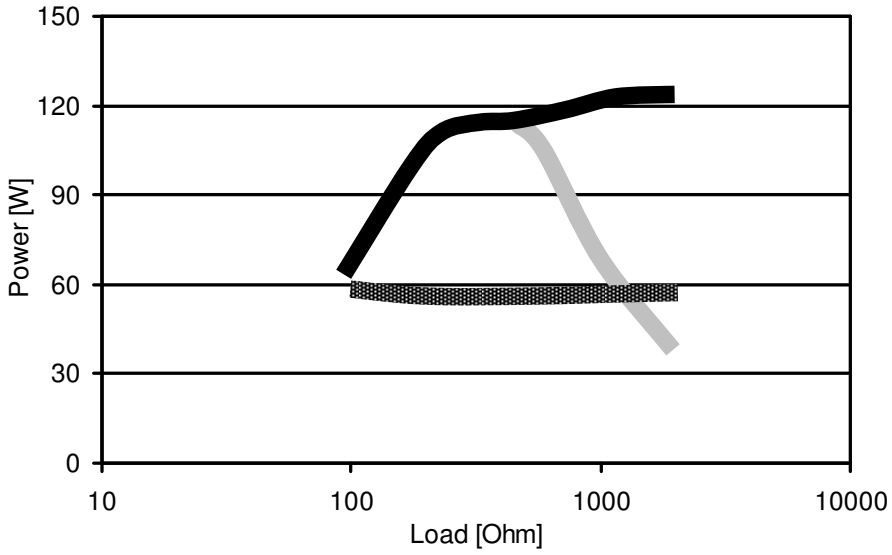
Monopolar ForcedCoag

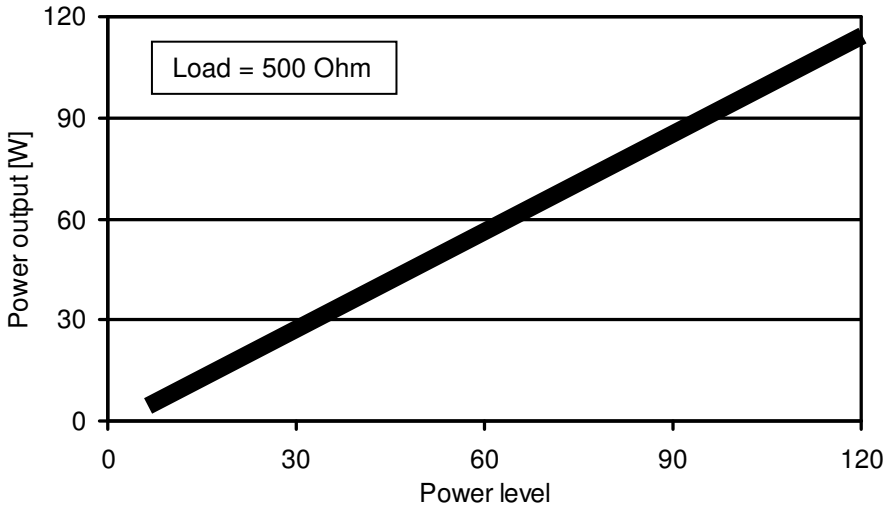


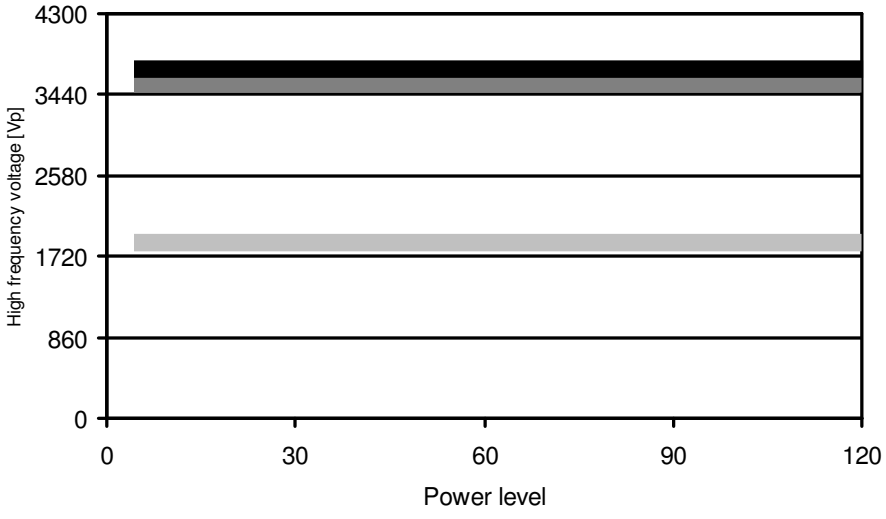




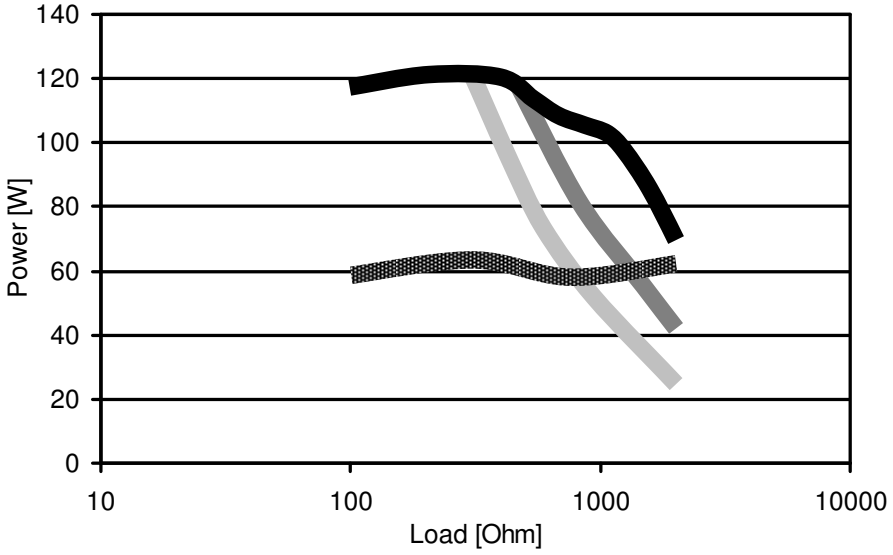
Monopolar SprayCoag

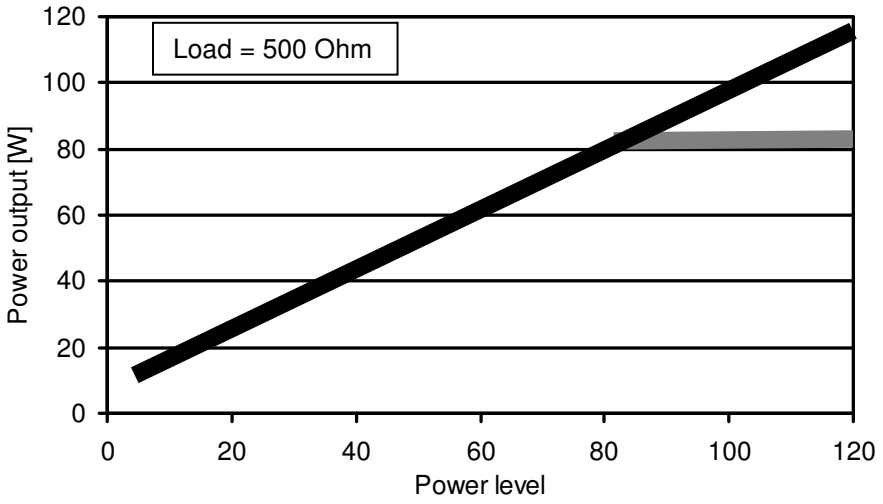


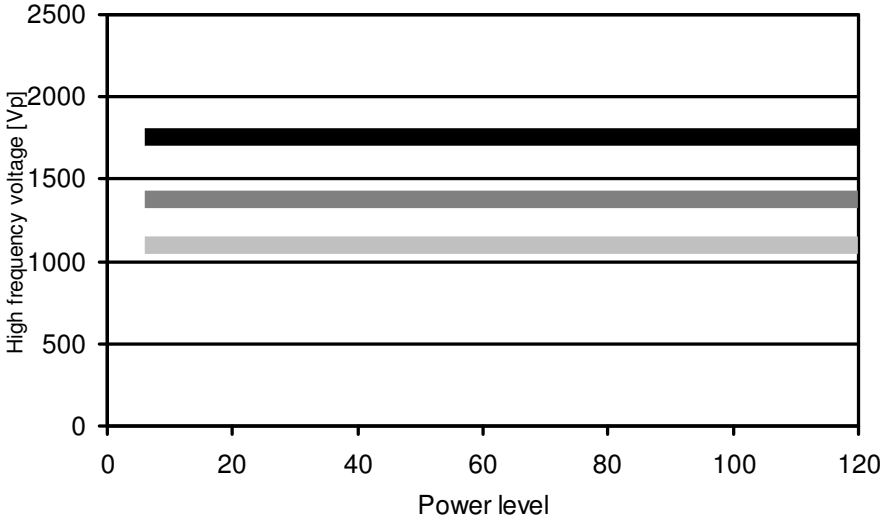




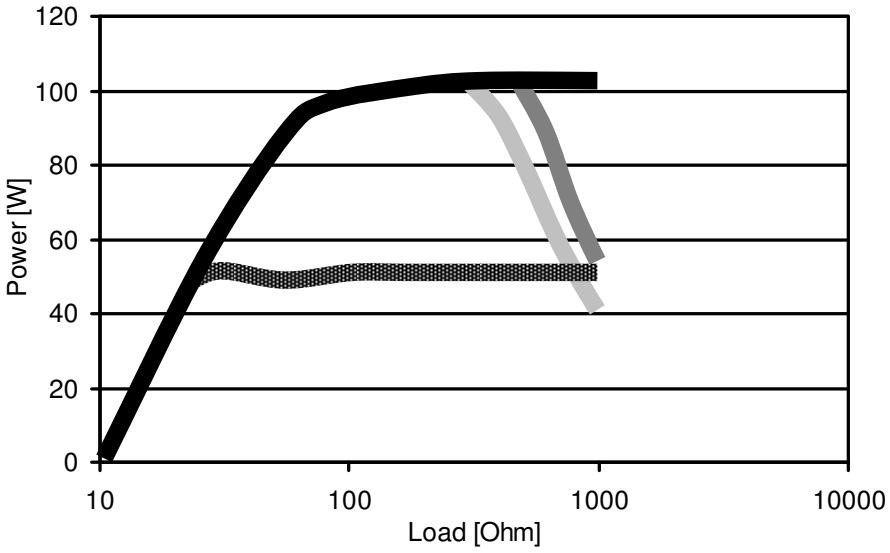
Monopolar PowerCoag

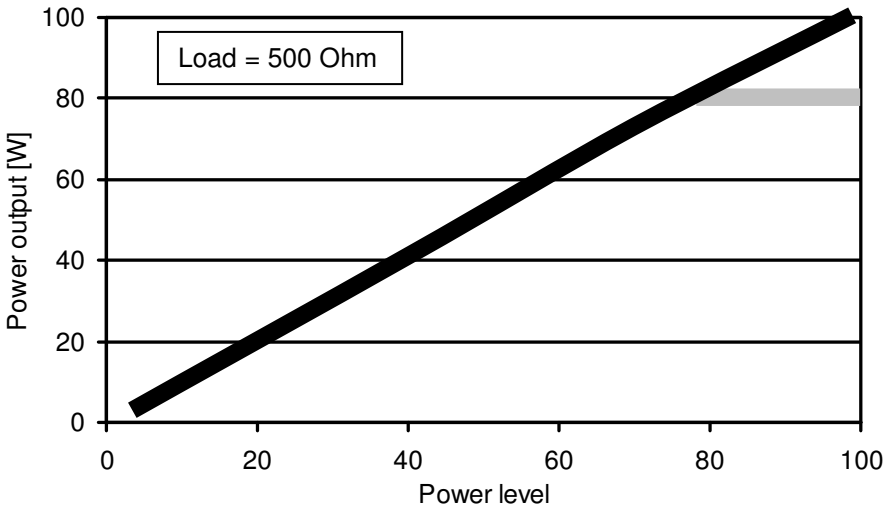


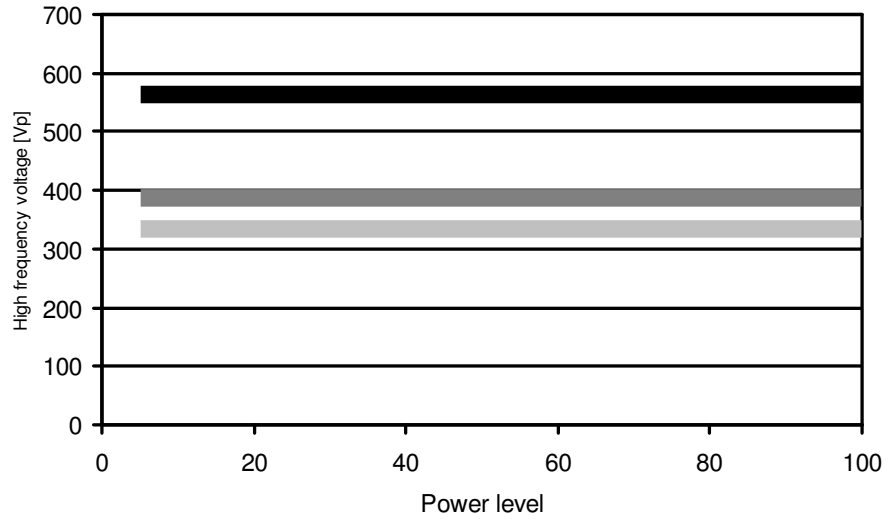




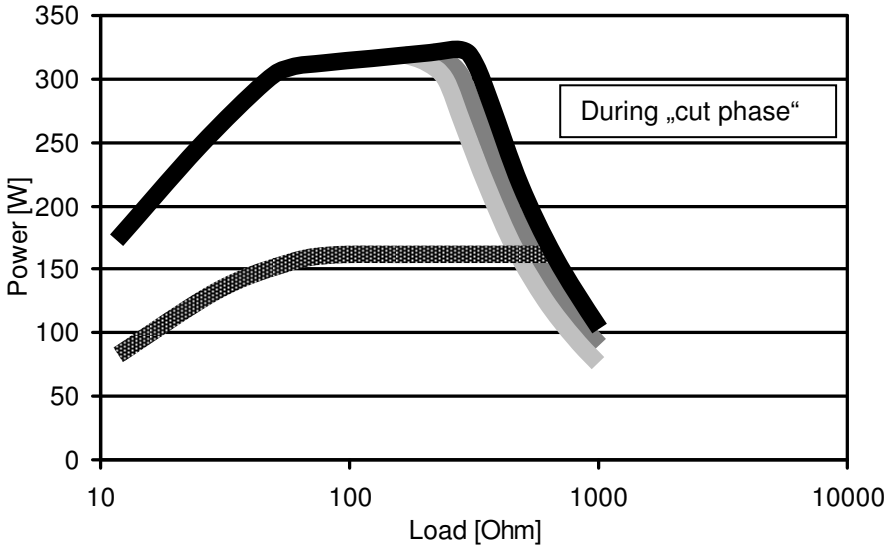
Bipolar Cut

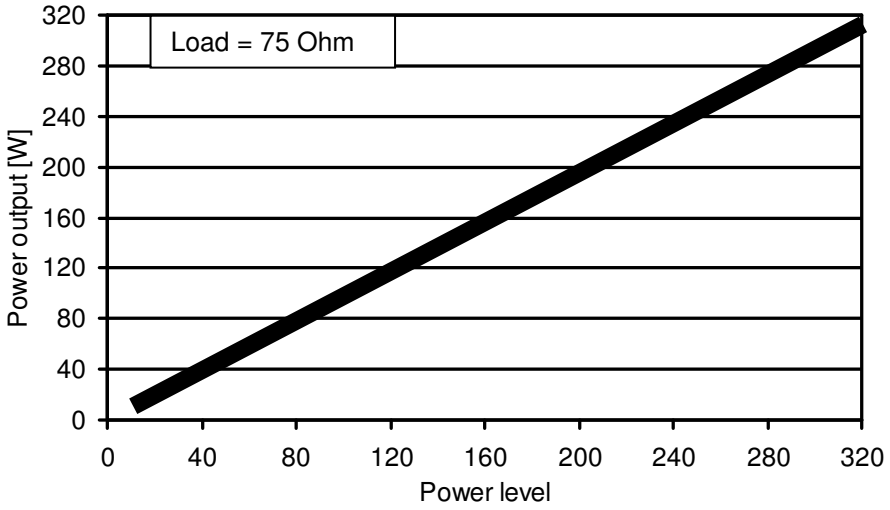

120
100
80
60
40
20
0
Power [W]
10
100
1000
10000
Load [Ohm]

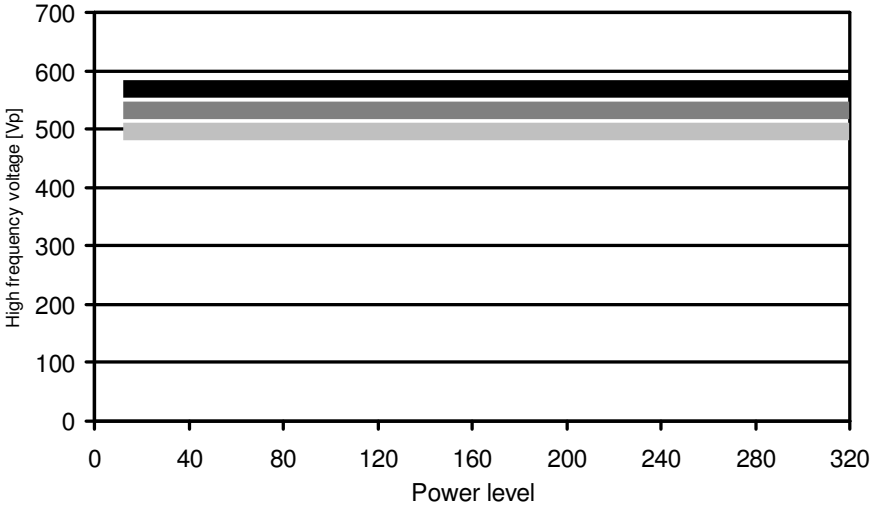

Load = 500 Ohm
100
80
60
40
20
0
Power output [W]
0
20
40
60
80
100
Power level


700
600
500
400
300
200
100
0
High frequency voltage [Vp]
0
20
40
60
80
100
Power level

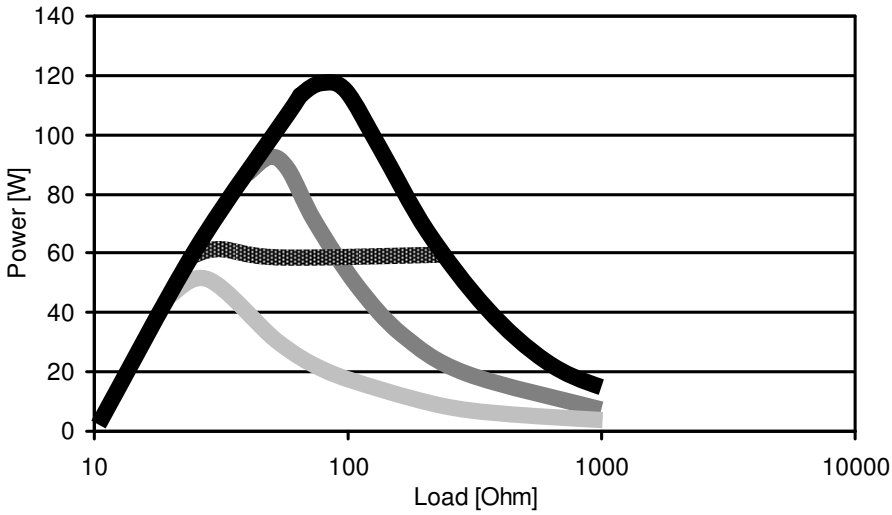
Bipolar SalineCut

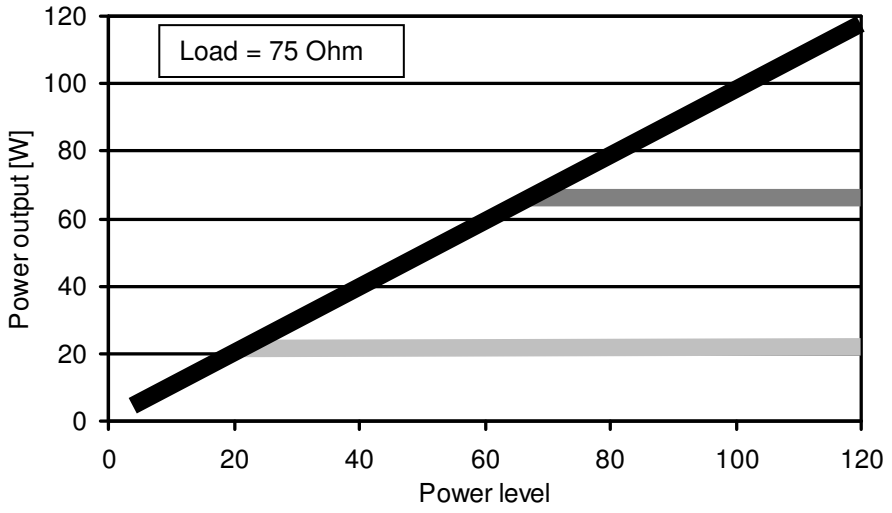


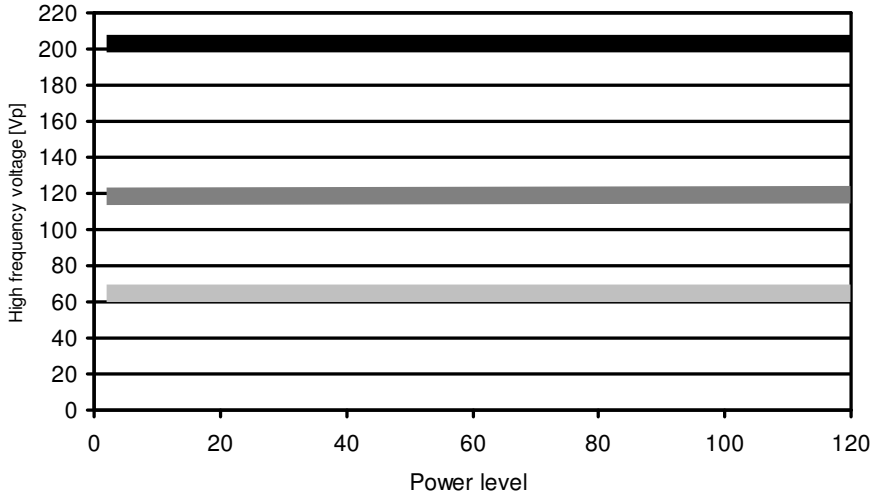




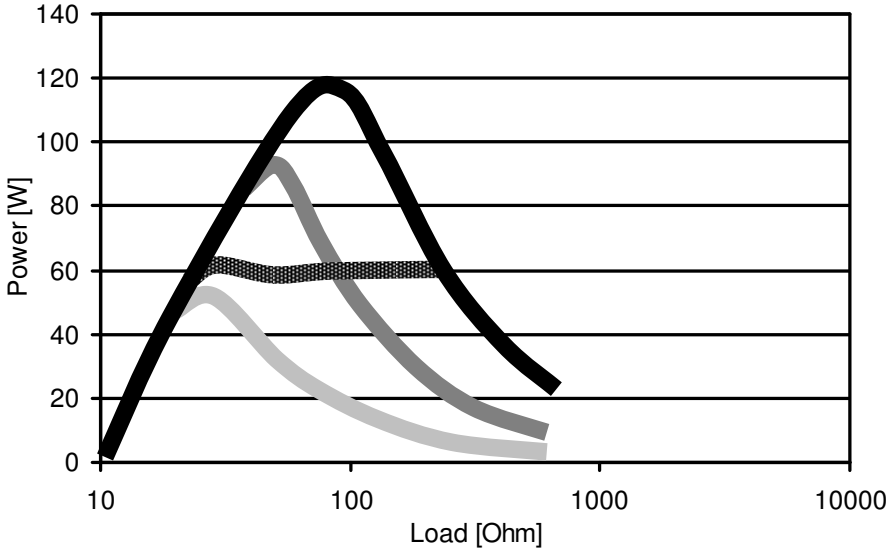
Bipolar BiSoftCoag

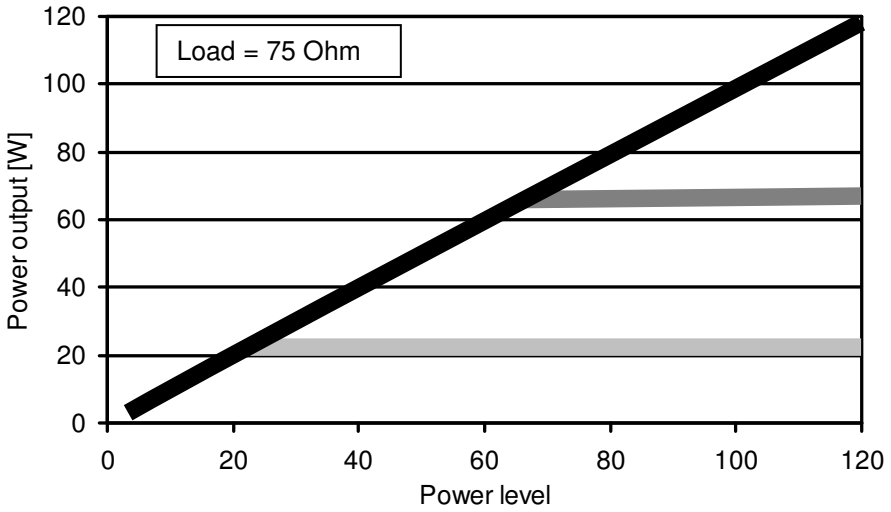


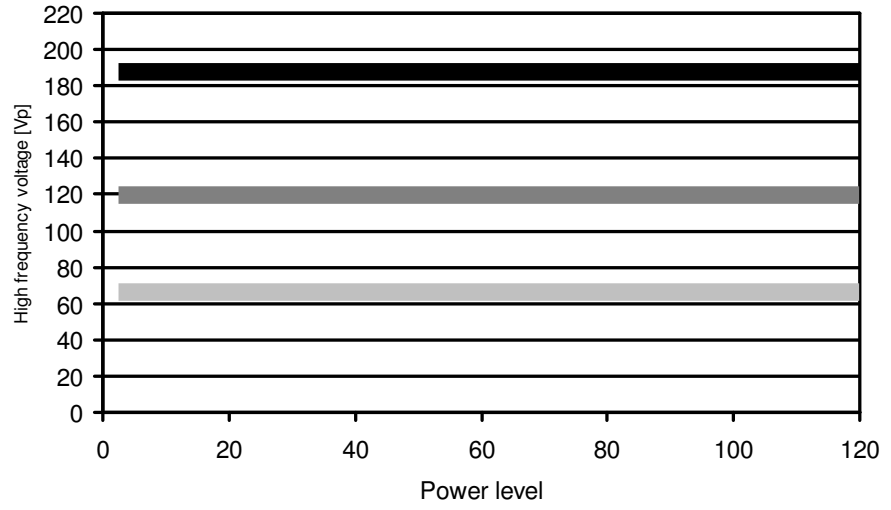




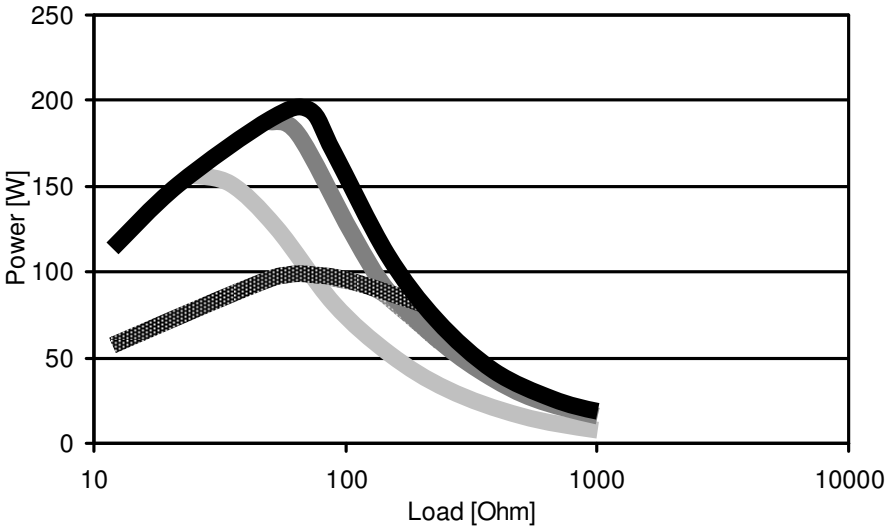
Bipolar AutoCoag

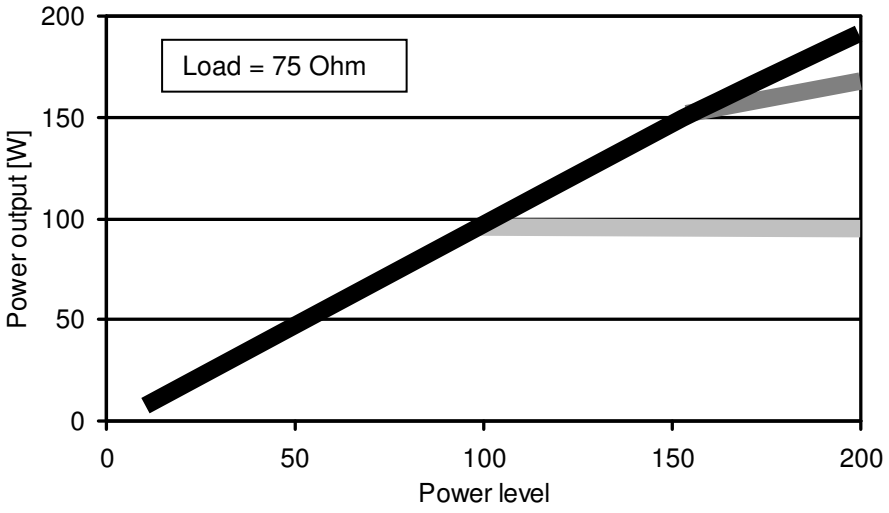


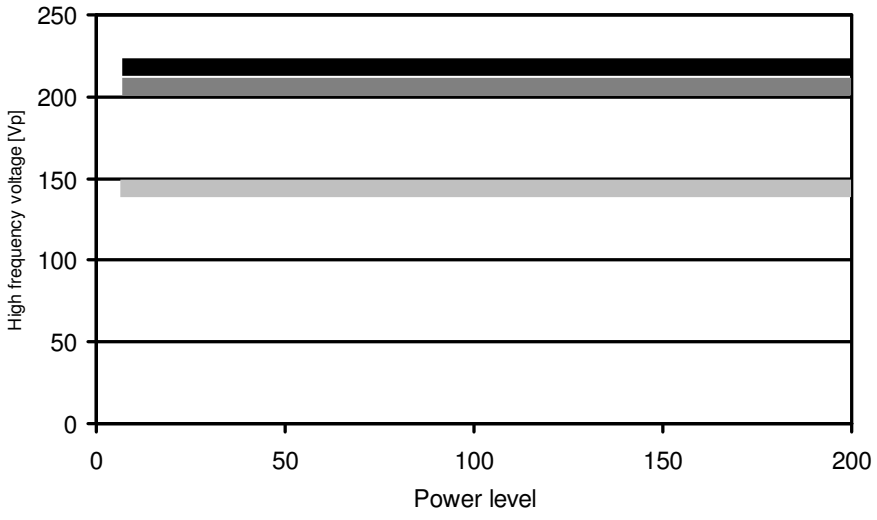




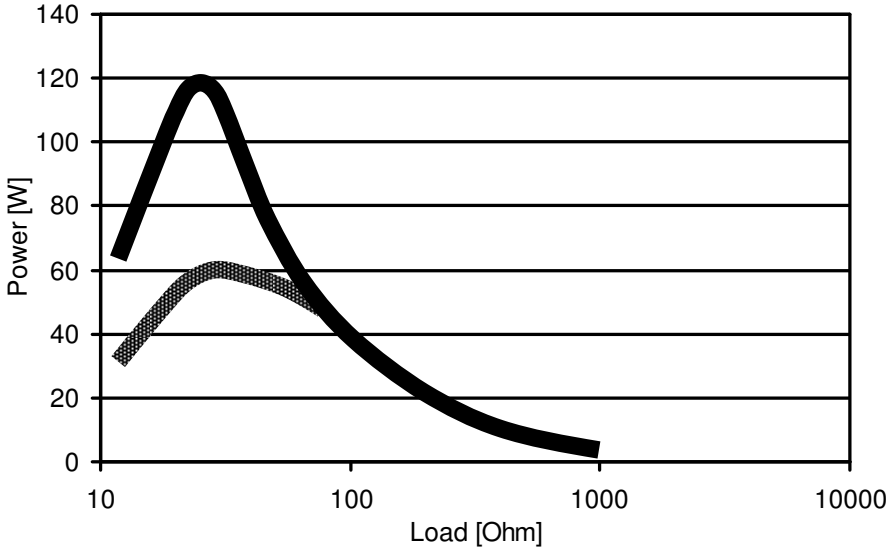
Bipolar SalineCoag

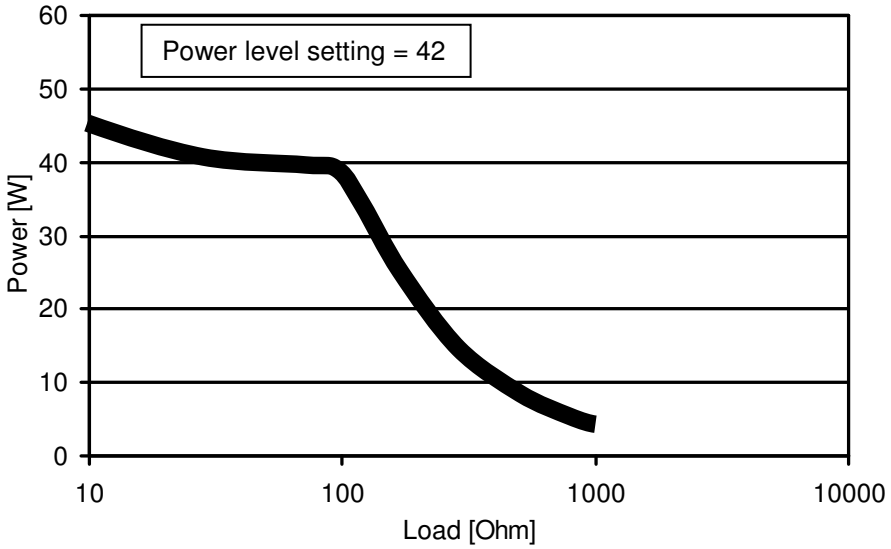


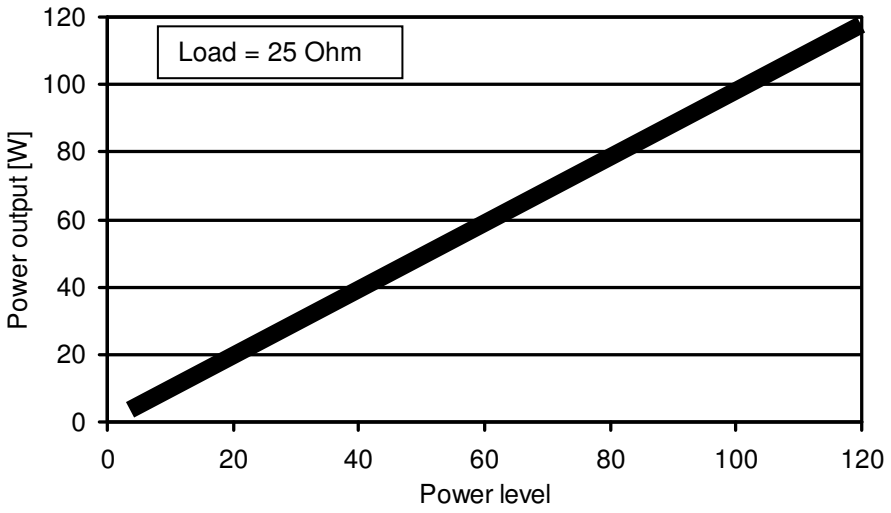


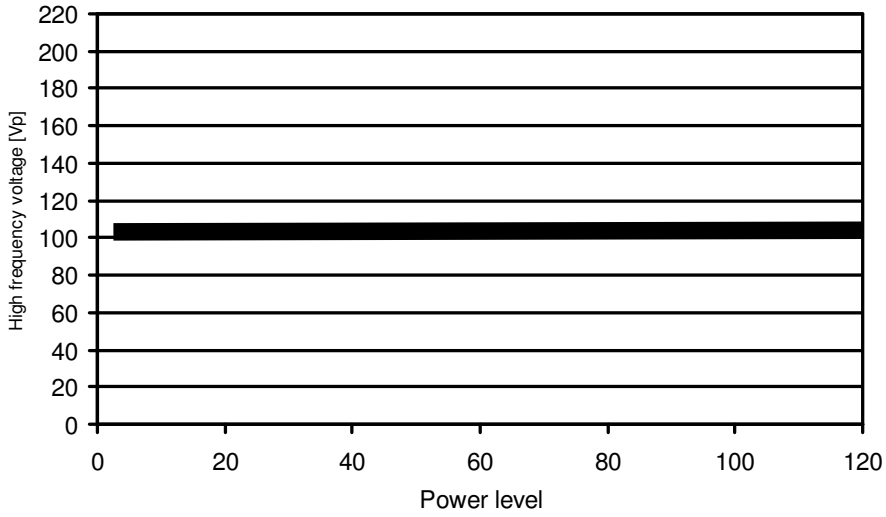


Bipolar HardCoag

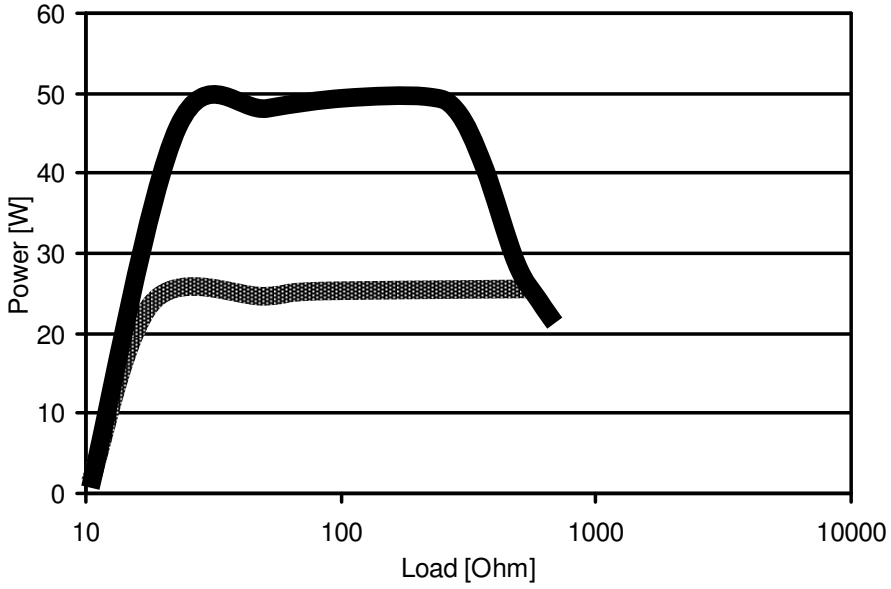


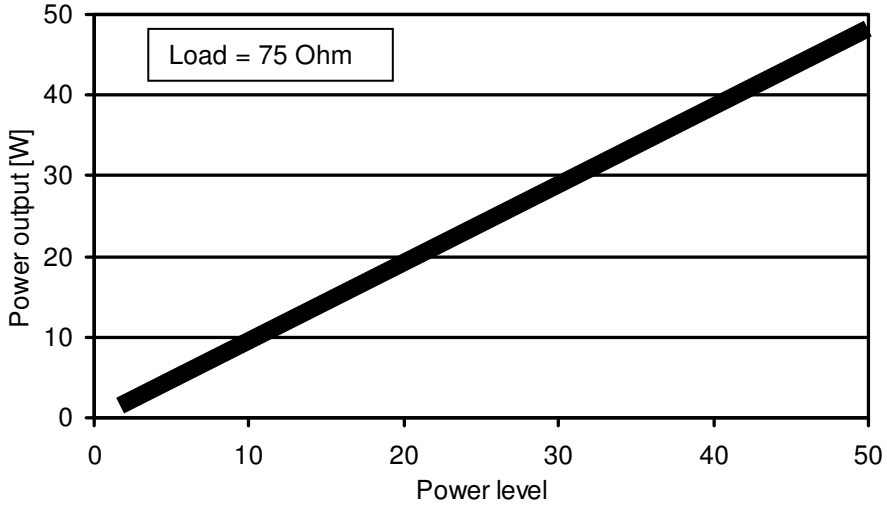


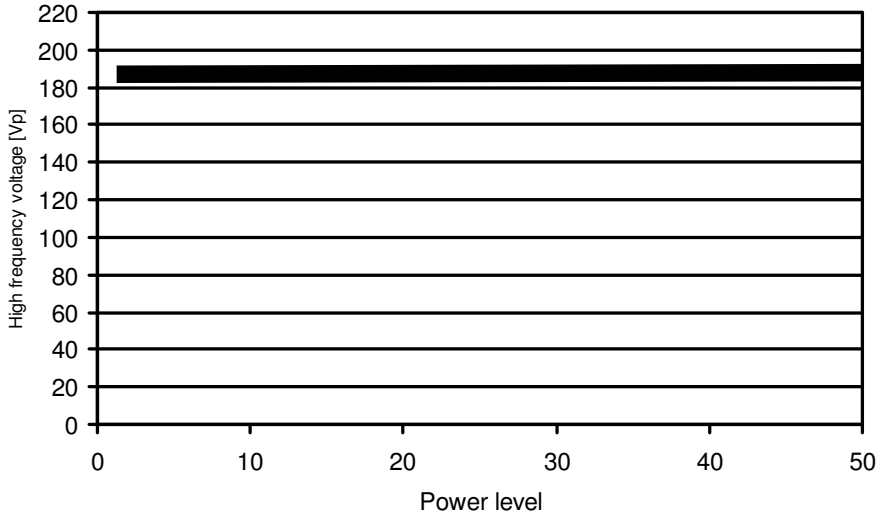



220
200
180
160
140
120
100
80
60
40
20
0
High frequency voltage [Vp]
0
20
40
60
80
100
120
Power level

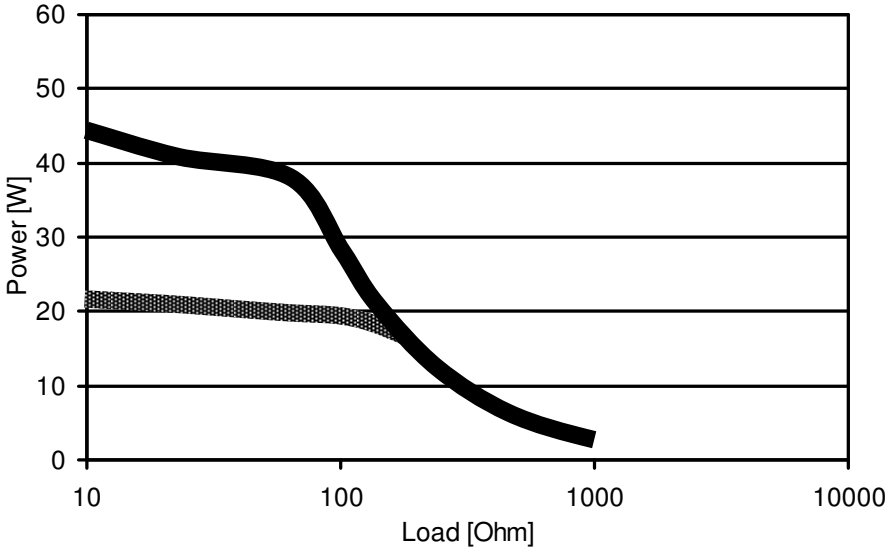
Bipolar RFCoag (w/o RCAP)

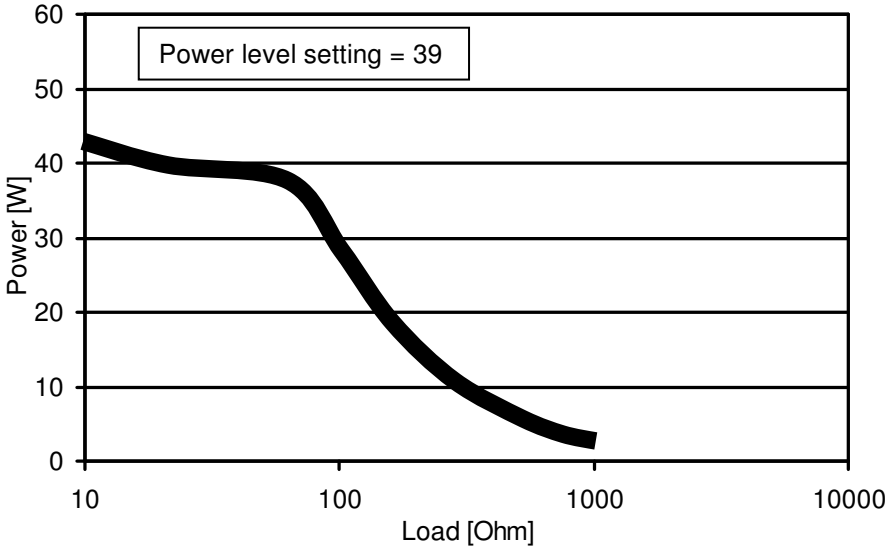


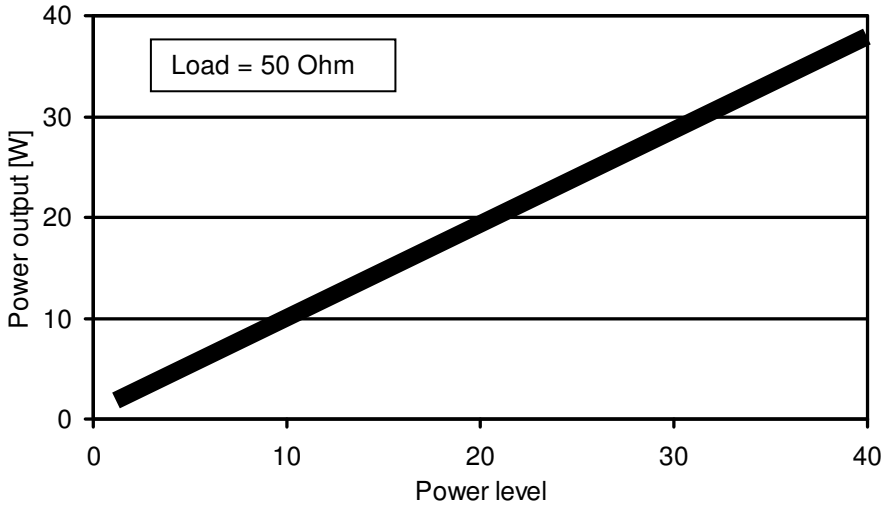


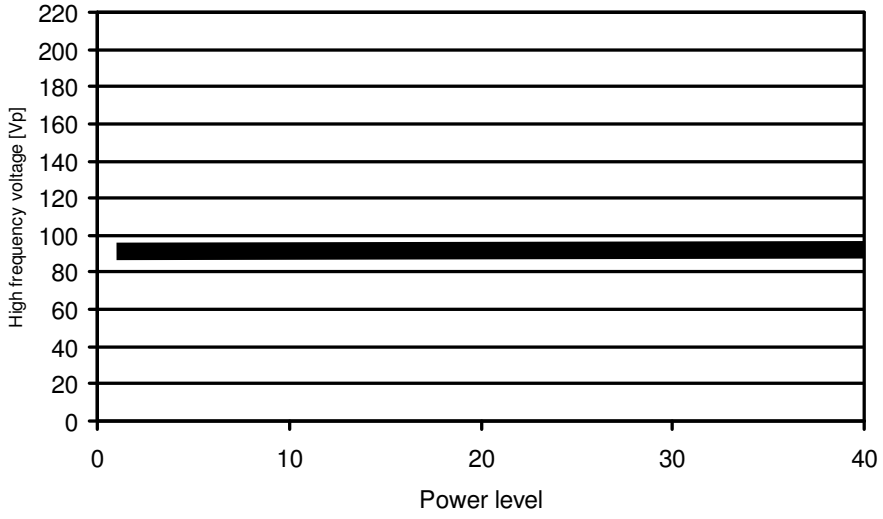


Bipolar FineCoag









Transportation, storage and operating environment

Operation environment	**Temperature**	+ 10…+ 40 °C (+ 50…+ 104 °F)
	Relative humidity	30…85%, non-condensing
	Atmospheric pressure	70…106 kPa
Transportation and storage environment	**Temperature**	- 25…+ 60 °C (- 13…+ 140 °F)
	Relative humidity	10…85%, non-condensing
	Atmospheric pressure	50…106 kPa

Specifications

Electrosurgical generator ESG-400

Power supply	**Voltage range**	100…120 V~ / 220…240 V~
	Frequency	50 / 60 Hz
	Maximum input power	1500 VA
	Power fuse	10 A (only FST-series from Schurter)
	Power connection line	IEC 60320-1 / C13 Maximum length: 4.5 m
	Terminal for potential equalization	Yes
Size, weight and packaging	**Width x Depth x Height**	370 × 465 × 156 mm
	Volume	25752 cm^3
	Weight of generator	12.5 kg
	Weight of packaging	2.3 kg
	Type of packaging	Cardboard and expanded polypropylene material
Classification	**Protection class according to IEC 60601-1**	CF, Class I
	Classification according to MDD 93/42/EEC	IIb
Output	**High frequency functions**	Monopolar / Bipolar
	High frequency	430 kHz ±20%
	Maximum high frequency power	320 W
	All modes	25% duty cycle (e.g. 10 s activated / 30 s deactivated)
	RFCoag (with or without RCAP)	100% duty cycle

Sockets	**MONOPOLAR 1**	3-pin (∅ 4 mm), Valleylab standard; coaxial (∅ 8 mm), Bovie standard
	MONOPOLAR 2	3-pin (∅ 4 mm), Valleylab standard; coaxial (∅ 5 / 9 mm), Erbe standard
	BIPOLAR	2-pin (∅ 4 mm, pin spacing 28.8 mm), Valleylab standard; coaxial (∅ 4 / 8 mm), Erbe standard
	UNIVERSAL	7-pin, Olympus standard
	Neutral electrode	Single or split, 10 mm plug
Contact quality monitor (CQM)	**Allowable resistance range for split type neutral electrodes**	10...155 Ω ±15 Ω
	Allowable resistance range for non-split type neutral electrodes	< 10 Ω ±5 Ω

○ Power cords (4.5 m, angled plug)

Power cords	**WA95621A**	Many European countries Type E/F
	WA95622A	USA, Canada and other countries Type B
	WA95623A	United Kingdom and other countries Type G

Footswitch (REF: WB50402W, double pedal)

Classification	**Protection class according to IEC 60529**	IPX8 (except the plug section)
Size, weight and packaging	**Width x Depth x Height**	350 × 185 × 65 mm
	Weight of footswitch	1.9 kg
	Length of cord	4 m
	Weight of packaging	0.5 kg
	Type of packaging	Cardboard material

Footswitch (REF: WB50403W, single pedal, optional)

Classification	**Protection class according to IEC 60529**	IPX8 (except the plug section)
Size, weight and packaging	**Width x Depth x Height**	175 × 185 × 50 mm
	Weight of footswitch	1.6 kg
	Length of cord	4 m
	Weight of packaging	0.5 kg
	Type of packaging	Cardboard material

Neutral electrode cable "P-cord" (REF: MAJ-814, optional)

Size	**Weight**	0.14 kg
	Length of cord	3.1 m

Compatible neutral electrodes

Neutral electrode	**Olympus MAJ-897**	Patient weight > 15 kg, split type, white foam
	Olympus WA90006A	Patient weight 0… 15 kg, split type, safety ring, soft backing
	3M 1180	Patient weight > 15 kg, split type, white foam
	3M 1179	Patient weight > 15 kg, split type, white foam, with cable
	3M 8180	Patient weight > 15 kg, split type, teal foam, soft conductive adhesive
	3M 9160	Patient weight 0… 15 kg, split type, safety ring, soft backing
	3M 9165	Patient weight 0… 15 kg, split type, safety ring, soft backing, with cable
	Valleylab E7509	Patient weight > 15 kg, split type, soft conductive adhesive
	Valleylab E7507	Patient weight > 15 kg, split type, soft conductive adhesive, with cord
	Valleylab E7510-25	Patient weight 0… 15 kg, split type, soft conductive adhesive
	Conmed SureFit 410-2000 / **410-2100**	Patient weight 0… 15 kg, split type, with cable
	Conmed SureFit 410-2200 / **410-2400**	Patient weight 0… 15 kg, split type
	Gyrus ACMI	Patient weight > 15 kg, split type, conductive adhesive, with cord

Communication cable 0.25 m (REF: MAJ-1871, optional)

Size	**Weight**	0.05 kg
	Length of cord	0.25 m

Communication cable 10 m (REF: MAJ-1872, optional)

Size	**Weight**	0.5 kg
	Length of cord	10 m

Adapter for UHI-2/3 (REF: MAJ-1873, optional)

Size	**Width x Depth x Height**	100 × 77 × 42 mm
	Weight	0.35 kg
Compatible cables		MAJ-1871, MAJ-1872

Electromagnetic compatibility (EMC) information

The electrosurgical generator is intended for use in the environment specified below. The user of the electrosurgical generator should assure that it is used in such an environment.

Guidance and manufacturer's declaration – electromagnetic emissions

Emission test	Compliance	Electromagnetic environment – guidance
High frequency emissions CISPR 11	Group 1	During standby the electrosurgical generator uses high frequency energy only for its internal function. Therefore, its high frequency emissions are very low and are not likely to cause any interference in nearby electronic equipment.
High frequency emissions CISPR 11	Class A	The electrosurgical generator is suitable for use in all establishments other than domestic, and may be used in domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes, provided the following warning is heeded: **Warning:** This electrosurgical generator is intended for use by healthcare professionals only. This electrosurgical generator may cause radio interference or may disrupt the operation of nearby equipment. It may be necessary to take mitigation measures, such as re-orienting or relocating the electrosurgical generator or shielding the location.
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations / flicker emissions IEC 61000-3-3	complies	

Length of power cord: ≤ 4.5 m

CAUTION

- The electrosurgical generator should not be used adjacent to or stacked with other electrical equipment, except devices which are intended for this purpose and tested by the manufacturer.
- The use of accessories which are not approved by the manufacturer may result in an increase of electromagnetic emissions and the compliance with the stipulated limit values are not guaranteed anymore.

Guidance and manufacturer's declaration – electromagnetic immunity

Immunity test	IEC 60601-1-2 test level	Compliance level	Electromagnetic environment - guidance
Electrostatic discharge (ESD) according to IEC 61000-4-2	± 6 kV contact discharge ± 8 kV air discharge	± 6 kV contact discharge ± 8 kV air discharge	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic materials, the relative humidity should be at least 30%.
Electrical fast transient / burst according to IEC 61000-4-4	± 2 kV for power supply lines ± 1 kV for input/output lines	± 2 kV ± 1 kV	The quality of the power supply voltage should comply with a typical commercial or hospital environment.
Surges according to IEC 61000-4-5	± 1 kV for differential mode ± 2 kV for common mode	± 1 kV ± 2 kV	The quality of the power supply voltage should comply with a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations of power supply input lines according to IEC 61000-4-11	< 5% for 5 s < 5% for 0.5 periods 40% for 5 periods 70% for 25 periods	< 5% for 5 s < 5% for 10 ms 40% for 100 ms 70% for 500 ms	The quality of the power supply voltage should comply with a typical commercial or hospital environment. If the user of the electrosurgical generator requires continuous operation during power supply interruption, it is recommended that the electrosurgical generator should be powered from an uninterruptible power supply or a battery.
Magnetic fields of mains frequency (50 / 60 Hz) according to IEC 61000-4-8	3 A/m	3 A/m	Magnetic fields of mains frequency should comply with typical levels characteristic of commercial or hospital environment. Portable and mobile high frequency communication equipment should be used not closer to any part of the electrosurgical generator, including cables, then the recommended separation distance calculated from 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 and d is the recommended separation distance in meters (m).

Immunity test	IEC 60601-1-2 test level	Compliance level	Electromagnetic environment - guidance
Conducted high frequency according to IEC 61000-4-6	3 V_{eff} 150 kHz to 80 MHz	3 V	1.2 * Square root (P)
Radiated high frequency according to IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	1.2 * Square root (P) for 80…800 MHz 2.3 * Square root (P) for 800 MHz…2.5 GHz The field strength from fixed high frequency transmitters, as determined by survey, should be less than the compliance level.

Interference may occur in the vicinity of equipment marked with the symbol “non-ionizing radiation“.

NOTE

This guideline may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects

The field strength from fixed transmitters, such as base stations from radio (cellular / cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast, cannot be theoretical predicted with exact accuracy.

To assess the electromagnetic environment due to fixed high frequency transmitters, a site survey should be considered. If the measured field strength at the location, where the electrosurgical generator is used, exceeds the above applicable compliance level, the electrosurgical generator should be observed to verify normal operation.

If unusual performance characteristics are observed, additional procedures may be necessary, such as reorientation or relocating of the electrosurgical generator.

Over the frequency range 150 kHz to 80 MHz, the field strength should be less than 3 V/m.

The electrosurgical generator is intended for use in an electromagnetic environment where the radiated high frequency disturbances are controlled. The user of the electrosurgical generator can help to prevent electromagnetic interference by maintaining a minimal distance between portable and mobile high frequency communication equipment (transmitters) and the electrosurgical generator, according to the maximum output power of the communication equipment, as recommended below.

Recommended separation distances between portable and mobile high frequency communication equipment and the electrosurgical generator

Rated output power of the transmitter	Separation distance (d) according to frequency of the transmitter in meters (m)		
P in W	150 kHz…80 MHz	80…800 MHz	800 MHz…2.5 GHz
general	1.2 * Square root (P)	1.2 * Square root (P)	2.3 * Square root (P)
0.01	0.1 m	0.1 m	0.2 m
0.1	0.4 m	0.4 m	0.7 m
1	1.2 m	1.2 m	2.3 m
10	3.7 m	3.7 m	7.4 m
100	11.7 m	11.7 m	23.3 m

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

NOTE

This guideline may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

Alarm information

The electrosurgical generator complies with the IEC 60601-1-8: 2006. The following table shows the priority relationship between errors and the output tone frequency.

Error priorities, frequencies, duty cycles and pressure levels of error tones

Error priority	Error codes	Duty cycle / frequency / volume
High	E004, E007…E011, E018, E024…E031, E033…E037, E039…E043, E048, E052, E054, E056…E061, E063…E067, E074, E075, E081…E102, E116…E119, E122…E130, E132, E133, E137, E142…E145, E150, E165, E168…E178, E197, E198, E203…E211, E213, E216, E217, E220…E387, E395, E400…E408, E410, E412, E415, E419…E437, E439, E440, E443…E456, E458…484, E490, E505…E514, E518…E538	Intermitting signal (number of burst = 10) / 200 / 300 Hz / ≥ 65 dB (A)
Medium	E012, E016, E017, E019…E023, E032, E038, E044…E047, E049, E051, E053, E055, E062, E068…E073, E078…E080, E103…E114, E120, E121, E131, E134…E136, E138…E141, E147…E149, E151…E154, E159, E166, E167, E179…E186, E188…E196, E199…E201, E212, E215, E218, E390…E394, E396…E399, E413, E414, E438, E457, E488…E490; E515; E516	Intermitting signal (number of burst = 3) / 200 / 300 Hz / ≥ 65 dB (A)
Low	E001…E003, E006, E013…E015, E115, E187, E202, E214, E409, E411, E416…E418, E441, E486	Intermitting signal (number of burst = 2) / 200 / 300 Hz / ≥ 65 dB (A)

Tone information

Frequencies, duty cycles and pressure levels of output tones

Type	Mode	Frequency	Duty cycle / volume
Volume tone	PureCut	587 Hz	Continuous signal / 40…65 dB (A)
	BlendCut	587 Hz	Continuous signal / 40…65 dB (A)
	PulseCut slow	494 / 440 Hz	Alternating signal / 40…65 dB (A)
	PulseCut fast	494 / 440 Hz	Alternating signal / 40…65 dB (A)
	SoftCoag	440 Hz	Continuous signal / 40…65 dB (A)
	ForcedCoag	554 Hz	Continuous signal / 40…65 dB (A)
	SprayCoag	554 Hz	Continuous signal / 40…65 dB (A)
	PowerCoag	554 Hz	Continuous signal / 40…65 dB (A)
	BipolarCut	587 Hz	Continuous signal / 40…65 dB (A)
	SalineCut	587 Hz	Continuous signal / 40…65 dB (A)
	BiSoftCoag	440 Hz	Continuous signal / 40…65 dB (A)
	AutoCoag	440 Hz End signal: 1200 / 800 Hz	Continuous signal / 40…65 dB (A) Alternating end signal (0.3 s)
	SalineCoag	440 Hz	Continuous signal / 40…65 dB (A)
	HardCoag	440 Hz End signal: 980 Hz	Continuous signal / 40…65 dB (A) Intermitting end signal (1.1 s)
	RFCoag	469 Hz < f < 1231 Hz depending on the resistance of the tissue If without RCAP: 469 Hz End signal: 1200 / 800 Hz	Continuous signal / 40…65 dB (A) Alternating end signal (0.3 s)
	FineCoag	250 / 500 Hz	Alternating signal / 40…65 dB (A)
Touch tone		500 Hz	0.09 s / ≥ 65 dB (A)
Start tone		500 / 1000 / 2000 Hz	0.375 s / ≥ 65 dB (A)

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