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USER MANUAL

USER MANUAL

VIO® 300 D

MEDICAL — APPLIED CURRENT/ENERGY EQUIPMENT
AS TO ELECTRICAL SHOCK, FIRE AND MECHANICAL HAZARDS ONLY
IN ACCORDANCE WITH AAMI ES60601-1 (2005) + AMD 1 (2012)
CSA-C22.2 No. 60601-1 (2014)
ANSI/AAMI/IEC 60601-2-2:2017
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Chapter 1
General Instructions for Use

This User Manual describes the normal use of the unit.

Intended Use / Indications for Use

The Erbe electrosurgical unit (ESU/Generator) model VIO 300 D with instruments and accessories is intended to deliver high frequency (HF) electrical current for the cutting and/or coagulation of tissue, as well as vessel sealing.

Compatibility

The VIO 300 D can be combined with suitable Erbe units and modules (e.g. APC 2, EIP 2, ERBEJET 2), instruments and accessories.

See the Accessories chapter for information on the compatibility of instruments and accessories.

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Environment

For the intended use, the unit may only be operated in premises used for medical purposes.

Qualification of user

For the intended use, the unit may only be operated by medical professionals who have been trained in the use of the unit or combination of units on the basis of the User Manual.

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Chapter 2
Safety Instructions

Safety notations

⚠ 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.

NOTICE

indicates a potentially hazardous situation which, if not avoided, may result in property damage.

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Meaning of the note

"Note:"

Refers a) to manufacturer's information that relates directly or indirectly to the safety of people or protection of property. The information does not relate directly to a risk or dangerous situation.

Refers b) to manufacturer's information that is important or useful for operating or servicing the unit.

Who must read this User Manual?

Knowledge of the User Manual is absolutely essential for correct operation of the unit.

The User Manual must therefore be read by everyone who works with the unit.

Anyone who prepares, sets, disassembles, cleans and disinfects the unit must also read the User Manual.

Please pay particular attention to the safety instructions in each chapter.

Compliance with safety information

Working with medical units is associated with certain risks to patients, medical personnel and the environment. Risks cannot be entirely eliminated by design measures alone.

Safety does not depend solely on the unit. Safety depends to a large extent on the training of medical personnel and correct operation of the unit.

The safety instructions in this chapter must be read, understood and applied by everyone who is working with the unit.

Structure of safety instructions

The safety instructions are structured according to the following risks:

- Operating errors and incorrect installation by persons without training
- Risks due to the environment
- Electric shock
- Fire / explosion
- Burns
- Inadvertent tissue damage
- Risks due to incorrect use of the neutral electrode
- Defective unit
- Interference caused by the unit
- Damage to the unit and accessories
- Notes

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Operating errors and incorrect installation by persons without training

⚠ WARNING

Operating errors and incorrect installation by persons without training

Persons without training can operate or install the unit incorrectly.

Risk of injury or death for patients and medical staff! Risk of damage to property.

⇨ The unit may only be used and installed by persons who have been trained on how to use and install it properly according to this User Manual.

⇨ Training may only be carried out by persons who are suitable on the basis of their knowledge and practical experience.

⇨ In the event of uncertainties or if you have any questions, please contact Erbe Elektromedizin. You will find the addresses in the address list at the end of this User Manual.

Risks due to the environment

NOTICE

Interference with the unit from portable and mobile HF telecommunications units (e.g. mobile phones, WLAN units)

Electromagnetic waves emitted by portable and mobile HF telecommunications units may affect the unit.

The unit may fail or not perform properly.

⇨ When using portable and mobile HF telecommunications units, including their accessories, there must be a distance of at least 30 cm between them and the unit and its cords.

NOTICE

Unsuitable temperature or level of humidity during operation

If you operate the unit at an unsuitable temperature or level of humidity, it may sustain damage, fail, or not perform properly.

⇨ Operate the unit at a suitable temperature and level of humidity. You will find the tolerances for temperature and humidity in the Technical Data.

⇨ If other ambient conditions must be observed for operation of the unit, you will also find them in the Technical Data.

NOTICE

Unsuitable temperature or humidity in transit or storage

If you transport or store the unit at an unsuitable temperature or level of humidity, it may sustain damage and fail.

⇨ Transport and store the unit at a suitable temperature and level of humidity. You will find the tolerances for temperature and humidity in the Technical Data.

⇨ If other ambient conditions must be observed for transport and storage of the unit, you will also find them in the Technical Data.

NOTICE

Insufficient acclimatization time, unsuitable temperature during acclimatization

If the unit was stored or transported below or above a certain temperature, it will take a certain time and temperature to acclimatize.

If you do not observe the rules, the unit can sustain damage and fail.

⇨ Acclimatize the unit according to the rules in the Technical Data.

NOTICE

Overheating of the unit due to poor ventilation

If ventilation is poor, the unit can overheat, sustain damage, and fail.

⇨ Install the unit in such a way that there is an unobstructed circulation of air around the housing. Installation in confined wall recesses is prohibited.

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NOTICE

Penetration of liquid into the unit

The housing is not absolutely watertight. If liquid penetrates, the unit can sustain damage and fail.

⇨ Make sure no liquid can penetrate the unit.

⇨ Do not place vessels containing liquids on top of the unit.

Electric shock

⚠ WARNING

Defective grounded power outlet, power supply network without proper grounding, inferior-quality power cord, incorrect line voltage, multiple power outlets, extension cords

Risk of electric shock and other injuries to the patient and medical personnel! Risk of damage to property.

⇨ Connect the unit / cart to a properly installed grounded power outlet.

⇨ Only connect the unit to a power supply network with proper grounding.

⇨ Only use the Erbe power cord or an equivalent power cord with a national quality symbol for this purpose.

⇨ Check the power cord for damage. You must not use a damaged power cord.

⇨ The supply voltage must match the voltage specified on the unit's rating plate.

⇨ Do not use multiple power outlets.

⇨ Do not use extension cords.

⚠ WARNING

Incorrect power fuse, defective unit

Risk of electric shock to the patient and medical personnel! Risk of damage to property.

⇨ Blown power fuses may only be replaced by a competent technician. Only replacement fuses that have the same rating as the one specified on the unit's rating plate may be used.

⇨ When a fuse has been changed, the function of the unit must be verified. If the unit does not function properly or if there are any concerns, please contact Erbe Elektromedizin. You will find the addresses in the address list at the end of this User Manual.

⚠ WARNING

Connection of unit / cart and power supply during cleaning and disinfection

Risk of electric shock to the medical personnel!

⇨ Switch off the unit. Unplug the power plug of the unit / cart.

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Fire / explosion

In electrosurgery electric sparks and arcs occur at the instrument. Flammable gases, vapors, and liquids can be set alight or caused to explode.

⚠ DANGER

Flammable anesthetics

Risk of explosion to the patient and medical personnel! Risk of damage to property.

⇨ Do not use flammable anesthetics when an operation is being performed on the head or thorax.

⇨ If use is unavoidable, you must evacuate the anesthetics before performing electrosurgery.

⚠ WARNING

Flammable gas mixture in TUR (Transurethral Resection) and TCR (Transcervical Endometrial Resection)

Hydrogen and oxygen can ascend into the roof of the bladder, the upper part of the prostate, and the upper part of the uterus. If you resect into this gas mixture, it could combust.

Risk of combustion to the patient!

⇨ Allow the gas mixture to escape through the resectoscope sheath.

⇨ Do not resect into the gas mixture.

⚠ DANGER

Flammable endogenous gases in the gastrointestinal tract

Risk of explosion to the patient!

⇨ Extract the gases before performing electrosurgery or irrigate with CO_2.

⚠ DANGER

Combustion-supporting gases, e.g. oxygen, nitrous oxide

The gases can accumulate in materials like cotton wool or gauze. The materials become highly flammable.

Risk of fire to the patient and medical personnel! Risk of damage to property.

⇨ Do not use combustion-supporting gases when an operation is being performed on the head or thorax.

⇨ If use is unavoidable, you must evacuate the combustion-supporting gases before performing electrosurgery.

⇨ Remove any jeopardized (e.g. cotton wool or gauze) materials before performing electrosurgery.

⇨ Check the oxygen-carrying tubes and connections for leaks.

⇨ Check the endotracheal tubes and their cuffs for leaks.

⇨ Before using argon plasma coagulation (APC) in the tracheobronchial system it is absolutely essential that you observe the specific safety information and instructions in the User Manual for the argon plasma unit!

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⚠ WARNING

Active or hot instruments in contact with combustible materials

Materials like gauze, swabs, and cloths can catch fire.

Risk of fire to the patient and medical personnel! Risk of damage to property.

⇨ Do not bring active or hot instruments into contact with combustible materials.

⇨ Put instruments down in a safe place: sterile, dry, non-conductive, and easy to see. Instruments that have been put down must not come into contact with the patient, medical personnel, or combustible materials.

⚠ WARNING

Flammable detergents and disinfectants, flammable solvents in adhesives used on the patient and on the unit / cart

Risk of fire and explosion to the patient and medical personnel! Risk of damage to property.

⇨ Use products that are not flammable.

If the use of flammable products is unavoidable, proceed as follows:

⇨ Allow the products to evaporate completely before switching on the unit.

⇨ Check whether flammable liquids have accumulated under the patient, in body recesses such as the navel, or in body cavities such as the vagina. Remove any liquids before performing electrosurgery.

⚠ WARNING

Ignition of anesthetics, skin cleansers, and disinfectants in potentially explosive atmospheres

If you place the unit in a potentially explosive atmosphere, anesthetics, skin cleansers, and disinfectants can ignite.

Risk of fire and explosion to the patient and medical personnel! Risk of damage to property.

⇨ Do not place the unit in potentially explosive atmospheres.

Burns

⚠ WARNING

Damaged unit, damaged accessories, modified unit, and modified accessories

Risk of burns and injury to the patient and medical personnel! Risk of damage to property.

⇨ Check the unit and accessories for damage every time before using them (e.g. footswitch, cords of instruments and the neutral electrode, cart).

⇨ You must not use a damaged unit or damaged accessories. Replace defective accessories.

⇨ If the unit or cart is damaged, please contact our customer service.

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⇨ For your safety and that of the patient: Never attempt to perform repairs or make modifications yourself. Any modification will invalidate liability on the part of Erbe Elektromedizin GmbH.

⚠ WARNING

HF leakage current flows through metal parts

The patient must not have contact with electrically conductive objects. That includes metal parts of the operating table, for example. HF current can be discharged through points of contact accidentally (HF leakage current).

Risk of burns to the patient!

⇨ Position the patient on dry, antistatic drapes.

⇨ If the drapes can become wet during the surgery due to sweat, blood, irrigation liquid, urine, etc., lay a waterproof plastic sheet under the drapes.

⚠ WARNING

HF leakage current flows through monitoring electrodes

HF current can be discharged through points of contact between the skin and monitoring electrodes accidentally (HF leakage current).

Risk of burns to the patient!

⇨ Position monitoring electrodes as far away as possible from the procedural field (area where electrosurgical instruments are used).

⇨ Do not use needle electrodes for monitoring during electrosurgery.

⇨ Where possible, use monitoring electrodes that contain devices to limit high-frequency current.

⚠ WARNING

HF leakage current flows through skin-to-skin points of contact

HF current can be discharged through skin-to-skin points of contact accidentally (HF leakage current).

Risk of burns to the patient!

⇨ Prevent skin-to-skin points of contact. For example, lay dry gauze between the patient's arms and body.

⚠ WARNING

Unintentional activation of the instrument

Risk of burns to the patient and medical personnel!

⇨ Put instruments down in a safe place: sterile, dry, non-conductive, and easy to see. Instruments that have been put down must not come into contact with the patient, medical personnel, or combustible materials.

⇨ Instruments that have been put down must not come into contact with the patient, not even indirectly. An instrument can come into contact with the patient indirectly through electrically conductive objects or wet drapes, for example.

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⚠ CAUTION

Hot instruments

Even non-active instruments that are still hot can burn the patient or medical personnel.

⇨ Put instruments down in a safe place: sterile, dry, non-conductive, and easy to see. Instruments that have been put down must not come into contact with the patient, medical personnel, or combustible materials.

⇨ Instruments that have been put down must not come into contact with the patient, not even indirectly. An instrument can come into contact with the patient indirectly through electrically conductive objects or wet drapes, for example.

⚠ WARNING

Unintentional activation of the instrument during an endoscopic application

If the instrument is activated and remains activated during an endoscopic application, the patient can suffer burns when the instrument is removed.

All points that come into contact with the active part of the instrument are at risk. The cause of unintentional activation can be a fault in the footswitch or unit for example.

You will recognize unintentional activation from the continuous activation signal, even though you have released the footswitch.

Risk of burns to the patient!

⇨ Turn off the power switch on the electrosurgical unit immediately. Only then should the instrument be removed from the patient's body.

⚠ WARNING

Capacitive coupling between the cords of two instruments

When one instrument is activated, current can be transferred to the cord of another instrument (capacitive coupling).

The patient can suffer burns if the non-active but still live instrument has direct or indirect contact with the patient.

Risk of burns to the patient!

⇨ Lay the cords of instruments in such a way that they are as far apart as possible.

⇨ Put instruments down in a safe place: sterile, dry, non-conductive, and easy to see.

⇨ Instruments that have been put down must not come into contact with the patient, medical personnel, or combustible materials.

⇨ Instruments that have been put down must not come into contact with the patient, not even indirectly. An instrument can come into contact with the patient indirectly through electrically conductive objects or wet drapes, for example.

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⚠ WARNING

Power setting too high, ON time too long, effects too high

The higher the power setting the longer the ON time of the unit and the higher the effect the higher the risk of accidental tissue damage.

Risk of accidental tissue damage to the patient!

- ⇨ Set power as low as possible relative to the required surgical effect. However, power settings that are too low can be dangerous, e.g. gas embolisms with the APC (Argon Plasma Coagulation).
- ⇨ Activate the unit for as short a time as possible relative to the required surgical effect.
- ⇨ The temperature at the neutral electrode site increases during long and continuous activations; therefore, ensure that the cooling phases between activations are sufficient.
- ⇨ Set effect as low as possible relative to the required surgical effect.
- ⇨ If you are unable to achieve a surgical effect with a power setting / ON time / effect level that is sufficient judging from experience, this can be due to a problem with the electrosurgical unit or accessories:
- ⇨ Check the instrument for soiling with insulating tissue remnants.
- ⇨ Check the neutral electrode to make sure it is secure.
- ⇨ Check the connectors on all cords to make sure they are secure.

⚠ WARNING

Activation of the unit with no knowledge of active settings

If the user does not understand the active settings of the unit, he can cause the patient accidental tissue damage.

- ⇨ Check the active settings on the display of the unit, after: switching on the unit, connecting up an instrument, and changing the program.

⚠ WARNING

The user was not informed of a change in maximum ON time

Risk of accidental tissue damage to the patient!

- ⇨ All users must be informed of any change in maximum ON time at an early stage. That is, before the user works with the modified maximum ON time for the first time.
- ⇨ The temperature at the neutral electrode site increases during long and continuous activations; therefore, ensure that the cooling phases between activations are sufficient.

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⚠ WARNING

Tissue structures / vessels with a cross-section that is small or becoming smaller

If monopolar HF current flows through parts of the body with a relatively small cross-section, there is a risk of unintentional coagulation for the patient!

⇨ If possible, use the bipolar coagulation technique.

⚠ WARNING

Activation signal not audible

You do not hear the signal when the electrosurgical unit is activated.

Risk of burns to the patient and medical personnel!

⇨ Adjust the activation signal so that it is clearly audible.

⚠ WARNING

Undesirable contact between the active instrument and metal objects in the patient's body

Contact with metal hemostats, etc.

Risk of burns to the patient!

⇨ Do not touch metal objects (e.g. implants) in the patient's body with the active instrument.

⚠ CAUTION

A hand-held metal instrument is touched with the active instrument (electrode)

Risk of hand burns!

⇨ Such practice is not recommended. The risk of burns cannot be ruled out.

⚠ CAUTION

HF leakage current flows through the skin of medical personnel

Risk of burns to the patient and medical personnel!

⇨ Do not come in contact with the patient while the surgeon is using an active electrosurgical instrument on the patient.

Inadvertent tissue damage

⚠ WARNING

Safety margin between the active instrument and sensitive tissue structures too narrow

Adjacent structures can be damaged by the thermal effect of electrosurgery.

⇨ Ensure that there is a sufficient safety margin between the active instrument and sensitive tissue structures (e.g. nerves, muscles).

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⚠ CAUTION

Electrically conductive implants can redirect or concentrate current flow.

Risk of burns for the patient and possible damage to the implant.

⇨ In the case of patients wearing electrically conductive implants, consult the manufacturer of the implant or the relevant specialist department of your hospital prior to surgery.

⇨ Position the neutral electrode so that the implant is not located between the active electrode (monopolar instrument) and the neutral electrode.

Risks due to incorrect use of the neutral electrode

⚠ CAUTION

Non-compatible or single surface neutral electrode

When applying a non-compatible neutral electrode, it should be expected that monitoring the contact between neutral electrode and skin is faulty.

When applying a single surface neutral electrode, the contact between neutral electrode and skin is not monitored. If contact between neutral electrode and skin is inadequate, the unit does not emit any visual and acoustic signal.

Risk of burns for the patient under the neutral electrode!

⇨ Check in the accompanying papers of the manufacturer whether the neutral electrode is suitable for the VIO unit used.

⇨ Use only suitable neutral electrodes.

⇨ When applying a single surface neutral electrode: Regularly check the neutral electrode for good skin contact.

⇨ Check in the accompanying papers of the manufacturer whether the neutral electrode cable is suitable for the neutral electrode used.

⇨ Use only suitable neutral electrode cables.

⚠ WARNING

Positioning the neutral electrode above the heart

Risk of cardiac arrhythmia for the patient due to function-related currents from neutral electrode monitoring!

⇨ Do not position the neutral electrode over the heart or in the region of the heart.

⚠ CAUTION

Incorrect application of the neutral electrode

Risk of burns to the patient!

⇨ Apply the entire contact surface of the neutral electrode to a muscular part of the body with good blood circulation.

⇨ Apply the neutral electrode as close as possible to the surgical site.

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⇨ Insert the contact tab of the neutral electrode completely into the connecting clamp. The contact tab must not touch the patient's skin. (For reusable cord with disposable pads only.)

⇨ Align the symmetry line of the neutral electrode towards the operating field. The current should flow from the active electrode (instrument) to the symmetry line of the neutral electrode.

⇨ Check the neutral electrode regularly for good contact with the patient's skin.

⇨ Check the neutral electrode especially when the patient has been repositioned and after surgical steps where the unit was activated frequently and for a long time.

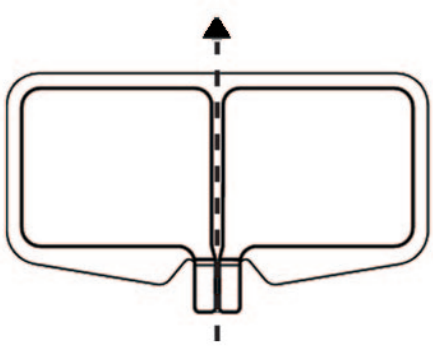

Fig. 2-1

⚠ CAUTION

Short circuit in the connecting cable or in the clip of a dual surface neutral electrode

With the NESSY setting "NE: either way" setup and a short circuit in the connecting cord or in the clip of a dual surface neutral electrode the unit can no longer monitor the contact with the patient's skin or the application direction of the contact surface. You will not receive a warning if the electrode becomes detached from the skin. You will not receive a warning if the application direction of the neutral electrode is incorrect.

Risk of burns to the patient!

⇨ To rule out the possibility of a short circuit in the connecting cable and the clip before use, see Chapter 2 of this Manual "Safety Features" for NESSY.

Note: Erbe recommends the use of split neutral electrodes in combination with the NESSY setting set to "NE: dynamic" or "NE: dual surface". With this combination the optimal use of the safety monitoring functions are given (see chapter 2 "NESSY Safety Features). If the unit is activated in a monopolar mode using a cable with a short, the unit will give an audible warning signal and will display a "B-B" error message on the screen.

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⚠ WARNING

HighCurrent Mode: Using the SOFT COAG mode at Effect 6 or higher with an unsuitable neutral electrode

Risk of burns to the patient!

⇨ If you set the Soft Coag Mode with Effect 6 or higher together with a power limitation of 135 watts or higher, you may only use neutral electrodes that are compatible for a heating factor of 36 A^2s according to the manufacturer's specifications. These are, for example, the Erbe neutral electrodes NESSY Plate 170 (REF No. 20193-070, 20193-074) or NESSY RePlate 200 (REF No. 20193-090).

Defective unit

⚠ WARNING

Undesirable rise in output level due to failure of electrosurgical unit

Risk of accidental tissue damage to the patient!

⇨ The unit shuts off independently.

⇨ To guard against a possible failure of the electrosurgical unit, have a technical safety check carried out at least once a year.

⚠ WARNING

Technical safety checks not being done

Risk of injury or death for patients and medical staff! Risk of damage to property.

⇨ Have a technical safety check carried out on the unit at least once a year.

⇨ You must not use a unit that is not safe.

⚠ WARNING

Failure of display elements

If display elements fail, you can no longer operate the unit safely.

Risk of injury or death for patients and medical staff!

⇨ You must not use the unit.

Interference caused by the unit

⚠ WARNING

Interference with cardiac pacemakers, internal defibrillators, or other active implants

Activation of the electrosurgical unit may affect the performance of active implants or damage them.

Risk of injury or death for patients!

⇨ In the case of patients having active implants, consult the manufacturer of the implant or the competent department of your hospital prior to performing surgery.

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⇨ Do not position the neutral electrode near cardiac pacemakers, internal defibrillators, or other active implants.

NOTICE

Interference with electronic units due to the electrosurgical unit

The activated electrosurgical unit can affect the performance of electronic units by causing interference.

The units may fail or not perform properly.

⇨ Position the electrosurgical unit, the cords of the instruments, and the cord of the neutral electrode as far away as possible from electronic units.

⇨ Position the cords as far away as possible from the cords of electronic units.

⚠ WARNING

Low-frequency currents stimulate nerves and muscles (Neuromuscular Stimulation)

Low-frequency currents arise either due to low-frequency power sources or partial rectification of the HF current. Spasms or muscle contractions can occur.

Risk of injury to the patient.

⇨ Set effect as low as possible relative to the required surgical effect.

NOTICE

Use of non-approved internal cables by Technical Service

This can result in the increased emission of electromagnetic waves or reduce the immunity of the unit.

The unit may fail or not perform properly.

⇨ Technical Service may only use the internal cables that are listed in the service manual for the unit.

NOTICE

Stacked units

If you place the unit next to or stack it with other units, the units may affect each other.

Units may fail or not function properly.

⇨ The unit may only be placed next to or stacked with VIO-series units.

⇨ If it is necessary to operate the unit near or stacked together with non-VIO-series units keep as much distance as possible between the units. Check whether the units are affecting each other: Are the units behaving unusually? Are faults occurring?

⚠ WARNING

Use of non-approved EMC-relevant accessories

This can result in the increased emission of electromagnetic interference or reduce the electromagnetic immunity of the unit.

Risk of injury to the patient.

Units may fail or not function properly.

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⇨ Only use cable that is specified in the table *"EMC-relevant accessories"*, see chapter *"Notes on electromagnetic compatibility (EMC)"*.

⇨ If you are using accessories from other manufacturers, check whether the Erbe unit is interfering with other units or being affected by interference itself. You cannot use the unit if there is any interference.

Damage to the unit and accessories

NOTICE

Alcohol-based spray disinfectant for fast disinfection

With membrane keyboards and paint surfaces there is the risk of cracks. Propanol and ethanol will erode surfaces.

⇨ Do not use these substances.

NOTICE

Alternate use of disinfectant solutions based on different active ingredients

A color reaction may occur with plastics.

⇨ Do not use these substances alternately.

NOTICE

Mix-up of sockets on monopolar socket modules 20140-622, 20140-623

If the sockets are mixed up, the unit will be damaged.

⇨ If you use a connecting cable with a monopolar 4 mm dia. connector, you may only plug the connector into the socket with the blue ring. The correct socket is marked with an arrow on the illustration.

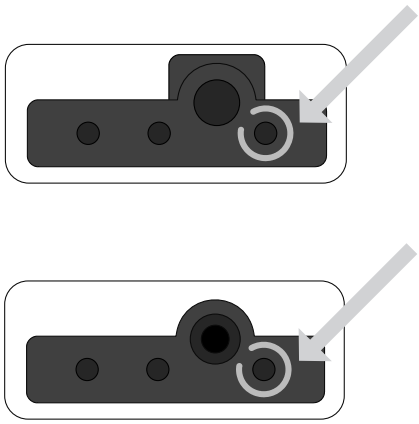

Fig. 2-2

⚠ CAUTION

Electric load on instrument too high

The instrument can be damaged.

If the damaged area comes into contact with tissue, it can lead to unintentional coagulation.

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⇨ Determine the electrical capacity of the instrument. It is either printed on the instrument or can be found in the User Manual. Compare the electrical capacity of the instrument with the maximum HF peak voltage of the required mode.

⇨ Instructions are available in the "Accessories" chapter.

NOTICE

Very long activation cycles without cooling phases

The electrosurgical unit is designed and tested for a relative ON time of 25 % (conforming to IEC 60601-2-2). If you perform very long activation cycles without appropriate cooling phases, the unit can be damaged.

⇨ Keep to the 25 % relative ON time (see also Technical Data, Operating Mode), if you operate the unit for a lengthy period.

Notes

Grounding

Note: If necessary, connect the grounding pin of the unit or the cart to the grounding system of the operating room using a grounding cable.

Use of a defibrillator

Note: All HF sockets and the neutral electrode socket (applied parts) meet Type CF requirements and are protected against the effects of defibrillator discharge.

Membrane keyboards

Note: If alcohol-based disinfectants are used on units with membrane keyboards, this remove the anti-glare finish. However, the user surfaces remain fully functional. This does not present a hazard.

Using a smoke evacuator

Note: In order to evacuate the smoke that develops during electrosurgical procedures, Erbe recommends using a smoke evacuator.

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Chapter 3
Safety Features

NESSY

What is NESSY?

The unit is equipped with a Neutral Electrode Safety System (NESSY), which monitors the neutral electrode (neutral electrode), warns of critical situations, and thus prevents burns. How effective the monitoring is depends on whether you choose a single surface or dual surface neutral electrode and on the NESSY setting.

The NESSY settings

On delivery the unit is set to *Neutral electrode: Dual surface*. To utilize this setting, you require a dual surface neutral electrode.

In the unit's service programs, a technician can carry out various NESSY settings according to your requirements. The following table shows you what effects the settings will have on the safety of monitoring.

- You will see the safety level in the first column. 1 = highest safety level.
- In the second column you can see the combination of neutral electrode (NE) / setting in the service programs.
- In columns 3 - 6 you can see what safety level NESSY offers with various combinations.

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		Unit - NE connection	Skin - NE contact	NE application direction	Higher safety for patients with low skin resistance
1	Dual surface NE / setting "NE: Dynamic"	●	●	●	●
2	Dual surface NE / setting "NE: Dual surface"	●	●	●	
3	Dual surface NE / setting "NE: Either way"	●	Partial, observe warning	Partial, observe warning	
4	Single surface NE / setting "NE: Either way"	●			
4	Single surface NE / setting "NE: Single surface"	●			

Short circuit in the connecting cord or in the clip of a dual surface neutral electrode with the NESSY setting "NE: either way" setup

With the NESSY setting "NE: either way" setup and a short circuit in the connecting cord or in the clip of a dual surface neutral electrode the unit can no longer monitor the contact with the patient's skin or the application direction of the contact surface. You will not receive a warning if the electrodes becomes detached from the skin. You will not receive a warning if the application direction of the neutral electrode is incorrect.

A check of the connecting cable can be performed before use as follows:

- Switch on the Unit. Set the NESSY setting to "NE: either way". Connect the cable to the neutral electrode socket.
- If the connecting cable or the clip of a reusable cable do not have shorts the display of the dual surface (1) and the display of the single surface (2) will light up red. If the displays lights up green, a short of the cable is detected by the unit.

Fig. 3-1

The displays of neutral electrodes (1) and (2) light up red.

- When you have inserted the dual-surface electrode into the clip and applied it to the patient, the display of the dual-surface neutral electrode (1) must light up green. However, when the display of the single-surface neutral electrode lights up green, there is a defect in the connecting cord or in the clip.

Fig. 3-2

The display of the dual-surface neutral electrode (1) lights up green.

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How do I receive information about the safety status of the neutral electrode?

Observe the indicator lights

Fig. 3-3

The neutral electrode socket is equipped with indicator lights, which represent a dual surface electrode (1) and a single surface electrode (2) respectively. Call up the NESSY window using the Focus button. Here you can check which setting is active in the unit's service programs.

- *Neutral electrode: Dynamic surface*
- Neutral electrode: Dual surface
- *Neutral electrode: Either way*
- *Neutral electrode: Single surface*

If the unit is set for a dual surface / dynamic electrode and you connect a single surface electrode, the dual surface indicator light will illuminate red. If the unit is set for a single surface electrode and you connect a dual surface electrode, the single indica-

tor light will illuminate red. In both cases you can only activate monopolar mode if you connect the correct electrode.

No electrode connected

If you switch on the unit without having connected an electrode, the indicator lights will illuminate red. It is not possible to activate monopolar mode.

Single surface electrode connected. Setup "Neutral electrode: Single surface"

If you connect a single surface electrode, the unit only monitors the connection between unit and electrode. If this is faultless, the electrode symbol illuminates green (safety status Green). Monopolar mode can be activated.

If the connection to the unit is interrupted, or if the electrode contact tab is not fully inserted into the connection clamp, the electrode symbol illuminates red (safety status Red). Monopolar mode cannot be activated. If you activate the unit despite the warning, an audible warning signal is emitted. If a single surface electrode is connected, the contact between the electrode and the patient's skin is not monitored! You will not receive a warning if the electrode becomes detached from the skin and there is a danger of burns.

Dual-surface neutral electrode connected. "Neutral electrode: Dual surface" or "Neutral electrode: Either way" setup

To optimally utilize the unit's monitoring functions, Erbe recommends connecting a dual-surface electrode, and in particular the Erbe NESSY Omega electrode. Apart from many other advantages, this electrode virtually eliminates any possibility of excessive heating of the tissue and skin at the edges of the electrode.

Contact between skin and electrode

If you connect a dual-surface electrode, the unit not only monitors the connection between unit and electrode, but also the contact between skin and electrode. If everything is OK, the electrode symbol illuminates green (safety status Green). Monopolar mode can be activated.

If the connection with the unit is interrupted, or if the contact tab is not fully inserted into the connection clamp, or if the contact with the skin is so bad that there is a danger of burns, the electrode symbol illuminates red (safety status Red). Monopolar mode cannot be activated. If you attempt activation, an audible warning signal is emitted..

Application direction of the contact surface relative to the conduction direction

When dual-surface electrodes are used, NESSY also monitors the direction of application of the contact surface relative to the conduction direction. The high-frequency current is not, as a rule, distributed evenly over the contact surface of the neutral electrode. The current flows to the proximal corners or edges. There it can be larger than at the distal corners or edges. For this reason, when applying the neutral electrode, ensure that the neutral electrode's line of symmetry points toward the operating field.

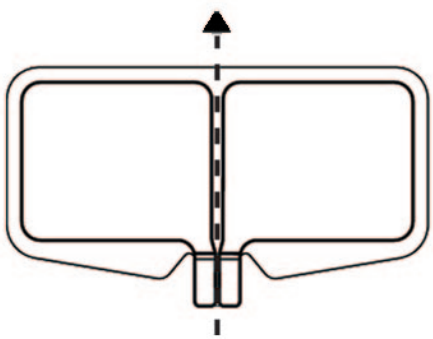

Fig. 3-4

NESSY compares the currents that flow through the two surfaces of the neutral electrode. If the currents differ slightly from each other, a green indicator window appears on the display. Monopolar mode can still be activated, but you should correct the position of the neutral electrode as soon as possible.

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If the currents differ too greatly from each other, the dual-surface electrode symbol on the VIO illuminates red. Monopolar mode cannot be activated. If you attempt activation, an audible warning signal is emitted. A red warning message appears on the display: When applying the neutral electrode, ensure that the line of symmetry points toward the operating field.

Checking function of the NESSY window when a dual-surface electrode is connected with "Neutral electrode: Dual surface" or "Neutral electrode: Either way" setup

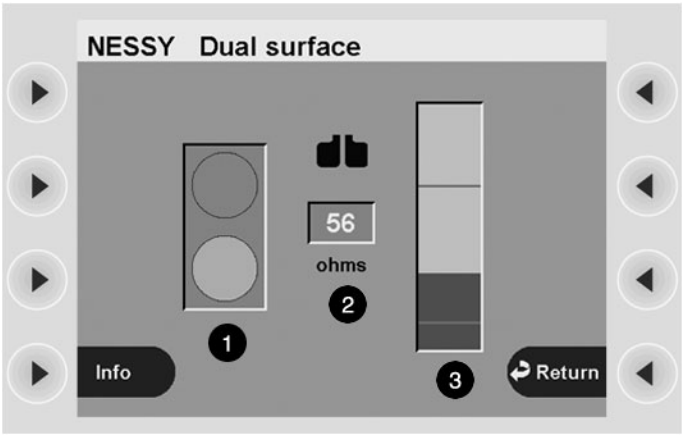

Fig. 3-5

If you press the Focus button on the neutral electrode socket, you change to the NESSY window.

You will see a traffic-light symbol (1). According to the contact resistance between skin and electrode, this symbol shows the following:

- Safety status Green. The unit can be activated without any danger for the patient.
- Safety status Red. You cannot activate the unit.

The middle indicator (2) shows the contact resistance as a numerical value.

"Neutral electrode: Dual surface" setup. The diagram on the right (3) shows the contact resistance as a bar. The upper and lower limits of the Green safety status are indicated by a red line at the top and bottom. The lower limit is 20 ohms. The upper limit is 120 ohms.

"Neutral electrode: Either way" setup (not illustrated). The diagram on the right (3) shows the contact resistance as a bar. The upper limit of the Green safety status is indicated by a red line. The upper limit is 120 ohms.

Dual surface neutral electrode connected. "Neutral electrode: Dynamic" setup

The "Neutral electrode: Dynamic" setup offers extra safety for patients with low skin resistance, for example, patients with little subcutaneous fatty tissue, children and infants. Even with these patients, critical detachment of the neutral electrode from the skin is detected in good time.

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Checking function of the NESSY window when a dual-surface electrode is connected with "Neutral electrode: Dynamic" setup

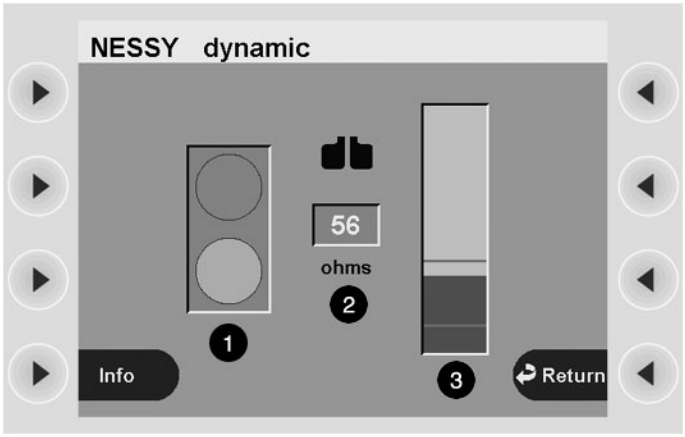

Fig. 3-6

If you press the Focus button on the neutral electrode socket, you change to the NESSY window.

You will see a traffic-light symbol (1). According to the contact resistance between skin and electrode, this symbol shows the following:

- Safety status Green. The unit can be activated without any danger for the patient.
- Safety status Red. You cannot activate the unit.

The middle indicator (2) shows the contact resistance as a numerical value.

The diagram on the right (3) shows the contact resistance as a bar. The upper and lower limits of the Green safety status are indicated by a red line at the top and bottom. The lower limit is 20 ohms. The upper limit is not fixed at 120 ohms, but depends on the lowest contact resistance measured between skin and neutral electrode (measured value). The upper limit is reduced relative to the measured value to ensure that a critical detachment of the neutral electrode from the skin is detected in good time.

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The NESSY window as a visual aid to applying a dual surface electrode

When you apply a dual surface electrode to the patient's skin, first change to the NESSY window. With the aid of its displays, you can recognize how good the skin contact is. Ideally the contact resistance should be between 20 and 120 ohms.

The NESSY window when connecting a single-surface electrode

To check a single-surface electrode it is sufficient to observe the indicator lights. Similarly, in the NESSY window you will only receive the information: Safety status Green or Red.

When a single-surface electrode is connected, the NESSY window does not give any visual assistance. The contact between electrode and skin cannot be measured when a single-surface electrode is used.

Neonatal NE Monitoring System

When using Neonatal neutral electrodes, you can activate the Neonatal NE Monitoring System. You can then turn the Neonatal NE Monitoring System on or off in the *NESSY* window. If an electric current limit of 300 mA is exceeded, an advisory message is shown on the VIO display:

"Neonatal NE Monitoring System. Reduce the effect or power setting."

Exceeding the electric current limit can indicate intense heating of the neutral electrodes. Check the neutral electrodes for heating, and reduce the effect and or power setting if necessary.

Automatic monitoring of equipment output error

The unit is equipped with an automatic monitoring system for the HF output parameters. This system monitors any divergence between the actual value and the setpoint of the HF output parameters selected and emits warning signals or switches off the HF generator if the divergence is so great that the required quality of the respective effect (CUT or COAG) is no longer guaranteed.

For the operating surgeon the display of any equipment output error allows him to immediately see, in the event of divergence or absence of the required effect, whether this defect has been caused by the unit. With the unit, any divergence of the HF output parameters from the HF output parameters actually selected can only be caused by loads with an excessively low resistance, e.g. too large coagulation electrodes, short circuit between active electrode and neutral electrode or by a defect in the unit.

Automatic monitoring of the ON time

With proper use, a high-frequency generator is only briefly activated to carry out a cut or coagulation using a fingerswitch, pedal or AUTO START. This generally only takes a few seconds. A defect in the unit, in the accessories or in usage may cause the high-frequency generator to be switched on unintentionally. To prevent major damage being caused by accidental activation of a high-frequency generator the unit is equipped with a monitor which automatically monitors the ON time of the high-frequency generator.

When a predetermined maximum ON time is exceeded, the monitor emits a visual and acoustic signal and automatically switches off the HF generator. However, the HF generator can be switched back on at any time, resulting in renewed monitoring of the ON time. This prevents major damage being caused by the accidental activation of an HF generator for indefinitely long periods.

Custom adaptation of maximum ON time

In view of the risk of thermal tissue damage due to the accidental switch-on, a HF generator which has been switched on accidentally should be switched off again automatically, as far as possible immediately. As the unit cannot automatically distinguish between the intentional and accidental switch-on of a HF generator, the automatic switch-off of a HF generator should not take place too quickly as this would hinder the operating surgeon with cutting or coagulation. Setting of the ON time can only be carried out by a technician in the service programs.

⚠ WARNING

The user was not informed of a change in maximum ON time

Risk of accidental tissue damage to the patient!

⇨ All users must be informed of any change in maximum ON time at an early stage. That is, before the user works with the modified maximum ON time for the first time.

⇨ The temperature at the neutral electrode site increases during long and continuous activations; therefore, ensure that the cooling phases between activations are sufficient.

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Protection from operating errors

To prevent operating errors the front panel and the menus are designed so as to automatically monitor and signal illogical or incomplete settings.

All sockets of the applied part are arranged in the socket strip next to the front panel. These sockets are designed so that only connectors of the proper accessories can be inserted (provided that only the accessories supplied or recommended by the manufacturer of the unit are used).

You can connect three instruments simultaneously to the unit. However, for safety reasons they can only be activated alternately. HF voltage is only ever carried by one socket. TWIN COAG mode is an exception to this.

Whenever the power switch is switched on, an automatic test program is run inside the unit, designed to detect and signal the following defects in the operator controls of the unit and the connected accessories:

- If a button on the front panel has short-circuited due to an error or was pressed when the power switch was switched on, this error will be indicated acoustically and by an error number and message after switch-on of the power switch.
- If a button on the electrode handle has short-circuited due to an error or has been bypassed at low resistance (e.g. due to moisture in the electrode handle) or was pressed while the power switch was switched on, this error will be indicated acoustically and by an error number and message after switch-on of the power switch.
- If a contact of the footswitch has short-circuited due to an error, or a pedal is jammed or a pedal was pressed while the power switch was switched on, this error will be indicated acoustically and by an error number and message.

The relevant error message on the display of the VIO tells you how to remedy the error.

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Chapter 4
Accessories

Introduction

You can connect a number of instruments and neutral electrodes from different manufactures to the VIO.

Check Erbe instruments and instruments from other manufacturers for compatibility with the required CUT / COAG mode of the VIO before use. Instructions are available in this chapter.

Check the neutral electrodes from other manufacturers for compatibility with the VIO before use. Instructions are available in this chapter.

The following offers an overview of example accessories for each accessory category. A complete overview is available in the Erbe accessories catalog and on the Erbe website. We recommend the use of Erbe accessories.

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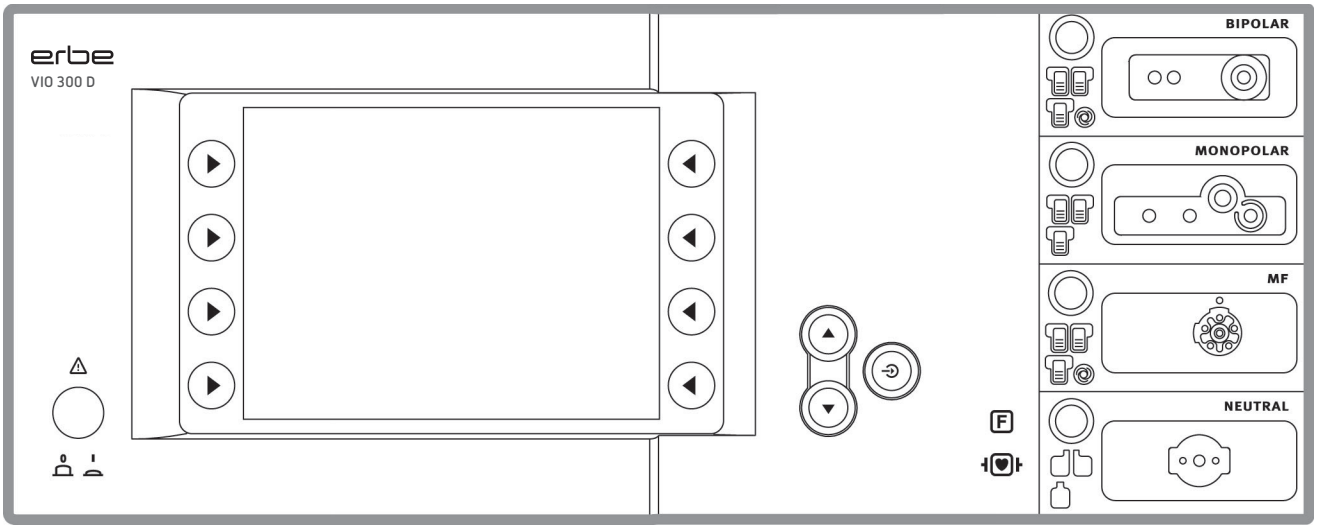
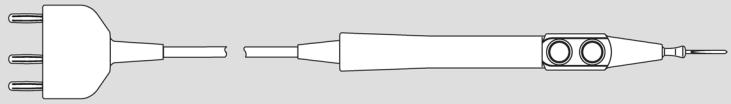
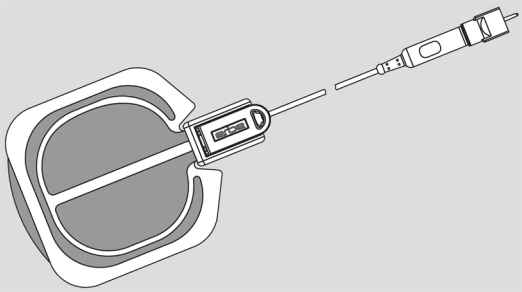
VIO 300 D example accessories



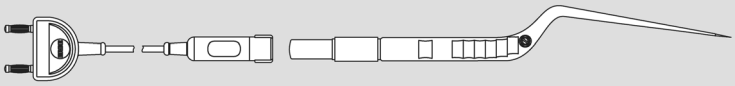
Monopolar electrosurgical pencils, monopolar electrodes



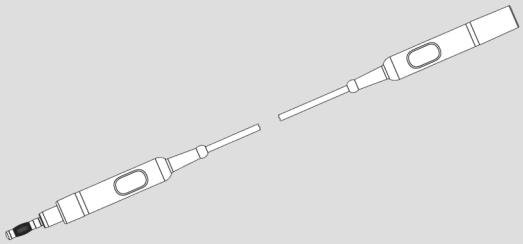
Neutral electrodes



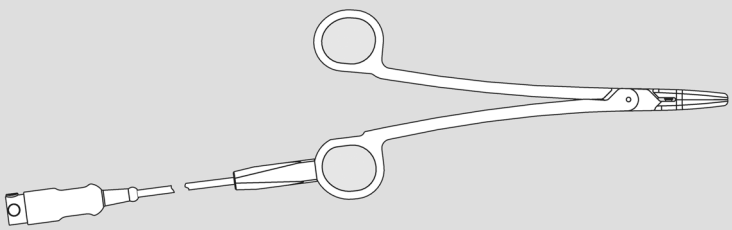
Bipolar instruments, bipolar forceps



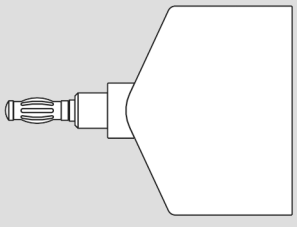
Connecting cables for electrosurgery



BiClamp and BiClamp LAP forceps



Adapters for electrosurgery



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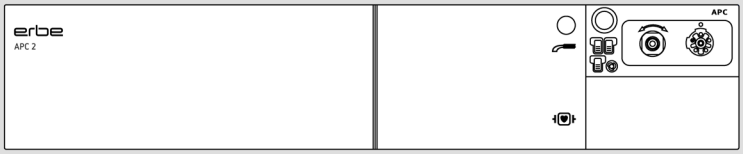
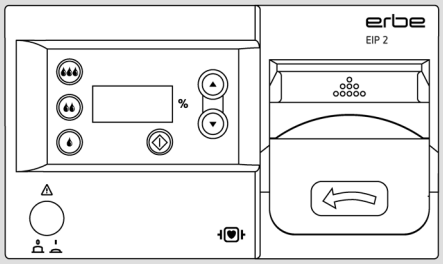
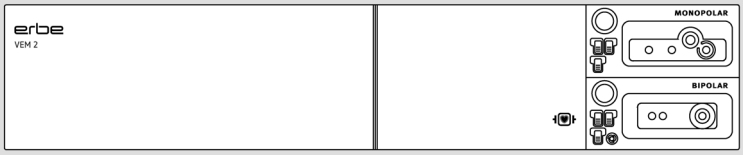
APC 2 (unit for argon-plasma coagulation)



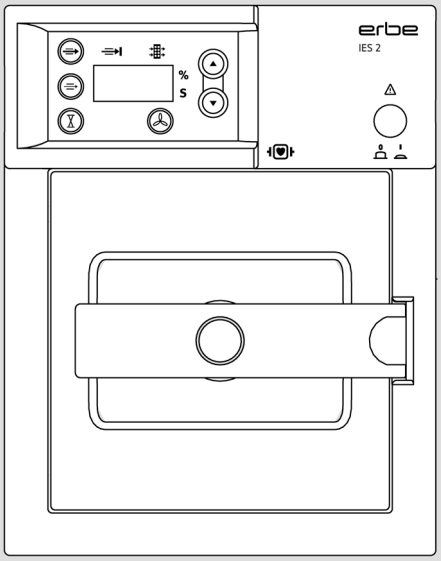
EIP 2 (irrigation pump)



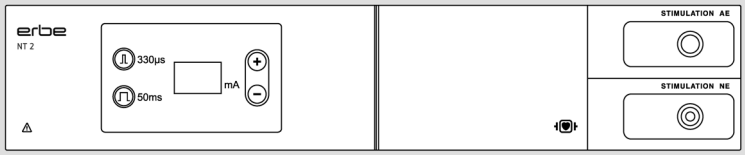
VEM 2 (module for socket extension)



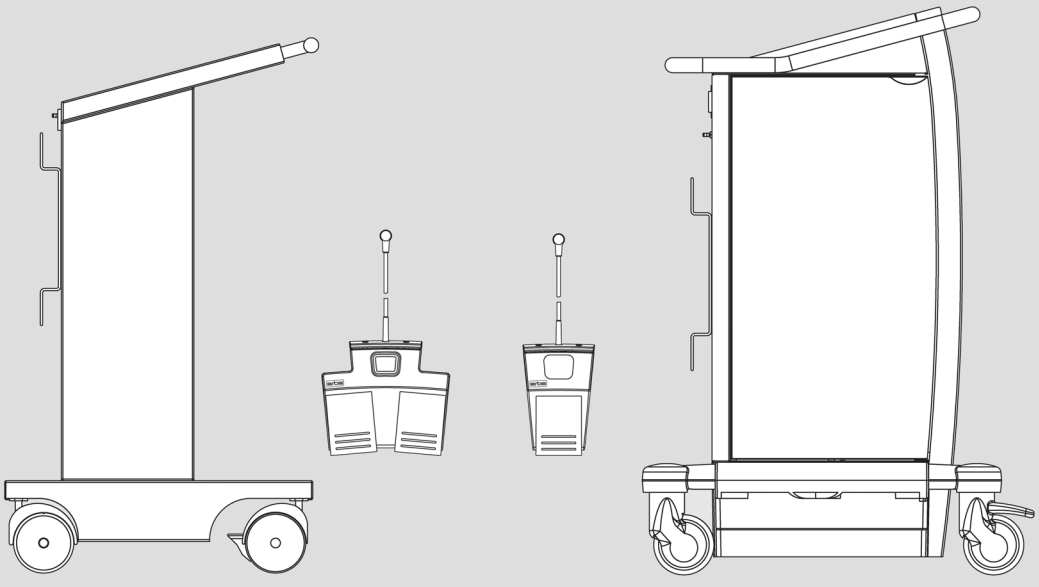
IES 2 (smoke evacuation)



NT 2 (nerve stimulator)



Accessories for ESU and modules



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Check compatibility of instrument and CUT / COAG mode with the help of the Upmax display

⚠ CAUTION

Electric load on instrument too high

The instrument can be damaged.

If the damaged area comes into contact with tissue, it can lead to unintentional coagulation.

⇨ Determine the electrical capacity of the instrument. It is either printed on the instrument or can be found in the User Manual. Compare the electrical capacity of the instrument with the maximum HF peak voltage of the required mode.

⇨ Observe the following instructions.

1. Determine the electrical capacity of the instrument

The maximum electrical capacity of the instrument is indicated on the instrument or in the User Manuals of the instruments. The unit of measurement for electrical capacity is Vp. For example, an instrument can have a maximum electrical capacity of 5 kVp (5000 Vp). Another instrument can have a maximum electrical capacity of 500 Vp. You are not permitted to load the instrument beyond these values.

Example

You want to operate an instrument with a maximum electrical capacity of 500 Vp. You want to operate the instrument in AUTO CUT mode and with Effect 8. Look at the *Upmax* display in the *Select Cut Effect* window.

2. Call up the CUT effect window

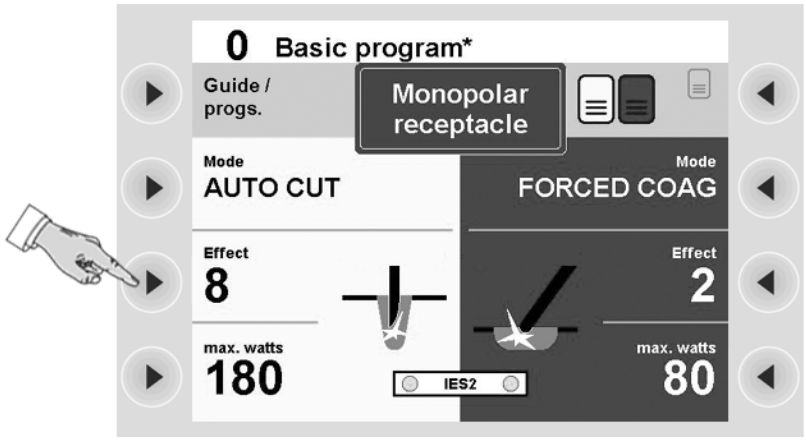

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Fig. 4-1

➢ Press the selection button next to the *Effect* menu item.

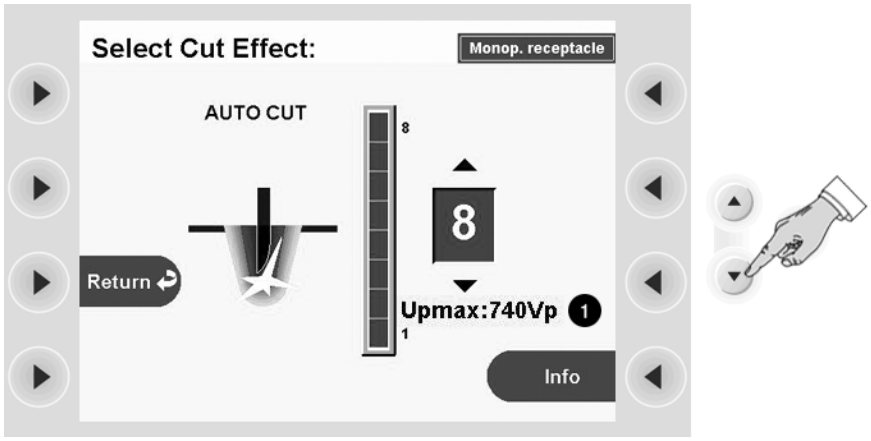

Fig. 4-2

The AUTO CUT mode with Effect 8 would load the instrument with peak voltage of 740 Vp (1). Do not operate the instrument with Effect 8 of the AUTO CUT mode. The electrical capacity of the instrument (500 Vp) is less than the HF peak voltage (740 Vp) of the AUTO CUT mode with Effect 8.

➢ Reduce the effect. Press the down button until the HF peak voltage (1) is the same or less than 500 Vp.

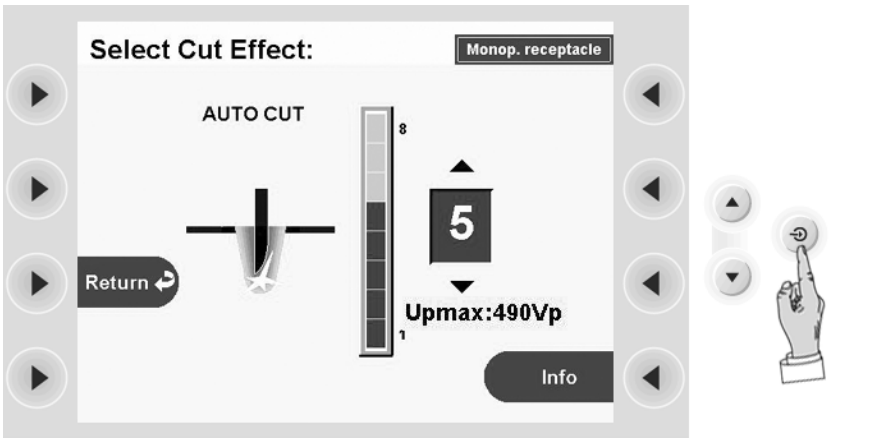

Fig. 4-3

➢ The HF peak voltage (490 Vp) of the AUTO CUT mode with Effect 5 is less than the electrical capacity of the instrument (500 Vp). You may operate the instrument with these settings. Confirm the settings. Press Enter.

You can also check the compatibility of instruments and COAG mode in the same way. Call up the *Select Coag Effect* window.

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Check compatibility of the neutral electrode

⚠ CAUTION

Non-compatible or single surface neutral electrode

When applying a non-compatible neutral electrode, it should be expected that monitoring the contact between neutral electrode and skin is faulty.

When applying a single surface neutral electrode, the contact between neutral electrode and skin is not monitored. If contact between neutral electrode and skin is inadequate, the unit does not emit any visual and acoustic signal.

Risk of burns for the patient under the neutral electrode!

⇨ Check in the accompanying papers of the manufacturer whether the neutral electrode is suitable for the VIO unit used.

⇨ Use only suitable neutral electrodes.

⇨ When applying a single surface neutral electrode: Regularly check the neutral electrode for good skin contact.

⇨ Check in the accompanying papers of the manufacturer whether the neutral electrode cable is suitable for the neutral electrode used.

⇨ Use only suitable neutral electrode cables.

Depending on the neutral electrode (single surface or dual surface) and the settings in the service programs, the neutral electrode safety system (NESSY) of the VIO monitors various parameters for Erbe and compatible neutral electrodes:

- The unit / neutral electrode connection
- The skin / neutral electrode contact
- The application direction of the neutral electrode

Get to know what specific parameters are monitored in the "Safety Features" chapter. When using single surface neutral electrodes, the skin / neutral electrode contact is not monitored.

When using third-party neutral electrodes, you must check in the accompanying papers of the manufacturer whether the neutral electrode is suitable for the VIO used.

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Compatible footswitches

You can connect only Erbe footswitches to the VIO. There are special footswitches for the VIO D / VIO S series and special footswitches for the VIO C series.

Adapter bipolar resection

Intended use

The adapter bipolar resection is used to connect bipolar resectoscopes to a VIO 300 D with MF socket. It allows the use of the BIPOLAR CUT ++ and BIPOLAR SOFT COAG ++ modes.

Fig. 4-4

Instructions

1. Connect the adapter with the connection cable (1) to the MF socket on the VIO.
2. Hold the magnetic inside of the adapter on the right wall of the VIO (socket side). The adapter sticks.
3. Connect the bipolar resectoscope with the Erbe bipolar cable for resectoscopes to the RESECTOSCOPE socket (2).

BIPOLAR CUT ++ and BIPOLAR SOFT COAG ++ are only available with adapter

You must use the adapter to access the optimized BIPOLAR CUT ++ and BIPOLAR SOFT COAG ++ modes. These modes are not available if you directly connect the resectoscope to the MF socket on the VIO.

Resectoscopes only work on the RESECTOSCOPE socket

You can only connect resectoscopes to the RESECTOSCOPE socket. Other instruments fit in the socket, but do not work. If you want to use the MF socket on the VIO with an instrument, remove the adapter.

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Chapter 5
Description of the Controls

Controls on the front panel

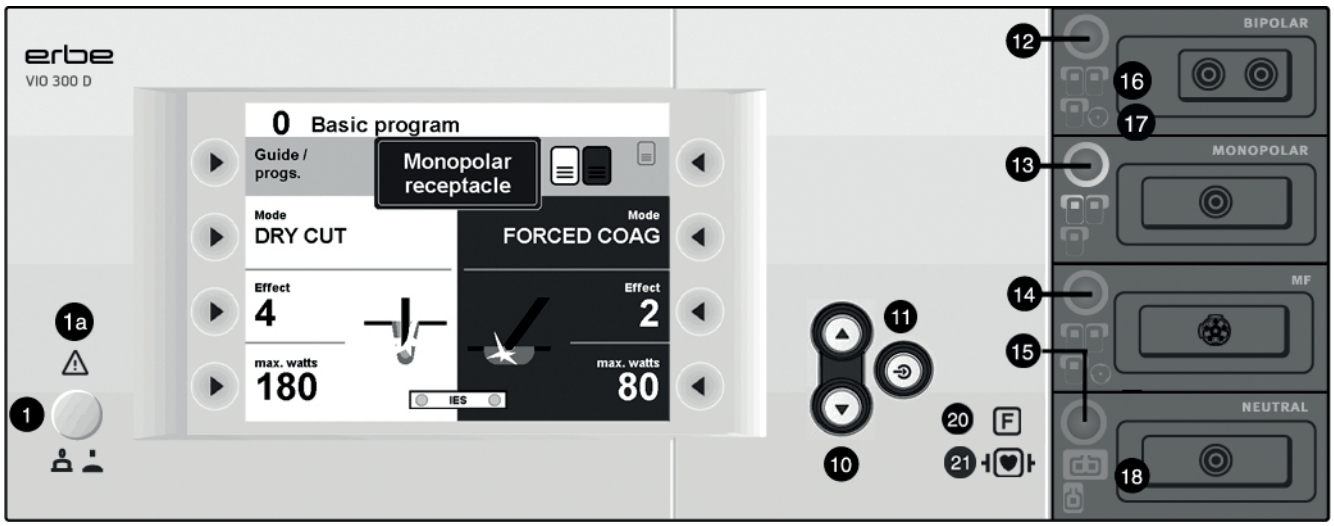

Fig. 5-1

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Power

(1) Power switch

Unit on/off. The unit is only fully disconnected from the power supply once the power cord is pulled out. Install the unit such that the power cord could be easily disconnected from the power source.

Symbol

(1a)

Indicates that the safety instructions in the User Manual must be read before switching the unit on.

Adjustment buttons

(10) Up / down

These buttons always have a function when they appear in the display. For example, the buttons are used to select the effect.

(11) Enter

Confirms a setting, accepts a selection, saves a setting.

Focus buttons

You can combine the unit sockets in any way required. In this regard Fig. 5-1 is only one example of a configuration. If a Focus button next to the socket is pressed, the functions of the socket and the setting of the functions will be shown in the display.

(12) Focus button for bipolar socket

(13) Focus button for monopolar socket

(14) Focus button for MF socket

(15) Focus button for neutral electrode socket

Shows info about the neutral electrode on the display.

Pilot lamps

(16) Footswitch

The footswitch symbol lights up when the respective footswitch is assigned to the scoket.

(17) Auto Start

When this lamp is lit up, Auto Start is active.

(18) Neutral electrodes

Single-surface or dual-surface neutral electrode connected. Green: all OK. Red: Hazard, call up Focus button, check neutral electrode.

Symbol

(20)

The symbol designates a constructional safety measure. The patient circuit is insulated from ground. The danger of leakage currents and therefore the danger of burns is substantially reduced for the patient.

Symbol

(21)

All HF sockets and the neutral electrode socket (applied parts) meet Type CF requirements and are protected against the effects of defibrillator discharge.

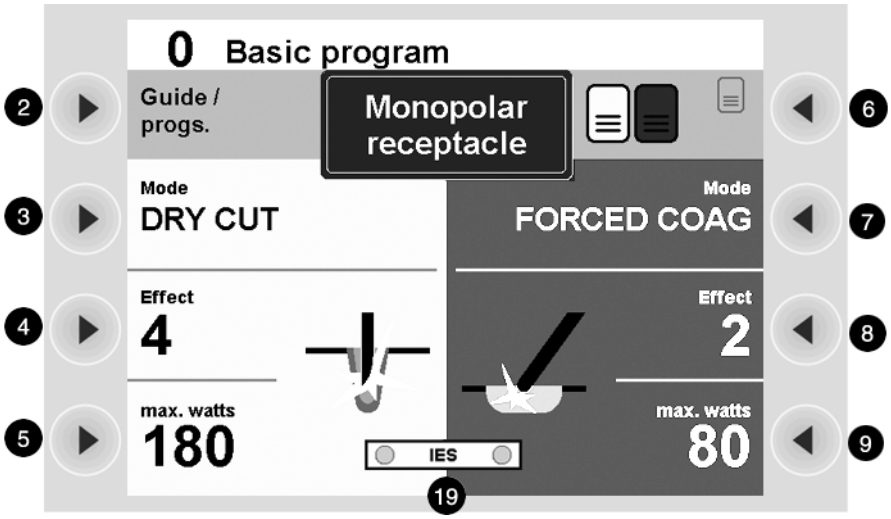

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Fig. 5-2

Selection buttons

The buttons have a different function depending on which window is shown on the display. Take note of the function toward which the button points.

In this example showing the Cut / Coag settings for the monopolar socket, the buttons have the following functions:

(2) Directory / Programs

Calls up the Directory window. The window provides information about the assignment of the active program: Which CUT / COAG mode, which effect, what capacity are active for which socket?

In addition, you have access to the submenu Select Program and the submenu Additional Functions.

(3) Select CUT mode

Calls up the window for selection of a CUT mode.

(4) Select CUT effect

Calls up the window for selection of a CUT effect.

(5) Select CUT power limitation

Calls up the window for selection of a CUT power limitation level.

(6) Socket Selected

Calls up the window for selection of the footswitches and Auto Start modes.

(7) Select COAG mode

Calls up the window for selection of a COAG mode.

(8) Select COAG effect

Calls up the window for selection of a COAG effect.

(9) Select COAG power limitation

Calls up the window for selection of a COAG power limitation level.

(19) Signal for smoke evacuator

If this signal is green in the control field Cutting or Coagulate, the smoke evacuator will automatically start on activation of the respective mode.

Controls on the back

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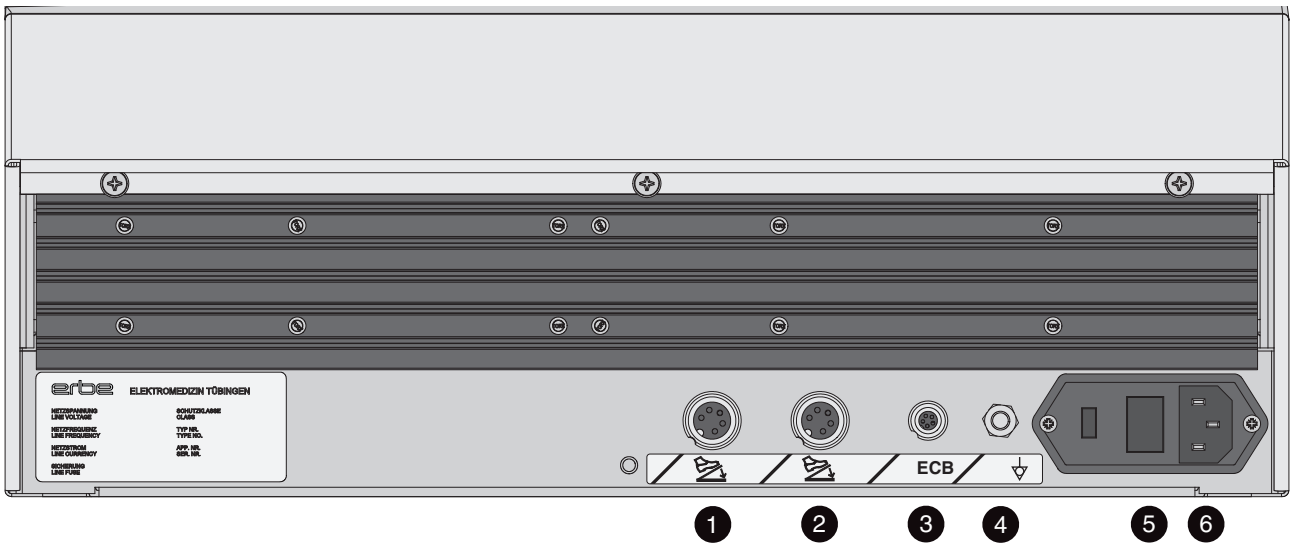

Fig. 5-3

Please consult the chapter Installation

The controls described below are important for installation of the unit.

Sockets

(1) and (2) footswitch sockets

You can connect a single-pedal and a dual-pedal footswitch to these sockets. The dual-pedal footswitch can be connected to either socket (1) or socket (2). The same applies to the single-pedal footswitch.

(3) ECB sockets (ECB means Erbe Communication Bus)

You can connect other units to the electrosurgical unit, e. g. an APC or a smoke evacuator. The electrosurgical unit then functions as a control unit whose display shows the functions of the other units. The ECB ensures communication between the units. Connect an ECB cable to this socket and connect it to one of the other units.

Potential equalization

(4) Potential equalization terminal

Connect a potential equalization line and connect this to the potential equalization system of the operating room. If you are using the Erbe VIO-CART, connect the potential equalization line to the potential equalization pin of the VIO-CART.

Power fuses

(5) Power fuses

The unit is protected with power fuses. If one of these power fuses has blown, the unit may not be used on the patient again until it has been checked by a competent technician. The values of the power fuses are specified on the unit's rating plate. Only spare fuses with these values may be used.

Power connection

(6) Power connection

Connect the unit to a properly installed grounded power outlet. Only use the Erbe power cord or an equivalent power cord with a national quality symbol for this purpose. If the unit is installed on the Erbe VIO-CART, make the power connection with the power cord of the VIO-CART.

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Chapter 6
Working with the Electrosurgical Unit: a Tutorial

The tutorial and your electrosurgical system

You have an individually configured system

The electrosurgical unit is part of a system. Every electrosurgical system is put together individually for you. This variability involves the sockets, the software and also the combination with other units which can be connected to the electrosurgical unit. There are separate user manuals for the units which are available for the combinable units and for the VIO-CART.

The tutorial is based on a sample configuration

In this tutorial you will learn how to operate the VIO 300 D electrosurgical unit using a sample configuration. Although the unit you have before you may be configured differently, the structure of the user environment and operation of the functions is nevertheless identical.

As with a computer program you can call up a series of windows in the user environment of the unit. In a window you can carry out a series of actions. You do not have to call up the windows and carry out the actions in a specific sequence. This depends on what you wish to achieve. A tutorial normally specifies a procedure; for this reason it can only act as an example.

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Operation is intuitive and simple to learn

The tutorial puts forward a task and describes the solution. Erbe recommends learning the different steps on the unit. Then think of a typical work situation: organize the sockets according to your requirements, for example, and save a program. If you get stuck with the settings in a window, consult the tutorial. "Learning by doing" is the fastest way to learn. Operation of the unit has been designed to be intuitive and enjoyable. The time required to work through the tutorial and several separate exercises is between 30 and 45 minutes. You should then have a grasp of all major functions.

Make power connection, switch on unit, self-test, assignment of active program

1. Make power connection

The supply voltage must match the voltage specified on the unit's rating plate.

Connect the unit to a properly installed grounded power outlet. Only use the Erbe power cord or an equivalent power cord with a national quality symbol for this purpose. If the unit is installed on the Erbe VIO-CART, make the power connection with the power cord of the VIO-CART.

2. Switch on unit, performance test

Use the power switch to switch the unit on. The unit then carries out a performance test and checks all sockets. Connected units and footswitches are detected. All pilot lamps and Focus buttons light up. The version number of the software appears on the display.

3. Getting an overview: assignment of the active program for the electrosurgical unit

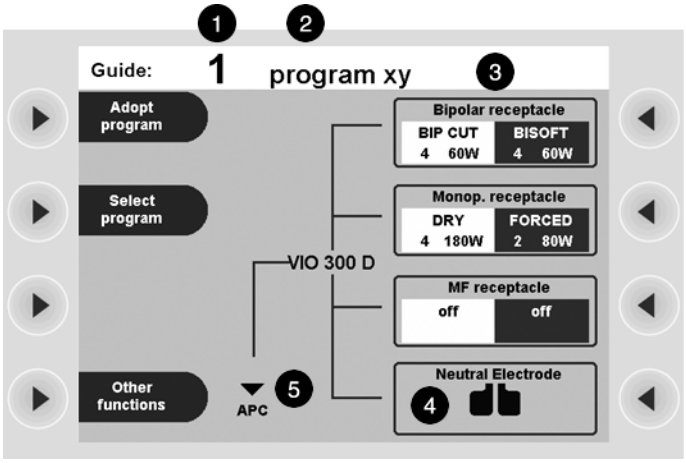

Fig. 6-1

Once the performance test has been completed, you will see the window *Guide*. Here you can see the number (1) and the name (2) of the active program. In this example it is the program *1 program xy*.

On the right side of the window you can see the assignment (3) of the active program. The sockets of your individual unit are displayed schematically. This provides you with answers to the questions: Which CUT / COAG mode, which effect, what capacity are active for which socket?

You now have two options for activating CUT or COAG for a socket of the program.

Option 1: Direct activation from the window *Guide*. It is not possible to assign a footswitch to a socket here. You can activate all sockets with a fingerswitch. With a footswitch you can only activate the CUT or COAG mode for a socket which was allocated a footswitch in the program. The allocation of the footswitches in this view can be seen from the illuminated footswitch symbols of the sockets.

Option 2: You press the selection button next to the menu item *Adopt Program*, switch to the window *Cut / Coag Settings* and effect activation from this window. The window *Cut / Coag Settings* focuses attention on the functions of a socket. In the window *Cut / Coag Settings* any allocation of the footswitches is possible. Activation using a fingerswitch is possible. The use of the window *Cut / Coag settings* is described in detail from p. 52.

In both cases you first have to confirm by pressing any button that you have checked the settings of the active program. Superimposed on the window *Guide* you will see a small window with the message:

Check settings before activating. Please confirm by pressing key

Only when you have complied with this prompt will you have access to the active program and the functions of the window *Guide*.

After switch-on, the unit always calls up the program you last used. This does not apply to ReMode programs. See here p. 67. In the sample program the bipolar socket is assigned with the following settings:

- Cut mode: BIP CUT
- Cut effect: 4
- Cut power limitation: 60 W
- Coag mode: BISOFT
- Coag effect: 4
- Coag power limitation: 60 W

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If your unit is equipped with a neutral electrode socket, the display of the socket will show a neutral electrode (4).

If you have connected an APC 2, an IES 2 or another unit to the electrosurgical unit, you can also find out about the assignment of the other unit sockets in the program.

The sample display shows the symbol of the Down button (5). Underneath you can see APC. An APC 2 is connected to the electrosurgical unit. If you press the Down button on the front panel of the electrosurgical unit, the window scrolls down to the APC sockets:

4. Getting an overview: assignment of the active program for the APC 2

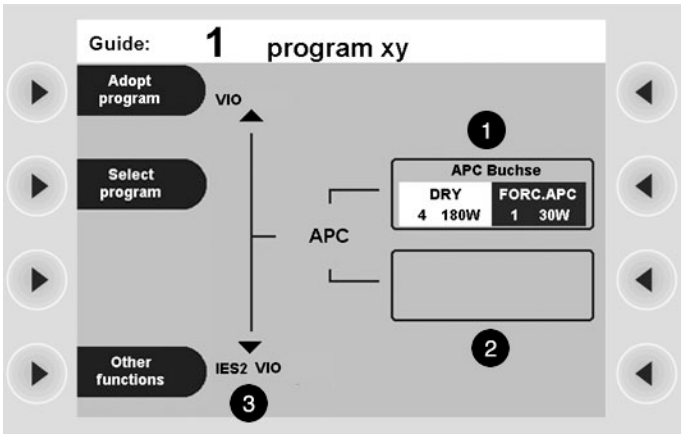

Fig. 6-2

In the sample display the APC 2 has one socket (1). The box showing the second socket (2) is empty.

Although the functions of the APC 2 are set on the electrosurgical unit, operation of the APC 2 is described in a separate user manual. Please consult the chapter Working with the APC 2 in the user manual for the APC 2.

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5. Getting an overview: assignment of the active program for the IES 2

Im Beispiel-Display ist das Symbol der Ab-Taste dargestellt (3). Darunter lesen Sie IES. Es ist ein IES 2 am HF-Chirurgiegerät angeschlossen. Wenn Sie die Ab-Taste auf der Frontplatte des HF-Chirurgiegerätes drücken, scrollt das Fenster zu den IES 2-Einstellungen.

Although the functions of the IES 2 are set on the electrosurgical unit, operation of the IES 2 is described in a separate user manual. Please consult the chapter Working with the IES 2 in the user manual for the IES 2.

Press the Up button several times. You will move to the first view of the window *Guide*.

6. Connecting the IES 3 to the VIO 300 D, operating the IES 3

Connecting the IES 3 to the VIO 300 D: Read the chapter The IES 3 in combination with a VIO D-series electrosurgical unit in the IES 3 user manual.

Operating the IES 3: Make all settings on the IES 3. Read the chapter Working with the IES 3 in the IES 3 user manual.

Adopt Program

Adopt Program

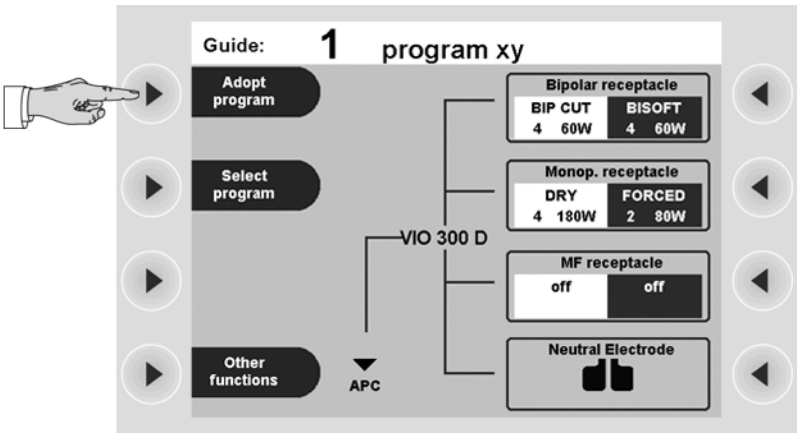

Fig. 6-3

If you want to accept the active Existing Program, press the selection button next to the menu item *Adopt program*. You will then move to the window *Cut / Coag Settings*. You will then see the settings of the socket last activated. The Focus button next to this socket is lit up.

Alternatively, you can press the selection button next to a socket display, e. g. the selection button next to the monopolar socket. With this action you will likewise accept the program. You will then move to the window *Cut / Coag Settings*. You will then see the settings for the socket selected. The Focus button next to this socket is lit up.

Press the selection button next to the menu item *Guide / progs*.You will then move to the window *Guide*.

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Select Program

1. Call up window Select Program

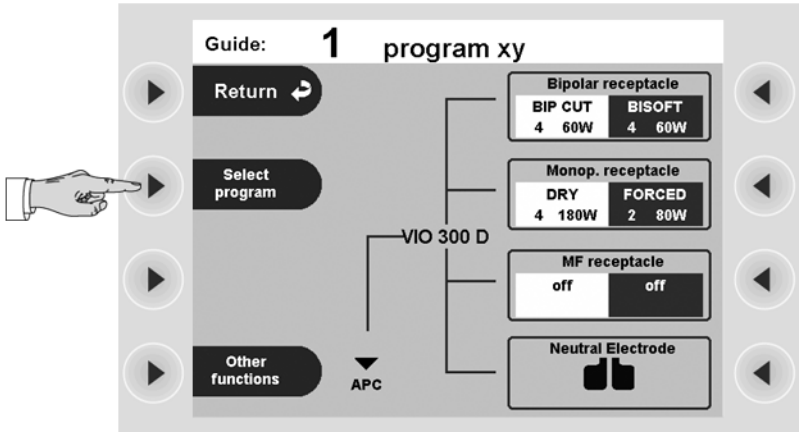

Fig. 6-4

If you want to use another program, press the selection button next to the menu item *Select program*.

2. Select Program

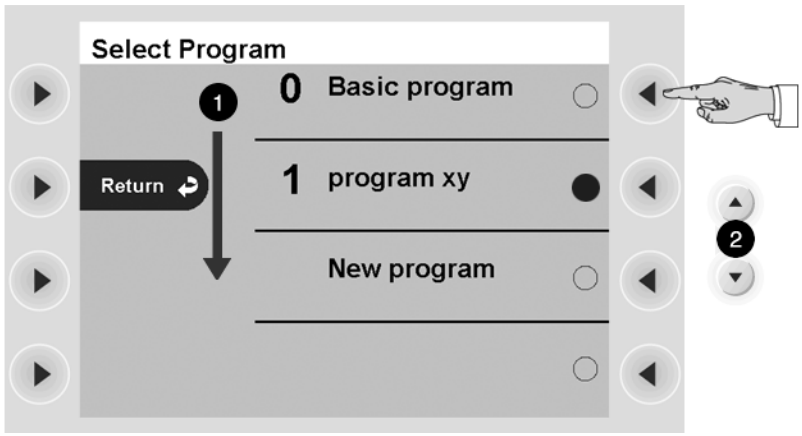

Fig. 6-5

You will then move to the window *Select Program*. You will then see a selection list of programs (1).

1. If you press the Up/Down buttons (2), and more than 4 programs are stored, the window scrolls in the program selection list. The active program is marked in green.
2. Press the selection button next to the required program. For the purpose of this exercise please select the *Basic Program*.

3. Accept selected program

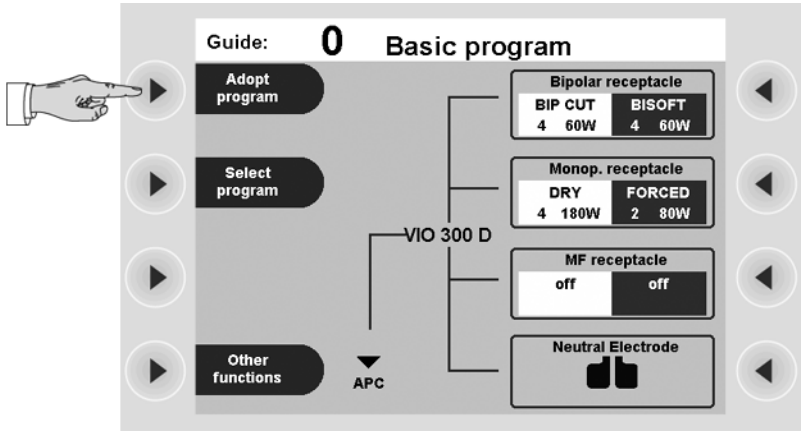

Fig. 6-6

You have now returned to the window *Guide* and can find out about assignment of the active program (see Assignment of the active program 48).

If you want to accept the selected program, press the selection button next to the menu item *Adopt Program*. You will then move to the window *Cut / Coag Settings*. You will then see the settings of the socket last activated. The Focus button next to this socket is lit up.

Alternatively, you can press the selection button next to a socket display, e. g. the selection button next to the monopolar socket. With this action you will likewise accept the program.

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The basic concept of the electrosurgical unit: focusing attention on the functions of a socket (Focus View)

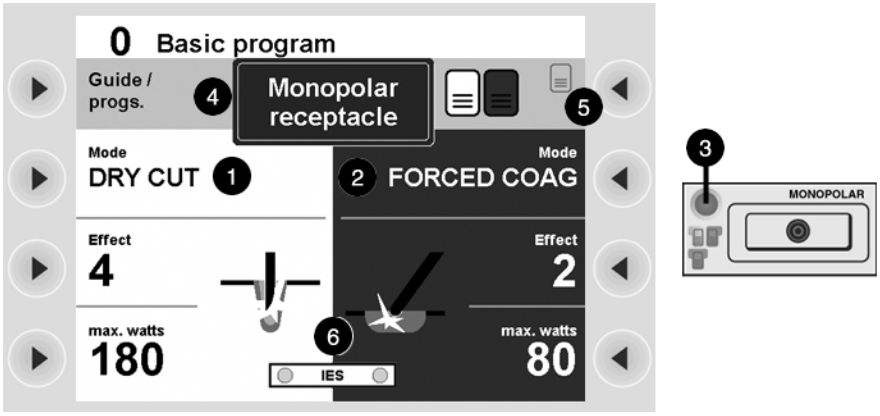

Fig. 6-7

The window Cut / Coag Settings

The window *Cut / Coag Settings* focuses attention on the functions of a socket as you only ever see the CUT settings (1) and COAG settings (2) of one socket.

If you want to check or change the settings of a socket, call up the socket with the appropriate Focus button (3). This also applies to the sockets of the connected units. For example, the CUT / COAG settings of the APC 2 are also displayed in this window of the electrosurgical unit.

Alternatively, you can briefly activate the instrument which is connected to the required socket. The display automatically switches to the activated socket.

Pressing the Focus button of the neutral electrode socket will show information about the neutral electrode on the display.

The window *Cut / Coag Settings* always appears in combination with the footswitch and Auto Start pilot lamps for the sockets! Further details can be found under the heading: socket Selected.

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What can I do in the window Cut / Coag Settings?

You can:

- Select CUT (1) and COAG (2).
- Change to the window *Guide* (4).
- Select a footswitch or Auto Start function (5) for the socket. Auto-Start is, however, only possible in the bipolar modes. In the display cutout (5), all the possible types of activation for the socket depicted are shown. The assigned activation type is highlighted in color.
- Determine whether the smoke evacuator is automatically activated (6) with CUT or COAG.

Changing settings of the Basic Program

Here you will change

- the mode,
- the effect,
- the power limitation,
- and the activation type.

Meaning of the asterisk

When you change a program, an asterisk next to the name of the program shows that you have made a change. When you save the program, the asterisk disappears.

The changed Basic Program cannot be saved. The changed Basic Program must be saved under a new name.

Setting Cut mode

1. Call up CUT mode

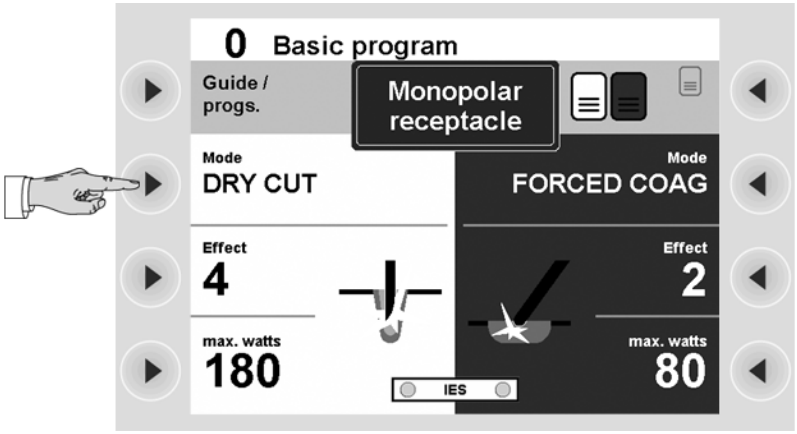

Fig. 6-8

Press the selection button next to the menu item *Mode*.

2. Select CUT mode

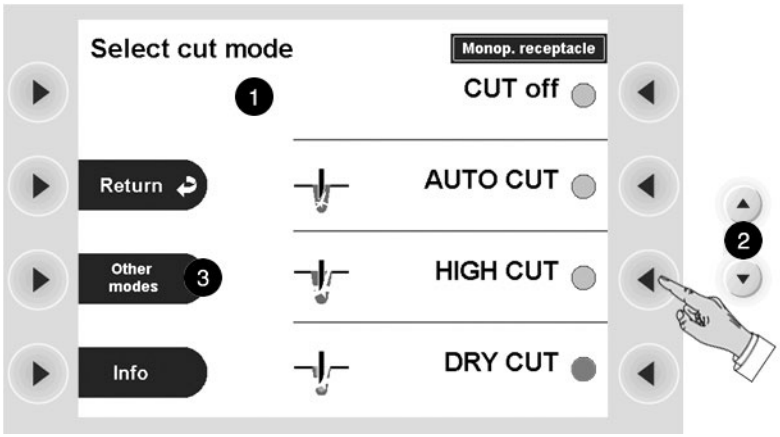

Fig. 6-9

You will then move to the window *Select cut mode*. On the right you will see a selection list of modes (1).

1. If you press the Up / Down button (2), the window scrolls in the selection list. The active mode is marked in green. To change to other modes (if available), you can also press the Select button next to the "Other modes" menu item (3). You will then change to the next window in which the selection list is continued. When you have reached the end of the selection list by pressing the Select button, the next time you press the Select button, you will return to the start of the selection list.
2. Press the selection button next to the required CUT mode (example: HIGH CUT). You will then move back to the window *Cut / Coag Settings*.

If you want to deactivate the CUT mode for the socket, select *CUT off in the selection list*.

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Call up information on CUT mode

If you wish, you can display information about the active CUT mode after selection of the CUT mode. Press the selection button next to the menu item *Mode again*. Press the selection button next to the menu item *Info*.

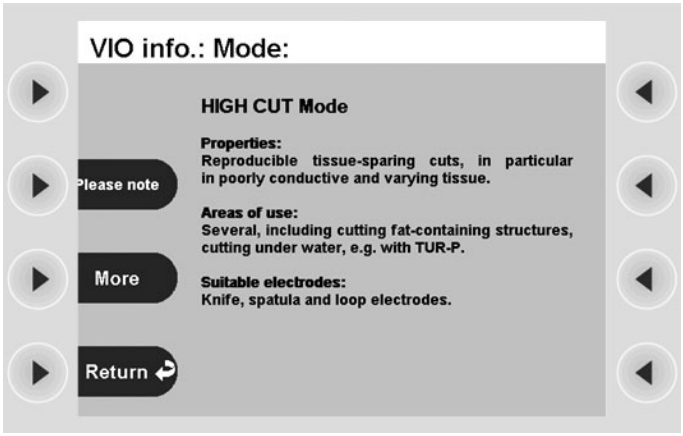

Fig. 6-10

Scroll with the Up/Down buttons or use the Select button next to the "Other modes" menu item to display the description of the mode selected.

After you have read the text, press the selection button next to the menu item *Return*. You will then move back to the window *Select cut mode*.

There press the selection button next to the menu item *Return*. You will then move back to the window *Cut / Coag Settings*.

Useful information can be called up in many windows for the unit. The method used to call up such information is always identical. It is not explained again in the next stages of the tutorial.

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Setting CUT effect

1. Call up CUT Effect

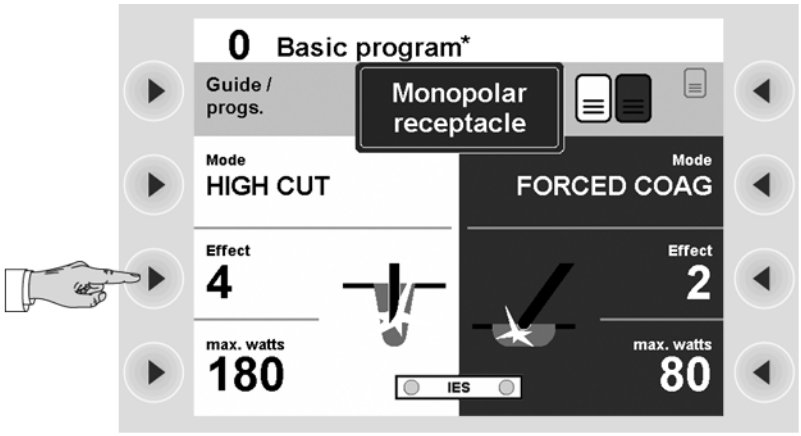

Fig. 6-11

Press the selection button next to the menu item *Effect*.

2. Choose CUT Effect

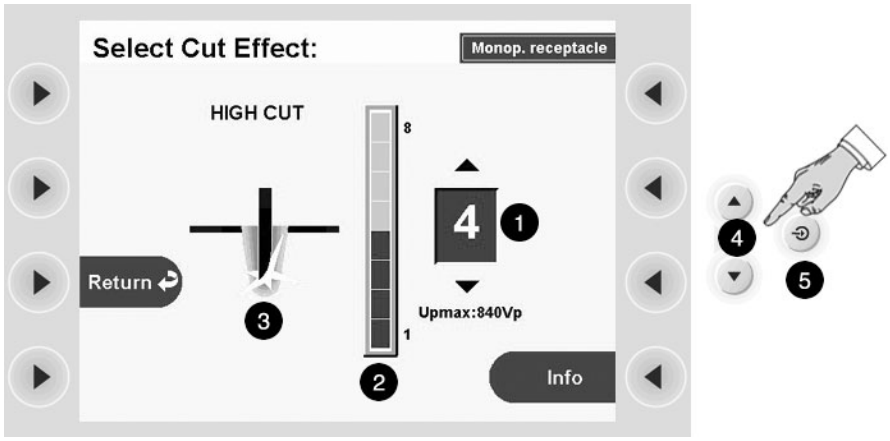

Fig. 6-12

You will then move to the window *Select Cut Effect*.

You will see a numerical display for the effect (1) and a display in the form of a bar diagram (2).

The *Upmax* display shows the maximum HF voltage [Vp] when activating the unit. This maximum electrical capacity is given in [Vp] in the user manual of the instrument or on the instrument itself. If the voltage is greater than the capacity of the instrument, the instrument can be damaged. In such cases select a smaller effect.

A picture (3) shows the consequence of the effect on tissue.

1. Select an effect with the Up / Down buttons (4) (example: Cut Effect 4):
2. Confirm your selection by pressing the Enter button (5) or by pressing the selection button next to the menu item *Return*. You will then move back to the window *Cut / Coag Settings*.

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Selecting CUT Max. Wattage

1. Call up Cut Power limitation

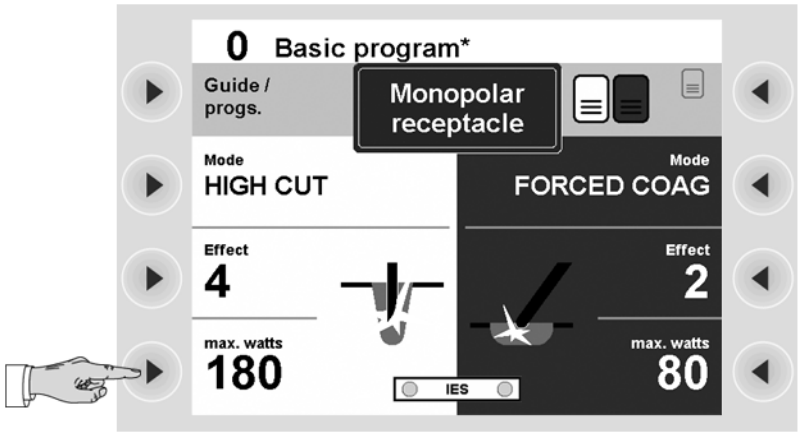

Fig. 6-13

Press the selection button next to the menu item *max. watts*.

2. Select Cut power limitation

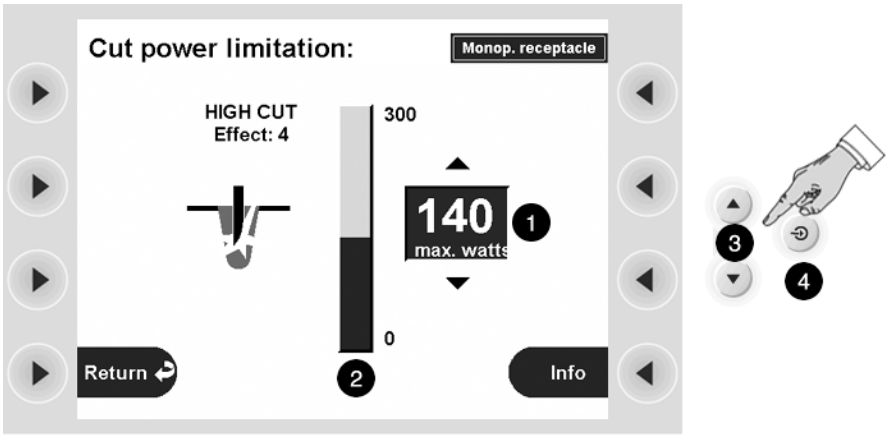

Fig. 6-14

You will then move to the window *Cut power limitation*. Selection of a power limitation level is for the safety of the patient and protects the instrument from damage.

You will see a numerical display for the power limitation (1) and a display in the form of a bar diagram (2).

1. Select a power limitation level with the Up / Down buttons (3) (example: 140 watts).
2. Confirm your selection by pressing the Enter button (4) or by pressing the selection button next to the menu item *Return*. You will then move back to the window *Cut / Coag Settings*.

Select COAG mode, COAG effect and COAG power limitation

Selection of the COAG window is made in the same way as for selection of the CUT window. Please try it out.

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Activation of CUT and COAG modes with footswitch

Footswitch concept

At the back of the electrosurgical unit you can connect a dual-pedal footswitch and a single-pedal footswitch. See the chapter Installation.

The dual-pedal footswitch has a yellow pedal for the activation of CUT and a blue pedal for the activation of COAG.

The pedal of the single-pedal footswitch is blue. It is also used to activate COAG.

The pedals of the dual-pedal footswitch CUT (yellow), COAG (blue) and the pedal of the single-pedal footswitch COAG (blue) can be freely allocated to the sockets of the electrosurgical unit. If you have connected an APC 2 to the electrosurgical unit, you can also allocate the pedals to the sockets of the APC 2.

1. Call up window Select activation type

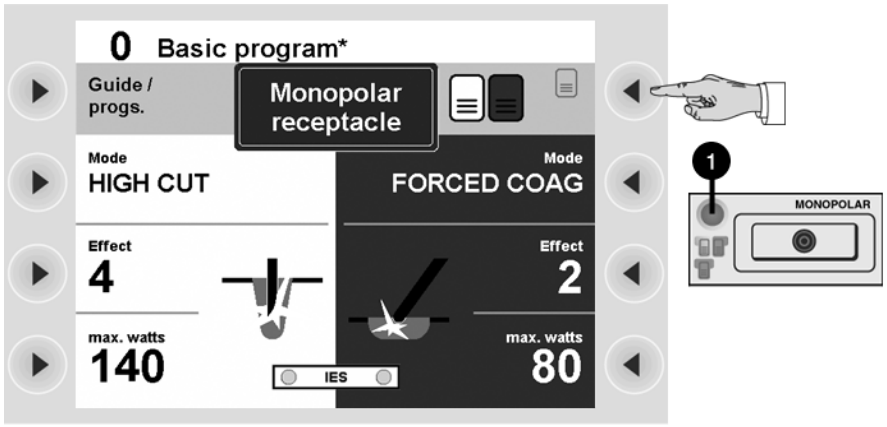

Fig. 6-15

1. First use a Focus button (1) to select a socket to which you want to allocate a footswitch. You will see the functions of the socket in the window *Cut / Coag Settings*. In our example it is the monopolar socket.
2. Press the selection button next to the menu item *Footswitch*.

2. Select footswitch

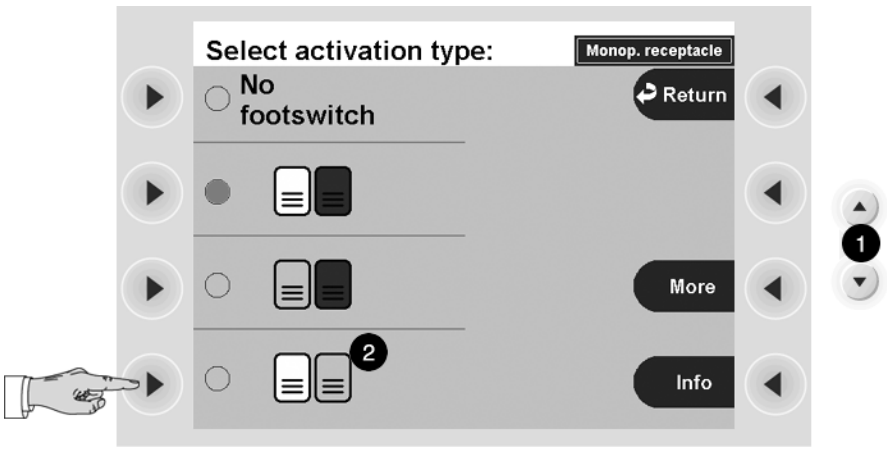

Fig. 6-16

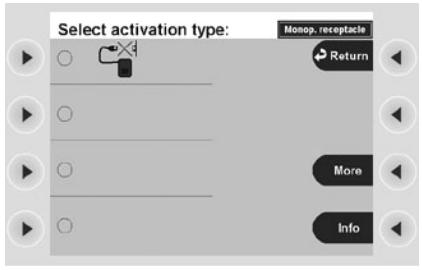

Fig. 6-17

In the window Fig. 6-16 you will see a list of the possible footswitch allocations. Scroll with the Down button (1) to the next window Fig. 6-17. You can also use the Select button next to the "Other modes" menu item.

- Dual-pedal footswitch yellow and blue pedal
- Dual-pedal footswitch blue pedal
- Dual-pedal footswitch yellow pedal
- Blue single-pedal footswitch

The active footswitch is marked in green. Use the selection button to select a footswitch, e. g. the yellow pedal of the dual-pedal footswitch (2).

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Orientation: Footswitch display in the window Cut / Coag Settings and on the socket

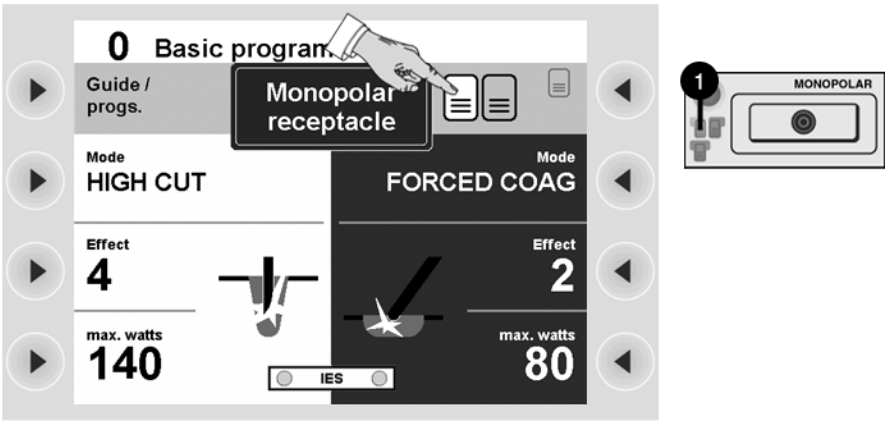

Fig. 6-18

In the window *Cut / Coag Settings* you will see the monopolar socket displayed. The yellow pedal allocated is highlighted yellow in the display. The yellow pedal of the dual-pedal footswitch (1) lights up at the monopolar socket.

You can thus activate the CUT function of the monopolar socket with the yellow pedal of the dual-pedal footswitch. No footswitch is allocated to the COAG function of the monopolar socket.

Plug and Play

It is possible to switch on the unit, select a program and only then connect a footswitch. The unit will detect the footswitch. The footswitch symbols at the sockets light up according to the footswitch assignment of the program.

Activation of CUT and COAG modes with fingerswitch, AUTO START, AUTO STOP

Fingerswitch activation

If an instrument has a fingerswitch, you can also activate any socket with the fingerswitch. The option of fingerswitch activation is not shown in the window *Cut / Coag Settings*.

Auto Start

The AUTO START function

You can only select AUTO START 1 or AUTO START 2 for the bipolar coagulation modes. When the instrument touches tissue, coagulation starts automatically after a start delay. You can set the start delay in the setup of the VIO for AUTO START 1 and AUTO START 2. See p. 74.

If you have selected AUTO START, you cannot activate bipolar cut modes on this socket.

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Selecting AUTO START

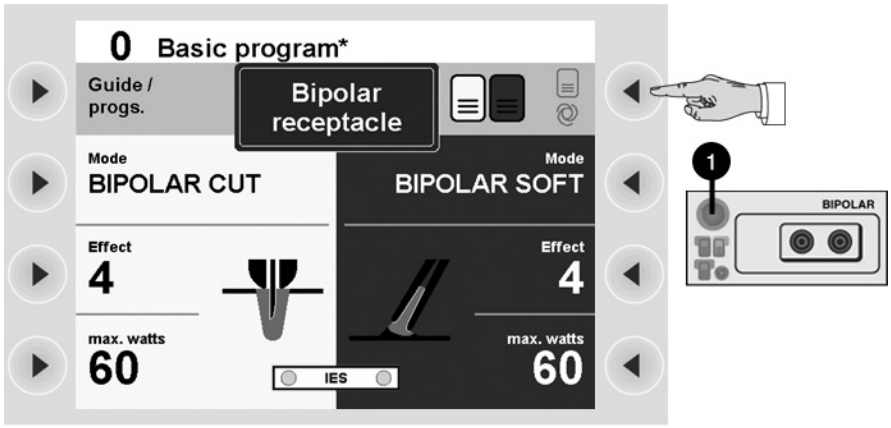

Fig. 6-19

1. Call up the bipolar socket with the Focus button **(1)**.
2. Press the selection button next to the menu item *footswitch / AUTO START*.
3. Use the Down button to scroll through the list.

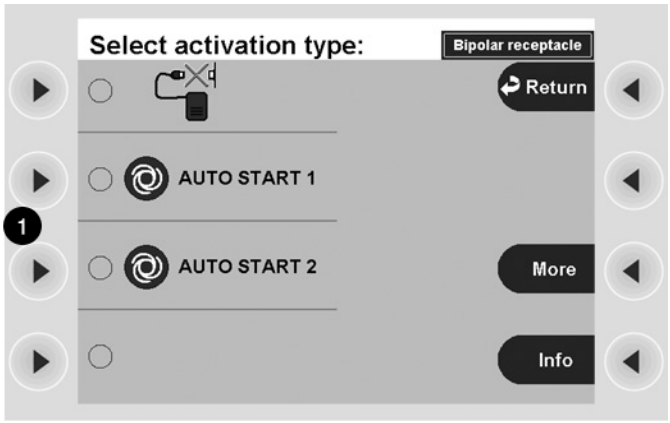

Fig. 6-20

4. Use the selection button **(1)** to select AUTO START 1 or AUTO START 2.

AUTO START display

Selection of AUTO START is shown in the window *Cut / Coag Settings* of the bipolar socket. The symbol for AUTO START lights up on the bipolar socket.

AUTO START with power limitation to 50 watts (factory setting)

If you select AUTO START and the bipolar coagulation was set above 50 watts, a message appears on the VIO display and the power limitation is automatically reduced to 50 watts. You cannot set the bipolar coagulation above 50 watts.

AUTO START without power limitation

The power limitation can be displayed in the Service Setup. Please contact an Erbe employee. You can then select the power limitation under the respective bipolar coagulation mode.

Auto Stop

By selecting the coagulation mode, you can select an AUTO STOP function, for example BIPOLAR SOFT with AUTO STOP. AUTO STOP ends activation automatically before the tissue sticks to the instrument.

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The Focus View and activation concept of the electrosurgical unit. What points must I observe?

Instrument at monopolar and bipolar socket

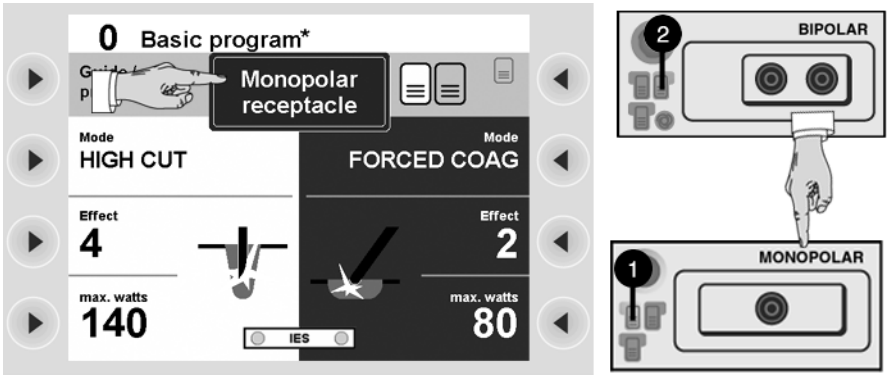

Fig. 6-21

Please imagine the following situation: The yellow pedal CUT (1) is allocated to the monopolar socket. The blue pedal COAG (2) is allocated to the bipolar socket. An instrument that you are using alternately is connected to both sockets. Cutting with the monopolar socket, coagulation with the bipolar socket.

What settings are displayed in the window Cut / Coag Settings, what settings do I want to activate?

After you have activated cutting for the monopolar socket, the window *Cut / Coag Settings* displays the settings for the monopolar socket. This situation is shown in Fig. 6-21. If you activate the instrument on the bipolar socket, you only see the settings of the bipolar socket if you have activated the instrument.

Check settings if in doubt.

If in doubt check the settings of the socket you want to activate: Press the Focus button at the socket. You can also briefly activate the instrument. When doing so, persons or objects must not be touched.

In both cases the window *Cut / Coag Settings* will now display the settings of the socket you want to activate. You can check the settings.

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NESSY

What is NESSY?

The unit is equipped with a Neutral Electrode Safety System (NESSY), which monitors the neutral electrode (neutral electrode), warns of critical situations, and thus prevents burns. How effective the monitoring is depends on whether you choose a single surface or dual surface neutral electrode and on the NESSY setting.

The NESSY settings

On delivery the unit is set to *Neutral electrode: Dual surface*. To utilize this setting, you require a dual surface neutral electrode.

In the unit's service programs, a technician can carry out various NESSY settings according to your requirements. The following table shows you what effects the settings will have on the safety of monitoring.

- You will see the safety level in the first column. 1 = highest safety level.
- In the second column you can see the combination of neutral electrode (NE) / setting in the service programs.
- In columns 3 - 6 you can see what safety level NESSY offers with various combinations.

		Unit - NE connection	Skin - NE contact	NE application direction	Higher safety for patients with low skin resistance
1	Dual surface NE / setting "NE: Dynamic"	●	●	●	●
2	Dual surface NE / setting "NE: Dual surface"	●	●	●	
3	Dual surface NE / setting "NE: Either way"	●	Partial, observe warning	Partial, observe warning	
4	Single surface NE / setting "NE: Either way"	●			
4	Single surface NE / setting "NE: Single surface"	●			

⚠ CAUTION

Short circuit in the connecting cable or in the clip of a dual surface neutral electrode

With the NESSY setting "NE: either way" setup and a short circuit in the connecting cord or in the clip of a dual surface neutral electrode the unit can no longer monitor the contact with the patient's skin or the application direction of the contact surface. You will not receive a warning if the electrode becomes detached from the skin. You will not receive a warning if the application direction of the neutral electrode is incorrect.

Risk of burns to the patient!

⇨ To rule out the possibility of a short circuit in the connecting cable and the clip before use, see Chapter 2 of this Manual "Safety Features" for NESSY.

Note: Erbe recommends the use of split neutral electrodes in combination with the NESSY setting set to "NE: dynamic" or "NE: dual surface". With this combination the optimal use of the safety monitoring functions are given (see chapter 2 "NESSY Safety Features). If the unit is activated in a monopolar mode using a cable with a short, the unit will give an audible warning signal and will display a "B-B" error message on the screen.

How do I receive information about the safety status of the neutral electrode?

Observe the indicator lights

Fig. 6-22

The neutral electrode socket is equipped with indicator lights, which represent a dual surface electrode (1) and a single surface electrode (2) respectively. Call up the NESSY window using the Focus button. Here you can check which setting is active in the unit's service programs.

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- *Neutral electrode: Dynamic surface*
- Neutral electrode: Dual surface
- *Neutral electrode: Either way*
- *Neutral electrode: Single surface*

If the unit is set for a dual surface / dynamic electrode and you connect a single surface electrode, the dual surface indicator light will illuminate red. If the unit is set for a single surface electrode and you connect a dual surface electrode, the single indicator light will illuminate red. In both cases you can only activate monopolar mode if you connect the correct electrode.

No electrode connected

If you switch on the unit without having connected an electrode, the indicator lights will illuminate red. It is not possible to activate monopolar mode.

Single surface electrode connected. Setup "Neutral electrode: Single surface"

If you connect a single surface electrode, the unit only monitors the connection between unit and electrode. If this is faultless, the electrode symbol illuminates green (safety status Green). Monopolar mode can be activated.

If the connection to the unit is interrupted, or if the electrode contact tab is not fully inserted into the connection clamp, the electrode symbol illuminates red (safety status Red). Monopolar mode cannot be activated. If you activate the unit despite the warning, an audible warning signal is emitted. If a single surface electrode is connected, the contact between the electrode and the patient's skin is not monitored! You will not receive a warning if the electrode becomes detached from the skin and there is a danger of burns.

Dual-surface neutral electrode connected. "Neutral electrode: Dual surface" or "Neutral electrode: Either way" setup

To optimally utilize the unit's monitoring functions, Erbe recommends connecting a dual-surface electrode, and in particular the Erbe NESSY Omega electrode. Apart from many other advantages, this electrode virtually eliminates any possibility of excessive heating of the tissue and skin at the edges of the electrode.

Contact between skin and electrode

If you connect a dual-surface electrode, the unit not only monitors the connection between unit and electrode, but also the contact between skin and electrode. If everything is OK, the electrode symbol illuminates green (safety status Green). Monopolar mode can be activated.

If the connection with the unit is interrupted, or if the contact tab is not fully inserted into the connection clamp, or if the contact with the skin is so bad that there is a danger of burns, the electrode symbol illuminates red (safety status Red). Monopolar mode cannot be activated. If you attempt activation, an audible warning signal is emitted..

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Application direction of the contact surface relative to the conduction direction

When dual-surface electrodes are used, NESSY also monitors the direction of application of the contact surface relative to the conduction direction. The high-frequency current is not, as a rule, distributed evenly over the contact surface of the neutral electrode. The current flows to the proximal corners or edges. There it can be larger than at the distal corners or edges. For this reason, when applying the neutral electrode, ensure that the neutral electrode's line of symmetry points toward the operating field.

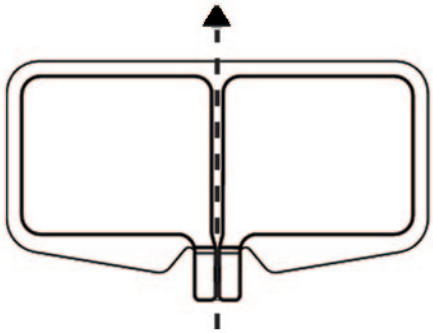

Fig. 6-23

NESSY compares the currents that flow through the two surfaces of the neutral electrode. If the currents differ slightly from each other, a green indicator window appears on the display. Monopolar mode can still be activated, but you should correct the position of the neutral electrode as soon as possible.

If the currents differ too greatly from each other, the dual-surface electrode symbol on the VIO illuminates red. Monopolar mode cannot be activated. If you attempt activation, an audible warning signal is emitted. A red warning message appears on the display: When applying the neutral electrode, ensure that the line of symmetry points toward the operating field.

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Checking function of the NESSY window when a dual-surface electrode is connected with "Neutral electrode: Dual surface" or "Neutral electrode: Either way" setup

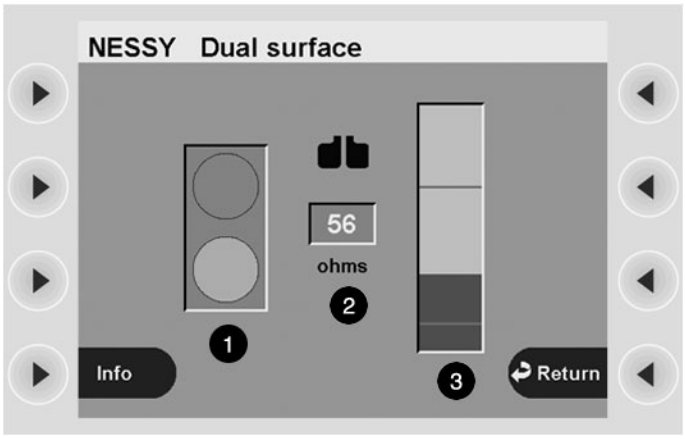

Fig. 6-24

If you press the Focus button on the neutral electrode socket, you change to the NESSY window.

You will see a traffic-light symbol (1). According to the contact resistance between skin and electrode, this symbol shows the following:

- Safety status Green. The unit can be activated without any danger for the patient.
- Safety status Red. You cannot activate the unit.

The middle indicator (2) shows the contact resistance as a numerical value.

"Neutral electrode: Dual surface" setup. The diagram on the right (3) shows the contact resistance as a bar. The upper and lower limits of the Green safety status are indicated by a red line at the top and bottom. The lower limit is 20 ohms. The upper limit is 120 ohms.

"Neutral electrode: Either way" setup (not illustrated). The diagram on the right (3) shows the contact resistance as a bar. The upper limit of the Green safety status is indicated by a red line. The upper limit is 120 ohms.

Dual surface neutral electrode connected. "Neutral electrode: Dynamic" setup

The "Neutral electrode: Dynamic" setup offers extra safety for patients with low skin resistance, for example, patients with little subcutaneous fatty tissue, children and infants. Even with these patients, critical detachment of the neutral electrode from the skin is detected in good time.

Checking function of the NESSY window when a dual-surface electrode is connected with "Neutral electrode: Dynamic" setup

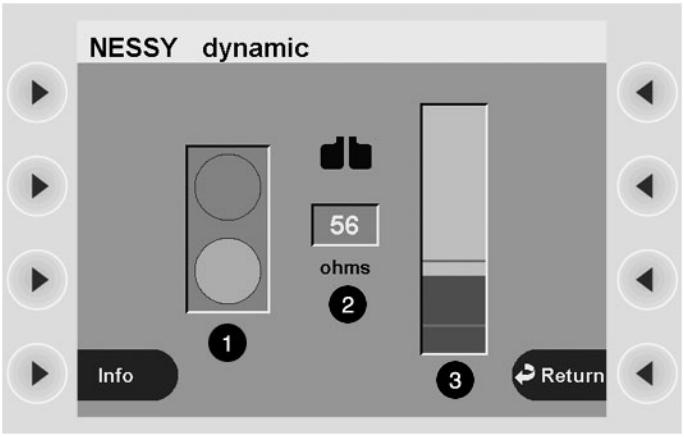

Fig. 6-25

If you press the Focus button on the neutral electrode socket, you change to the NESSY window.

You will see a traffic-light symbol (1). According to the contact resistance between skin and electrode, this symbol shows the following:

- Safety status Green. The unit can be activated without any danger for the patient.
- Safety status Red. You cannot activate the unit.

The middle indicator (2) shows the contact resistance as a numerical value.

The diagram on the right (3) shows the contact resistance as a bar. The upper and lower limits of the Green safety status are indicated by a red line at the top and bottom. The lower limit is 20 ohms. The upper limit is not fixed at 120 ohms, but depends on the lowest contact resistance measured between skin and neutral electrode (measured value). The upper limit is reduced relative to the measured value to ensure that a critical detachment of the neutral electrode from the skin is detected in good time.

The NESSY window as a visual aid to applying a dual surface electrode

When you apply a dual surface electrode to the patient's skin, first change to the NESSY window. With the aid of its displays, you can recognize how good the skin contact is. Ideally the contact resistance should be between 20 and 120 ohms.

The NESSY window when connecting a single-surface electrode

To check a single-surface electrode it is sufficient to observe the indicator lights. Similarly, in the NESSY window you will only receive the information: Safety status Green or Red.

When a single-surface electrode is connected, the NESSY window does not give any visual assistance. The contact between electrode and skin cannot be measured when a single-surface electrode is used.

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Neonatal NE Monitoring System

When using Neonatal neutral electrodes, you can activate the Neonatal NE Monitoring System. You can then turn the Neonatal NE Monitoring System on or off in the *NESSY* window. If an electric current limit of 300 mA is exceeded, an advisory message is shown on the VIO display:

"Neonatal NE Monitoring System. Reduce the effect or power setting."

Exceeding the electric current limit can indicate intense heating of the neutral electrodes. Check the neutral electrodes for heating, and reduce the effect and or power setting if necessary.

Saving the amended Basic program under a new name

Changes to the Basic program which have not been saved will be lost

In the preceding stages of the tutorial you made changes to the settings of the Basic program. The settings will be lost if they are not saved. You cannot overwrite the Basic program with your settings. The Basic program cannot be changed, but you can store the changed settings of the Basic program as a new program. The settings for all sockets will then be stored as a complete setting in the memory. Adaptation of the Basic program and its storage under a new name is a simple and fast method for creating a program.

Save changed Basic program as a new program

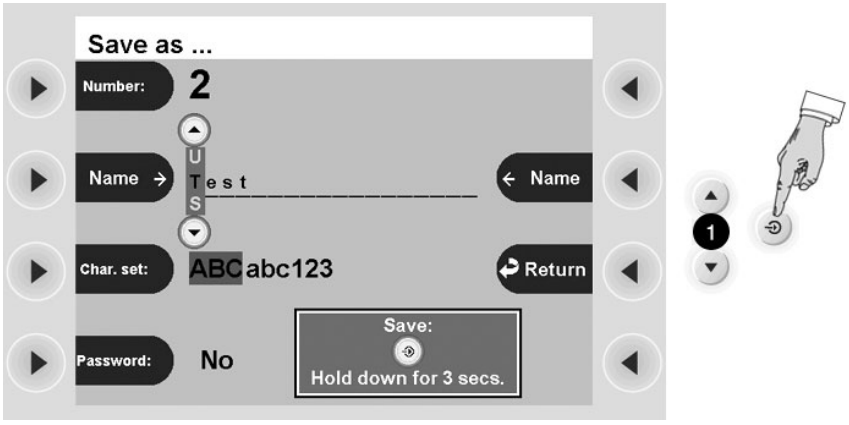

Fig. 6-26

Press the Enter button. You will then move to the window *Save as*.

Optionally you can enter a password for the new program. The program can then only be overwritten or deleted after entering the password. Please do not forget your password, because without it you cannot access the program either.

1. Press the Selection button next to the menu item *Password*. This takes you to the window *Password*.

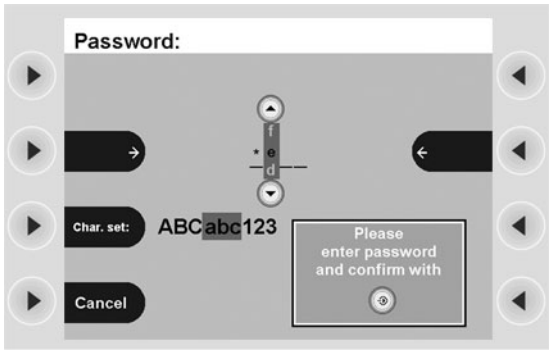

Fig. 6-27

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2. The password is up to four characters long. As an example, we shall call the password "Test". Select the letter T using the Up/Down buttons. Press the Selection button arrow to move the cursor on to the next character. By pressing the selection button next to the menu item *Char set*, you can choose between upper case, lower case and numbers.
3. Press the Enter button to confirm the password. This takes you to the window *Save as*.
4. Press the Selection button next to the menu item Number. The field Number is marked gray with a cursor. Select a number with the Up/Down buttons (1). The number refers to the free memory cells of the unit.
5. Press the Selection button next to the menu item Name. The field Name is marked gray with a cursor. We want to call the program Test. Select the letter T with the Up/Down buttons. Press the selection button next to the menu item Name again to move the cursor forward one letter. By pressing the selection button next to the menu item Char. set you can choose between upper-case or lower-case letters and numbers.
6. Depress the Enter button for 3 sec. to save the program.

Note: You can change the settings of any program and then save it under a new name.

Overwriting a program

You can change the settings of a program and overwrite it with the new settings.

Overwrite changed program Test

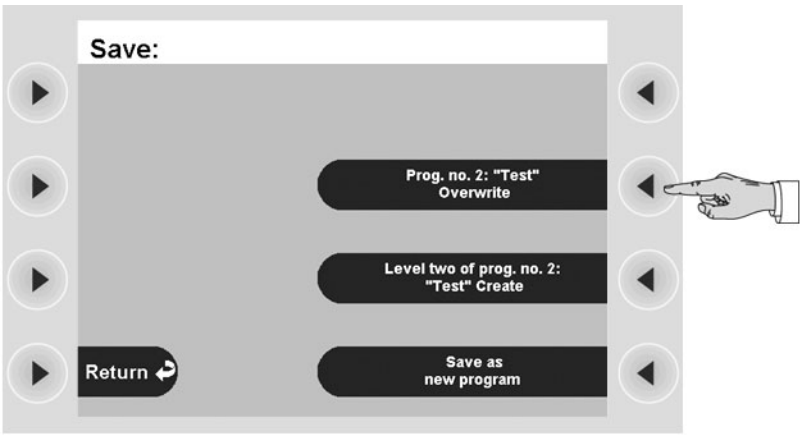

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Fig. 6-28

1. Call up the program *Test*. Change any setting.
2. Press the Enter button. You will then move to the window Save.
3. Press the selection button next to the menu item *Prog. no. 2 "Test" overwrite*.

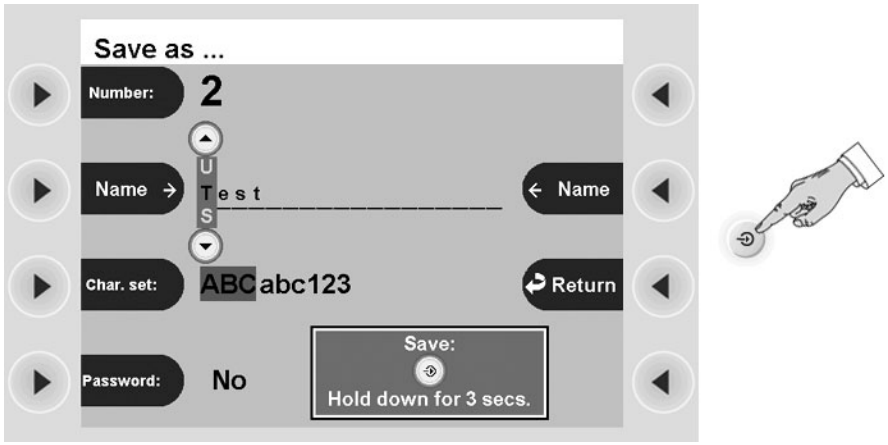

Fig. 6-29

4. You will then move to the window *Save as*. Depress the Enter button for 3 sec. to overwrite the program.

Creating all settings for a program from scratch

You can create a program from an empty program template. Call up the menu item *Guide*. Select the menu item *Select Program*. From the program selection list *select New program*. You will then move back to the window *Guide*. Look at the schematic display of the sockets. In the new program all CUT and COAG Modes are switched off. Select a socket. Select the mode, effect, power limitation and activation.

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Deleting a program

Call up the menu item *Guide*. Select the program you want to delete. Call up the menu item *Additional Functions*. Select *Delete*. Depress the Enter button for 3 sec. to delete the program.

Creating programs for ReMode function

What is the ReMode function used for?

With the ReMode switch of the footswitch (1) or certain handles (2) you can switch between two programs a and b without having to operate the unit.

If you are alternating between two programs a and b, the unit always calls up program a after switch-on, even if you switched off with program b.

Fig. 6-30

Fig. 6-31

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Examples of options for ReMode function

1st option: You can switch between any two settings of a socket as required.

2nd option: You can switch between the settings of two sockets, for example, if you assign the footswitch in program a to a monopolar socket and in program b to a bipolar socket. If you start with program a and the monopolar socket and then switch to program b, the settings for the monopolar socket will now still be displayed for program b, but the footswitch is on the bipolar socket. This socket is configured with the settings you made for program b. If you press the footswitch, the display switches to the settings of the bipolar socket and BIPOLAR CUT or BIPOLAR COAG is activated.

This sounds rather complicated but just try out the two options according to the following instructions. If you try out the ReMode function on the unit itself, it will become clearer.

Create programs 3a ReMode and 3b ReMode to familarize yourself with the first ReMode option

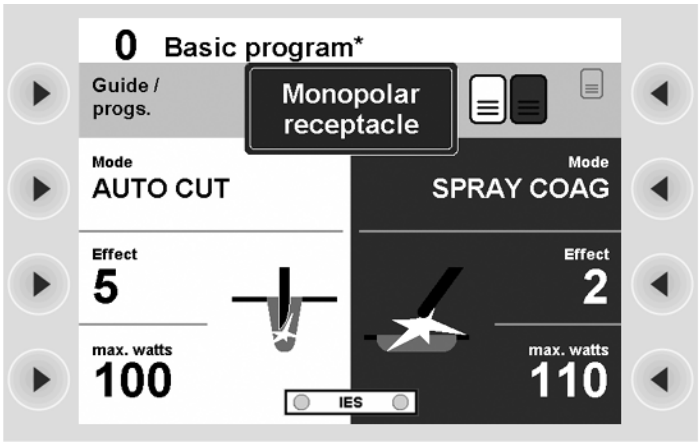

Fig. 6-32

1. Call up the Basic Program. Call up the monopolar socket.
2. Change the setting according to the following specifications: AUTO CUT, Effect 5, 100 W. SPRAY COAG, Effect 2, 110 W. Allocate the footswitch (CUT and COAG) to the monopolar socket.
3. Press the Enter button.

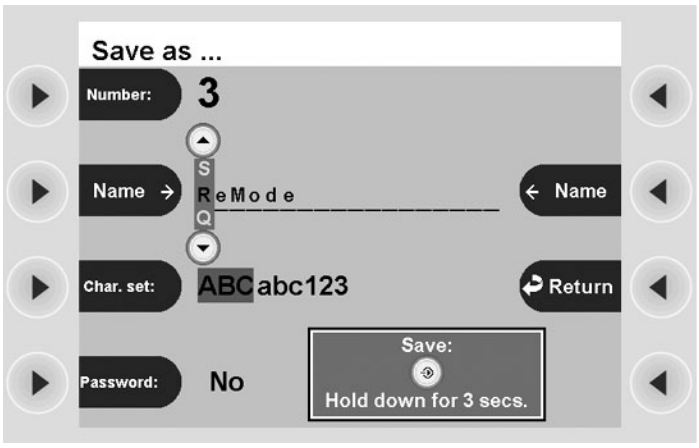

Fig. 6-33

4. You will then move to the window *Save as*. Press the selection button next to the menu item *Number*. The field Number is marked gray with a cursor. Select a Number with the Up / Down buttons. The tutorial uses number 3. The number refers to the free memory locations of the unit.
5. Press the selection button next to the menu item *Name*. Enter ReMode. Depress the Enter button for 3 sec. to save the program.

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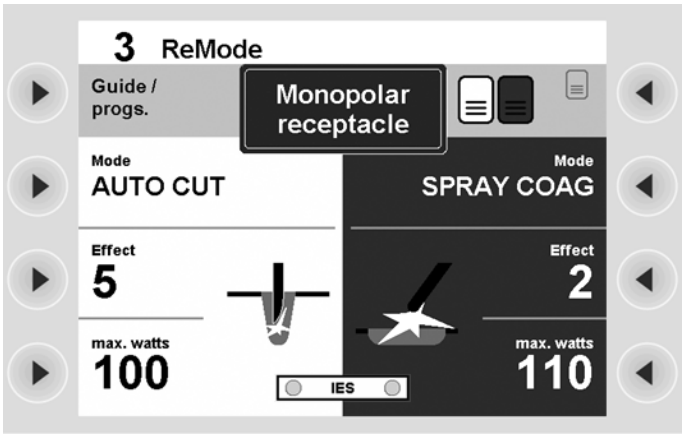

Fig. 6-34

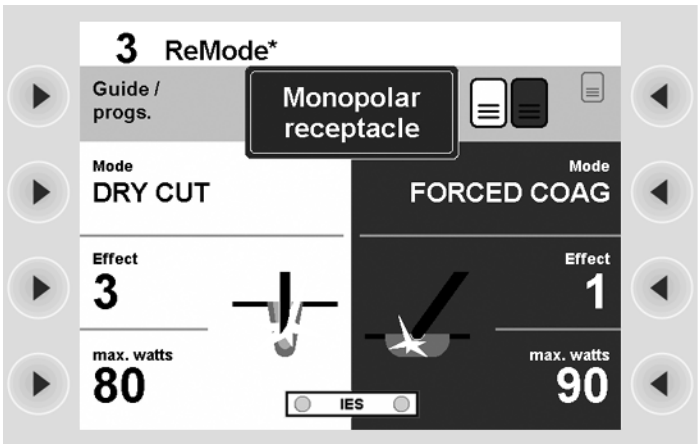

Fig. 6-35

6. You will then move to the window *Cut / Coag Settings*. There you will see the name of the program *3 ReMode* at the top of the window . Change the settings of the program *3 ReMode* according to the following specifications: DRY CUT, Effect 3, 80 W. FORCED COAG, 1, 90 W.
7. Press the Enter button.

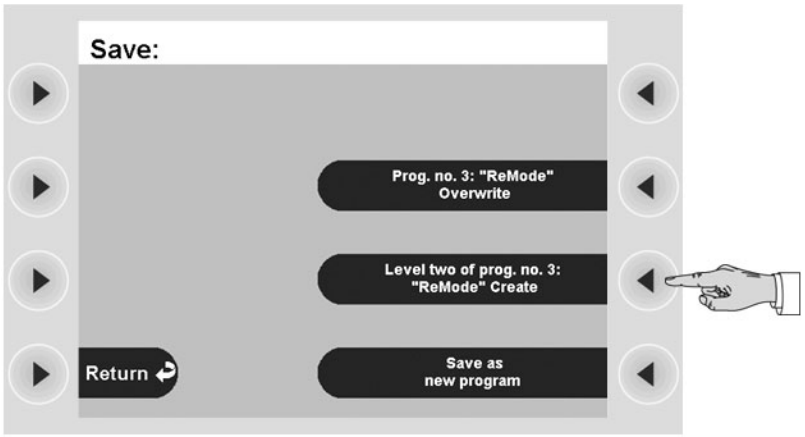

Fig. 6-36

8. You will then move to the window *Save*. Press the selection button next to the menu item *Level two of prog. no. 3 "ReMode" create*.

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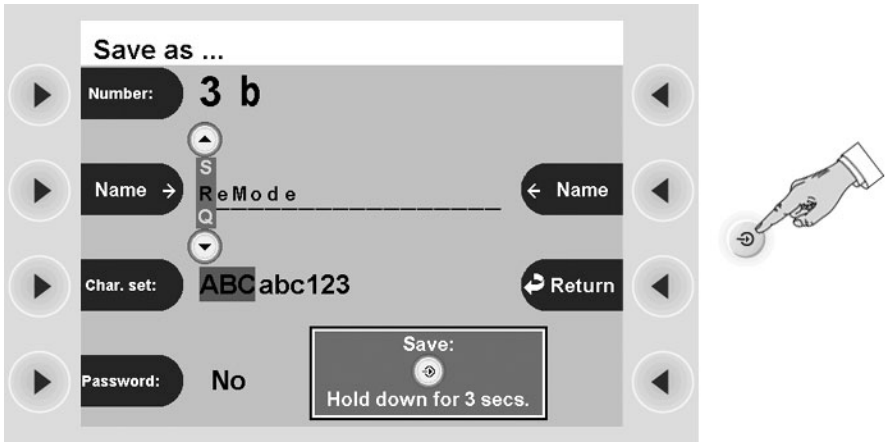

Fig. 6-37

9. You will then move to the window *Save as*. Press the Enter button. The program will be saved.

Switch between program 3a ReMode and 3b ReMode

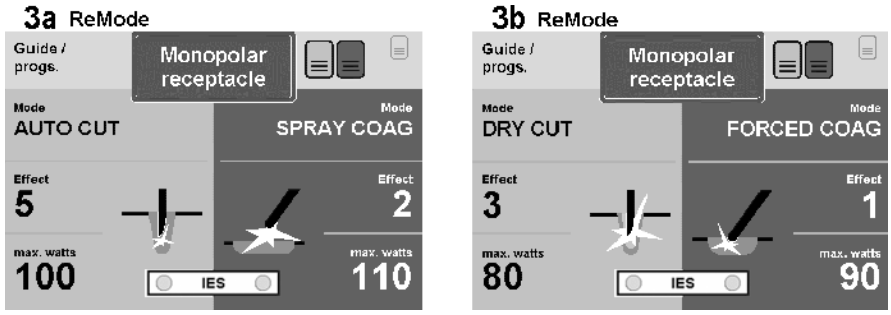

Fig. 6-38

The system has renamed program *3 ReMode* as *3a ReMode* and saved a program *3b ReMode*.

With the ReMode switch you can now switch between programs *3a ReMode* and *3b ReMode*. The settings of the monopolar socket are always displayed. With the footswitch only these settings can be activated as in both *3a ReMode* and *3b ReMode* the footswitch is allocated to the monopolar socket.

Amend program 3b ReMode to familarize yourself with the second ReMode option

1. In the program *3b ReMode* call up the bipolar socket.
2. Assign the footswitch (CUT and COAG) to the bipolar socket. Any value can be set for the bipolar socket.
3. Overwrite the program *3b ReMode* with the new footswitch allocation.
4. Switch to program *3a ReMode*. Call up the monopolar socket with the Focus button. If you now switch between the program *3a ReMode* and *3b ReMode*, the display and the socketstrip look as follows:

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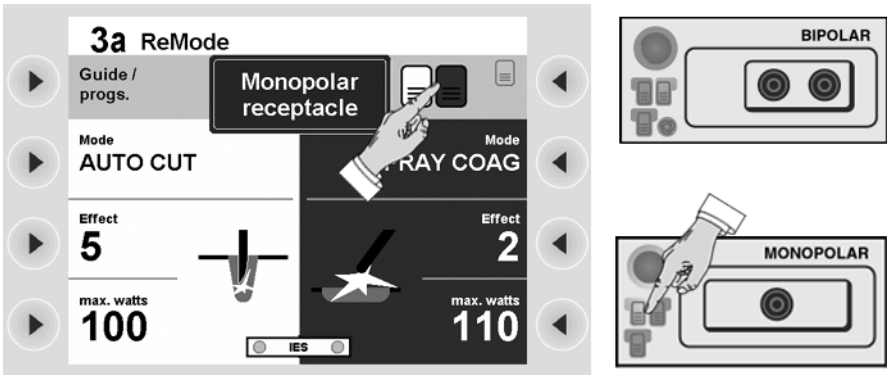

Fig. 6-39

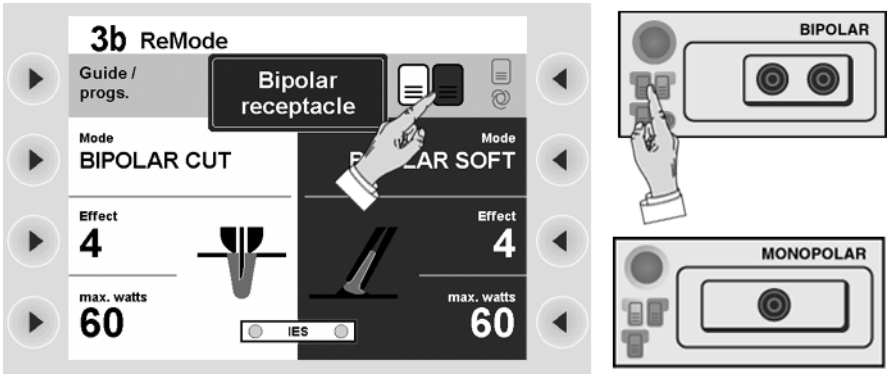

Fig. 6-40

In the program *3a ReMode* you will see the settings of the monopolar socket of this program. The footswitch (CUT and COAG) is allocated to the monopolar socket.

If you switch to the program *3b ReMode*, you will see the settings of the bipolar socket. The footswitch (CUT and COAG) is allocated to the bipolar socket.

By switching between the programs you have changed the allocation of the footswitch to the sockets! In the program *3b ReMode* you can activate the modes of the bipolar socket with the footswitch.

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ReMode change-over with a 2-button handpiece

Press the buttons CUT and COAG simultaneously. ReMode change-over with the buttons CUT and COAG is not possible with handpieces with so-called "compensators."

Calling up Setup

In Setup you can for example adjust the unit to the light conditions in the room. Call up the window *Guide*. Call up the menu item *Additional Functions*. Call up the menu item *Setup*.

Use a selection button to select a Setup setting. Change the setting with the Up / Down buttons. Press the Enter button to confirm the changed setting.

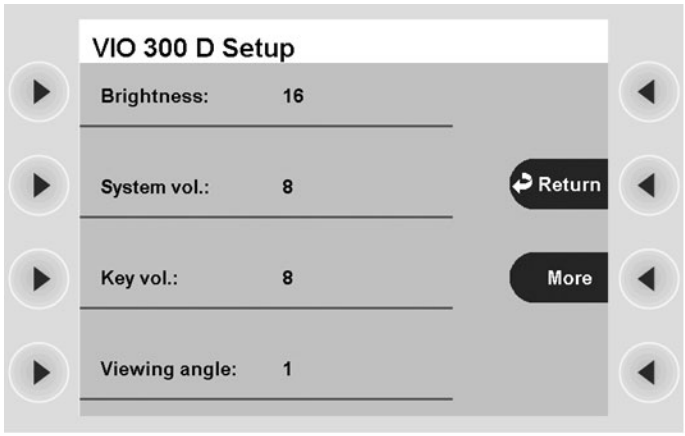

Fig. 6-41

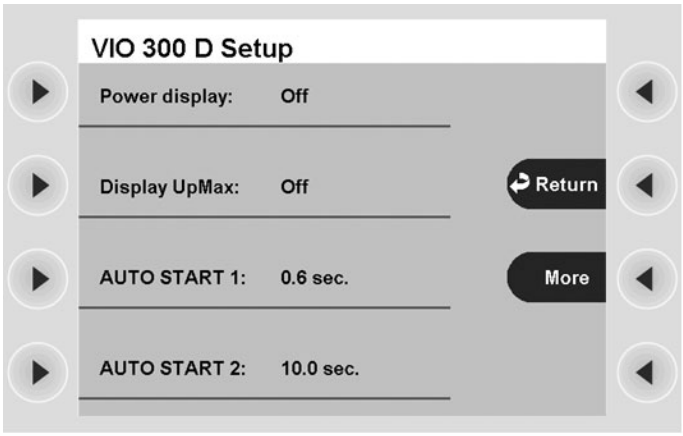

Fig. 6-42

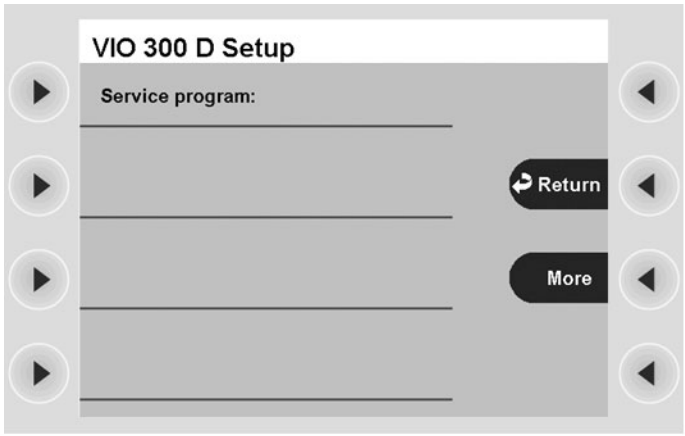

Fig. 6-43

Brightness Display of screen brightness in 16 levels.

Volume Selection of the volume level of the warning signals in 16 levels. The warning signals must be clearly audible!

Volume button Selection of the button volume in 16 levels.

Viewing angle Setting of the viewing angle on the display: from top, from bottom, from front.

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Power display If you switch on the output display, you will see a bar diagram on activation of the unit.

The diagram shows the maximum possible output in the respective mode. The green line represents the power limitation. If you change the power limitation level, the line will move within the bar.

On activation, the bar diagram shows the output level currently called up by the unit under power limitation. If it is making full use of the power limitation, and you are not satisfied with the cut or coagulation, we recommend setting the power limitation to a higher level.

The numerical values displayed are measurement values.

Pmax refers to: the maximum output of the last activation. This may lie above the power limitation level selected if PPS (Power Peak System) is permitted.

Pavg refers to: the average power consumed over a unit of time to be specified.

Upmax display Maximum HF voltage [Vp] display when activating the unit. This maximum electrical capacity is given in [Vp] in the user manual of the instrument or on the instrument itself. If the voltage is greater than the capacity of the instrument, the instrument can be damaged. In such cases select a smaller effect.

AUTO START 1 Input of start delay for the AUTO START function. 0.0 to 9.5 sec. in 0.1 sec. steps.

AUTO START 2 Input of start delay for the AUTO START function. 0.1 to 10 sec. in 0.1 sec. steps.

Service programs This menu item is provided for Service.

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Chapter 7
Description of socket hardware

Purchasing further sockets

You can individually select the sockets of your electrosurgical unit when placing your order. After purchase it is possible to add further sockets or to replace existing sockets with others.

A socket module consists of a front plate, socket insert and two holding clips. Installation in the electrosurgical unit is simple and can be carried out quickly by any technician authorized by Erbe.

Sockets for different modes and instrument connectors

In this chapter the sockets are described from the aspect of their usage and compatibility with various instrument connectors.

Cutting and coagulation modes

Specific cutting and coagulation modes are allocated to the sockets. Via the monopolar socket you can thus activate AUTO CUT and SOFT COAG for example. If you require SOFT COAG for one of your applications, the monopolar socket is used.

Instrument compatibility

The VIO electrosurgical unit is sold all over the world. The standard instrument connectors vary from country to country. To ensure your instruments can be connected to the electrosurgical unit, the sockets are available in various designs.

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Monopolar socket

Cutting and coagulation modes

Standard

- AUTO CUT
- HIGH CUT
- DRY CUT
- DRY CUT °
- SOFT COAG
- SWIFT COAG
- SWIFT COAG °
- FORCED COAG
- SPRAY COAG
- CLASSIC COAG

Optional

- PRECISE CUT
- ENDO CUT Q
- ENDO CUT I
- TWIN COAG
- PRECISE COAG

Instrument compatibility

Socket module MO 3-pin Bovie

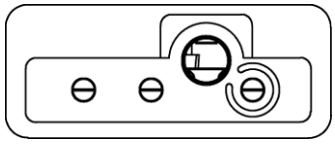

Fig. 7-1

Erbe No. 20140-622

You can connect ONE of the following connectors as required: a monopolar 3-pin connector; a Bovie connector; a monopolar connector dia. 4 mm to the input marked blue.

Socket module MO 3-pin 9 / 5

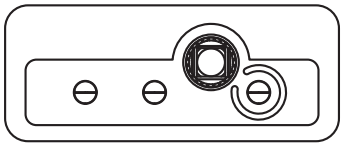

Fig. 7-2

Erbe No. 20140-623

You can connect ONE of the following connectors as required: a monopolar 3-pin connector; a monopolar socket based on Erbe standard; a monopolar connector dia. 4 mm to the input marked blue.

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Bipolar socket

Cutting and coagulation modes

Standard

- BIPOLAR CUT
- BIPOLAR SOFT COAG
- BIPOLAR FORCED COAG

Optional

- BIPOLAR PRECISE CUT
- BIPOLAR PRECISE COAG

Instrument compatibility

Socket module BI 8/4

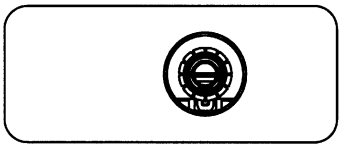

Fig. 7-3

Erbe No. 20140-610

The socket module is suitable for the following connectors: Bipolar connector based on Erbe standard. Rear contact ring dia. 8 mm, front contact ring dia. 4 mm.

Socket module BI 2 pin 22 – 28 – 8 / 4

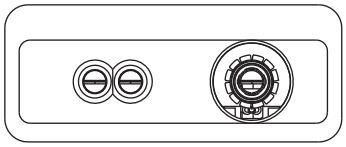

Fig. 7-4

Erbe No. 20140-613

You can connect ONE of the following connectors, as required: international bipolar connector with 2 pins (pin spacing 22 mm); international bipolar connector with 2 pins (pin spacing 28.5 mm); Erbe standard bipolar connector.

Multifunctional socket

Instrument detection with multifunctional socket

Instruments with instrument detection are identified only at multifunctional sockets.

Cutting and coagulation modes

Standard Monopolar

- AUTO CUT
- HIGH CUT
- DRY CUT
- DRY CUT °
- SOFT COAG
- SWIFT COAG
- SWIFT COAG °
- FORCED COAG
- SPRAY COAG
- CLASSIC COAG

Optional Monopolar

- PRECISE CUT
- ENDO CUT Q
- ENDO CUT I
- PRECISE COAG
- TWIN COAG

Standard Bipolar

- BIPOLAR CUT
- BIPOLAR CUT +
- BIPOLAR CUT ++
- BIPOLAR SOFT COAG
- BIPOLAR SOFT COAG +
- BIPOLAR SOFT COAG ++
- BIPOLAR FORCED COAG

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Optional Bipolar

- BiClamp
- BIPOLAR PRECISE CUT
- BIPOLAR PRECISE COAG

Instrument compatibility

Socket module MF-0

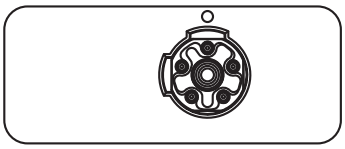

Fig. 7-5

Erbe No. 20140-630

The socket module is suitable for the following connectors: 5-pole Erbe multifunctional connector.

Socket module MF-2

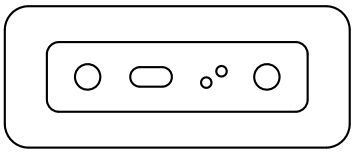

Fig. 7-6

Erbe no. 20140-633

The socket module is suitable for the following connectors: Erbe MF-2 connector.

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Socket for neutral electrode

Function

The socket is used to connect a neutral electrode with monopolar modes.

Connector compatibility

Socket module NE 6

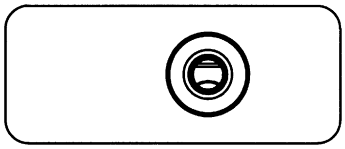

Fig. 7-7

Erbe No. 20140-640

The socket module is suitable for the following connectors: Erbe neutral electrode connector Ø 6.35 mm.

Socket module NE 6 and NE 2-pin

Fig. 7-8

Erbe No. 20140-642

You may connect ONE of the following plugs: Erbe neutral electrode plug with Ø 6.35 mm; neutral electrode plug with 2 pins. The socket is equipped with a slide switch that

allows you to connect the plug with Ø 6.35 mm or the plug with 2 pins based on the position of the socket (see illustration above).

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Chapter 8
Monopolar Standard Modes

AUTO CUT

Properties

Reproducible, gentle cuts, extra kind to tissue, minimal to medium hemostasis.

PPS (Power Peak System)

The AUTO CUT mode is equipped with PPS. A special problem during incision may be posed by the initial incision phase, in particular when the cutting electrode is pressed firmly against the tissue to be cut before activation of the HF generator so that the cutting electrode has a relatively extensive and thus low-resistance contact with the tissue. This is generally the case for example with TUR and endoscopic polypectomy. In such cases the HF generator must offer an above-average output so that the initial incision is not delayed, as otherwise an excessive coagulation necrosis may be produced at the point of initial incision. The VIO is equipped with automatic power control which detects low-resistance loads and controls the HF generator so that it briefly provides sufficient output to ensure the HF voltage necessary for the cutting quality selected or the intensity of the electric arcs even with low-resistance loads. Thanks to this feature the average output can be limited to relatively low levels, something which represents improved protection from unintentional thermal tissue damage.

Areas of use

All cutting procedures in electrically conductive tissue: e.g. muscle tissue and vascular tissue. Dissections and cutting of fine structures.

Suitable electrodes

Needle electrodes, knife electrodes, spatula electrodes, and loop electrodes.

Technical data

HF voltage waveform	unmodulated sinusoidal alternating voltage
Rated frequency	350 kHz (at R_L = 500 ohms) ± 10%
Crest factor	1.4 (at R_L = 500 ohms)
Rated load resistor	500 ohms
Max. HF peak voltage	740 V_p
Number of effects	8
Consistency of effects	Automatic control of HF peak voltage
HF power limitation	10 watts to 300 watts in 1-watt steps
Max. power output at rated load resistor	300 watts ± 20%
Max. RMS current (maximum HF output current in normal use)	220 mA

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Diagrams

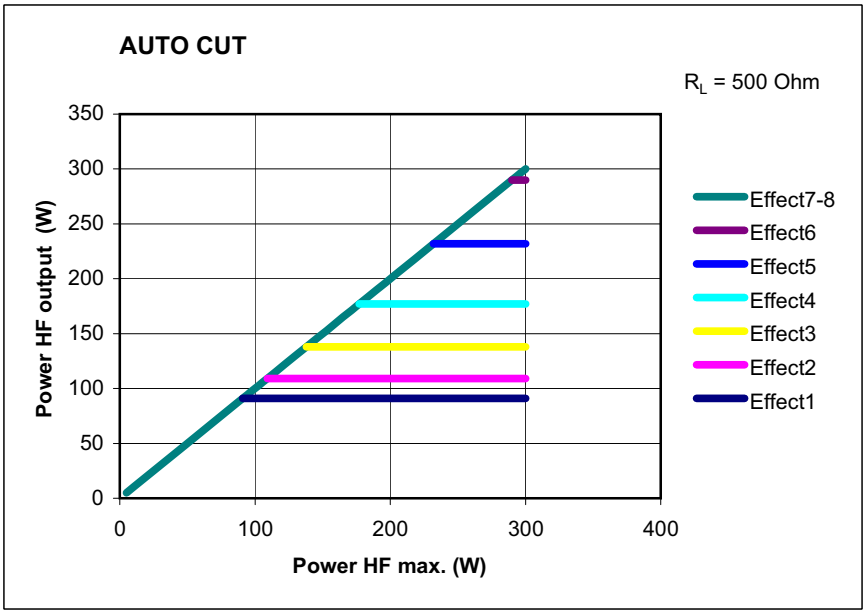

Fig. 8-1

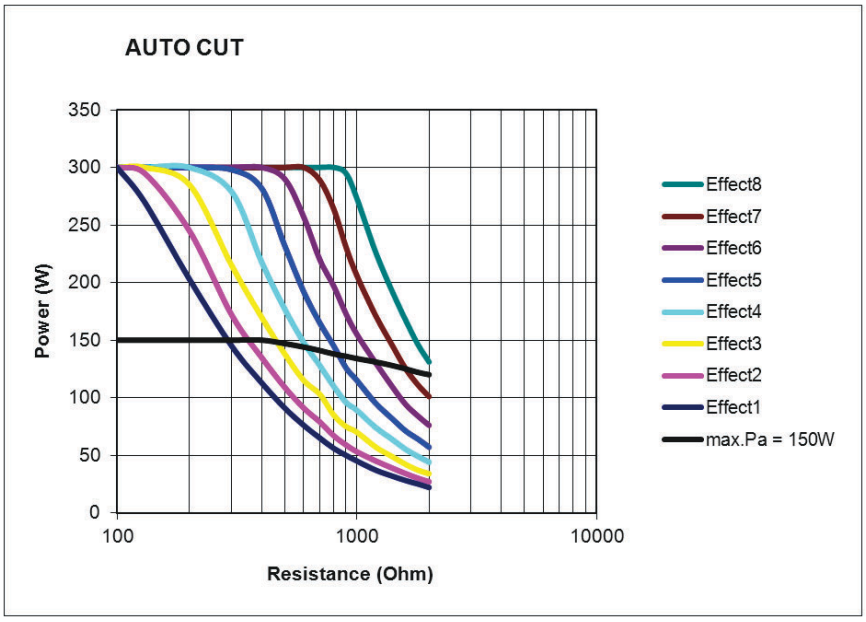

Fig. 8-2

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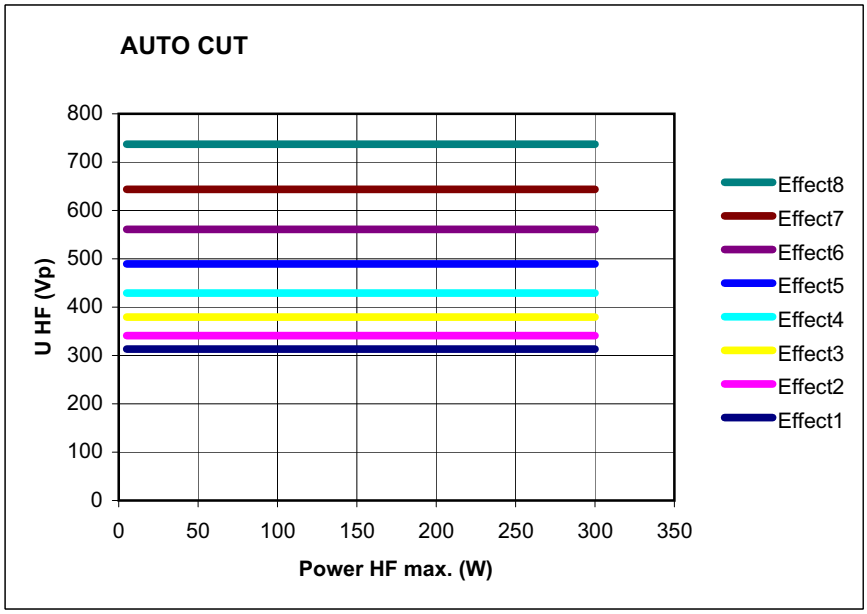

Fig. 8-3

HIGH CUT

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Properties

Reproducible tissue-sparing cuts, in particular in poorly conductive and varying tissue.

PPS (Power Peak System)

The HIGH CUT mode is equipped with PPS. A special problem during incision may be posed by the initial incision phase, in particular when the cutting electrode is pressed firmly against the tissue to be cut before activation of the HF generator so that the cutting electrode has a relatively extensive and thus low-resistance contact with the tissue. This is generally the case for example with TUR and endoscopic polypectomy. In such cases the HF generator must offer an above-average output so that the initial incision is not delayed, as otherwise an excessive coagulation necrosis may be produced at the point of initial incision. The VIO is equipped with automatic power control which detects low-resistance loads and controls the HF generator so that it briefly provides sufficient output to ensure the HF voltage necessary for the cutting quality selected or the intensity of the electric arcs even with low-resistance loads. Thanks to this feature the average output can be limited to relatively low levels, something which represents improved protection from unintentional thermal tissue damage.

Areas of use

Several, including cutting fat-containing structures, cutting under water, e.g. with TUR-P.

Suitable electrodes

Knife, spatula, and loop electrodes.

Technical data

HF voltage waveform	unmodulated sinusoidal alternating voltage
Rated frequency	350 kHz (at R_L = 500 ohms) ± 10%
Crest factor	1.4 (at R_L = 500 ohms)

Rated load resistor	500 ohms
Max. HF peak voltage	1040 V_p (if an arc is present)
Number of effects	8
Consistency of effects	Automatic control of arc intensity
HF power limitation	10 watts to 300 watts in 1-watt steps
Max. power output at rated load resistor	300 watts ± 20%
Max. RMS current (maximum HF output current in normal use)	500 mA

Diagrams

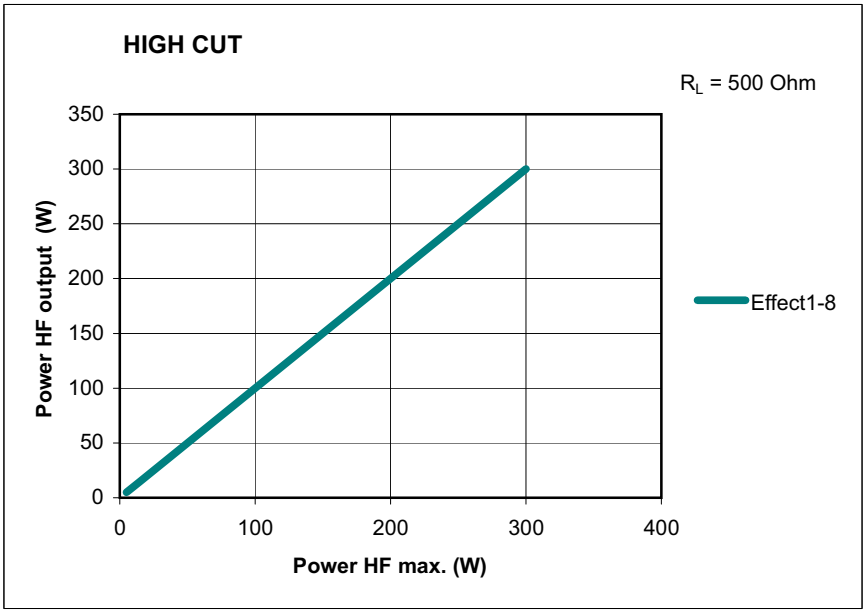

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Fig. 8-4

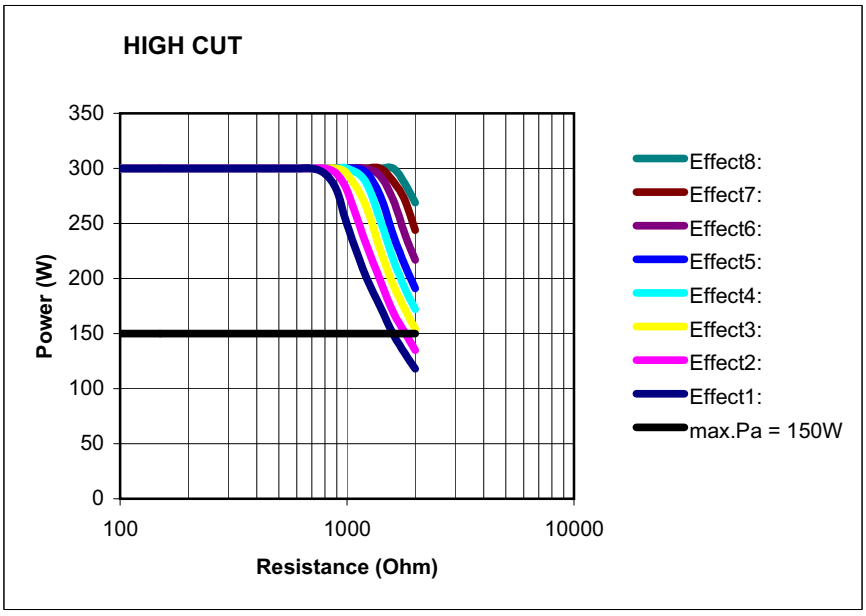

Fig. 8-5

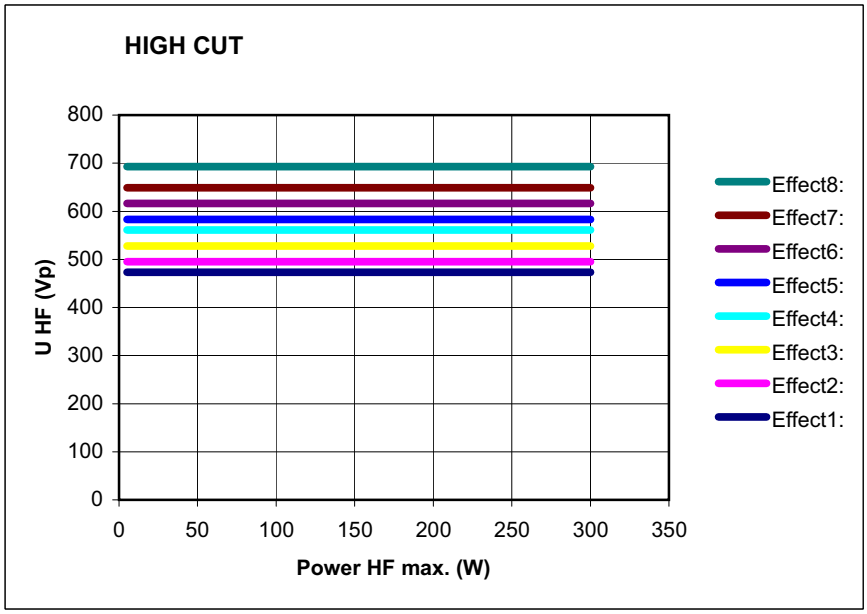

Fig. 8-6

DRY CUT

Properties

Intense hemostasis with somewhat slower cutting speed.

Areas of use

E.g. cuts in "open surgery" and cuts in endoscopic operations that require very good primary hemostasis during the cut and tolerate a somewhat slower cutting speed.

Difference from AUTO CUT and HIGH CUT

Medium to intense hemostasis.

Suitable electrodes

Electrodes with a large application area: knife and spatula electrodes as well as strap loop electrodes.

Technical data

HF voltage waveform	pulse-modulated sinusoidal alternating voltage
Rated frequency	350 kHz (at R_L = 500 ohms) ± 10%
Crest factor	Effect 1-4: 3.2 Effect 5+6: 3.3 Effect 7+8: 3.6 (at R_L = 500 ohms)
Rated load resistor	500 ohms
Max. HF peak voltage	1450 Vp
Number of effects	8
Consistency of effects	Automatic control of HF peak voltage

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HF power limitation	10 watts to 200 watts in 1-watt steps
Max. power output at rated load resistor	200 watts ± 20%
Max. RMS current (maximum HF output current in normal use)	280 mA

Diagrams

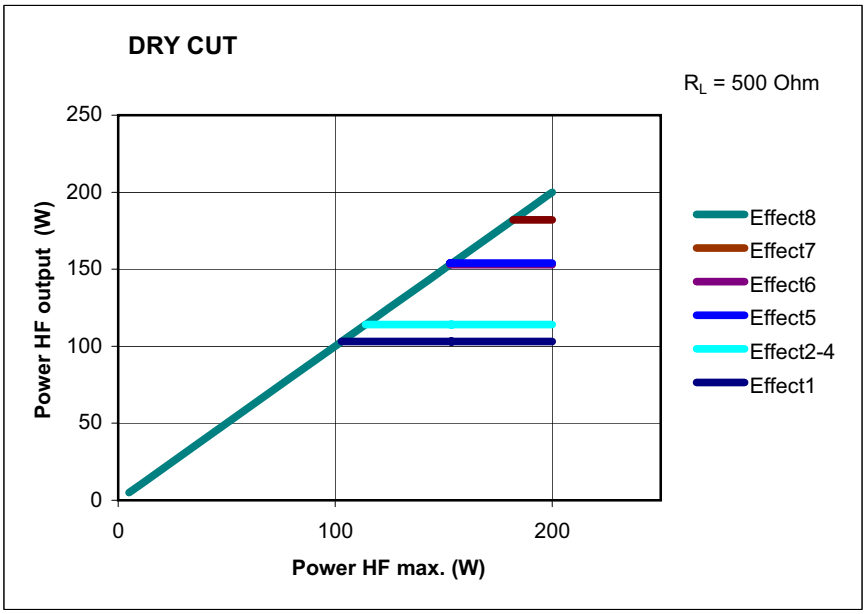

Fig. 8-7

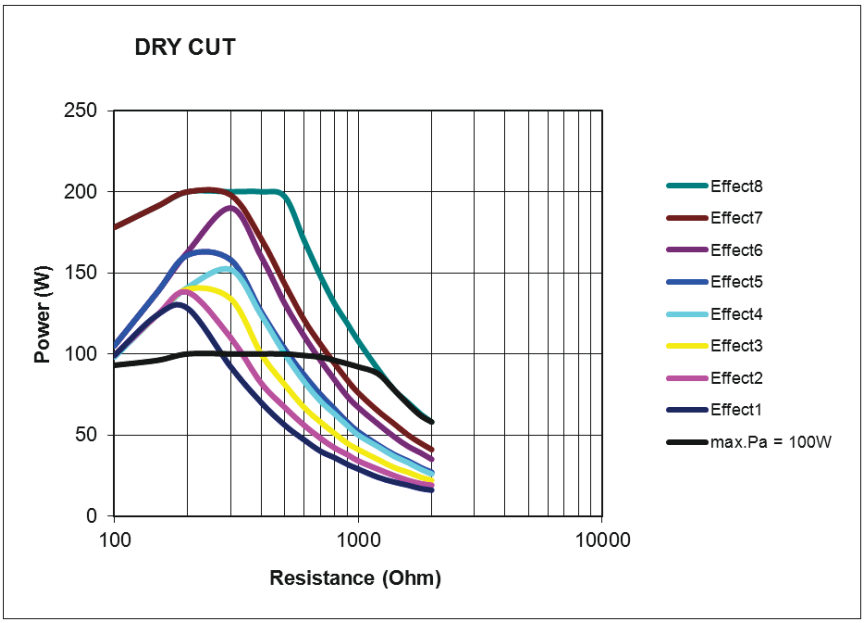

Fig. 8-8

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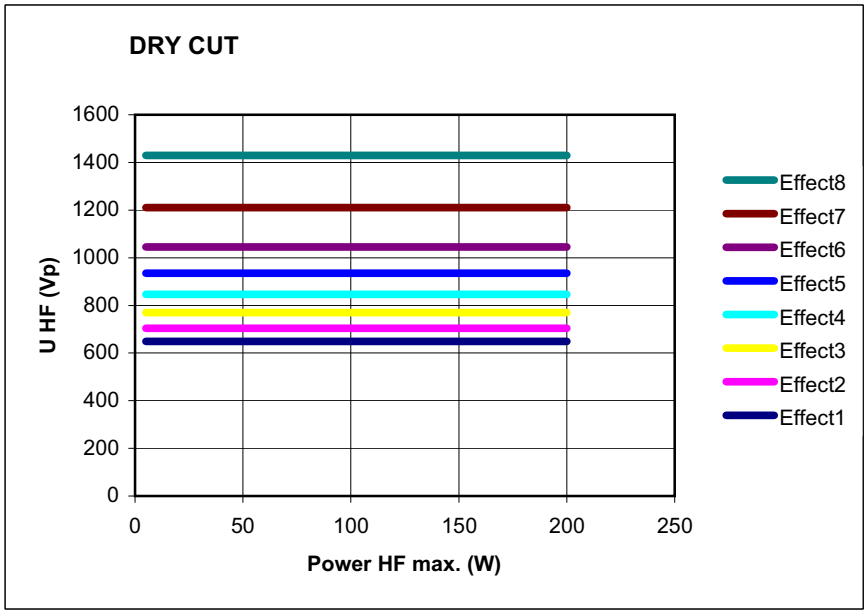

Fig. 8-9

DRY CUT °

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Properties

Intense hemostasis with somewhat slower cutting speed.

Difference compared with Dry Cut

Changed ratio of crest factor to RF peak voltage.

Areas of use

E.g. cuts in "open surgery" and cuts in endoscopic operations that require very good primary hemostasis during the cut and tolerate a somewhat slower cutting speed.

Suitable electrodes

Electrodes with a large application area: knife and spatula electrodes as well as strap loop electrodes.

Technical data

HF voltage waveform	pulse-modulated sinusoidal alternating voltage
Rated frequency	350 kHz (at R_L = 500 ohms) ± 10%
Crest factor	3.7 (at R_L = 500 ohms)
Rated load resistor	500 ohms
Max. HF peak voltage	1550 V_p
Number of effects	8
Consistency of effects	Automatic control of HF peak voltage
HF power limitation	10 watts to 200 watts in 1-watt steps

Max. power output at rated load resistor	200 watts ± 20%
Max. RMS current (maximum HF output current in normal use)	600 mA

Diagrams

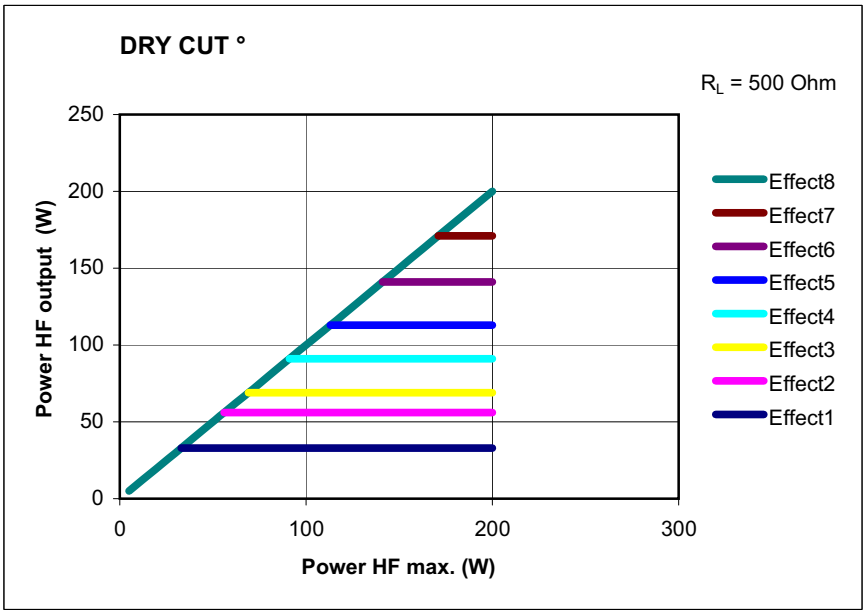

Fig. 8-10

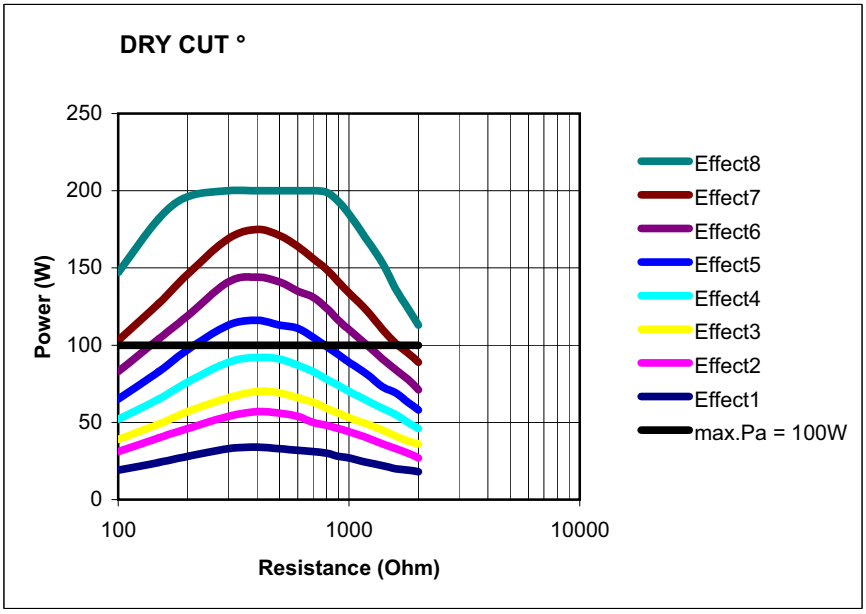

Fig. 8-11

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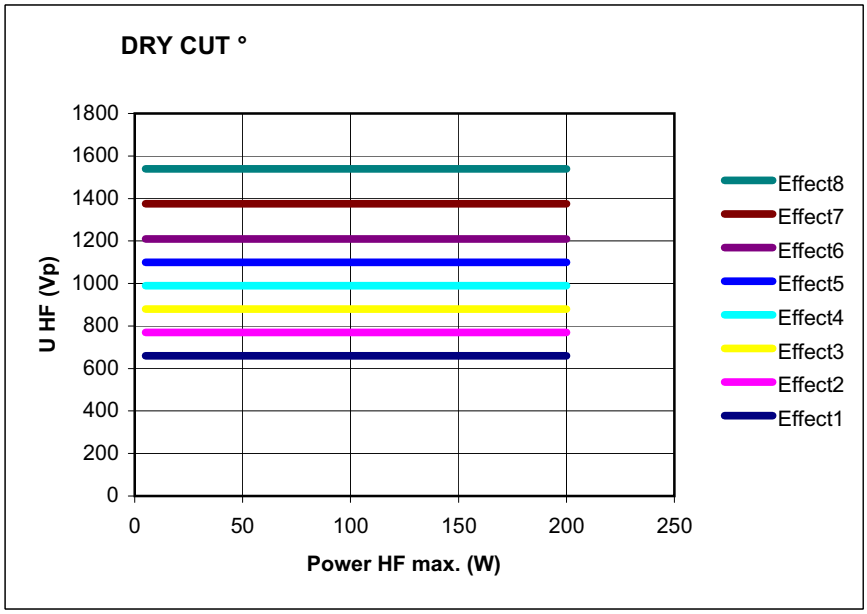

Fig. 8-12

SOFT COAG

Properties Carbonization of the tissue is prevented, adhesion of the electrode to the tissue is greatly reduced. Greater coagulation intensities than in other COAG modes. If you want to use the potentially high coagulation intensities of SOFT COAG to the full, select a low effect level and carry out coagulation for a longer period. If you are only able to carry out coagulation for a short time, select a high effect level. You will then still achieve a high coagulation intensity in comparison with other COAG modes, but do not use the potential coagulation intensity of SOFT COAG to the full.

AUTO STOP The SOFT COAG mode is also available as SOFT COAG with AUTO STOP. AUTO STOP ends activation automatically before the tissue sticks to the instrument.

Areas of use In almost all operations that call for safe, "intense" coagulation, or in which adhesion of the electrode would have a negative effect on the coagulation process.

Suitable electrodes Electrodes with a large contact surface, e.g. ball electrodes for intense coagulation.

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HighCurrent Mode

⚠ WARNING

HighCurrent Mode: Using the SOFT COAG mode at Effect 6 or higher with an unsuitable neutral electrode

Risk of burns to the patient!

⇨ If you set the Soft Coag Mode with Effect 6 or higher together with a power limitation of 135 watts or higher, you may only use neutral electrodes that are compatible for a heating factor of 36 A^2s according to the manufacturer's specifications. These are, for example, the Erbe neutral electrodes NESSY Plate 170 (REF No. 20193-070, 20193-074) or NESSY RePlate 200 (REF No. 20193-090).

Technical data

HF voltage waveform	unmodulated sinusoidal alternating voltage
Rated frequency	350 kHz (at R_L = 500 ohms) ± 10%
Crest factor	1.4 (at R_L = 500 ohms)
Rated load resistor	50 Ohm
Max. HF peak voltage	190 Vp
Number of effects	8
Consistency of effects	Automatic control of HF peak voltage
HF power limitation	5 watts to 200 watts in 1-watt steps
Max. power output at rated load resistor	200 watts ± 20%
Max. RMS current (maximum HF output current in normal use)	1330 mA
Heating Factor	36 A^2s

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Diagrams

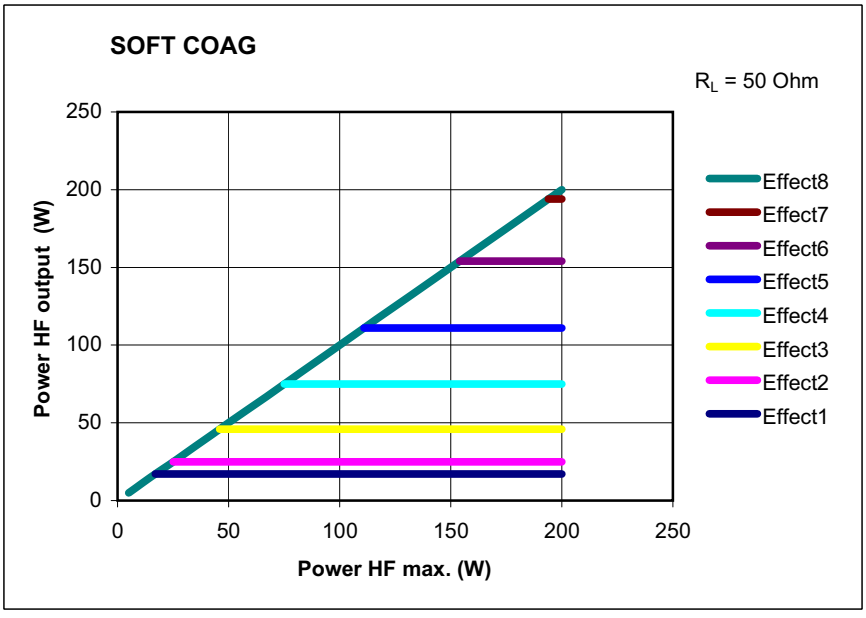

Fig. 8-13

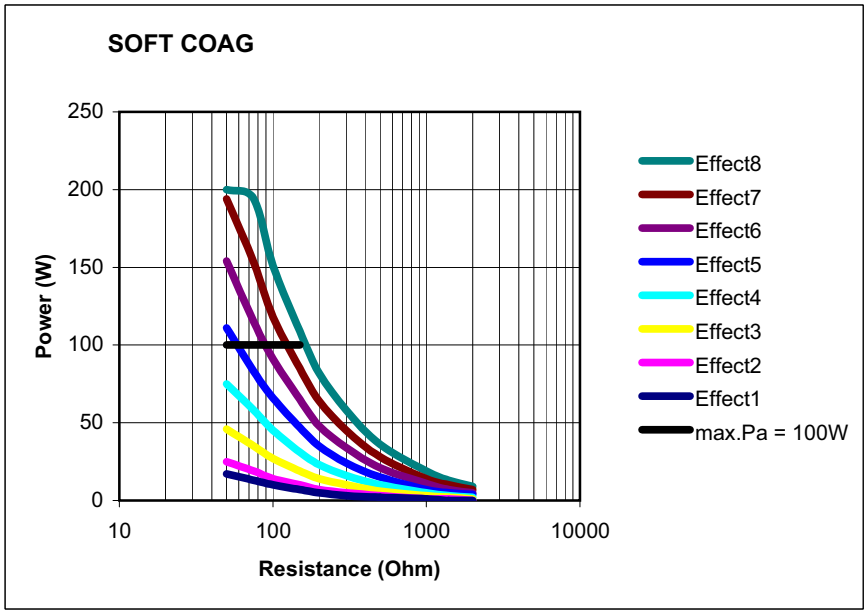

Fig. 8-14

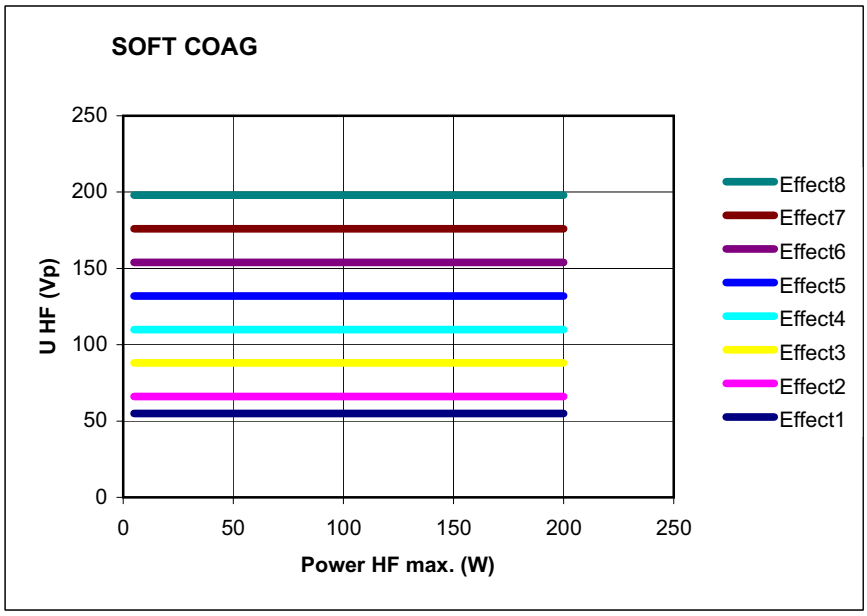

Fig. 8-15

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SWIFT COAG

Properties Fast effective coagulation which is very suitable for dissection with high hemostasis due to its limited tissue-cutting property.

Applications Coagulation and dissection.

Suitable electrodes

Ball electrodes for coagulation only. Knife or spatula electrodes for dissection and coagulation.

Technical data

HF voltage waveform	pulse-modulated sinusoidal alternating voltage
Rated frequency	350 kHz (at R_L = 500 ohms) ± 10%
Crest factor	5.2 (at R_L = 500 ohms)
Rated load resistor	500 ohms
Max. HF peak voltage	2500 V_p
Number of effects	8
Consistency of effects	Automatic control of HF peak voltage
HF power limitation	5 watts to 200 watts in 1-watt steps
Max. power output at rated load resistor	200 watts ± 20%
Max. RMS current (maximum HF output current in normal use)	570 mA

Diagrams

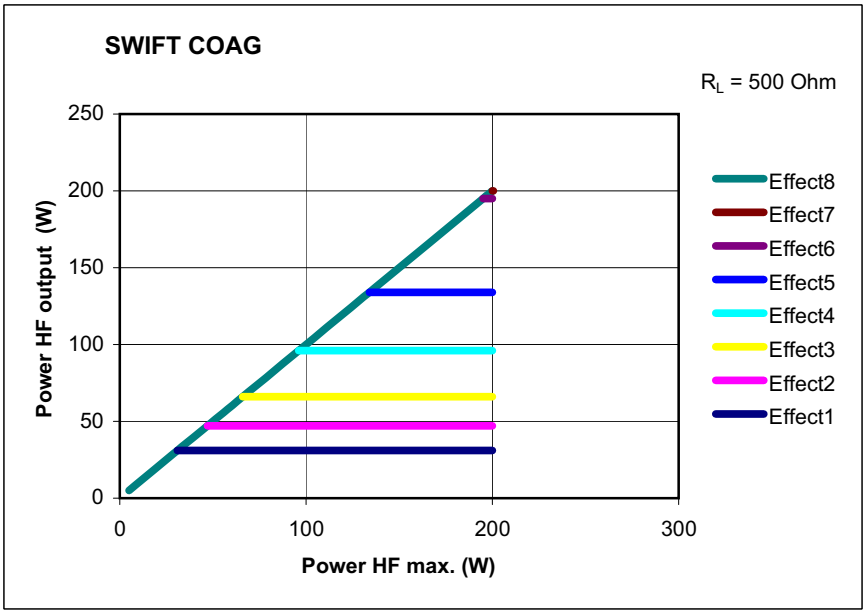

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Fig. 8-16

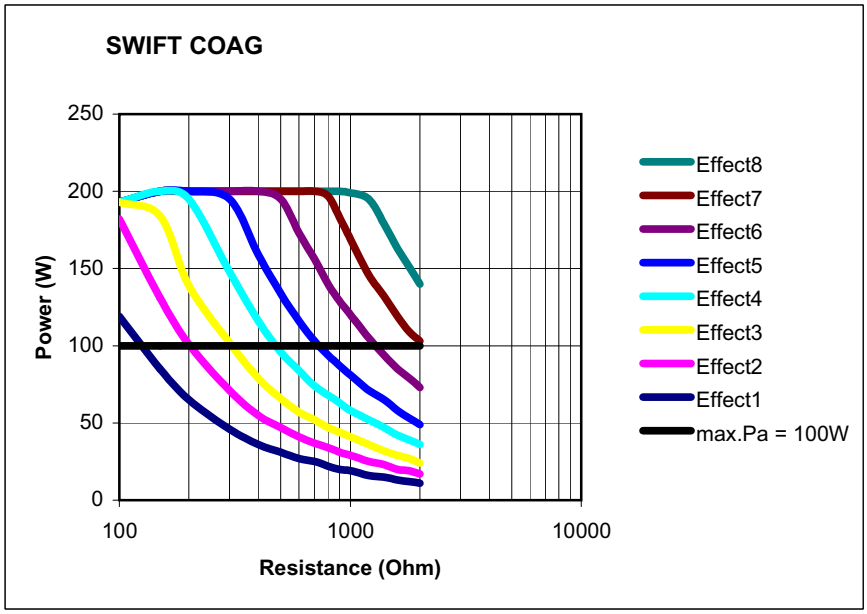

Fig. 8-17

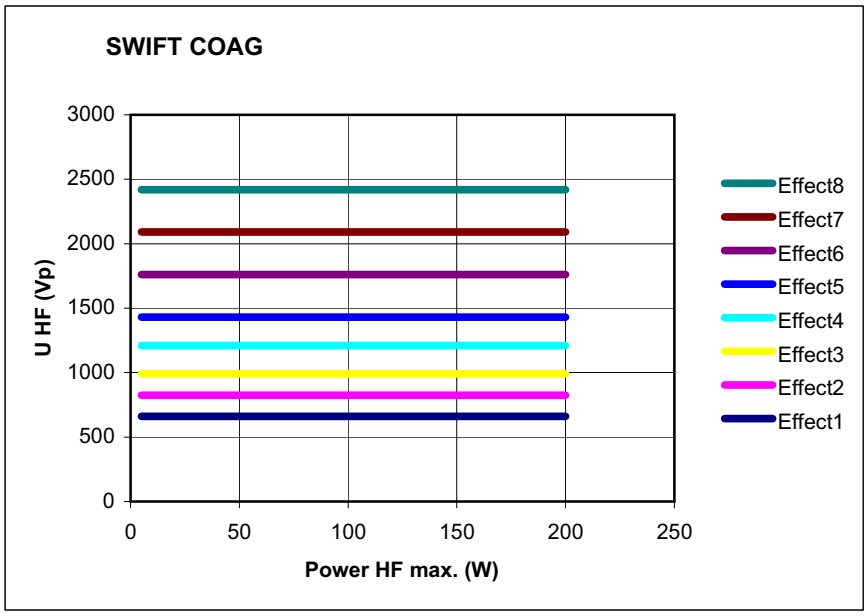

Fig. 8-18

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SWIFT COAG °

Properties

Fast effective coagulation which is very suitable for dissection with high hemostasis due to its limited tissue-cutting property.

Difference compared with SWIFT COAG

Optimised preparation characteristics due to changed ratio of crest factor to RF peak voltage.

Applications Coagulation and dissection.

Suitable electrodes Ball electrodes for coagulation only. Knife or spatula electrodes for dissection and coagulation.

Technical data

HF voltage waveform	pulse-modulated sinusoidal alternating voltage
Rated frequency	350 kHz (at R_L = 500 ohms) ± 10%
Crest factor	3.7 (at R_L = 500 ohms)
Rated load resistor	500 ohms
Max. HF peak voltage	1550 V_p
Number of effects	8
Consistency of effects	Automatic control of HF peak voltage
HF power limitation	5 watts to 200 watts in 1-watt steps
Max. power output at rated load resistor	200 watts ± 20%
Max. RMS current (maximum HF output current in normal use)	600 mA

Diagrams

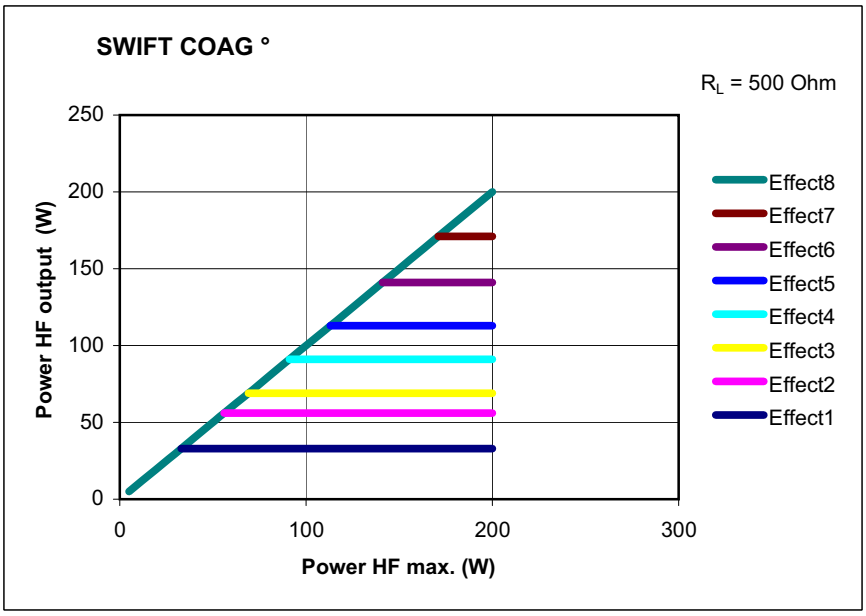

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Fig. 8-19

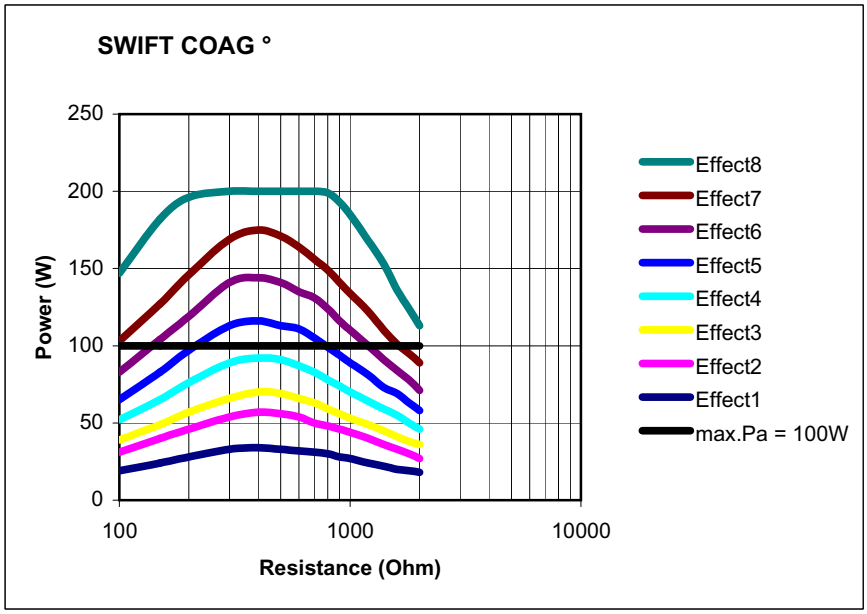

Fig. 8-20

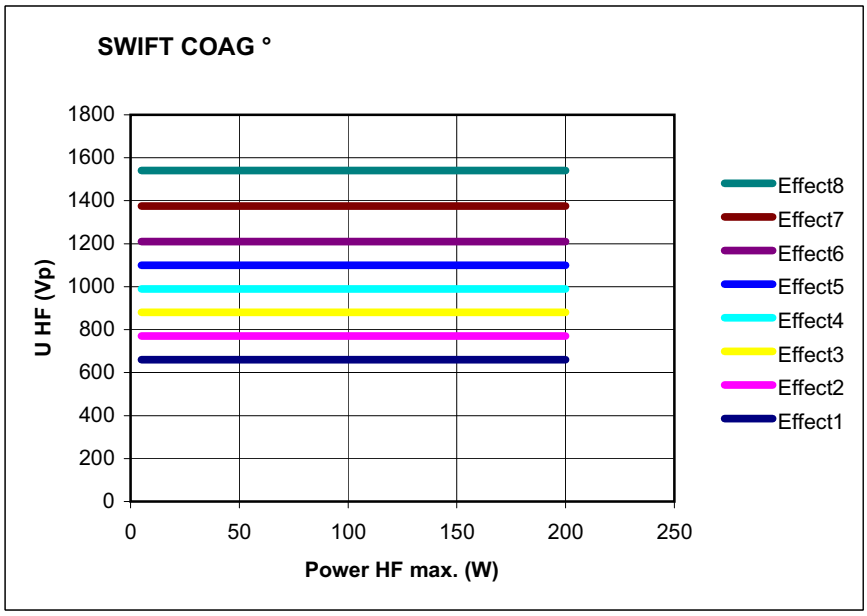

Fig. 8-21

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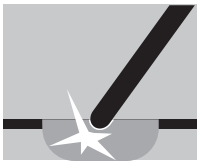
FORCED COAG



Properties Effective, fast "standard" coagulation.

Areas of use Contact coagulation, clamp coagulation, e.g. with insulated monopolar forceps.

Difference from SWIFT COAG The tissue cutting property is suppressed.

Suitable electrodes Ball electrodes for coagulation. Insulated monopolar forceps for clamp coagulation.

Technical data

HF voltage waveform	pulse-modulated sinusoidal alternating voltage
Rated frequency	350 kHz (at R_L = 500 ohms) ± 10%
Crest factor	5.0 (at R_L = 500 ohms)
Rated load resistor	500 ohms
Max. HF peak voltage	2000 Vp
Number of effects	4
Consistency of effects	Automatic control of HF peak voltage
HF power limitation	5 watts to 120 watts in 1-watt steps
Max. power output at rated load resistor	120 watts ± 20%
Max. RMS current (maximum HF output current in normal use)	1150 mA

Diagrams

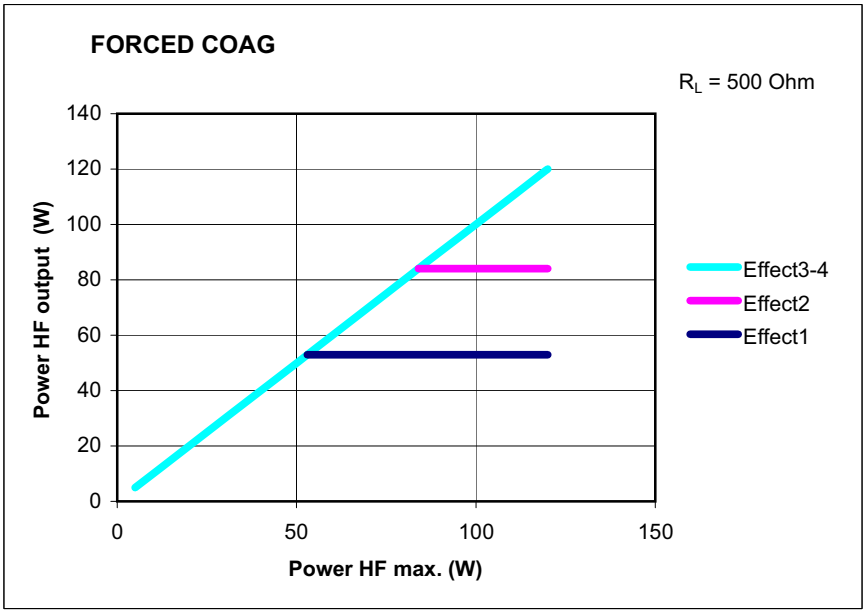


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Fig. 8-22

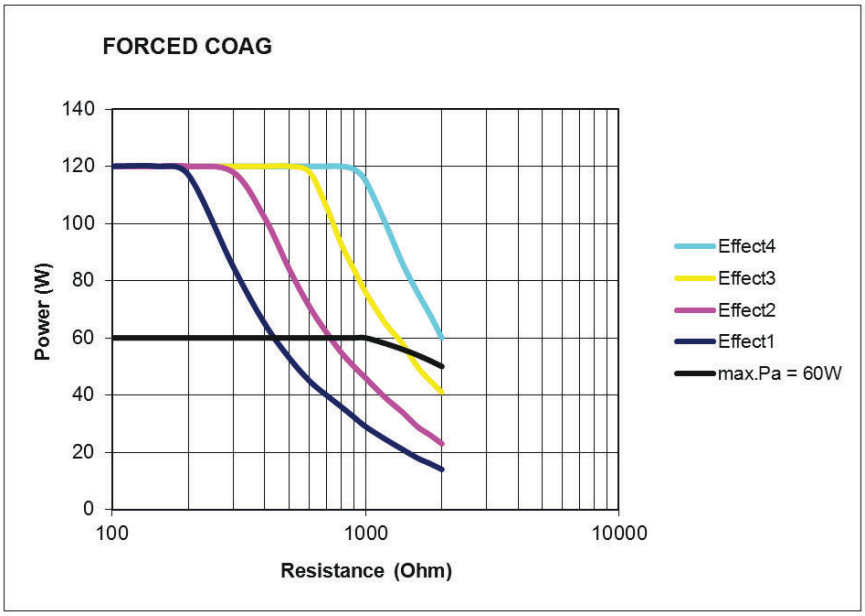

Fig. 8-23

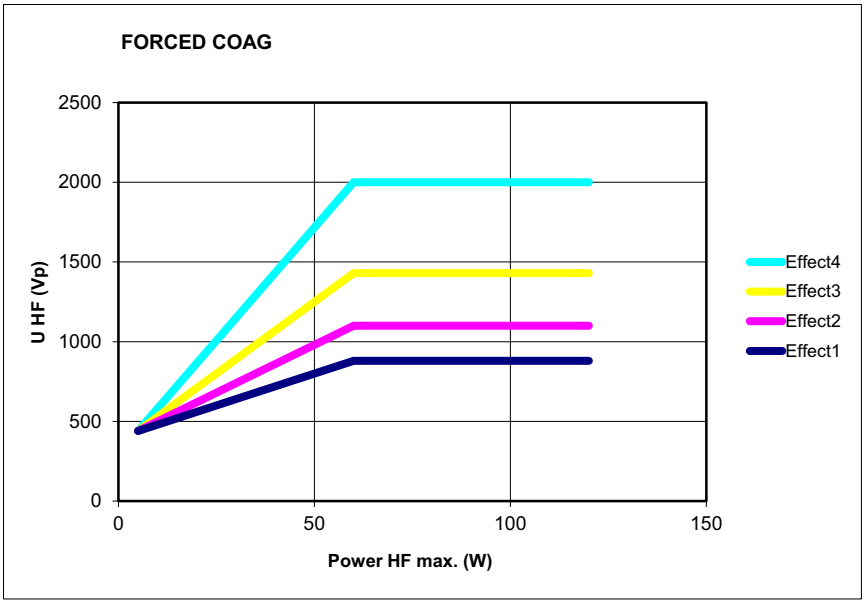

Fig. 8-24

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SPRAY COAG

Properties Contact-free, efficient surface coagulation, low penetration depths. Automatic dosing of power within the pre-selected limits.

Areas of use Coagulation of diffuse hemorrhage.

WARNING! Only use insulated monopolar metal forceps for clamp coagulation.

Suitable electrodes Knife and lancet-shaped electrodes.

Technical data

HF voltage waveform	pulse-modulated sinusoidal alternating voltage
Rated frequency	350 kHz (at R_L = 500 ohms) ± 10%
Crest factor	7.4 (at R_L = 500 ohms)
Rated load resistor	500 ohms
Max. HF peak voltage	4300 V_p
Number of effects	2
Consistency of effects	Restriction of HF peak voltage
HF power limitation	5 watts to 120 watts in 1-watt steps
Max. power output at rated load resistor	120 watts ± 20%
Max. RMS current (maximum HF output current in normal use)	820 mA

Diagrams

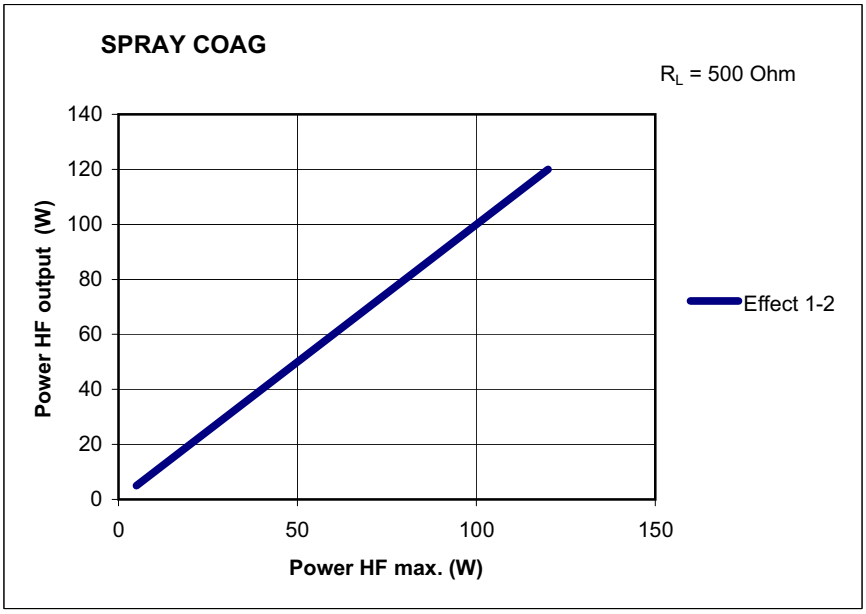

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Fig. 8-25

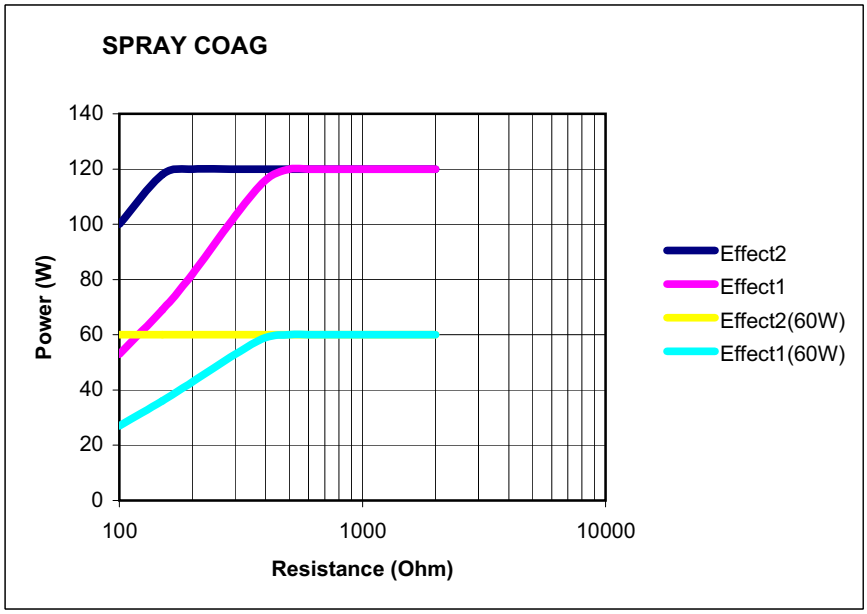

Fig. 8-26

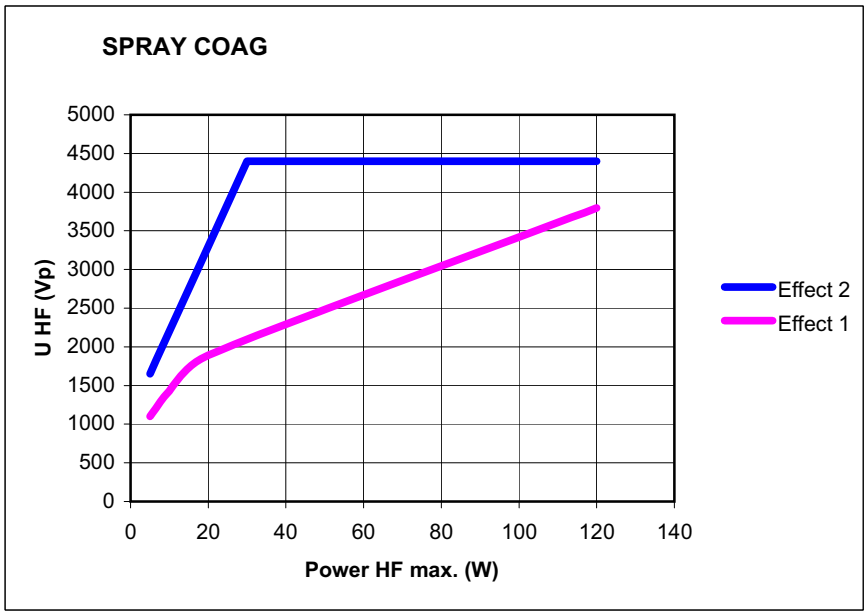

Fig. 8-27

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CLASSIC COAG

Properties Reproducible preparation characteristics that are well suited for dissecting tissue layers with very good hemostasis and low lateral tissue damage.

Areas of Use Dissection of tissue layers and coagulation.

Suitable electrodes Knife electrodes and spatula electrodes.

Technical data

HF voltage waveform	pulse-modulated sinusoidal alternating voltage
Rated frequency	350 kHz (at R_L = 500 ohms) ± 10%
Crest factor	4.5 (at R_L = 1000 ohms)
Rated load resistor	1,000 ohms
Max. HF peak voltage	1450 Vp
Number of effects	2
Consistency of effects	Automatic control of HF peak voltage
HF power limitation	5 watts to 60 watts in 1-watt steps
Max. power output at rated load resistor	60 watts ± 20 %
Max. RMS current (maximum HF output current in normal use)	300 mA

Diagrams

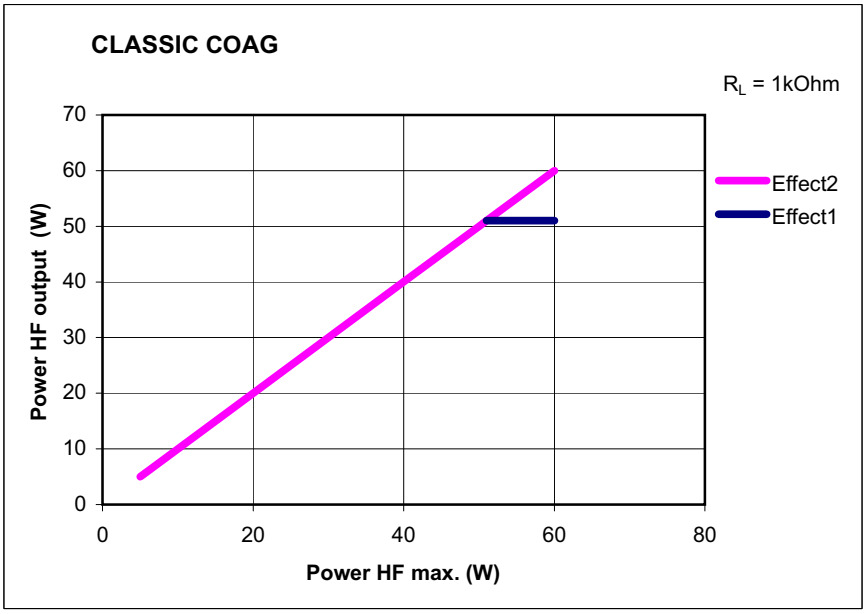

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Fig. 8-28

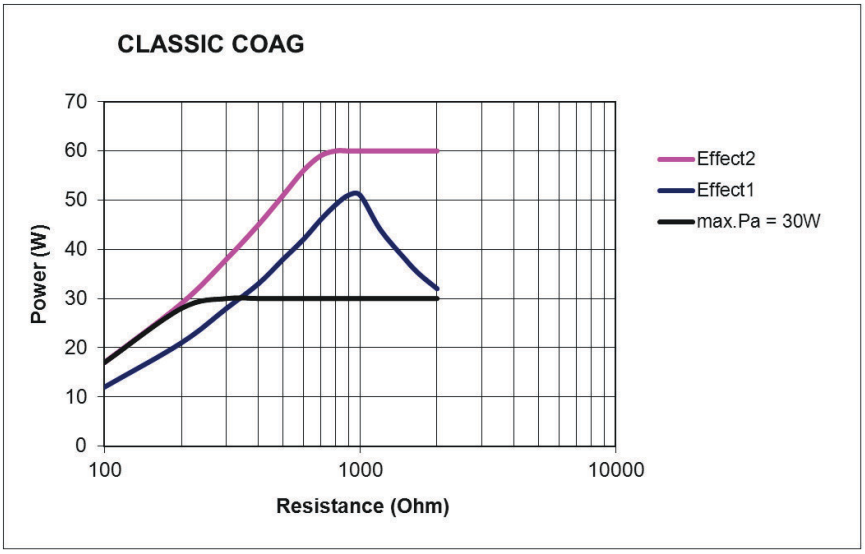

Fig. 8-29

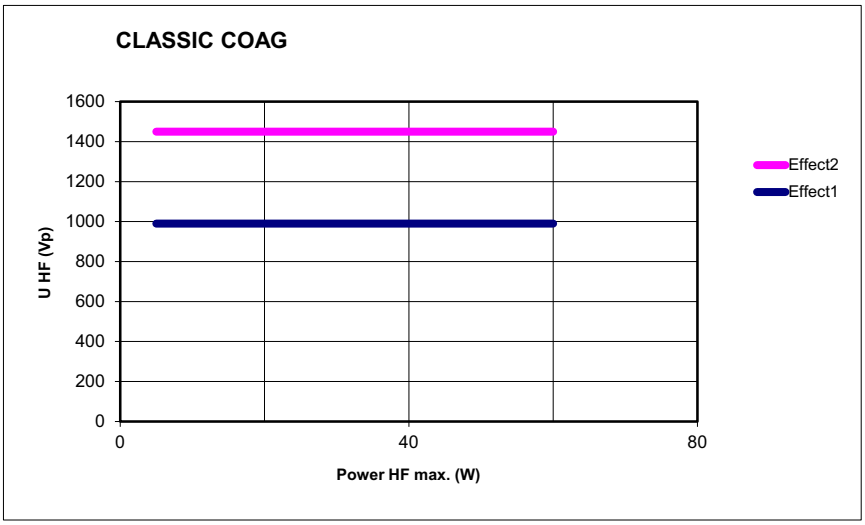

Fig. 8-30

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Chapter 9
Bipolar Standard Modes

BIPOLAR CUT

Properties

Cutting current that only flows directly around the distal end of the applicator. You can use the effect levels to set the degree of hemostasis at the cut edge.

PPS (Power Peak System)

The BIPOLAR CUT mode is equipped with PPS. A special problem during incision may be posed by the initial incision phase, in particular when the cutting electrode is pressed firmly against the tissue to be cut before activation of the HF generator so that the cutting electrode has a relatively extensive and thus low-resistance contact with the tissue. This is generally the case for example with TUR and endoscopic polypectomy. In such cases the HF generator must offer an above-average output so that the initial incision is not delayed, as otherwise an excessive coagulation necrosis may be produced at the point of initial incision. The VIO is equipped with automatic power control which detects low-resistance loads and controls the HF generator so that it briefly provides sufficient output to ensure the HF voltage necessary for the cutting quality selected or the intensity of the electric arcs even with low-resistance loads. Thanks to this feature the average output can be limited to relatively low levels, something which represents improved protection from unintentional thermal tissue damage.

Suitable electrodes

Special applicators (bipolar electrodes with a rigid or retractable cutting needle) in laparoscopy, neurosurgery, and ENT.

Technical data

HF voltage waveform	unmodulated sinusoidal alternating voltage
Rated frequency	350 kHz (at R_L = 500 ohms) ± 10%
Crest factor	1.4 (at R_L = 500 ohms)
Rated load resistor	500 ohms
Max. HF peak voltage	740 Vp
Number of effects	8
Constancy of effects	automatic control of HF peak voltage
HF power limitation	1 watts to 100 watts in 1 watt steps
Max. power output at rated load resistor	100 watts ± 20%

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Diagrams

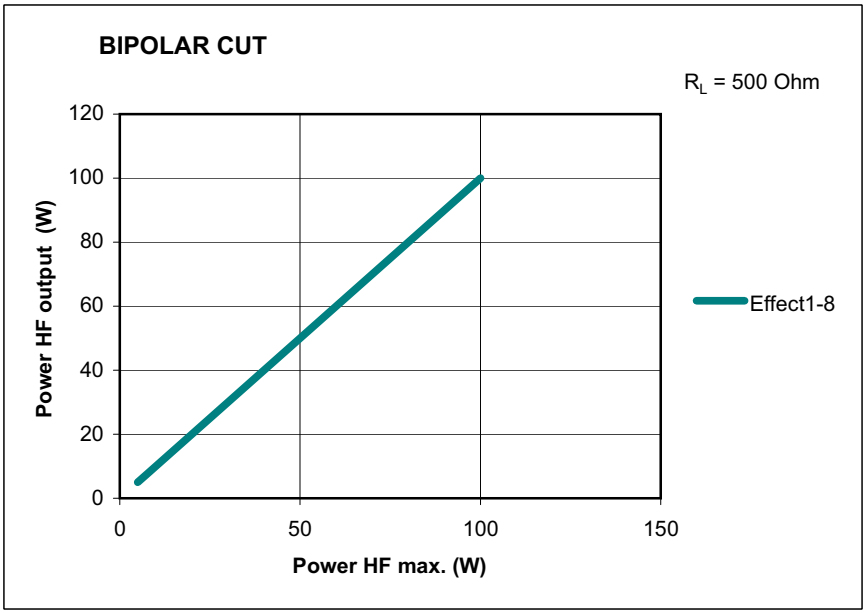

Fig. 9-1

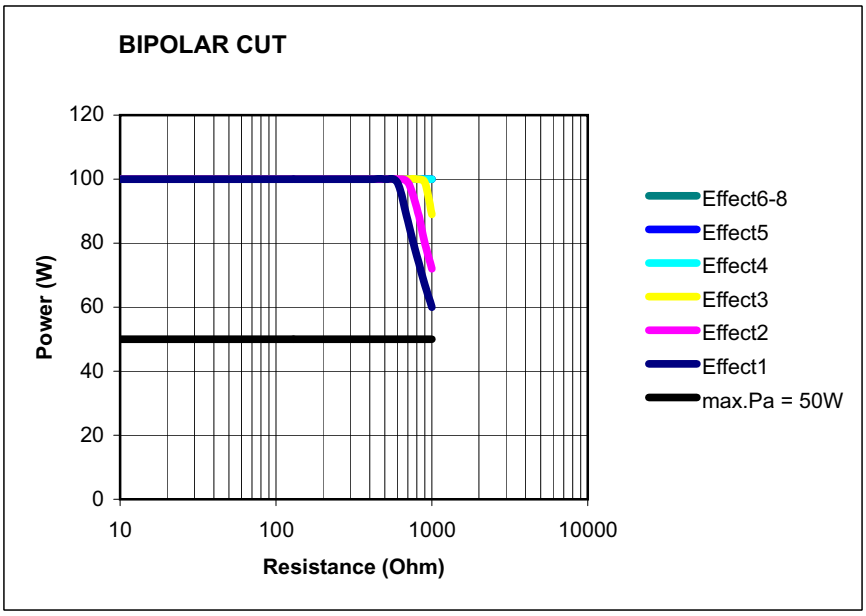

Fig. 9-2

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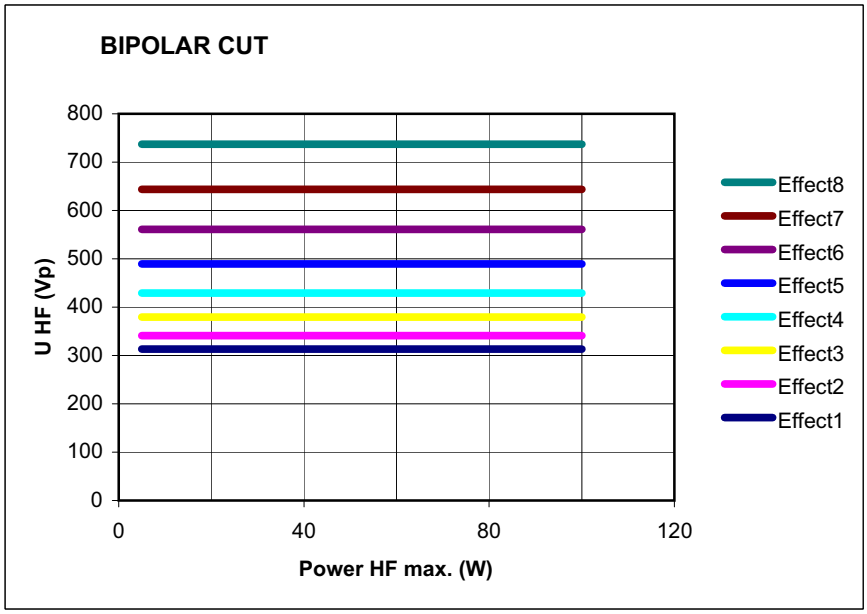

Fig. 9-3

BIPOLAR CUT +

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Properties

Reproducible, tissue-sparing cuts. You can use the effect levels to set the degree of hemostasis at the cut edge.

Areas of use

Cutting procedures in Bipolar Resection.

PPS (Power Peak System)

The BIPOLAR CUT mode is equipped with PPS. A special problem during incision may be posed by the initial incision phase, in particular when the cutting electrode is pressed firmly against the tissue to be cut before activation of the HF generator so that the cutting electrode has a relatively extensive and thus low-resistance contact with the tissue. This is generally the case for example with TUR and endoscopic polypectomy. In such cases the HF generator must offer an above-average output so that the initial incision is not delayed, as otherwise an excessive coagulation necrosis may be produced at the point of initial incision. The VIO is equipped with automatic power control which detects low-resistance loads and controls the HF generator so that it briefly provides sufficient output to ensure the HF voltage necessary for the cutting quality selected or the intensity of the electric arcs even with low-resistance loads. Thanks to this feature the average output can be limited to relatively low levels, something which represents improved protection from unintentional thermal tissue damage.

Suitable electrodes

On the MF socket the mode is restricted by the connecting cords for use with bipolar resectoscopes.

Technical data

Type of HF voltage	Unmodulated sinusoidal AC voltage
Nominal frequency	350 kHz (across R_L = 500 ohms) ± 10%
Crest factor	1.4 (across R_L = 500 ohms)

Design load resistance	500 ohms
Max. HF peak voltage	770 Vp
Number of effects	8
Consistency of effects	Automatic control of HF peak voltage
Max. output across the design load resistor	370 W +8 % / -20 %

Diagrams

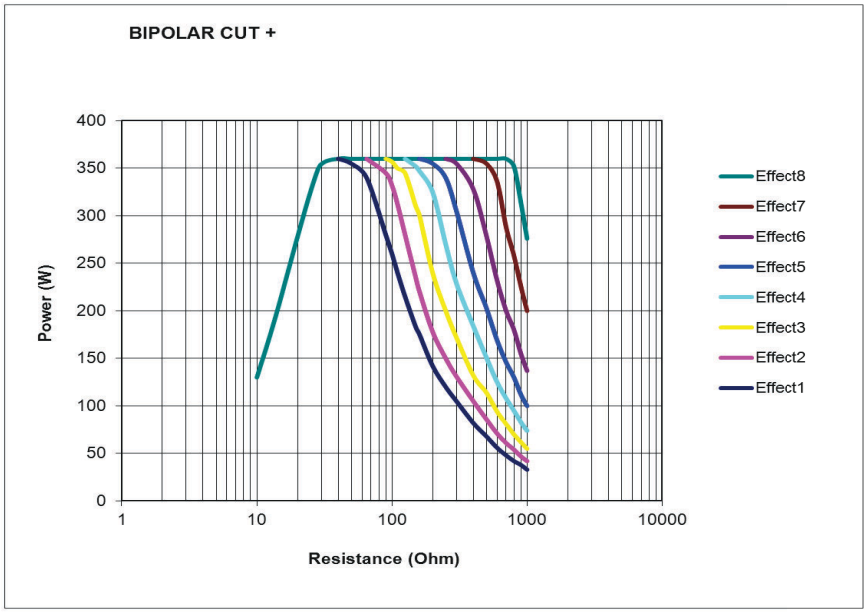

Fig. 9-4

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BIPOLAR CUT ++

Properties Reproducible, tissue-sparing cuts. You can use the effect levels to set the degree of hemostasis at the cut edge.

Areas of use Cutting procedures in Bipolar Resection.

PPS (Power Peak System) The BIPOLAR CUT++ mode is equipped with PPS. A special problem during incision may be posed by the initial incision phase, in particular when the cutting electrode has little contact with the tissue when activating the HF generator. This is the case with TUR, for example. In such cases, the HF generator must offer an above-average output so that the initial incision is not delayed. The VIO is equipped with automatic power control which detects low-resistance loads and controls the HF generator so that it briefly provides sufficient output to ensure the HF voltage necessary for the cutting quality selected or the intensity of the electric arcs even with low-resistance loads. Thanks to this feature, the average output can be limited to relatively low levels, something which represents improved protection from unintentional thermal tissue damage.

Suitable electrodes

Bipolar resectoscopes that are connected with the Erbe bipolar cable for resectoscopes to the RESECTOSCOPE socket of a bipolar resection adapter.

Technical data

Type of HF voltage	Unmodulated sinusoidal AC voltage
Nominal frequency	350 kHz (across R_L = 500 ohms) ± 10%
Crest factor	1.4 (across R_L = 500 ohms)
Designed load resistance	75 ohms
Max. HF peak voltage	490 Vp
Number of effects	8
Consistency of effects	Automatic control of HF generator power supply
Max. output across the designed load resistor	300 watts ± 20%

Diagram

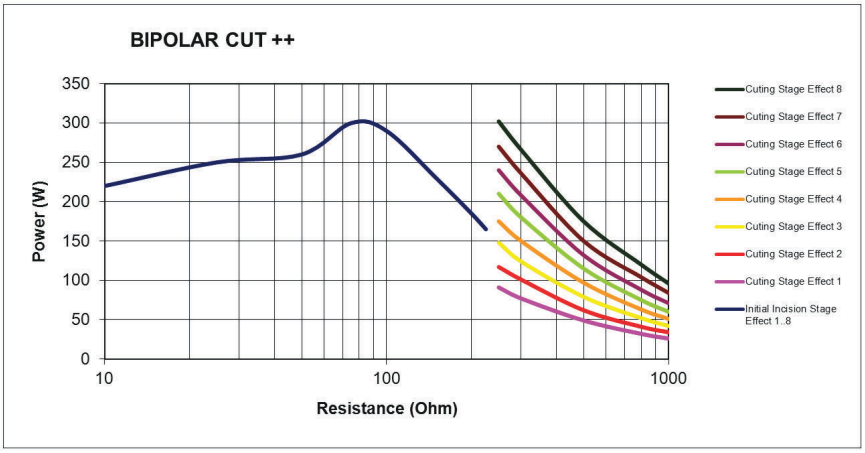

Fig. 9-5

BIPOLAR SOFT COAG

Properties

Lower voltages, carbonization of the tissue is prevented, adhesion of the electrode to the tissue is very much reduced.

If you want to use the potentially high coagulation intensities of BIPOLAR SOFT COAG to the full, select a low effect level and carry out coagulation for a longer period. If you are only able to carry out coagulation for a short time, select a high effect level. You will then still achieve a high coagulation intensity in comparison with other COAG modes, but do not use the potential coagulation intensity of BIPOLAR SOFT COAG to the full.

AUTO STOP

The BIPOLAR SOFT COAG mode is also available as BIPOLAR SOFT COAG with AUTO STOP. AUTO STOP ends activation automatically before the tissue adheres to the instrument.

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AUTO START

In the window *Select activation type* you can select an AUTO START function for BIPOLAR SOFT COAG. When the instrument touches tissue, coagulation starts automatically after a specified period of time.

Suitable electrodes

Bipolar instruments, e.g. bipolar forceps and bipolar hook electrodes.

Technical data

HF voltage waveform	unmodulated sinusoidal alternating voltage
Rated frequency	350 kHz (at R_L = 500 ohms) ± 10%
Crest factor	1.4 (at R_L = 500 ohms)
Rated load resistor	75 ohms
Max. HF peak voltage	200 Vp
Number of effects	8
Constancy of effects	automatic control of HF peak voltage
HF power limitation	1 watt to 120 watts in 1 watt steps
Max. power output at rated load resistor	120 watts ± 20%

Diagrams

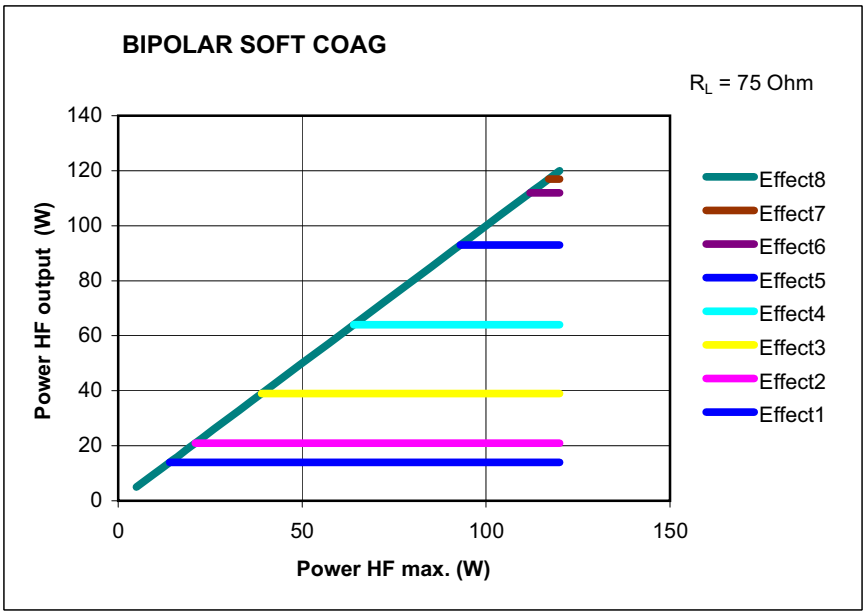

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Fig. 9-6

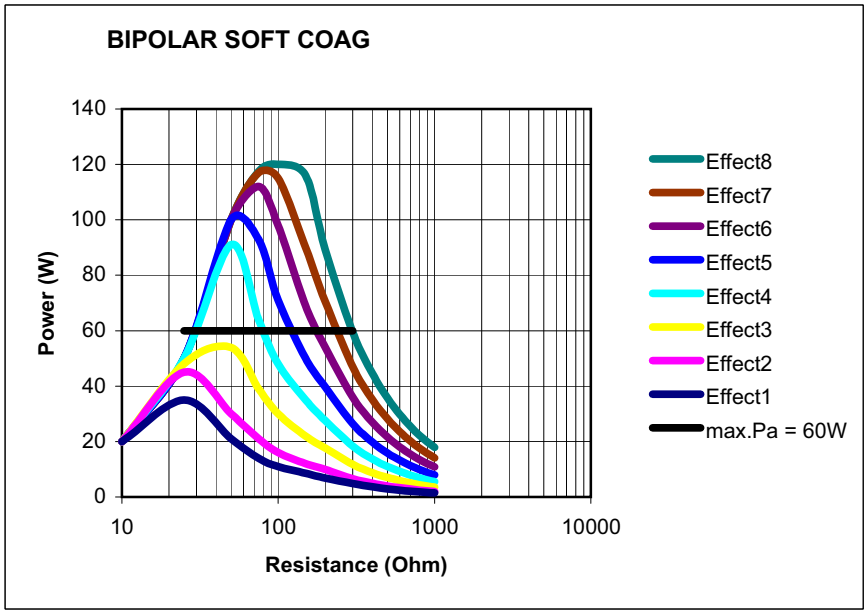

Fig. 9-7

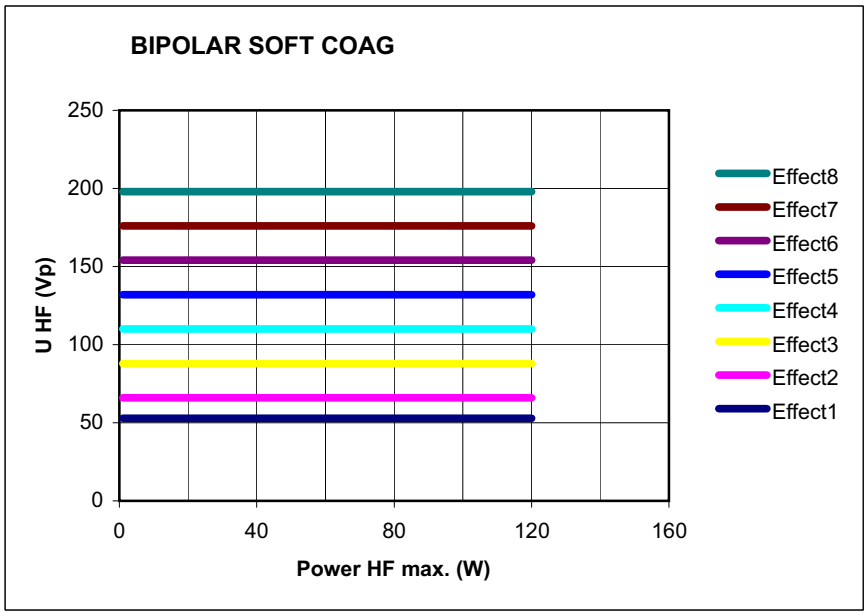

Fig. 9-8

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BIPOLAR SOFT COAG +

Properties Lower voltages, carbonization of the tissue is prevented, adhesion of the electrode to the tissue is reduced considerably.

Areas of use Coagulation in Bipolar Resection.

Suitable electrodes

On the MF socket the mode is restricted by the connecting cords for use with bipolar resectoscopes.

Technical data

Type of HF voltage	Unmodulated sinusoidal AC voltage
Nominal frequency	350 kHz (across R_L = 500 ohms) ± 10%
Crest factor	1.4 (across R_L = 500 ohms)
Design load resistance	75 ohms
Max. HF peak voltage	200 Vp
Number of effects	8
Consistency of effects	Automatic control of HF peak voltage
Max. output across the design load resistor	200 W ± 20%

Diagrams

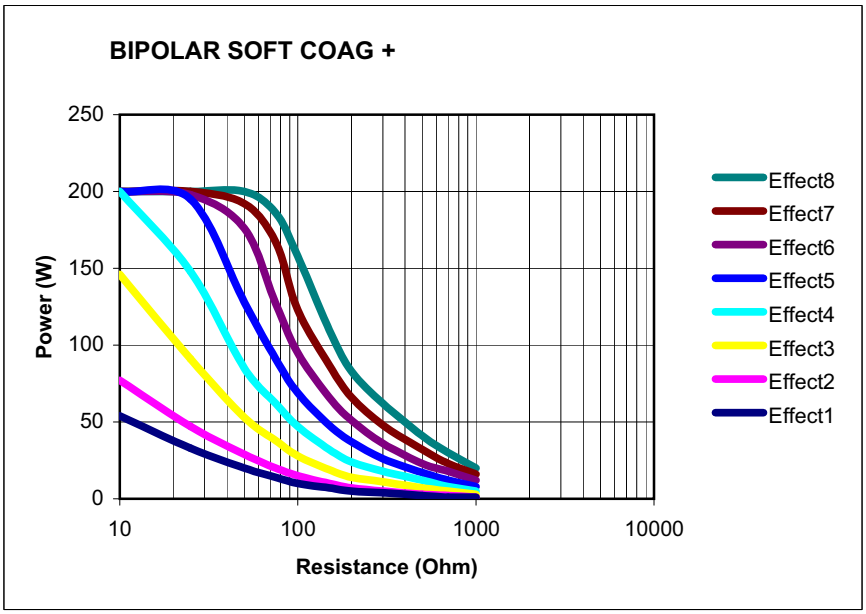

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Fig. 9-9

BIPOLAR SOFT COAG ++

Properties

Lower voltages, carbonization of the tissue is prevented, adhesion of the electrode to the tissue is reduced considerably.

Areas of use

Coagulation in Bipolar Resection.

Suitable electrodes

Bipolar resectoscopes that are connected with the Erbe bipolar cable for resectoscopes to the RESECTOSCOPE socket of a bipolar resection adapter.

Technical data

Type of HF voltage	Unmodulated sinusoidal AC voltage
Nominal frequency	350 kHz (across R_L = 500 ohms) ± 10%
Crest factor	1.4 (across R_L = 500 ohms)
Designed load resistance	50 ohms
Max. HF peak voltage	200 Vp
Number of effects	8
Consistency of effects	Automatic control of HF generator power supply
Max. output across the design load resistor	200 W ± 20%

Diagrams

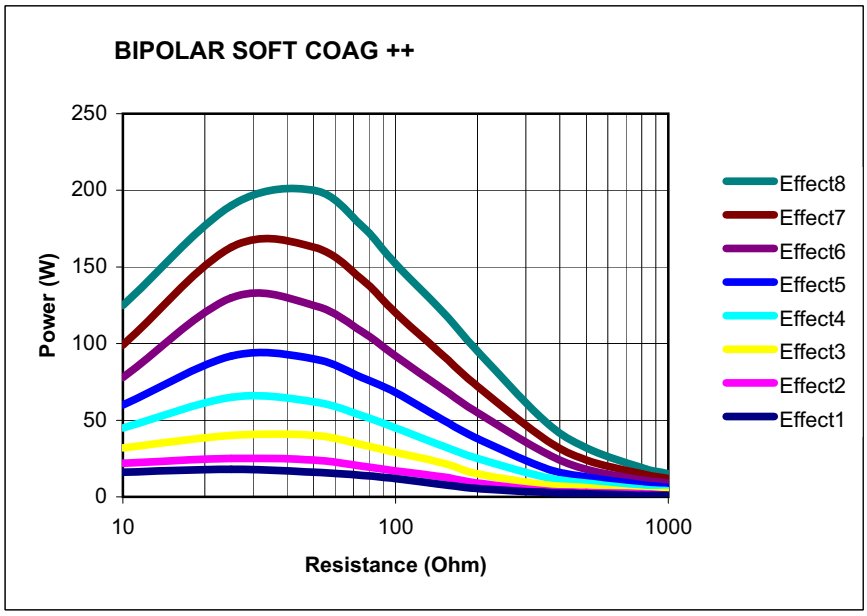

Fig. 9-10

BIPOLAR FORCED COAG

Properties Fast bipolar coagulation.

AUTO START In the *Select activation type* window, you can select an AUTO START function for BIPOLAR FORCED COAG. When the instrument touches tissue, coagulation starts automatically after a specified period of time.

Areas of use All bipolar coagulation procedures in which you want to coagulate vessels fast and effectively or want to replace monopolar forceps coagulation.

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Difference from BIPOLAR SOFT COAG

Faster bipolar coagulation. Carbonization of the tissue cannot be precluded.

Suitable electrodes

Bipolar instruments, e.g. bipolar forceps, bipolar hook electrodes.

Technical data

Type of HF voltage	pulse-modulated sinusoidal AC voltage
Nominal frequency	350 kHz (at R_L= 500 ohms) ± 10%
Crest factor	3.8 (at R_L = 500 ohms)
Designed load resistance	200 ohms
Max. HF peak voltage	560 Vp
Number of effects	2
Consistency of effects	Automatic control of HF peak voltage
HF power limitation	5 watts to 90 watts in 1 watt increments
Max. output across the designed load resistor	90 watts ± 20%

Diagrams

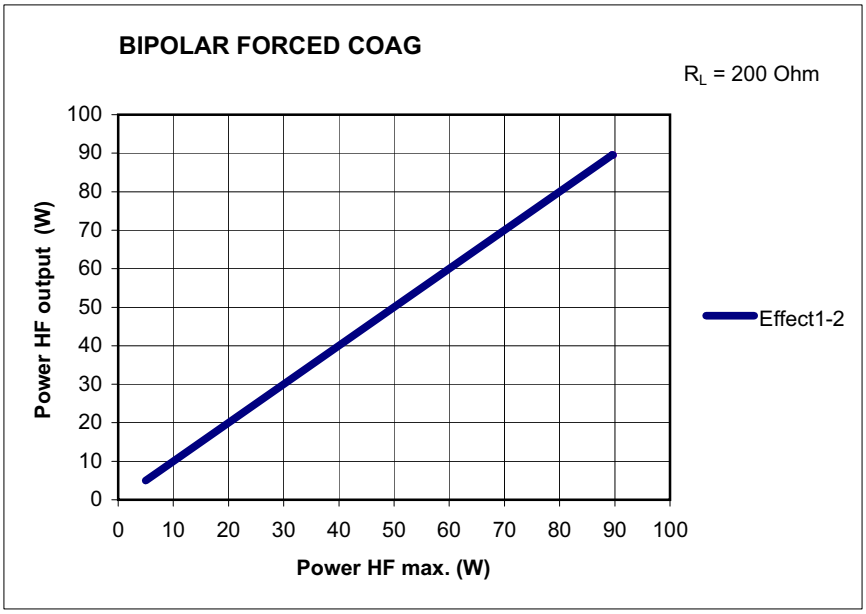

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Fig. 9-11

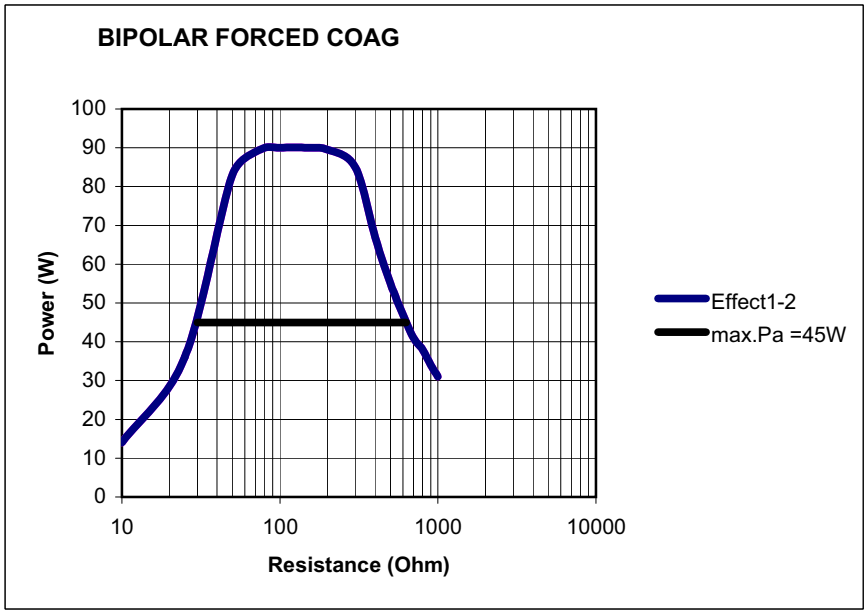

Fig. 9-12

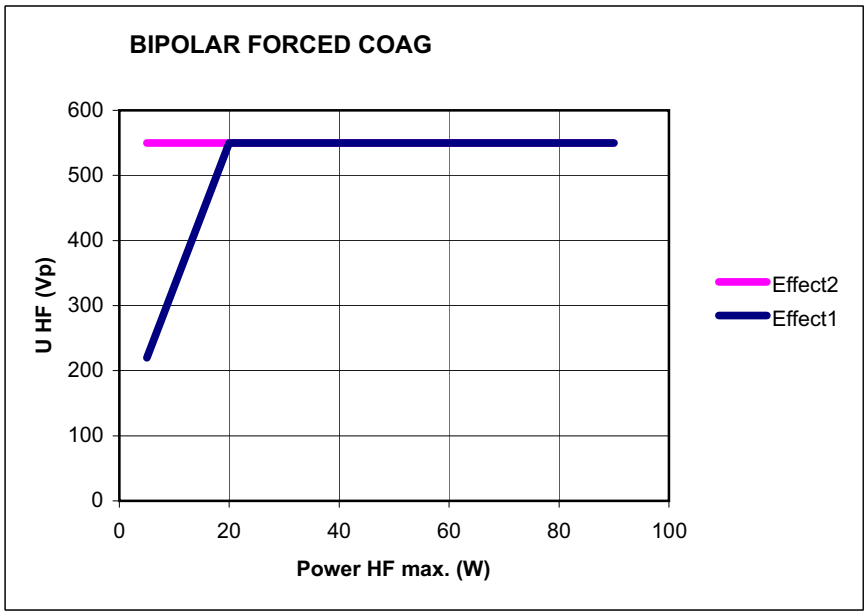

Fig. 9-13

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Chapter 10
Monopolar Optional Modes

PRECISE CUT

Properties

Very fine adjustment, minimum necroses at the cut edge, very fine power output in a range of 1 to 50 watts.

Areas of use

E.g. cuts in operations where strain on the tissue or patient must be kept to a minimum, e.g. neurosurgery, ENT, and dermatology.

Difference from AUTO CUT

In the lower power range, you can set the degree of hemostasis lower and more accurately.

Suitable electrodes

Microsurgical instruments and needle electrodes for microsurgery.

Technical data

HF voltage waveform	unmodulated sinusoidal alternating voltage
Rated frequency	350 kHz (at R_L = 500 ohms) ± 10%
Crest factor	1.4 (at R_L = 500 ohms)
Rated load resistor	500 ohms
Max. HF peak voltage	390 V_p
Number of effects	8
Consistency of effects	Automatic control of HF peak voltage
HF power limitation	1 watt to 50 watts in 1 watt steps
Max. power output at rated load resistor	50 watts ± 20 %
Max. RMS current (maximum HF output current in normal use)	140 mA

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Diagrams

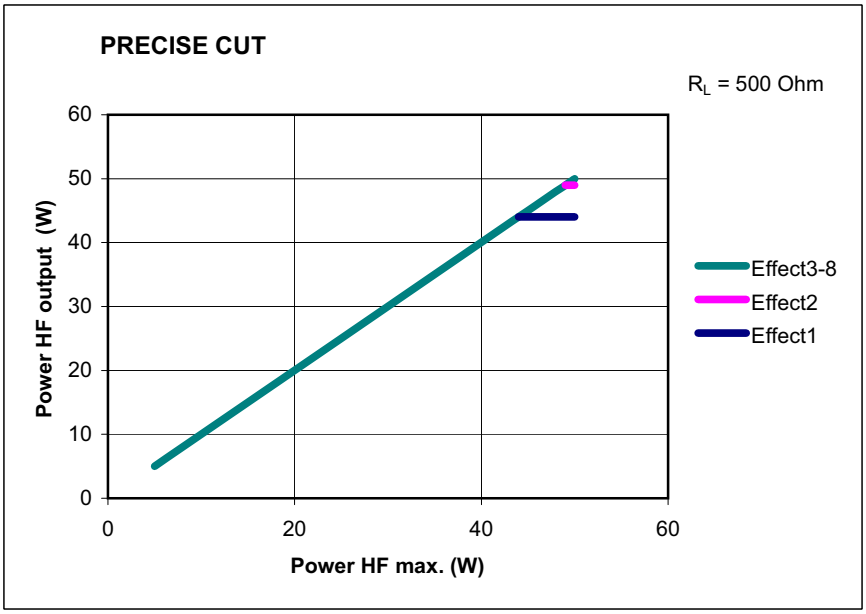

Fig. 10-1

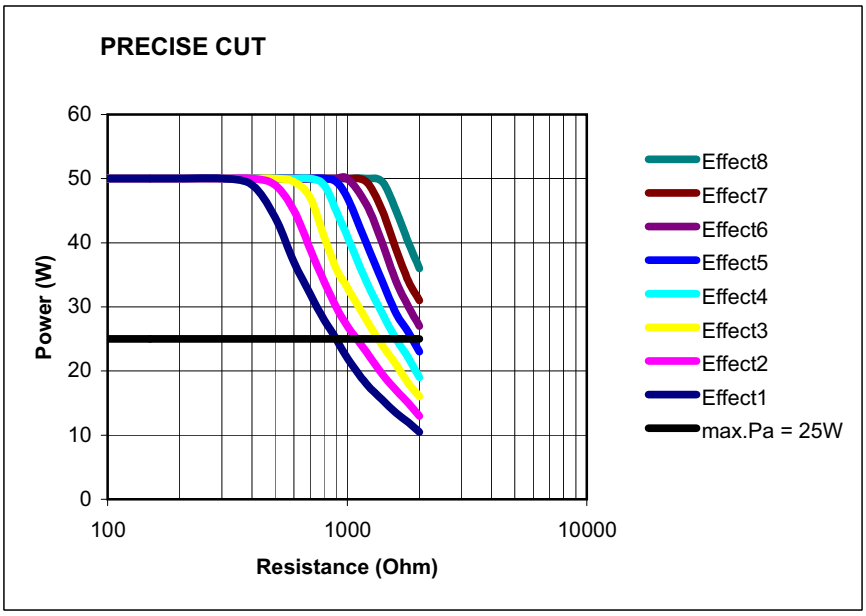

Fig. 10-2

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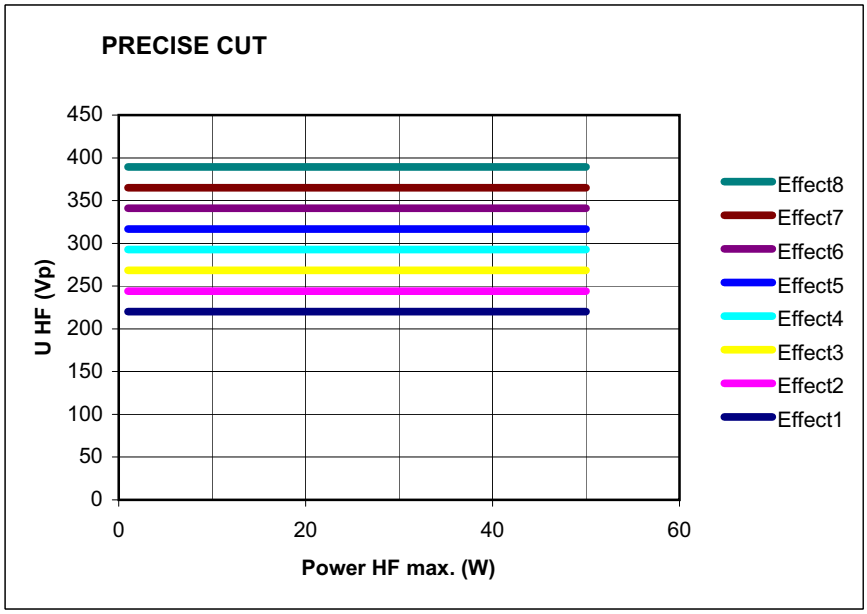

Fig. 10-3

ENDO CUT Q

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Properties The cut consists of alternating cutting and coagulating phases. The cut is easy to control and is characterized by a reproducible, preselectable coagulation property while cutting.

Areas of use Endoscopic interventions in which alternating cutting and coagulation with activation is called for.

Suitable electrodes Monofilament and polyfilament snare electrodes.

Expert mode For a customized setting you can have Expert mode activated by a service technician. The *Cut / Coag Settings* window will then also show the parameters *Cutting duration* and *Cutting interval* .

Cutting duration

Depending on the size, type and location of lesions it may be advantageous to vary cutting duration.

You can set cutting duration to one of 4 levels. Cutting duration has a major influence on cutting width.

Cutting interval

The cutting interval is the amount of time between the start of a cutting cycle and the start of the next cutting cycle. The cutting interval is thus comprised of one cutting cycle and one coagulation cycle.

You can set the cutting interval to one of 10 levels. The higher the level, the longer the cutting interval and coagulation cycle. A short cutting interval makes it easier to re-

move the lesion quickly. A long cutting interval makes it easier to remove the lesion slowly under control.

Technical data

HF voltage waveform	unmodulated sinusoidal alternating voltage
Rated frequency	350 kHz (at R_L = 500 ohms) ± 10%
Crest factor	1.4 (at R_L = 500 ohms)
Max. HF peak voltage	770 V_p
Number of effects	4
Consistency of effects	Automatic control of HF peak voltage
Max. power output	400 watts + 0% / -20%
Max. RMS current (maximum HF output current in normal use)	510 mA

Diagrams

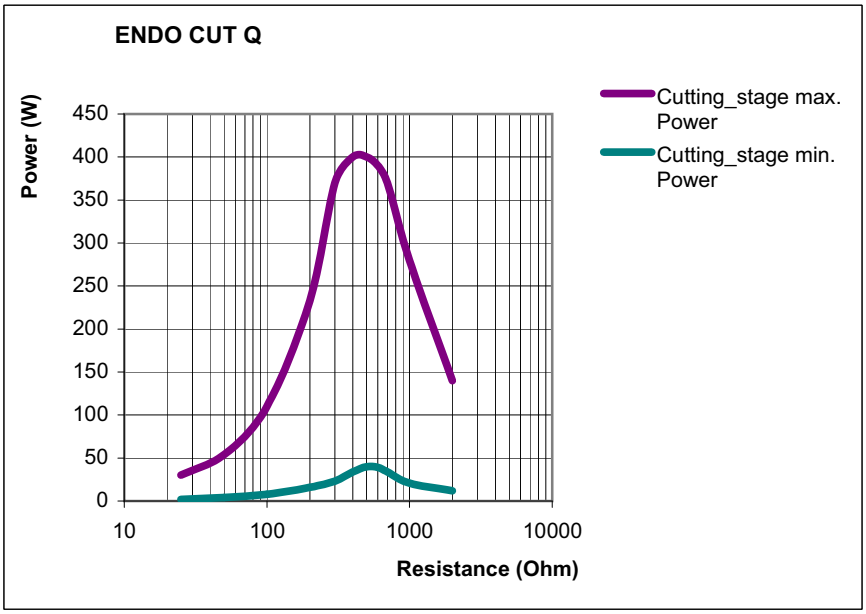

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Fig. 10-4

ENDO CUT I

Properties The cut consists of alternating cutting and coagulating phases. The cut is easy to control and is characterized by a reproducible, preselectable coagulation property while cutting.

Areas of use Endoscopic interventions in which alternating cutting and coagulation with activation is called for.

Suitable electrodes Papillotomy and needle electrodes

Expert mode For a customized setting you can have Expert mode activated by a service technician. The *Cut / Coag Settings* window will then also show the parameters *Cutting duration* and *Cutting interval* .

Cutting duration

Depending on the size, type and location of lesions it may be advantageous to vary cutting duration.

You can set cutting duration to one of 4 levels. Cutting duration has a major influence on cutting width.

Cutting interval

The cutting interval is the amount of time between the start of a cutting cycle and the start of the next cutting cycle. The cutting interval is thus comprised of one cutting cycle and one coagulation cycle.

You can set the cutting interval to one of 10 levels. The higher the level, the longer the cutting interval and coagulation cycle. A short cutting interval makes it easier to remove the lesion quickly. A long cutting interval makes it easier to remove the lesion slowly under control.

Technical data

HF voltage waveform	unmodulated sinusoidal alternating voltage
Rated frequency	350 kHz (at R_L = 500 ohms) ± 10%
Crest factor	1.4 (at R_L = 500 ohms)
Max. HF peak voltage	550 V_p
Number of effects	4
Consistency of effects	Automatic control of HF peak voltage
Max. power output	170 watts ± 20%
Max. RMS current (maximum HF output current in normal use)	300 mA

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Diagrams

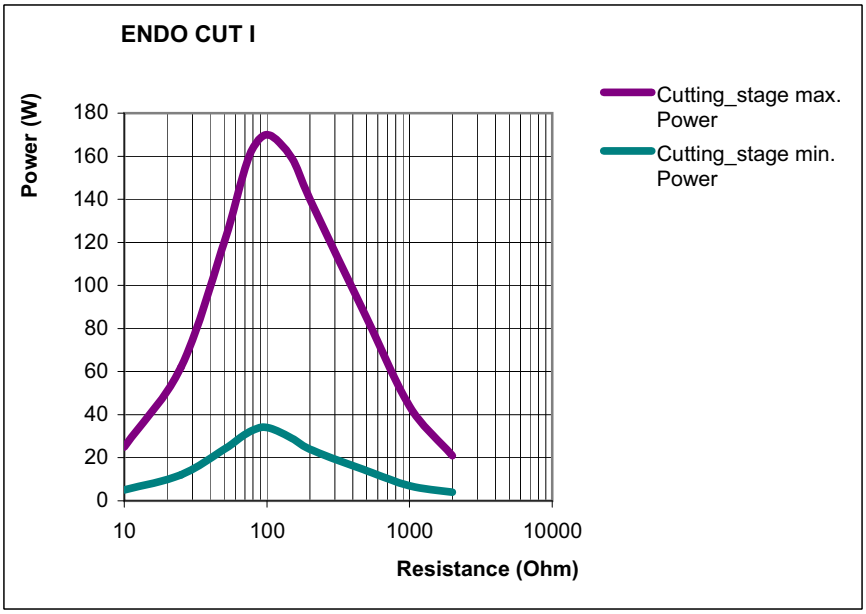
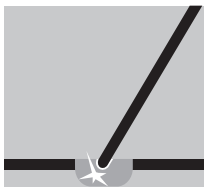


Fig. 10-5

PRECISE COAG



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Properties

Extremely fine adjustment, extremely fine precision power output in range from 1 to 50 watts.

Applications

Coagulation processes where stress for tissue or patient must be minimized, e.g. neurosurgery, ENT, dermatology.

Difference from SOFT COAG

In the lower output range the degree of coagulation can be set lower and more accurately.

Suitable electrodes

Microsurgical instruments and electrodes for microsurgery.

Technical data

HF voltage waveform	unmodulated sinusoidal alternating voltage
Rated frequency	350 kHz (at R_L = 500 ohms) ± 10%
Crest factor	1.4 (at R_L = 500 ohms)
Rated load resistor	50 Ohm
Max. HF peak voltage	110 V_p
Number of effects	8
Consistency of effects	Automatic control of HF peak voltage
HF power limitation	1 watt to 50 watts in 1 watt steps

Max. power output at rated load resistor	50 watts ± 20 %
Max. RMS current (maximum HF output current in normal use)	700 mA

Diagrams

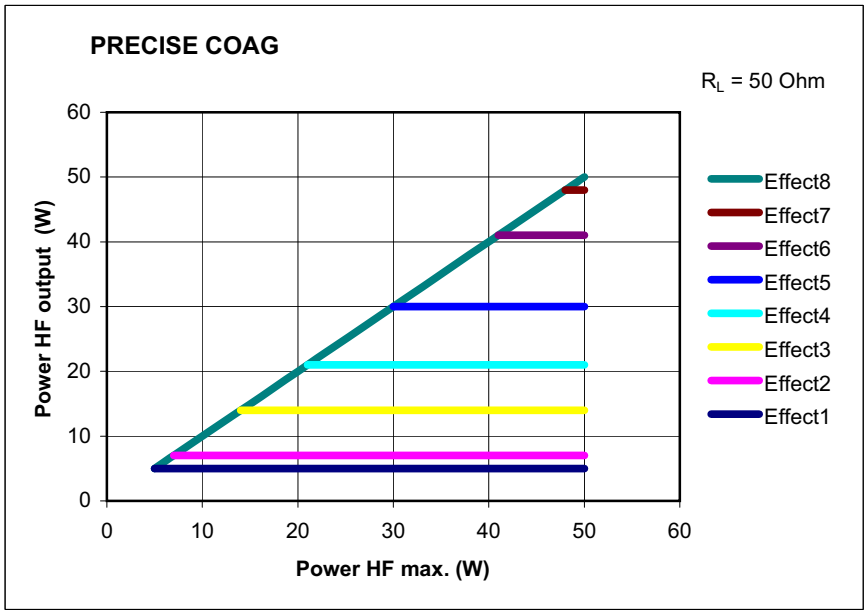

Fig. 10-6

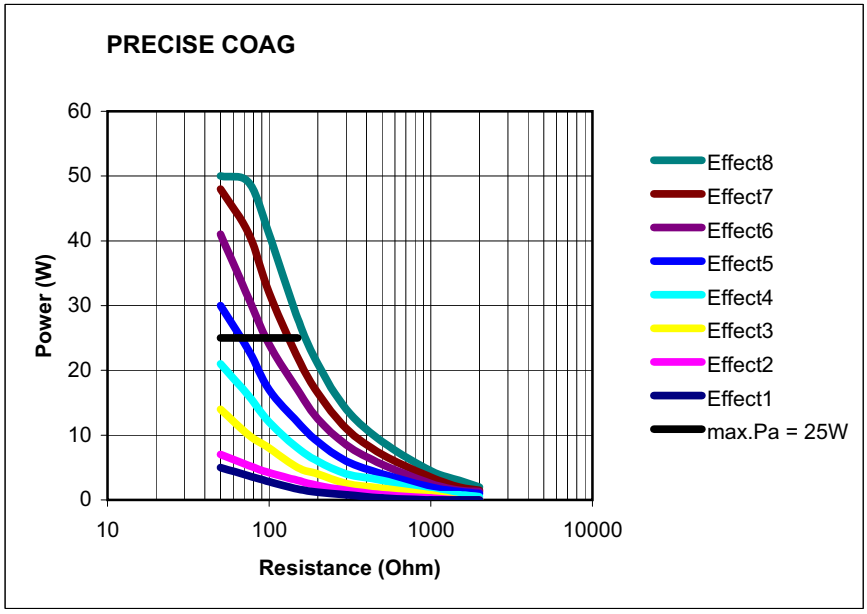

Fig. 10-7

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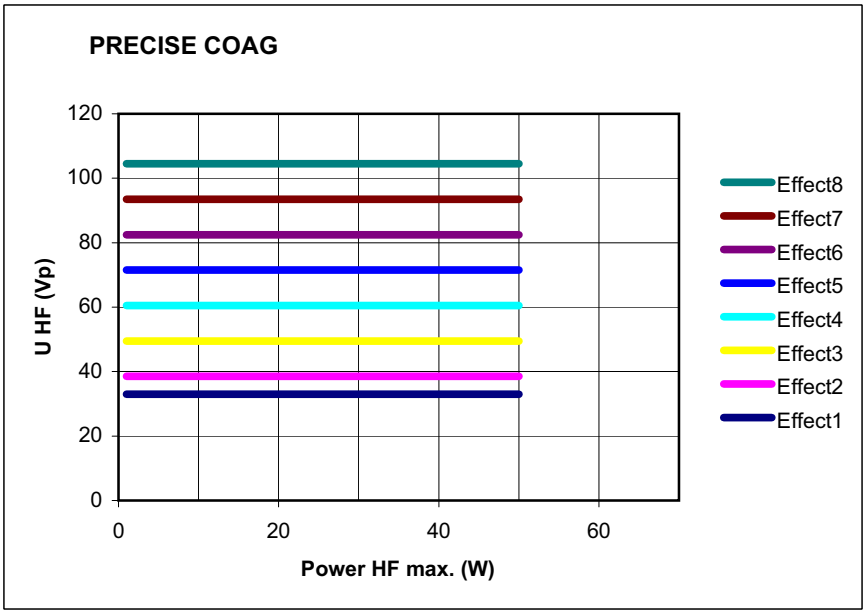

Fig. 10-8

TWIN COAG

Properties

Fast, effective coagulation, which is highly suitable for preparation with high hemostasis owing to its limited tissue-cutting property. Two monopolar instruments can be activated at the same time.

WARNING! In the TWIN COAG mode the output power of any of the active electrodes can change.

Setting

When carrying out the first selection of TWIN COAG, you are requested to select a second additional monopolar socket (on the VIO or APC 2) by pressing the required Focus button.

Activation

The TWIN COAG function can be called up on the two selected sockets simultaneously. If one of the two sockets requires a CUT function, they must be activated alternately.

Areas of use

Especially in disciplines where simultaneous coagulation and preparation is required, e.g. in heart and breast surgery.

Suitable electrodes

Ball electrodes for coagulation. Knife or blade electrodes for preparation and coagulation.

Technical data

HF voltage waveform	pulse-modulated sinusoidal alternating voltage
Rated frequency	350 kHz (at R_L = 500 ohms) ± 10%
Crest factor	5.3 (at R_L = 500 ohms)
Rated load resistor	500 ohms

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Max. HF peak voltage	2000 Vp
Number of effects	8
Consistency of effects	Automatic control of HF peak voltage
HF power limitation	5 watts to 200 watts in 1-watt steps
Max. power output at rated load resistor	200 watts ± 20%
Max. RMS current (maximum HF output current in normal use)	650 mA

Diagrams

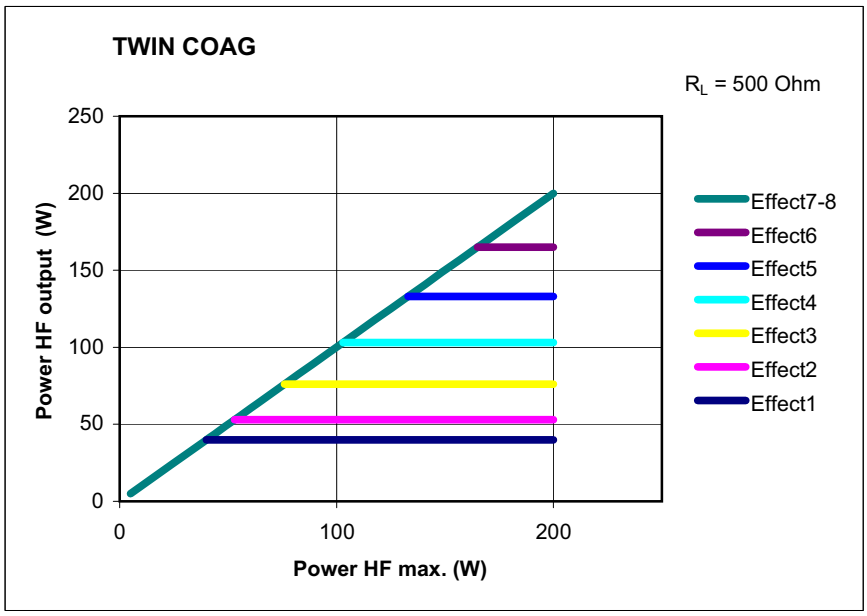

Fig. 10-9

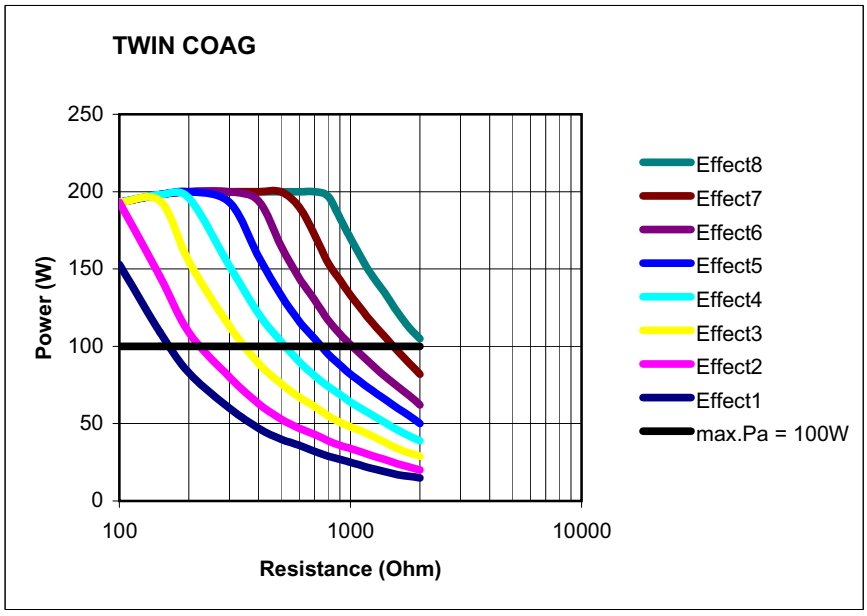

Fig. 10-10

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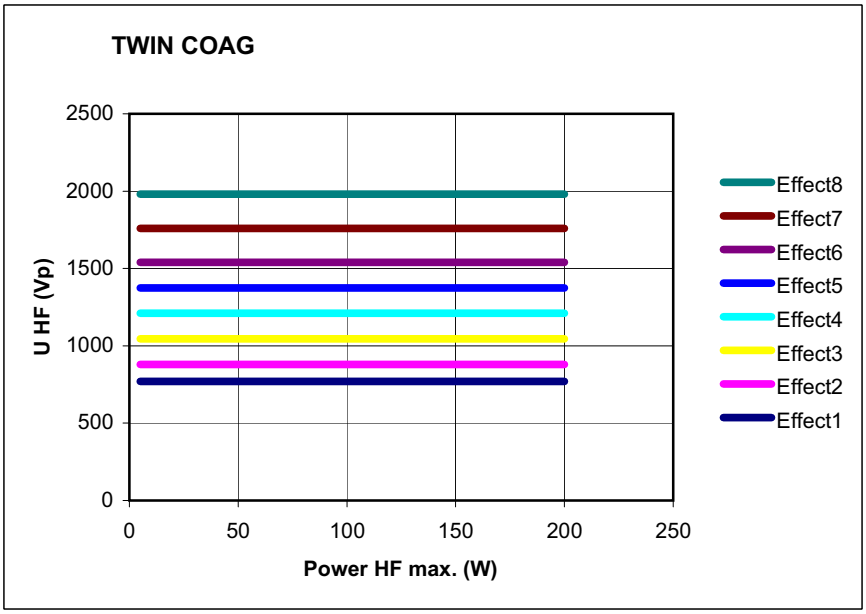

Fig. 10-11

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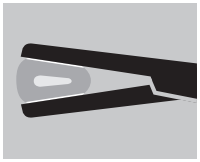
Chapter 11
Bipolar Optional Modes

BiClamp



Properties

Special COAG mode for Erbe BiClamp (bipolar clamp). With four effect graduations you can adjust the coagulation performance exactly to the type of tissue involved. The AUTO STOP function is adjusted to BiClamp and ends activation automatically when the best coagulation effect is achieved.

Modulation

BiClamp is a modulated current waveform with alternating pulse and rest periods. This ratio is set using "Modulation". This means the larger the "Modulation" value, the longer the rest period is compared to the subsequent active current flow period.

Technical data

Type of HF voltage	modulated sinusoidal alternating voltage
Nominal frequency	350 kHz (at R_L= 500 ohms) ± 10%
Crest factor	1.4 (at R_L = 500 ohms)
Designed load resistance	25 ohms
Max. HF peak voltage	220 Vp
Number of effects	4
Consistency of effects	Automatic control of HF peak voltage
max. HF output	300 watts ± 20 %

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Diagrams

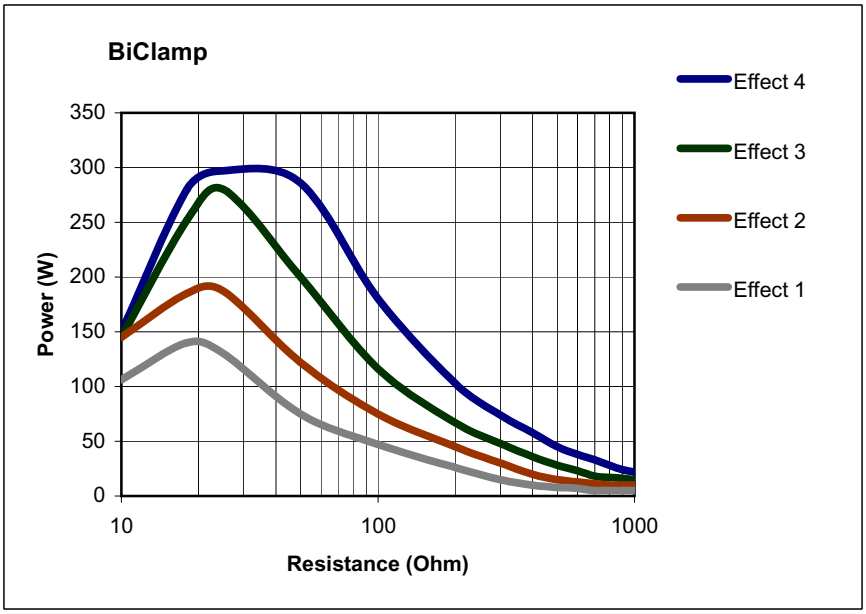
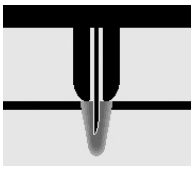


Fig. 11-1

BIPOLAR PRECISE CUT



Properties Very fine adjustment, minimal necrosis at the cut edge, extremely precise power output in the 1 to 50 W range.

Applications For example, incisions during procedures where stress for the tissue or patient must be minimised, e.g. neurosurgery, ENT, dermatology

Difference from BIPOLAR CUT In the lower output range, you can set the degree of haemostasis to a lower and more precise value.

Suitable electrodes Bipolar microsurgical instruments.

Technical data

HF voltage waveform	unmodulated sinusoidal alternating voltage
Rated frequency	350 kHz (at R_L = 500 ohms) ± 10%
Crest factor	1.4 (at R_L = 500 ohms)
Rated load resistor	500 ohms
Max. HF peak voltage	390 Vp
Number of effects	8
Constancy of effects	automatic control of HF peak voltage

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HF power limitation	1 watt to 50 watts in 1 watt steps
Max. power output at rated load resistor	50 watts ± 20%

Diagrams

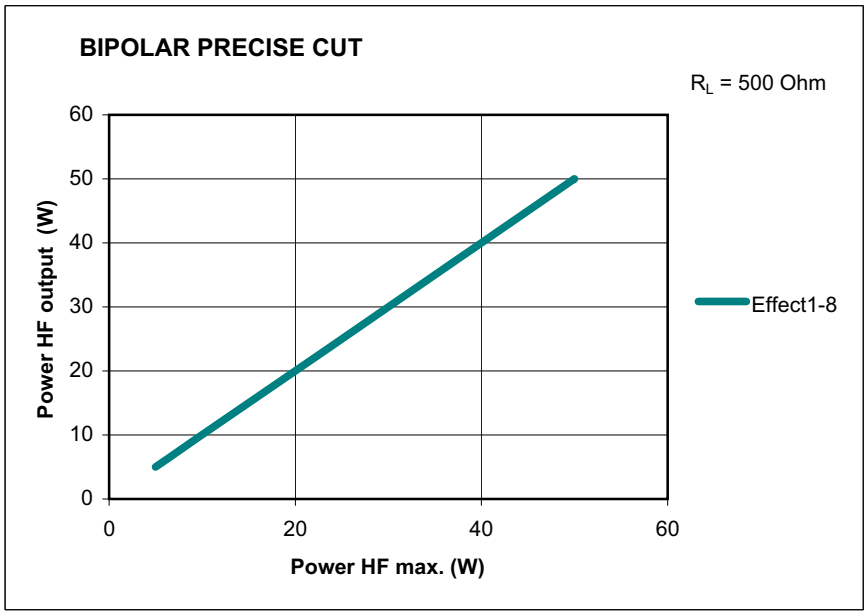

Fig. 11-2

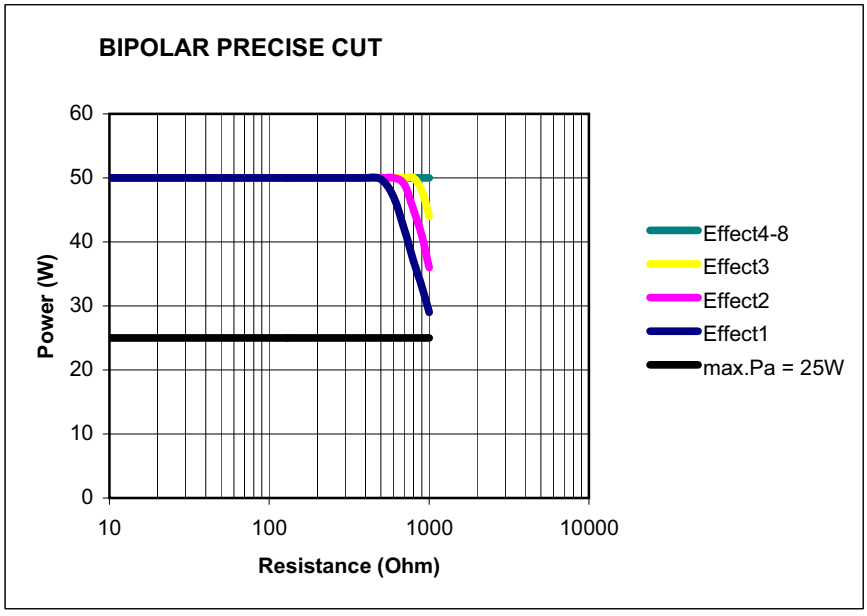

Fig. 11-3

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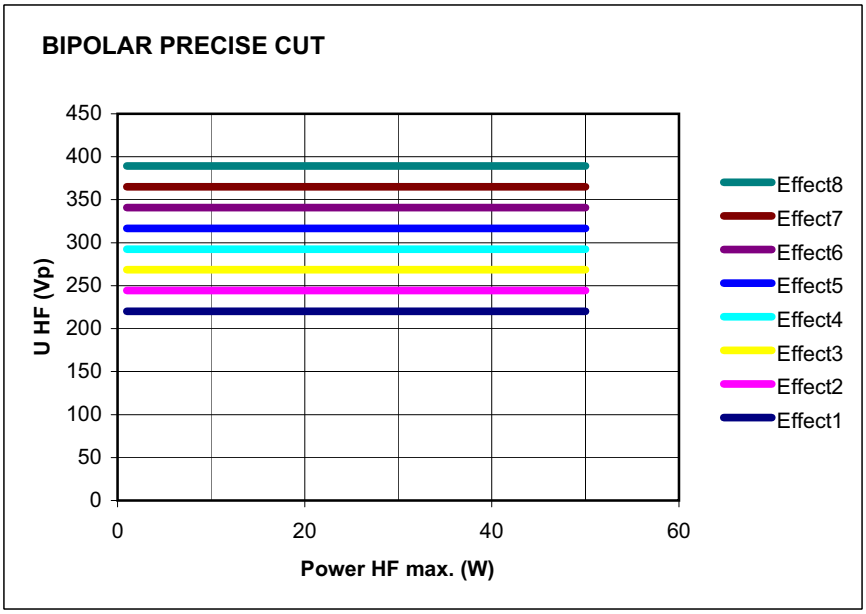
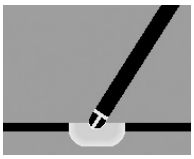


Fig. 11-4

BIPOLAR PRECISE COAG



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Properties Very fine adjustment, extremely precise power output in the 1 to 50 W range.

AUTO START In the *Select activation type* window, you can select an AUTO START function for BIPOLAR PRECISE COAG . When the instrument touches tissue, coagulation starts automatically after a specified period of time.

Areas of use Coagulation processes where stress for tissue or patient must be minimized, e.g. neurosurgery, ENT, and dermatology.

Difference from BIPOLAR SOFT In the lower output range, you can set the coagulation degree to a lower and more precise value.

Suitable electrodes Bipolar microsurgical instruments.

Technical data

HF voltage waveform	unmodulated sinusoidal alternating voltage
Rated frequency	350 kHz (at R_L = 500 ohms) ± 10%
Crest factor	1.4 (at R_L = 500 ohms)
Rated load resistor	75 ohms
Max. HF peak voltage	110 Vp
Number of effects	8
Constancy of effects	automatic control of HF peak voltage

HF power limitation	1 watt to 50 watts in 1 watt steps
Max. power output at rated load resistor	50 watts ± 20%

Diagrams

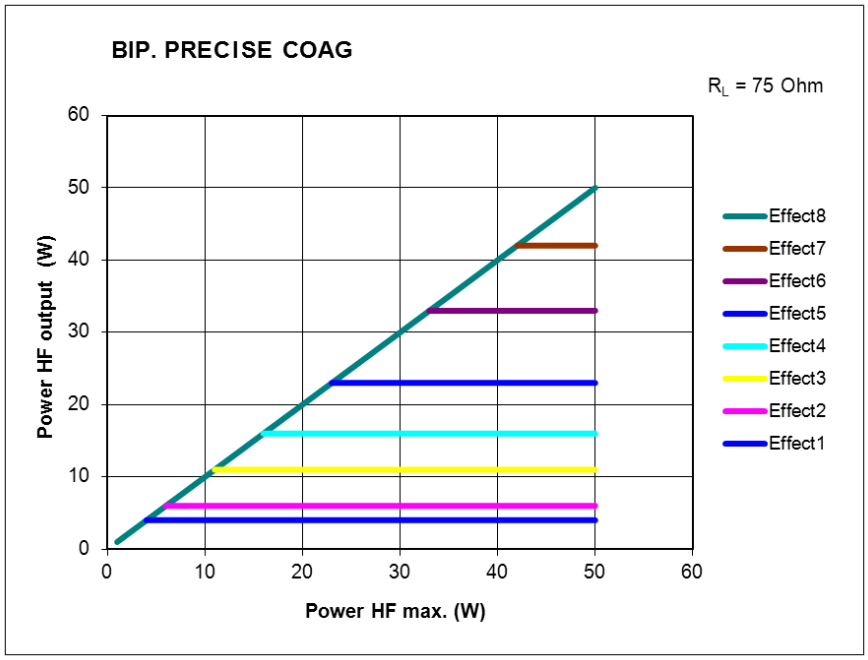

Fig. 11-5

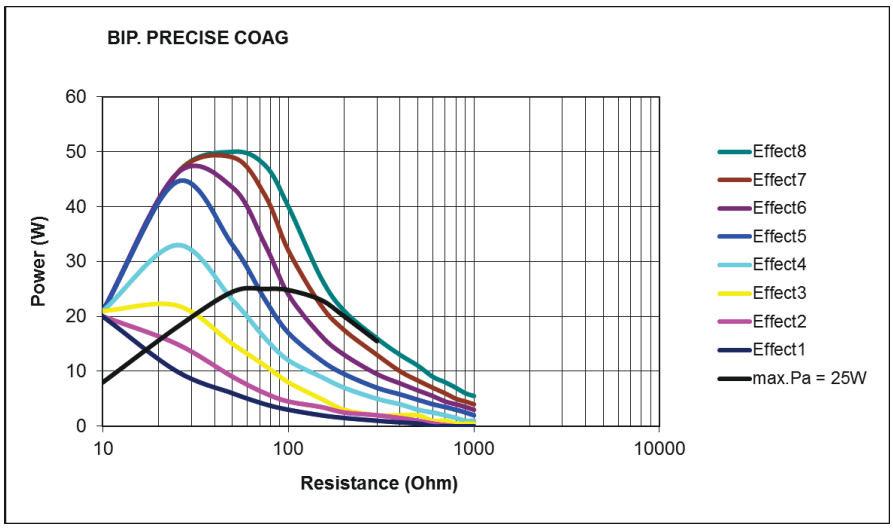

Fig. 11-6

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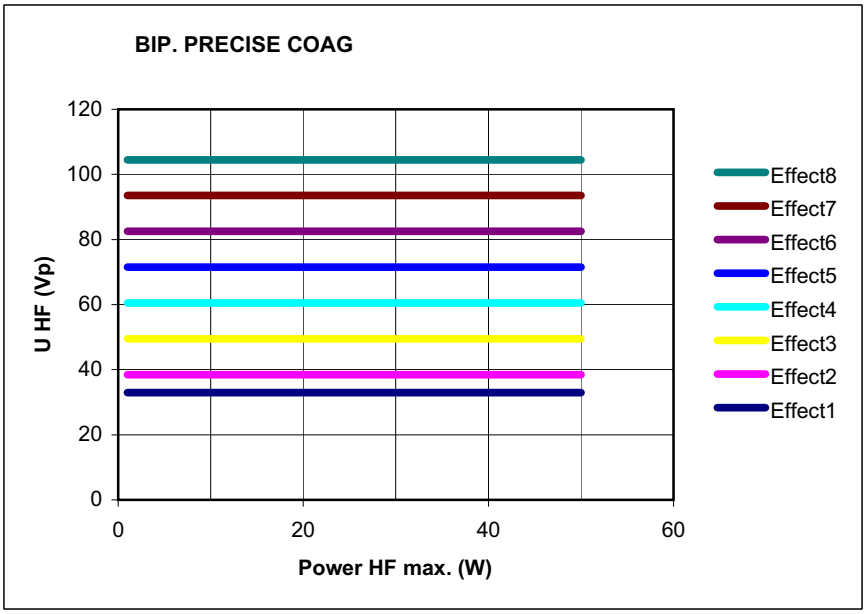

Fig. 11-7

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Chapter 12
APC socket (only available with the APC module)

	APC socket
Cutting and coagulation modes	**Standard** • Forced APC • Precise APC • Pulsed APC • Argon-assisted AUTO CUT Mode • Argon-assisted HIGH CUT Mode • Argon-assisted DRY CUT Mode • Argon-assisted DRY CUT ° Mode • Argon-assisted SWIFT COAG Mode • Argon-assisted SWIFT COAG ° Mode • Argon-assisted FORCED COAG Mode • Argon-assisted SOFT COAG Mode **Optional** • Argon-assisted TWIN COAG Mode

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12 • APC socket (only available with the APC module)

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Chapter 13
APC Standard Modes (Only Available with an APC Module)

FORCED APC

Properties Standard setting for the APC with ignition assistance for safe ignition of the plasma.

Areas of use Hemostasis of small, diffuse areas of bleeding. Devitalization and reduction of tissue.

Setting The intensity of the thermal effect can be set with the power. The higher the power, the higher the intensity of the thermal effect.

Suitable instruments Rigid APC applicators, flexible APC probes.

Technical data

HF voltage waveform	pulse-modulated sinusoidal alternating voltage
Rated frequency	350 kHz (at R_L = 500 ohms)
Crest factor	7.5 (at R_L = 500 ohms)
Rated load resistor	500 ohms
Max. HF peak voltage	4300 V_p
Consistency of effects	Restriction of HF peak voltage
HF power limitation	5 W to 120 W in 1-watt steps
Max. power output at rated load resistor	120 watts ± 20%
Max. RMS current (maximum HF output current in normal use)	210 mA

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Diagrams

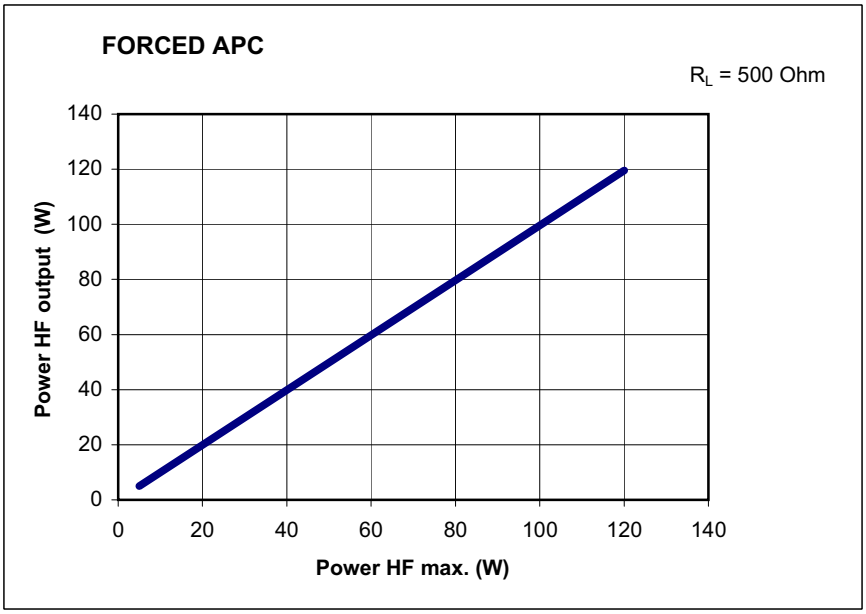

Fig. 13-1

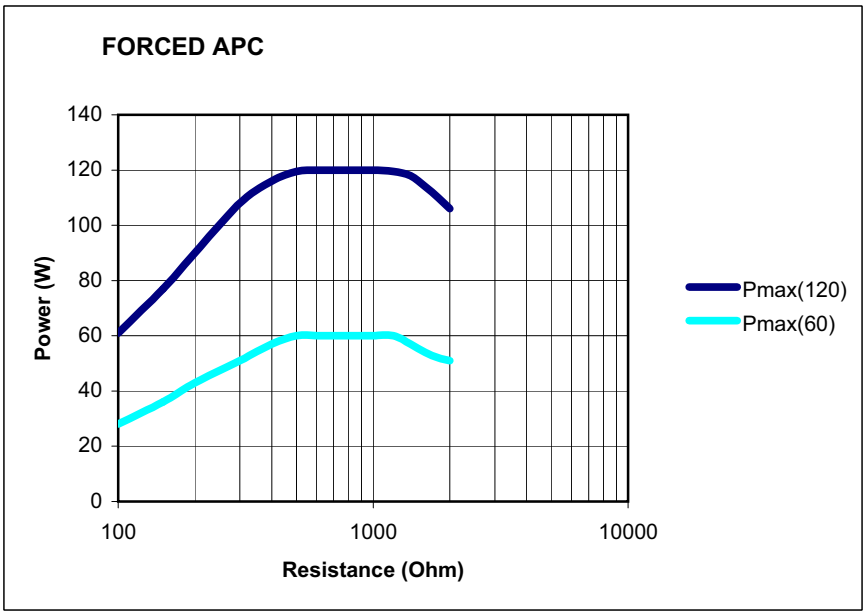

Fig. 13-2

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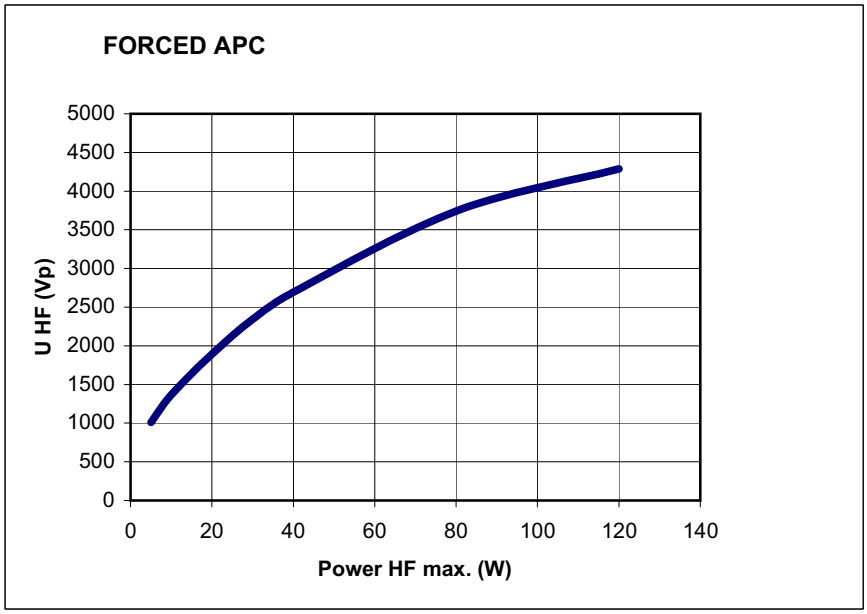

Fig. 13-3

PRECISE APC

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Properties

APC with well controllable change of effect at the tissue surface, largely independent of the distance between applicator and tissue.

Areas of use

Hemostasis of diffuse areas of bleeding. Devitalization and reduction of tissue with emphasis on reproducibly low coagulation depth.

Setting

The coagulation depth is set with effect levels. A low effect level means "very superficial" and a high effect level means "greatest possible penetration depth".

Max. application time

The maximum application time indicates when (or how many seconds until) the activation of the PRECISE APC modes will be automatically stopped. It is intended to prevent excessive, unintended thermal damage of the tissue.

To set the maximum application time, select "Effect". In the "Choose Coag Effect" menu, select "maximum appl. time".

Suitable instruments

Rigid APC applicators, flexible APC probes.

Technical data

HF voltage waveform	pulse-modulated sinusoidal alternating voltage
Rated frequency	350 kHz (at R_L = 500 ohms)
Crest factor	7.4 (at R_L = 500 ohms)
Rated load resistor	1,000 ohms
Max. HF peak voltage	4300 V_p

Number of effects	8
Consistency of effects	automatic control of arc intensity
Max. power output at rated load resistor	160 watts ± 20%
Max. RMS current (maximum HF output current in normal use)	240 mA

Diagrams

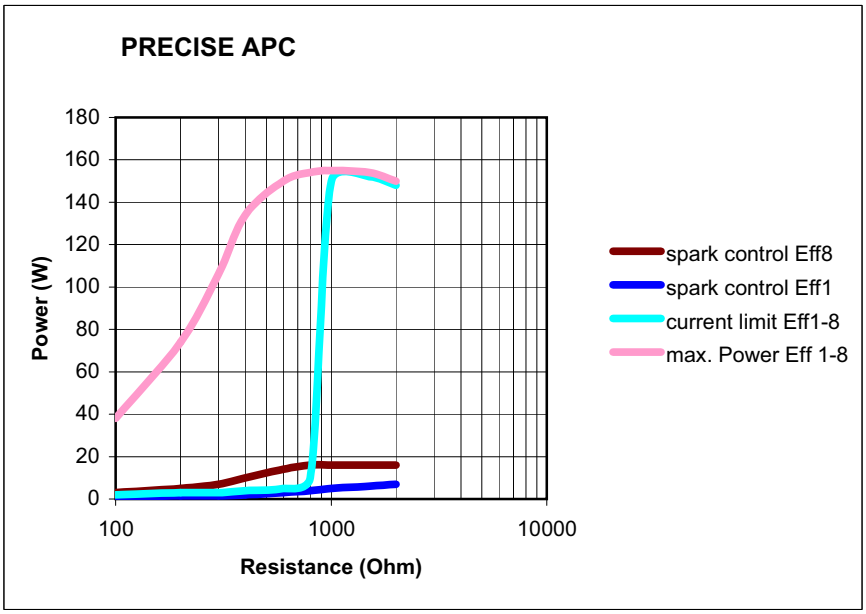

Fig. 13-4

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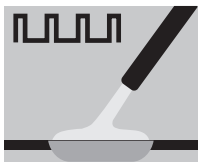
PULSED APC



Properties Defined output of individual APC impulses with well controllable change of effect at the tissue surface.

Area of use Hemostasis of diffuse areas of bleeding. Devitalization and reduction of tissue with emphasis on controlled power output.

Setting Adjustment of the intensity of the thermal effect with the power. When the effect level is changed, the pulse frequency also changes.

Suitable instruments Rigid APC applicators, flexible APC probes.

Technical data

HF voltage waveform	pulse-modulated sinusoidal alternating voltage
Rated frequency	350 kHz (at R_L = 500 ohms) ± 10%
Crest factor	7.4 (at R_L = 500 ohms)

Rated load resistor	500 ohms
Max. HF peak voltage	4700 V_p
Number of effects	2
Consistency of effects	Restriction of HF peak voltage
HF power limitation	1 watts to 120 watts in 1-watt steps
Max. power output at rated load resistor	120 watts ± 20%
Max. RMS current (maximum HF output current in normal use)	520 mA

Diagrams

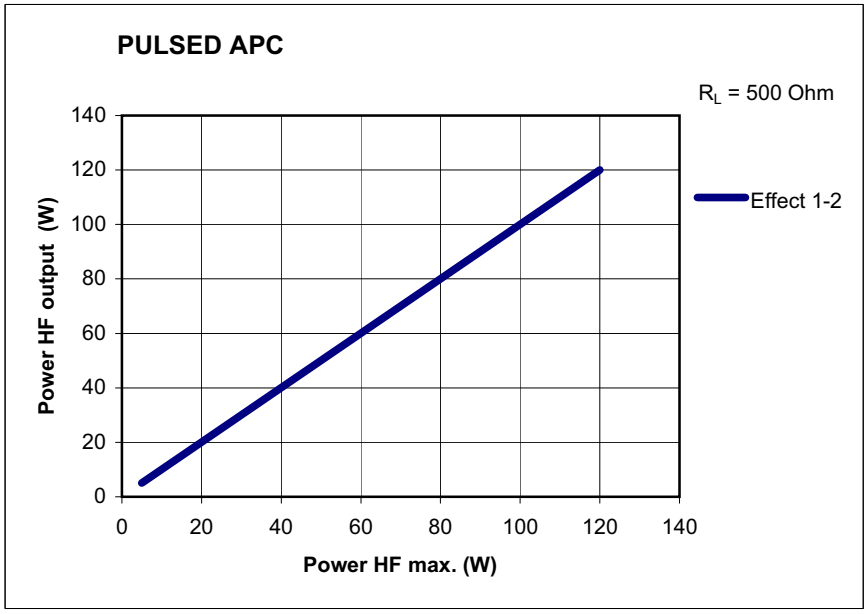


Fig. 13-5

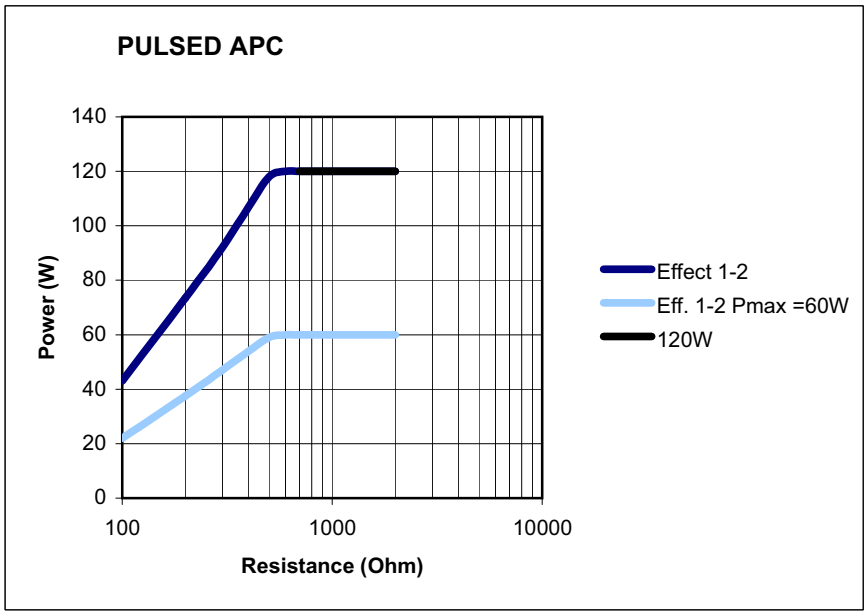


Fig. 13-6

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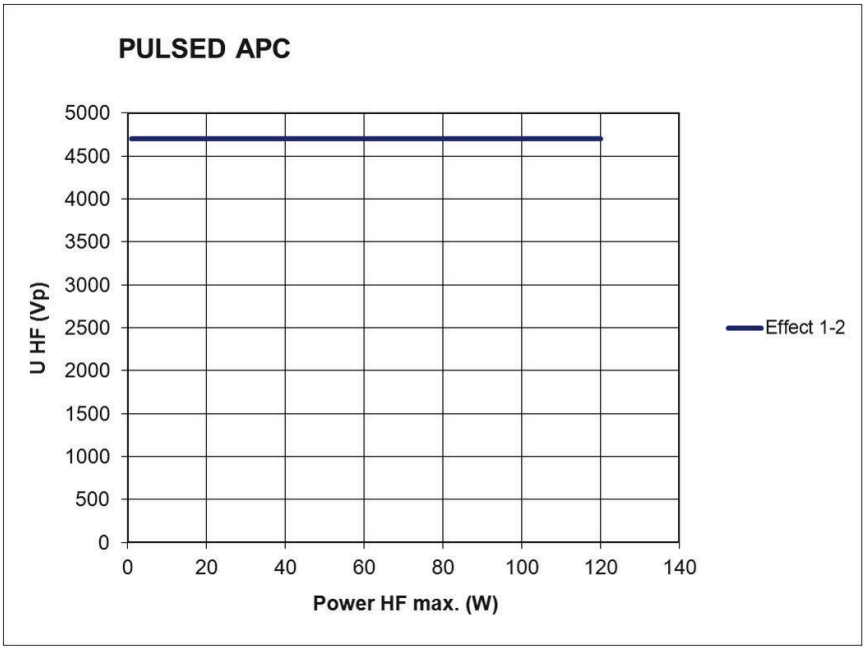
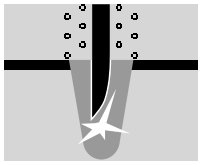


Fig. 13-7

Argon-assisted AUTO CUT Mode



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Properties Reproducible, extremely tissue-sparing cuts, minimal to medium hemostasis. The argon gas reduces the formation of smoke and the carbonization.

Areas of use All cutting procedures in electrically conductive tissue: e.g. muscle tissue and vascular tissue. Dissections and cutting of fine structures.

Suitable electrodes APC applicators with adjustable electrodes, as well as the laparoscopic hook electrode.

Technical data

HF voltage waveform	unmodulated sinusoidal alternating voltage
Rated frequency	350 kHz (at R_L = 500 ohms) ± 10%
Crest factor	1.4 (at R_L = 500 ohms)
Rated load resistor	500 ohms
Max. HF peak voltage	740 V_p
Number of effects	8
Consistency of effects	Automatic control of HF peak voltage
HF power limitation	10 watts to 300 watts in 1-watt steps

Max. power output at rated load resistor	300 watts ± 20%
Max. RMS current (maximum HF output current in normal use)	220 mA

Diagrams

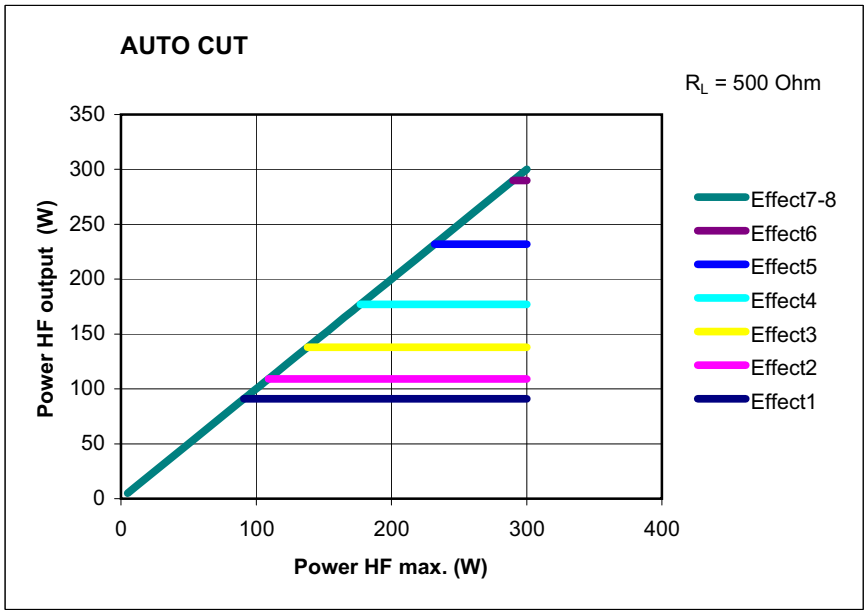

Fig. 13-8

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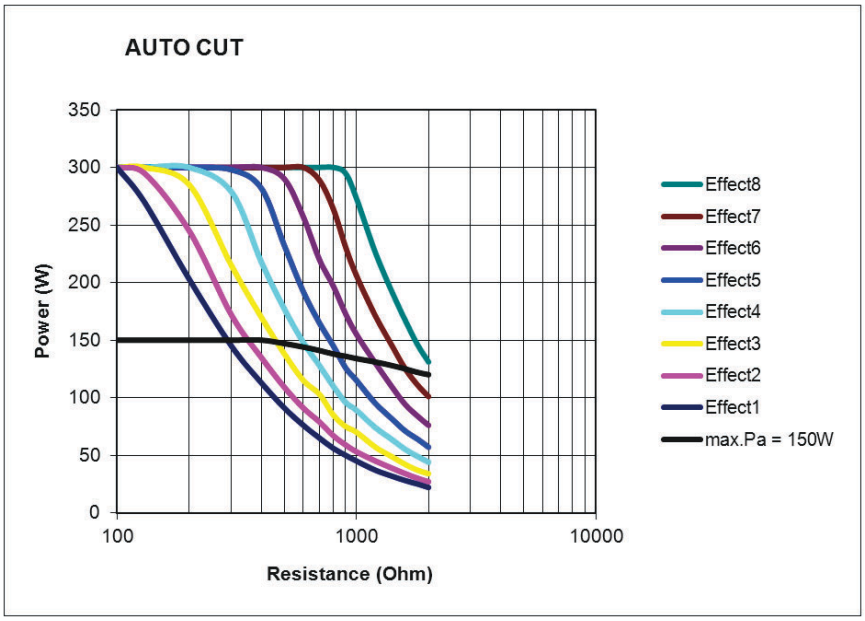


Fig. 13-9

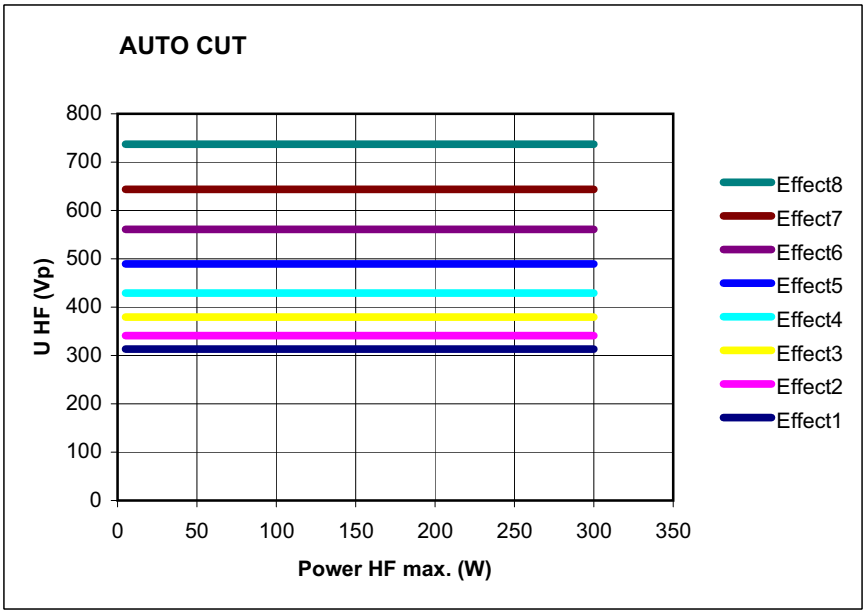
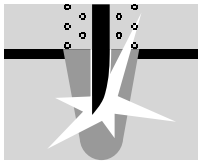


Fig. 13-10

Argon-assisted HIGH CUT Mode



Properties Reproducible, tissue-sparing cuts, in particular in poorly conductive and varying tissue. The argon gas reduces the formation of gas and carbonization.

Areas of use Several, including cutting fat-containing structures.

Suitable electrodes APC applicators with adjustable electrodes, as well as the laparoscopic hook electrode.

Technical data

HF voltage waveform	unmodulated sinusoidal alternating voltage
Rated frequency	350 kHz (at R_L = 500 ohms) ± 10%
Crest factor	1.4 (at R_L = 500 ohms)
Rated load resistor	500 ohms
Max. HF peak voltage	1040 V_p (if an arc is present)
Number of effects	8
Consistency of effects	Automatic control of arc intensity
HF power limitation	10 watts to 300 watts in 1-watt steps
Max. power output at rated load resistor	300 watts ± 20%
Max. RMS current (maximum HF output current in normal use)	500 mA

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Diagrams

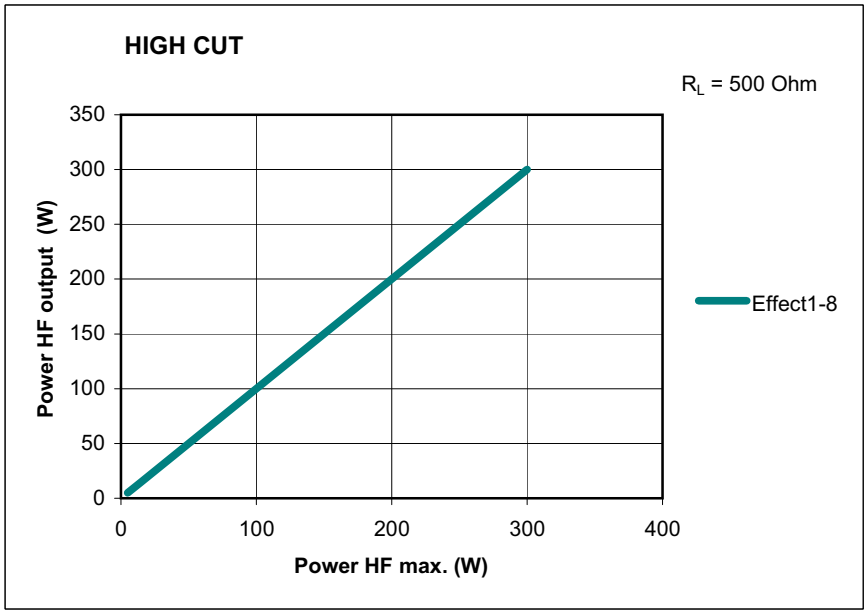

Fig. 13-11

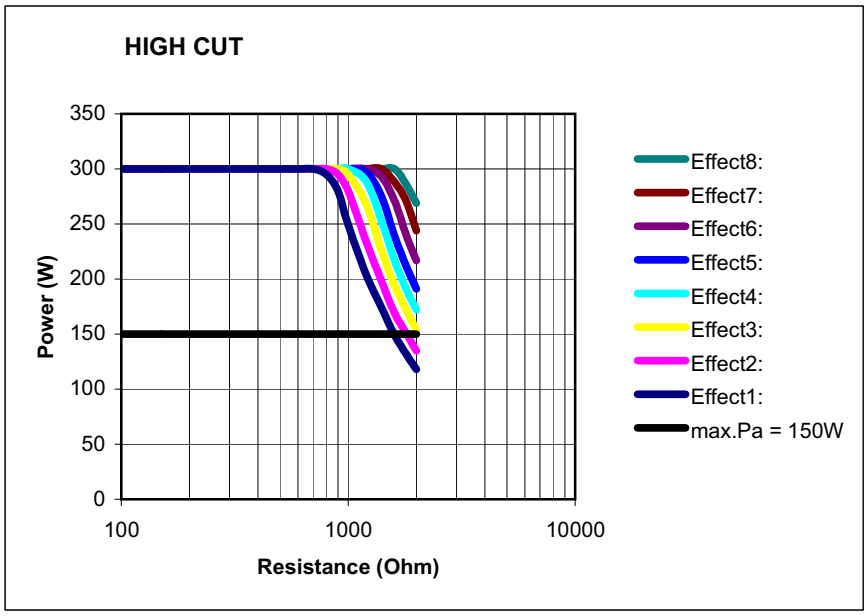

Fig. 13-12

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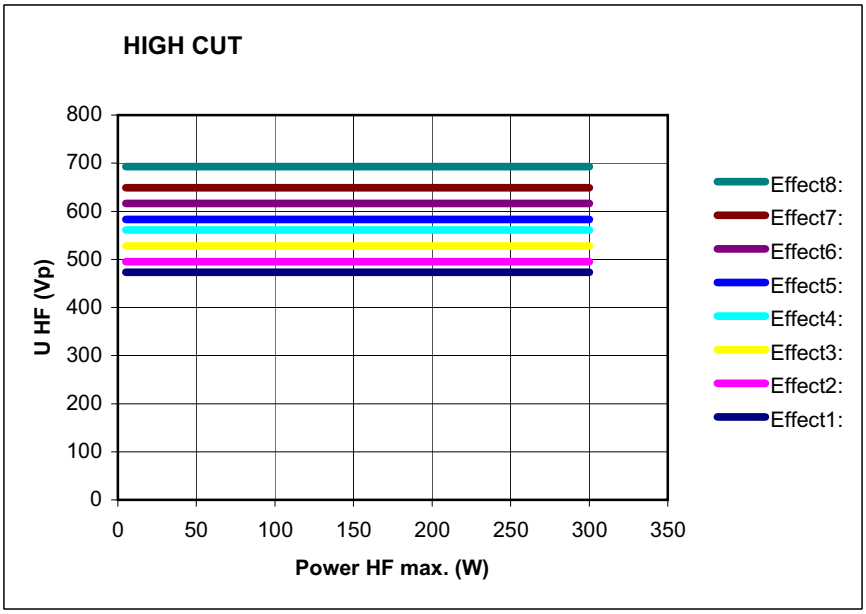
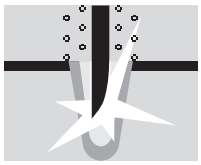


Fig. 13-13

Argon-assisted DRY CUT Mode



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Properties

Intense hemostasis with somewhat slower cutting speed. The argon gas reduces the formation of smoke and the carbonization.

Areas of use

E.g. cuts in "open surgery" and cuts in endoscopic operations that require very good primary hemostasis during the cut and tolerate a somewhat slower cutting speed.

Differences from AUTO CUT and HIGH CUT

Medium to intense hemostasis.

Suitable electrodes

APC applicators with adjustable electrodes, as well as the laparoscopic hook electrode.

Technical data

HF voltage waveform	pulse-modulated sinusoidal alternating voltage
Rated frequency	350 kHz (at R_L = 500 ohms) ± 10%
Crest factor	Effect 1-4: 3.2 Effect 5+6: 3.3 Effect 7+8: 3.6 (at R_L = 500 ohms)
Rated load resistor	500 ohms
Max. HF peak voltage	1450 Vp
Number of effects	8
Consistency of effects	Automatic control of HF peak voltage

HF power limitation	10 watts to 200 watts in 1-watt steps
Max. power output at rated load resistor	200 watts ± 20%
Max. RMS current (maximum HF output current in normal use)	280 mA

Diagrams

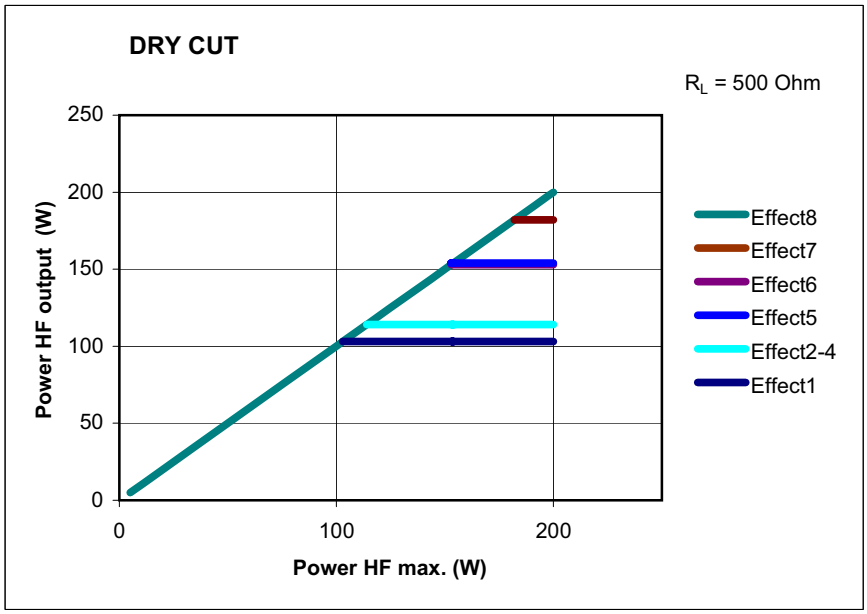

Fig. 13-14

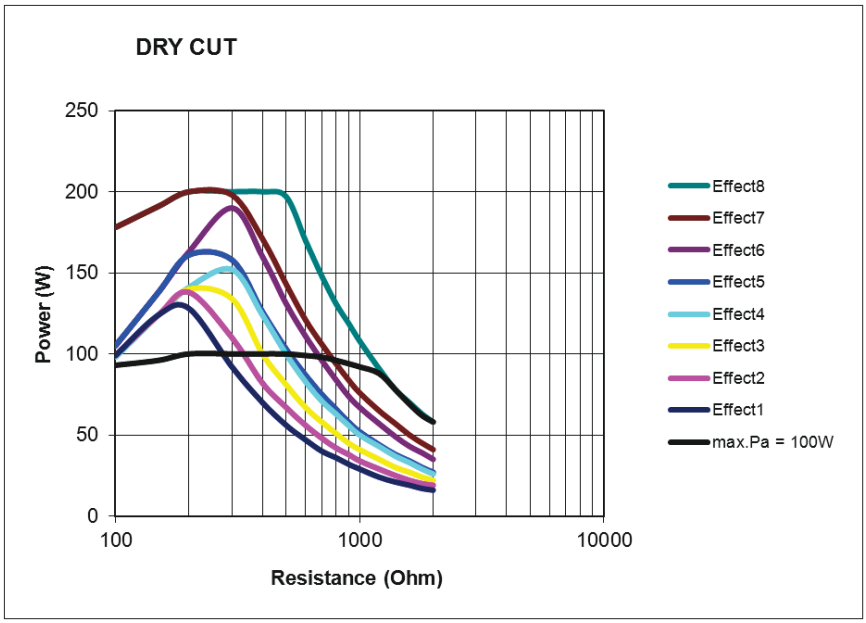

Fig. 13-15

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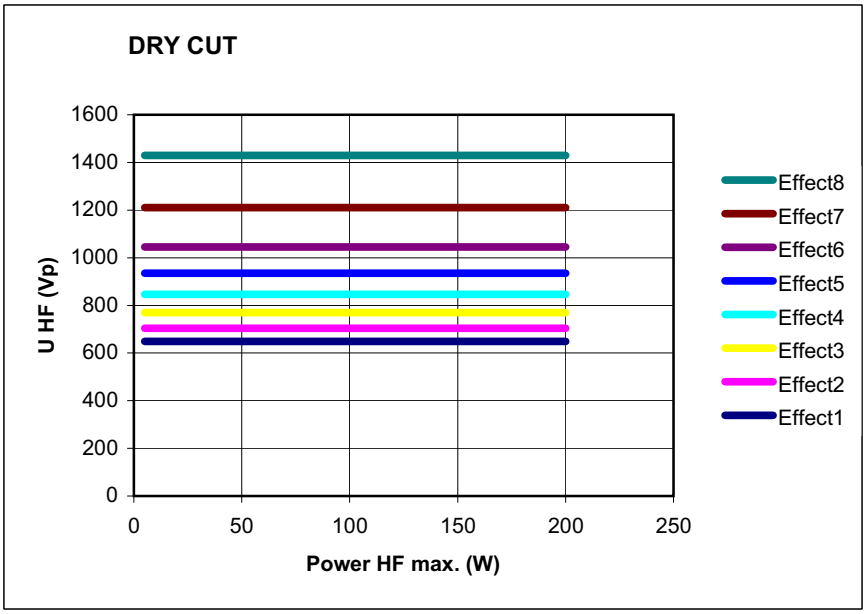
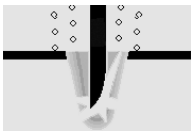


Fig. 13-16

Argon-assisted DRY CUT ° Mode



Properties Intense hemostasis with somewhat slower cutting speed.

Difference compared with Dry Cut Changed ratio of crest factor to RF peak voltage.

Areas of use E.g. cuts in "open surgery" and cuts in endoscopic operations that require very good primary hemostasis during the cut and tolerate a somewhat slower cutting speed.

Suitable electrodes APC applicators with adjustable electrodes, as well as the laparoscopic hook electrode.

Technical data

HF voltage waveform	pulse-modulated sinusoidal alternating voltage
Rated frequency	350 kHz (at R_L = 500 ohms) ± 10%
Crest factor	3.7 (at R_L = 500 ohms)
Rated load resistor	500 ohms
Max. HF peak voltage	1550 V_p
Number of effects	8
Consistency of effects	Automatic control of HF peak voltage
HF power limitation	10 watts to 200 watts in 1-watt steps

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Max. power output at rated load resistor	200 watts ± 20%
Max. RMS current (maximum HF output current in normal use)	600 mA

Diagrams

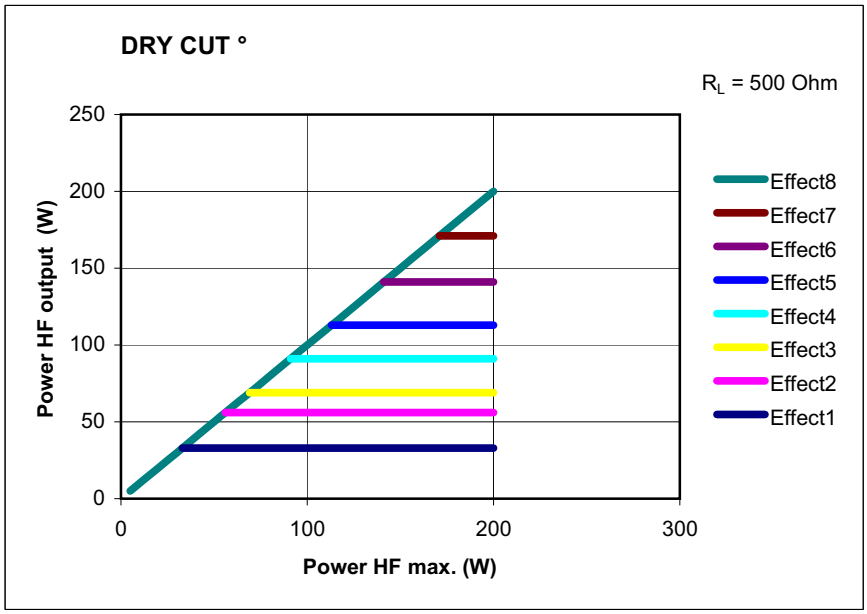

Fig. 13-17

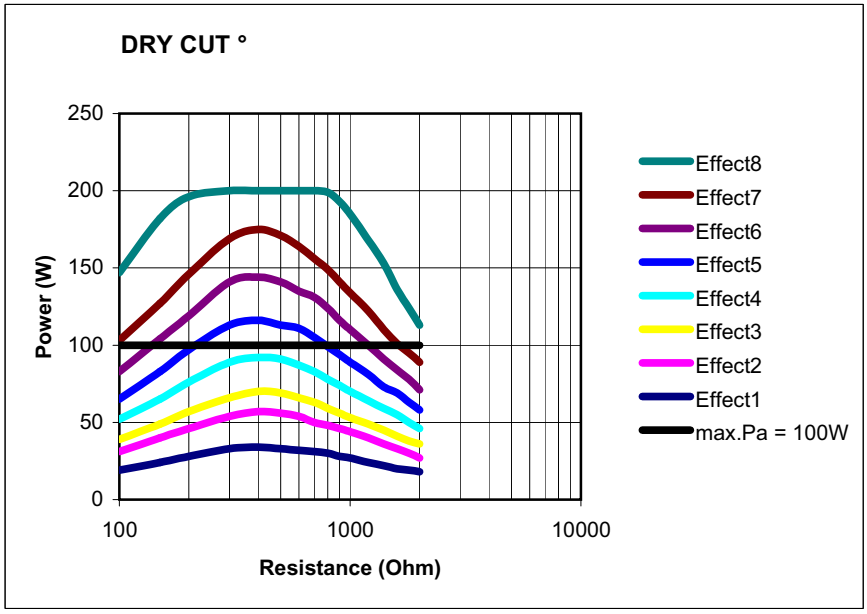

Fig. 13-18

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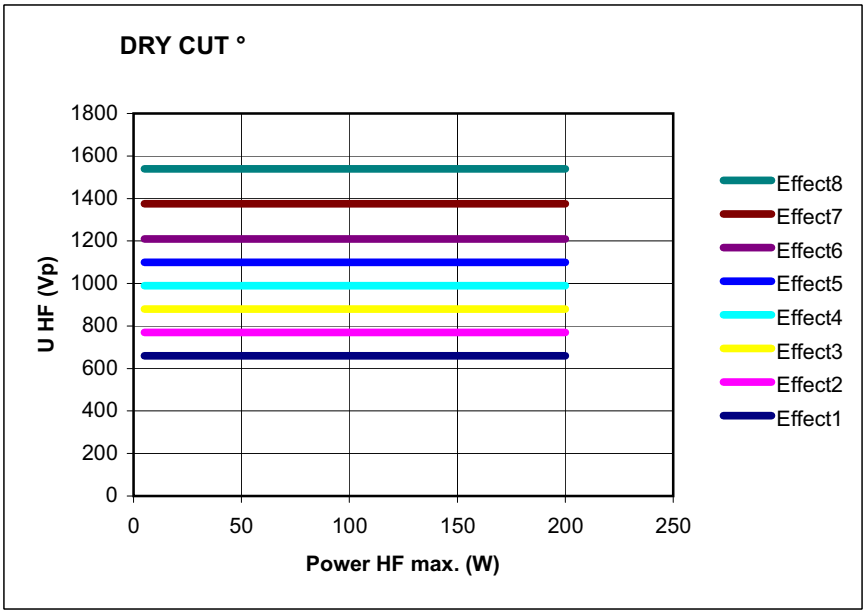
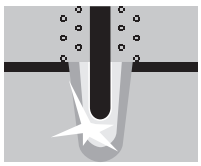


Fig. 13-19

Argon-assisted SWIFT COAG Mode



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Properties

Fast, effective coagulation, which is highly suitable for preparation with high hemostasis owing to its limited tissue-cutting property.

Areas of use

Coagulation and preparation.

Suitable electrodes

Ball electrodes only for coagulation. Knife or blade electrodes for preparation and coagulation. (Note: When using the Erbe VIO APC handpiece, a conventional 4 mm electrode can be used instead of the argon applicator. For this, the flow setting must be set to 0)

Technical data

HF voltage waveform	pulse-modulated sinusoidal alternating voltage
Rated frequency	350 kHz (at R_L = 500 ohms) ± 10%
Crest factor	5.2 (at R_L = 500 ohms)
Rated load resistor	500 ohms
Max. HF peak voltage	2500 V_p
Number of effects	8
Consistency of effects	Automatic control of HF peak voltage
HF power limitation	5 watts to 200 watts in 1-watt steps

Max. power output at rated load resistor	200 watts ± 20%
Max. RMS current (maximum HF output current in normal use)	570 mA

Diagrams

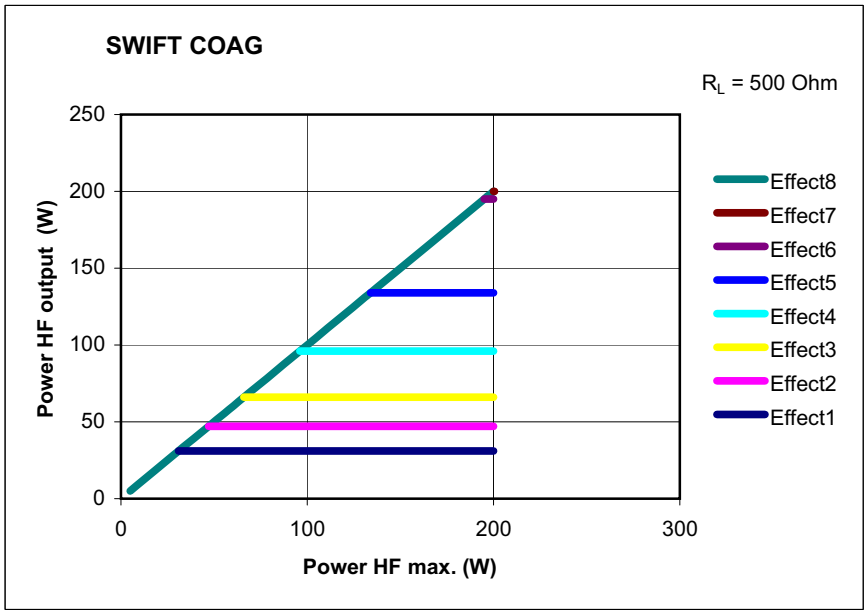

Fig. 13-20

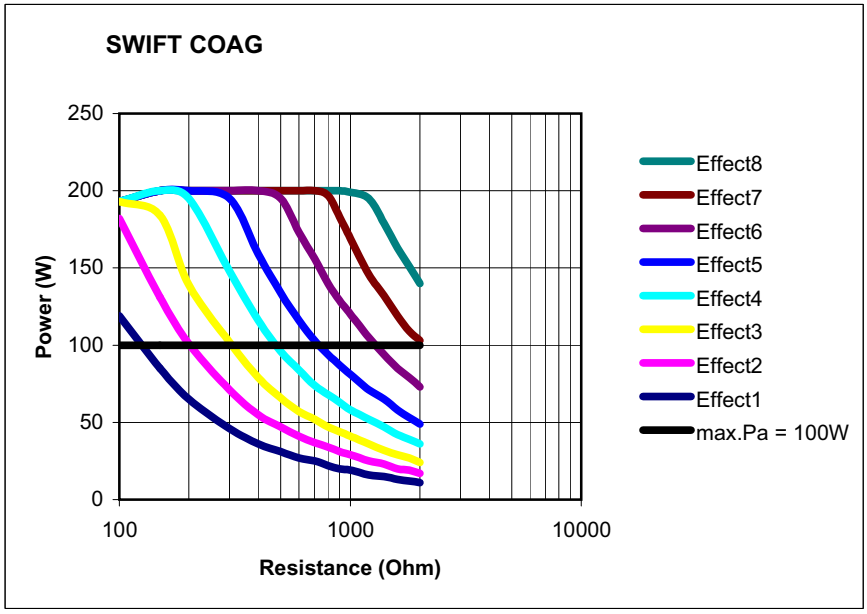

Fig. 13-21

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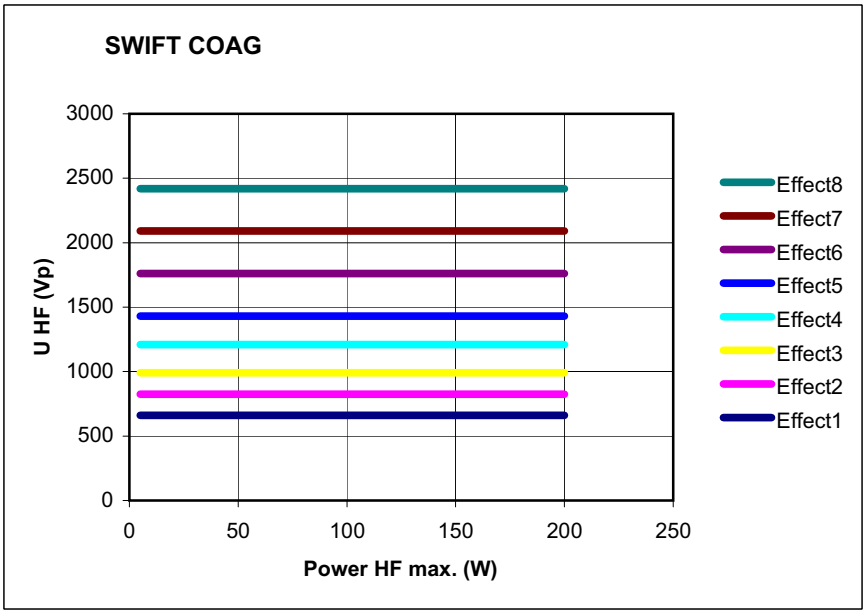
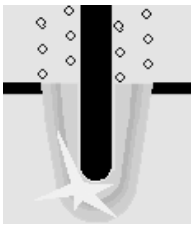


Fig. 13-22

Argon-assisted SWIFT COAG ° Mode



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Properties

Fast effective coagulation which is very suitable for dissection with high hemostasis due to its limited tissue-cutting property.

Difference compared with SWIFT COAG

Optimised preparation characteristics due to changed ratio of crest factor to RF peak voltage.

Applications

Coagulation and dissection.

Suitable electrodes

Ball electrodes only for coagulation. Knife or blade electrodes for preparation and coagulation. (Note: When using the Erbe VIO APC handpiece, a conventional 4 mm electrode can be used instead of the argon applicator. For this, the flow setting must be set to 0)

Technical data

HF voltage waveform	pulse-modulated sinusoidal alternating voltage
Rated frequency	350 kHz (at R_L = 500 ohms) ± 10%
Crest factor	3.7 (at R_L = 500 ohms)
Rated load resistor	500 ohms
Max. HF peak voltage	1550 V_p
Number of effects	8

Consistency of effects	Automatic control of HF peak voltage
HF power limitation	5 watts to 200 watts in 1-watt steps
Max. power output at rated load resistor	200 watts ± 20%
Max. RMS current (maximum HF output current in normal use)	600 mA

Diagrams

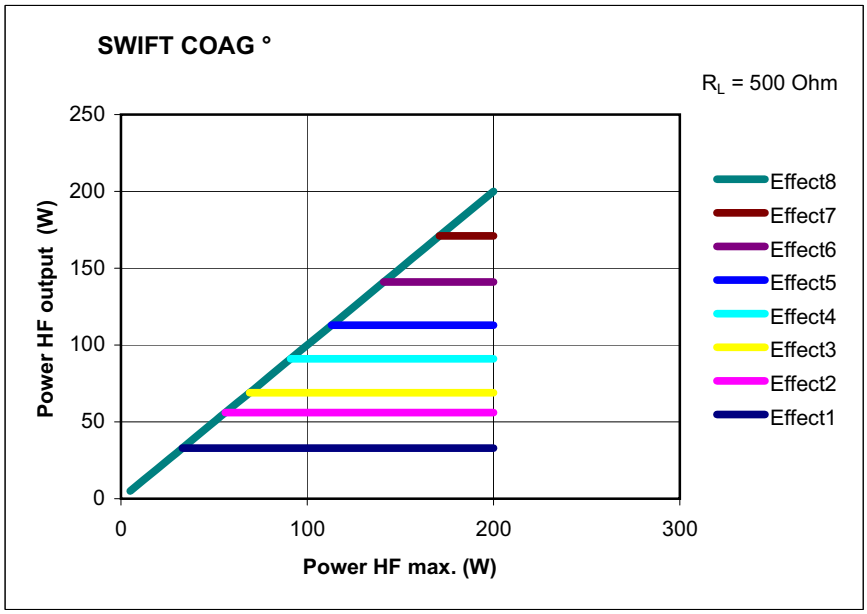

Fig. 13-23

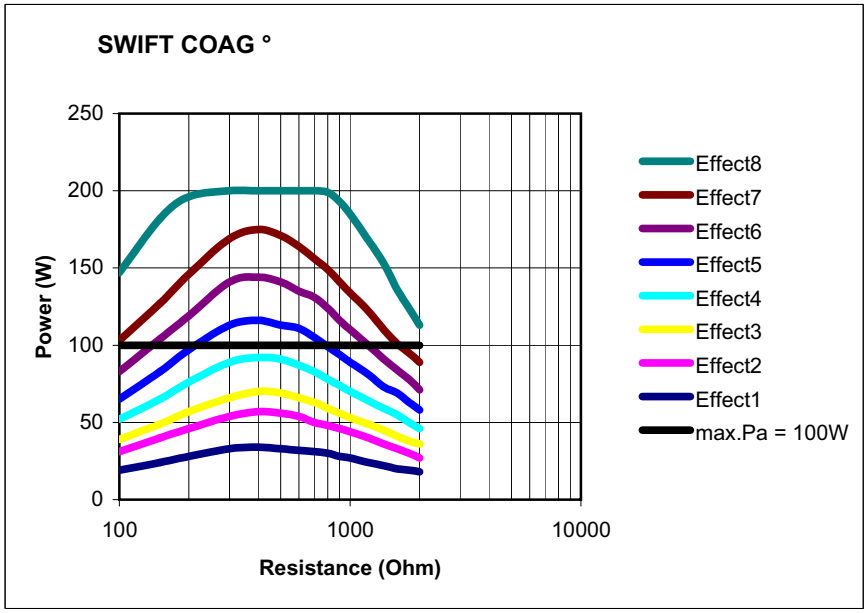

Fig. 13-24

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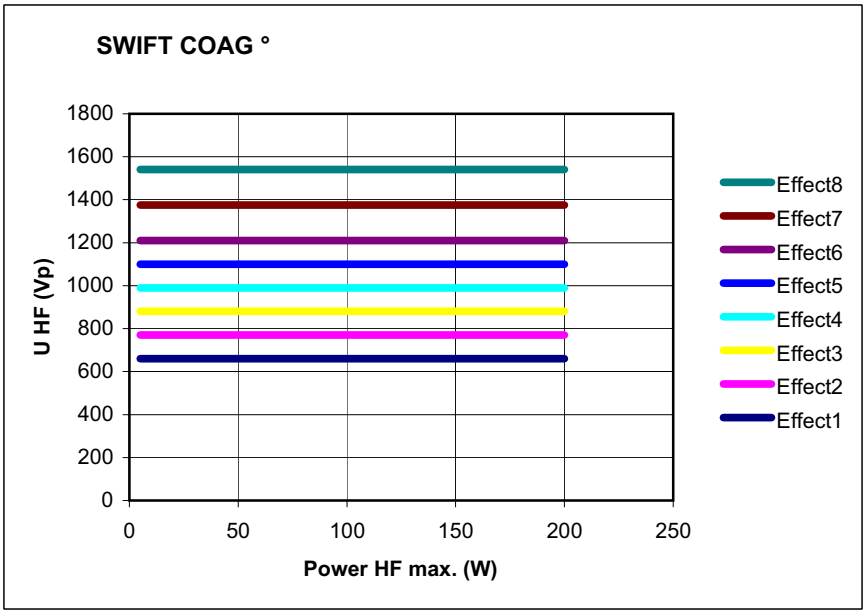
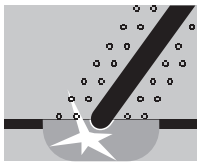


Fig. 13-25

Argon-assisted FORCED COAG Mode



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Properties Effective, fast "standard" coagulation.

Areas of use Contact coagulation, clamp coagulation, e.g. via insulated monopolar forceps.

Difference from SWIFT COAG Tissue-cutting property is suppressed.

Suitable electrodes Ball electrodes for contact coagulation. Insulated monopolar forceps for clamp coagulation. (Note: When using the Erbe VIO APC handpiece, a conventional 4 mm electrode can be used instead of the argon applicator. For this, the flow setting must be set to 0)

Technical data

HF voltage waveform	pulse-modulated sinusoidal alternating voltage
Rated frequency	350 kHz (at R_L = 500 ohms) ± 10%
Crest factor	5.0 (at R_L = 500 ohms)
Rated load resistor	500 ohms
Max. HF peak voltage	2000 Vp
Number of effects	4
Consistency of effects	Automatic control of HF peak voltage
HF power limitation	5 watts to 120 watts in 1-watt steps

Max. power output at rated load resistor	120 watts ± 20%
Max. RMS current (maximum HF output current in normal use)	1150 mA

Diagrams

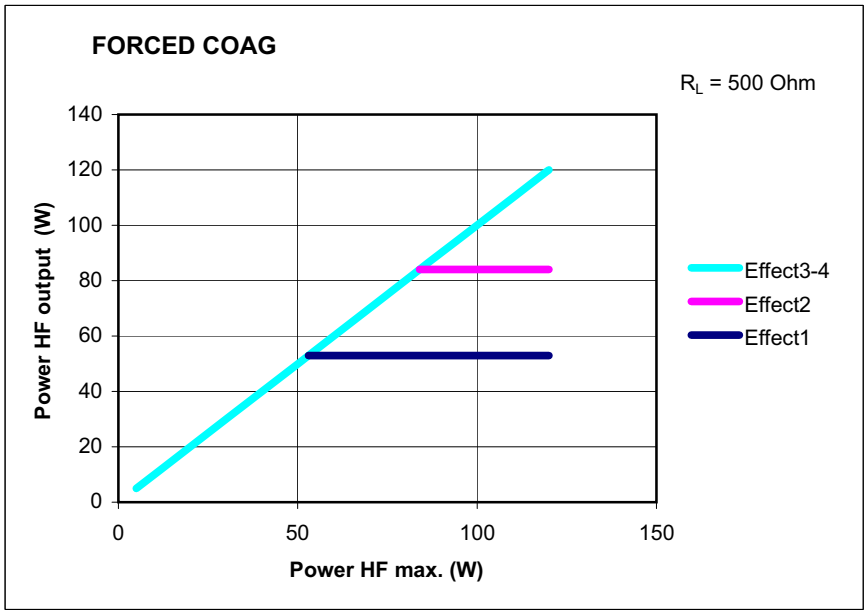

Fig. 13-26

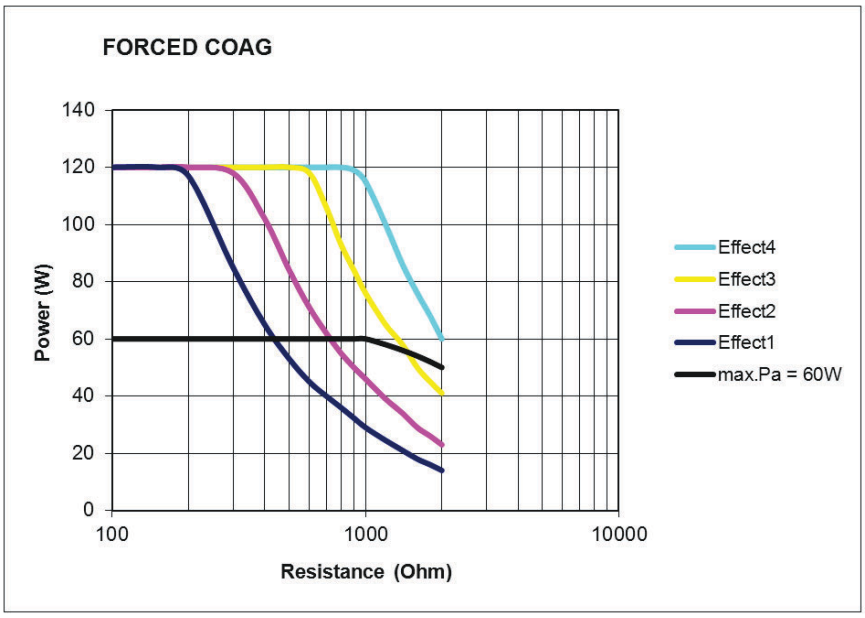

Fig. 13-27

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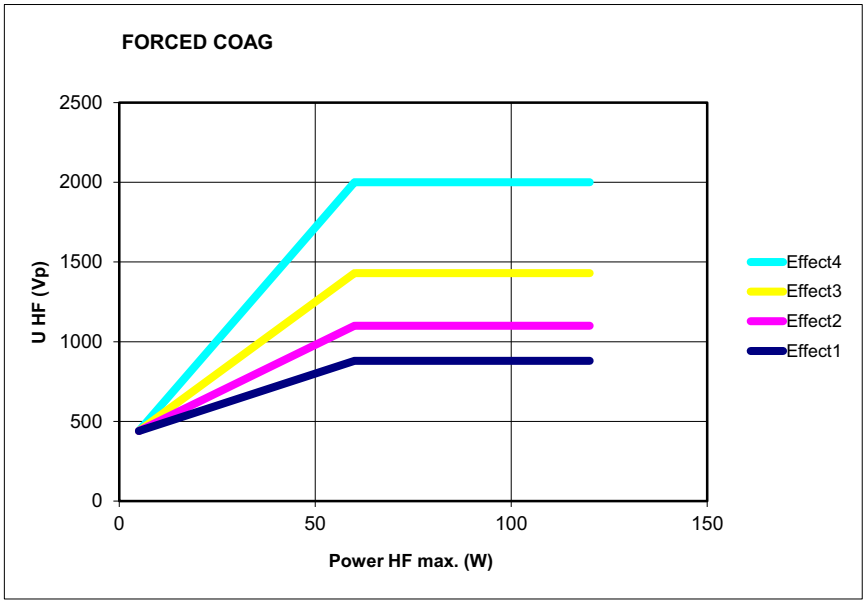
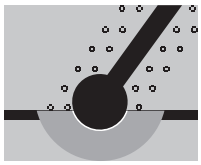


Fig. 13-28

Argon-assisted SOFT COAG Mode



Properties

Carbonization of the tissue is prevented, adhesion of the electrode to the tissue is greatly reduced. Great coagulation depth in comparison to other COAG modes.

If you wish to fully utilize the potentially great coagulation depth of SOFT COAG, select a low effect level and coagulate over a long period.

If you can only coagulate for a short time, select a high effect level. In comparison to other COAG modes you will attain an even greater coagulation depth, but do not fully utilize the potential coagulation depth of SOFT COAG.

AUTO STOP

The Argon-assisted SOFT COAG mode is also available as Argon-assisted SOFT COAG mode with AUTO STOP. AUTO STOP ends activation automatically before the tissue sticks to the instrument.

Areas of Use

In almost all operations which require safe, "deep" contact coagulation or in which an adhesion of the electrode would have a negative effect on the coagulation process.

Clamp coagulation, e.g. via insulated monopolar forceps.

Suitable electrodes

Contact electrodes, for this in particular electrodes with large contact surface, e.g. ball electrodes for deep coagulation. (Note: When using the Erbe VIO APC handpiece, a conventional 4 mm electrode can be used instead of the argon applicator. For this, the flow setting must be set to 0)

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HighCurrent Mode

⚠ WARNING

HighCurrent Mode: Using the SOFT COAG mode at Effect 6 or higher with an unsuitable neutral electrode

Risk of burns to the patient!

⇨ If you set the Soft Coag Mode with Effect 6 or higher together with a power limitation of 135 watts or higher, you may only use neutral electrodes that are compatible for a heating factor of 36 A^2s according to the manufacturer's specifications. These are, for example, the Erbe neutral electrodes NESSY Plate 170 (REF No. 20193-070, 20193-074) or NESSY RePlate 200 (REF No. 20193-090).

Technical data

HF voltage waveform	unmodulated sinusoidal alternating voltage
Rated frequency	350 kHz (at R_L = 500 ohms) ± 10%
Crest factor	1.4 (at R_L = 500 ohms)
Rated load resistor	50 Ohm
Max. HF peak voltage	190 Vp
Number of effects	8
Consistency of effects	Automatic control of HF peak voltage
HF power limitation	5 watts to 200 watts in 1-watt steps
Max. power output at rated load resistor	200 watts ± 20%
Max. RMS current (maximum HF output current in normal use)	1330 mA
Heating Factor	36 A^2s

Diagrams

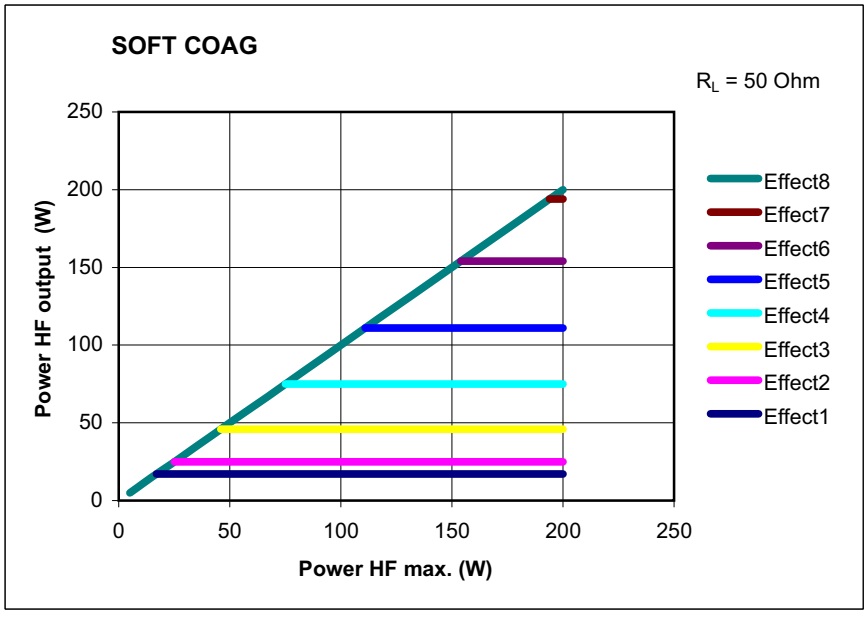

Fig. 13-29

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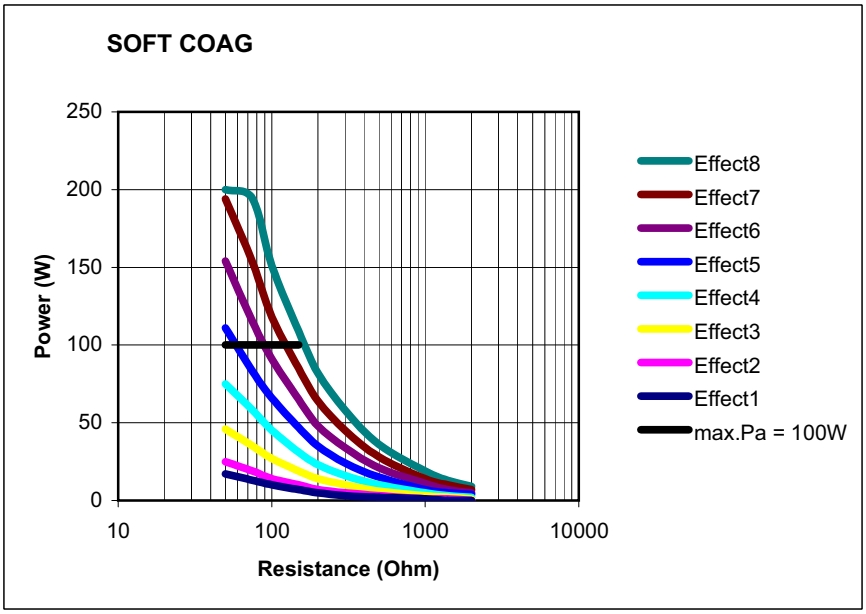

Fig. 13-30

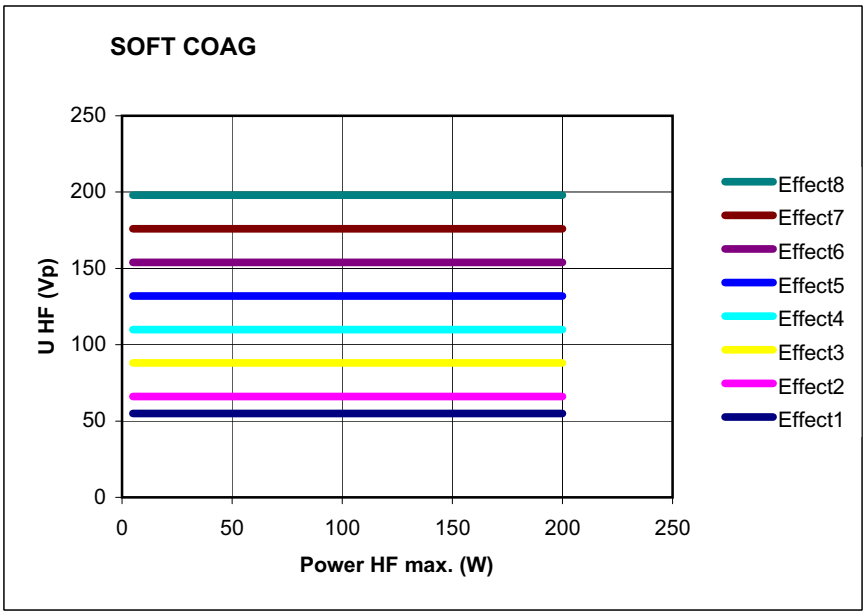

Fig. 13-31

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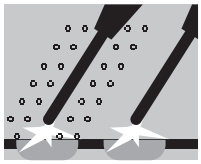
Chapter 14
APC Optional Modes (Only Available with an APC Module)

Argon-assisted TWIN COAG Mode



Properties

Fast, effective coagulation, which is highly suitable for preparation with high hemostasis owing to its limited tissue-cutting property. Two monopolar instruments can be activated at the same time.

WARNING! In the TWIN COAG mode the output power of any of the active electrodes can change.

Setting

When carrying out the first selection of TWIN COAG, you are requested to select a second additional monopolar socket (on the VIO or APC 2) by pressing the required Focus button.

Activation

The TWIN COAG function can be called up on the two selected sockets simultaneously. If one of the two sockets requires a CUT function, they must be activated alternately.

Areas of use

Especially in disciplines where simultaneous coagulation and preparation is required, e.g. in heart and breast surgery.

Suitable electrodes

APC applicators (with adjustable electrode). Monopolar electrodes for inserting on the APC handpiece.

Technical data

HF voltage waveform	pulse-modulated sinusoidal alternating voltage
Rated frequency	350 kHz (at R_L = 500 ohms) ± 10%
Crest factor	5.3 (at R_L = 500 ohms)
Rated load resistor	500 ohms
Max. HF peak voltage	2000 Vp
Number of effects	8
Consistency of effects	Automatic control of HF peak voltage
HF power limitation	5 watts to 200 watts in 1-watt steps
Max. power output at rated load resistor	200 watts ± 20%
Max. RMS current (maximum HF output current in normal use)	650 mA

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Diagrams

Fig. 14-1

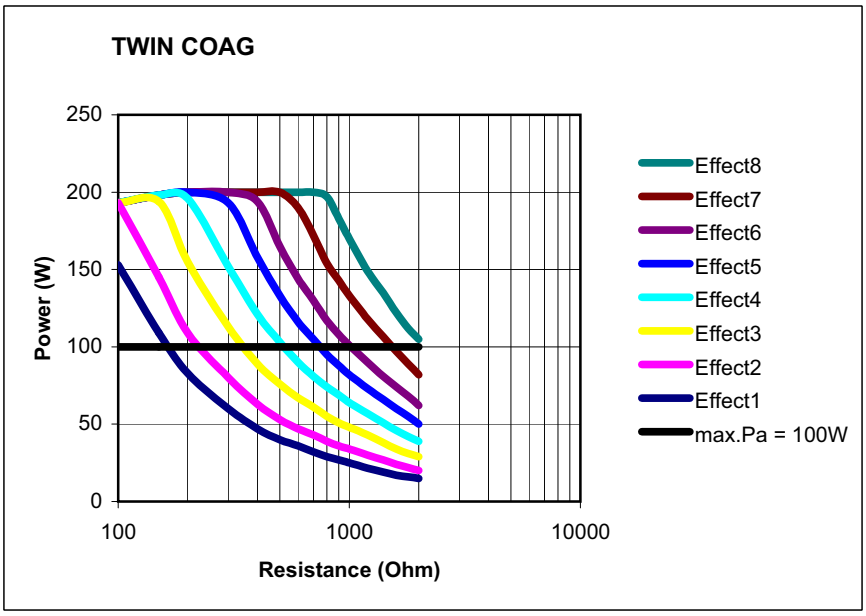

Fig. 14-2

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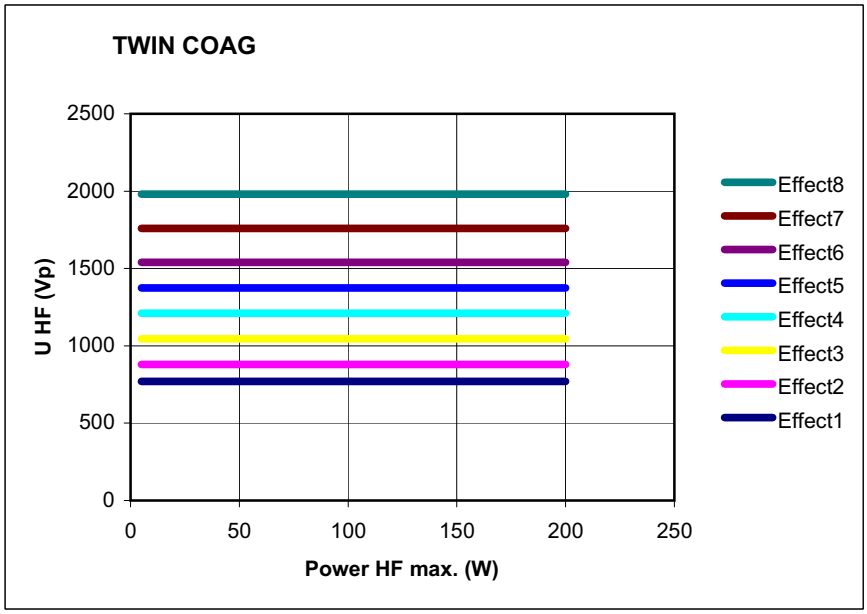

Fig. 14-3

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Chapter 15
Installation

Ambient conditions

⚠ WARNING

Ignition of anesthetics, skin cleansers, and disinfectants in potentially explosive atmospheres

If you place the unit in a potentially explosive atmosphere, anesthetics, skin cleansers, and disinfectants can ignite.

Risk of fire and explosion to the patient and medical personnel! Risk of damage to property.

⇨ Do not place the unit in potentially explosive atmospheres.

NOTICE

Interference with the unit from portable and mobile HF telecommunications units (e.g. mobile phones, WLAN units)

Electromagnetic waves emitted by portable and mobile HF telecommunications units may affect the unit.

The unit may fail or not perform properly.

⇨ When using portable and mobile HF telecommunications units, including their accessories, there must be a distance of at least 30 cm between them and the unit and its cords.

NOTICE

Unsuitable temperature or level of humidity during operation

If you operate the unit at an unsuitable temperature or level of humidity, it may sustain damage, fail, or not perform properly.

⇨ Operate the unit at a suitable temperature and level of humidity. You will find the tolerances for temperature and humidity in the Technical Data.

⇨ If other ambient conditions must be observed for operation of the unit, you will also find them in the Technical Data.

NOTICE

Unsuitable temperature or humidity in transit or storage

If you transport or store the unit at an unsuitable temperature or level of humidity, it may sustain damage and fail.

⇨ Transport and store the unit at a suitable temperature and level of humidity. You will find the tolerances for temperature and humidity in the Technical Data.

⇨ If other ambient conditions must be observed for transport and storage of the unit, you will also find them in the Technical Data.

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NOTICE

Insufficient acclimatization time, unsuitable temperature during acclimatization

If the unit was stored or transported below or above a certain temperature, it will take a certain time and temperature to acclimatize.

If you do not observe the rules, the unit can sustain damage and fail.

⇨ Acclimatize the unit according to the rules in the Technical Data.

NOTICE

Overheating of the unit due to poor ventilation

If ventilation is poor, the unit can overheat, sustain damage, and fail.

⇨ Install the unit in such a way that there is an unobstructed circulation of air around the housing. Installation in confined wall recesses is prohibited.

NOTICE

Penetration of liquid into the unit

The housing is not absolutely watertight. If liquid penetrates, the unit can sustain damage and fail.

⇨ Make sure no liquid can penetrate the unit.

⇨ Do not place vessels containing liquids on top of the unit.

Electrical installation

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⚠ WARNING

Defective grounded power outlet, power supply network without proper grounding, inferior-quality power cord, incorrect line voltage, multiple power outlets, extension cords

Risk of electric shock and other injuries to the patient and medical personnel! Risk of damage to property.

⇨ Connect the unit / cart to a properly installed grounded power outlet.

⇨ Only connect the unit to a power supply network with proper grounding.

⇨ Only use the Erbe power cord or an equivalent power cord with a national quality symbol for this purpose.

⇨ Check the power cord for damage. You must not use a damaged power cord.

⇨ The supply voltage must match the voltage specified on the unit's rating plate.

⇨ Do not use multiple power outlets.

⇨ Do not use extension cords.

⚠ WARNING

Incorrect power fuse, defective unit

Risk of electric shock to the patient and medical personnel! Risk of damage to property.

⇨ Blown power fuses may only be replaced by a competent technician. Only replacement fuses that have the same rating as the one specified on the unit's rating plate may be used.

⇨ When a fuse has been changed, the function of the unit must be verified. If the unit does not function properly or if there are any concerns, please contact Erbe Elektromedizin. You will find the addresses in the address list at the end of this User Manual.

⚠ WARNING

Damaged unit, damaged accessories, modified unit, and modified accessories

Risk of burns and injury to the patient and medical personnel! Risk of damage to property.

⇨ Check the unit and accessories for damage every time before using them (e.g. footswitch, cords of instruments and the neutral electrode, cart).

⇨ You must not use a damaged unit or damaged accessories. Replace defective accessories.

⇨ If the unit or cart is damaged, please contact our customer service.

⇨ For your safety and that of the patient: Never attempt to perform repairs or make modifications yourself. Any modification will invalidate liability on the part of Erbe Elektromedizin GmbH.

Access to the power cord

Note: Install the unit such that the power cord could be easily disconnected from the power source.

Grounding

If necessary, connect the grounding pin of the unit or of the cart to the grounding system of the operating room using a grounding conductor.

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Install electrosurgical unit on overhead support

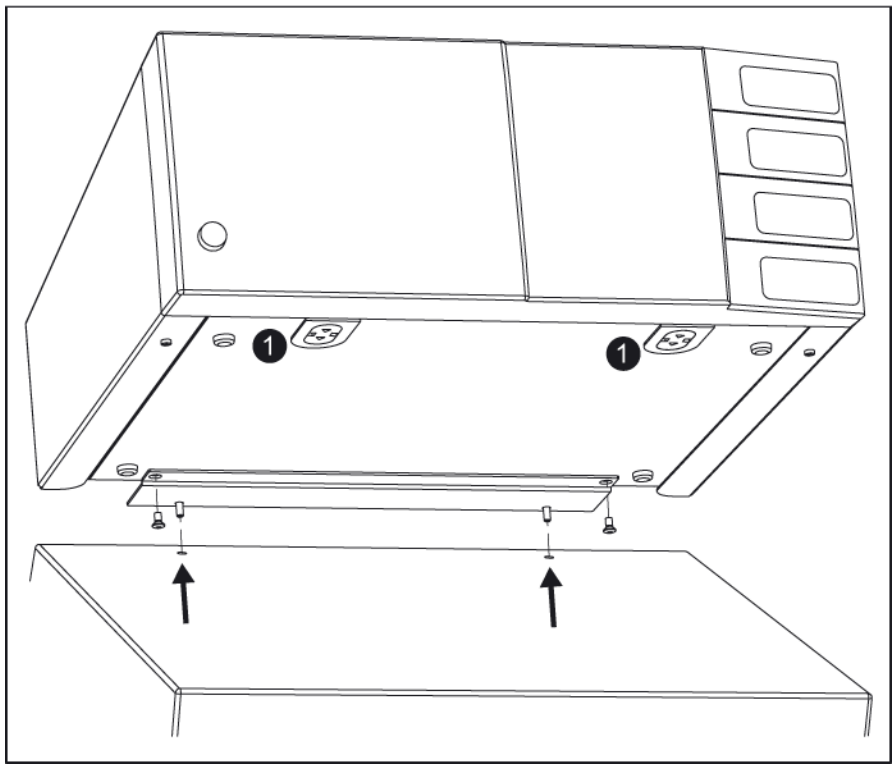

Fig. 15-1

For installation you require the VIO fastening set on console No. 20180-133.

1. Screw the bottom plate to the electrosurgical unit.
2. If the electrosurgical unit is installed on an overhead support, the caps* (1) must be fitted to the interconnections. When the unit is activated, the interconnections carry HF voltage. Place the electrosurgical unit on the overhead support. In the bottom plate you will see two holes which are provided for the insertion of screws. These must match up with the respective holes in the overhead support (arrows).
3. Firmly screw the electrosurgical unit with the bottom plate to the overhead support.

*Meaning of the symbols on the caps:

WARNING! Read the User Manual before removing the caps.

WARNING! HF voltage when the unit is activated.

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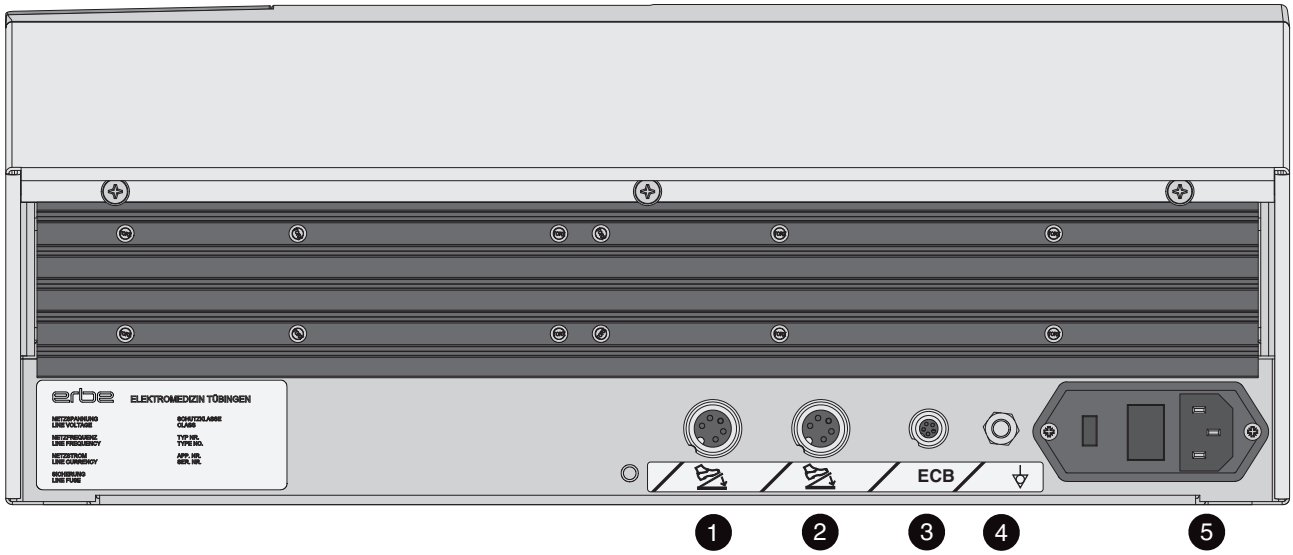

Fig. 15-2

Sockets **(1) and (2) footswitch sockets**

You can connect a one pedal and a two pedal footswitch to these sockets. The two pedal footswitch can be connected to either socket (1) or socket (2). The same applies to the one pedal footswitch.

(3) ECB sockets (ECB means Erbe Communication Bus)

You can connect other units to the electrosurgical unit, e. g. an APC or a smoke evacuator. The electrosurgical unit then functions as a control unit whose display shows the functions of the other units. The ECB ensures communication between the units. Connect an ECB cable to this socket and connect it to one of the other units.

Grounding **(4) Grounding terminal**

Connect a grounding cable and connect this to the grounding system of the operating room.

Power connection **(5) Power connection**

Connect the unit to a properly installed grounded power outlet. Only use the Erbe power cord or an equivalent power cord with a national quality symbol for this purpose.

Installing the unit on an Erbe cart

Please read the User Manual for the cart concerned. There you will find instructions on how to secure the unit to the cart.

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Chapter 16
Cleaning and disinfection

Wipe disinfection

For cleaning and disinfecting the surfaces of the unit or of the cart, Erbe recommends a wipe disinfection. Use only disinfectant which complies with the relevant national standards.

Instructions for cleaning and disinfection

Mix the disinfectant in the concentration specified by the manufacturer.

Clean surfaces contaminated with blood before using the disinfectant; otherwise it may be less effective.

Wipe the surfaces. Make sure the surfaces are treated uniformly. Comply with the action time of the disinfectant specified by the manufacturer.

Safety Instructions

⚠ WARNING

Connection of unit / cart and power supply during cleaning and disinfection

Risk of electric shock to the medical personnel!

⇨ Switch off the unit. Unplug the power plug of the unit / cart.

⚠ WARNING

Flammable detergents and disinfectants, flammable solvents in adhesives used on the patient and on the unit / cart

Risk of fire and explosion to the patient and medical personnel! Risk of damage to property.

⇨ Use products that are not flammable.

If the use of flammable products is unavoidable, proceed as follows:

⇨ Allow the products to evaporate completely before switching on the unit.

⇨ Check whether flammable liquids have accumulated under the patient, in body recesses such as the navel, or in body cavities such as the vagina. Remove any liquids before performing electrosurgery.

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NOTICE

Penetration of liquid into the unit

The housing is not absolutely watertight. If liquid penetrates, the unit can sustain damage and fail.

⇨ Make sure no liquid can penetrate the unit.

⇨ Do not place vessels containing liquids on top of the unit.

NOTICE

Alcohol-based spray disinfectant for fast disinfection

With membrane keyboards and paint surfaces there is the risk of cracks. Propanol and ethanol will erode surfaces.

⇨ Do not use these substances.

NOTICE

Alternate use of disinfectant solutions based on different active ingredients

A color reaction may occur with plastics.

⇨ Do not use these substances alternately.

Membrane keyboards

Note: If alcohol-based disinfectants are used on units with membrane keyboards, this remove the anti-glare finish. However, the user surfaces remain fully functional. This does not present a hazard.

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Chapter 17
Status Messages, Error Messages

An error message consists of an error code and an error text. The display of the VIO system shows two different types of error messages.

a) Error messages that prompt you to take action and remedy the error. You will find these error messages in the table.

b) Error messages that prompt you to inform Technical Service. These error messages are not listed individually in the User Manual because the error texts of the relevant error codes are constantly repeated. The error texts are:

- Activation has been stopped. Activate again. If the display shows this error number repeatedly, please inform Technical Service.
- Minor deviation from the system parameters. If the display shows this note repeatedly, please inform Technical Service.

Status Messages	
B-84	Connected two-pedal footswitch ready for operation.
B-85	Two-pedal footswitch disconnected from system.
B-88	Single-pedal footswitch ready for operation.
B-89	Single-pedal footswitch disconnected from system.
B-93	Multifunctional footswitch ready for operation..
B-94	Multifunctional footswitch disconnected from system.
B-95	Connected instrument ready for operation. It has already been used approx. xxx times.
B-A6	Data transmission. Transferring data to program memory. Please wait until system has been restarted.
B-9B	Remote control. VIO system disconnected from an external master unit and ready for operation.
B-9C	Remote control. VIO system disconnected from external master unit.
B-9D	Remote control. VIO system controlled by external remote control and ready for operation.
B-9E	Remote control. VIO system disconnected from external remote control.
B-9F	Instrument disconnected from VIO system.

Error Messages	
B-B	Nessy contact. Please check contact between skin and neutral electrode (patient plate).
B-F	Keyboard fault. The selection buttons are defective. If this message reappears, please inform Technical Service.
B-01	Fault. Restarting device due to fault.
B-09	Fault. Restarting device due to fault.

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Error Messages	
B-10	Please end activation! Activation via finger or footswitch must be ended. After which reactivation is possible.
B-12	Please end activation! Footswitch or fingerswitch activation detected during device start-up.
B-16	Program memory full. Please delete programs no longer needed.
B-17	Double activation. Two switches pressed simultaneously e.g. footswitch and fingerswitch.
B-19	Line voltage fault. The unit has discontinued activation due to an insufficient supply voltage. If this recurs, please inform Technical Service.
B-21	Invalid BMP file. Inform Technical Service.
B-22	Please end activation! Please remove forceps from tissue After which reactivation is possible.
B-26	The maximum application time in PRECISE APC mode was exceeded. The maximum application time can be adjusted in the "Choose Coag Effect" Effect submenu.
B-81	Invalid system component. The connected component is not compatible with the VIO system. Inform Technical Service.
B-1B	Self-check active. Please wait until self-check is complete. The unit is then ready for use.
B-1C	ON time limitation. Maximum ON time exceeded. Maximum ON time can be adjusted in setup.
B-1D	Instrument detection fault Do not use instrument; have it checked.
B-1E	Pressed button detected. Button pressed on device during start-up. Release button. If fault cannot be remedied, inform Technical Service.
B-1F	NESSY symmetry. When applying neutral electrode (patient plate), ensure that neutral electrode line of symmetry runs towards the operating field.
B-8E	VIO socket 1 fault; restart VIO. If fault cannot be remedied, inform Technical Service.
B-8F	VIO socket 2 fault. Restart VIO. If fault cannot be remedied, inform Technical Service.
B-90	VIO socket 3 fault. Restart VIO. If fault cannot be remedied, inform Technical Service.
B-97	Program memory fault. Restoring basic program setting. If this recurs, please inform Technical Service.
B-98	Program memory fault. The stored program could not be called up. If this recurs, please inform Technical Service.
B-99	Activation type unavailable. For further information, consult user manual.
B-9A	Please check time in system menu.
B-A0	No other mode can be selected for this instrument.
B-A3	Footswitch not assigned. Footswitch activated but not assigned to a socket.
B-A4	Two footswitches connected. Two footswitches of the same type connected. For further information, consult user manual.
B-A8	Invalid system component. The connected component is not compatible with the VIO system. Inform Technical Service.
B-A9	Please confirm settings. Cannot activate device until current settings have been confirmed.
B-AA	Cannot activate mode. Attempt made to activate a mode that is switched off or unavailable. For further information, consult user manual.
B-AB	Instrument not connected. Socket activated to which no instrument is connected. Or attempt made to activate an instrument with old, invalid software.

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Error Messages	
B-B0	NESSY symmetry. When applying neutral electrode (patient plate), ensure that neutral electrode line of symmetry runs towards the operating field.
B-AC	Contact detected. Attempt made to assign the AUTO START function to the instrument. This is not possible if the tips are touching each other. This is not possible if there is tissue contact.
B-B1	NESSY contact. Please check contact between skin and neutral electrode (patient plate).
B-B3	Recalibrating glass keyboard. Do not touch!
B-B7	The AUTO START function is only permissible up to a max. power output of 50 W.
B-BB	Safety check due. Deadline for next safety check has been reached. Inform Technical Service.
B-C0	Please assign activation type. Newly connected instrument not assigned to either footswitch or AUTO START.
B-C6	Neonatal NE Monitoring System. Reduce the effect or power setting.
C-85	No tissue effect! If applicable release hand trigger.
X 81 - 86	Fault with instrument detection. Do not use instrument; have it checked.

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Chapter 18
General Technical Data

Power connection		
Rated supply voltage	100 V – 120 V ± 10 %	220 V – 240 V ± 10 %
Rated supply frequency	50 / 60 Hz	50 / 60 Hz
Line current	8 A	4 A
Power input in standby mode	40 watts	40 watts
Power input with max. HF output	500 watts / 920 VA	500 watts / 920 VA
Terminal for grounding (potential equalization)	yes	yes
Power fuses	T 8 A H / 250 V	T 4 A H / 250 V

Operating mode	
Intermittent operation	ON time 25% (e.g. activated for 10 sec. / deactivated for 30 sec.)

Dimensions and weight	
Width x height x depth	410 x 165 x 380 mm
Weight	9.5 kg

Ambient conditions for transport and storage of unit	
Temperature	-40 °C to +70 °C
Relative humidity	10 % – 95 %

Ambient conditions for operation of unit	
Temperature	+10 °C to +40 °C
Relative humidity	15% – 80%, non-condensing
Air pressure	54 kPa – 106 kPa
Maximum operating altitude	5000 m above sea level

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Acclimatizing
If the unit has been stored or transported at temperatures below +10 °C or above +40 °C, the unit will require approx. 3 hours to acclimatize at room temperature.

Standards	
Classification according to EC Directive 93/42/EEC	II b
Protection class as per EN 60 601-1	I
Type as per EN 60 601-1	CF

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Chapter 19
Notes on electromagnetic compatibility (EMC)

Where EMC is concerned, medical electrical units are subject to special safety measures and must be installed and commissioned according to the EMC notes stated herein.

Guidelines for avoiding, recognizing and rectifying unwanted electromagnetic effects on other units or systems, which are the result of operating the VIO system.

When VIO electrosurgical units are activated, disturbance of other units or systems in the immediate vicinity can occur. This can be recognized as, for example, image artifacts in imaging units or unusual fluctuations in measured value displays.

Such disturbances from an activated electrosurgical unit can be reduced by placing it further away and/or carrying out suitable shielding measures on the equipment or system experiencing disturbance.

When the VIO electrosurgical unit is in the non-activated state, interference with other units in the immediate vicinity does not occur.

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⚠ WARNING

Use of non-approved EMC-relevant accessories

This can result in the increased emission of electromagnetic interference or reduce the electromagnetic immunity of the unit.

Risk of injury to the patient.

Units may fail or not function properly.

⇨ Only use cable that is specified in the table *"EMC-relevant accessories"*, see chapter *"Notes on electromagnetic compatibility (EMC)"*.

⇨ If you are using accessories from other manufacturers, check whether the Erbe unit is interfering with other units or being affected by interference itself. You cannot use the unit if there is any interference.

NOTICE

Stacked units

If you place the unit next to or stack it with other units, the units may affect each other.

Units may fail or not function properly.

⇨ The unit may only be placed next to or stacked with VIO-series units.

⇨ If it is necessary to operate the unit near or stacked together with non-VIO-series units keep as much distance as possible between

the units. Check whether the units are affecting each other: Are the units behaving unusually? Are faults occurring?

NOTICE

Interference with the unit from portable and mobile HF telecommunications units (e.g. mobile phones, WLAN units)

Electromagnetic waves emitted by portable and mobile HF telecommunications units may affect the unit.

The unit may fail or not perform properly.

⇨ When using portable and mobile HF telecommunications units, including their accessories, there must be a distance of at least 30 cm between them and the unit and its cords.

NOTICE

Use of non-approved internal cables by Technical Service

This can result in the increased emission of electromagnetic waves or reduce the immunity of the unit.

The unit may fail or not perform properly.

⇨ Technical Service may only use the internal cables that are listed in the service manual for the unit.

Guidance and manufacturer's declaration - electromagnetic emissions

The unit is intended for use in the electromagnetic environment specified below. The customer or the user of the unit should ensure that it is used in such an environment.

Emissions test	Compliance	Electromagnetic environment - guidance
HF emissions CISPR 11	Group 1	In stand-by operation, the unit uses HF energy only for its internal function.
	Group 2	In the active state, the unit emits HF energy to the patient.
HF emissions CISPR 11	Class A	The properties of this unit in terms of its emissions mean it can only be used in medical facilities that are connected to supply systems specifically provided for that purpose (usually supplied via isolating transformers). For domestic use (for which class B is usually required as per CISPR 11), this unit may not offer adequate protection against radio services. The user may need to take corrective measures such as relocating or reorienting the unit.
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations/flicker emissions IEC 61000-3-3	Complies	

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Guidance and manufacturer's declaration - electromagnetic immunity			
The unit is intended for use in the electromagnetic environment specified below. The customer or the user of the unit should ensure that it is used in such an environment.			
Immunity test	**IEC 60601-1-2 test level**	**Compliance level**	**Electromagnetic environment - guidance**
Discharge of static electricity (ESD) in accordance with IEC 61000-4-2	±8 kV contact discharge ±15 kV air discharge	±8 kV contact discharge ±15 kV air discharge	The floor should be made from wood or concrete or be covered with ceramic tiles. If the floor is covered with non-conductive synthetic material, the relative humidity must be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	±2 kV for power supply lines ±1 kV for input/output lines	±2 kV for power supply lines ±1 kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1 kV differential mode ±2 kV common mode	±1 kV differential mode ±2 kV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short-term interruptions and voltage fluctuations on power supply input lines as per IEC 61000-4-11	0% U_T for 0.5 cycle, at 0, 45, 90, 135, 180, 225, 270 and 315 degrees 0% U_T for 1 cycle, single-phase at 0 degrees 70% U_T for 25/30 cycles, single-phase at 0 degrees	0% U_T for 0.5 cycle, at 0, 45, 90, 135, 180, 225, 270 and 315 degrees 0% U_T for 1 cycle, single-phase at 0 degrees 70% U_T for 25/30 cycles, single-phase at 0 degrees	Mains power quality should be that of a typical commercial or hospital environment. If the user of the unit requires continued operation during power mains interruptions, it is recommended that the unit be powered from an uninterruptible power supply or a battery.
Voltage monitoring as per IEC 61000-4-11	0% U_T for 250/300 cycles (50/60 Hz)	0% U_T for 250/300 cycles (50/60 Hz)	
Power frequency (50/60 Hz) magnetic field as per IEC 61000-4-8	30 A/m	30 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
Note: U_T is the a.c. mains voltage prior to application of the test level.			

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Guidance and manufacturer's declaration - electromagnetic immunity

The unit is intended for use in the electromagnetic environment specified below. The user of the unit should ensure that it is used in such an environment.

Immunity test	IEC 60601-1-2 test level	Compliance level	Electromagnetic environment - guidance
Conducted HF disturbances as per IEC 61000-4-6	3 V_{eff} 150 kHz to 80 MHz	3 V_{eff} 150 kHz to 80 MHz	The field strengths of fixed transmitters, as determined by an electromagnetic site survey should be below the compliance level in each frequency range. [b]
	6 V_{eff} [a] in ISM frequency bands 150 kHz to 80 MHz	6 V_{eff} [a] in ISM frequency bands 150 kHz to 80 MHz	Interference may occur in the vicinity of units marked with the following symbol. 
Radiated high-frequency electromagnetic fields as per IEC 61000-4-3	3 V/m 80 MHz to 2.7 GHz	3 V/m 80 MHz to 2.7 GHz	

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

a)
The ISM bands between 150 kHz and 80 MHz are 6.765 MHz to 6.795 MHz, 13.553 MHz to 13.567 MHz, 26.957 MHz to 27.283 MHz and 40.66 MHz to 40.7 MHz.

b)
The field strengths of fixed transmitters, such as base stations for radio (cellular/cordless) telephones and terrestrial radio units, amateur radio stations, AM and FM radio and TV channels cannot be predicted theoretically with accuracy. To assess the electromagnetic environment with regard to fixed transmitters, a site inspection should be considered. If the field strength measured at the site where the unit is used exceeds the abovementioned compliance level, the unit must be monitored to ensure it is functioning properly. In the event of any unusual operating behavior, additional measures may be required, such as changing the orientation or location of the unit.

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Electromagnetic immunity against high-frequency wireless communication units as per IEC 61000-4-3

Frequency band (MHz)	Test frequency (MHz)	Modulation	Compliance level (V/m)
380 - 390	385	Pulse [a] (18 Hz)	27
430 - 470	450	FM ± 5 kHz deviation or pulse [a] (18 Hz)	28
704 - 778	710, 745, 780	Pulse [a] (217 Hz)	9
800 - 960	810, 870, 930	Pulse [a] (18 Hz)	28
1700 - 1990	1720, 1845, 1970	Pulse [a] (217 Hz)	28
2400 - 2570	2450	Pulse [a] (217 Hz)	28
5100 - 5800	5240, 5500, 5785	Pulse [a] (217 Hz)	9

Electromagnetic immunity against high-frequency wireless communication units as per IEC 61000-4-3
Note: A **minimum safety distance of 30 cm** should be maintained between the unit and portable HF telecommunications units that transmits in the stated frequency band. This includes mobile phones, WLAN and RFID, and Bluetooth units. Failure to comply may lead to a reduction in the unit's performance features. Interference may occur in the vicinity of units marked with the following symbol. 
a) The pulse modulation is defined as a square-wave signal with a 50% duty factor.

The cables / cords used on the unit must not exceed the lengths specified below.

EMC-relevant accessories [a]	
Name	**Maximum cable length**
Power cord	5 m
Grounding cable (POAG)	10 m
Footswitch cable	5 m
Monopolar connecting cable	5 m [b]
Bipolar connecting cable	5 m [b]
Multifunction cable	4 m [b]
Neutral electrode cable	5 m [b]
a) EMC-relevant accessories refers to the cable specified. The cable can affect the unit's electromagnetic interference or the electromagnetic immunity of the unit. b) When connecting Erbe instruments and neutral electrodes, the overall cord length increases by max. 0.5 m.	

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Operating environment

For the intended use, the unit may only be operated in premises used for medical purposes.

The unit may be operated in the vicinity of an electrosurgical unit. The safety instructions for the unit and the electrosurgical unit must be observed. Please read the safety instructions on the following subjects in particular:

- distance between the unit and the electrosurgical unit. In this User Manual, refer to the safety instruction *Stacked units*.
- Distances between the unit and the electrosurgical unit's cords.
- Distances between the unit's cords and the electrosurgical unit's cords.

Position the units and cords so that they are as far apart as possible.

Essential performance characteristics

The unit does not have any essential performance features within the meaning of IEC 60601-2-2.

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Chapter 20
Maintenance, Customer Service, Warranty, Disposal

Maintenance

Modifications and repairs

Modifications and repairs must not impair the safety of the unit or cart and accessories for the patient, user and the environment. This condition is met when changes to the structural and functional characteristics are not detrimental to safety.

Authorized persons

Modifications and repairs may only be undertaken by Erbe or by persons expressly authorized by Erbe. Erbe accepts no liability if modifications and repairs to the unit or accessories are made by unauthorized persons. This will also invalidate the warranty.

Technical safety checks

The technical safety checks determine whether the safety and operational readiness of the unit or the cart and accessories conform to a defined technical required status. Technical safety checks must be performed at least once a year.

What technical safety checks must be performed?

For this unit the following technical safety checks have been stipulated:

- Checking of labels and User Manual
- Visual inspection of unit and accessories for damage
- Testing the grounded conductor in accordance with IEC 60601-1 Section 18
- Testing the leakage current in accordance with IEC 60601-1 Section 19
- Functional testing of all the unit's operating and control elements
- Testing the monitoring equipment
- Measurement of DC resistance
- Testing footswitch and fingerswitch activation
- Testing the automatic start/stop mode
- Testing the spark monitor
- Measurement of the output power in the CUT and COAG operating modes
- Functional testing of the upgrades

The results of the technical safety checks must be documented.

If during the technical safety checks any defects are found which might endanger patients, staff or third parties, the unit may not be operated until the defects have been remedied by competent service technicians.

Customer service

If you are interested in a maintenance contract, please contact Erbe Elektromedizin in Germany, or your local contact in other countries. This may be an Erbe subsidiary, an Erbe representative or a distributor.

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Warranty

The General Terms and Conditions or the conditions of the purchase contract apply.

Disposal

Your product bears a crossed-out garbage can icon (see picture). Meaning: In all EU countries this product must be disposed of separately in accordance with the national laws implementing EU Directive 2012/19/EU of 07/04/2012, WEEE.

In non-EU countries the local regulations must be observed.

If you have any questions about disposal of the product, please contact Erbe Elektromedizin or your local distributor.

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Chapter 21
Symbols

Individual details of the symbols in this chapter may deviate from your product. Not all symbols may necessarily appear on your unit or its packaging.

Symbol	Explanation
	Caution: Before switching the unit on or performing another action related to the unit, read the safety instructions in the User Manual.
	Consult instructions for use
	Catalogue number
	Serial number
	Manufacturer
	Date of manufacture
	Keep away from sunlight
	Keep dry
	Temperature limit
	Humidity limitation
	Atmospheric pressure limitation
	Quantity (x)
	Follow instructions for use
	Warning; Electricity
	Foot switch

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Symbol	Explanation
ECB	Erbe Communication Bus Used to exchange data between Erbe units.
	Equipotentiality Refers to the grounding terminal.
	Off, On
	Defibrillation-proof type CF applied part The applied parts of the unit (e.g. instrument sockets) are protected against the effects of defibrillator discharge.
	Computer network Refers to the computer network itself or the network connections.
	Input
	Air inlet
	Air outlet
F	HF isolated patient circuit The danger of leakage currents and therefore the danger of burns is substantially reduced for the patient.
	Non-ionizing electromagnetic radiation A unit that bears this symbol does not transmit ionizing electromagnetic radiation. Interference may occur in the vicinity of the unit.
	The product must be disposed of separately.
CE	European conformity marking
MD	Medical device

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