VIO 300 D

User manual

design award
winner
2003

12.04

V 1.4.x

ERBE

VIO 300 D

User manual

Peter Mock

Technical Editor

Tel. (+ 49) 70 71 75 52 37

E-mail pmock@erbe-med.de.

I shall be very pleased if this User Manual can make your work easier and help you to use all the functions of your unit safely. It has been produced with great care by me in collaboration with development engineers and quality personnel. The use of publishing software and digital photography provided the documentation team with layout flexibility. Our object was to achieve a clear combination of text and photographs. The translation of the text into your language is subjected to a strict quality control. The User Manual is digitally printed only on delivery of your machine. All information is up to date. The ERBE documentation team would like to improve its products for your benefit, and I would therefore be very pleased to receive suggestions, criticism and questions as well as positive comments.

CLASSIFIED C UL US

Medical Electrical Equipment
WITH RESPECT TO ELECTRICAL SHOCK
FIRE, AND MECHANICAL HAZARDS ONLY
IN ACCORDANCE WITH UL2601-1 /
CAN/CSA C22.2 No. 601.1 / IEC60601-2-2
19NA

CE 0124

EN ISO 9001 EN ISO 13485

User Manual Art. No. 80104-501

Printed by: ERBE Elektromedizin GmbH

Printed in Germany

Table of Contents

Art.-Nr.:80104-501
12/ 2004

Art.-Nr.:80104-501
12/ 2004

Art.-Nr.:80104-501
12/ 2004

Art.-Nr.:80104-501
12/ 2004

CHAPTER 1

Safety instructions

Intended use

The VIO 300 D is an electrosurgical unit for cutting and coagulation. Thanks to its performance features it offers universal applications.

Safety notations

WARNING! || The WARNING! safety indication refers to a risk of personal injury.

CAUTION! || The CAUTION! safety indication refers to a risk of damage to property.

ATTENTION: || The ATTENTION: safety indication refers to a risk which can cause equipment to become unserviceable.

Safety of equipment and accessories

Compliance with safety information

Appropriate application of and compliance with the safety information makes a considerable contribution to the safety of the user, patients, and environment.

Safety of equipment and instruments

ERBE devices complys with all relevant and generally accepted engineering practices as well as with the applicable occupational protection and accident prevention regulations.

Combination with other equipment

You can combine this device with other ERBE equipment and instruments. You will then have a well-conceived, coordinated system.

Contribution of medical personnel to safety

Working with medical equipment is basically associated with certain risks to medical personnel and patients. Risks cannot be entirely eliminated by design measures alone. Safety does not depend solely on the equipment but depends to a large extent on factors influenced by you. These factors are dealt with in the safety information in this chapter.

Importance of the User Manual and training of medical personnel

Who should read this User Manual?

The User Manual forms an important part of the safety concept of the unit.

Therefore everyone who is concerned with

- preparing,
- adjusting,
- operating,
- disassembling, as well as
- cleaning and disinfecting

the unit and instruments as applicable should read the User Manual and the instructions for using the instruments. Please pay particular attention to the safety instructions in each chapter.

Art.-Nr.:80104-501
12/ 2004

Training

WARNING! The equipment must be used only by medical professionals who have been appropriately trained (In-Serviced) and authorized by ERBE.

Training must be carried out only by personnel who are suitable on the basis of their knowledge and practical experience. ERBE is not responsible for damage caused by user error.

In the event of uncertainties or if you have any questions, please contact ERBE. We will be glad to give you further assistance and will be pleased to receive your suggestions concerning this User Manual.

Protection from the risk of electric shock

Leakage current

The equipment conforms to the requirements of Type CF (Cardiac Float) and is protected against the effects of a defibrillator discharge.

Inspecting the equipment, equipment cart, accessories

WARNING! Inspect the equipment or equipment cart and the accessories (e.g. foot control, cable) for damage after every period of use. You must not use damaged equipment, a damaged equipment cart or damaged accessories. Exchange defective accessories. If the equipment or equipment cart is damaged, please contact our customer service. For your safety and that of patients, never attempt to effect repairs yourself. Any modification will invalidate liability on the part of ERBE Elektromedizin GmbH.

Power cord, power outlet

WARNING! The supply voltage must match the voltage specified on the rating plate. Connect the unit / the equipment cart to a properly installed grounded outlet. Only use the ERBE power cord or an equivalent power cord for this purpose. The power cord must bear the national test symbol.

Power fuses

WARNING! The unit is protected with power fuses. They can be found in the fuse drawer next to the power connection of the unit. 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. Only spare fuses with the values indicated on the unit rating plate may be used.

Art.-Nr.:80104-501
12/ 2004

Potential equalisation

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

Ambient conditions

Do not operate in potentially explosive atmospheres

WARNING! The device may only be operated in rooms used for medical purposes. Position the device in such a way that it is located outside of potentially explosive atmospheres. Potentially explosive atmospheres can form due to the use of combustible anesthetics, skin cleansers and disinfectants.

Operating conditions

ATTENTION: The device must be operated at a certain temperature and humidity. You will find the specified temperature and humidity in the Technical Data. If levels exceed or fall below the tolerances specified there, the device may fail. If other conditions have to be observed for operation of this device, you will also find them in the Technical Data.

Portable and mobile communication equipment HF

ATTENTION: Portable and mobile communication equipment HF can influence the device.

Transport and storage

ATTENTION: The device must be stored and transported at a certain temperature and humidity. You will find the specified temperature and humidity in the Technical Data. If levels exceed or fall below the tolerances specified there, the device may fail. If other conditions have to be observed for operation of this device, you will also find them in the Technical Data.

Acclimatization

ATTENTION: If the device was stored or transported below a certain temperature, it will take a certain time to acclimatize to room temperature. You will find the temperature and acclimatization time in the Technical Data.

Ventilation

ATTENTION: The device must be installed in such a way that there is an unobstructed circulation of air around the housing. Installation in confined wall recesses is not permitted.

Penetration of liquids

ATTENTION: The housing is not absolutely watertight. Therefore do not place the device in the immediate vicinity of tubes or tanks containing liquids.

Maintenance

WARNING! The unit must undergo a safety check at least once a year.

Attention: WARNING!

Failure of display elements

The unit must not be used following failure of display elements.

Electrical capacity of instruments

The ERBE instructions for use of the instruments indicate the maximum electrical capacity of the instrument. Check that the instrument is suitable for the required mode and the required power limitation. This can be done with the help of the performance diagrams for each mode.

Patient plate

Place the patient plate with its entire surface on the patient's body to ensure proper functioning. The patient plate must be as close as possible to the area of the operation.

Insert the contact tab of the patient plate completely into the connecting clamp. The contact tab must not touch the patient's skin. There is the danger of burns.

Do not apply the patient plate over the heart or in the region of the heart.

Art.-Nr.:80104-501
12/ 2004

Special points to observe with the "Neutral electrode: Either way" setup

If a short circuit occurs in the connecting cord, or in the clip of a dual surface neutral electrode, the unit can no longer monitor the contact between the electrode and 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 and there is a danger of burns. You will not receive a warning if the application direction of the contact surface is incorrect.

Insulation of patient

The patient should not come into contact with metal parts which are grounded or have high capacitance to ground (e. g. operating table holders). The use of antistatic drapes is recommended to insulate the patient.

Dry bedding of patient

Avoid skin-to-skin contact (e. g. between the patient's arms and body), e. g. by packing with dry gauze.

Position of monitoring electrodes

When simultaneously using an electrosurgical unit and physiological monitoring equipment you should position any monitoring electrodes as far as possible from the surgical electrodes. Needle electrodes for monitoring are not recommended. In all cases monitoring electrodes which are designed to limit high-frequency current are recommended.

Active electrodes

The lines to the surgical electrodes should be fitted so that they do not touch the patient or other lines. Any active electrodes not currently in use should be put to one side so that they can not touch the patient.

Parts of body with a relatively small cross-section

For surgical procedures which involve HF current flowing through parts of the body with a relatively small cross-section the use of bipolar technology may be indicated to avoid unintentional coagulation.

Power output

The power output should be set as low as possible for the relevant purpose.

An apparently low output value or functional failure of the electrosurgical unit during normal operation may be caused by poor positioning of the patient plate or insufficient contact in its lines. In this case the positioning of the patient plate and its lines should be checked before a higher power output is selected.

Flammable anesthetics, easily combustible gases

The use of flammable anesthetics or easily combustible gases such as nitrous oxide (N_2O) and oxygen should be avoided when an operation is being performed on the thorax or the head, unless these substances are removed by extractors.

Non-combustible substances for cleaning and disinfection

Where possible, non-combustible substances should be used for cleaning and disinfection. Combustible substances which are used as cleaning agents or disinfectants or as a solvent for adhesives should have evaporated before electrosurgery takes place. There is the risk that combustible liquids may accumulate underneath the patient or in bodily recesses such as the navel or in bodily cavities such as the vagina. Any liquid which has collected at such places should be wiped away before the electrosurgical unit is used. Please be aware of the risk of ignition of endogenous gases. When saturated with oxygen, certain materials such as cotton wool and gauze may be ignited by sparks occurring during proper use of the electrosurgical unit.

Patients with cardiac pacemakers

In the case of patients with cardiac pacemakers or other active implants there is a risk that a malfunction may occur in the pacemaker function or the cardiac pacemaker might become damaged. In the case of doubt expert advice should be obtained.

Unwanted increase in power output

Failure of the electrosurgical unit may result in an unwanted increase in the power output level.

Interference with other electronic equipment

Interference generated during operation of the electrosurgical unit may affect the functioning of other electronic equipment.

Unintentional electrical stimulation of nerves and muscles

A known risk of electrosurgery is the unintentional electrical stimulation of the patient's nerves and muscles. Such stimulation may be caused by low-frequency electrical currents which are produced either by low-frequency power sources or by electric arcs between the active electrode and the patient's tissue. Electrical alternating current with a frequency above 300 kHz can not stimulate nerves and muscles. However, the unavoidable electric arcs occurring between the active electrode and tissue during cutting procedures, forced coagulation and spray coagulation have the effect of rectifying part of the high-frequency alternating current, resulting in low-frequency current components modulated to a greater or lesser extent, which act on structures susceptible to electrical stimulation, such as nerves and muscle. This may bring about possibly violent spasms or muscle contractions.

Art.-Nr.:80104-501
12/ 2004

CHAPTER 2

Safety Features

NESSY

What is NESSY?

The unit is equipped with a Neutral Electrode Safety System (NESSY), which monitors the 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.

- In the first column you can see the safety level, 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.

Art.-Nr.:80104-501
12/ 2004

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

Special points to observe with the "Neutral electrode: Either way" setup

WARNING! If a short circuit occurs in the connecting cord, or in the clip of a dual surface neutral electrode, the unit can no longer monitor the contact between the electrode and 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 and there is a danger of burns. You will not receive a warning if the application direction of the contact surface is incorrect.

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

Observe the indicator lights

Fig. 2-1

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
- 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. "Neutral electrode: Single surface" setup

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 attempt activation, 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.

Art.-Nr.:80104-501
12/ 2004

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. The line of symmetry of different neutral electrodes is shown below.

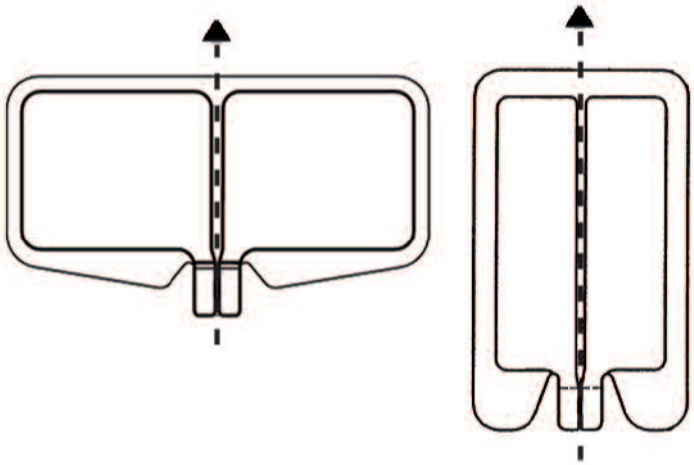


Fig. 2-2

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.

Art.-Nr.:80104-501
12/ 2004

Special points to observe with the "Neutral electrode: Either way" setup

WARNING! If a short circuit occurs in the connecting cord, or in the clip of a dual surface neutral electrode, the unit can no longer monitor the contact between the electrode and 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 and there is a danger of burns. You will not receive a warning if the application direction of the contact surface is incorrect.

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

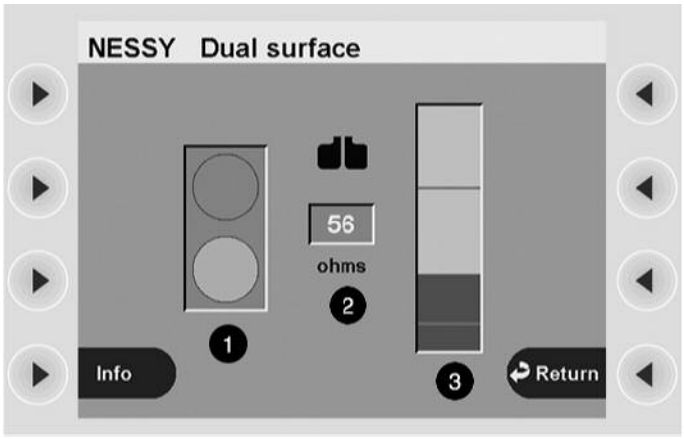


Fig. 2-3

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.

Art.-Nr.:80104-501
12/ 2004

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

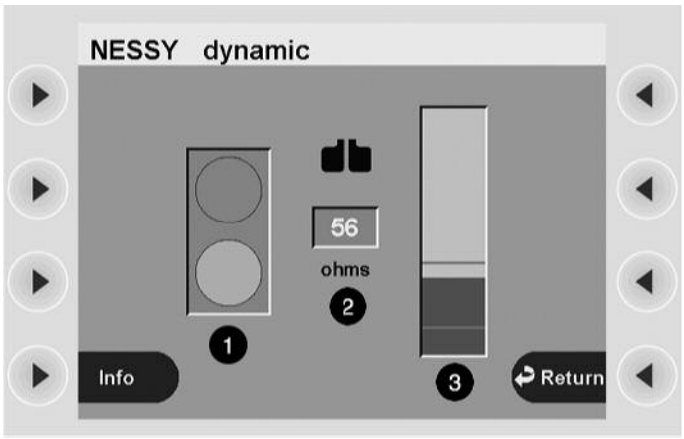


Fig. 2-4

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.

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 patient plate or by a defect in the unit.

Art.-Nr.:80104-501
12/ 2004

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! For safety reasons modification of the automatic restriction of the maximum ON time must only be carried out when all users of the respective unit have been informed about this modification in a suitable manner and in good time. Modification of the automatic restriction of the maximum ON time must also be documented in a suitable manner, for example in the medical product logbook of the respective unit.

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 receptacles of the applied part are arranged in the receptacle strip next to the front panel. These receptacles 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 receptacle. 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.

Art.-Nr.:80104-501
12/ 2004

CHAPTER 3

Description of the Controls

Controls of the front panel

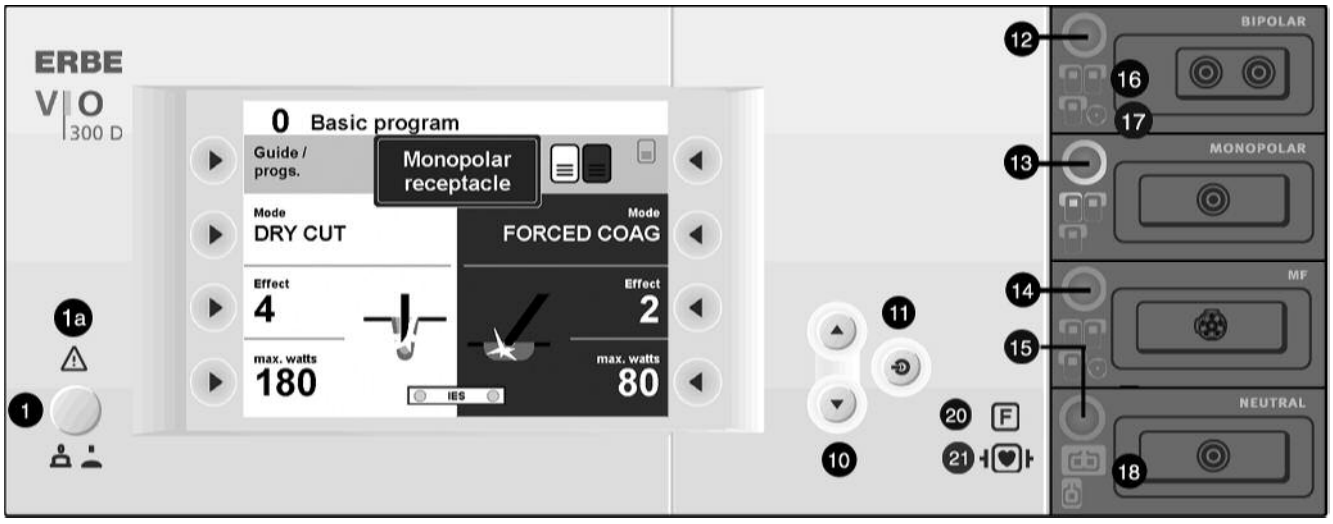


Fig. 3-1

Art.-Nr.:80104-501
12/ 2004

Power

(1) Power switch

Unit on / off

Symbol

(1a)

Read the user manual before switching on and using the unit.

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 receptacles in any way required. In this regard Fig. 3-1 is only one example of a configuration. If a Focus button next to the receptacle is pressed, the functions of the receptacle and the setting of the functions will be shown in the display.

(12) Focus button for bipolar receptacle

(13) Focus button for monopolar receptacle

(14) Focus button for MF receptacle

(15) Focus button for patient plate receptacle

Shows info about the patient plate 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) Patient plates

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

Symbol

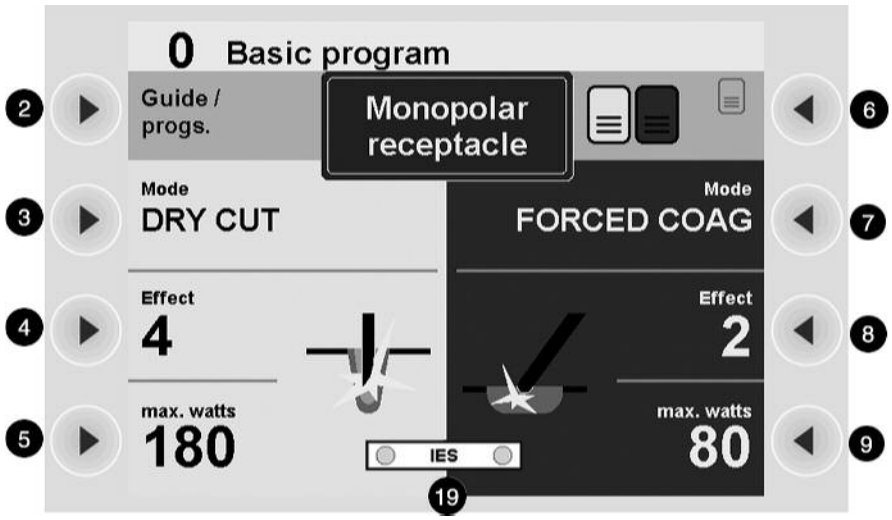
(20)

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)

The equipment conforms to the requirements of Type CF (Cardiac Float) and is protected against the effects of a defibrillator discharge.



Art.-Nr.:80104-501
12/ 2004

Fig. 3-2

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 receptacle, 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 receptacle?

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

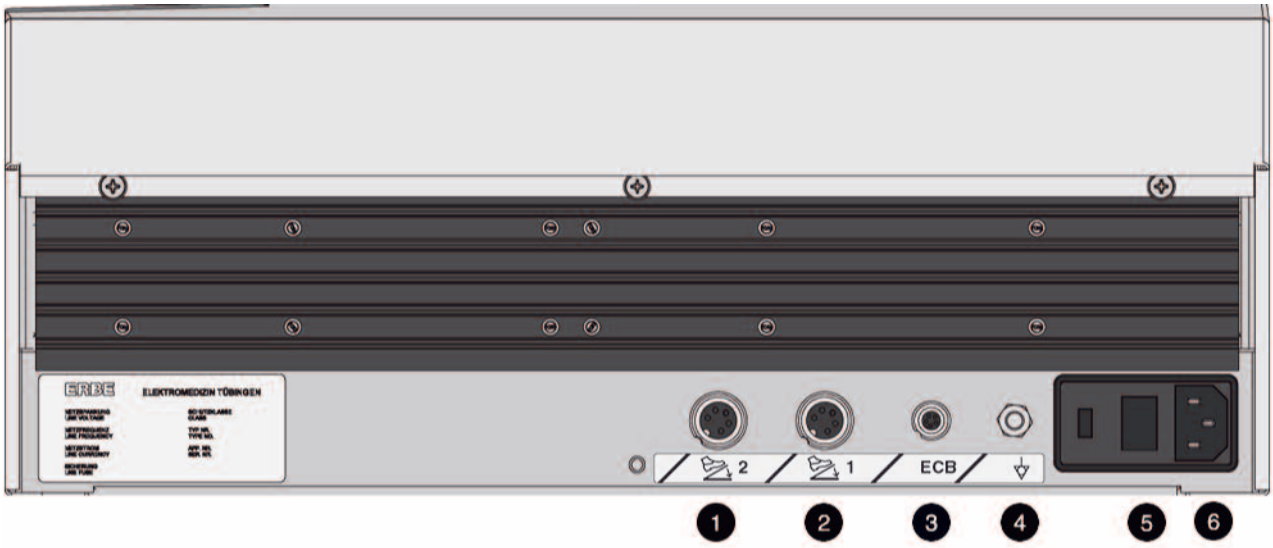


Fig. 3-3

Art.-Nr.:80104-501
12/ 2004

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 receptacles. The dual-pedal footswitch can be connected to either receptacle (1) or receptacle (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 outlet. Only use the ERBE power cord or an equivalent power cord for this purpose. The power cord must bear the national test symbol. If the unit is installed on the ERBE VIO-CART, make the power connection with the power cord of the VIO-CART.

Art.-Nr.:80104-501
12/ 2004

CHAPTER 4

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 receptacles, 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.

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 receptacles 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.

Art.-Nr.:80104-501
12/ 2004

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 outlet. Only use the ERBE power cord or an equivalent power cord for this purpose. The power cord must bear the national test symbol. If the unit is installed on the 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 receptacles. 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

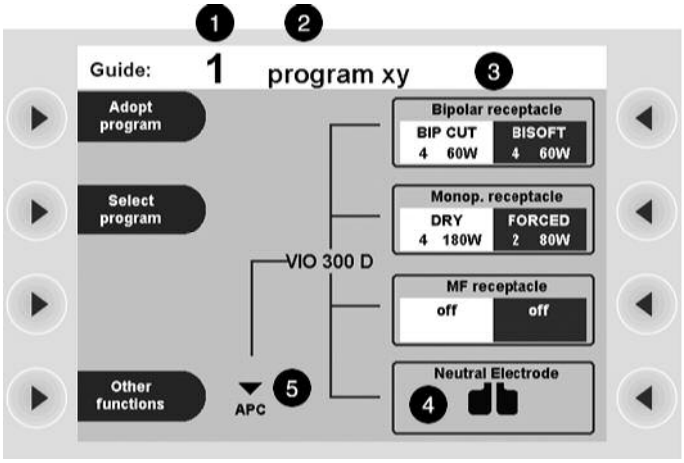


Fig. 4-1

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 receptacles 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 receptacle?

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

Option 1: Direct activation from the window *Guide.* It is not possible to assign a footswitch to a receptacle here. You can activate all receptacles with a fingerswitch. With a footswitch you can only activate the CUT or COAG mode for a receptacle 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 receptacles.

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 receptacle. 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. 28.

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. 42. In the sample program the bipolar receptacle is assigned with the following settings:

Art.-Nr.:80104-501
12/ 2004

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

If your unit is equipped with a patient plate receptacle , the display of the receptacle will show a patient plate (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 receptacles 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 receptacles:

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

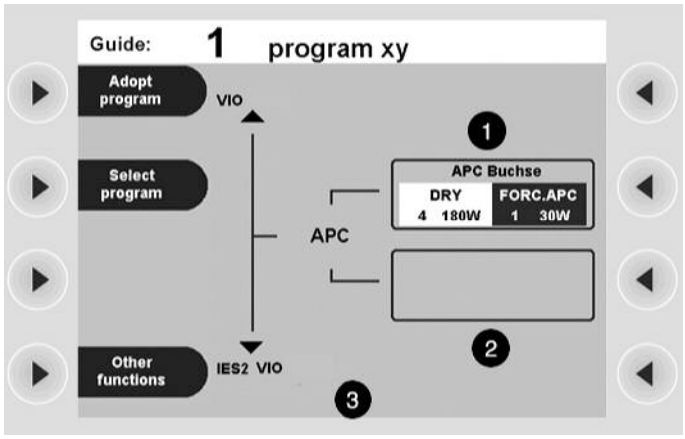


Fig. 4-2

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

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

The sample display shows the symbol of the Down button (3). Underneath you can see IES. An IES 2 is connected to the electrosurgical unit. Press the Down button on the front panel of the electrosurgical unit and keep it pressed until you see the *IES 2 settings for VIO 300 D* window. You can also scroll to the *IES 2 settings for APC* window.

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.*

Art.-Nr.:80104-501
12/ 2004

Adopt Program

Adopt Program

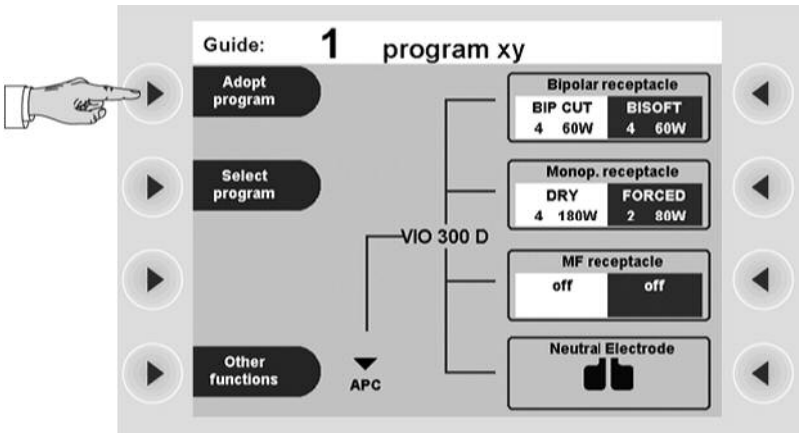


Fig. 4-3

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 receptacle last activated. The Focus button next to this receptacle is lit up.

Alternatively, you can press the selection button next to a receptacle display, e. g. the selection button next to the monopolar receptacle. 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 receptacle selected. The Focus button next to this receptacle is lit up.

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

Art.-Nr.:80104-501
12/ 2004

Select Program

1. Call up window Select Program

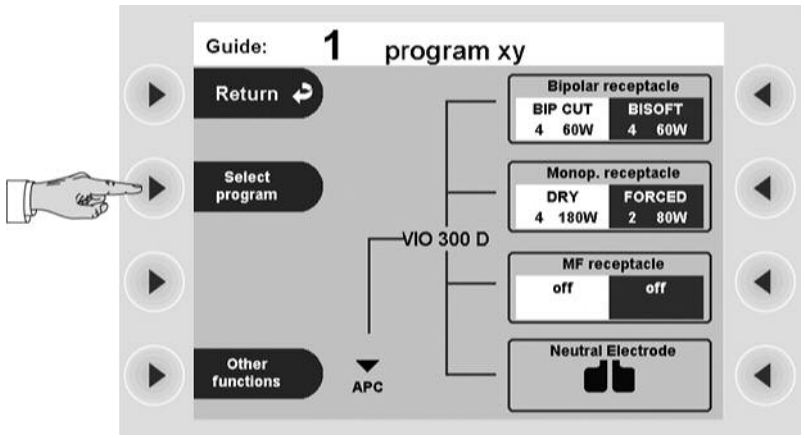


Fig. 4-4

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

2. Select Program

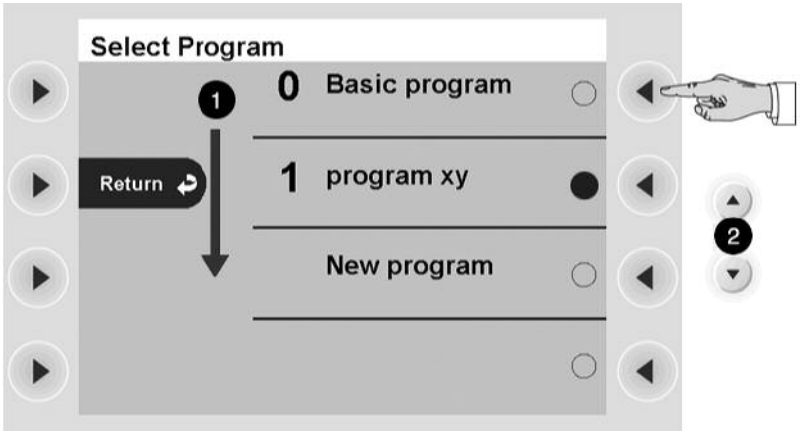


Fig. 4-5

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

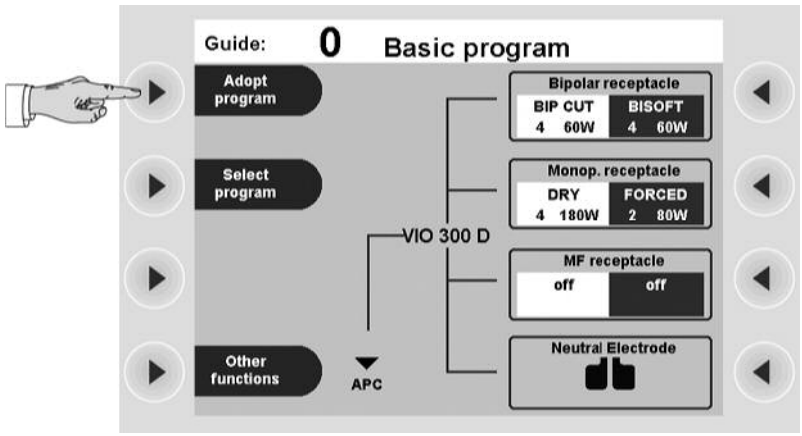


Fig. 4-6

You have now returned to the window *Guide* and can find out about assignment of the active program (see Assignment of the active program 24).

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 receptacle last activated. The Focus button next to this receptacle is lit up.

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

Art.-Nr.:80104-501
12/ 2004

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

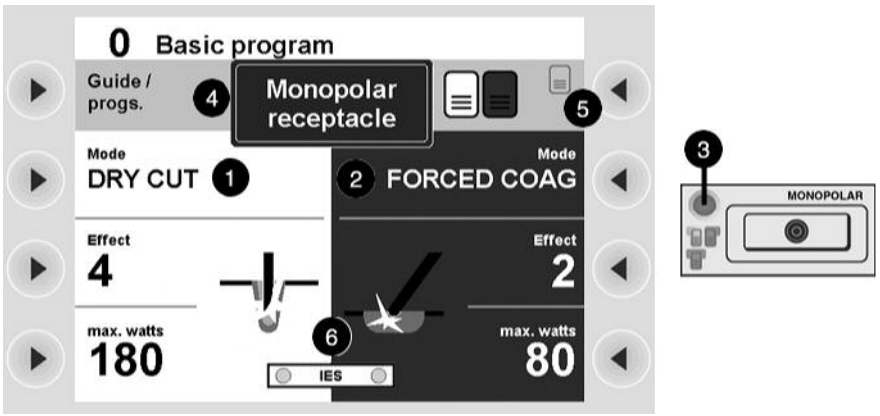


Fig. 4-7

The window Cut / Coag Settings

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

If you want to check or change the settings of a receptacle, call up the receptacle with the appropriate Focus button (3). This also applies to the receptacles 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 receptacle. The display automatically switches to the activated receptacle.

Pressing the Focus button of the patient plate receptacle will show information about the patient plate on the display.

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

Art.-Nr.:80104-501
12/ 2004

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 receptacle. 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.

Setting Cut mode

1. Call up CUT mode

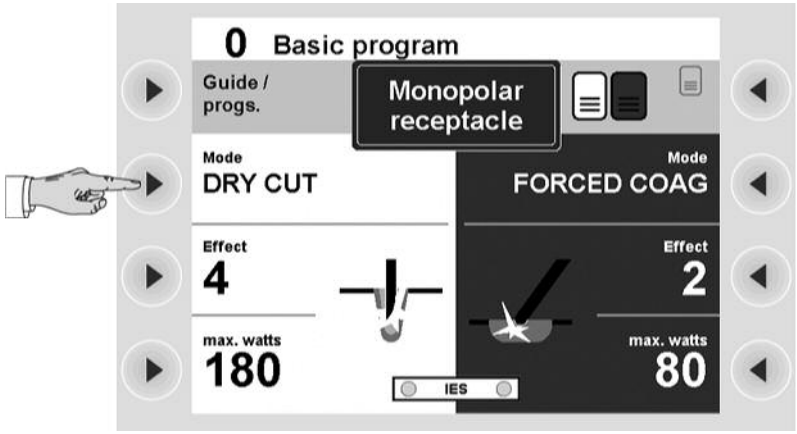


Fig. 4-8

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

2. Select CUT mode

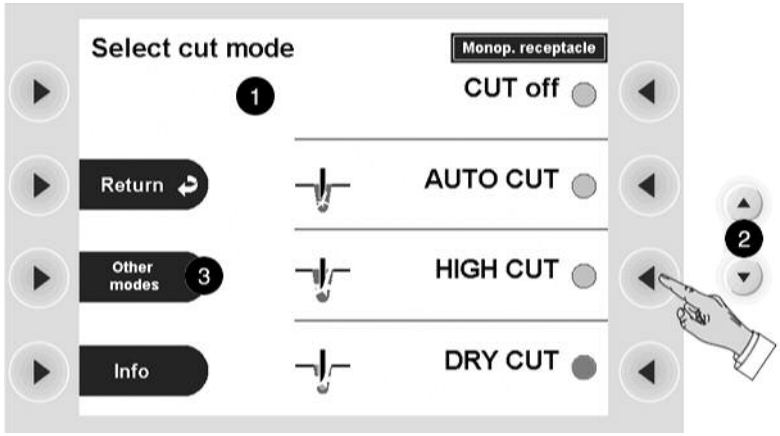


Fig. 4-9

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 receptacle, select *CUT off in the selection list*.

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.*

Art.-Nr.:80104-501
12/ 2004

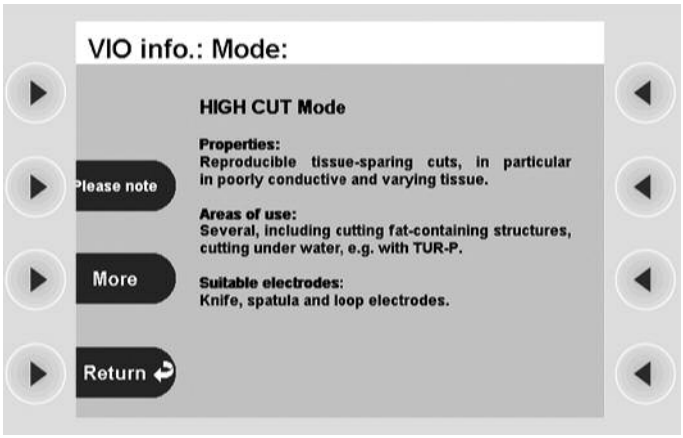


Fig. 4-10

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.

Setting CUT effect

Art.-Nr.:80104-501
12/ 2004

1. Call up CUT Effect

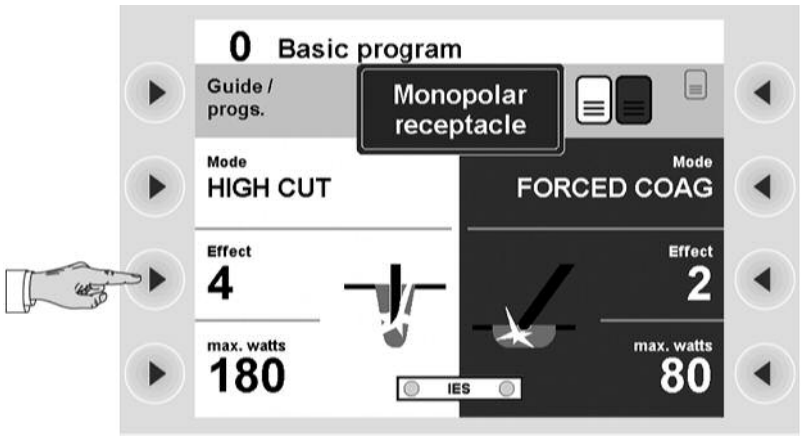


Fig. 4-11

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

2. Choose CUT Effect

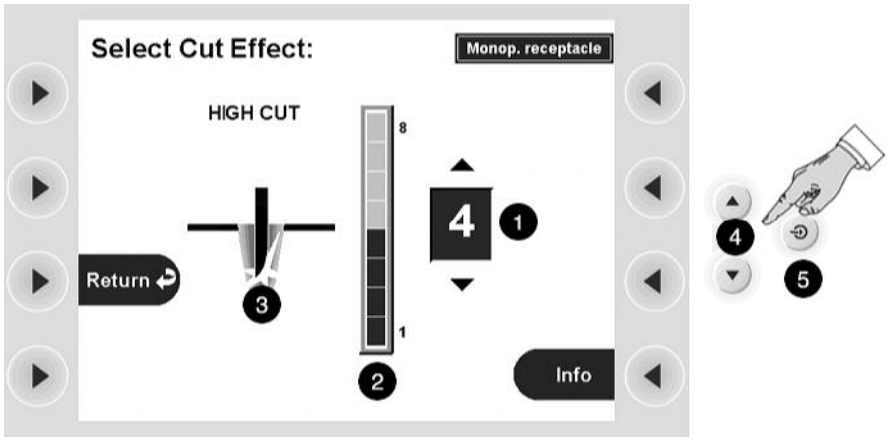


Fig. 4-12

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).

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.*

Selecting CUT Max. Wattage

1. Call up Cut Power limitation

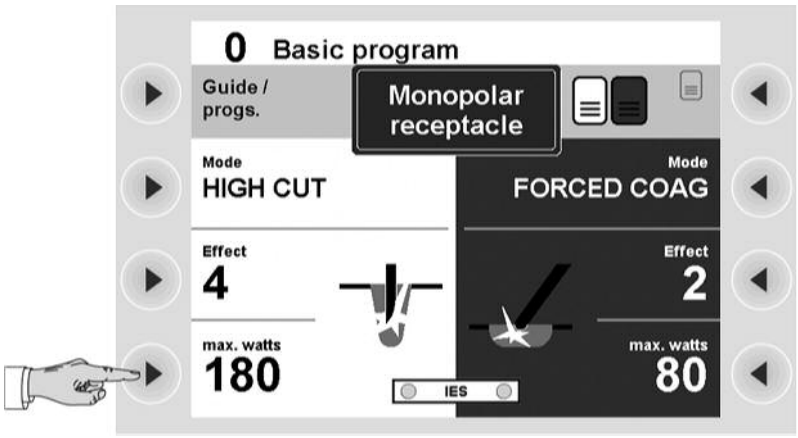


Fig. 4-13

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

Art.-Nr.:80104-501
12/ 2004

2. Select Cut power limitation

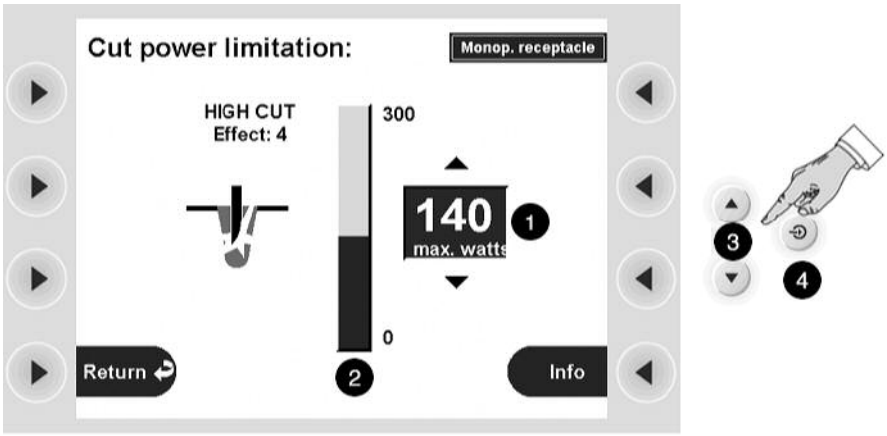


Fig. 4-14

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.

Art.-Nr.:80104-501
12/ 2004

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 receptacles of the electrosurgical unit. If you have connected an APC 2 to the electrosurgical unit, you can also allocate the pedals to the receptacles of the APC 2.

1. Call up window Select activation type

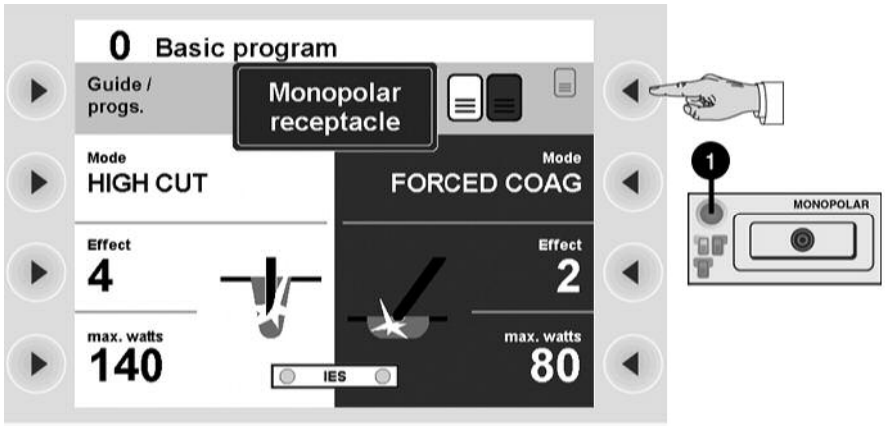


Fig. 4-15

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

2. Select footswitch

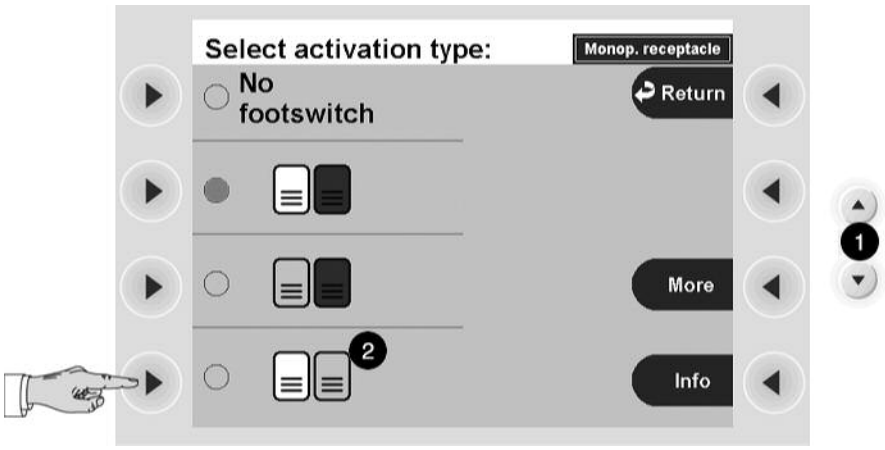


Fig. 4-16

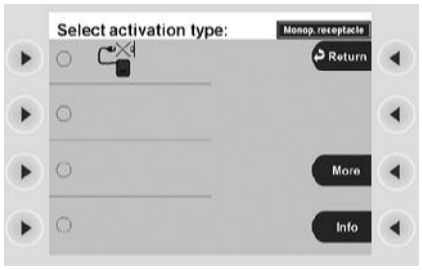


Fig. 4-17

In the window Fig. 4-16 you will see a list of the possible footswitch allocations. Scroll with the Down button (1) to the next window Fig. 4-17. 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

Art.-Nr.:80104-501
12/ 2004

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).

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

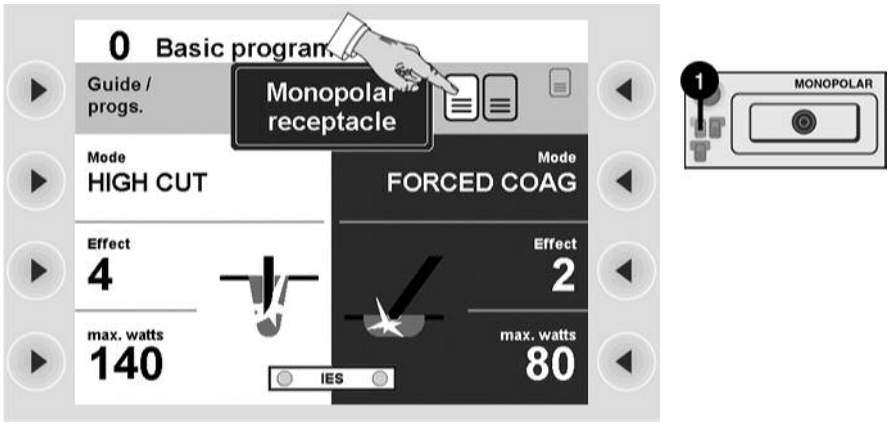


Fig. 4-18

In the window *Cut / Coag Settings* you will see the monopolar receptacle 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 receptacle.

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

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 receptacles light up according to the footswitch assignment of the program.

Art.-Nr.:80104-501
12/ 2004

Activation of CUT and COAG modes with fingerswitch, Auto Start

Fingerswitch activation

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

AUTO START

If the bipolar receptacle has been selected, you can select AUTO START 1 or AUTO START 2 in the window receptacle Selected. When the instrument touches tissue, coagulation starts automatically after a specified period of time. You can adjust this time period in Setup. See p. 48.

Selection of the Auto-Start function is shown in the window *Cut / Coag Settings* of the bipolar receptacle. The symbol for Auto Start lights up at the bipolar receptacle. The selection of AUTO START is only possible for bipolar coagulation.

If you have assigned Auto Start to the bipolar receptacle, CUT can no longer be activated with the footswitch.

AUTO STOP

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

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

Instrument at monopolar and bipolar receptacle

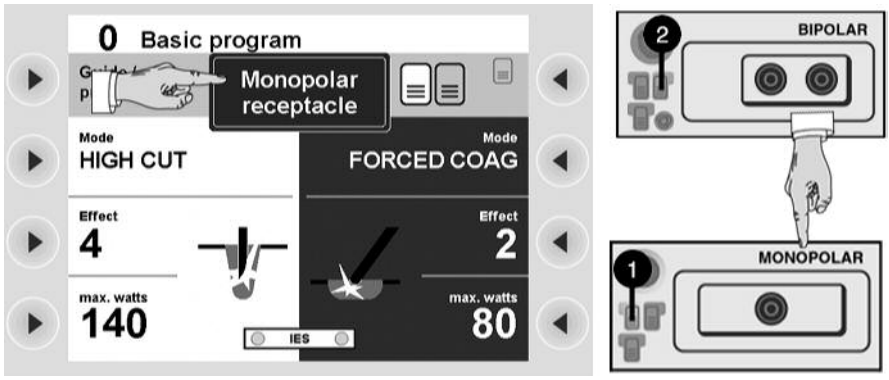


Fig. 4-19

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

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 receptacle, the window *Cut / Coag Settings* displays the settings for the monopolar receptacle. This situation is shown in Fig. 4-19. If you now activate the instrument at the bipolar receptacle, you will not see the settings of the bipolar receptacle!

Check settings if in doubt.

If in doubt check the settings of the receptacle you want to activate: Press the Focus button at the receptacle. 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 receptacle you want to activate. You can check the settings.

Art.-Nr.:80104-501
12/ 2004

NESSY

What is NESSY?

The unit is equipped with a Neutral Electrode Safety System (NESSY), which monitors the 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.

- In the first column you can see the safety level, 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 / "NE: Dynamic" setting	●	●	●	●
2	Dual surface NE / "NE: Dual surface" setting	●	●	●	
3	Dual surface NE / "NE: Either way" setting	●	Partial, observe warning	Partial, observe warning	
4	Single surface NE / "NE: Either way" setting	●			
4	Single surface NE / "NE: Single surface" setting	●			

Special points to observe with the "Neutral electrode: Either way" setup

WARNING! If a short circuit occurs in the connecting cord, or in the clip of a dual surface neutral electrode, the unit can no longer monitor the contact between the electrode and 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 and there is a danger of burns. You will not receive a warning if the application direction of the contact surface is incorrect.

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

Observe the indicator lights

Fig. 4-20

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
- 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.

Art.-Nr.:80104-501
12/ 2004

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

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 attempt activation, 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. The line of symmetry of different neutral electrodes is shown below.

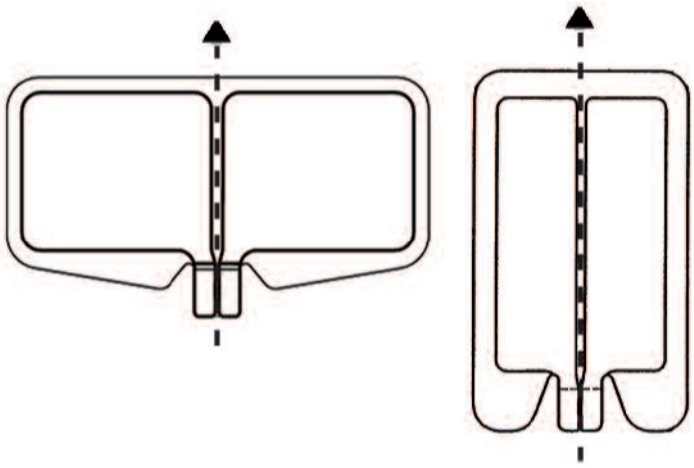


Fig. 4-21

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.

Art.-Nr.:80104-501
12/ 2004

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.

Special points to observe with the "Neutral electrode: Either way" setup

WARNING! If a short circuit occurs in the connecting cord, or in the clip of a dual surface neutral electrode, the unit can no longer monitor the contact between the electrode and 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 and there is a danger of burns. You will not receive a warning if the application direction of the contact surface is incorrect.

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

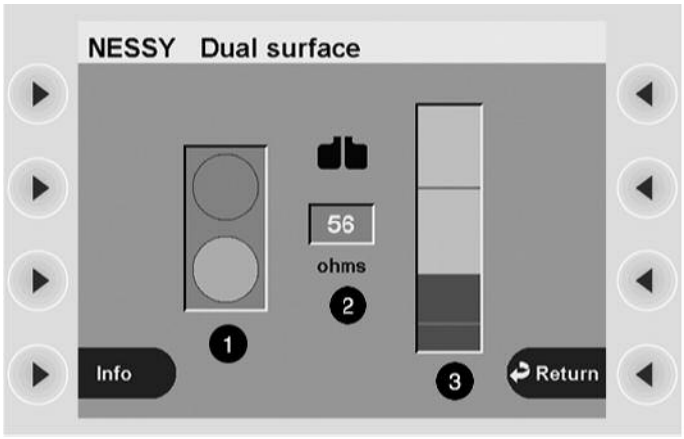


Fig. 4-22

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.

Art.-Nr.:80104-501
12/ 2004

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

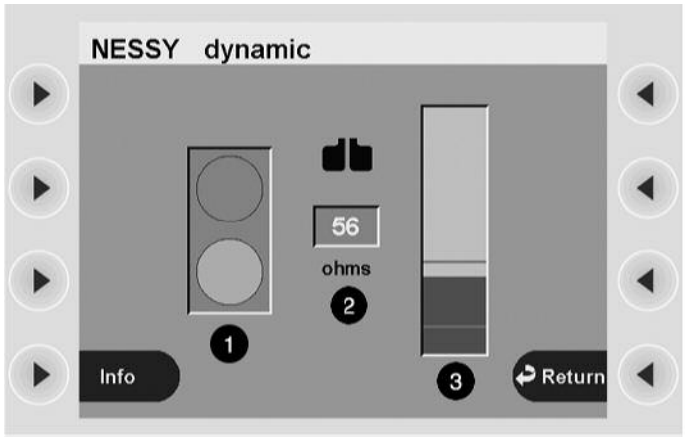


Fig. 4-23

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.

Art.-Nr.:80104-501
12/ 2004

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.

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 receptacles 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

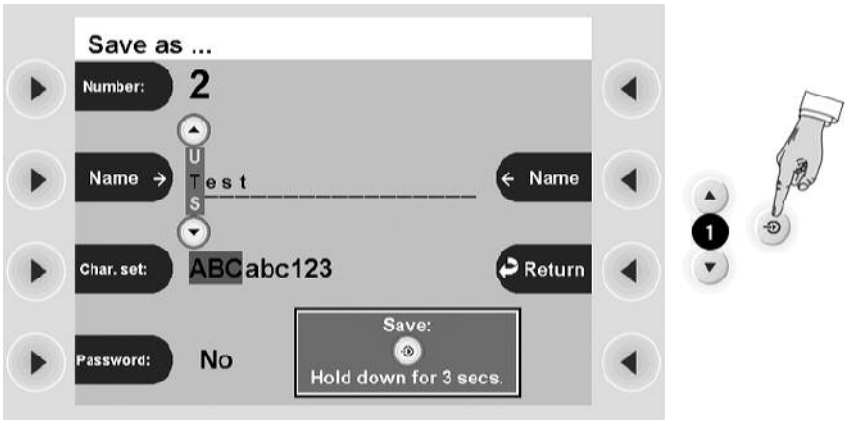
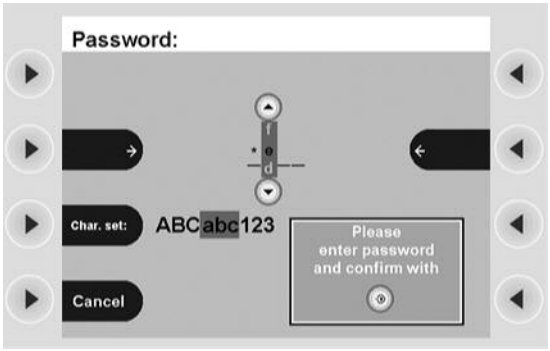


Fig. 4-24

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*.



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 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.
5. Depress the Enter button for 3 sec. to save the program. Note: The assigned program numbers in this tutorial assumes no prior programming of the unit and are for example purposes only. Therefore, your program numbers may differ.

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

Art.-Nr.:80104-501
12/ 2004

Overwriting a program

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

Overwrite changed program Test

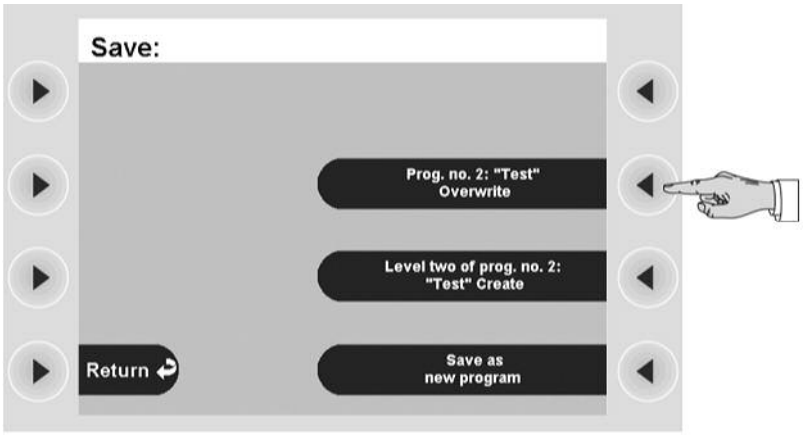


Fig. 4-25

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.*

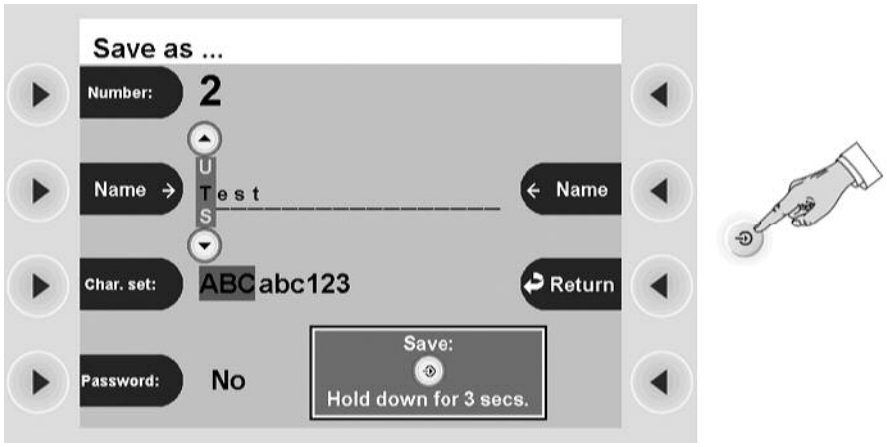


Fig. 4-26

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 receptacles. In the new program all CUT and COAG Modes are switched off. Select a receptacle. Select the mode, effect, power limitation and activation.

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.

Art.-Nr.:80104-501
12/ 2004

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. 4-27

Fig. 4-28

Art.-Nr.:80104-501
12/ 2004

Examples of options for ReMode function

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

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

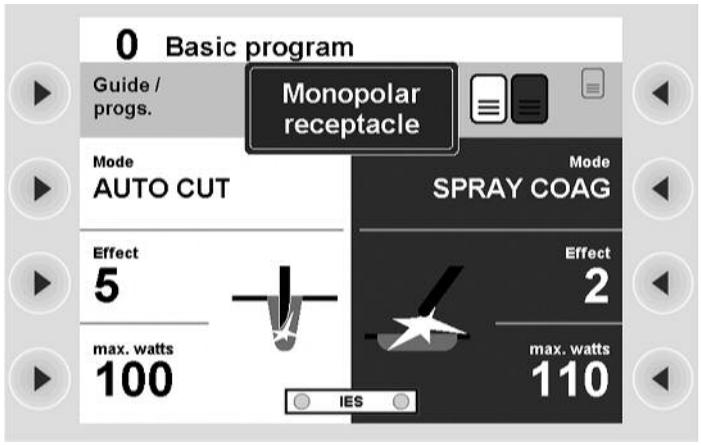


Fig. 4-29

1. Call up the Basic Program. Call up the monopolar receptacle.
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 receptacle.
3. Press the Enter button.

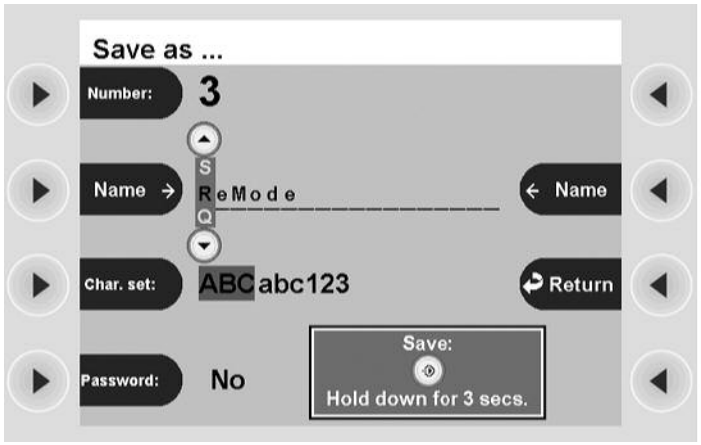


Fig. 4-30

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.

Art.-Nr.:80104-501
12/ 2004

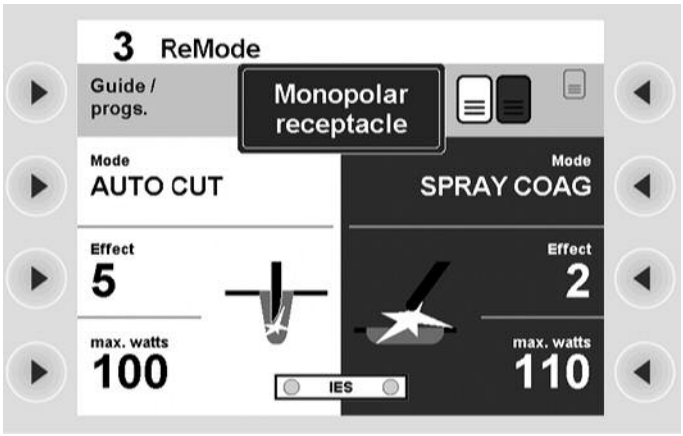


Fig. 4-31

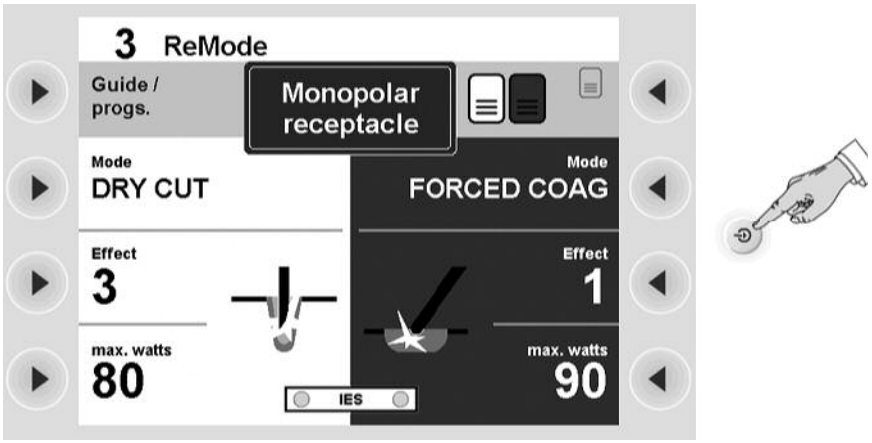


Fig. 4-32

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.

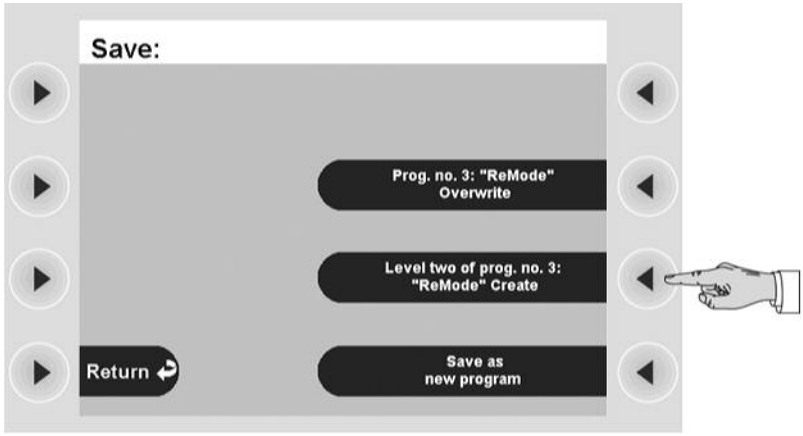


Fig. 4-33

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.*

Art.-Nr.:80104-501
12/ 2004

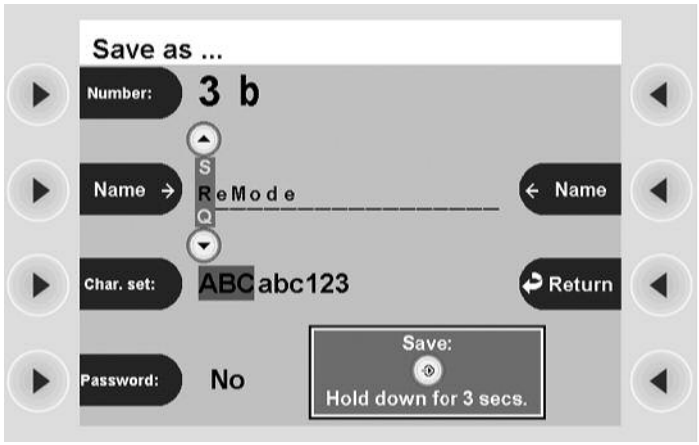


Fig. 4-34

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

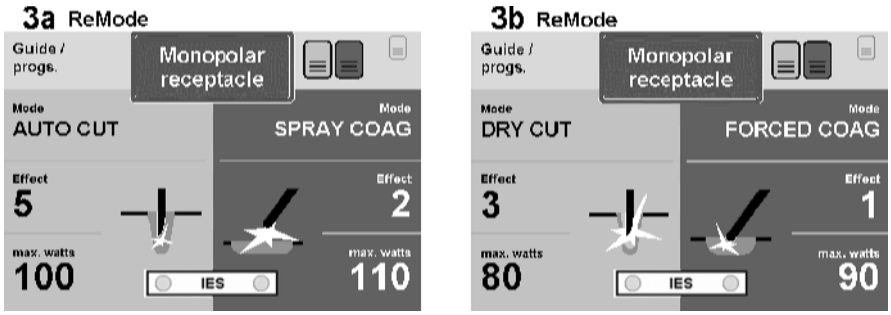


Fig. 4-35

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 receptacle 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 receptacle.

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

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

Art.-Nr.:80104-501
12/ 2004

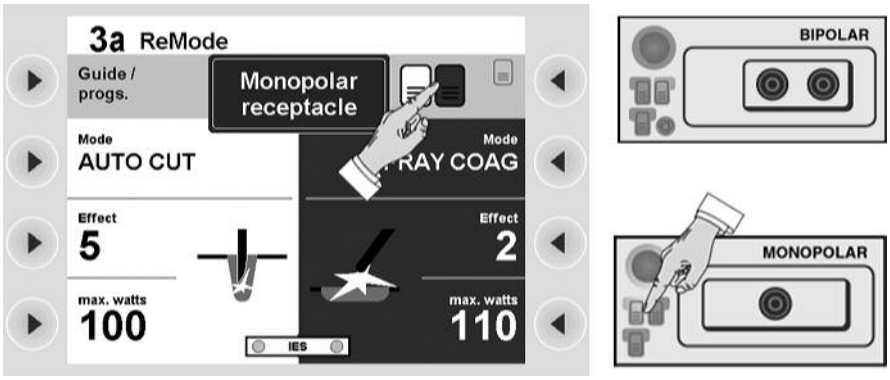


Fig. 4-36

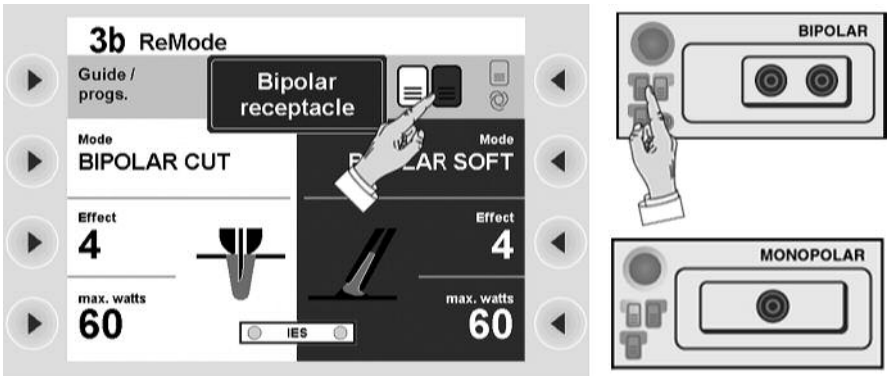


Fig. 4-37

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

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

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

Art.-Nr.:80104-501
12/ 2004

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.

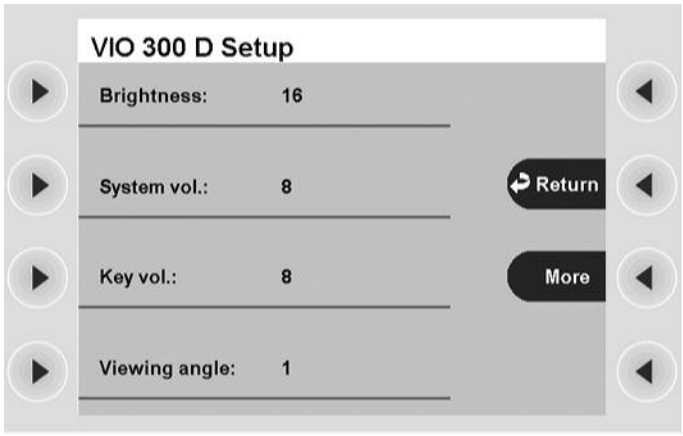


Fig. 4-38

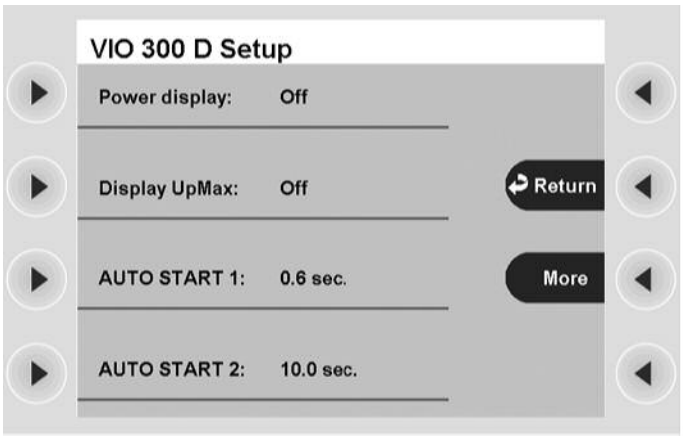


Fig. 4-39

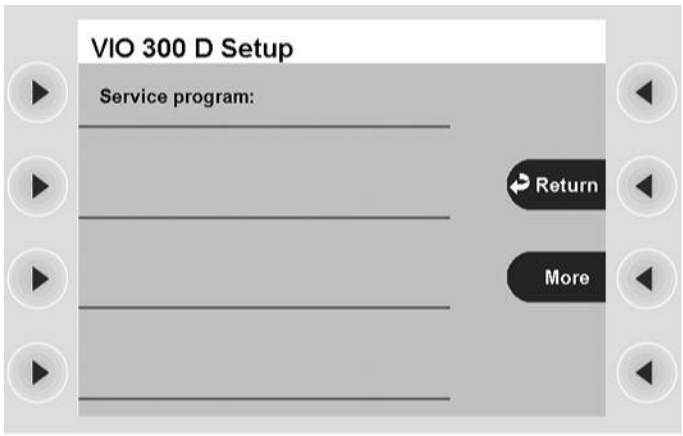


Fig. 4-40

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.

Art.-Nr.:80104-501
12/ 2004

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. 0.1 to 1.9 sec. in 0.1 sec. steps.

AUTO START 2

Input of start delay for the AUTO START function. 2 to 10 sec. in 0.5 sec. steps.

Service programs

This menu item is provided for Service.

Art.-Nr.:80104-501
12/ 2004

CHAPTER 5

Description of socket hardware

Purchasing further receptacles

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

A receptacle module consists of a front plate, receptacle 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 receptacles 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 receptacles. Via the monopolar receptacle you can thus activate AUTO CUT and SOFT COAG for example. If you require SOFT COAG for one of your applications, the monopolar receptacle 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 receptacles are available in various designs.

Art.-Nr.:80104-501
12/ 2004

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

Optional

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

Instrument compatibility

Receptacle module MO 9 / 5

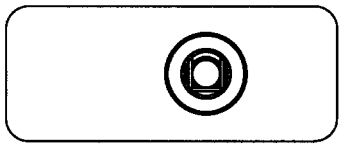


Fig. 5-1

ERBE No. 20140-620

The receptacle module is suitable for the following connectors: monopolar receptacle based on ERBE standard. Contact ring which transmits activation signal dia. 9 mm. HF contact ring dia. 5 mm.

Receptacle module MO 4

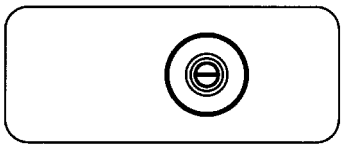


Fig. 5-2

ERBE No. 20140-621

The receptacle module is suitable for the following connectors: monopolar connector dia. 4 mm. (mainly used in endoscopy for polypectomy loops etc.)

Receptacle module MO 3-pin Bovie

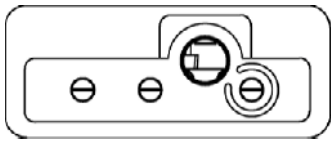


Fig. 5-3

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

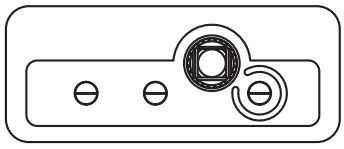


Fig. 5-4

ERBE No. 20140-623

You can connect ONE of the following connectors as required: a monopolar 3-pin connector; a monopolar receptacle based on ERBE standard. a monopolar connector dia. 4 mm.

Art.-Nr.:80104-501
12/ 2004

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

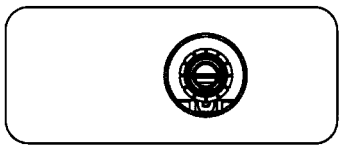


Fig. 5-5

ERBE No. 20140-610

The receptacle 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

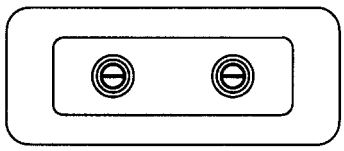


Fig. 5-6

ERBE No. 20140-612

The receptacle module is suitable for the following connectors: international bipolar connector with 2 pins, pin spacing 22 mm.

Socket module BI 2-pin 28

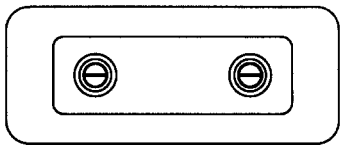


Fig. 5-7

ERBE No. 20140-611

The receptacle module is suitable for the following connectors: international bipolar connector with 2 pins, pin spacing 28.5 mm.

Art.-Nr.:80104-501
12/ 2004

Multifunctional receptacle

Instrument detection with multifunctional receptacle

Instruments with instrument detection are identified only at multifunctional receptacles.

Cutting and coagulation modes

Standard monopolar

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

Optional monopolar

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

Standard bipolar

- BIPOLAR CUT
- BIPOLAR SOFT COAG
- BIPOLAR FORCED COAG

Optional bipolar

- BiClamp
- BIPOLAR PRECISE CUT
- BIPOLAR PRECISE COAG

Instrument compatibility

Socket module MF-0

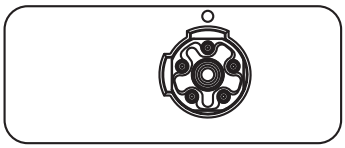


Fig. 5-8

ERBE No. 20140-630

The receptacle module is suitable for the following connectors: 5-pole ERBE multifunctional connector.

Art.-Nr.:80104-501
12/ 2004

Socket for patient plate

Function

The receptacle is used to connect a patient plate with monopolar modes.

Connector compatibility

Socket module NE 6

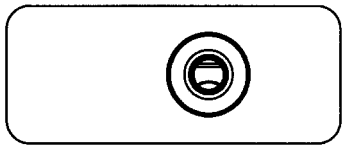


Fig. 5-9

ERBE No. 20140-640

The receptacle module is suitable for the following connectors: ERBE patient plate connector Ø 6.35 mm.

Socket module NE 2-pin

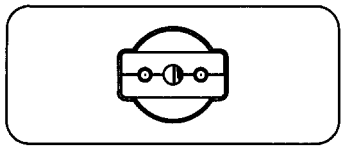


Fig. 5-10

ERBE No. 20140-641

The receptacle module is suitable for the following connectors: Patient plate connector with 2 pins.

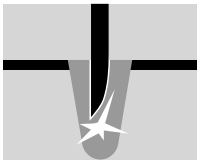
Art.-Nr.:80104-501
12/ 2004

Art.-Nr.:80104-501
12/ 2004

CHAPTER 6

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.

Art.-Nr.:80104-501
12/ 2004

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, loop electrodes.

Technical data

HF voltage waveform	unmodulated sinusoidal alternating voltage
Rated frequency	350 kHz (at RL = 500 W) ± 10%
Crest factor	1.4 (at RL = 500 W)
Rated load resistor	500 W
Max. HF peak voltage	740 Vp
Number of effects	8
Constancy 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%

Performance diagrams

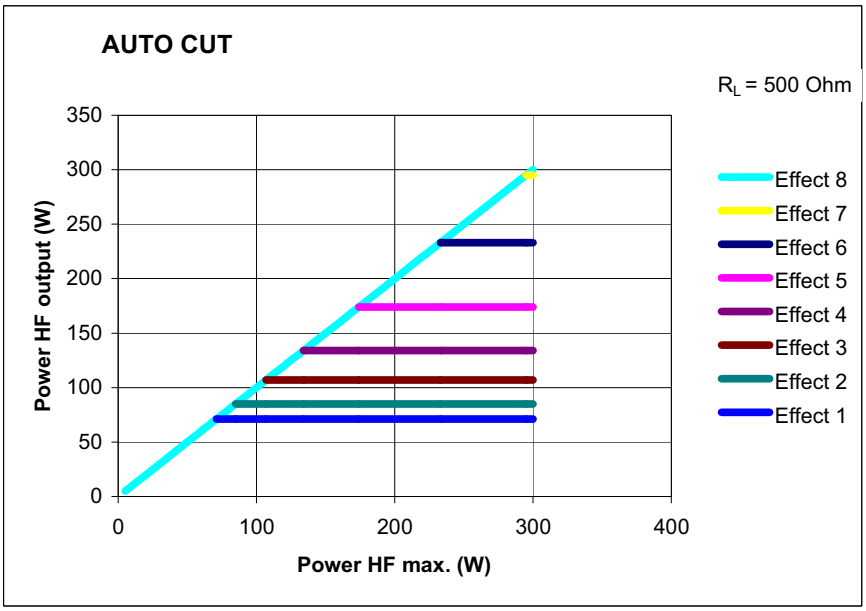


Fig. 6-1

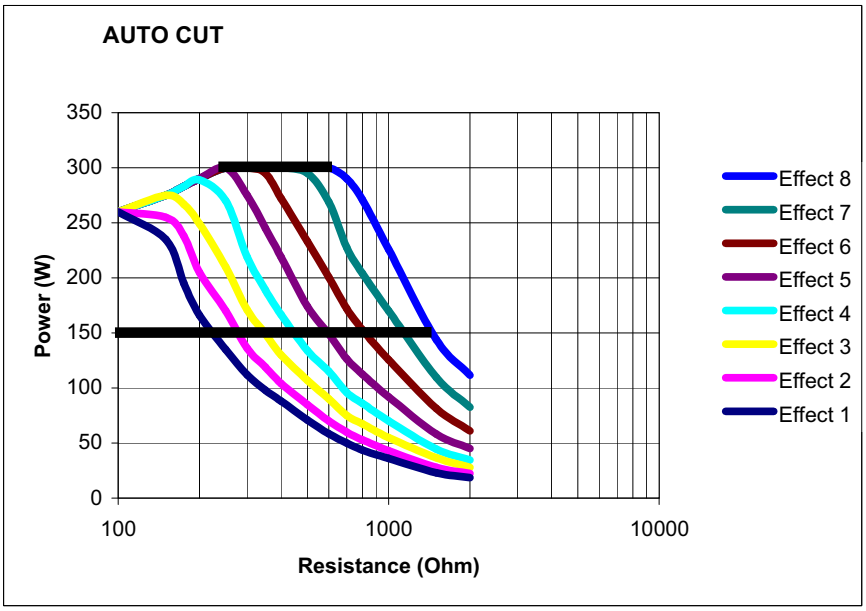


Fig. 6-2

Art.-Nr.:80104-501
12/ 2004

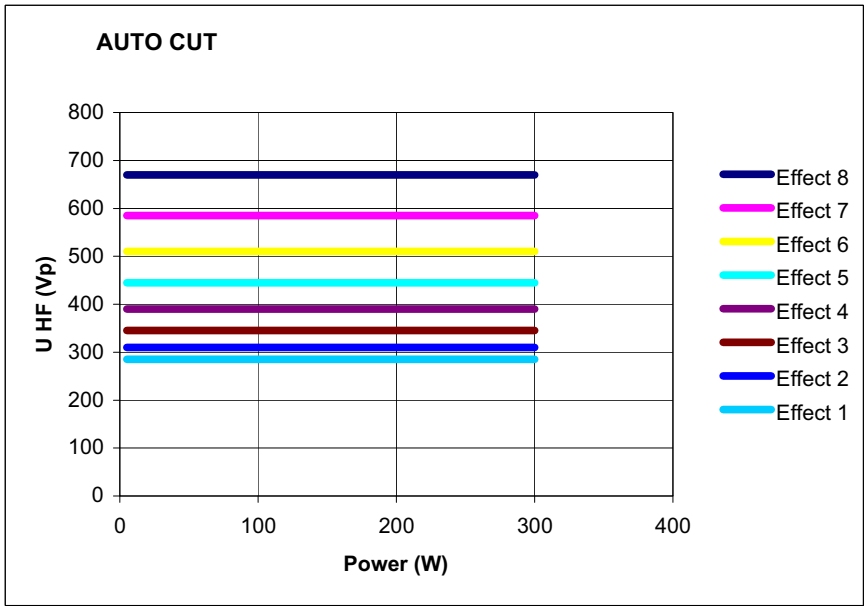


Fig. 6-3

HIGH CUT

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%

Art.-Nr.:80104-501
12/ 2004

Crest factor	1.4 (at R_L = 500 ohms)
Rated load resistor	500 ohms
Max. HF peak voltage	950 Vp (with an arc)
Number of effects	8
Constancy 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%

Performance diagrams

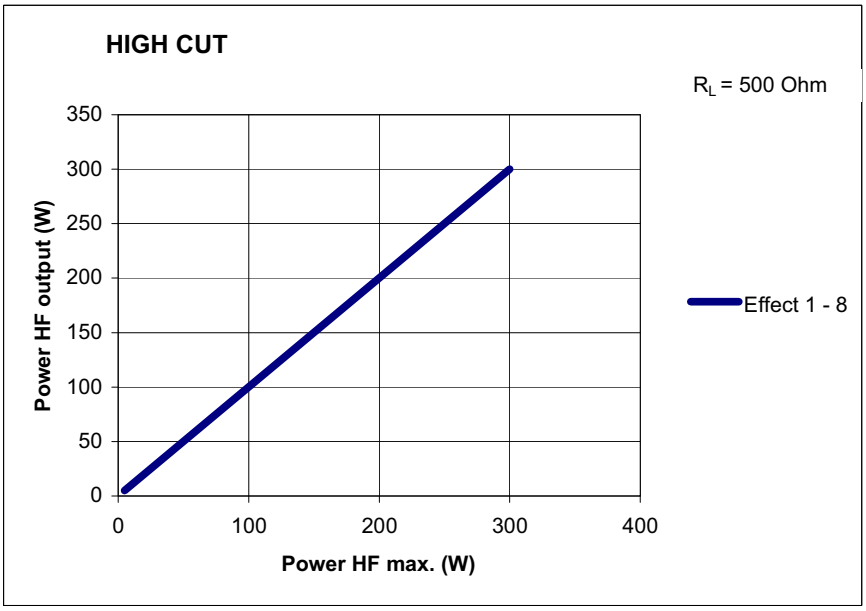


Fig. 6-4

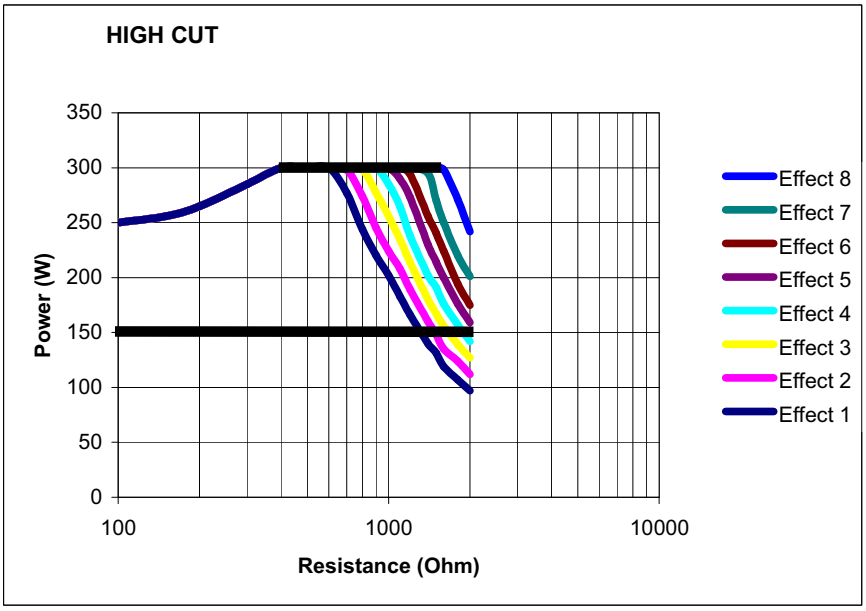


Fig. 6-5

Art.-Nr.:80104-501
12/ 2004

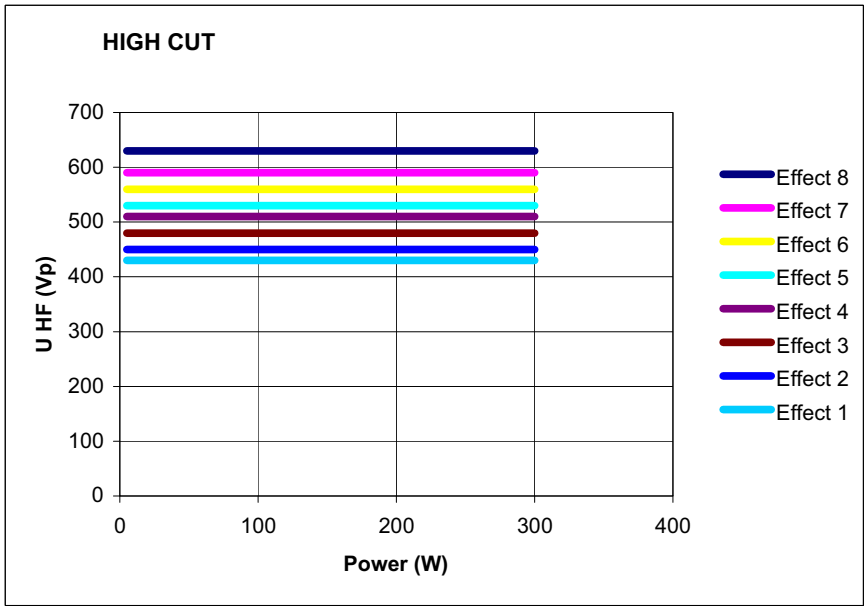
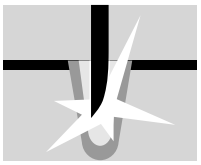


Fig. 6-6

DRY CUT



Properties

Intense haemostasis 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 and 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: 3.0 effect 5+6: 3.2 effect 7+8: 3.8 (at R_L = 500 ohms)
Rated load resistor	500 ohms
Max. HF peak voltage	1450 Vp
Number of effects	8
Constancy of effects	automatic control of HF peak voltage

Art.-Nr.:80104-501
12/ 2004

HF power limitation	10 watts to 200 watts in 1 watt steps
Max. power output at rated load resistor	200 watts ± 20%

Performance diagrams

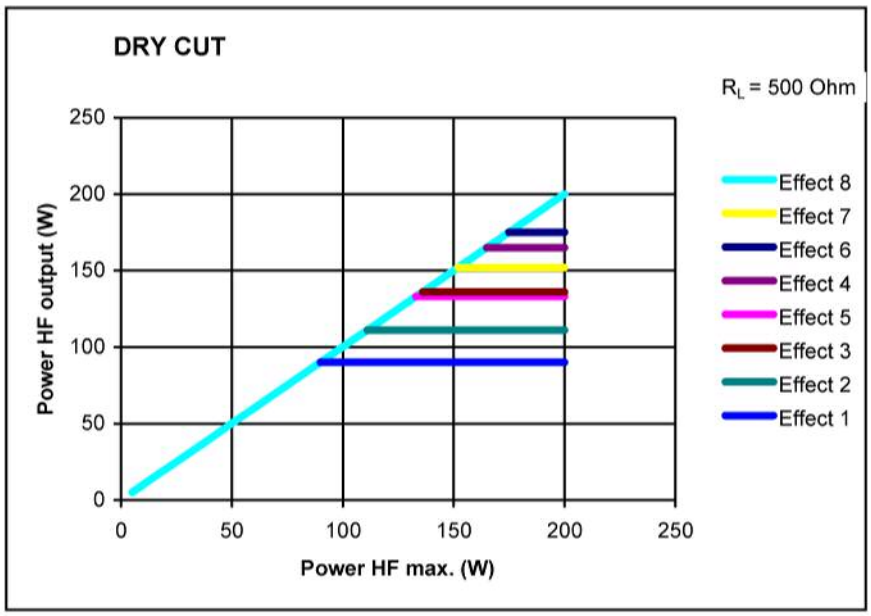


Fig. 6-7

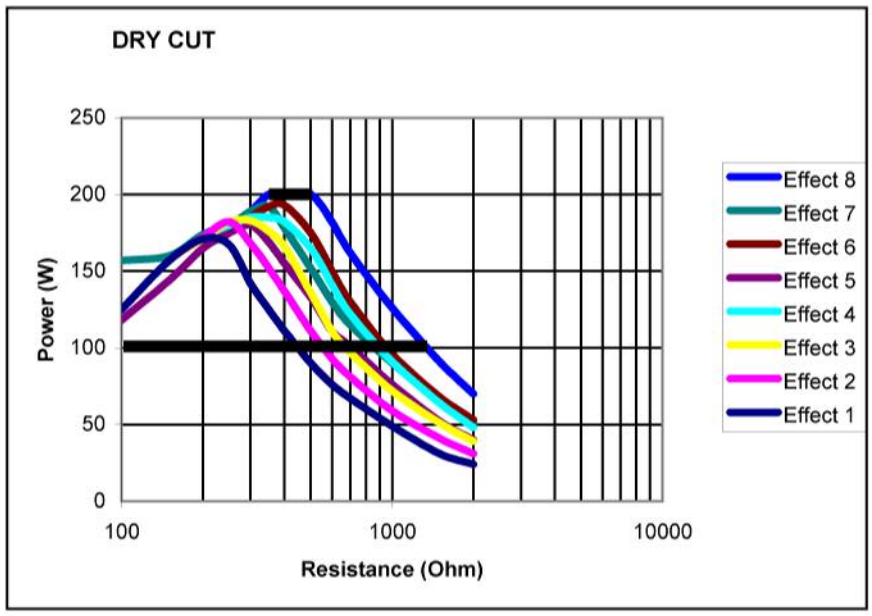


Fig. 6-8

Art.-Nr.:80104-501
12/ 2004

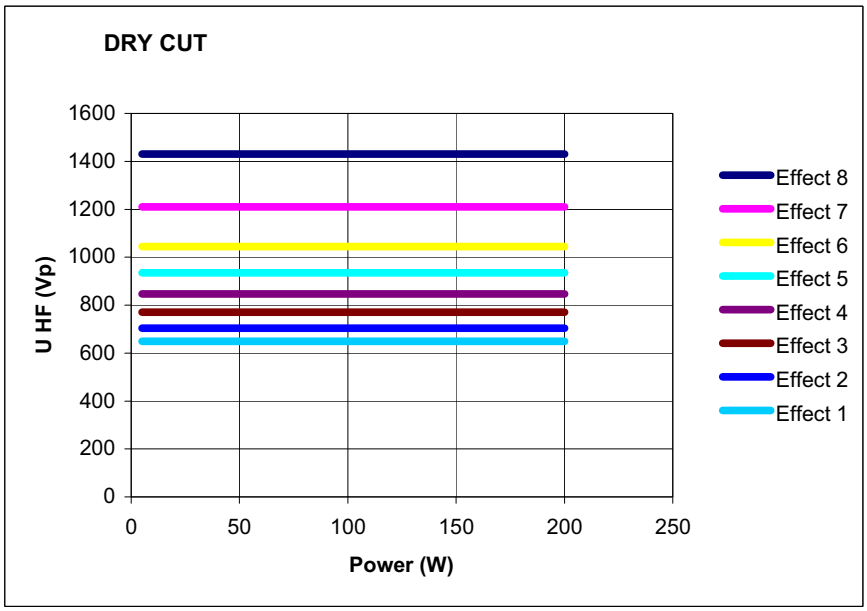


Fig. 6-9

DRY CUT °

Properties

Intense haemostasis 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 and 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	3.5 (at R_L = 500 ohms)
Rated load resistor	500 ohms
Max. HF peak voltage	1550 Vp
Number of effects	8
Constancy 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%

Art.-Nr.:80104-501
12/ 2004

Performance diagrams

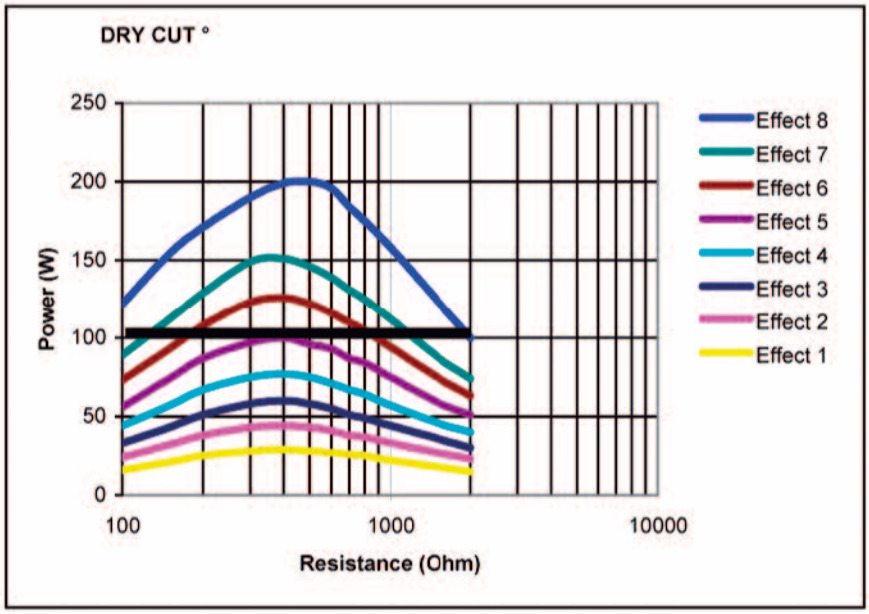


Fig. 6-10

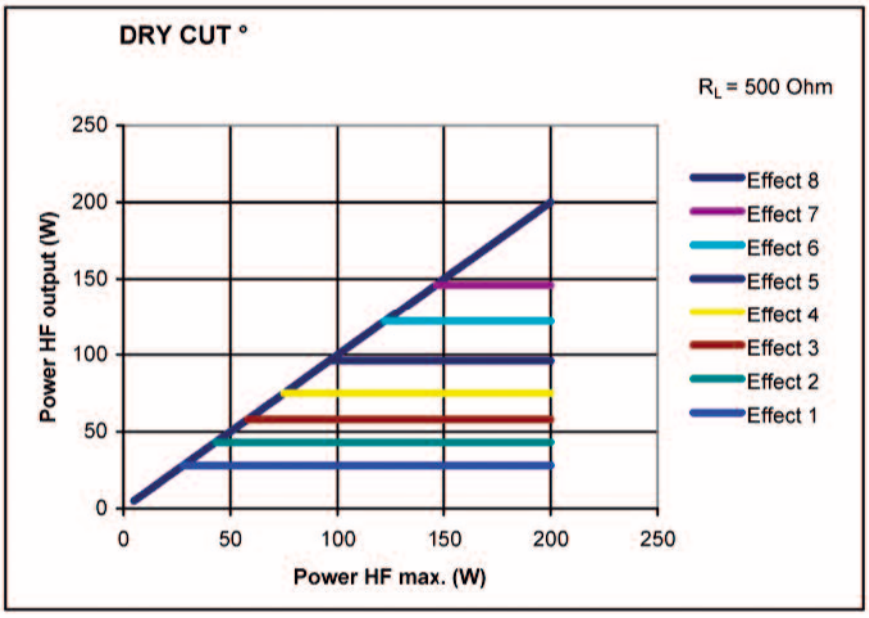


Fig. 6-11

Art.-Nr.:80104-501
12/ 2004

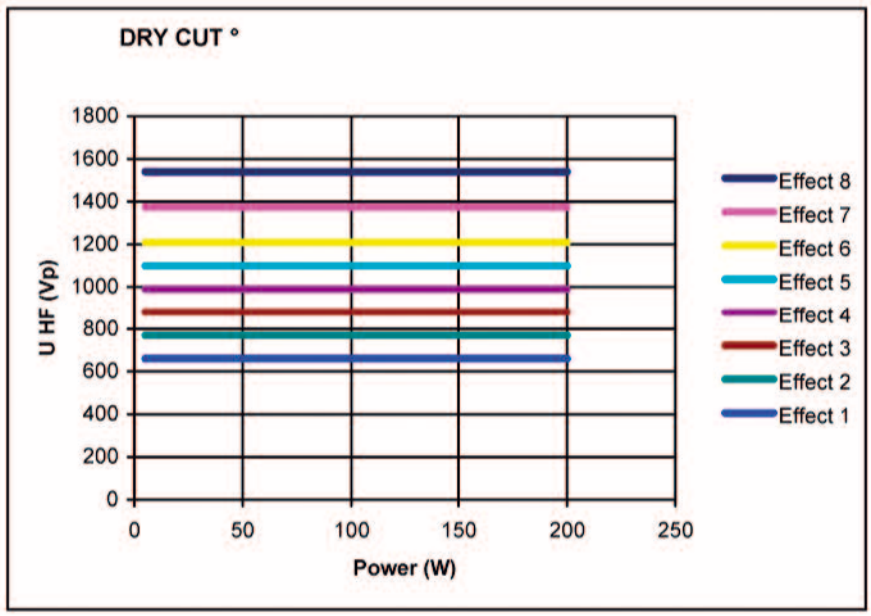
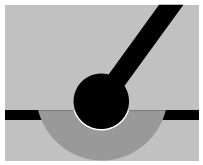


Fig. 6-12

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.

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.

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 ohms
Max. HF peak voltage	190 Vp
Number of effects	8
Constancy of effects	automatic control of HF peak voltage

Art.-Nr.:80104-501
12/ 2004

HF power limitation	5 watts to 200 watts in 1 watt steps
Max. power output at rated load resistor	200 watts ± 20%

Performance diagrams

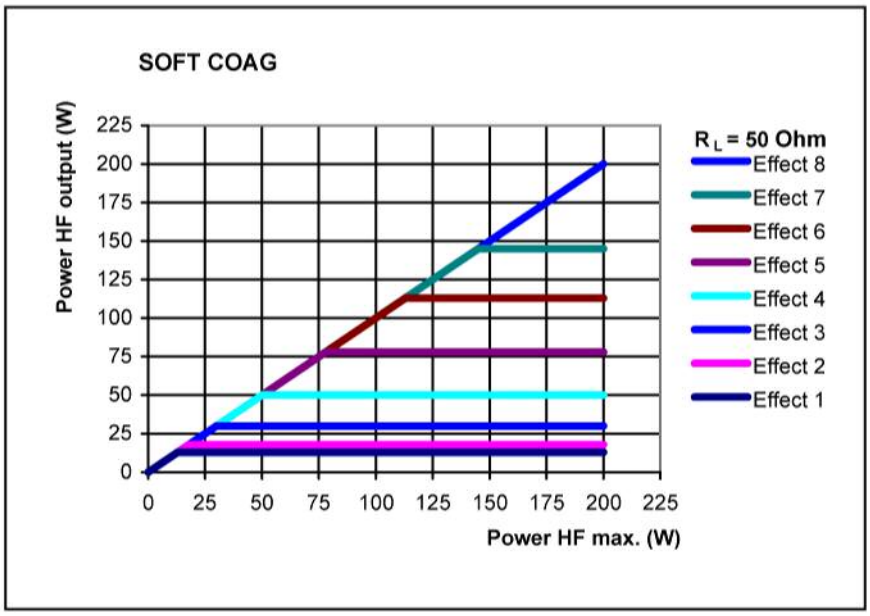


Fig. 6-13

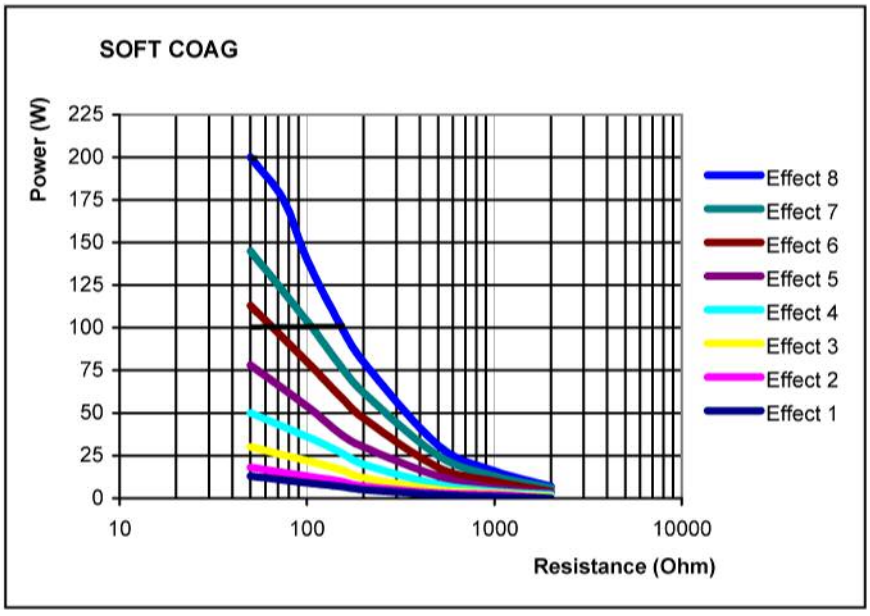


Fig. 6-14

Art.-Nr.:80104-501
12/ 2004

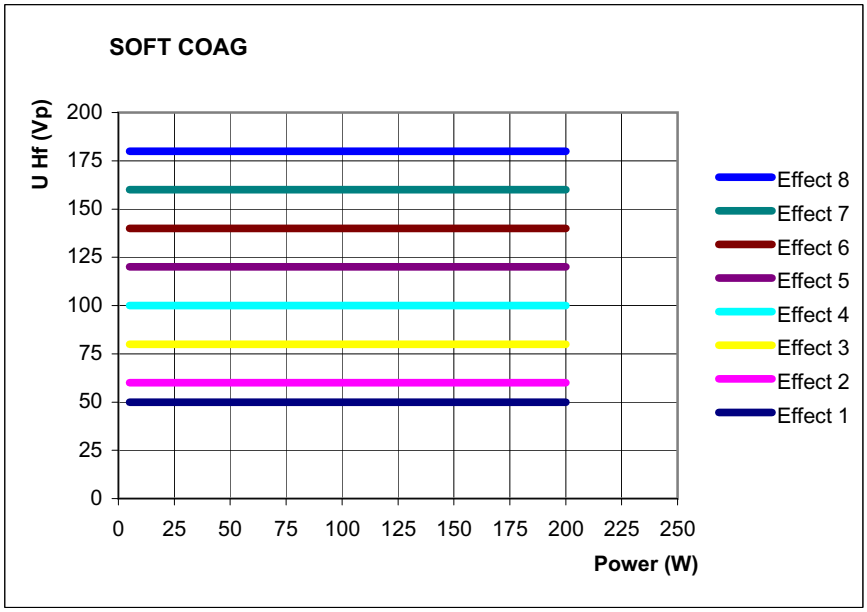


Fig. 6-15

SWIFT COAG °

Art.-Nr.:80104-501
12/ 2004

Properties

Fast effective coagulation which is very suitable for dissection with high haemostasis 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	3.5 (at R_L = 500 ohms)
Rated load resistor	500 ohms
Max. HF peak voltage	1550 Vp
Number of effects	8
Constancy 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%

Performance diagrams

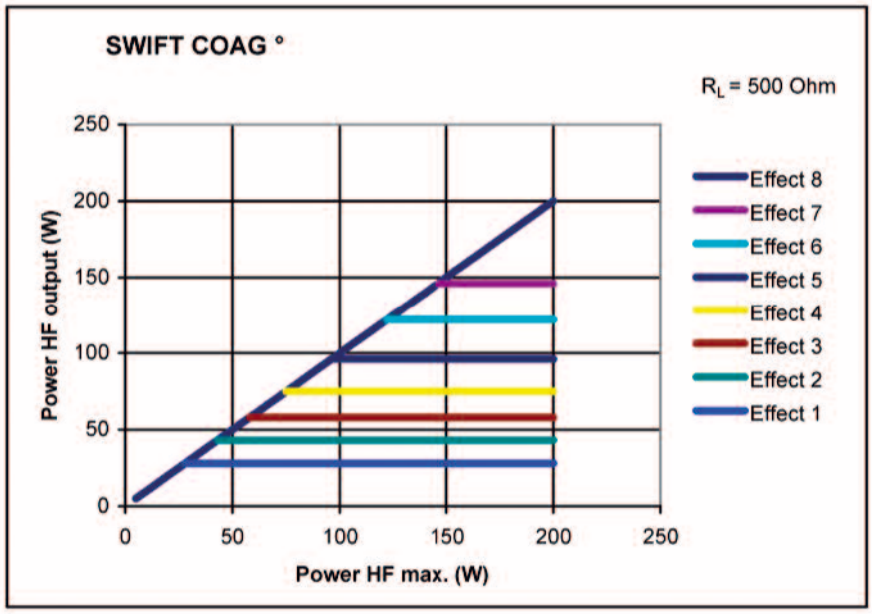


Fig. 6-16

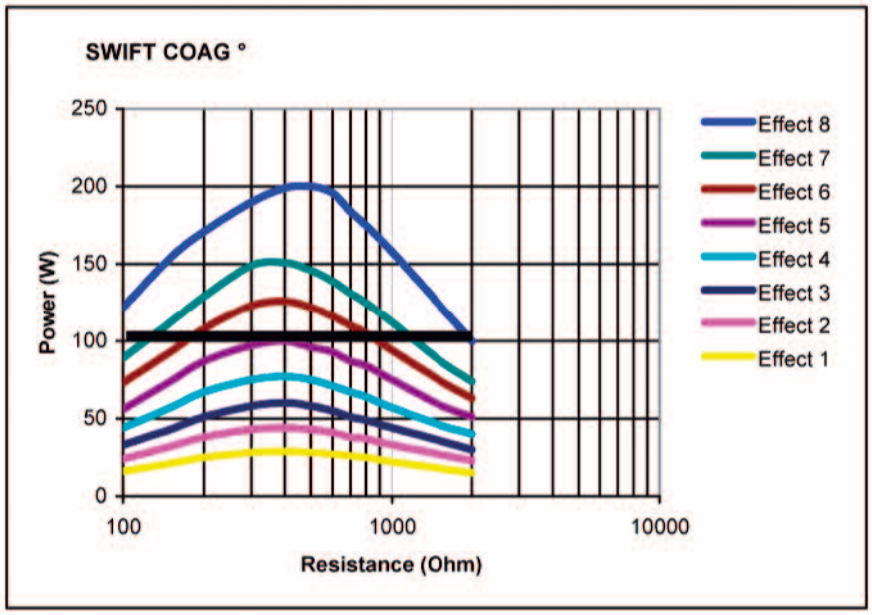


Fig. 6-17

Art.-Nr.:80104-501
12/ 2004

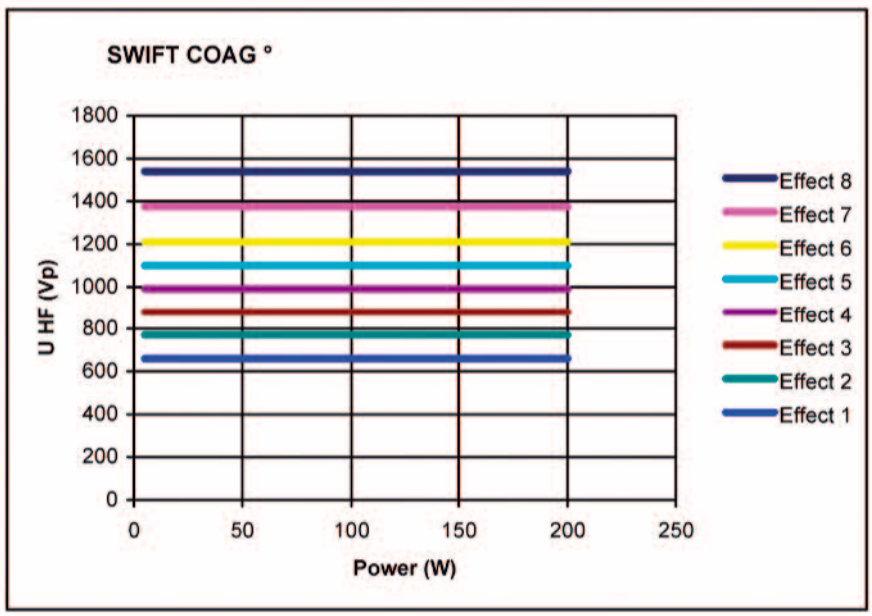
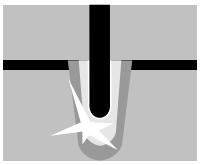


Fig. 6-18

SWIFT COAG



Art.-Nr.:80104-501
12/ 2004

Properties Fast effective coagulation which is very suitable for dissection with high haemostasis 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	5.4 (at R_L = 500 ohms)
Rated load resistor	500 ohms
Max. HF peak voltage	2500 Vp
Number of effects	8
Constancy 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%

Performance diagrams

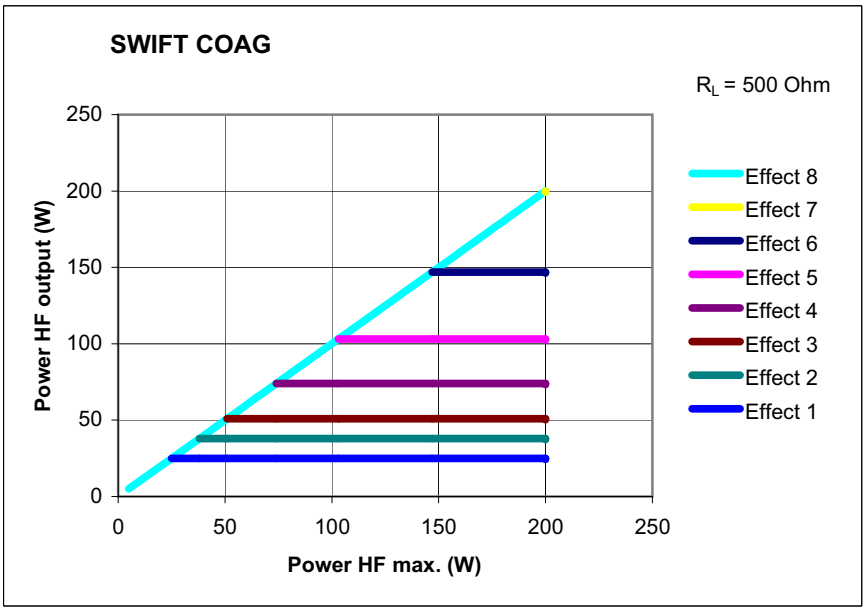


Fig. 6-19

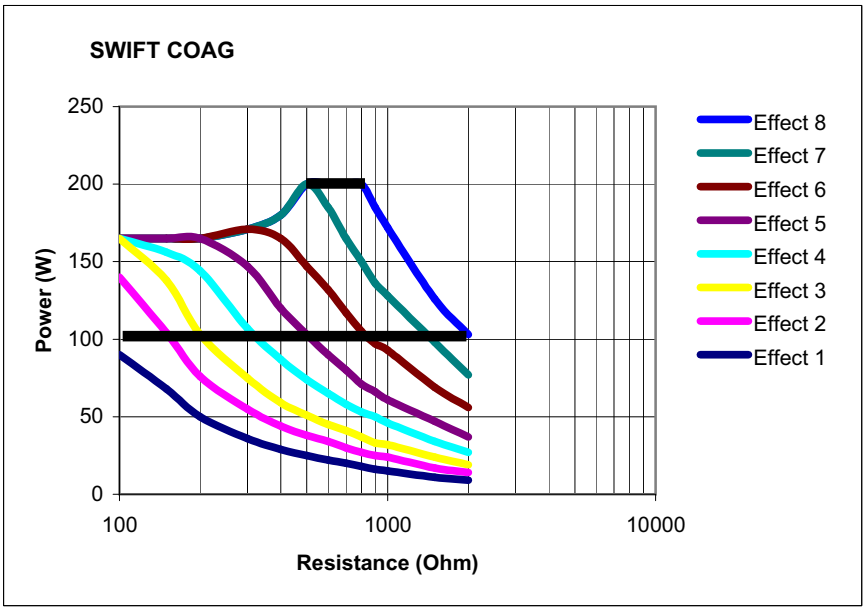


Fig. 6-20

Art.-Nr.:80104-501
12/ 2004

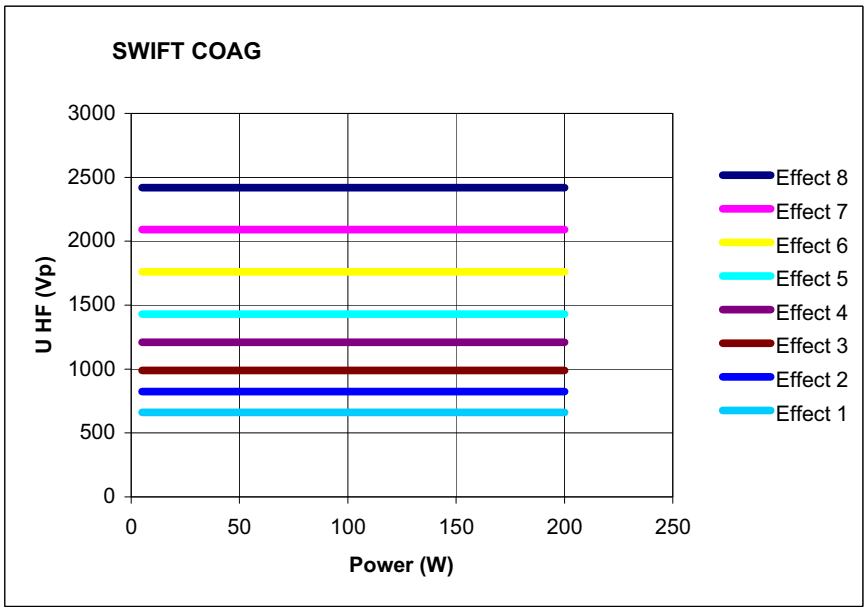
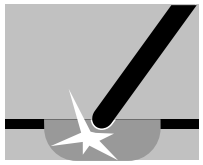


Fig. 6-21

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	6.0 (at R_L = 500 ohms)
Rated load resistor	500 ohms
Max. HF peak voltage	1800 Vp
Number of effects	4
Constancy 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%

Art.-Nr.:80104-501
12/ 2004

Performance diagrams

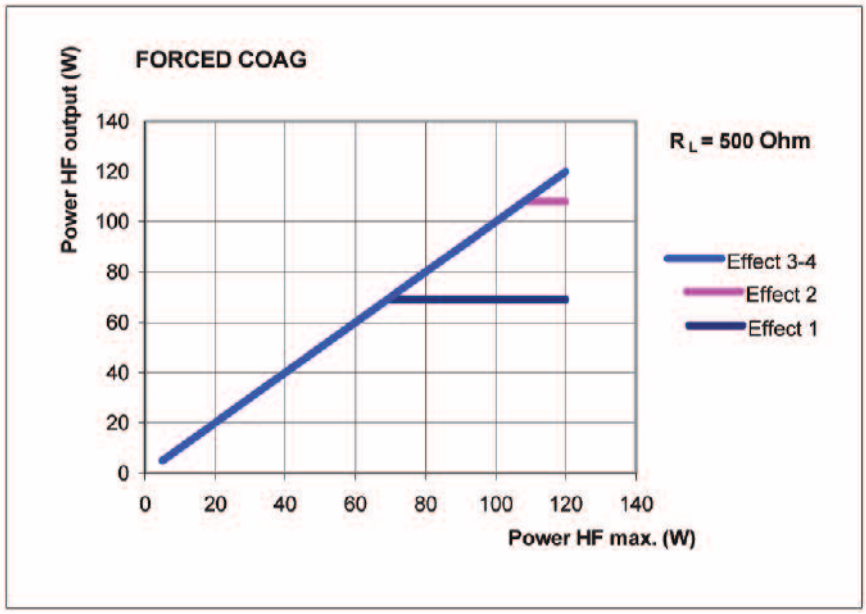


Fig. 6-22

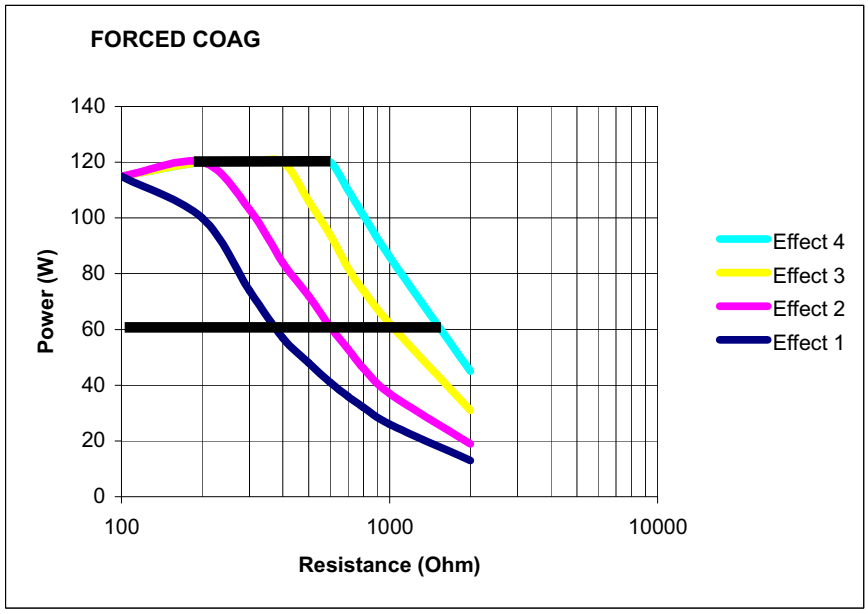


Fig. 6-23

Art.-Nr.:80104-501
12/ 2004

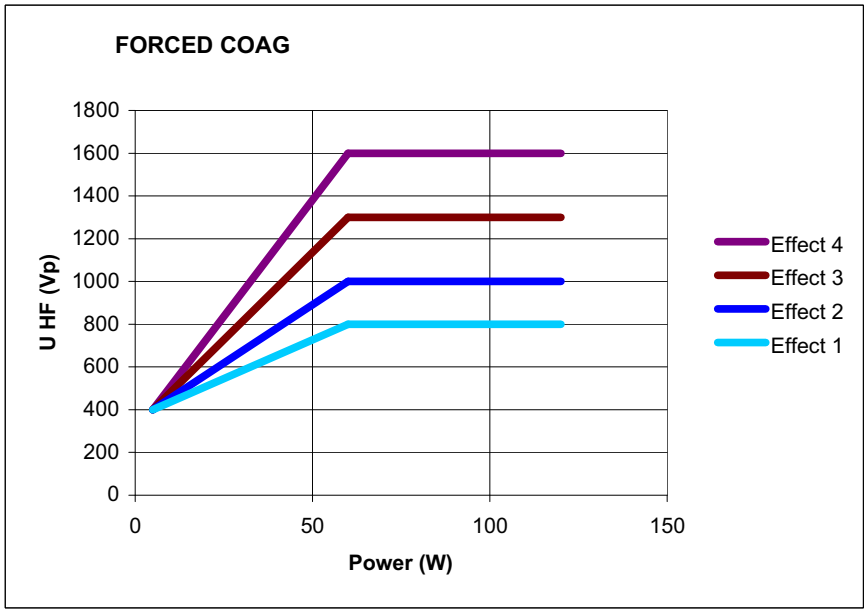
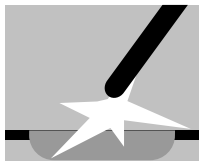


Fig. 6-24

SPRAY COAG



Art.-Nr.:80104-501
12/ 2004

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 Vp
Number of effects	2
Constancy 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%

Performance diagrams

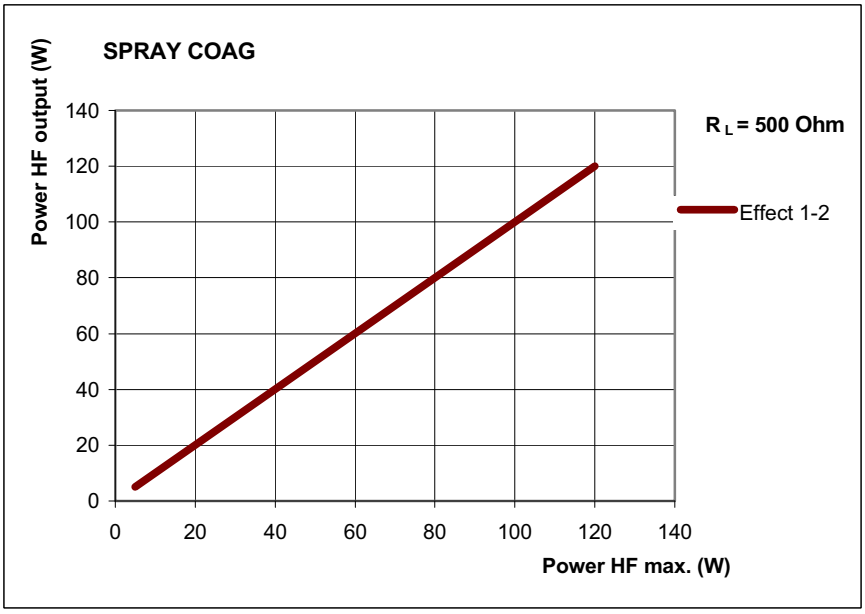


Fig. 6-25

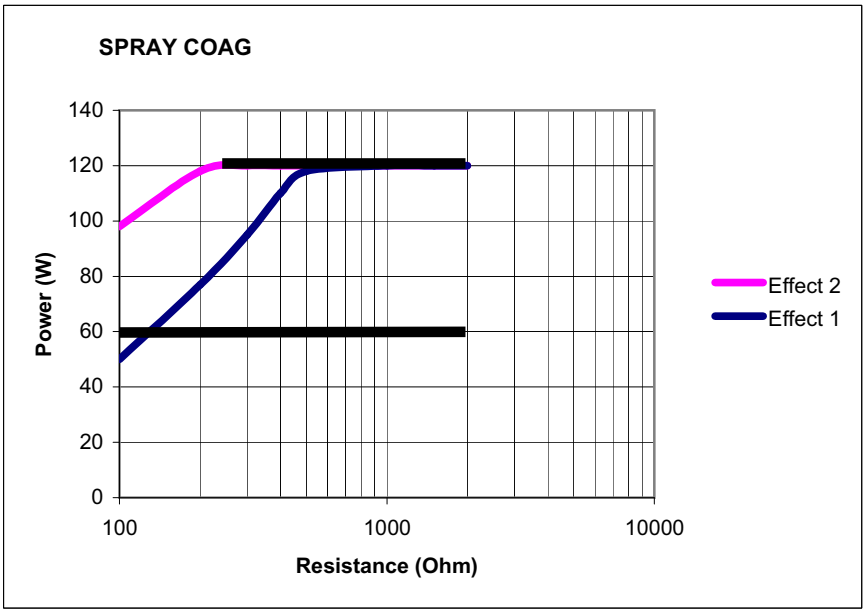


Fig. 6-26

Art.-Nr.:80104-501
12/ 2004

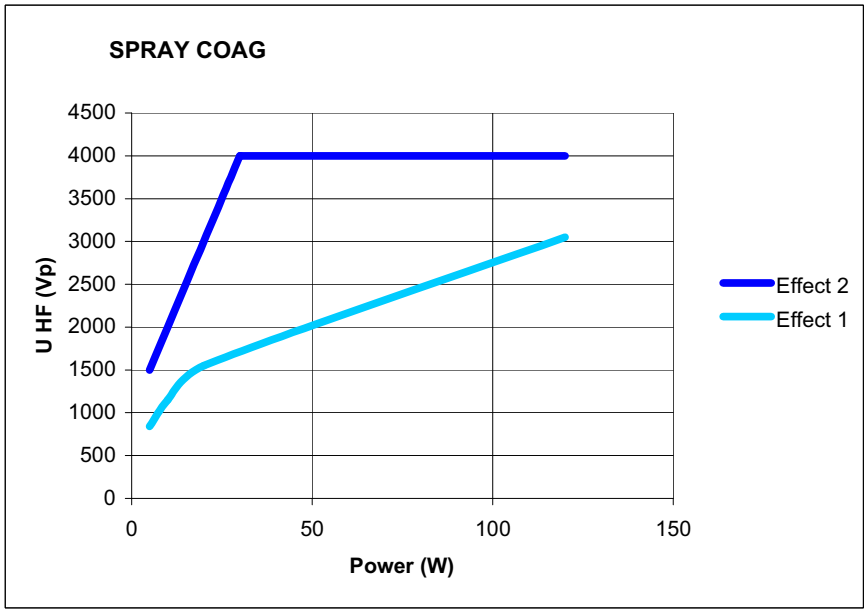


Fig. 6-27

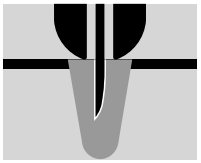
Art.-Nr.:80104-501
12/ 2004

Art.-Nr.:80104-501
12/ 2004

CHAPTER 7

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 haemostasis 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.

Art.-Nr.:80104-501
12/ 2004

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%

Performance diagrams

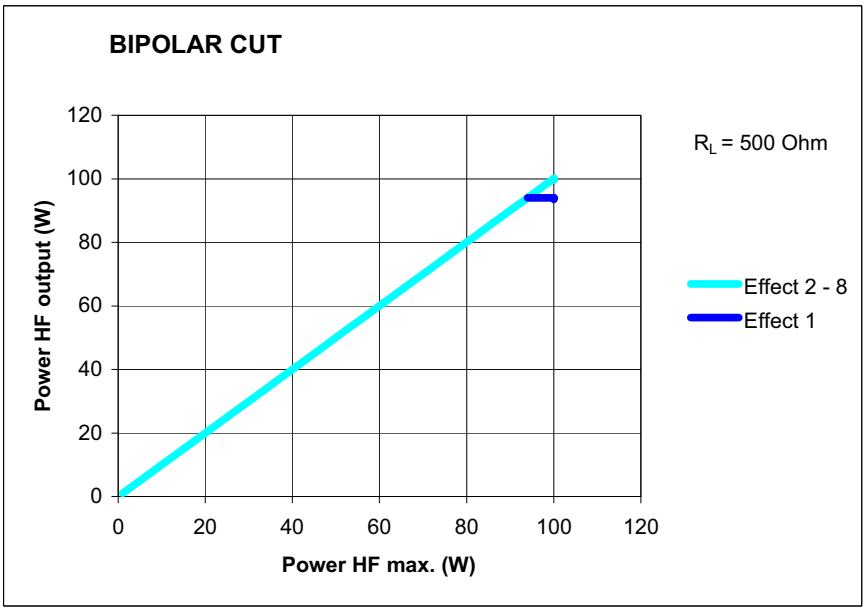


Fig. 7-1

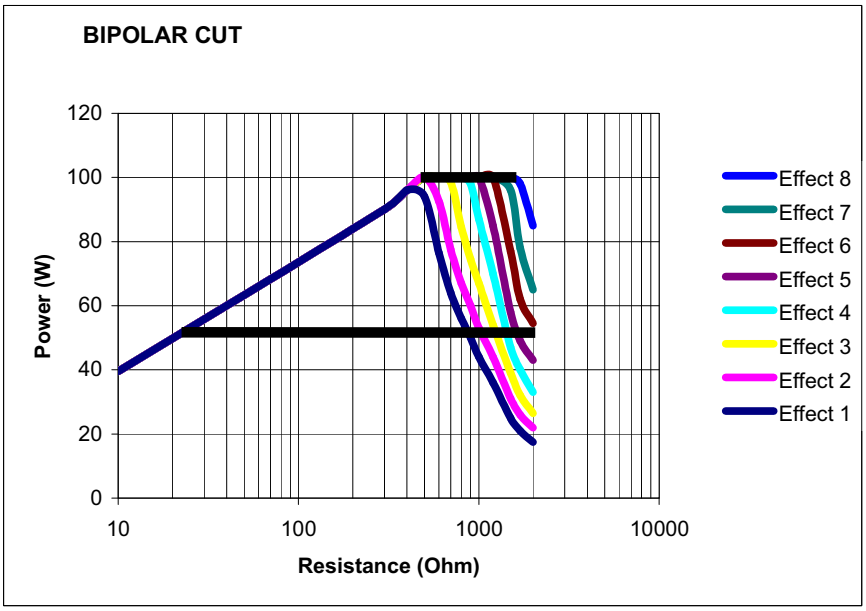


Fig. 7-2

Art.-Nr.:80104-501
12/ 2004

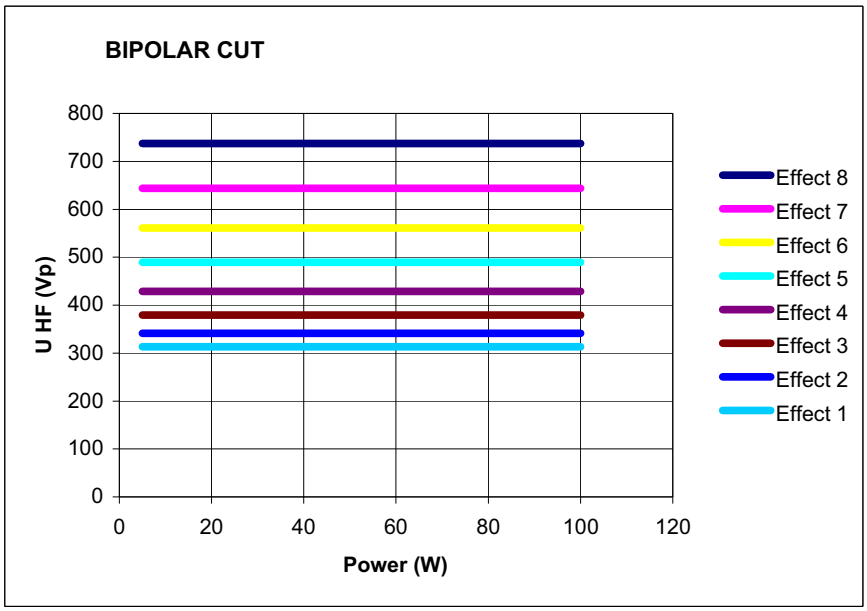


Fig. 7-3

BIPOLAR SOFT COAG

Properties

Lower voltages, carbonisation 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.

AUTO START

In the window *Socket Selected* 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, 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	190 Vp

Art.-Nr.:80104-501
12/ 2004

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%

Performance diagrams

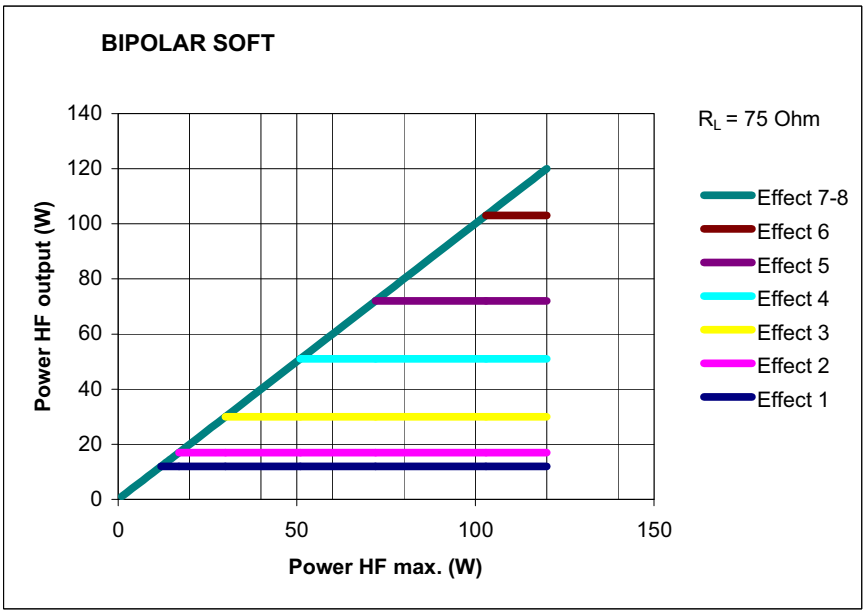


Fig. 7-4

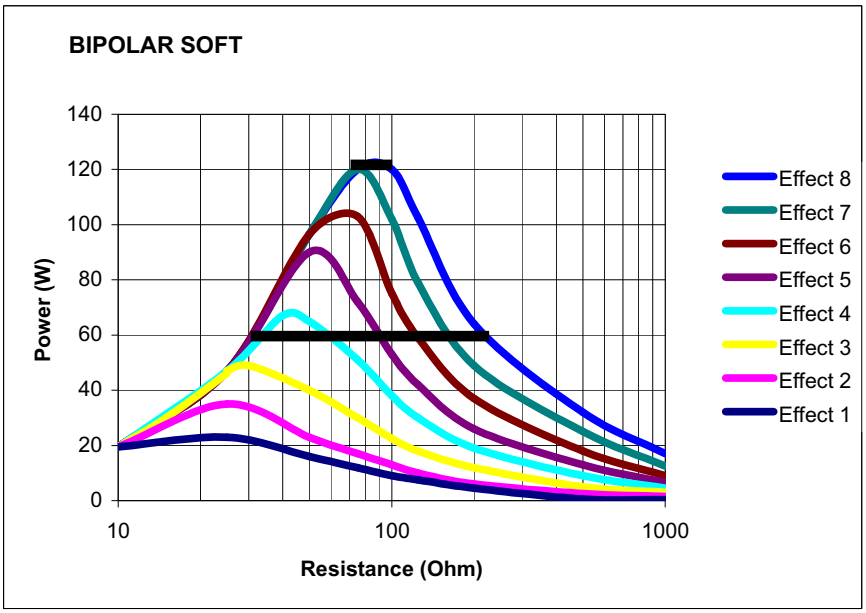


Fig. 7-5

Art.-Nr.:80104-501
12/ 2004

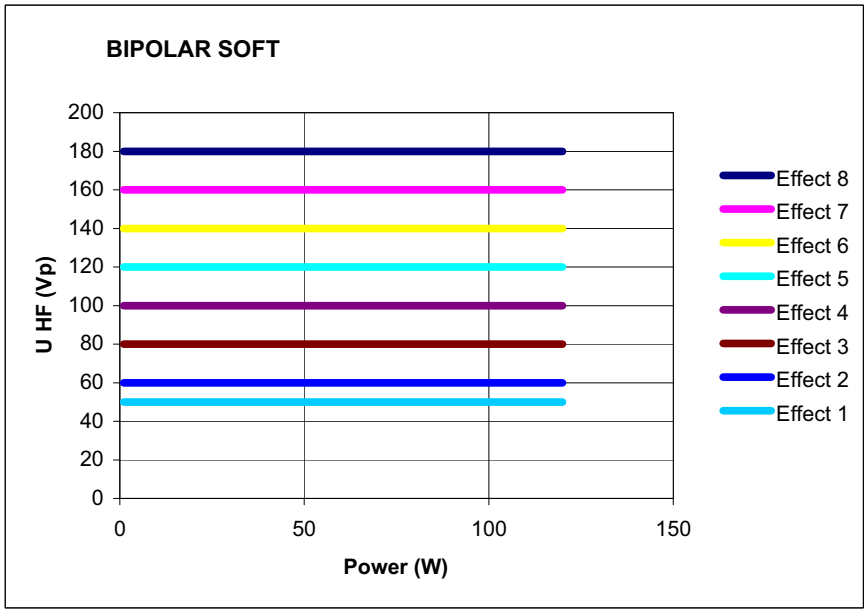


Fig. 7-6

BIPOLAR FORCED COAG

Properties

Fast bipolar coagulation.

Areas of use

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

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

HF voltage waveform	pulse-modulated sinusoidal alternating voltage
Rated frequency	350 kHz (at R_L= 500 ohms) ± 10%
Crest factor	4.4 (at R_L = 500 ohms)
Rated load resistor	200 ohms
Max. HF peak voltage	560 Vp
Number of effects	2
Constancy of effects	automatic control of HF peak voltage
HF power limitation	5 watts to 90 watts in 1 watt steps
Max. power output at rated load resistor	90 watts ± 20%

Art.-Nr.:80104-501
12/ 2004

Performance diagrams

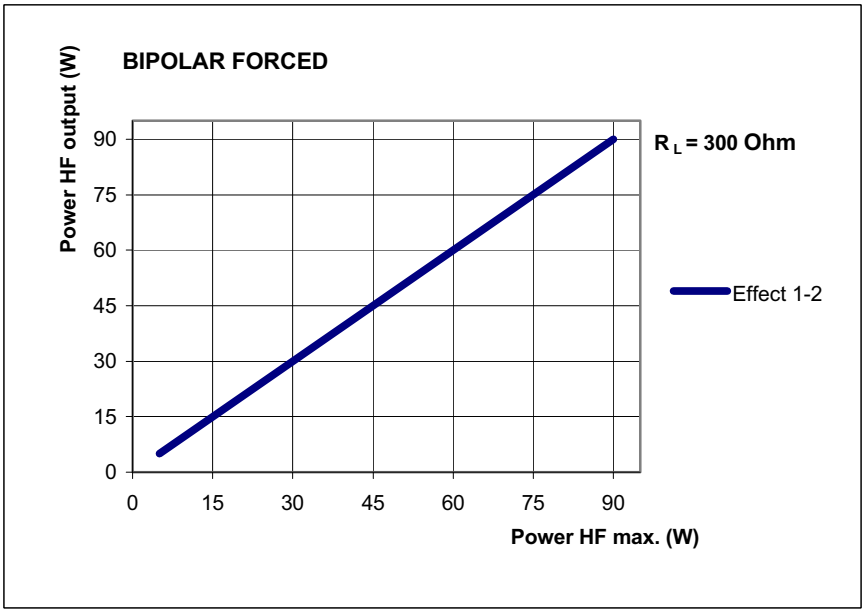


Fig. 7-7

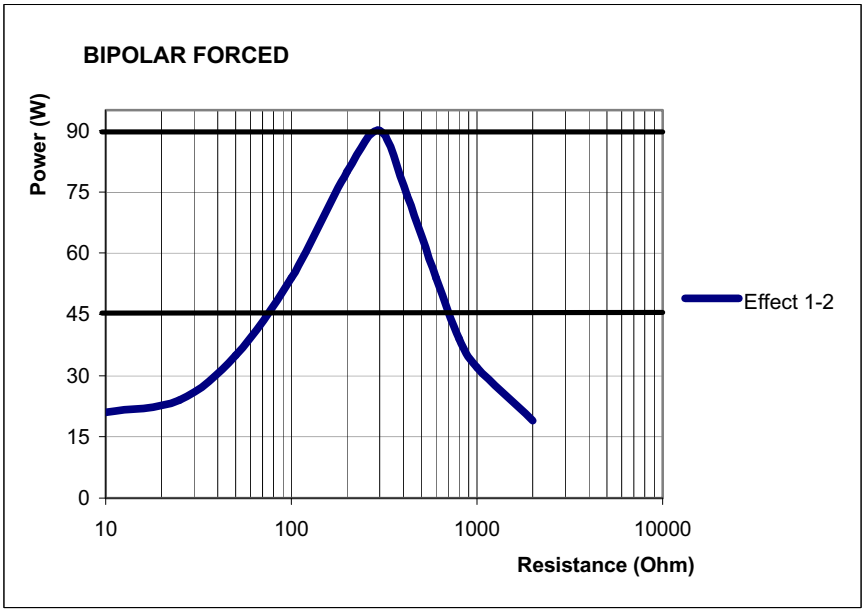


Fig. 7-8

Art.-Nr.:80104-501
12/ 2004

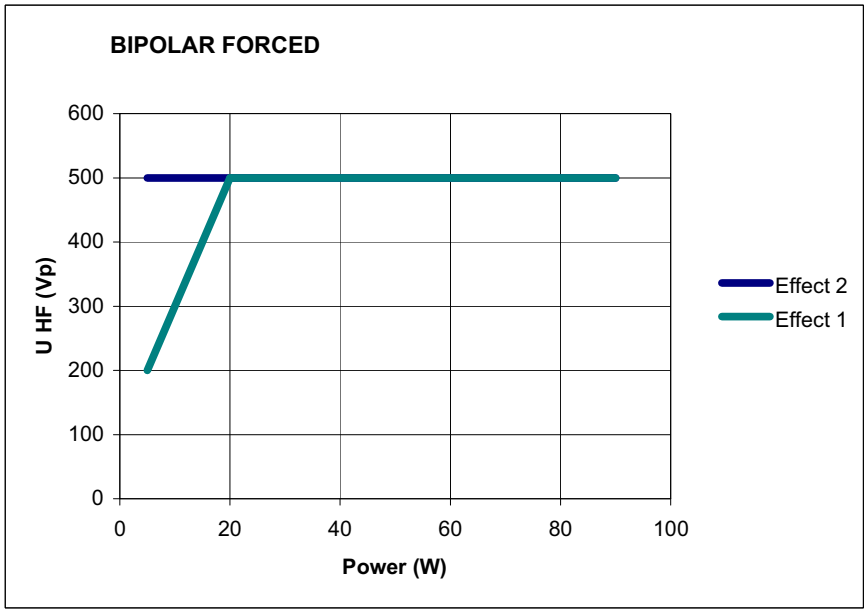


Fig. 7-9

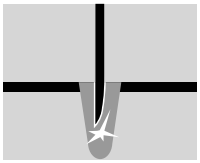
Art.-Nr.:80104-501
12/ 2004

Art.-Nr.:80104-501
12/ 2004

CHAPTER 8

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, 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, 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 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%

Art.-Nr.:80104-501
12/ 2004

Performance diagrams

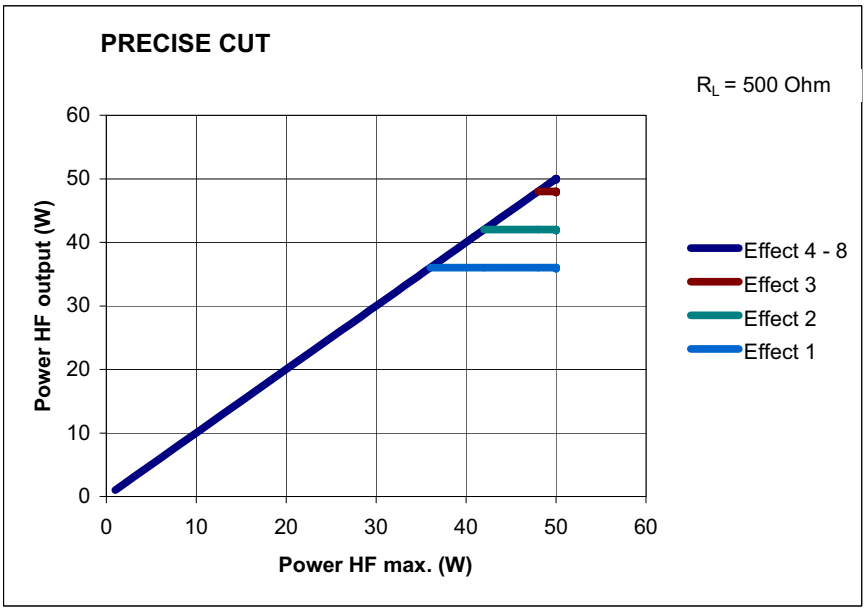


Fig. 8-1

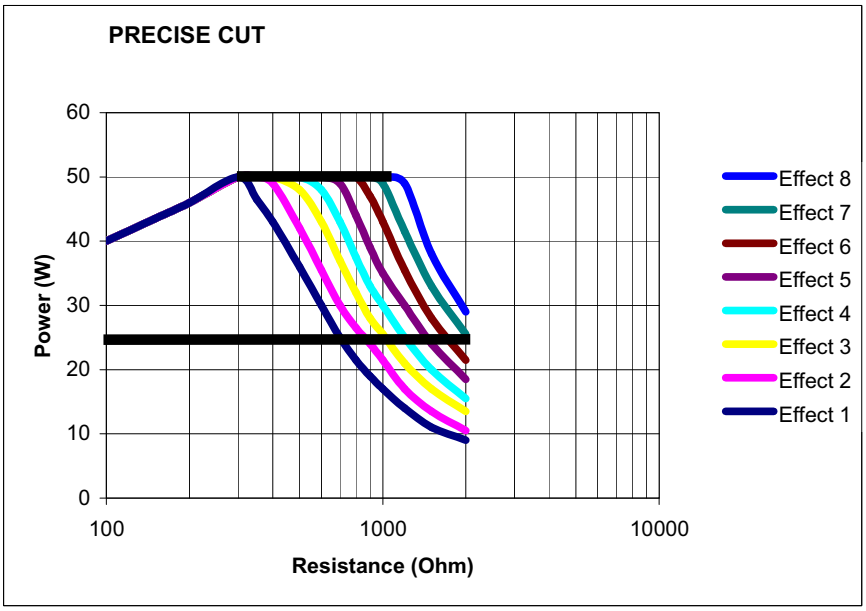


Fig. 8-2

Art.-Nr.:80104-501
12/ 2004

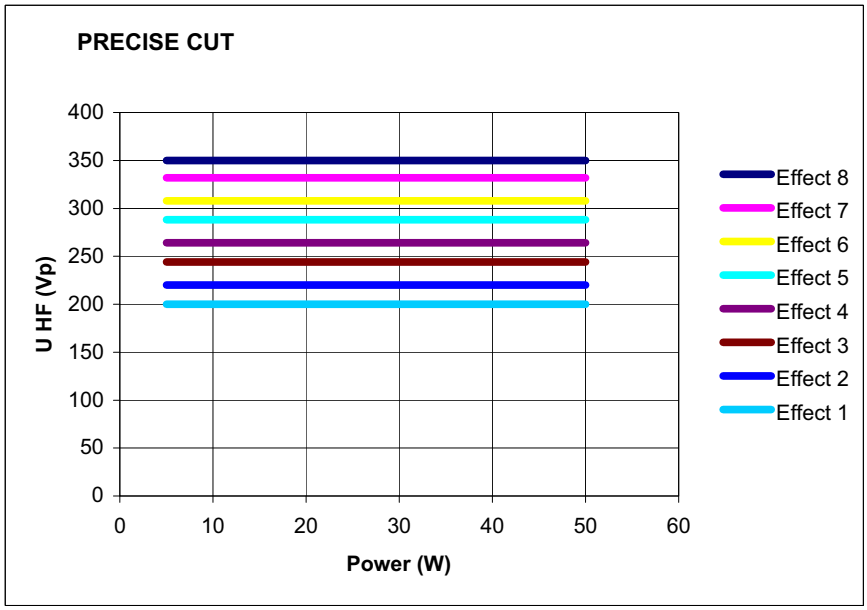


Fig. 8-3

ENDO CUT Q

Properties

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

Applications

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

Suitable electrodes

Monofilament and polyfilament snare 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)
Max. HF peak voltage	770 Vp
Number of effects	4
Constancy of effects	automatic control of HF peak voltage
Max. power output	400 watts ± 20%

Art.-Nr.:80104-501
12/ 2004

Performance diagram

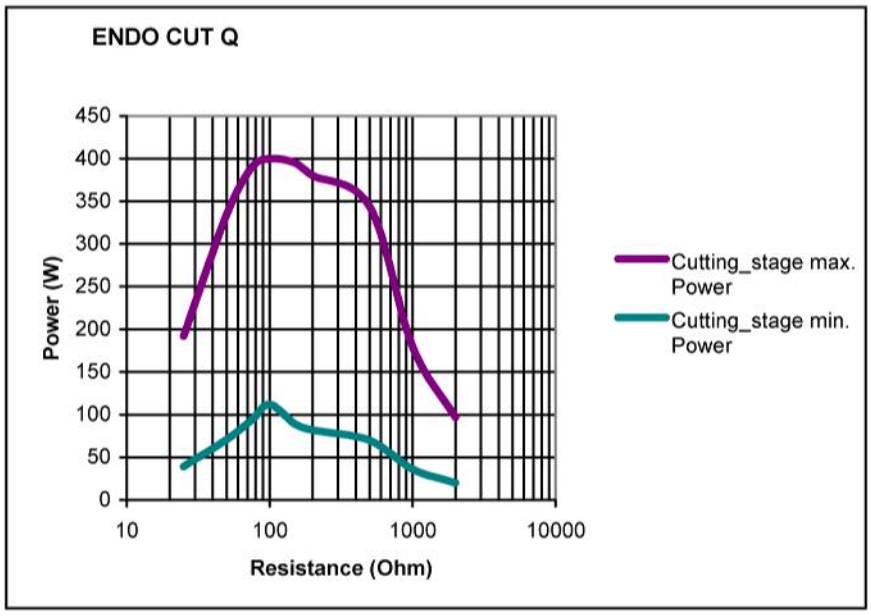


Fig. 8-4

ENDO CUT I

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

Applications Endoscopic interventions in which alternating cutting and coagulation with activation is called for.

Suitable electrodes Papillotomy, needle 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)
Max. HF peak voltage	550 Vp
Number of effects	4
Constancy of effects	automatic control of HF peak voltage
Max. power output at rated load resistor	155 watts ± 20%

Art.-Nr.:80104-501
12/ 2004

Performance diagram

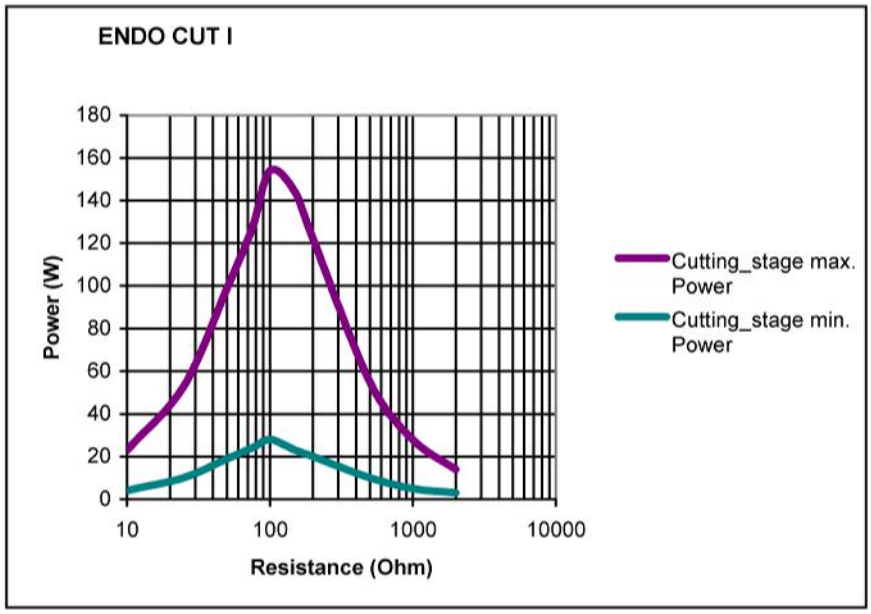
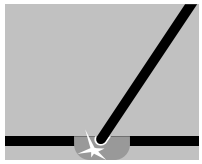


Fig. 8-5

PRECISE COAG



Art.-Nr.:80104-501
12/ 2004

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, 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 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%

Performance diagrams

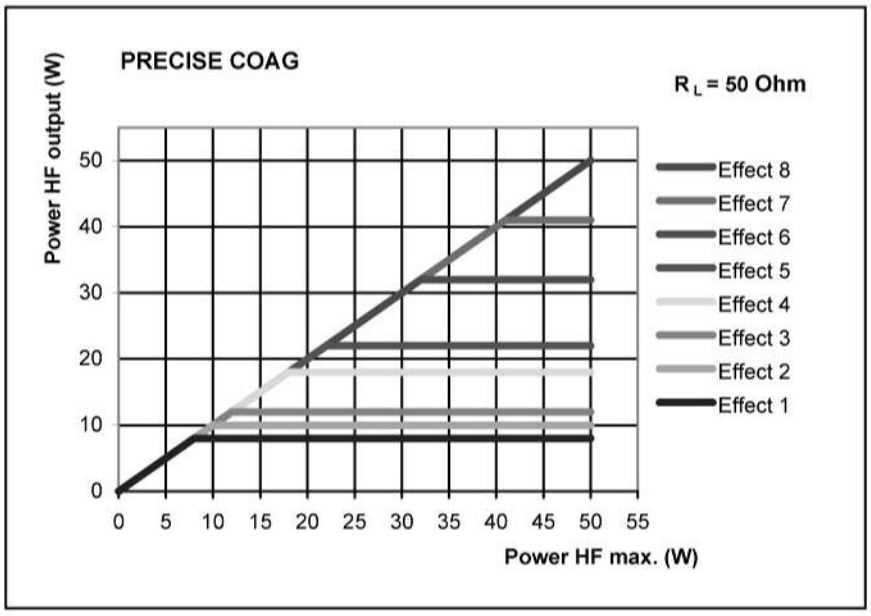


Fig. 8-6

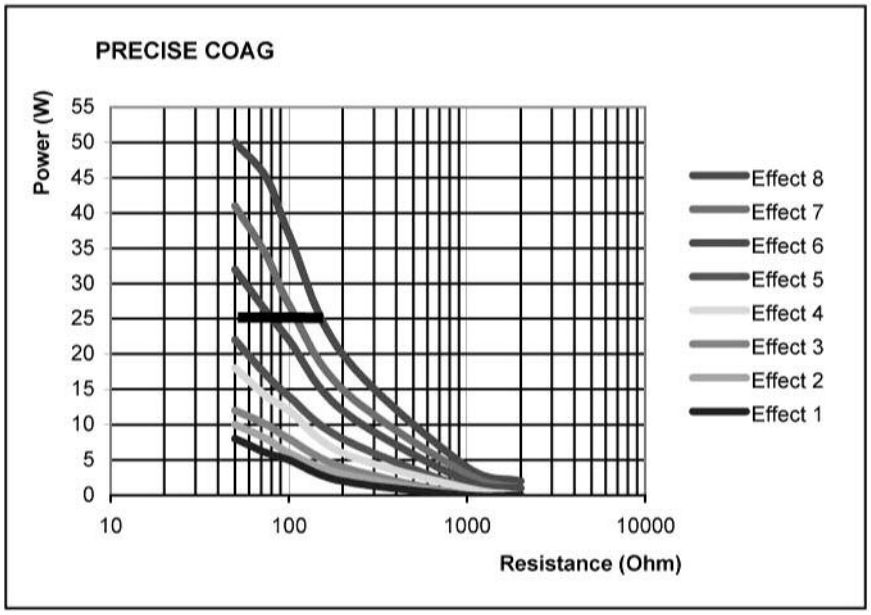


Fig. 8-7

Art.-Nr.:80104-501
12/ 2004

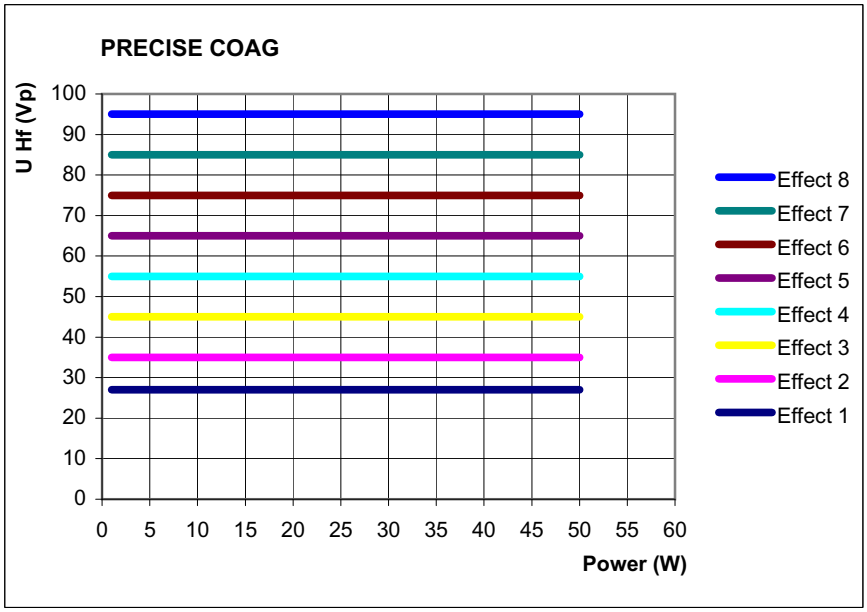
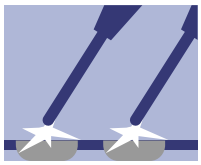


Fig. 8-8

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	5.0 (at R_L = 500 ohms)
Rated load resistor	500 ohms

Art.-Nr.:80104-501
12/ 2004

Max. HF peak voltage	2000 Vp
Number of effects	8
Constancy 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%

Performance diagrams

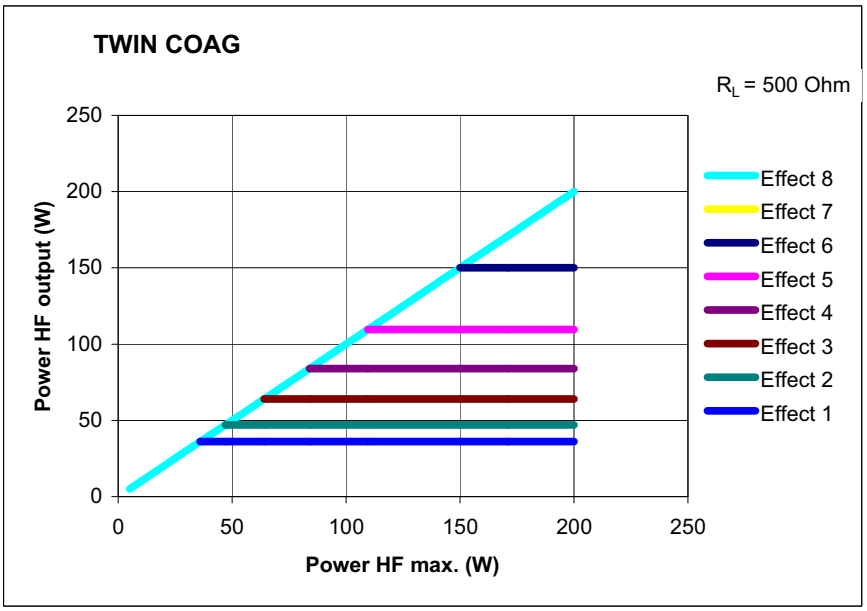


Fig. 8-9

Art.-Nr.:80104-501
12/ 2004

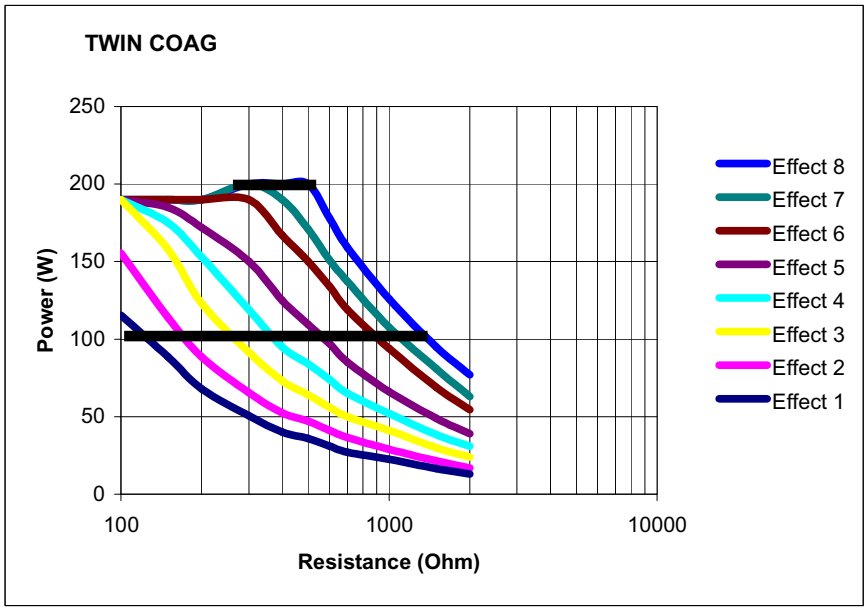


Fig. 8-10

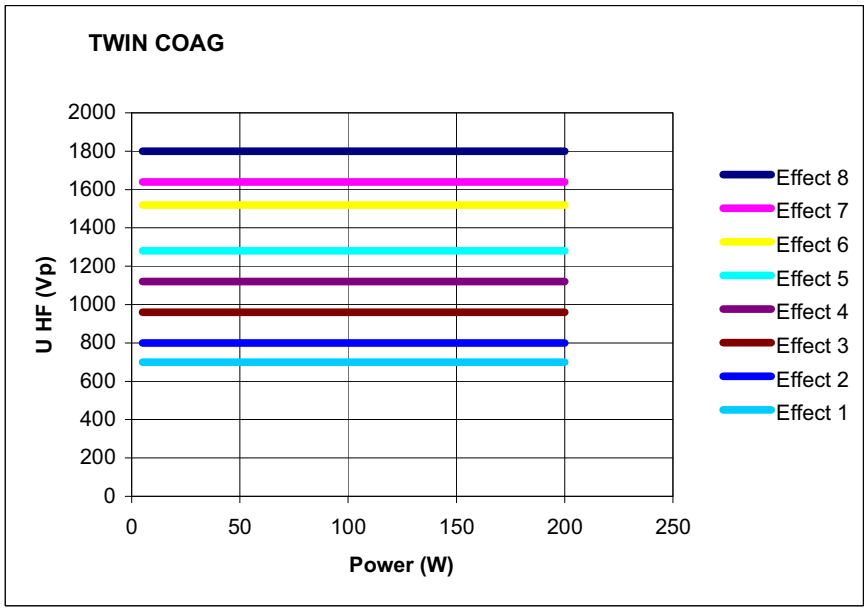


Fig. 8-11

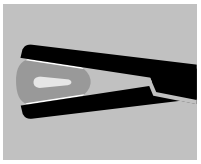
Art.-Nr.:80104-501
12/ 2004

Art.-Nr.:80104-501
12/ 2004

CHAPTER 9

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. The power limitation is set to 300 watts and cannot be modified.

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

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	25 ohms
Max. HF peak voltage	220 Vp
Number of effects	4
Constancy of effects	automatic control of HF peak voltage
max. HF output	225 watts

Art.-Nr.:80104-501
12/ 2004

Performance diagram

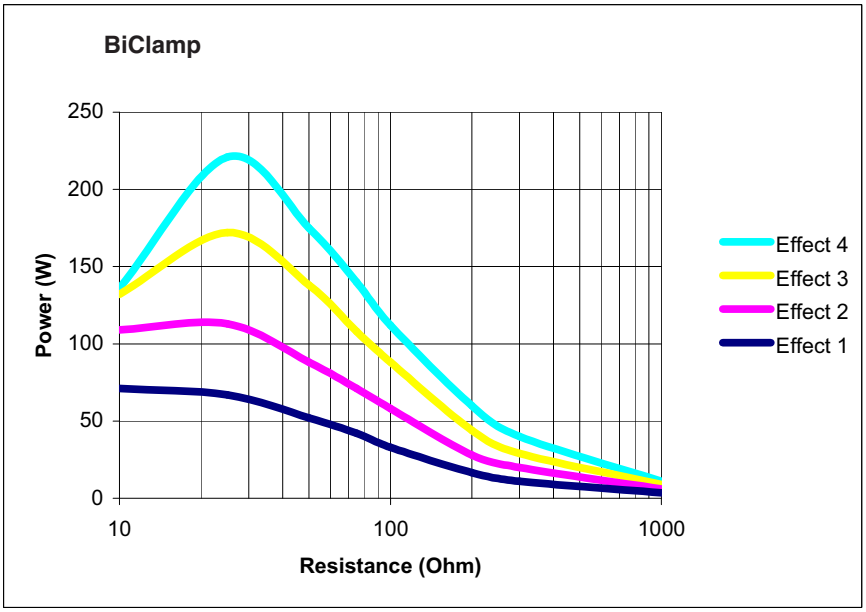


Fig. 9-1

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

Art.-Nr.:80104-501
12/ 2004

Performance diagrams

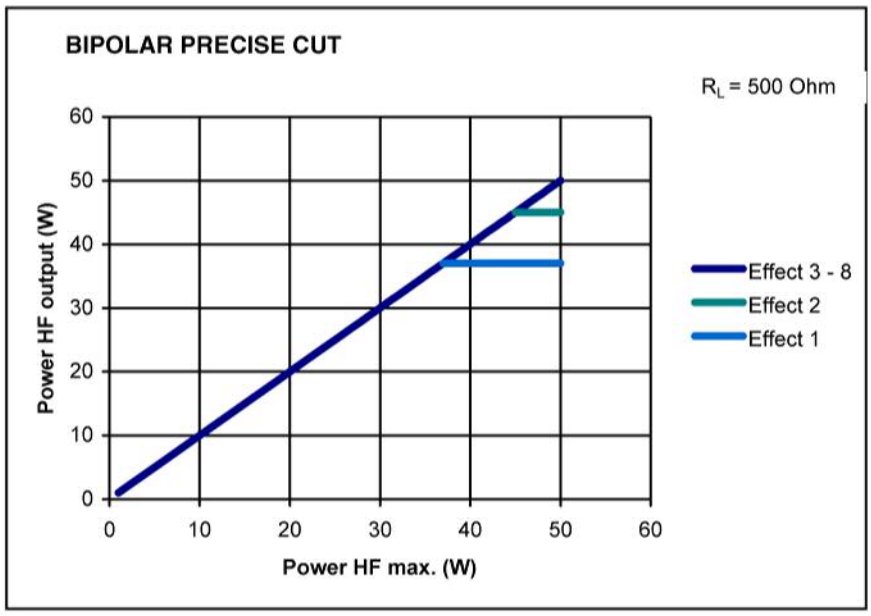


Fig. 9-2

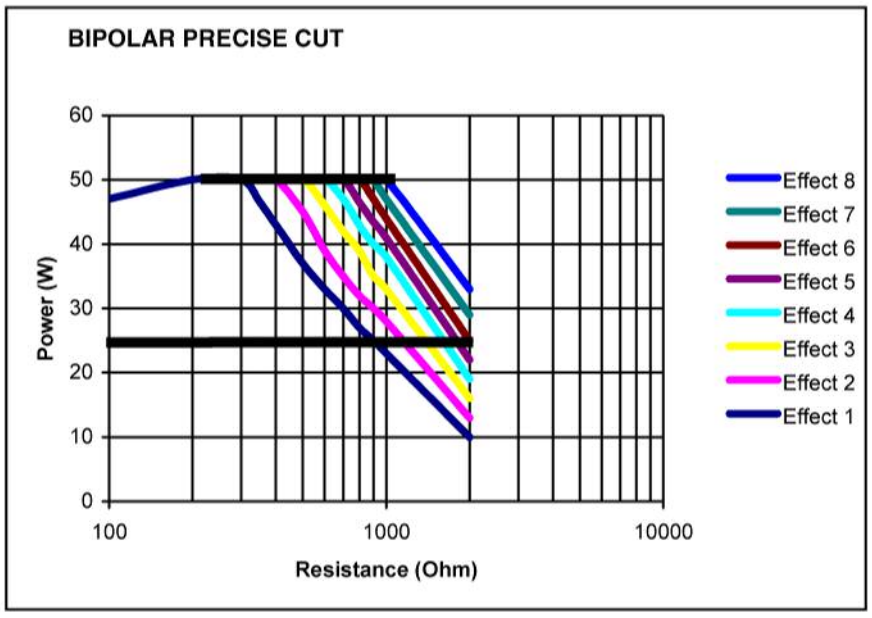


Fig. 9-3

Art.-Nr.:80104-501
12/ 2004

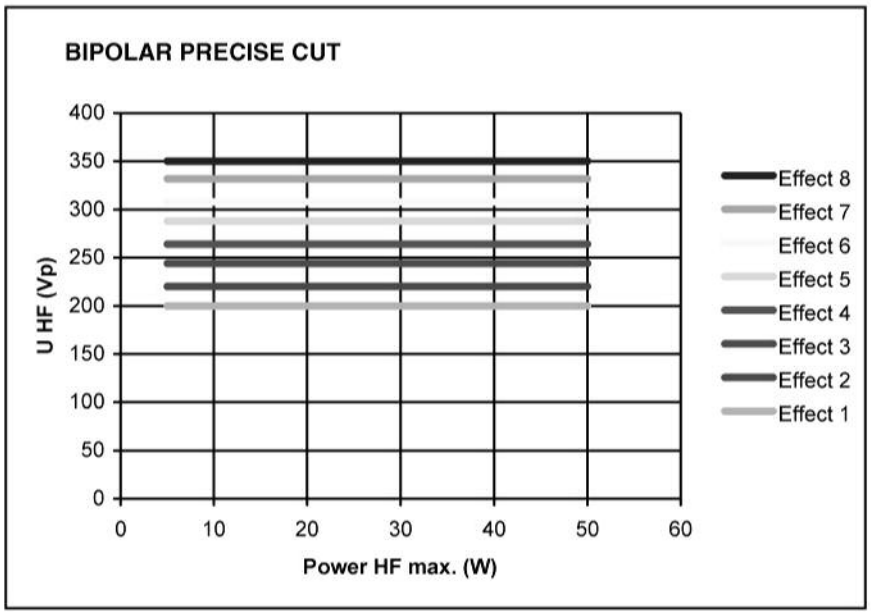


Fig. 9-4

BIPOLAR PRECISE COAG

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

Applications Coagulation processes where stress for tissue or patient must be minimised, e.g. neurosurgery, ENT, 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%

Art.-Nr.:80104-501
12/ 2004

Performance diagrams

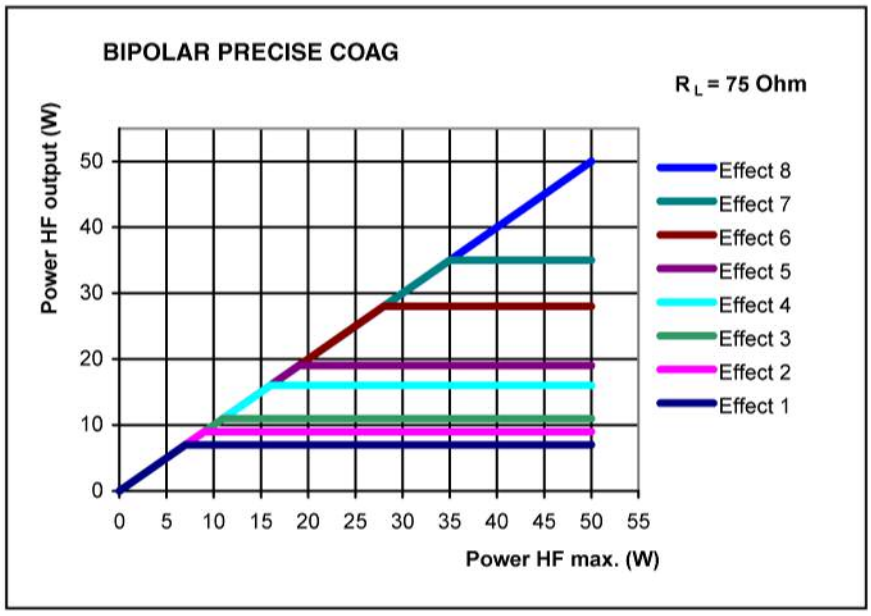


Fig. 9-5

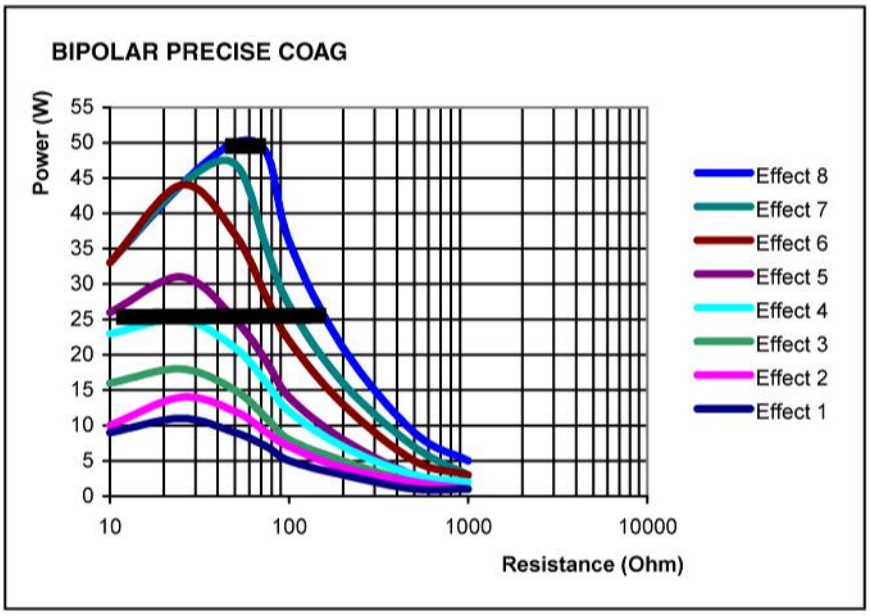


Fig. 9-6

Art.-Nr.:80104-501
12/ 2004

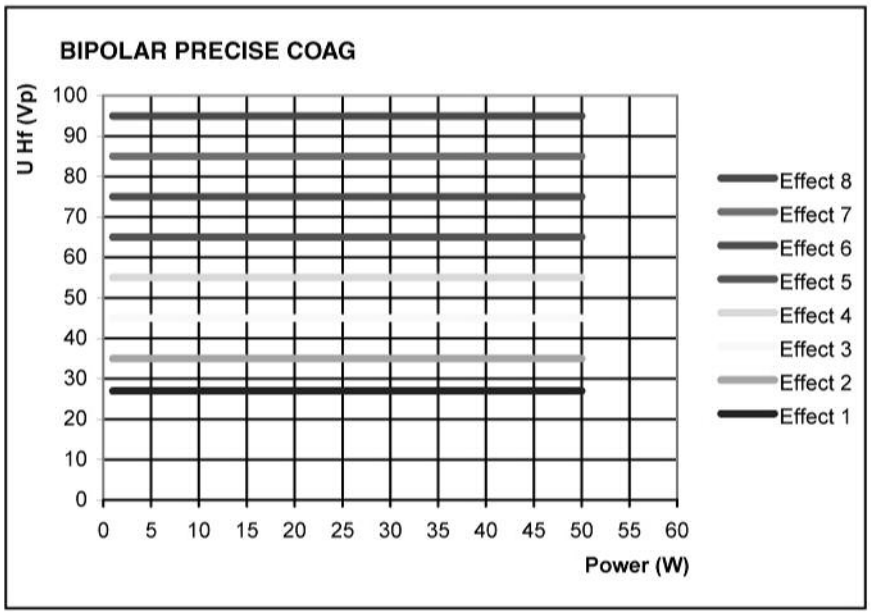


Fig. 9-7

Art.-Nr.:80104-501
12/ 2004

CHAPTER 10

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

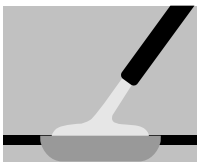
Art.-Nr.:80104-501
12/ 2004

Art.-Nr.:80104-501
12/ 2004

CHAPTER 11

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	7.0 (at R_L = 500 ohms)
Rated load resistor	500 ohms
Max. HF peak voltage	3,650 Vp
Constancy of effects	Restriction of HF peak voltage
HF power limitation	5 W to 120 W in 1 W steps
Max. power output at rated load resistor	120 watts ± 20%

Art.-Nr.:80104-501
12/ 2004

Performance diagrams

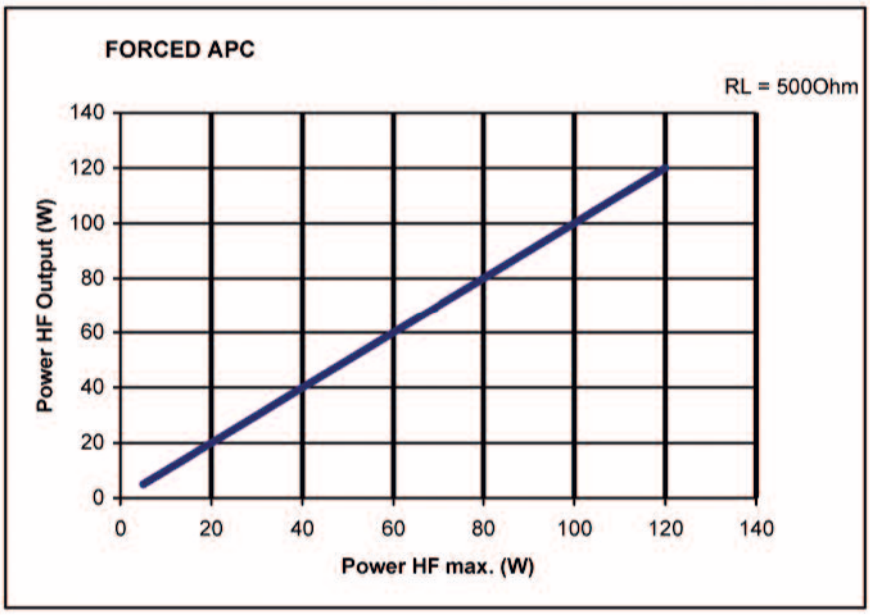


Fig. 11-1

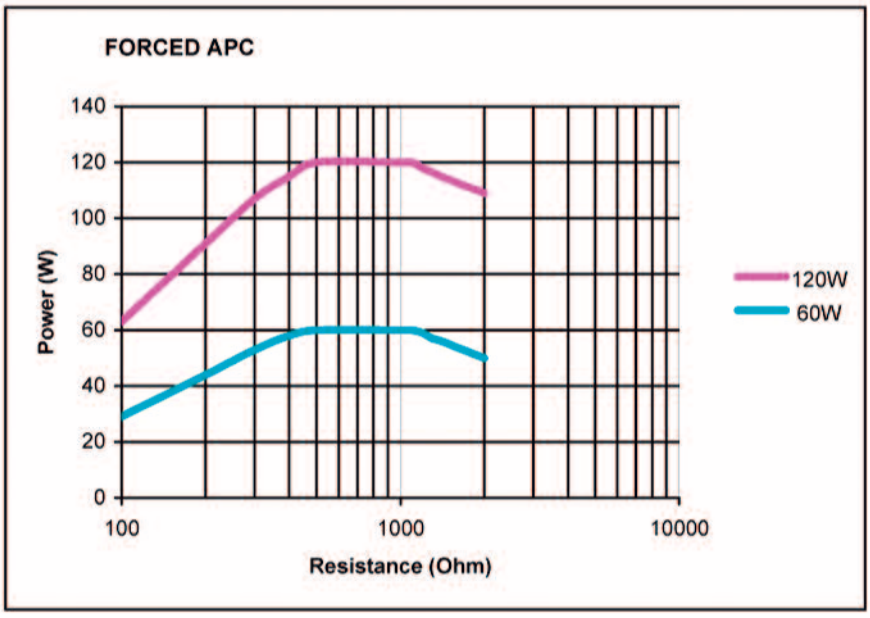


Fig. 11-2

Art.-Nr.:80104-501
12/ 2004

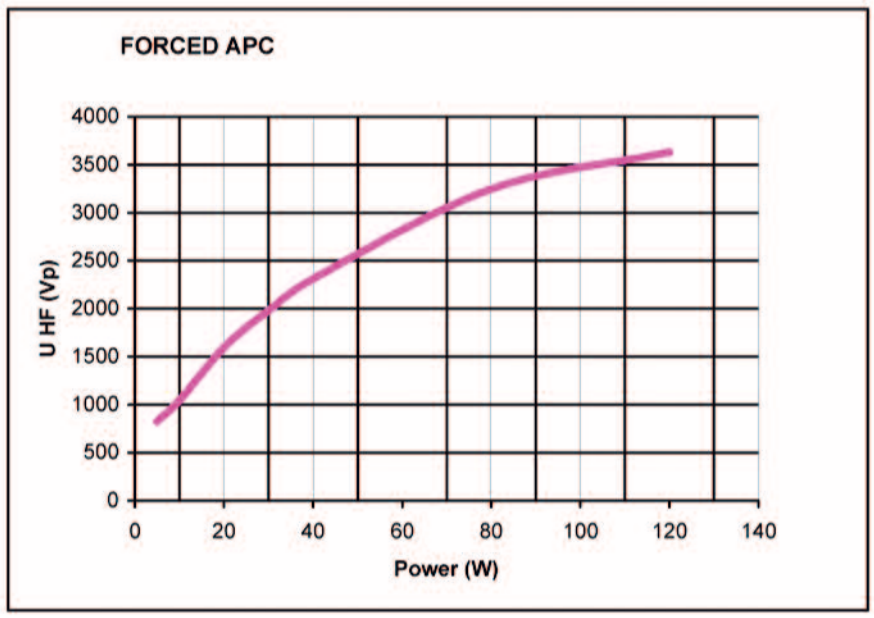


Fig. 11-3

PRECISE APC

Art.-Nr.:80104-501
12/ 2004

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".

Modulation PRECISE APC is a current waveform which is modulated by the spark signal. Finer graduation of the effect levels is achieved using the "Modulation" value. This means the larger the "Modulation" value, the closer the thermal effect is to the next highest effect level.

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	4,300 Vp
Number of effects	8

Constancy of effects	automatic control of arc intensity
Max. power output at rated load resistor	160 watts ± 20%

Performance diagram

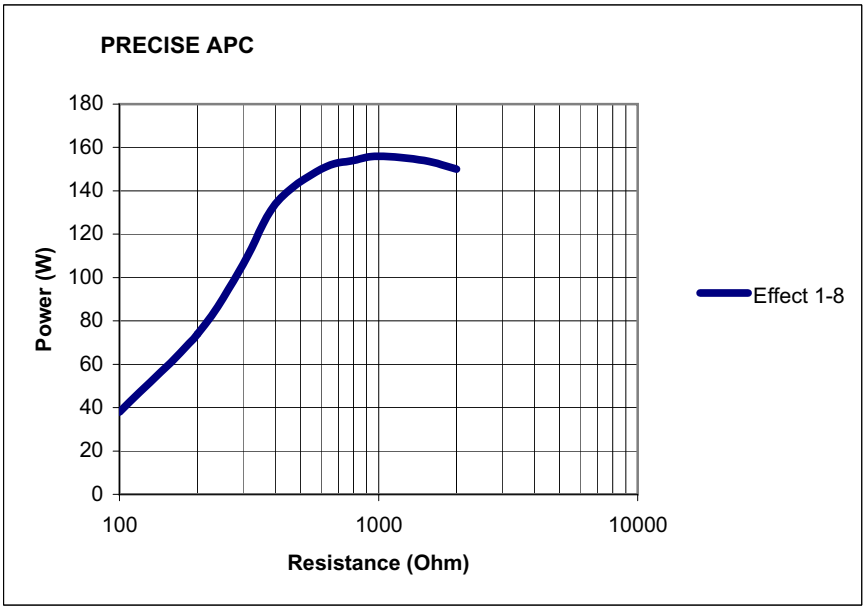
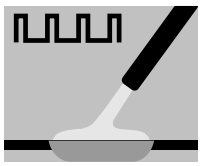


Fig. 11-4

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)
Crest factor	7.4 (at R_L = 500 ohms)
Rated load resistor	500 ohms
Max. HF peak voltage	4,300 Vp
Number of effects	2

Art.-Nr.:80104-501
12/ 2004

Constancy of effects	Restriction of HF peak voltage
HF power limitation	1 W to 120 W in 1 W steps
Max. power output at rated load resistor	120 watts ± 20%

Performance diagrams

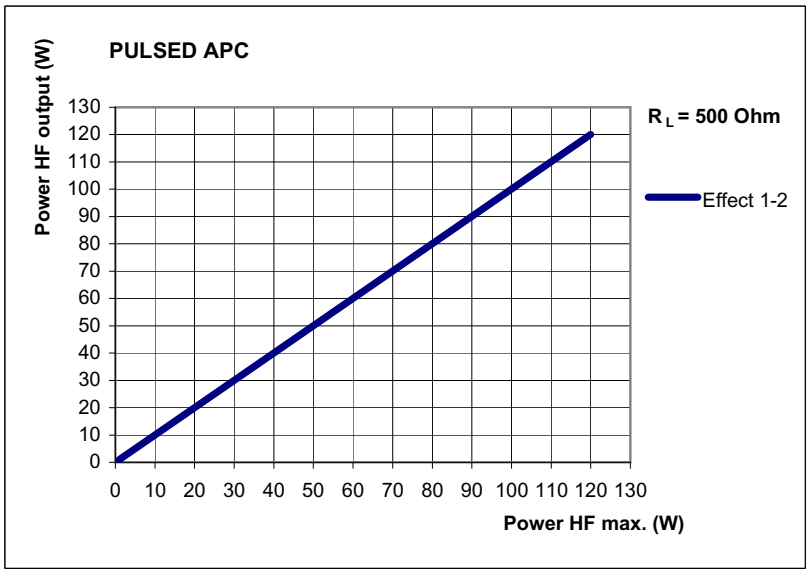


Fig. 11-5

Art.-Nr.:80104-501
12/ 2004

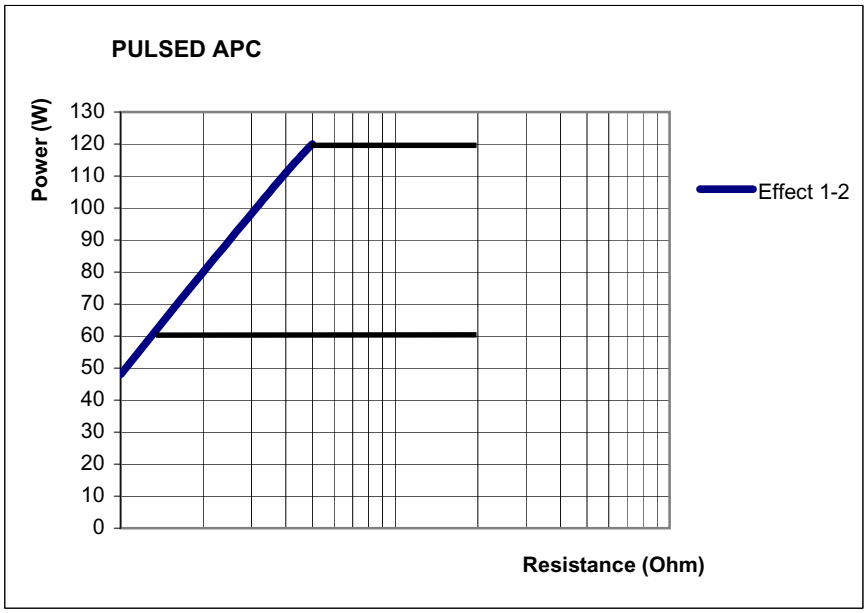


Fig. 11-6

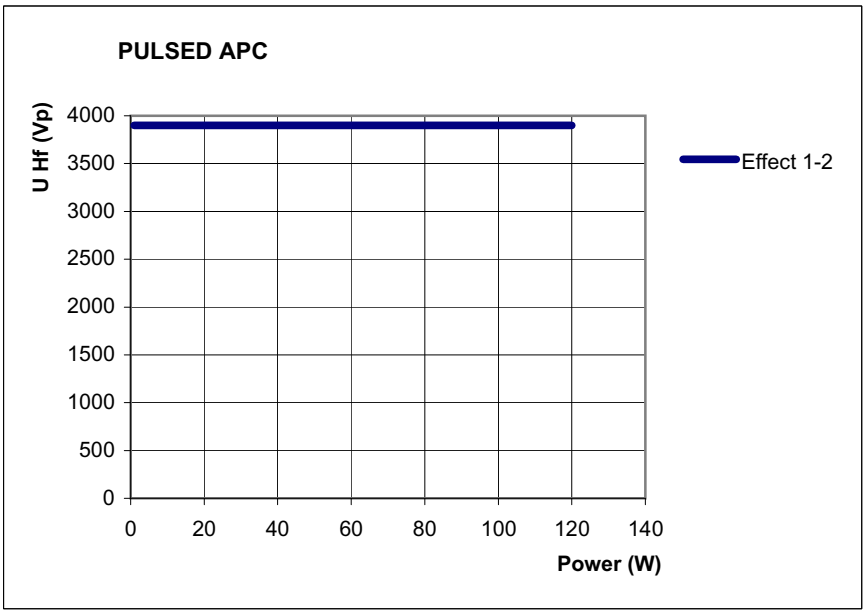
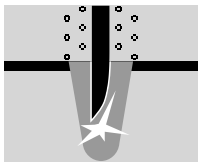


Fig. 11-7

Argon-assisted AUTO CUT Mode



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)
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	10 W to 300 W in 1 W steps
Max. power output at rated load resistor	300 watts ± 20%

Art.-Nr.:80104-501
12/ 2004

Performance diagrams

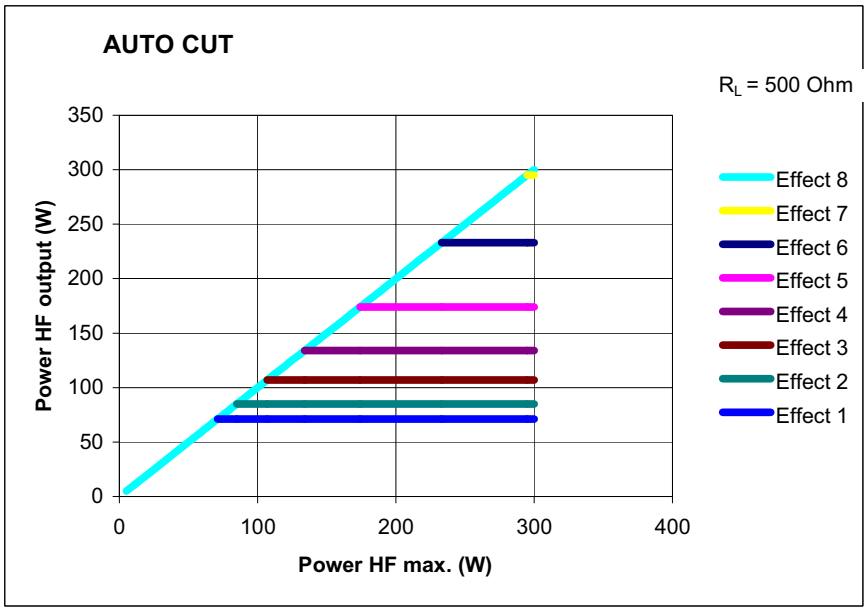


Fig. 11-8

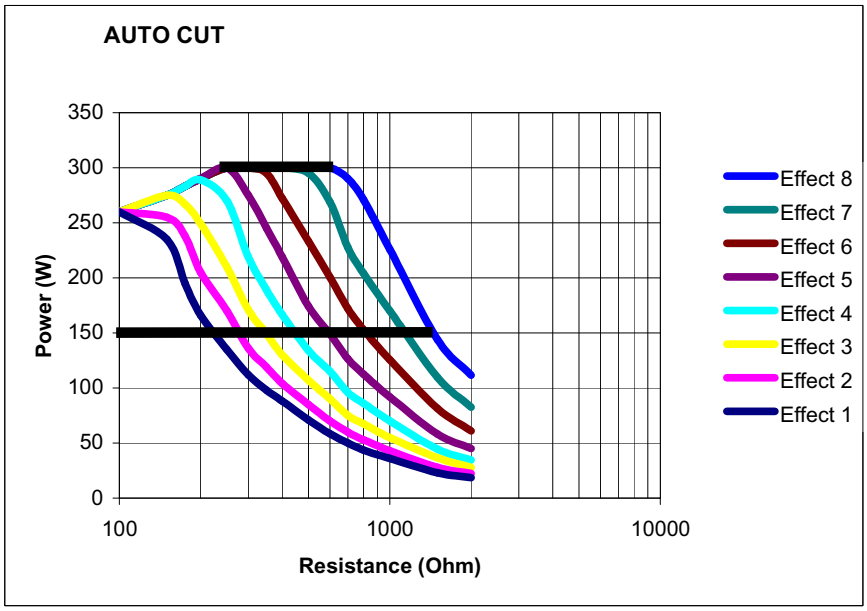


Fig. 11-9

Art.-Nr.:80104-501
12/ 2004

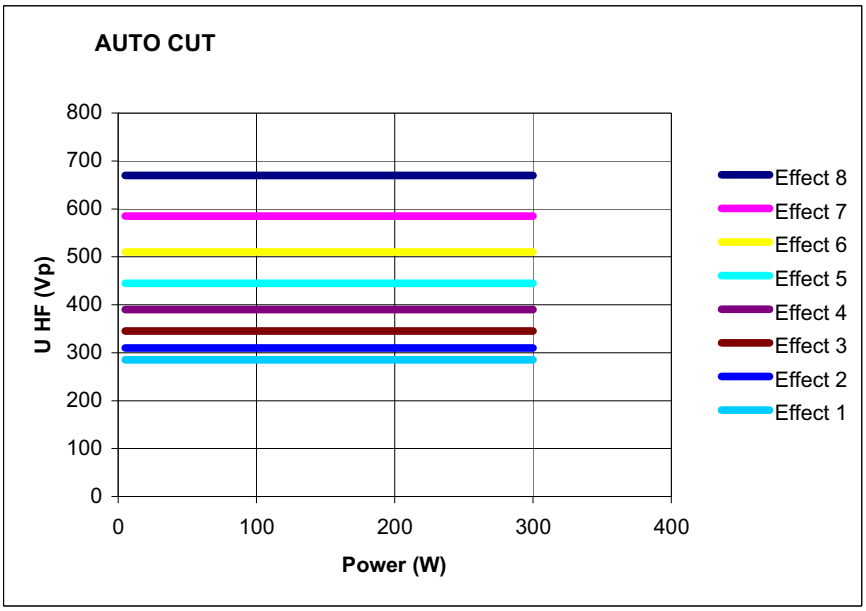
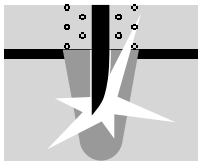


Fig. 11-10

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)
Crest factor	1.4 (at R_L = 500 ohms)
Rated load resistor	500 ohms
Max. HF peak voltage	950 Vp (with an arc)
Number of effects	8
Constancy of effects	automatic control of arc intensity
HF power limitation	10 W to 300 W in 1 W steps
Max. power output at rated load resistor	300 watts ± 20%

Art.-Nr.:80104-501
12/ 2004

Performance diagrams

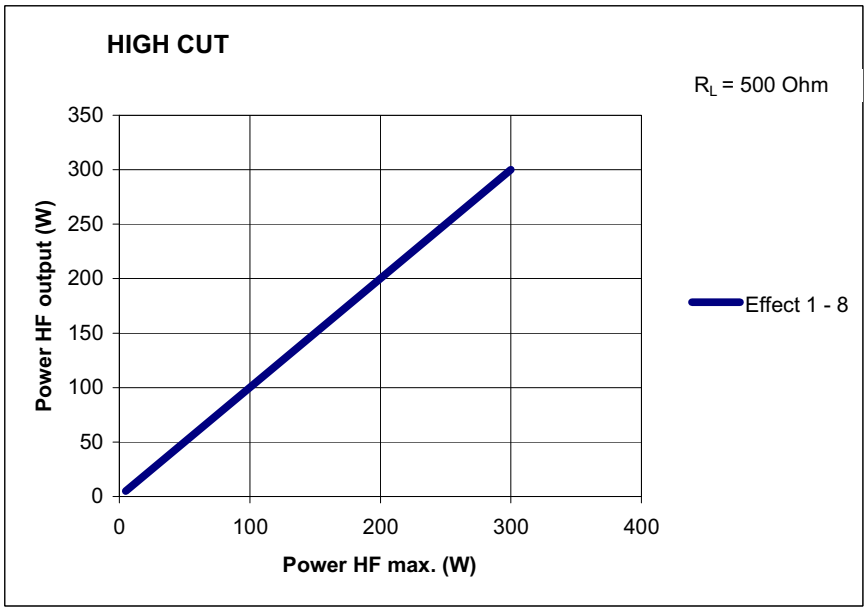


Fig. 11-11

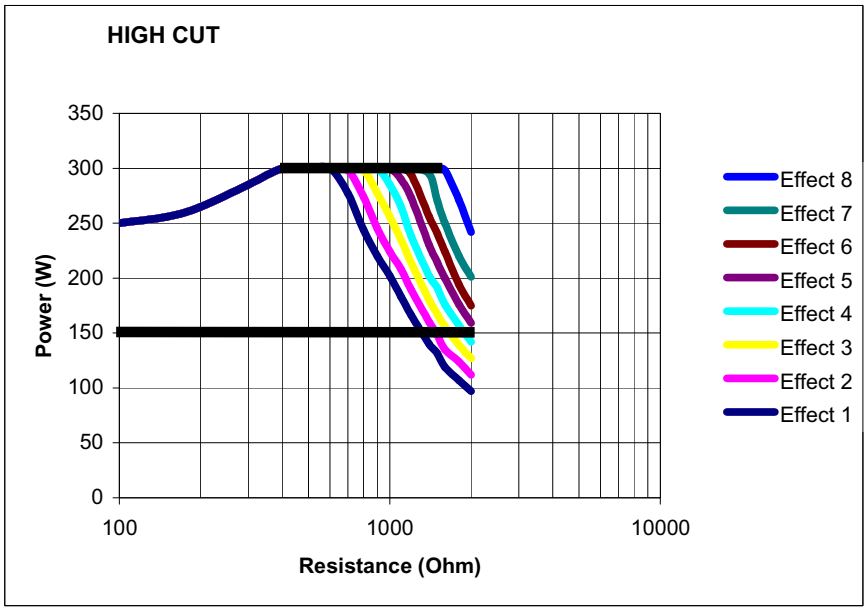


Fig. 11-12

Art.-Nr.:80104-501
12/ 2004

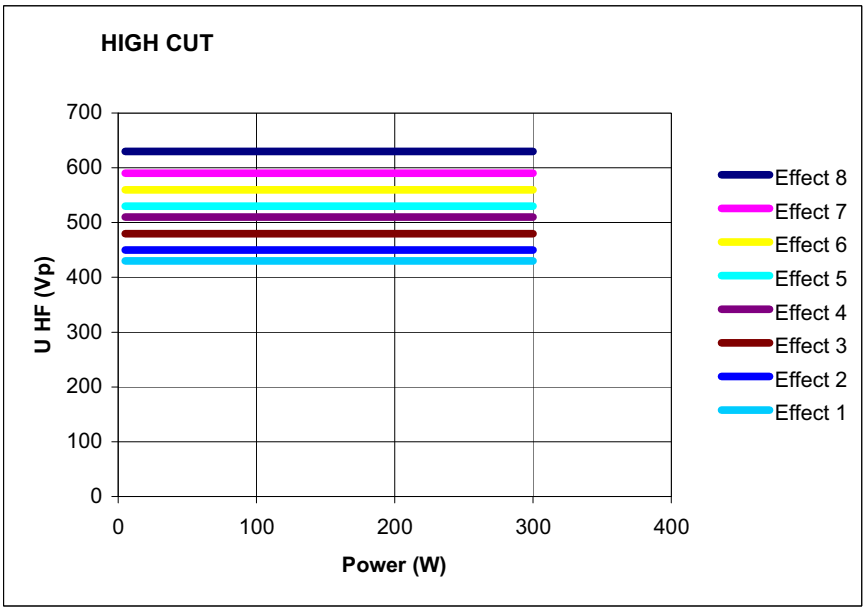
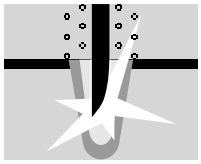


Fig. 11-13

Argon-assisted DRY CUT Mode



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)
Crest factor	effect 1-4: 3.0 effect 5+6: 3.2 effect 7+8: 3.8 (at R_L = 500 ohms)
Rated load resistor	500 ohms
Max. HF peak voltage	1,450 Vp
Number of effects	8
Constancy of effects	automatic control of HF peak voltage

Art.-Nr.:80104-501
12/ 2004

HF power limitation	10 W to 200 W in 1 watt steps
Max. power output at rated load resistor	200 watts ± 20%

Performance diagrams

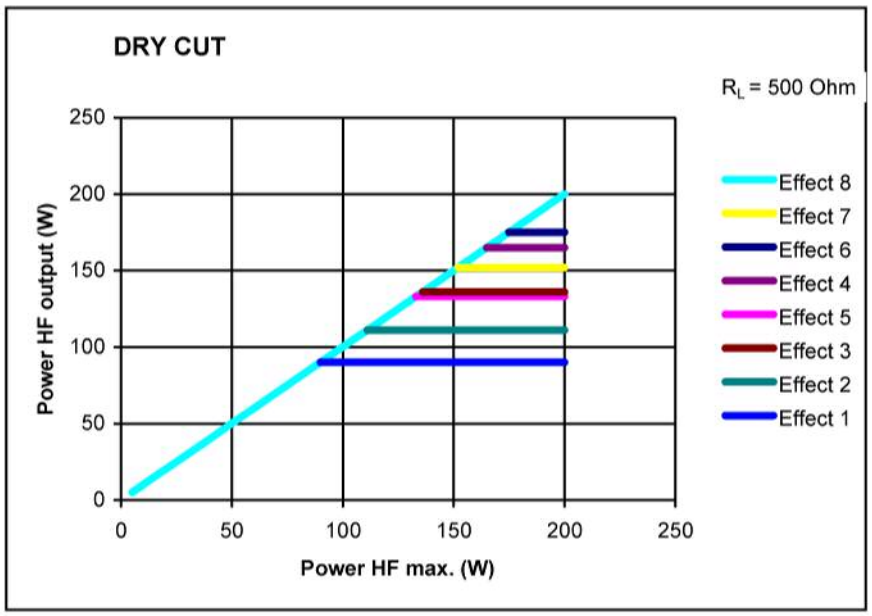


Fig. 11-14

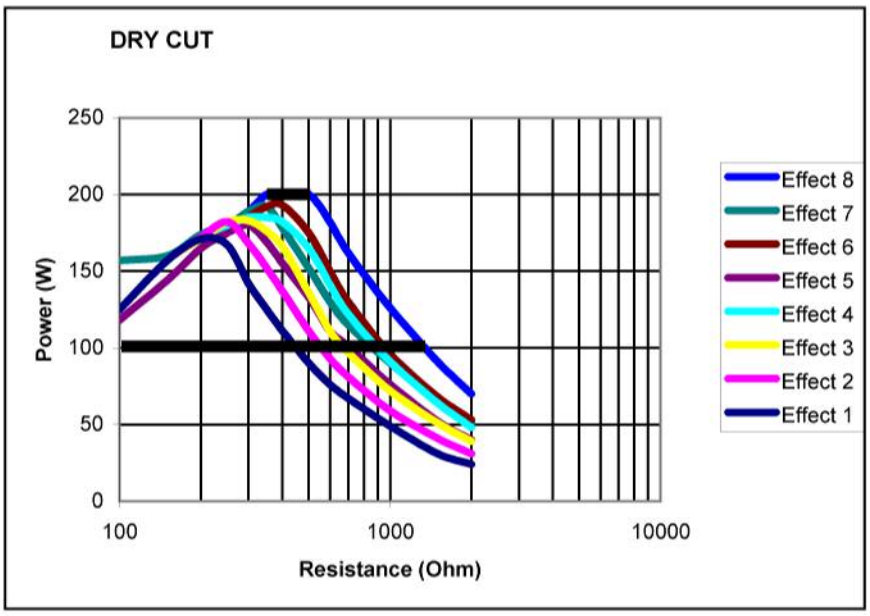


Fig. 11-15

Art.-Nr.:80104-501
12/ 2004

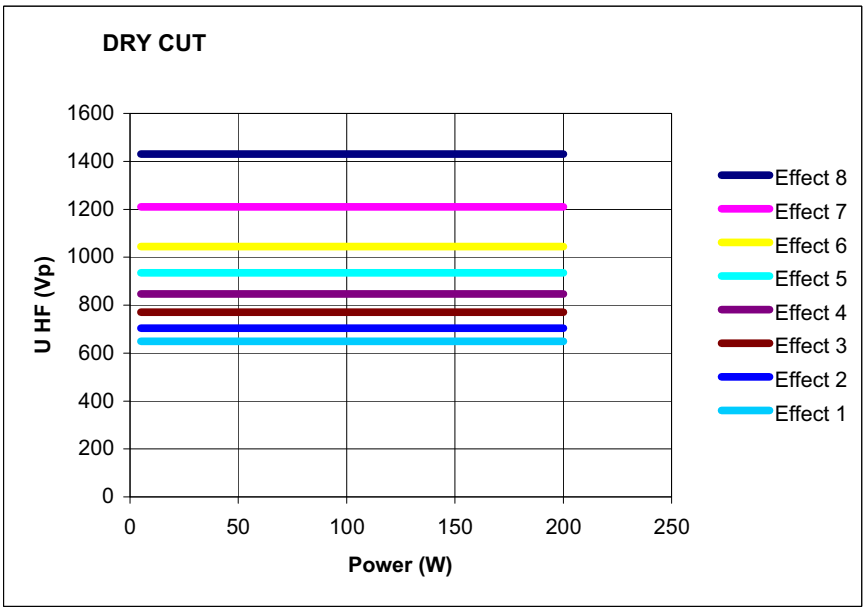


Fig. 11-16

Argon-assisted DRY CUT ° Mode

Properties

Intense haemostasis 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	3.5 (at R_L = 500 ohms)
Rated load resistor	500 ohms
Max. HF peak voltage	1550 Vp
Number of effects	8
Constancy 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%

Art.-Nr.:80104-501
12/ 2004

Performance diagrams

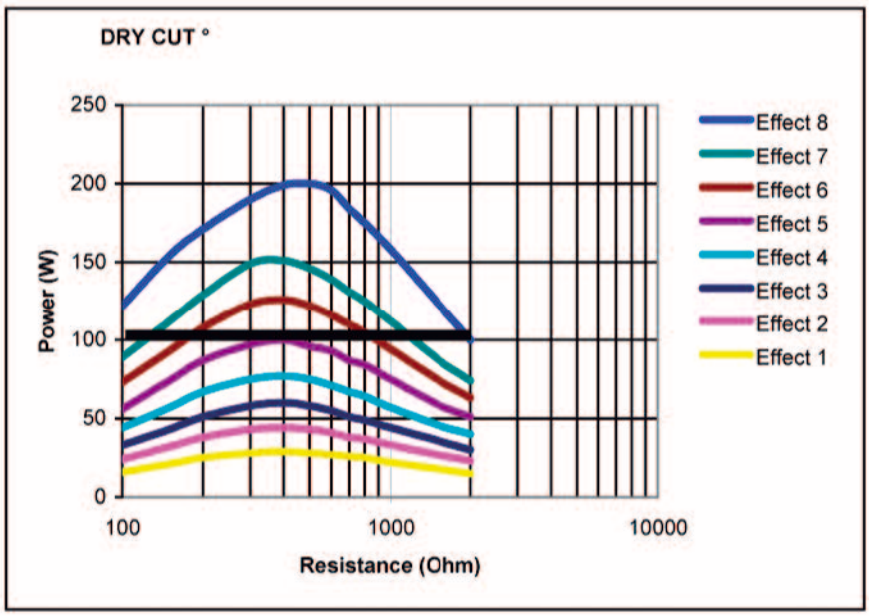


Fig. 11-17

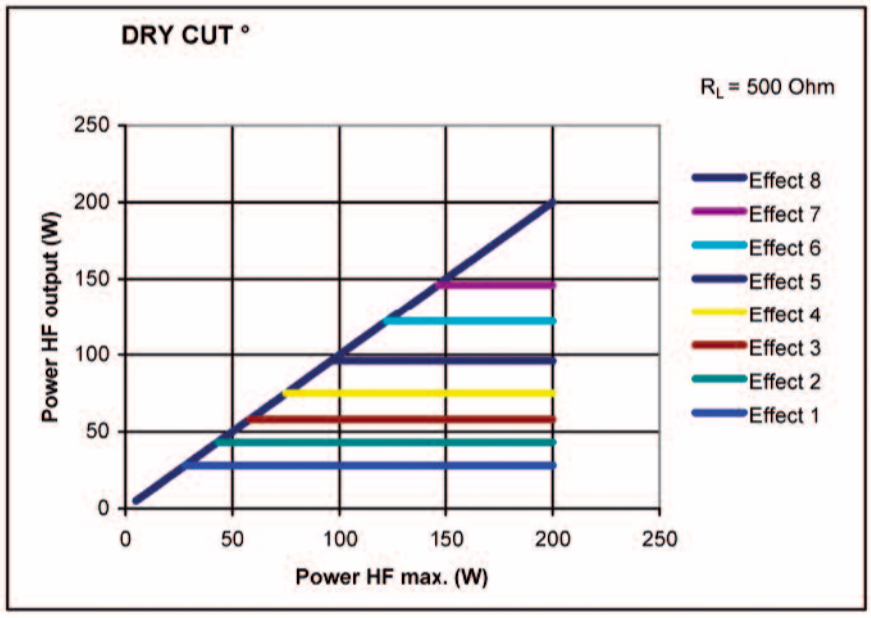


Fig. 11-18

Art.-Nr.:80104-501
12/ 2004

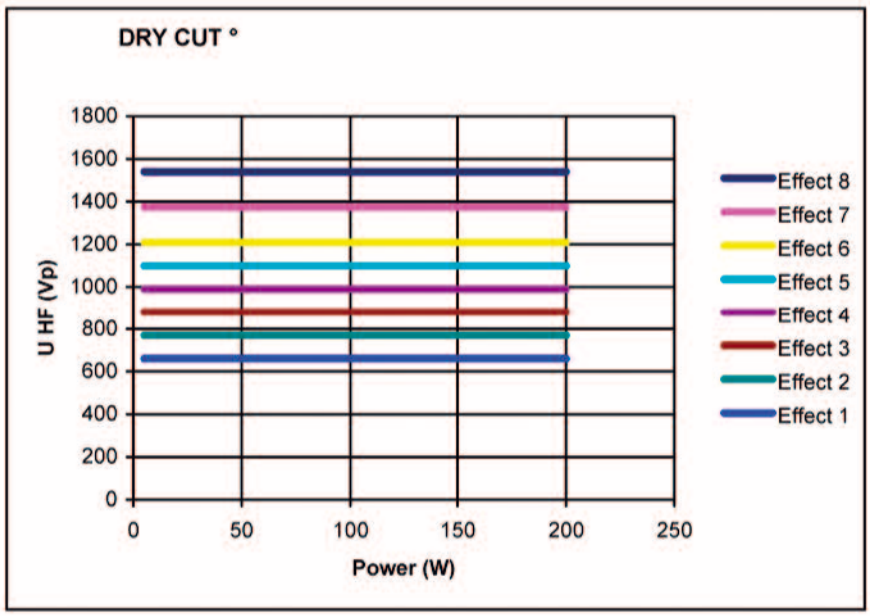
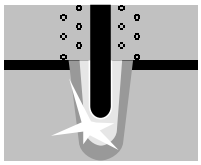


Fig. 11-19

Argon-assisted SWIFT COAG Mode



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	5.4 (at R_L = 500 ohms)
Rated load resistor	500 ohms
Max. HF peak voltage	2,500 Vp
Number of effects	8
Constancy 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%

Art.-Nr.:80104-501
12/ 2004

Performance diagrams

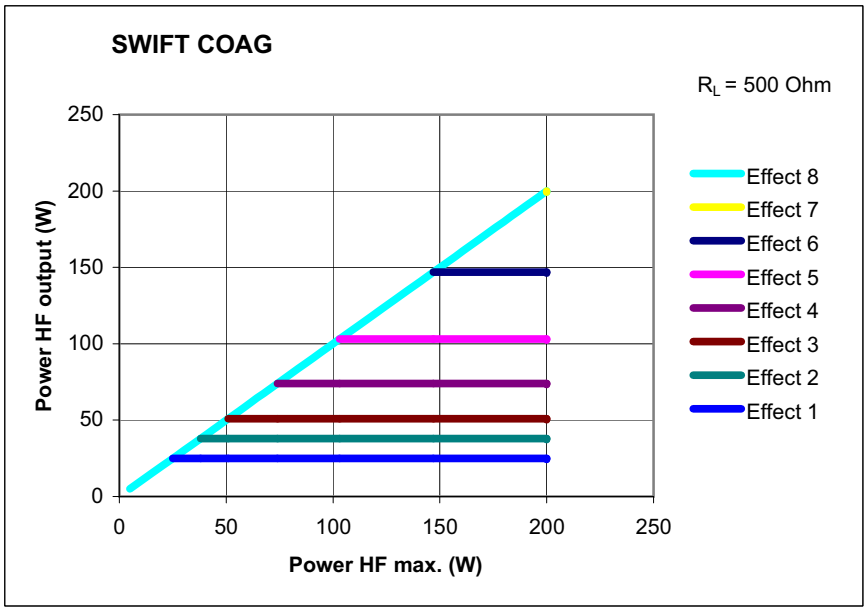


Fig. 11-20

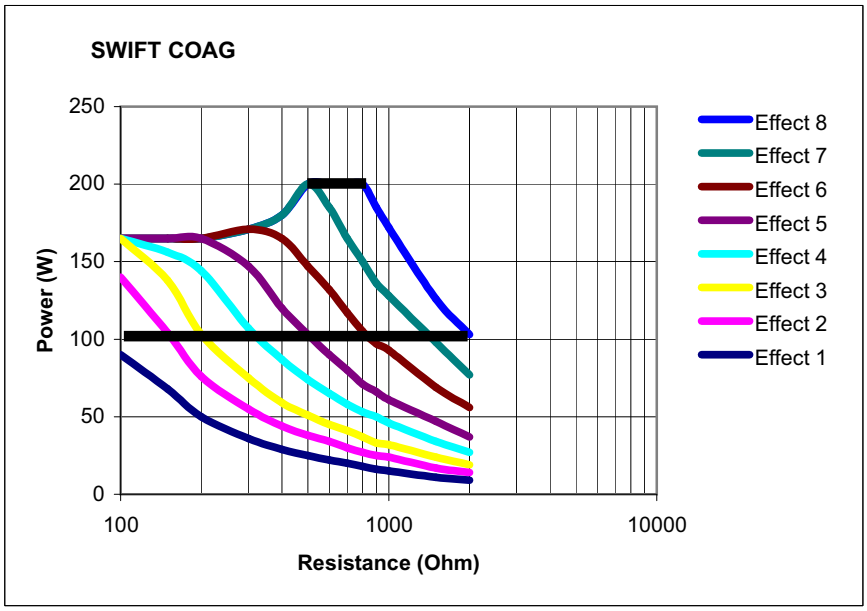


Fig. 11-21

Art.-Nr.:80104-501
12/ 2004

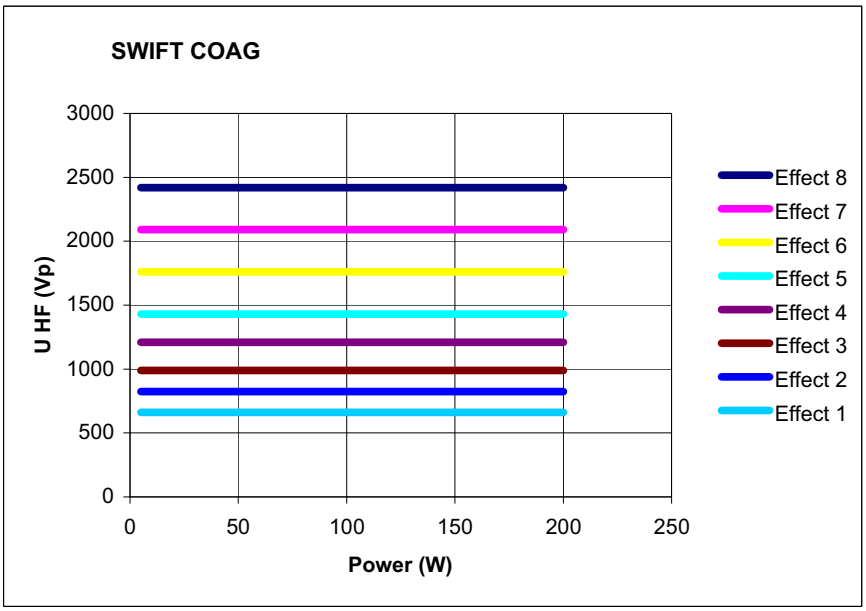
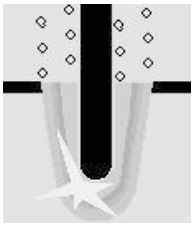


Fig. 11-22

Argon-assisted SWIFT COAG ° Mode



Note: The Mode, as with Argon-assisted DRY CUT °, can only be selected through the service program.

Art.-Nr.:80104-501
12/ 2004

Properties

Fast effective coagulation which is very suitable for dissection with high haemostasis 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	3.5 (at R_L = 500 ohms)
Rated load resistor	500 ohms
Max. HF peak voltage	1550 Vp
Number of effects	8

Constancy 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%

Performance diagrams

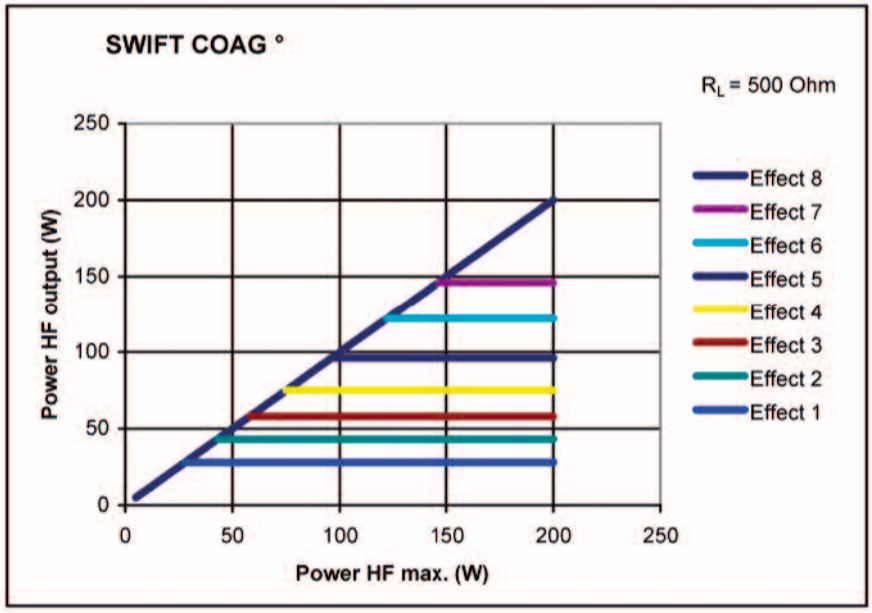


Fig. 11-23

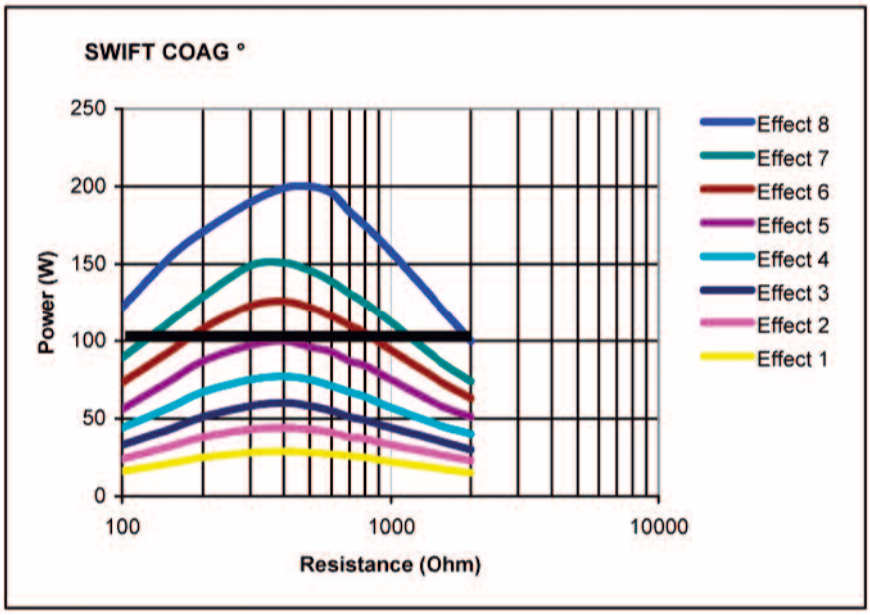


Fig. 11-24

Art.-Nr.:80104-501
12/ 2004

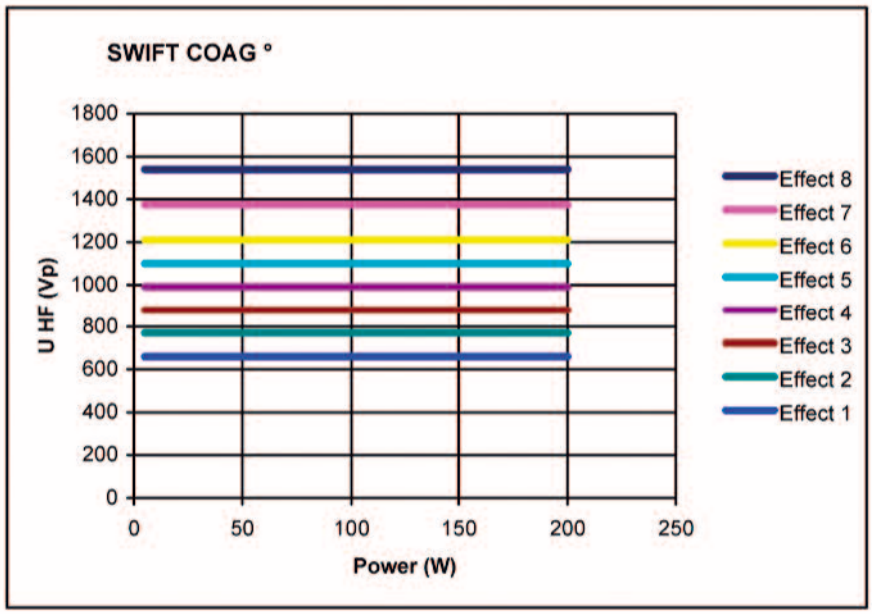
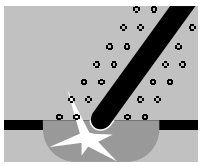


Fig. 11-25

Argon-assisted FORCED COAG Mode



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	6.0 (at R_L = 500 ohms)
Rated load resistor	500 ohms
Max. HF peak voltage	1800 Vp
Number of effects	4
Constancy 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%

Art.-Nr.:80104-501
12/ 2004

Performance diagrams

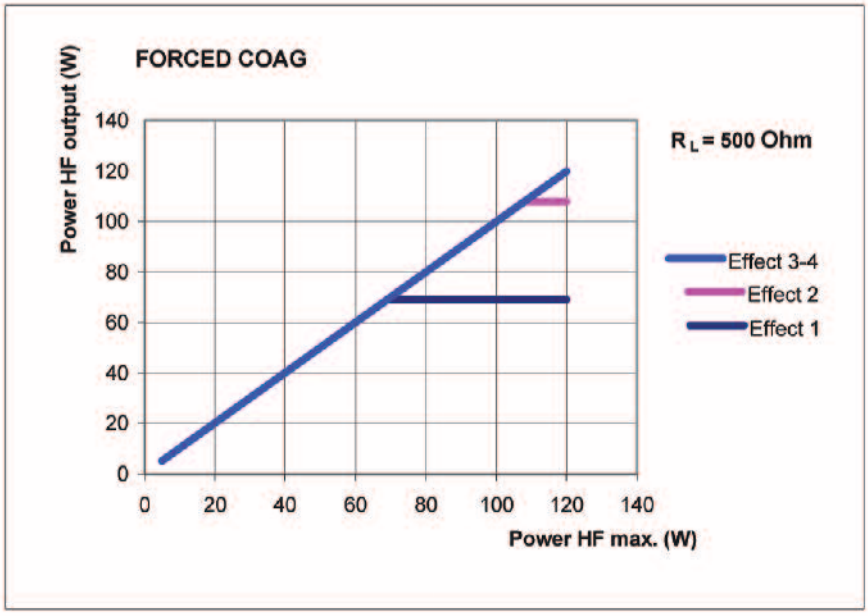


Fig. 11-26

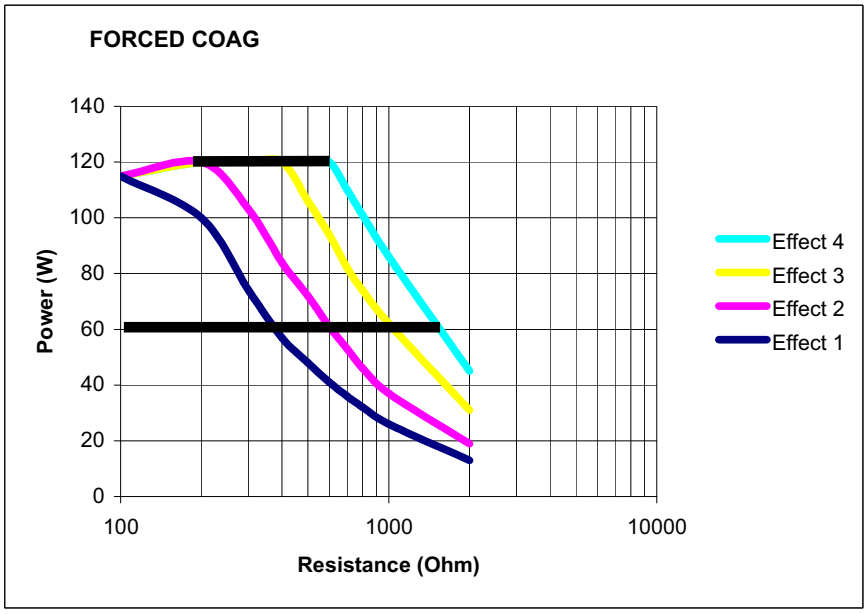


Fig. 11-27

Art.-Nr.:80104-501
12/ 2004

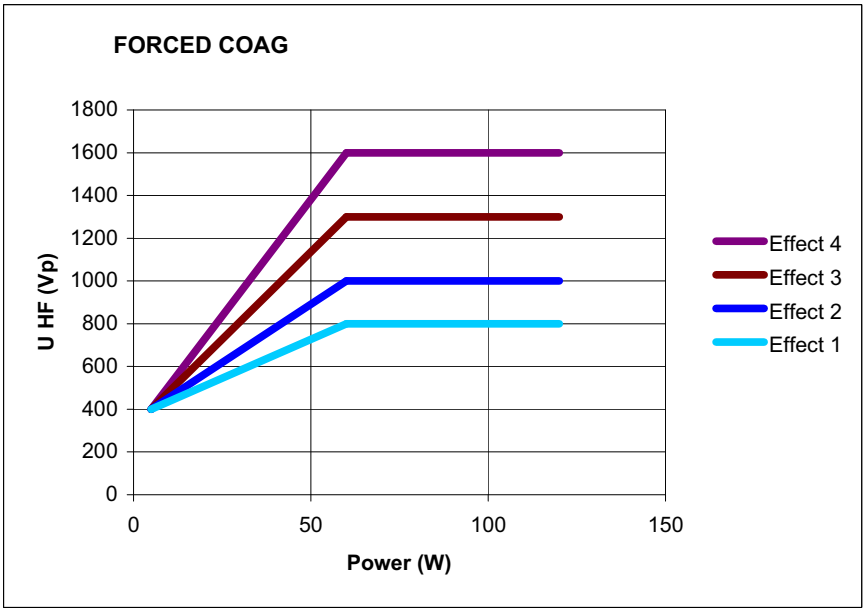
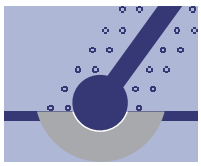


Fig. 11-28

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.

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)

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 ohms

Art.-Nr.:80104-501
12/ 2004

Max. HF peak voltage	190 Vp
Number of effects	8
Constancy 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%

Performance diagrams

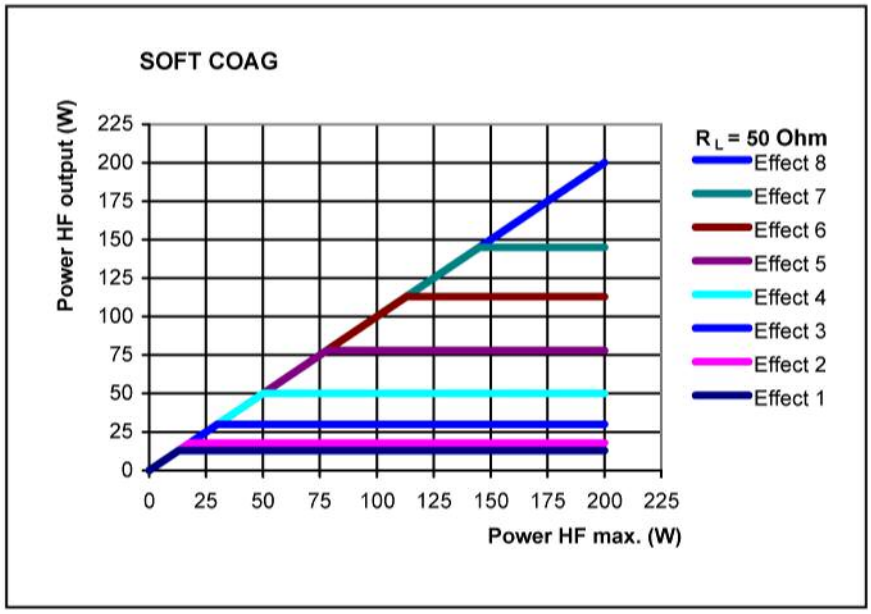


Fig. 11-29

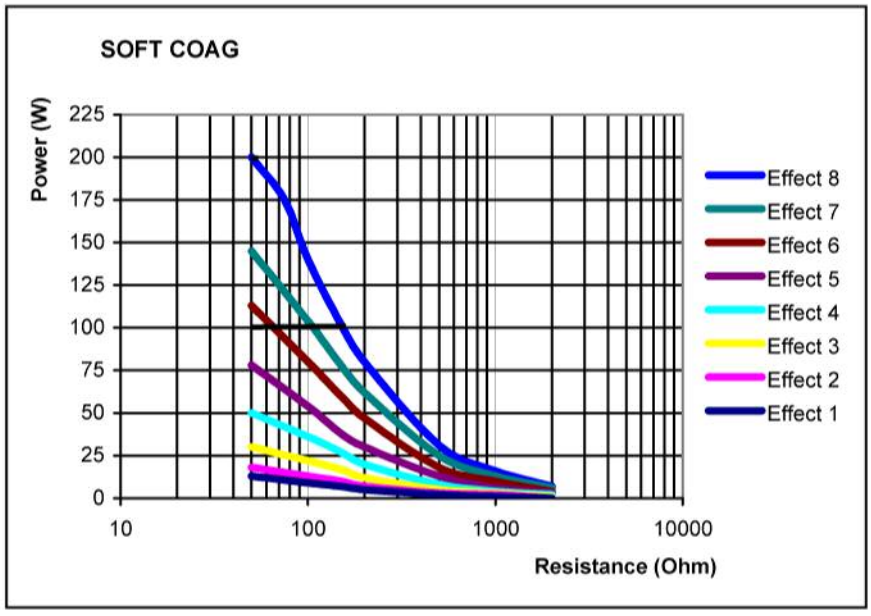


Fig. 11-30

Art.-Nr.:80104-501
12/ 2004

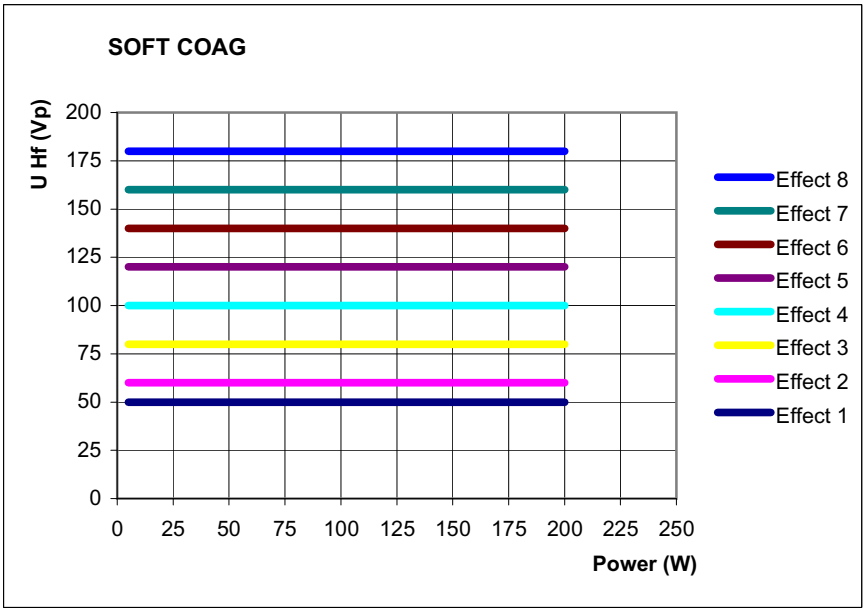


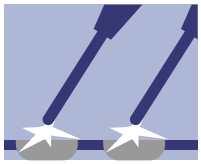
Fig. 11-31

Art.-Nr.:80104-501
12/ 2004

CHAPTER 12

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	5.0 (at R_L = 500 ohms)
Rated load resistor	500 ohms
Max. HF peak voltage	2000 Vp
Number of effects	8
Constancy 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%

Art.-Nr.:80104-501
12/ 2004

Performance diagrams

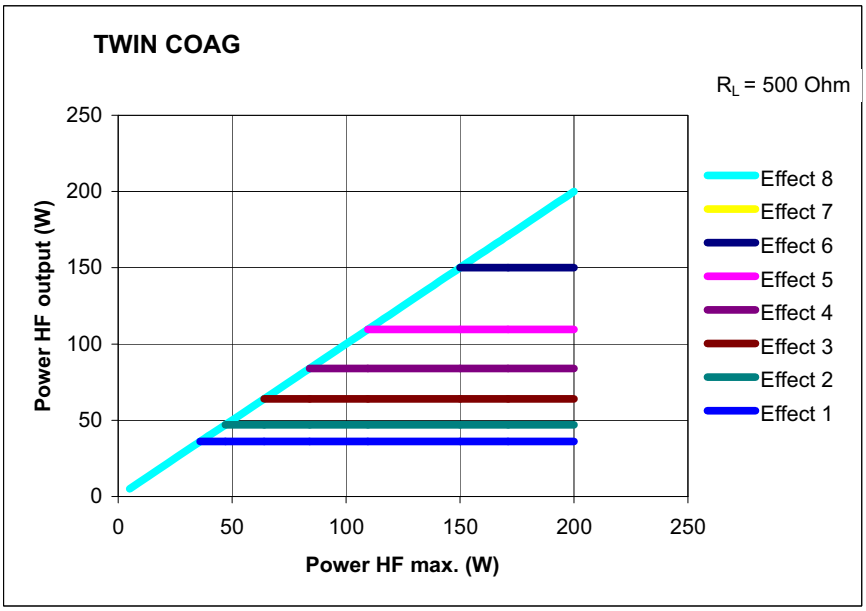


Fig. 12-1

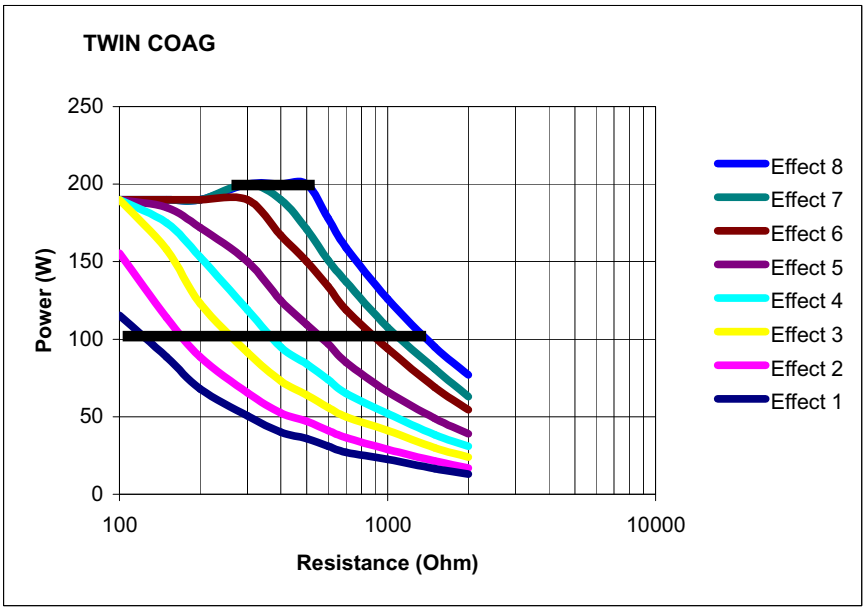


Fig. 12-2

Art.-Nr.:80104-501
12/ 2004

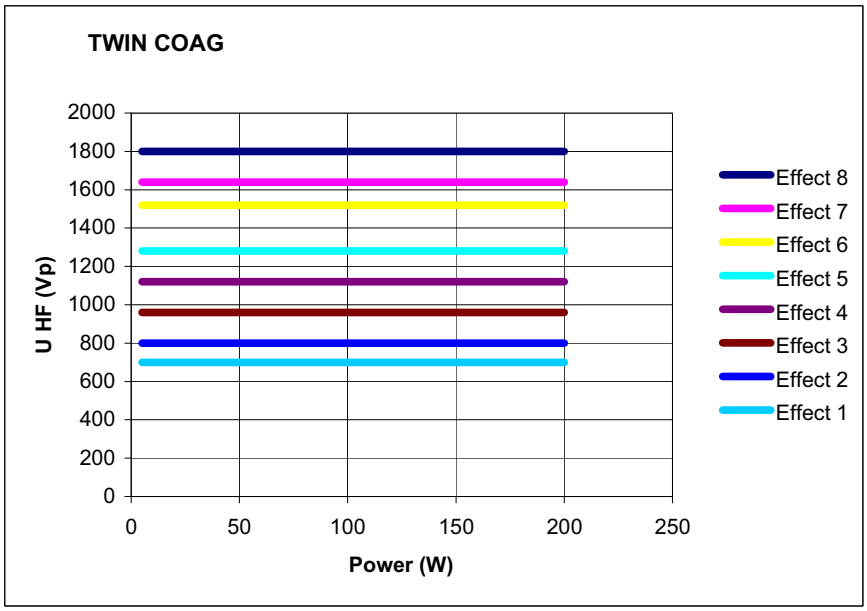


Fig. 12-3

Art.-Nr.:80104-501
12/ 2004

Art.-Nr.:80104-501
12/ 2004

CHAPTER 13

Installation

Ambient conditions

Do not operate in potentially explosive atmospheres

WARNING! The device may only be operated in rooms used for medical purposes. Position the device in such a way that it is located outside of potentially explosive atmospheres. Potentially explosive atmospheres can form due to the use of combustible anesthetics, skin cleansers and disinfectants.

Operating conditions

ATTENTION: The device must be operated at a certain temperature and humidity. You will find the specified temperature and humidity in the Technical Data. If levels exceed or fall below the tolerances specified there, the device may fail. If other conditions have to be observed for operation of this device, you will also find them in the Technical Data.

Portable and mobile communication equipment HF

ATTENTION: Portable and mobile communication equipment HF can influence the device.

Transport and storage

ATTENTION: The device must be stored and transported at a certain temperature and humidity. You will find the specified temperature and humidity in the Technical Data. If levels exceed or fall below the tolerances specified there, the device may fail. If other conditions have to be observed for operation of this device, you will also find them in the Technical Data.

Art.-Nr.:80104-501
12/ 2004

Acclimatization

ATTENTION: If the device was stored or transported below a certain temperature, it will take a certain time to acclimatize to room temperature. You will find the temperature and acclimatization time in the Technical Data.

Ventilation

ATTENTION: The device must be installed in such a way that there is an unobstructed circulation of air around the housing. Installation in confined wall recesses is not permitted.

Penetration of liquids

ATTENTION: The housing is not absolutely watertight. Therefore do not place the device in the immediate vicinity of tubes or tanks containing liquids.

Electrical installation

Power cord, power outlet

WARNING! The supply voltage must match the voltage specified on the rating plate. Connect the unit / the equipment cart to a properly installed grounded outlet. Only use the ERBE power cord or an equivalent power cord for this purpose. The power cord must bear the national test symbol.

Inspecting the equipment, equipment cart, accessories

WARNING! Inspect the equipment or equipment cart and the accessories (e.g. foot control, cable) for damage after every period of use. You must not use damaged equipment, a damaged equipment cart or damaged accessories. Exchange defective accessories. If the equipment or equipment cart is damaged, please contact our customer service. For your safety and that of patients, never attempt to effect repairs yourself. Any modification will invalidate liability on the part of ERBE Elektromedizin GmbH.

Power fuses

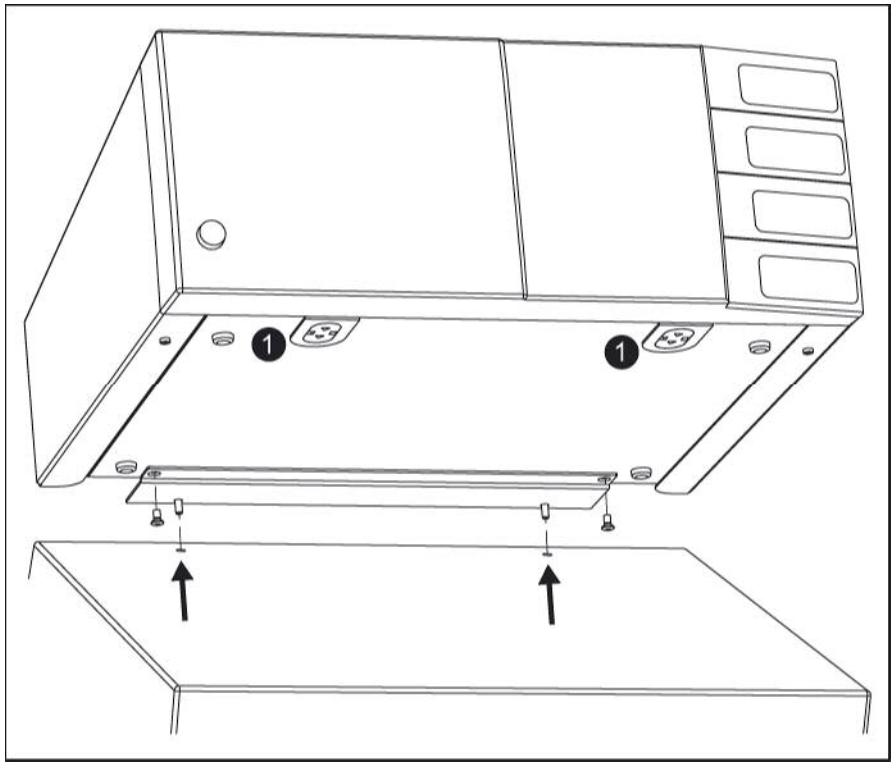
WARNING! The unit is protected with power fuses. They can be found in the fuse drawer next to the power connection of the unit. If one of these power fuses has

blown, the unit may not be used on the patient again until it has been checked by a competent technician. Only spare fuses with the values indicated on the unit rating plate may be used.

Potential equalisation

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

Install electrosurgical unit on overhead support



Art.-Nr.:80104-501
12/ 2004

Fig. 13-1

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.

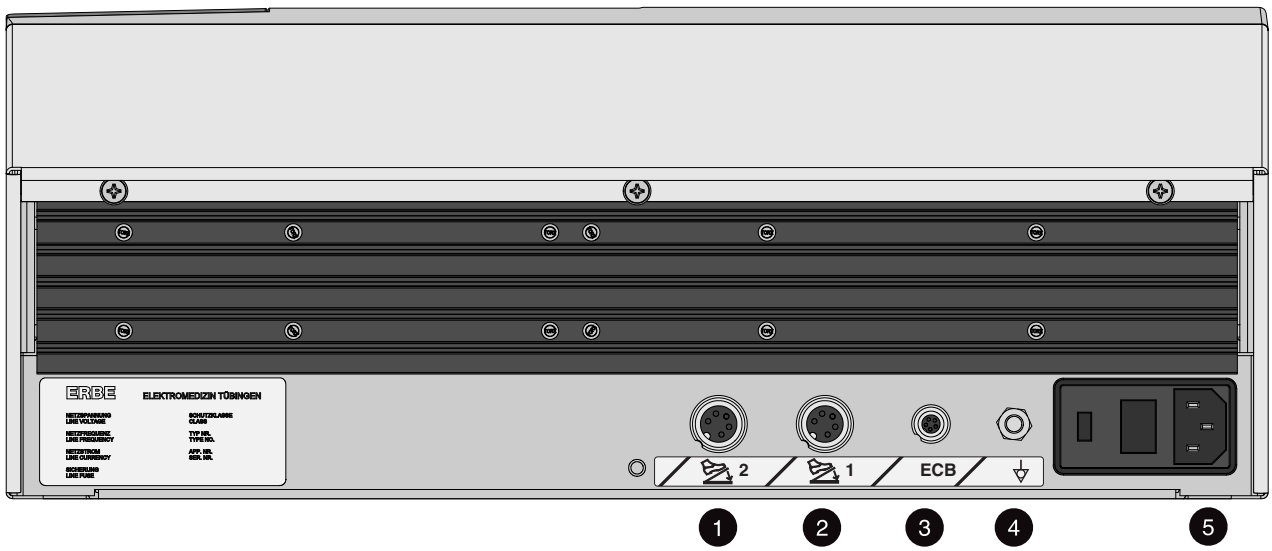


Fig. 13-2

Sockets

(1) and (2) footswitch sockets

You can connect a single-pedal and a dual-pedal footswitch to these receptacles. The dual-pedal footswitch can be connected to either receptacle (1) or receptacle (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.

Art.-Nr.:80104-501
12/ 2004

Potential equalization

(4) Potential equalization terminal

Connect a potential equalization line and connect this to the potential equalization system of the operating room.

Power connection

(5) Power connection

Connect the unit to a properly installed grounded outlet. Only use the ERBE power cord or an equivalent power cord for this purpose. The power cord must bear the national test symbol.

Installing the unit on an ERBE equipment cart

Please read the user manual for the equipment cart concerned. There you will find instructions on how to secure the unit to the equipment cart.

Art.-Nr.:80104-501
12/ 2004

CHAPTER 14

Cleaning and Disinfection

Wipe disinfection

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

Instructions for cleaning and disinfection

WARNING! Ensure that you disconnect the equipment or equipment cart from the power supply before starting cleaning and disinfection. Unplug the power connector!

WARNING! Ensure that you disconnect the equipment or equipment cart from the power supply before starting cleaning and disinfection. Unplug the power connector!

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 ensuring that they are uniformly treated. Comply with the action time of the disinfectant specified by the manufacturer.

Art.-Nr.:80104-501
12/ 2004

Safety Instructions

WARNING! Moisture must not penetrate the equipment. Drain off any ingress of liquid immediately. The equipment must be used again only when this liquid has completely evaporated.

ATTENTION: Do not alternate between using disinfectant solutions based on different active ingredients. A color reaction may occur with plastics.

WARNING! Do not clean or disinfect surfaces with combustible or explosive products. If their use cannot be avoided, combustible or explosive products must have completely evaporated before the unit is switched on.

ATTENTION: Do not treat surfaces with alcohol-based spray disinfectants for fast disinfection. With elastic moulded parts, keyboards and paint surfaces there is the risk of cracks. Propanol and ethanol will attack surfaces.

ATTENTION: If alcoholic disinfectants are used on units with foil keyboards, this may take off the anti-glare finish. The user surfaces still remain fully functional without presenting any risk.

Art.-Nr.:80104-501
12/ 2004

CHAPTER 15

Status Messages, Error Messages

The VIO system displays two different types of error messages: error messages which prompt you to take action and rectify the error, and error messages occurring with errors which can only be rectified by the Technical Service. You will then see one of the following messages:

- Activation has been interrupted due to an error. If the error recurs, please inform Technical Service.
- Minor deviation from the system parameters. If this message is repeated, 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.
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.
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.

Art.-Nr.:80104-501
12/ 2004

Error Messages	
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-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.
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-B0	NESSY symmetry. When applying neutral electrode (patient plate), ensure that neutral electrode line of symmetry runs towards the operating field.

Art.-Nr.:80104-501
12/ 2004

Error Messages	
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.
X 81 - 86	Fault with instrument detection. Do not use instrument; have it checked.

Art.-Nr.:80104-501
12/ 2004

Art.-Nr.:80104-501
12/ 2004

CHAPTER 16

General Technical Data

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

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

Art.-Nr.:80104-501
12/ 2004

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%, noncondensing

Acclimatizing
If the unit has been stored or transported at temperatures below + 10 °C, in particular under 0 °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

Art.-Nr.:80104-501
12/ 2004

CHAPTER 17

Information on electromagnetic compatibility (EMC)

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

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

When VIO electrosurgical units are activated, disturbance of other equipment or systems in the immediate vicinity can occur. This can be recognised as, for example, image artifacts in imaging devices 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 equipment in the immediate vicinity does not occur.

ATTENTION: The use of internal cables other than those specified in the Service Manual may result in increased emissions or decreased immunity of the equipment.

ATTENTION: The equipment should not be used adjacent to or stacked with equipment, other than with that which is intended for this purpose. If adjacent or stacked use is necessary, the entire system should be observed to verify normal operation in the configuration in which it will be used.

Art.-Nr.:80104-501
12/ 2004

Guidance and manufacturer's declaration - electromagnetic emissions

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

Emissions test	Compliance	Electromagnetic environment - guidance
HF emissions CISPR 11	Group 1	In the stand-by state the equipment uses HF energy only for its internal function. Therefore its HF emissions are very low in the stand-by state and are not likely to cause any interference in nearby electronic equipment.
HF emissions CISPR 11	Class B	The equipment is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations/flicker emissions IEC 61000-3-3	Complies	

Guidance and manufacturer's declaration - electromagnetic immunity

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

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
Electrostatic discharge (ESD) IEC 61000-4-2	±6 kV contact ±8 kV air	±6 kV contact ±8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with non-conductive synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	±2 kV for power supply lines ±1 kV for input/output lines	±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 interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5% U_T (>95% dip in U_T) for 0.5 cycle 40% U_T (60% dip in U_T) for 5 cycles 70% U_T (30% dip in U_T) for 25 cycles <5% U_T (>95% dip in U_T) for 5 s	<5% U_T (>95% dip in U_T) for 0.5 cycle 40% U_T (60% dip in U_T) for 5 cycles 70% U_T (30% dip in U_T) for 25 cycles <5% U_T (>95% dip in U_T) for 5 s	Mains power quality should be that of a typical commercial or hospital environment. If the user of the equipment requires continued operation during power mains interruptions, it is recommended that the equipment be powered from an uninterruptible power supply or a battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 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.

Art.-Nr.:80104-501
12/ 2004

Guidance and manufacturer's declaration - electromagnetic immunity

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

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
			Portable and mobile HF communications equipment should be used no closer to any part of the equipment, including cables, than the recommended separation distance. The separation distance is calculated from various equations depending on the frequency of the portable and mobile HF communications equipment:
			Recommended separation distance
Conducted HF IEC 61000-4-6	3 V_{rms} 150 kHz to 80 MHz	3 V_{rms}	Equation 1) $d=1.2\ P^{1/2}$
Radiated HF IEC 61000-4-3	3 V/m 80 MHz to 800 MHz	3 V/m	Equation 2) $d=1.2\ P^{1/2}$
	3 V/m 800 MHz to 2.5 GHz	3 V/m	Equation 3) $d=2.3\ P^{1/2}$
			P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer. *d* is the recommended separation distance in metres (m). Field strengths from fixed transmitters, as determined by an electromagnetic site survey[a)] should be less than the compliance level in each frequency range[b)]. Interference may occur in the vicinity of equipment marked with the following symbol: 

Note 1: At 80 MHz equation 2) applies At 800 MHz equation 3) applies Note 2: These guidlines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

a) Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed HF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the equipment is used exceeds the applicable compliance level above, the equipment should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the equipment. b) Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.

Art.-Nr.:80104-501
12/ 2004

Recommended separation distances between portable and mobile HF communications equipment and the equipment

The equipment is intended for use in an electromagnetic environment in which radiated HF disturbances are controlled. The customer or the user of the equipment can help prevent electromagnetic interference. This can be achieved by maintaining the minimum distance recommended below between the communications equipment (transmitters) and the equipment. The minimum distance depends on the maximum output power and the frequency of the communications equipment.

Rated maximum output power of transmitter (W)	**Separation distance according to frequency of transmitter (m)**		
	150 kHz to 80 MHz $d=1.2\ P^{1/2}$	**80 kHz to 800 MHz** $d=1.2\ P^{1/2}$	**800 MHz to 2.5 GHz** $d=2.3\ P^{1/2}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance can be determined using the equation applicable to the frequency of the transmitter. P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.Note 1: An additional factor of 10/3 is used in calculating the recommended separation distance for transmitters in the frequency bands between 80 MHz and 2.5 GHz to decrease the likelihood that mobile/portable communications equipment could cause interference if it is inadvertently brought into patient areas. Note 2: These guidlines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

Art.-Nr.:80104-501
12/ 2004

CHAPTER 18

Maintenance, Customer Service, Warranty, Disposal

Maintenance

Modifications and repairs

Modifications and repairs represent preventative maintenance. They must not impair the safety of the equipment or equipment 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 be undertaken only 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.

Safety checks

The safety check consists of preventive maintenance. Here it is checked whether the safety and operational readiness of the unit or the equipment cart and accessories conform to a defined technical required status. A safety check must be performed at least once a year.

What safety checks must be performed?

The following safety checks have been laid down for this unit:

- Checking of labels and User Manual
- Visual inspection of unit and accessories for damage
- Electrical safety checks as per EN 60 601-1
- Testing the grounded conductor
- Leakage current test
- Performance test of all switches and pilot lamps on unit
- Testing the monitoring equipment
- Testing the automatic start mode
- Measurement of power output in CUT mode
- Measurement of power output in COAG mode
- Measurement of high-frequency output in the various modes

The results of these safety checks must be entered in the medical product logbook.

If the safety checks reveal defects which represent a possible hazard to patients, staff or third parties, the unit may not be operated until such defects have been rectified by the specialist technical service.

Customer service

If you are interested in a maintenance contract, please contact ERBE Elektromedizin or an authorized distributor.

Do you have any questions concerning the equipment or instructions for use? Would you like scientific publications from ERBE? If so, contact an ERBE employee or your local branch office. We will be glad to provide further assistance.

Art.-Nr.:80104-501
12/ 2004

Warranty

Inspect the equipment or equipment cart for deficiencies and transport damage immediately on receipt. Claims for compensation for such deficiencies can be accepted only when the seller or transporter is notified without delay. A damage report must be compiled.

The warranty period is 3 years calculated from the date of delivery. A claim under warranty is valid only on presentation of a correctly completed warranty card.

The scope of the warranty covers cost-free repair of equipment or equipment cart provided that the damage was caused by a material or manufacturing deficiency. Other claims, in particular claims for compensation, are excluded.

The repair must be carried out only by ERBE Elektromedizin GmbH or by persons who have been expressly authorized by ERBE. Claims under warranty are void if improper modifications or repairs have been undertaken.

The warranty is neither extended nor renewed by services under warranty.

Disposal

The equipment or equipment cart can be disposed of at the end of their useful life as with normal electronic scrap.

Art.-Nr.:80104-501
12/ 2004