BERCHTOLD

ELEKTROTOM® 630

Service Manual (E)

Valid for version 1170, 1171

Berchtold. Wir helfen

CONTENS PAGE

CONTENS PAGE

1. GENERAL

1.1 Introduction

Electrosurgery belongs to the most important energy applications in surgery. In all surgical disciplines, it remains the most effective means of combining tissue cutting and haemostasis. The electrosurgical unit, the ELEKTROTOM® 630 electrosurgical unit is a modern instrument combining economy with a considerable degree of operative flexibility. The unit has a capable output of 300 Watts.

Particularly important features of the ELEKTROTOM® 630 include:

- Enhanced user simplicity and safety via integrated microprocessor technology
- Three current types offering excellent cutting qualities combined with simultaneous haemostasis
- Bipolar coagulation with up to 95 Watts output
- Contact coagulation up to 120 watts, effective forced coagulation (standard) up to 150 watts, and spray coagulation up to 100 watts.
- User friendly control panel with foil covered pressure pads and digital read-out display
- The highest degree of safety using modern, negative electrode monitoring technology, for both single and split negative electrodes
- A malfunction, error code display system, showing user information and offering assistance during service and repair procedures

All the advantages of the ELEKTROTOM® 630 can be put to optimum use by the user if these instructions are observed. These will assist you in competent operation, correct selection and handling of your HF instruments.

1.2 Manufacturer´s notes

The manufacturer of the products specified in the service manual is

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Ludwigstaler Straße 25
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D-78505 Tuttlingen
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1.3 General information

- Precise observance of the user's manual is a prerequisite for the proper use and correct operation of the equipment, which is essential for the safety of patients and operators alike.
- Only accessories which are specified in this user's manual and which have been tested together with the equipment may be used. If accessories are used which are not specified in the user's manual, their ability to be used in accordance with safety regulations must be proved.

- All literature relates to the equipment model and the prevailing basic safety regulations when printed. All rights are reserved for equipment, switches, procedures, software programs and names.

1.4 Notes on product responsibility

The BERCHTOLD company can only consider themselves responsible for the safety, reliability and function of the product under the following conditons:

a) installation, modifications or repairs have been performed only by BERCHTOLD or by an agent expressly authorized by BERCHTOLD to do so,

b) the electrical installation of the room complies with regulations IEC 60364-710,

c) the product is used in accordance with the operating instructions.

1.5 Routine checks following delivery

The product and accessories should be inspected for possible transport damage or other defects immediately on arrival.

Reclamation regarding damage or defects can only be entertained by the selling organisation (BERCHTOLD GmbH & Co.) or the delivering agency when they are immediately reported. In case of complaint, the forwarding agent or the BERCHTOLD sub-agency must immediately be informed, prior to the submission of a damage / deficiency report to the BERCHTOLD main offices in Germany for further processing by our insurance agents. When returning a unit or one of its components to BERCHTOLD or to a BERCHTOLD service centre, every effort should be made to use the original packaging material. The following information/documentation must also accompany the returned items:Name and address of the owners, product identification number (see plate affixed to unit), Detailed description of the defect.

1.6 EC certification

The equipment complies with the requirements of the EC guideline regarding medical products, 93/42/EEC.

1.7 Repairs

By obvious defect, either of the unit or its connecting cable, it must be repaired or its cable renewed before being used again.

The ELEKTROTOM® 630 may only be repaired by BERCHTOLD or their officially appointed agent.

Should the unit be repaired by an officially appointed agent, the user is required to obtain written confirmation of the work carried out.

This signed confirmation should bare the date of the repair and the details of the officially appointed agent. When repairs are not carried out by BERCHTOLD direct, the repairing organisation must append their details to the unit or, that part of the unit which has been repaired.

1.7.1 Replacement of fuses

The mains fuses is to be found the fuse housing (35) below the mains cable socket (36) at the rear of the unit.

Changing the fuse is performed as follows:

- Remove the mains cable from its socket (36),
- Using a small screw driver, prise open the flap covering the fuse housing (35) and fold it upwards,
- Remove the red fuse holder and replace the defective fuse. Take care to use a fuse of the correct value which is written on the fuse holder. T 6,0 A,
- Re-insert the red fuse holder and close the flap before re-inserting the mains cable in the socket (36).

1.8 Technical safety controls

The following controls must be carried out at least on a yearly basis:

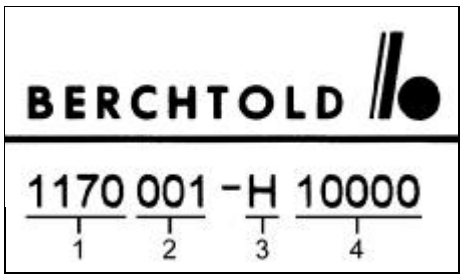
- Visual checking for any mechanical or functional defect
- Safety relevant markings on the unit must be readable
- Checking of the mains fuses against nominal electrical value
- Checking the calibration of the HF current output against the setting of the UP/DOWN button of the control panel
- The actual output measurement for the current modes and the coagulatory modes should be checked to the values the laid down in the specifications for the unit.
- Checking of optical and acoustic signalisation
- Compare protected resistance according to EN 60601-1 with mains connection: Limit 0.2 Ω
- Measure case leakage according to EN 60601-1 Limit 0.50 mA (N.C.) * Limit 1.00 mA (S.F.C.) **
- Gehäuseableitstrom lt. EN 60601-1 messen: Limit 0.10 mA (N.C.) * Limit 0.50 mA (S.F.C.) **
- Measure patient leakage according to EN 60601-1 Limit 0.01 mA (N.C.) * Limit 0.05 mA (S.F.C.) **
- Measure patient leakage according to EN 60601-1 (Mains voltage at used instrument) Limit 0.05 mA (S.F.C.) **

* N.C. = Normal condition
** S.F.C. = Single fault condition

The results of the technical safety checks should be documented.

Should the unit prove to be defective or otherwise unsafe it must not be used until repaired.

1.9 Type plate identification



1 Version number
2 Variant
3 Manufacturing year
4 Serial number

2. COMMISSIONING

2.1 Installation

The unit is intended for use only in a medical environment and connection to the mains must be in accordance with the IEC 60364-710 regulations. Further, connection to the mains should be via a suitably protected socket using the mains lead and plug provided by the manufacturer or one of an equivalent quality. For safety reasons, extension leads or multi-socket connections should not be used. The mains socket must be protected by a fuse rated at not less than 10 Amperes.

The ELEKTROTOM® 630 can be placed on any flat surface with a tilt angle not in excess of 10°. The surface itself should be equivalent in size to that of the unit. Care must be taken not to block the air vents on the underside of the generator and ensure a free flow of air around the unit. The ELEKTROTOM® 630 should be protected from the danger of fluids entering the unit.

For intracardiac surgery this equipment must be connected to the main power stabilizer in the operating room or location where it is installed by means of the (yellow/green) power-stabilization cable supplied.

2.2 Important notes for safe usage

Misuse of the generator and a disregard of these instruction can lead to serious injury!

Take care to study these instructions supplied with your ELEKTROTOM® 630.

Warning!
The unit is not intended for use in explosion endangered areas.

Caution must be exercised when anaesthetic gas mixtures such as Oxygen (O_2) and nitrous Oxide (N_2O) are used during surgery in the thoracic or head regions. The use of anaesthetic gas, exhaust management systems is to be recommended. Inflammable substances used for cleaning or disinfection or, particularly, solvents used to remove adhesives, must be removed or fully evaporated before the using an electrosurgical unit. The danger of pocketing or pooling of inflammable liquids or vapours in body cavities such as the navel or vagina as well as in the depths of surgical wounds which must also be considered and not underestimated. Liquids must not be allowed to gather or pool under the patient. The presence of endogenic gases which may be ignited, must also be taken into account when using electrosurgical equipment on the gut and a system of inert gas flushing is recommended. Material such as cotton wool or gauze can, in certain circumstances, also be ignited via HF current induced sparking - particularly in the presence of oxygen.

The use of electrosurgery requires caution and the following rules should be considered:

- The high frequency current output of the unit should be minimal and not more than is required for the task to be performed.

Note:
A reduced or lack of function after setting the unit output controls at 'normal' power can be caused by a number of factors such as neutral electrode problems, bad connections, damaged cables or a crusted active electrode. Theses point should be considered before selecting what might be a much higher unit output than necessary.

- Do not attempt to test the unit by directly discharging against a metal object or the negative electrode.
- The function of other electromedical equipment can be interfered with by the use of high frequency current.
- The switching mechanisms of an electrode handle which is not completely water tight, may be penetrated by blood, saline or other rinsing liquids or amniotic fluid producing an unpredictable response from the generator.
- In order to prevent accidental HF current burns, the electrode handle should be placed on the instrument trolley when not in use and not on the patient.
- Placing a finger switched, electrode handle onto very damp drapes or, into pooled liquid on the drapes, may cause patient burns directly below the electrode handle.

2.3 First usage

Before the unit is first used surgically, the Manufacturer or their official agent shall:

b) have fully tested the unit in the position in which it is to be used;

c) have given full operational instructions for the unit to a responsible person.

2.4 Visual and functional checks before each use

Before each use the user must be sure that the unit and its accessories are in good working order.

The following visual checks should be made:

- check for external damage to the unit, insulation and plugs,
- check that the appropriate accessories a present and that they fit,
- Very carefully check the insulation on endoscopic instruments.

Damaged or doubtful equipment must not be used.

Warning!
Should the flow of HF current be indicated by the unit without the attachment of a foot-switch or electrode handle with a double, finger switch then the unit is faulty and must be examined before use. An indicated malfunction following the attachment of a foot-switch or electrode handle with double, finger switch shows a defective accessory which must be checked and eventually replaced.

2.5 Cleaning, disinfecting and sterilisation

2.5.1 Cleaning and disinfecting of the ELEKTROTOM® 630

The entire exterior of the unit, including the foil covered operating panel, can be cleaned with normal, alcohol free cleaning fluids. (Spray or wipe disinfecting)

Please take note of the manufacturers instructions for disinfectant solutions.

2.5.2 Cleaning, disinfecting and sterilisation of accessories

After use, accessories may be soaked in standard disinfecting solutions following the instructions of the manufacturers, without exceeding soaking times. The life expectancy of some plastics may be shortened by certain chemicals and a thorough rinsing of all accessories is important. Phenol and chlorine solutions are not suitable. Alternatively, a mechanised washing and thermal disinfecting process is acceptable, provided temperatures do not exceed 93° C/10 min..

Good operative results can only be expected when the active and negative electrode are perfectly clean and free from any dried protein.

Connecting cables and the insulation of active electrodes must be constantly checked and maintained in perfect condition. Articles with damaged insulation must not be used.

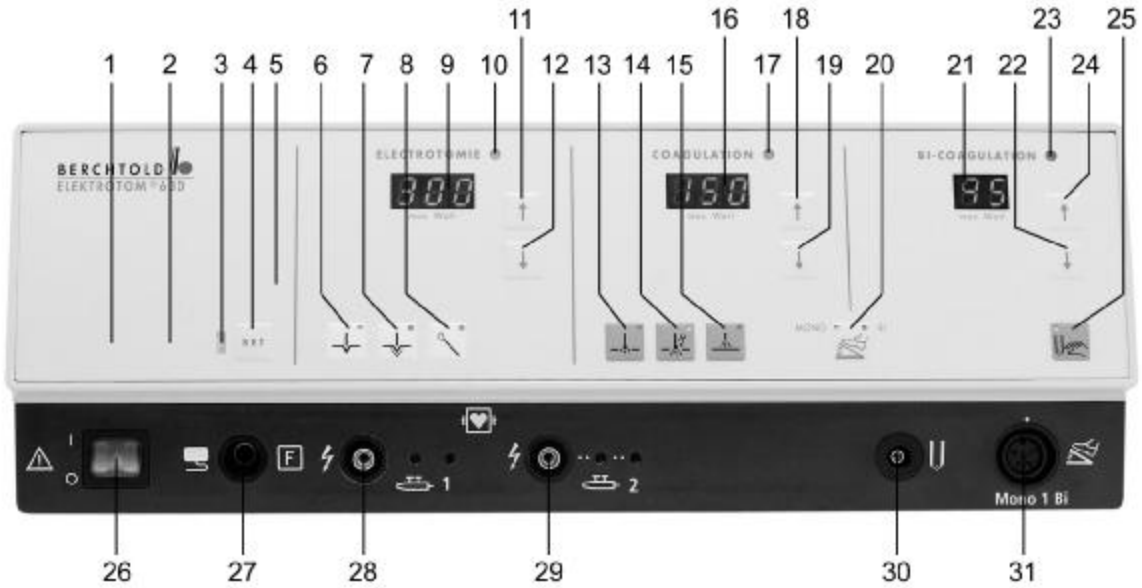
The following sterilisation temperatures are acceptable:

	Gas sterilisation up to 70 °C	**Steam sterilisation up to 134 ° C**	**Hot air sterilisation at 200 ° C**
Connecting cables for electrode handle	yes	yes	no
Electrode handle	yes	yes	no
Active electrodes	yes	yes	yes
Bipolar coagulation forceps	yes	yes	no

3. OPERATING THE ELEKTROTOM® 630

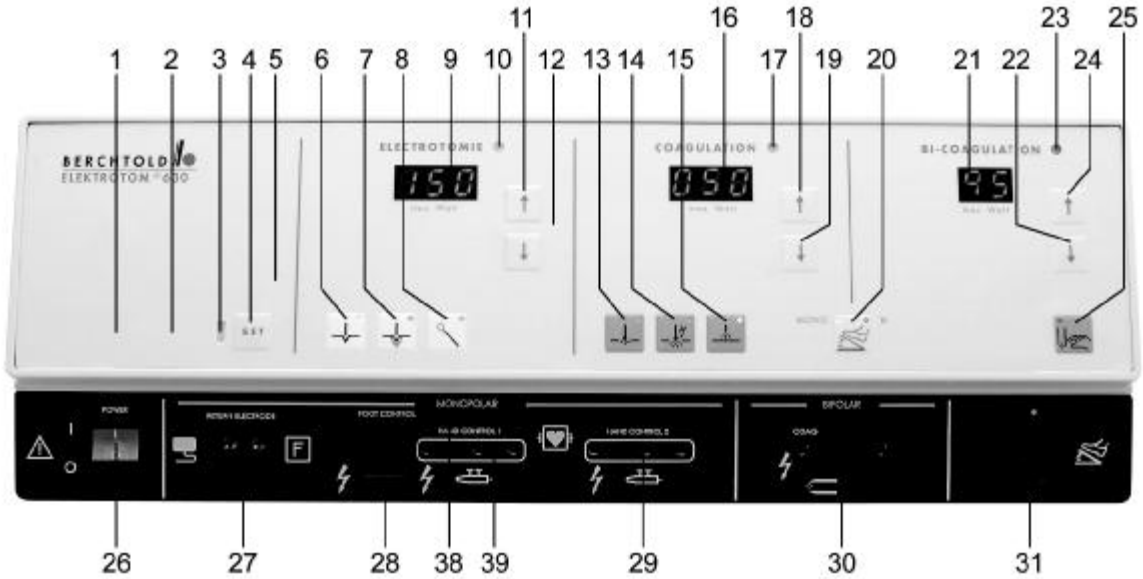
3.1 Puhsbuttons, signal lights and symbols

3.1.1 The front of the ELEKTROTOM® 630 version 1170



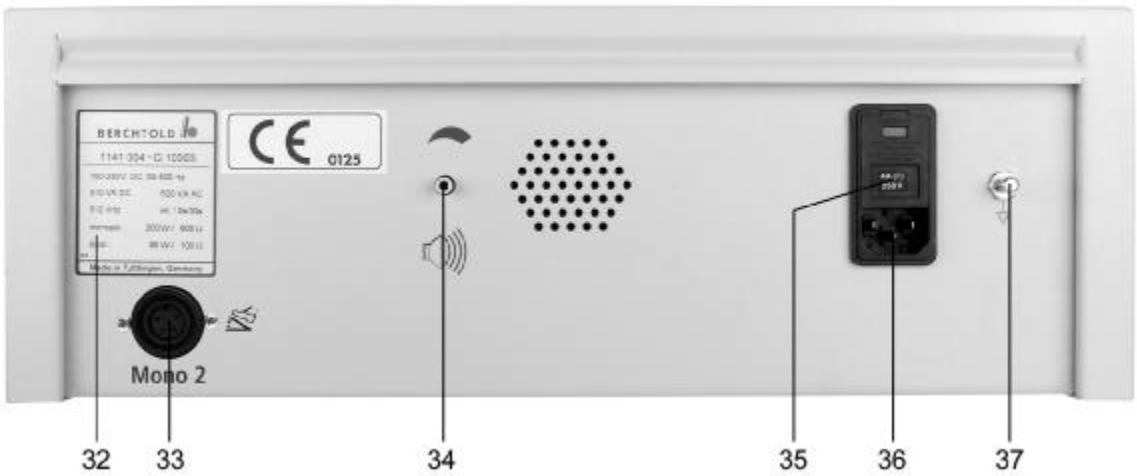
1 Symbol indicating „split, neutral electrode applied“
2 Symbol indicating „single, neutral electrode applied“
3 Signal light red for negative electrode alarm
4 Button to confirm the correct application of a negative electrode (SET button)
5 Service indication: when this lights up, a service technician should inspect the unit within one week
6 Button for Cut I “cutting with minimal tissue charring”
7 Button for Cut II “cutting with medium tissue charring, also for “transurethral resection”
8 Button for Cut III “cutting with wire loop electrodes for polypectomy and papillotomy”
9 Digital output indicator in watts for cutting power
10 Signal light indicating activation - cutting current
11 Button to increase cutting output
12 Button to decrease cutting output
13 Button for contact coagulation
14 Button for forced coagulation
15 Button for spray coagulation (ray of sparks coagulation)
16 Digital output indicator in watts for coagulatory power
17 Signal light indicating activation - coagulatory current
18 Button to increase coagulating output
19 Button to decrease coagulating output
20 Button for double foot-switch use in either monopolar or bipolar coagulation
21 Digital output indicator in watts for bipolar coagulatory power
22 Button to decrease bipolar coagulating output
23 Signal light indicating activation - bipolar coagulatory current
24 Button to increase bipolar coagulating output
25 Button for bipolar coagulating via forceps activation (auto-start mode)
26 Mains, on/off switch
27 Connecting socket for neutral electrode (split or single)
28 Connecting socket for electrode handle, HF output 1 (with additional socket for disposable handles)
29 Connecting socket for electrode handle, HF output 2 (with additional socket for disposable handles)
30 Connecting socket for bipolare coagulations instruments
31 Connecting socket for foot-switch (for HF output 1 and bipolar coagulation)

3.1.2 The front of the ELEKTROTOM® 630 version 1171



1 Symbol indicating „split, neutral electrode applied“
2 Symbol indicating „single, neutral electrode applied“
3 Signal light red for negative electrode alarm
4 Button to confirm the correct application of a negative electrode (SET button)
5 Service indication: when this lights up, a service technician should inspect the unit within one week
6 Button for Cut I “cutting with minimal tissue charring”
7 Button for Cut II “cutting with medium tissue charring, also for “transurethral resection”
8 Button for Cut III “cutting with wire loop electrodes for polypectomy and papillotomy”
9 Digital output indicator in watts for cutting power
10 Signal light indicating activation - cutting current
11 Button to increase cutting output
12 Button to decrease cutting output
13 Button for contact coagulation
14 Button for forced coagulation
15 Button for spray coagulation (ray of sparks coagulation)
16 Digital output indicator in watts for coagulatory power
17 Signal light indicating activation - coagulatory current
18 Button to increase coagulating output
19 Button to decrease coagulating output
20 Button for double foot-switch use in either monopolar or bipolar coagulation
21 Digital output indicator in watts for bipolar coagulatory power
22 Button to decrease bipolar coagulating output
23 Signal light indicating activation - bipolar coagulatory current
24 Button to increase bipolar coagulating output
25 Button for bipolar coagulating via forceps activation (auto-start mode)
26 Mains, on/off switch
27 Connecting socket for neutral electrode (split or single)
28 Connecting socket for electrode handle, HF output 1, activation with foot-switch
29 Connecting socket for electrode handle with 3-pin plug, HF output 2
30 Connecting socket for bipolare coagulations instruments
31 Connecting socket for foot-switch (for HF output 1 and bipolar coagulation)
38 Slide for release of socket 28 or socket 39
39 Connecting socket for electrode handle with 3-pin plug, HF output 1

3.1.3 The rear of the ELEKTROTOM® 630



32 Plate showing unit number and mains information
33 Connecting socket for foot-switch (for HF output 2)
34 Volume control for acoustic signals
35 Mains fuses F1 and F2 in removable housing
36 Connecting socket for mains cable
37 Connecting socket for earth potential balancing cable

3.1.4 Description of the pushbuttons and symbols

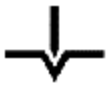
Symbol indicating that a single neutral electrode is attached (lights up green)

Symbol indicating that a split, neutral electrode is attached (lights up green)

Signal light for the neutral electrode (lights up red) and SET button to confirm correct application of the neutral electrode to the patient. The type of neutral electrode attached is detected automatically.

DOWN button for decreasing power

UP button for increasing power



Button for cutting current type for minimal tissue charring and transurethral resection

Button for cutting current type for tissue charring and transurethral resection

Button for special type of cutting current for endoscope-compatible flexible wire loop electrode (polypectomy, papillotomy) for blood-stopping cutting. The current changes automatically between soft-coagulation and cutting.

Button for contact coagulation, for microarc-free contact coagulation. This “standard coagulation” uses a modulated and controlled HF output voltage with peak values less than 200 V.

Button for forced coagulation, for microarc-forced contact coagulation. This “standard coagulation” uses a modulated and controlled HF output voltage with peak values greater than 200 V.

Button for spray coagulation for macroarc-forced and contactless spray coagulation. This “non-touch coagulation” uses strongly modulated and very high HF output voltage with maximum output above 4210 Vp. This current must be set for argon gas supported coagulation in combination with the BERCHTOLD BEAMER 100.

Button to enable the use of a double foot-switch for either monopolar or bipolar use.
In the „Mono“ mode, double foot-switches attached to this socket (31) will activate monopolar cutting or coagulation current for instruments attached to socket (28) and in the „BI“ mode of the blue pedal, for monopolar instruments attached to socket (30).

Button and display for bipolar coagulation with auto-start mode (forceps activation).
Sensory mechanisms and software detect the contact of the bipolar forceps with the biotissue, so that the HF current is switched on automatically. This function can only be activated in the “BI” application mode.

Service note. When this indicator lights up, the unit should be inspected by a medical technician.

Symbol markings on the socket of the unit

This symbol advises the user to read the instructs before use!

MAINS SWITCH

On switching the unit on, a green light indicates connection and status. There then follows an automatic self-check.
Following the self-check, the machine will be programmed with basic status. Digital displays become visible, the symbols light up and the unit is ready for use.

Symbol indicating „neutral electrode."

Split or single neutral electrodes may be attached here. The unit recognises the electrode type.

Symbol indicating „Floating Output". The neutral electrode is isolated from earth potential.

Symbol indicating apparatus of the „CF class." The unit is protected against cardiac defibrillator, high voltage.

Symbol with the meaning „Caution! High voltage!„

High-voltage current is present at this socket during unit activation.

Symbol indicating a „Monopolar electrode handle with double, finger switch"

Symbol indicating „Bipolar coagulation."

Symbol indicating a „Double pedal foot-switch."
In the „Mono" mode, double foot-switches attached to this socket (31) "Mono 1 Bi" will activate monopolar cutting or coagulation current for instruments attached to socket (28) and in the „BI" mode of the blue pedal, for monopolar instruments attached to socket (30).

3.1.5 Symbol markings on the rear of the unit

Symbol indicating a „Double pedal foot-switch.“
In the „Mono“ mode, double foot-switches attached to this socket (33) “Mono 2” will activate monopolar cutting or coagulation current for instruments attached to socket (29).

Symbol meaning “Volume of acoustic signals”. This allows the loudness level to be continuously adjusted (except for the alarm signal).

Symbol indicating „Electrical potential balancing“.

4. TECHNICAL DESCRIPTION

4.1 Technical data

4.1.1 Mains connection

Power supply	100-230 V DC, 100-230V AC 50-400 Hz
Power consumption	450 VA DC 820 VA AC
Loading relationship	int. 10s/30s (Time relation: active / pause)
Mains fuses	2 each 6,3 A (inert) according to rating plate

4.1.2 HF current output and current characteristics

Cutting current

• CUT I - monopolar cutting current with minimal tissue charring

Nominal frequency	312 kHz
Current form	non modulated, sinus form
Crest factor *	1,43
HF voltage max.	715 Vp/500 Veffective
Max. HF power	300 W/500 Ω
Unit output settings	Up/Down pushbutton and digital display
Cutting qualities	minimal tissue charring

• CUT II - monopolar cutting current with medium tissue charring

Nominal frequency	312 kHz
Current form	non modulated, sinus form
Crest factor *	1,87
HF voltage max.	1945Vp/1040 Veffective
Max. HF power	200 W/500 Ω
Unit output settings	Up/Down pushbutton and digital display
Cutting qualities	medium tissue charring

• CUT III - monopolar blood-stopping cutting current (polypectomy, papillotomy)

Nominal frequency	312 kHz
Current form	modulated, sinus form
Crest factor *	2,83
HF voltage max.	525 Vp / 185 Veffective
Max. HF power	100 W / 200 Ω
Unit output settings	Up / Down pushbutton and digital display
Cutting qualities	medium tissue charring

Coagulating currents

• Contact coagulation, monopolar

Nominal frequency	312 kHz
Current form	non modulated, sinus form
Crest factor *	1,42
HF voltage max.	300 Vp / 212 Veffective
Max. HF power	120 W / 150 Ω
Unit output settings	Up / Down pushbutton and digital display
Coagulation qualities	micro light arc free coagulation

• Forced coagulation, monopolar

Nominal frequency	1000 kHz
Current form	impulse modulated, impulse frequency 125 kHz
Crest factor *	2,65
HF voltage max.	2810 Vp / 1058 Veffective
Max. HF power	150 W / 500 Ω
Unit output settings	Up / Down pushbutton and digital display
Coagulation qualities	micro light arc forced coagulation

• Spray coagulation, monopolar

Nominal frequency	1000 kHz
Current form	impulse modulated, impulse frequency 31 kHz
Crest factor *	3,98
HF voltage max.	4210 Vp / 1058 Veffective
Max. HF power	100 W / 500 Ω
Unit output settings	Up / Down pushbutton and digital display
Coagulation qualities	micro light arc forced contactless coagulation

• Bipolar coagulation (mode „BI“)

Nominal frequency	312 kHz
Current form	non modulated, sinus form
Crest factor *	1,41
HF voltage max.	150 Vp / 106 Veffective
Max. HF power	95 W / 100 Ω
Unit output settings	Up / Down pushbutton and digital display
Coagulation qualities	micro light arc free coagulation

* The crest factor is the proportion between peak voltage to effective voltage

4.2 Safety relevant data

Basic construction in accordance with	EN 60601; ICE 60601
Protection class	I
Unit type	cardiac floating (CF)
Circuit of neutral electrode	floating output
Neutral electrode monitoring	• automatic, electronic recognition of electrode type • continuous electronic control of neutral electrode cable • continuous electronic control of contact impedance with patient contact control, split neutral electrodes
Dosage shut-off due to unit malfunction	yes
Anti-malfunction control	self-check on switching on
HF. leakage control	yes
Equipotential bonding pin	yes

4.3 Equipment for user support

- Digital read-out
- Acoustic signalisation following generator activation by finger switch or foot-switch
- Error code display
- Memory (on switching off the last setting will be stored)

4.4 Dimensions and weight

Lenght x width x height = 405 x 395 x 145 mm

Weight: 8,5 kg

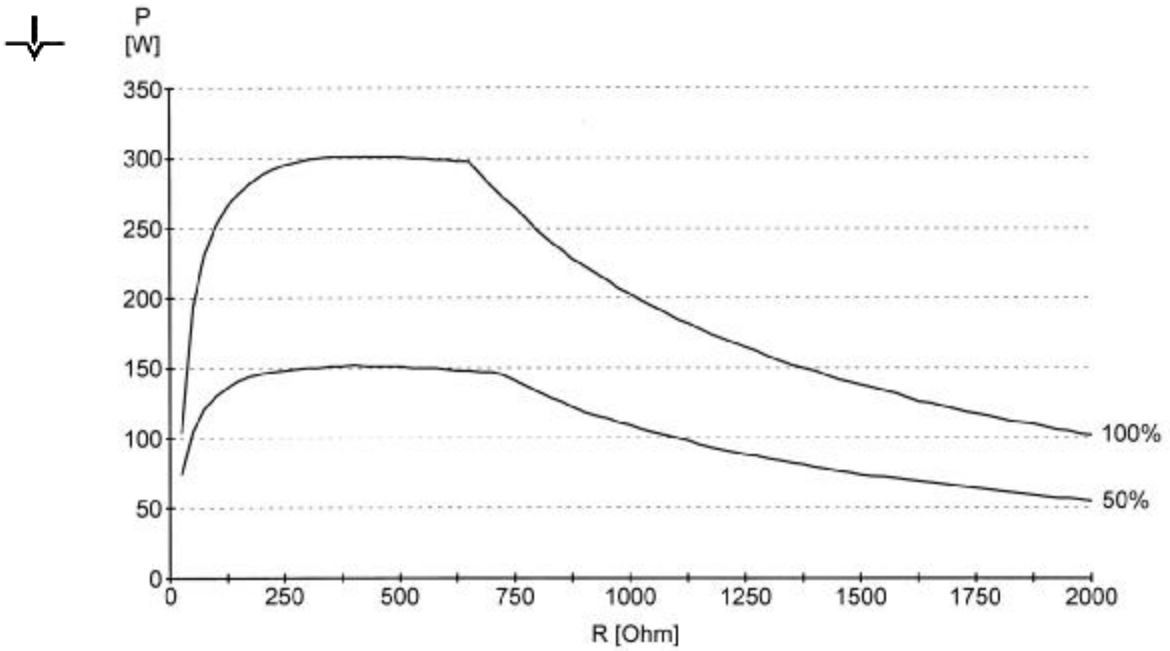
4.5 Certification

CE 0-25 conform with 93/42/EEC

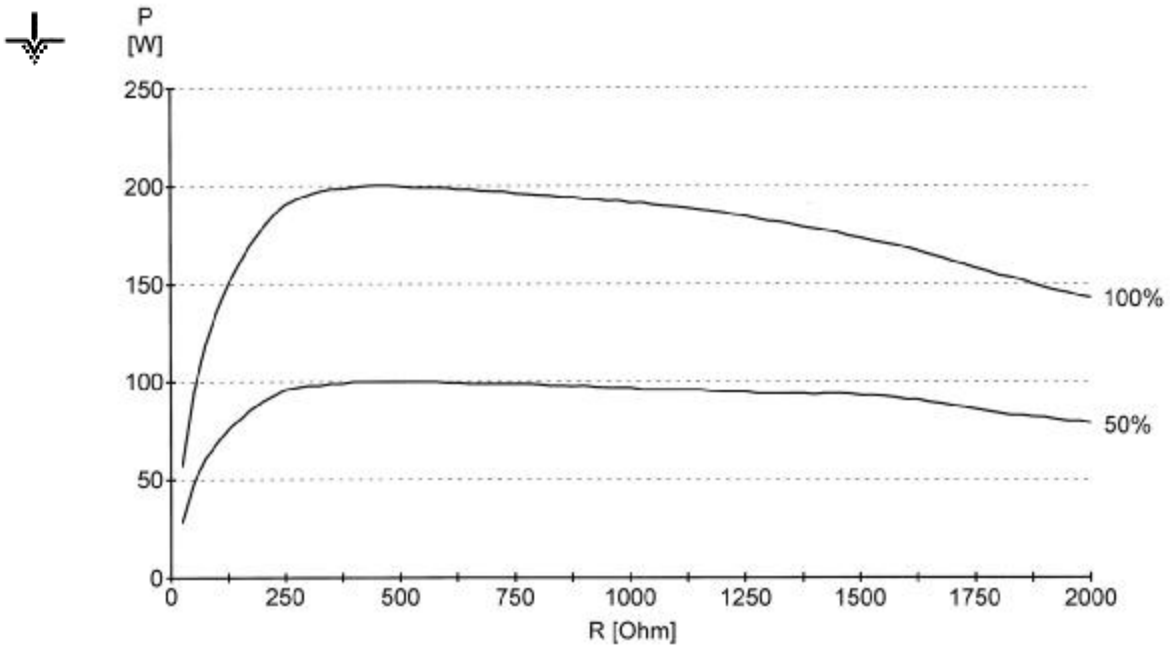
5. POWER OUTPUT DIAGRAM

5.1 Power output in relation to resistance (output characteristic)

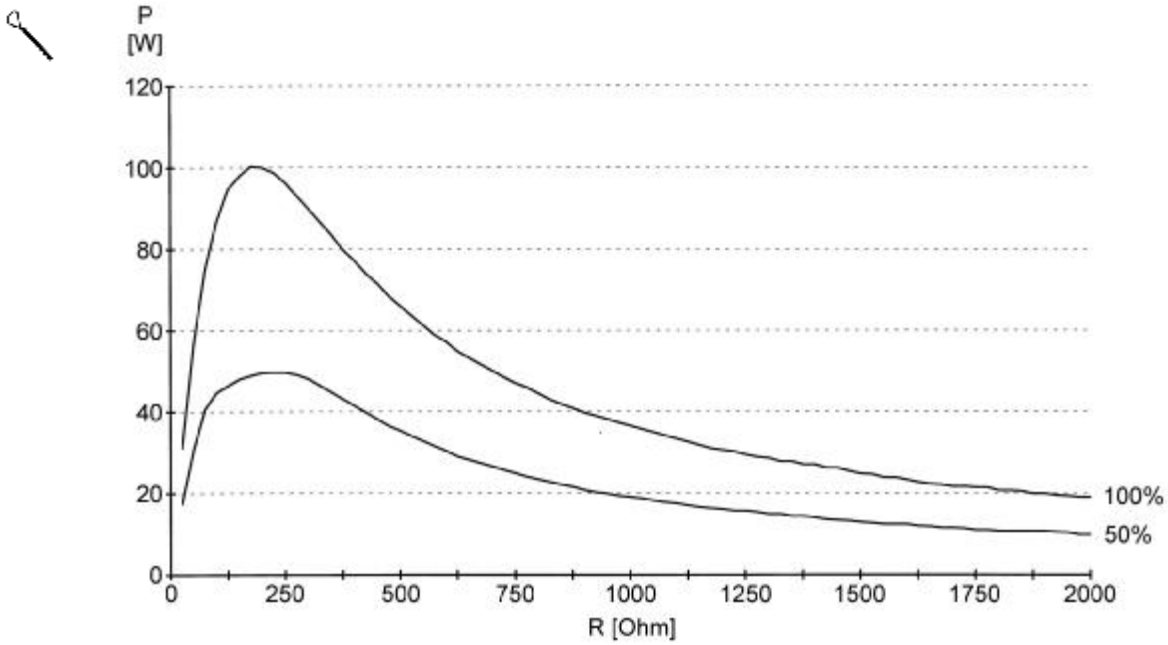
5.1.1 Current type: CUT I 50% / 100%



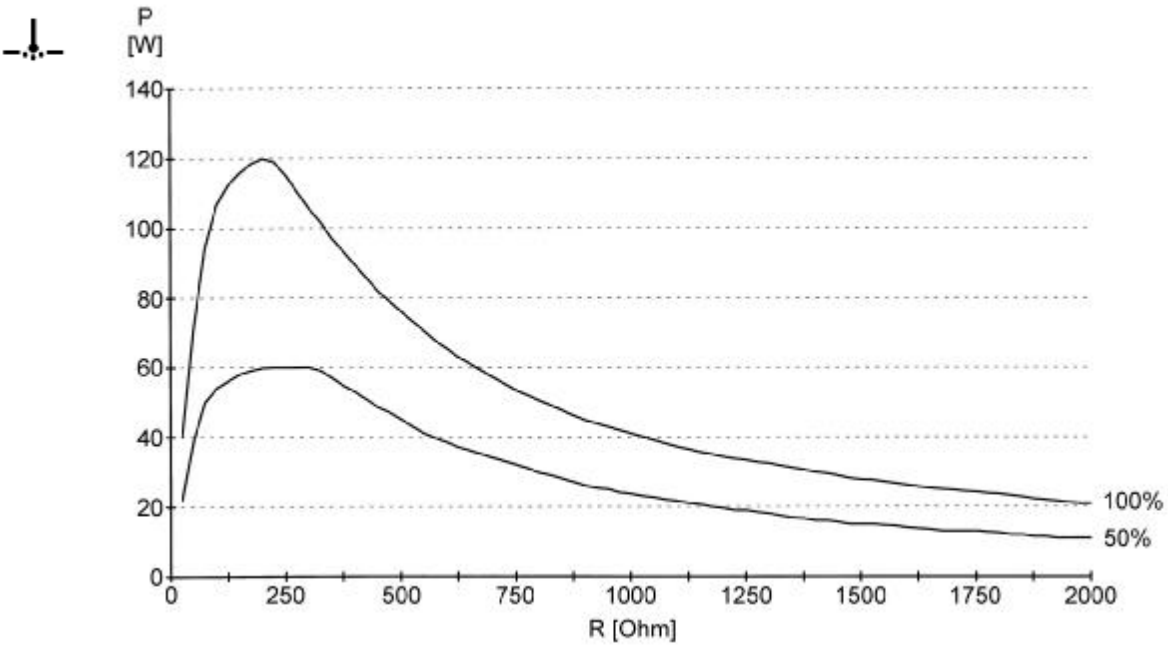
5.1.2 Current type: CUT II 50% / 100%



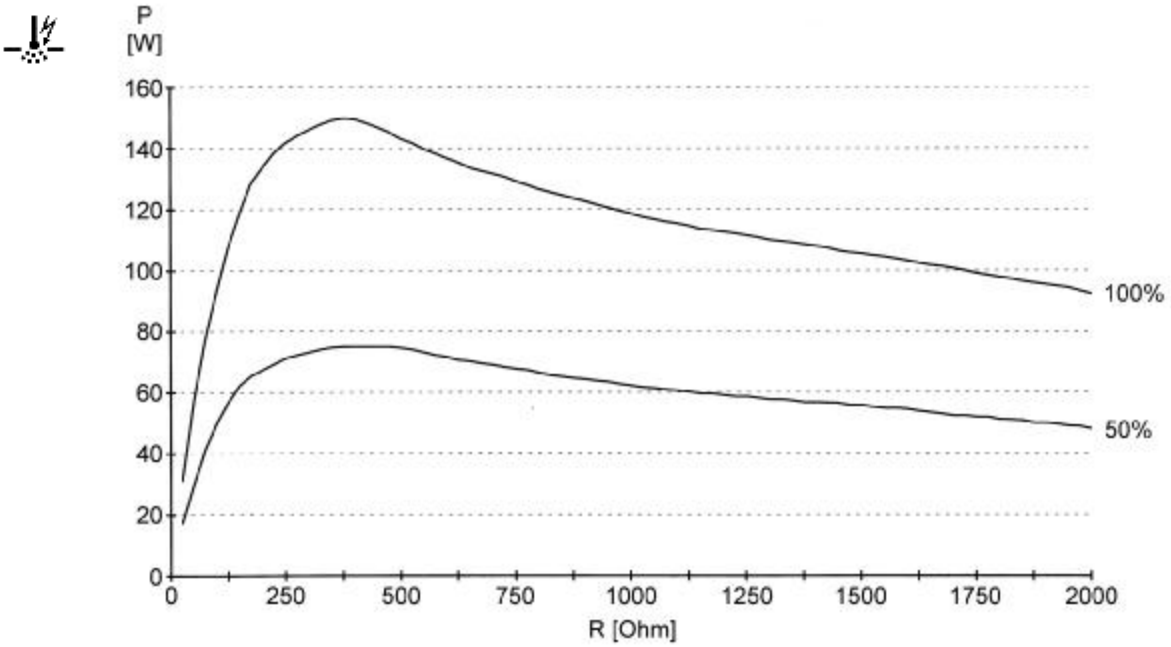
5.1.3 Current type: CUT III (Polypectomy) 50% / 100%



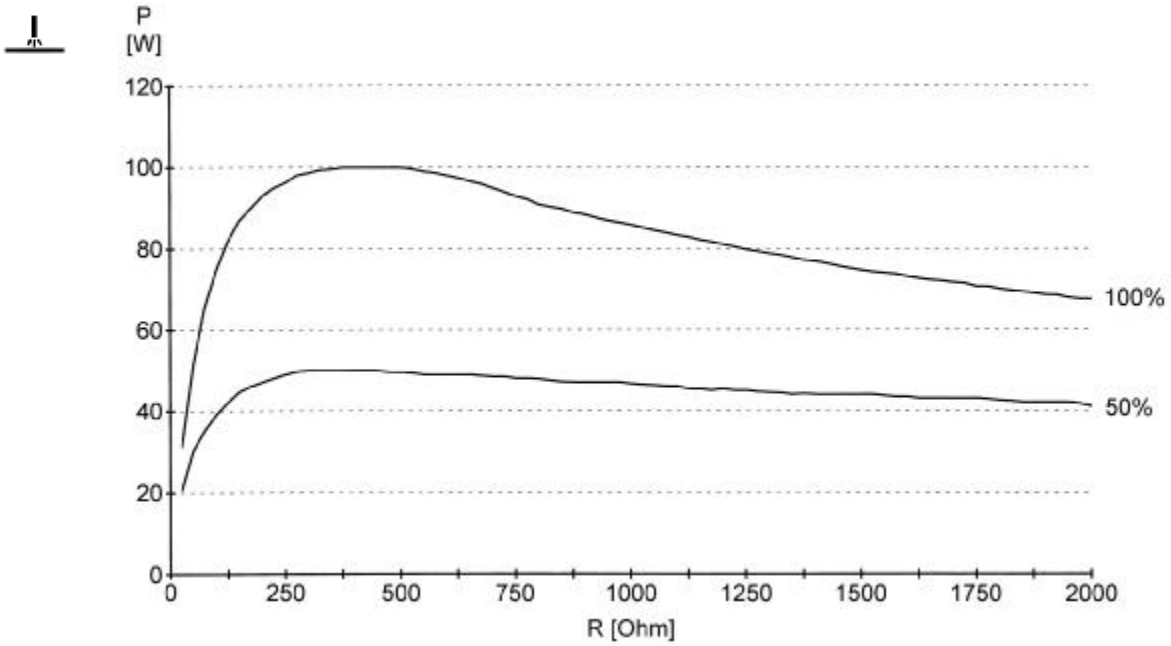
5.1.4 Current type: CONTACT COAGULATION 50% / 100%



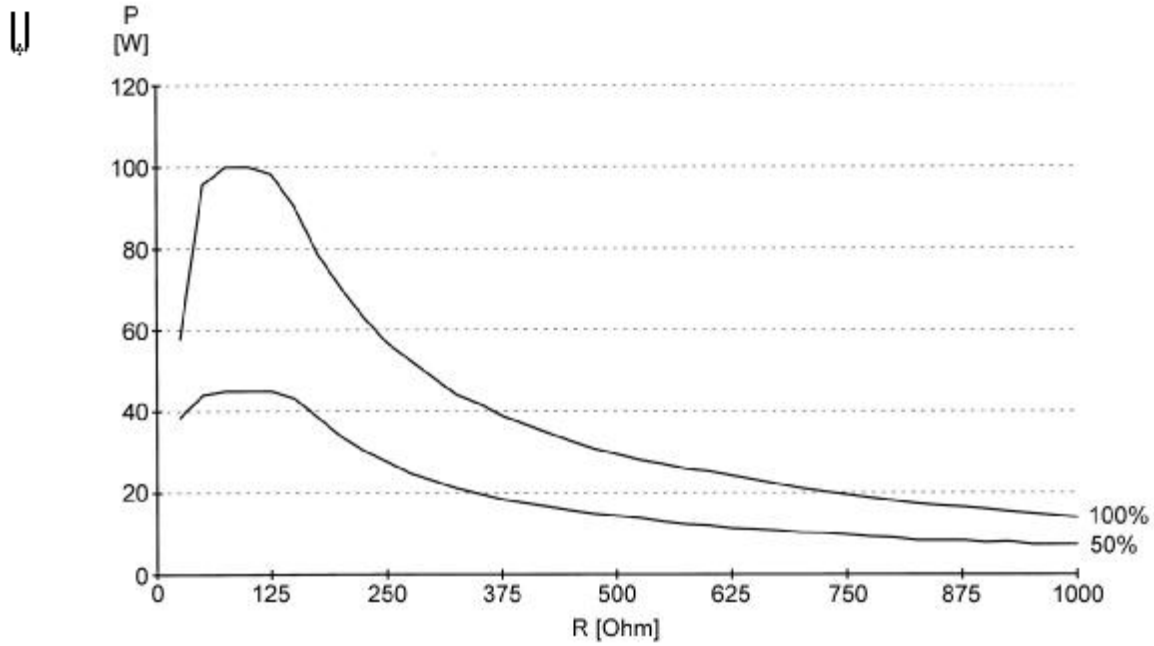
5.1.5 Current type: FORCED COAGULATION 50% / 100%



5.1.6 Current type: SPRAY COAGULATION 50% / 100%

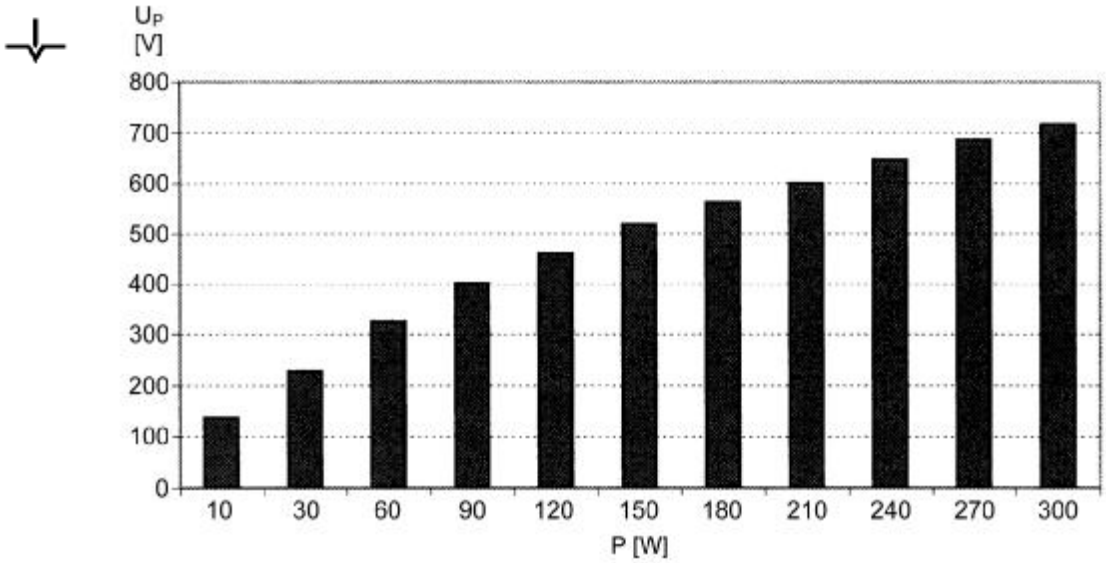


5.1.7 Current type: BIPOLAR COAGULATION 50% / 100%

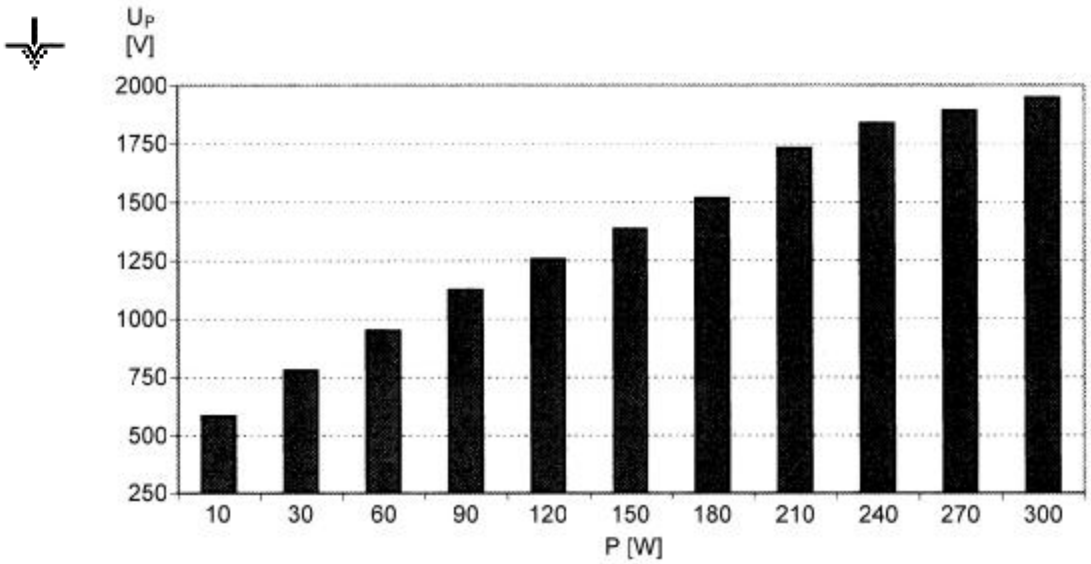


5.2 Peak voltage in relation to power regulator

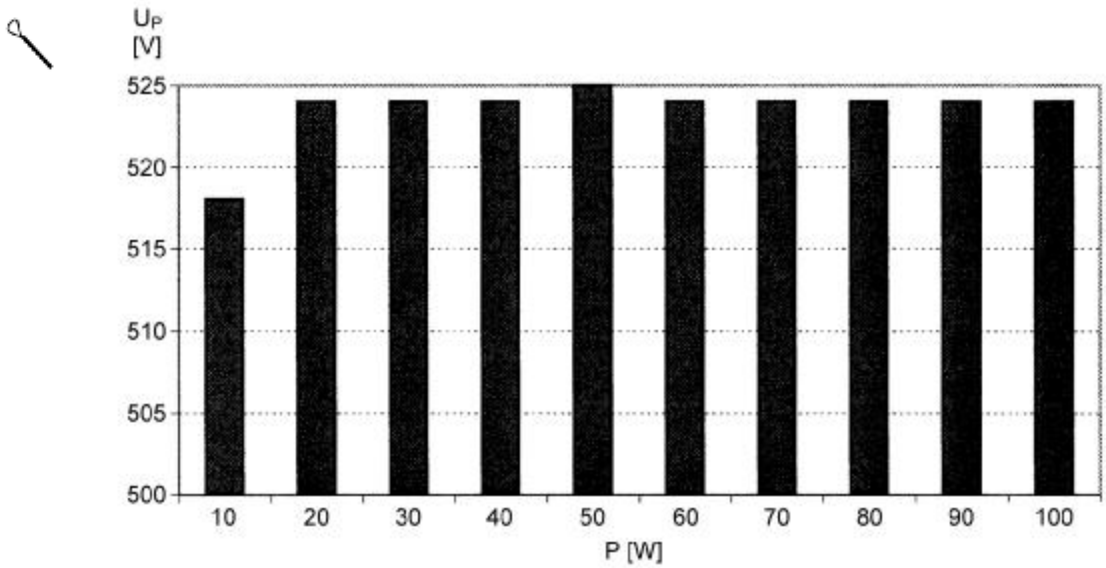
5.2.1 Current type: CUT I



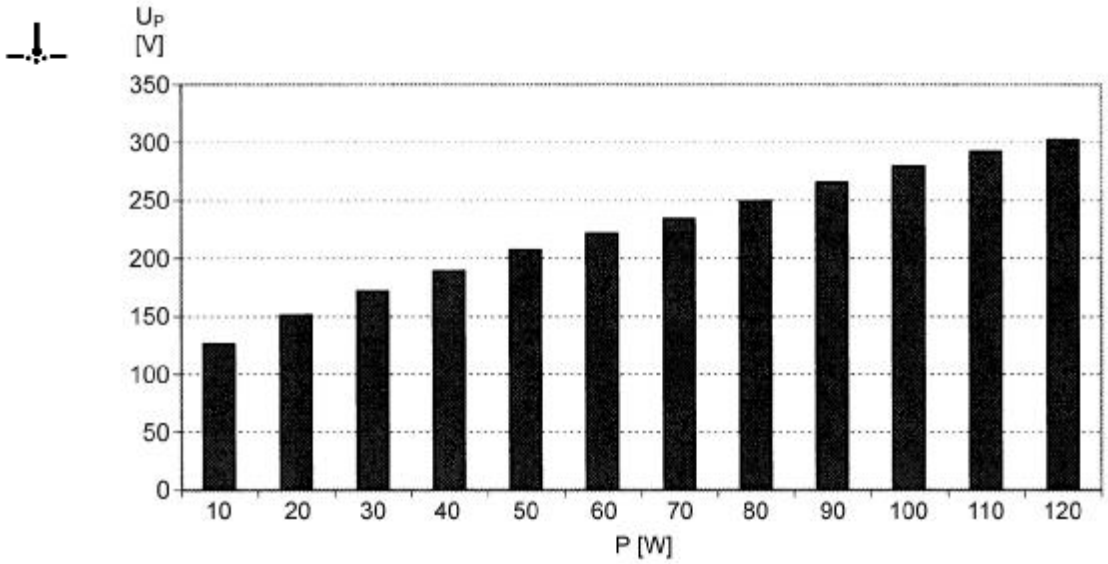
5.2.2 Current type: CUT II



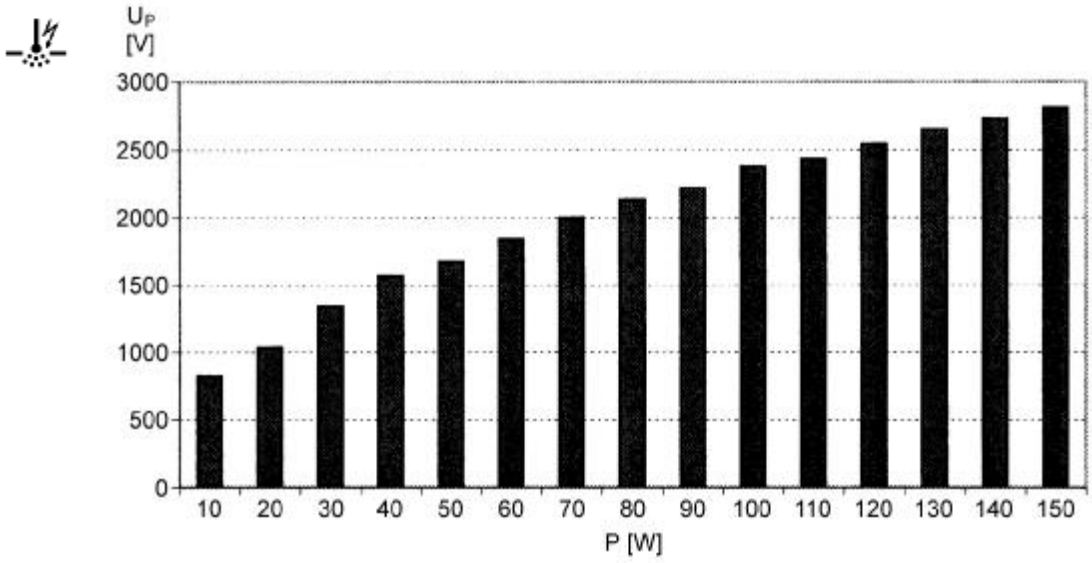
5.2.3 Current type: CUT III



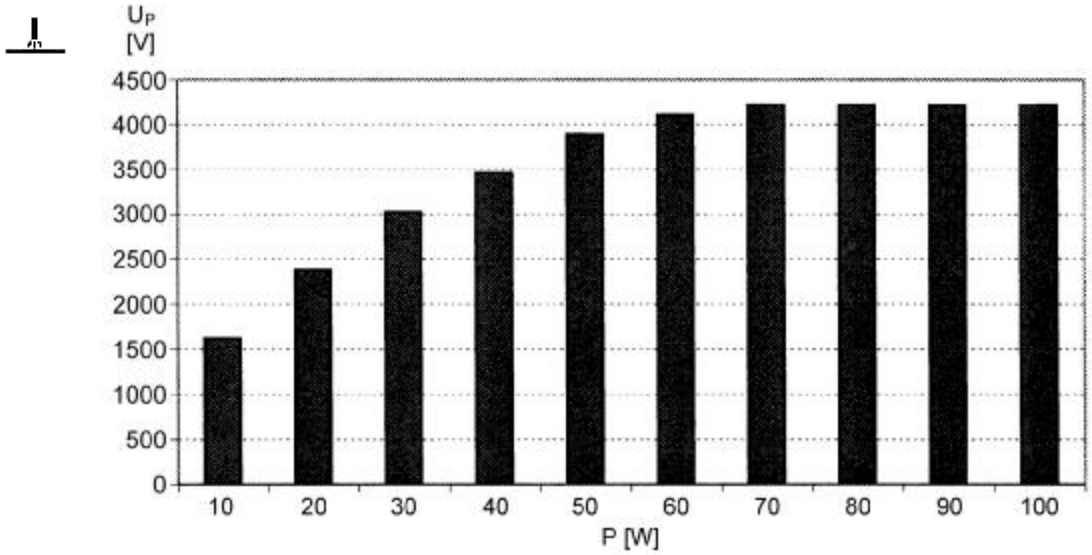
5.2.4 Current type: CONTACT COAGULATION



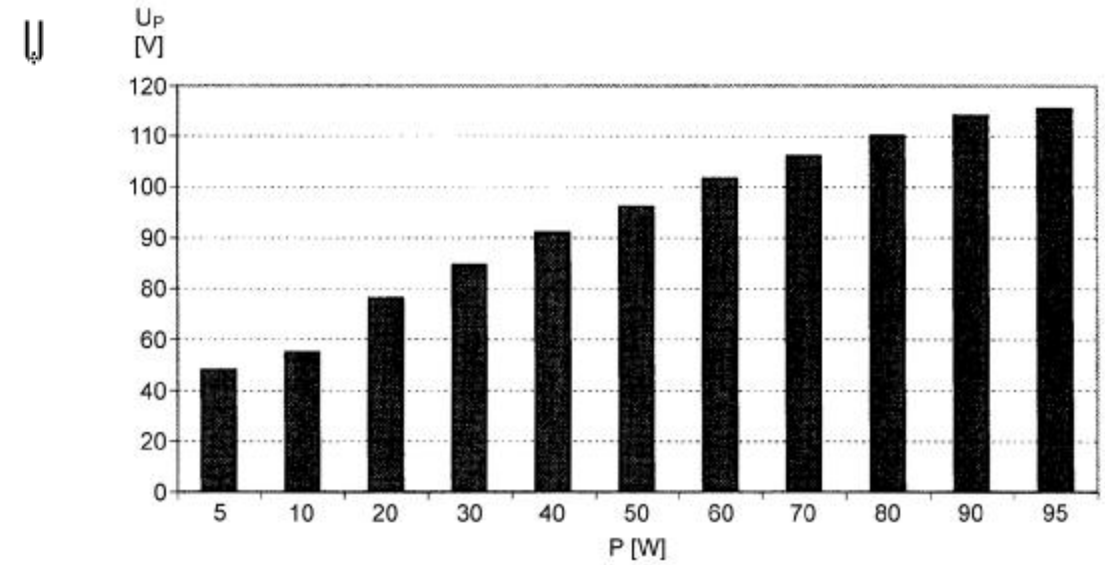
5.2.5 Current type: FORCED COAGULATION



5.2.6 Current type: SPRAY COAGULATION

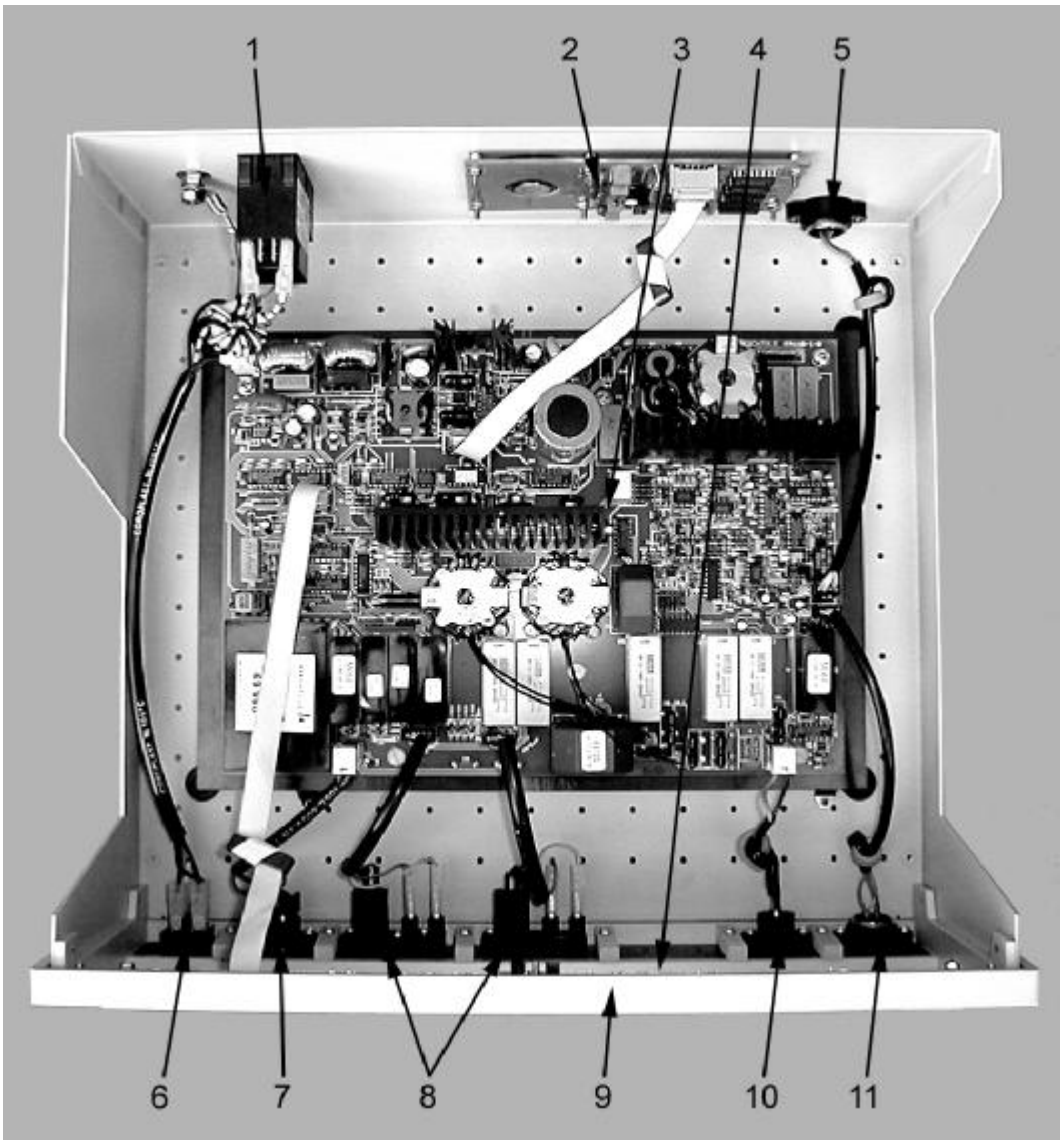


5.2.7 Current type: BIPOLAR COAGULATION



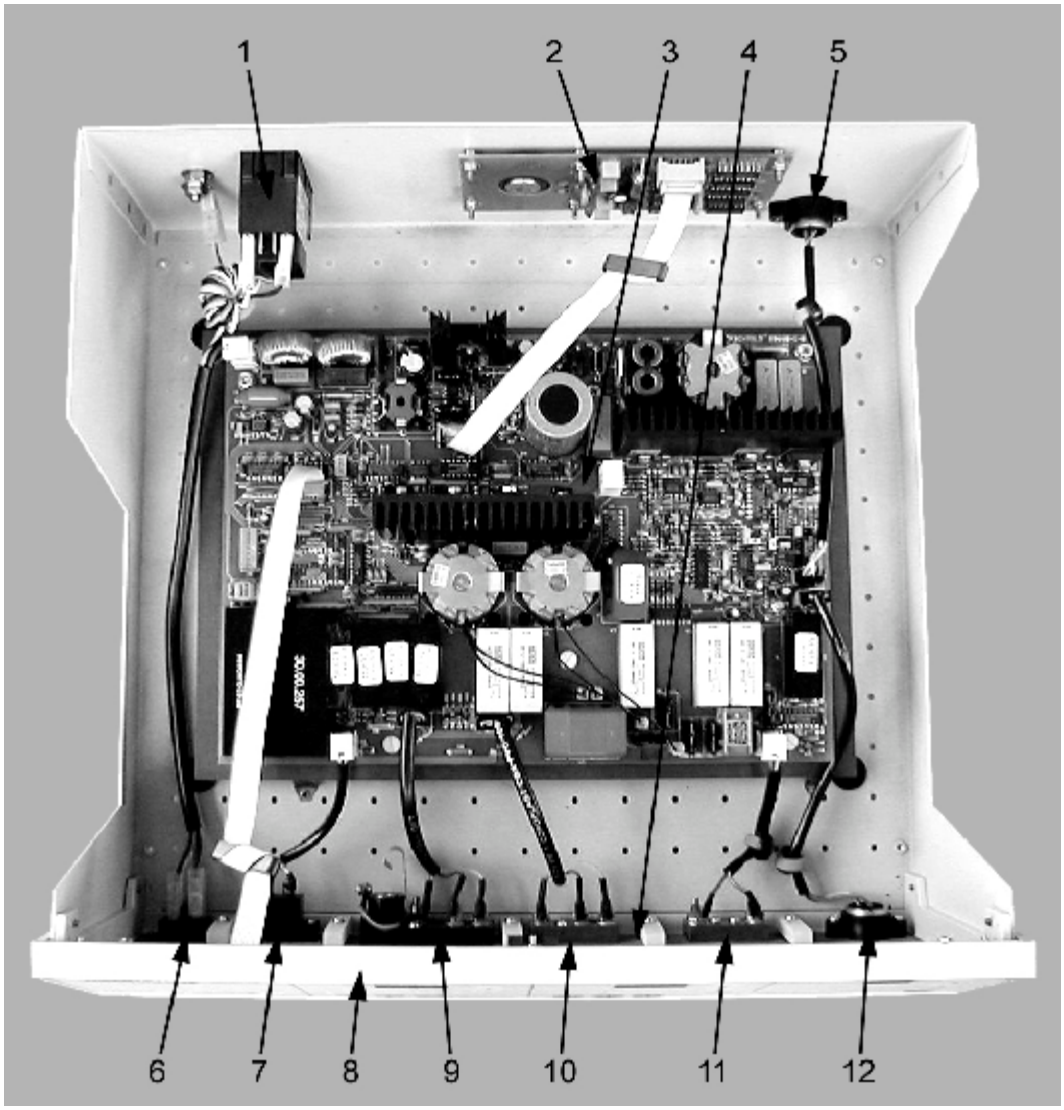
6. POSITIONES OF SPARE PARTS

6.1 Valid for version 1170



Pos.	Description	Part no.
1	Mains input modul	65261
2	Tone generator board (integrated loudspeaker)	69823
3	Power board (available only in combination with the sevice modul)	
4	Front board (without controller A)	67255
5	Connecting socket for foot-switch (on the front of the unit)	64011
6	Mains switch green	23939
7	Connecting socket for neutral electrode	64002
8	Connecting socket for electrode handle	62775
9	Control panel	69432
10	Connecting socket for bipolare coagulations instruments	62774
11	Cable with connecting socket for foot-switch (on the rear of the unit)	65193

6.2 Valid for version 1171



Pos.	Description	Part no.
1	Mains input modul	65261
2	Tone generator board (integrated loudspeaker)	69823
3	Power board (available only in combination with the sevice modul)	
4	Front board (without controller A)	67255
5	Connecting socket for foot-switch (on the front of the unit)	64011
6	Mains switch green	23939
7	Connecting socket for neutral electrode	66848
8	Control panel	69432
9	Connecting socket for electrode handle	72110
10	Connecting socket for disposable electrode handle	66850
11	Connecting socket for bipolare coagulations instruments	66851
11	Cable with connecting socket for foot-switch (on the rear of the unit)	65193

7. SPARE PART LIST

Description	Part no.
Mains input modul	65261
Service modul	65462
Front board (without controller A)	67255
Tone generator board (integrated loudspeaker)	69823
Control panel	69432
Connecting socket for neutral electrode (version 1170)	64002
Connecting socket for neutral electrode (version 1171)	66848
Connecting socket for electrode handle (version 1170)	62775
Connecting socket for electrode handle (version 1171)	72110
Connecting socket for disposable electrode handle (version 1171)	66850
Connecting socket for bipolare coagulations instruments (version 1170)	62774
Connecting socket for bipolare coagulations instruments (version 1171)	66851
Cable with connection socket for foot switch (on the front of the unit)	65193
Connection socket for foot switch (on the rear of the unit)	64011
Mains switch green	23039
Mains fuse 6,3 A slow-blow (2 pcs.)	1147

8. ADJUSTMENT NEUTRAL ELECTRODE CONTROL

- Set neutral electrode tester (part no. 69941) to 520 Ω and connect to the neutral electrode connection socket (27) on the unit.
- Switch the unit on.
- Press SET button (4).
- The green signal lamp (1) for split neutral electrode must light up.
- Press SET button (4).
- If the red signal lamp (3) for neutral electrode alarm lights up, adjust as follows:

  Adjust trimmer R75 on power generator board, until red signal lamp (3) for neutral electrode alarm goes out.

- If the resistance of the neutral electrode tester is set to ≥ 530 Ω, the red signal lamp (3) for neutral electrode alarm lights up.
- If the neutral electrode tester is unplugged, the red signal lamp (3) for neutral electrode alarm should light up.

9. TROUBLE SHOOTING AND REPAIR

Error description	Repair
Unit cannot be switched on	Check mains cable and/or mains switch (26) on front panel and/or mains fuses. Switch off, wait 10 seconds and switch on again
No HF-activation when the finger switch on the electrode handle is pressed	Replace connection cable and electrode handle
No HF-activation when the foot switch is pressed	Replace foot switch
Service display (5) on the front panel illuminates,	Replace power board and controller A (service module part no. 65461). Controller A is located on the front panel, see page 31.
Control panel error: Button sticks when pressed	Replace front section part no. 69432.

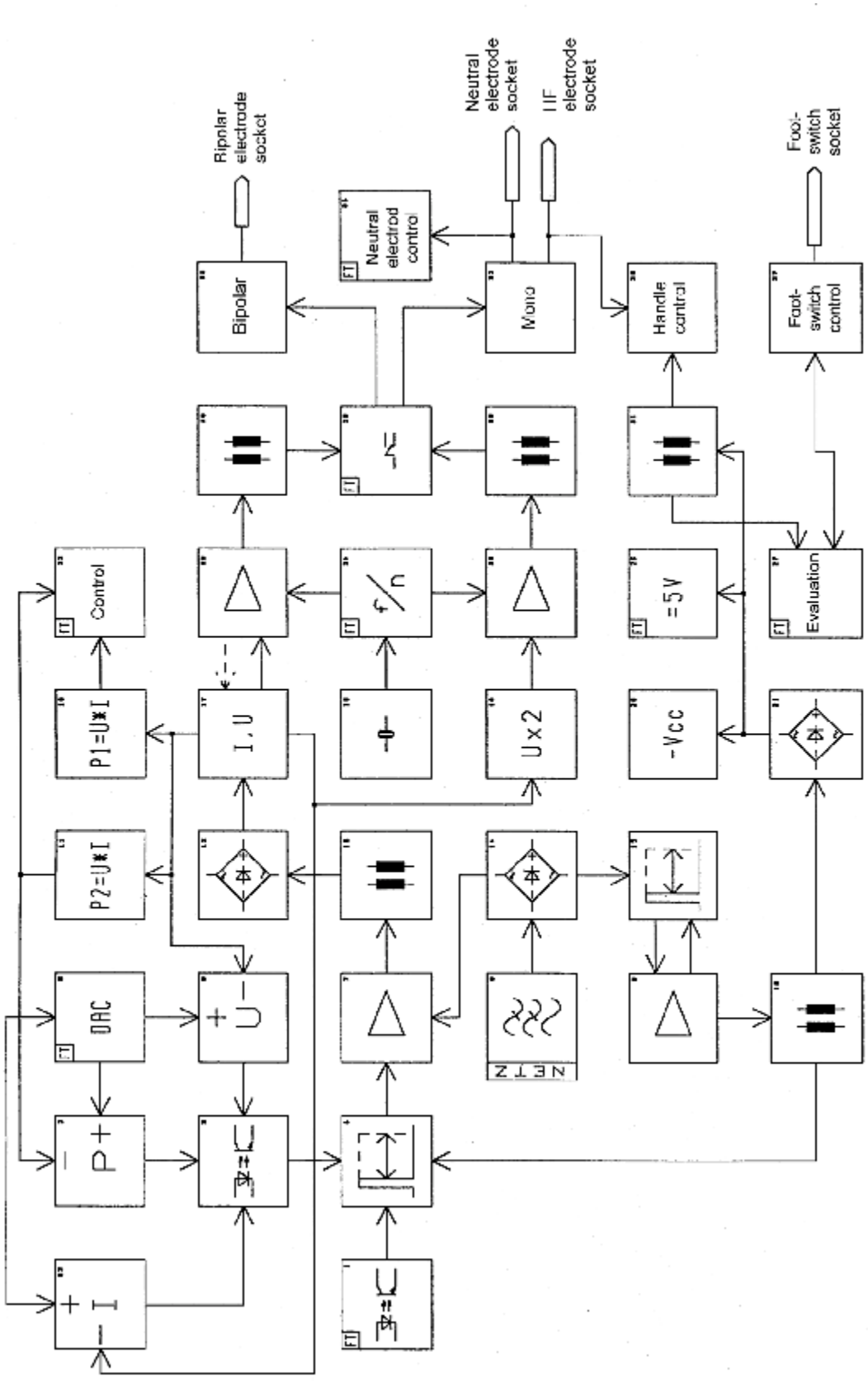
10. CHECK OF THE HF POWER

- Connect the power meter to the connection socket for the electrode handle (28).
- Set the load resistance on the HF-power meter in accordance with the table.
- Set Cut I to Cut II nominal power with button UP (11) or button DOWN (12) on the front panel display (9) in accordance with the table.
- Set the contact coagulation to spray coagulation nominal power with button UP (18) or button DOWN (19) on the front panel display (16) in accordance with the table.
- Set bipolar coagulation nominal power with button UP (24) or button DOWN (22) on the front panel display (21) in accordance with the table.

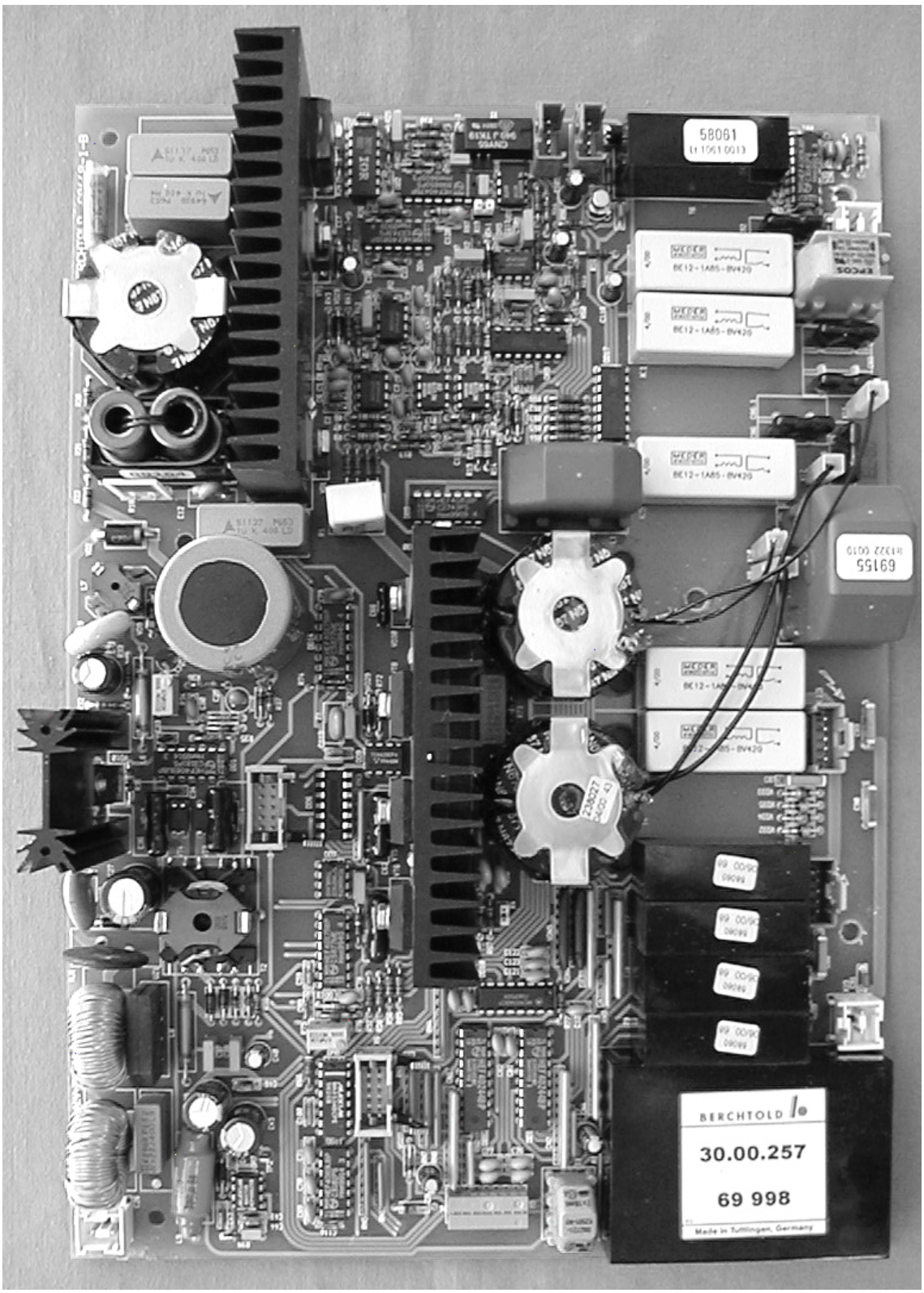
Current type	Power meter	Connecting socket	min. Power	max. Power
Cut I	500 Ω	27 and 28	10 W	300 W
Cut II	500 Ω	27 and 28	10 W	200 W
Cut III	200 Ω	27 and 28	10 W	100 W
Contact coagulation	150 Ω	27 and 28	10 W	120 W
Forced coagulation	500 Ω	27 and 28	10 W	150 W
Spray coagulation	500 Ω	27 and 28	10 W	100 W
Bipolar coagulation	100 Ω	30	5 W	95 W

If the measured power deviates from the nominal power by more than 20%, the power board and Controller A (Service module part no. 65462) must be replaced. Controller A is located on the front board, see Page 31.

11. FUNCTION AND CONNECTION DIAGRAM

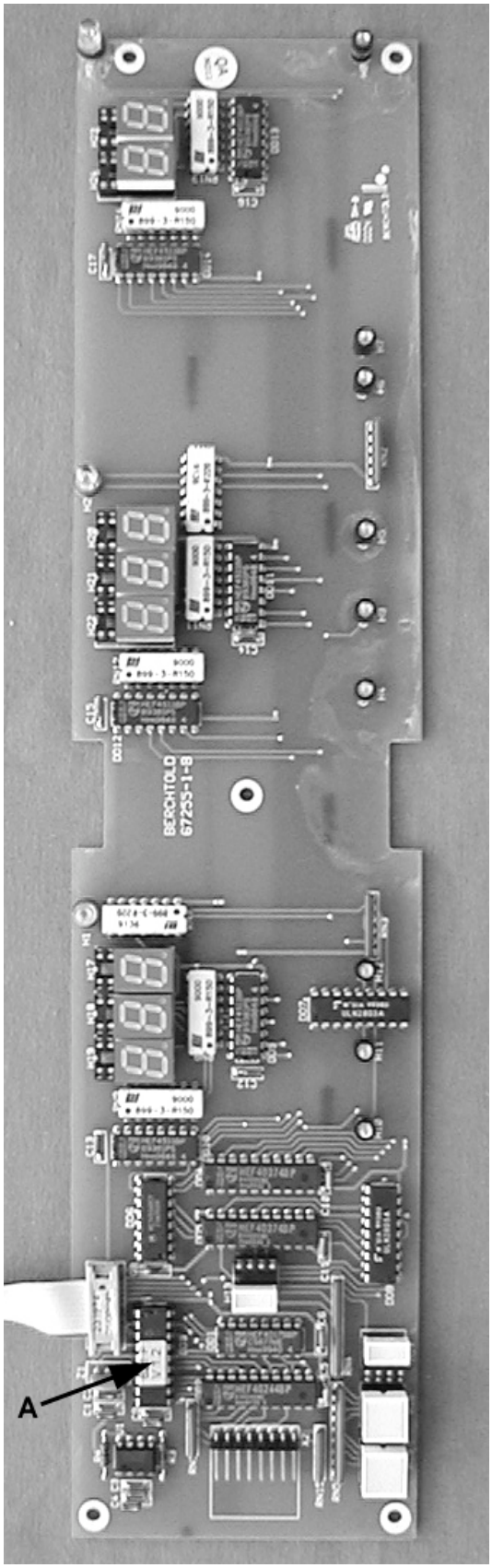


12. POWER BOARD



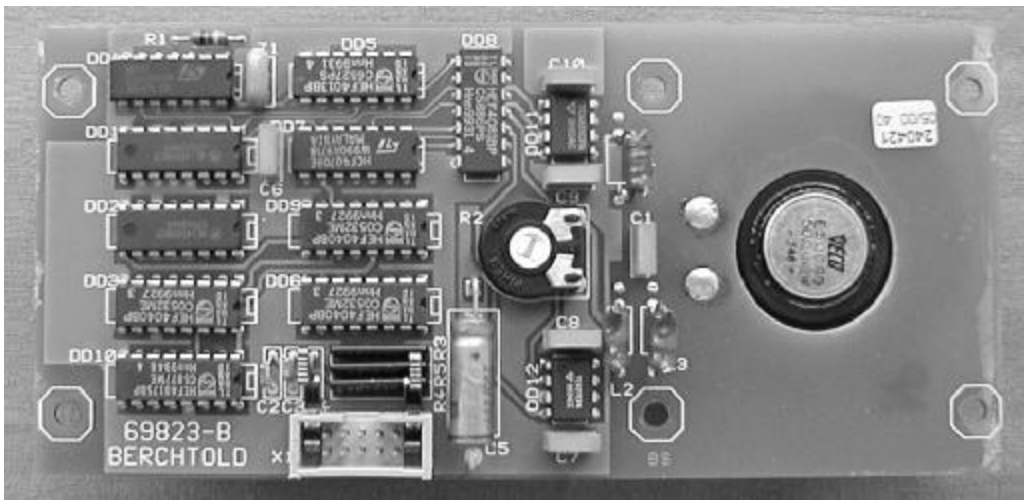
Power board, (available only in combination with the service modul)

13. FRONT BOARD



Front board, part no. 67255 (without controller A)

14. TONE GENERATOR BOARD



Tone generator board (integrated loudspeaker), part no. 69823

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