

OPERATING MANUAL
ELECTROSURGICAL UNIT



BOWA
2500

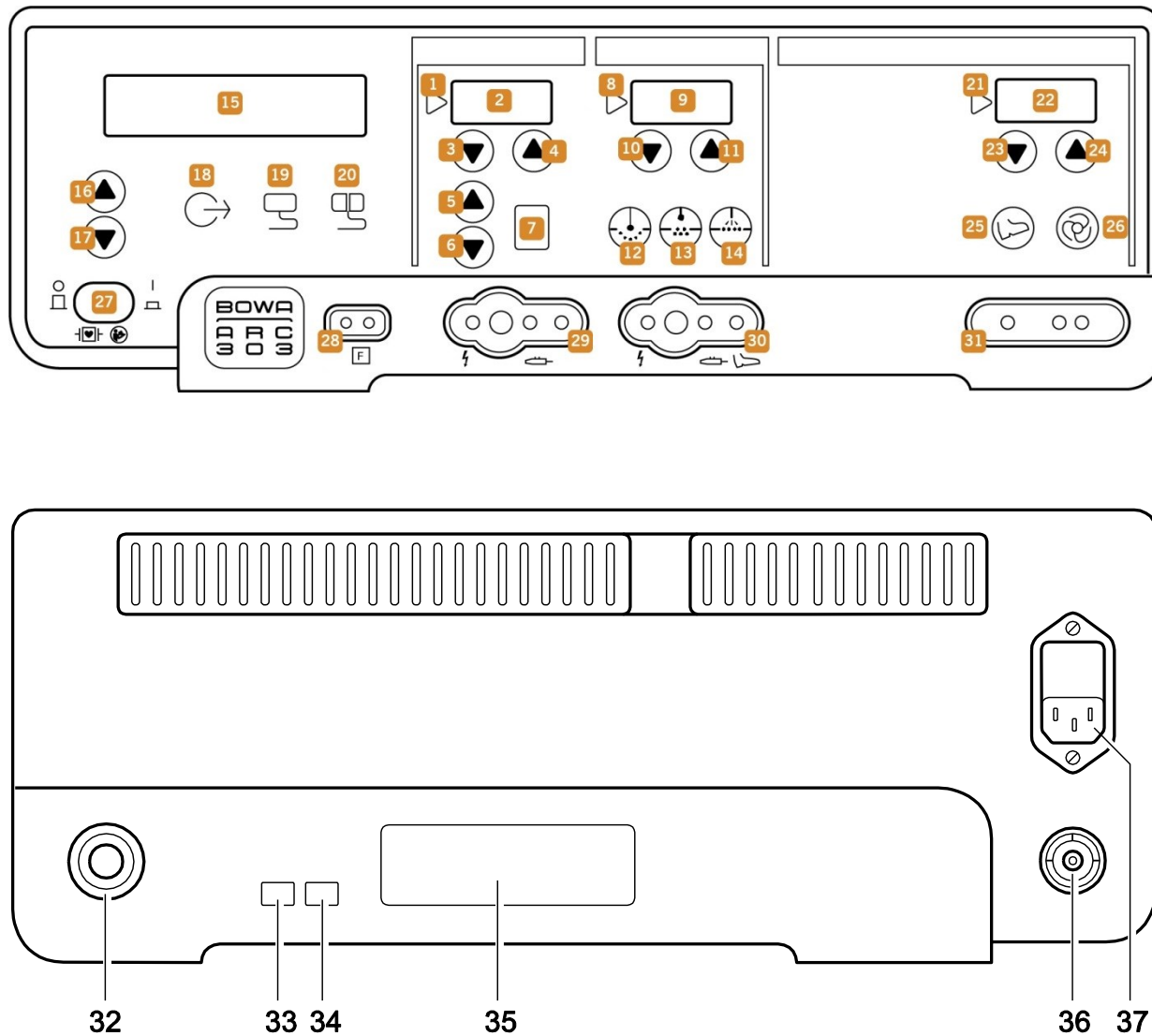
BOWA
3030

Legend

Legend

- | | |
|--------------|---|
| 1 | "Monopolar Cut" indicator arrow (yellow) |
| 2 | "Monopolar Cut" 7-segment display |
| 3/4 | Power limitation for monopolar cutting |
| 5/6 | Key for the degree of scabbing during monopolar cutting |
| 7 | "Monopolar Cut" blend factor indicator Blend settings 0–9 |
| 8 | "Monopolar Coag" indicator arrow (blue) |
| 9 | "Monopolar Coag" 7-segment display |
| 10/11 | Power limitation for monopolar coagulation |
| 12 | Key/indicator for "Moderate Coagulation" current mode |
| 13 | Key/indicator for "Forced Coagulation" current mode |
| 14 | Key/indicator for "Spray Coagulation" current |
| 15 | Indicator on main display: programs and information Current indicator on 2-line display |
| 16/17 | Program key |
| 18 | Error status indicator |
| 19 | EASY monitoring for one-piece neutral electrode (EASY one-piece monitoring) |
| 20 | EASY monitoring for split neutral electrode (EASY split monitoring) |
| 21 | Indicator arrow for "Bipolar Coag" (blue) |
| 22 | "Bipolar Coag" 7-segment display |
| 23/24 | Power limitation for bipolar coagulation |
| 25 | Key/indicator for "Bipolar Output" FOOT SWITCH (socket connector 31) Only for bipolar coagulation! |
| 26 | Key/indicator for AUTOSTART "Bipolar Output" (socket connector 31) Only for bipolar coagulation! |
| 27 | On/off switch |
| 28 | Socket for the neutral electrode (NE)* |
| 29 | Socket connector for monopolar instruments with hand switch* (only for ARC 303) |
| 30 | Socket connector for monopolar instruments with hand or foot switch, Bovie connector or 4 mm monopolar endoscope connector, or 3-pin connector* |
| 31 | Socket connector for bipolar instruments with foot switch or AUTOSTART* |

* Application part F according to IEC 60601-1



Back side of ARC 250/303

- 32** Socket connector for foot switch for sockets **30** and **31**
- 33** Fibre optic signal output socket connector
(with ARC 250/303 with GastroCut option)
- 34** Fibre optic signal output socket connector
(with ARC 250/303 with GastroCut option)
- 35** Rating label
- 36** Connection for equipotential bonding
- 37** Power connection for cooling device connector

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1. Using this operating manual

This operating manual is part of the device.

BOWA-electronic GmbH & Co. KG, referred to in the following simply as BOWA, assume no liability nor provide any warranty whatsoever for damage and consequential damages that arise due to non-compliance with the operating manual.

- ▶ Read the operating manual carefully and thoroughly before using this device.
- ▶ Store the operating manual in a safe place throughout the service life of the device.
- ▶ Keep the operating manual accessible to operating room personnel.
- ▶ Give the operating manual to each successive owner and/or user of this device.
- ▶ Always update the operating manual whenever you receive additional information from the manufacturer.

1.1. Revision index

| Software version | Last revised |
|------------------|--------------|
| 2.21 | 2014/06 |

1.2. Validity

This operating manual applies only to the devices designated on the title page.

1.3. Other applicable documents

- ▶ Comply with other applicable documents in the appendix or in the other sections.

1.4. Icons and labeling

1.4.1. Structure of warning instructions



SIGNAL WORD

"Risk type, source and consequences there of" (Personal injury)!

► Measure for risk prevention.







NOTE

"Risk type, source and consequences there of" (Property damage)!

► Measure.

1.4.2. Risk levels in the warning instructions




| Symbol | Risk level | Probability of occurrence | Consequences of non-compliance |
|---|----------------|---------------------------|--------------------------------|
|  | DANGER | Immediate risk | Death, serious injuries |
|  | WARNING | Possible risk | Death, serious injuries |
|  | CAUTION | Possible risk | Minor injuries |
|  | NOTE | Possible risk | Property damage |

1.4.3. Tips



Tips and additional information to facilitate tasks.

1.4.4. Other icons and labeling

| Icon/Labeling | Meaning |
|---|---|
|  | Prerequisite for an activity |
|  | Activity with one step |
| 1. 2. 3. | Activity with several steps in a binding sequence |
|  | Result of preceding activity |
| • | List (first level) |
| • | List (second level) |
| Emphasis | Emphasis |
| ..., see section xxx, page xxx | Cross reference |
| ... "Monopolar output" 29/30 | Bold numbers (e.g. 29/30) refer to the schematic depiction of the ARC 250 / 303 and the associated legend see pages 6– 7) |

2. Safety

2.1. Intended use

The HF device is intended exclusively for the generation of electrical power for monopolar cutting as well as monopolar and bipolar coagulation in surgical interventions involving tissue.

It is used in the following areas:

- general surgery
- endoscopy (only with the "GastroCut" option)
- gynecology
- hand surgery
- ENT
- cardiac surgery (including open-heart surgery)
- neurosurgery
- pediatric surgery
- plastic surgery and dermatology
- thoracic surgery
- orthopedics
- urology, including transurethral resection (TUR)

Do not use the HF device if, in the opinion of an experienced physician or according to current professional literature, such use would cause endangerment of the patient due, for example, to the general condition of the patient, or if other contraindications are present.



BOWA requires that the HF device is operated under the supervision of qualified and authorized personnel. The surgeon and medical staff must be trained in the fundamental principles, rules for use and risks of HF surgery and must be familiar with these in order to safely and reliably prevent putting patients, personnel and devices at risk.



Any other use is neither intended nor proper and must be effectively prevented.

2.2. General safety instructions

- ▶ Ensure that no electronic devices that are subject to interference from electromagnetic fields are set up in the vicinity of the HF device.
- ▶ Observe the instructions on electromagnetic compatibility provided in section EMC, page 86.
- ▶ Always connect the HF device to a mains power system with a protective earth lead in order to prevent electric shock.

Additional devices that are connected to electrical medical devices must satisfy relevant IEC or ISO standards (e.g. IEC 60950 for data processing devices). Furthermore, all configurations must comply with the standardised requirements for medical systems (see IEC 60601-1-1 or Section 16 of the 3rd edition of IEC 60601-1 as relevant). Anyone who connects additional devices to electrical medical devices is automatically a system configurator and thus responsible for meeting standardised system requirements. Please note that local laws prevail over the aforementioned standard requirements. In case of questions, please contact your local dealer or Technical Service, see section Technical service, page 59.



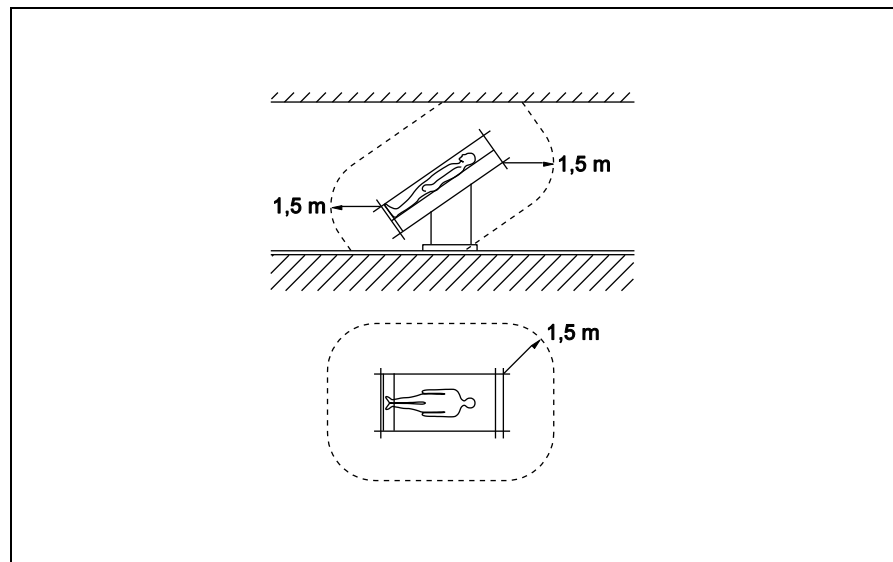
To protect personnel, BOWA recommends the use of a smoke evacuator to extract electrosurgical smoke, e.g. BOWA SHE SHA.

2.3. Personal safety instructions

2.3.1. Ambient conditions

Excessive leakage currents may create a risk of burns to the patient.

- ▶ Do not use the HF device in the immediate vicinity of the patient. Observe the minimum distances recommended by BOWA, as shown in the following figure.



2.3.2. Patients with pacemakers

Malfunctions or destruction of the pacemaker can endanger the life of the patient or result in irreversible injuries to the patient.

- ▶ In cases of patients with pacemakers, consult the cardiologist before carrying out HF surgery.
- ▶ Use bipolar HF methods.
- ▶ Move the HF neutral electrode close to the operating field.
- ▶ Set the demand pacemaker to a fixed frequency.
- ▶ Ensure that the pacemaker does not come into contact with the HF electrode.
- ▶ Keep a fully operational defibrillator handy.
- ▶ Carry out a postoperative pacemaker check.

2.3.3. Safe positioning of the patient

- ▶ Position the patient so that he is not touching any metal parts that are grounded or have considerable capacitance relative to ground (e.g. operating table brackets). Lay anti-static towels between the patient and the bedding.
- ▶ Ensure that the patient does not touch any wet towels or bedding.
- ▶ Place anti-static towels between areas of heavy sweating and skin-to-skin contact on the patient's trunk.
- ▶ Ensure that you are using a suitable support surface in order to prevent pressure necrosis.
- ▶ Drain urine via the catheter.

2.3.4. Correct connection of the HF device

- ▶ Always ground the HF device via the equipotential bonding. Also note the requirements of chapter 8.6.7 of ISO 60601-1 for medical electrical systems.
- ▶ Do not use any needle electrodes for monitoring.
- ▶ Attach electrodes of physiological monitoring devices without protective resistors or HF regulators as far as possible from the HF electrodes.
- ▶ Attach lines from monitoring devices so that they do not lie on the patient's skin.
- ▶ Keep the leads to the HF electrodes as short as possible and position them so that they do not touch the patient or other leads.
- ▶ Do not place any objects on the HF device.

2.3.5. Correct use of the HF device

Inadvertent activation in the non-visible area of the HF device can injure the patient.

- ▶ Activate the HF device only when the electrode is in your field of vision and you can quickly deactivate the HF device at all times.
- ▶ After inadvertent activation of the HF device, switch off the device immediately using the on/off switch.
- ▶ Pay particular attention whenever you use the foot switch or the manual switch.

Lack of preparation, errors in usage or faults in the HF device can cause damage to the HF device.

- ▶ Use the automatic monitoring functions to ensure that the HF device works properly without errors. For information on the automatic test functions, see section Monitoring functions, page 29.
- ▶ Ensure that no conductive fluids (e.g. blood, amniotic fluid) have penetrated the foot switch or the manual switch.
- ▶ Ensure that the cables for the foot switch and manual switch are free from short circuits and broken leads.

2.3.6. Adjusting the settings of the HF device and use of the accessories

Setting the output power too high can injure the patient. Therefore, before you increase the output power, ensure that:

- the neutral electrode is correctly positioned,
- the working electrodes are clean,
- and the plug connections are all correct.

Setting the HF device correctly

- ▶ To prevent inadvertent (thermal) tissue damage during operations on body parts with small cross sections and in areas with high resistance (bones or joints), use the bipolar method in these areas.
- ▶ Set the acoustic signal that sounds when the electrode is activated so that it is always clearly audible.

Nerve and muscle irritations due to low-frequency currents!

In electrosurgical applications (particularly applications generating an arc), a part of the HF current is converted to a low-frequency current. This can trigger muscle spasms in patients.

- ▶ To minimize the risk of injury to the patient, set the power and effect as low as possible.

Correct usage of the accessories

- ▶ Use only insulated accessories.
- ▶ Check all electrodes for sharp edges and projecting parts before use.
- ▶ Use only electrodes that are free of defects and in good working order.
- ▶ Never place active electrodes on or near the patient.
- ▶ Do not remove hot electrodes from the patient's body directly after cutting or coagulation.
- ▶ Ensure that there is sufficient distance between the patient cables and the cables of the HF device.
- ▶ Do not run the patient cable across the patient.

2.4. Device-related safety instructions

Devices manufactured by BOWA are developed in accordance with the current state of technology and generally accepted safety rules. Despite this, risks to the life and health of the user or third parties and/or damage to the device and other objects can occur.

- ▶ Use only accessories approved by BOWA, see section Accessories and replacement parts, page 85).
- ▶ Use the device only when it is in free of technical defects and in good working order and only for the intended purpose, always remaining aware of safety requirements and risks while complying with this operating manual.
- ▶ Have malfunctions that can adversely affect safety (e.g. deviations from the permissible operating conditions) repaired without delay.
- ▶ Wipe down the HF device only with cleaning agents and disinfectants that are nationally approved for surface cleaning, see section Disinfection and cleaning, page 56.
- ▶ Never immerse the device in water or cleaning agents.
- ▶ Never boil the device and never disinfect it mechanically.
- ▶ Immediately drain any fluid that might have penetrated the device.

A malfunction can result in an undesired increase of the output power if the device is damaged or defective.

2.5. Safe handling (general instructions)

- ▶ Before each use of the device, check to ensure that it is functioning properly and is in good working order and connected properly.
- ▶ Observe the instructions for use with regard to standards, see section Risk levels in the warning instructions, page 14.
- ▶ Always observe and obey the acoustic signals or error indications during use, see section Error list, page 51.
- ▶ The device and accessories may be operated and used only by people who have the necessary training, knowledge and experience.
- ▶ Check the accessories regularly for damage to the isolation, for proper function, and the expiration date, especially the electrode cable, endoscopic accessories, and neutral electrodes.
- ▶ Do not place any instruments on the patients or on the devices.
- ▶ Ensure that no instruments are being cleaned when AUTOSTART is activated.
- ▶ Wear suitable gloves during operations.

2.5.1. Surgical environment: prevention of explosions/combustion

Sparks fly during proper use of the HF device.

- ▶ Do not use the HF device in areas where there is a risk of explosion.
- ▶ Do not use any flammable or explosive liquids.
- ▶ If display components fail, do not use the HF device any longer.
- ▶ Avoid using ignitable anesthetics and gases which support combustion (e.g. nitrous oxide, oxygen) during operations (e.g. in the head and thoracic regions).
- ▶ Wear suitable gloves during operations.
- ▶ Use exclusively non-flammable cleaning agents, disinfectants and solvents (for adhesives). If you use flammable cleaning agents, disinfectants or solvents, ensure that they have fully evaporated before using the HF surgical equipment.
- ▶ Ensure that no flammable liquids collect beneath the patient or in body cavities (e.g. the vagina). Suction and/or flush body cavities before activating the device.
- ▶ Wipe off all liquids before using the HF device.
- ▶ Ensure that no endogenous gases are present that could ignite.
- ▶ Ensure that all materials saturated with oxygen (e.g. cotton, gauze) are removed far enough from the HF environment that they cannot ignite.

2.5.2. Application of the neutral electrode



Please read and comply with the notes about using the neutral electrode listed in the user manual as well as the information on the packaging of the neutral electrode.

In the monopolar HF method, the neutral electrode feeds the current introduced into the patient's body at the surgical site back to the HF device.

- ▶ To prevent a rise in temperature at the current emergence point, the following conditions must be ensured:
 - sufficiently large contact surface between the neutral electrode and the patient's body
 - high electrical conductivity between the neutral electrode and the patient's body

- ▶ To prevent the patient being burned by the neutral electrode, you must comply with the following conditions:
 - Select the application point for the neutral electrode so that the current paths between the active and neutral electrodes are as short as possible and run longitudinally or diagonally to the patient's body (because muscles are more conductive in the direction of the fibrils).

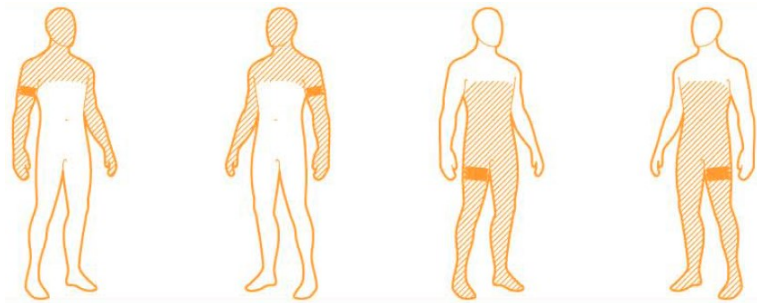


Figure 2-1: Application point of neutral electrode

- During surgery in the thoracic region, do not run the current path transversely across the patient's body and ensure that the patient's heart is never in the path of the current.
- Depending on the surgical site, apply the neutral electrode to the nearest upper arm or thigh if possible, but never closer than 20 cm.
- In the case of self-adhesive disposable electrodes, comply with any further manufacturer specifications regarding the point of application.
- Ensure that the application point is free of scar tissue, bony protuberances, surface hair and ECG electrodes.
- Ensure that there are no implants (e.g. bone nails, bone plates, endoprostheses) in the current path.
- Ensure that no short circuits can occur at the neutral electrode connection.
- Avoid locations where fluids may collect.

Before applying the neutral electrode

- ▶ Shave the area where the neutral electrode will be applied.
- ▶ Clean the application site, but do not use any alcohol, as it dries out the skin and increases the transition resistance.
- ▶ If the patient has poor circulation, massage or brush the application site.
- ▶ Apply the neutral electrode using the entire contact surface. Secure reusable neutral electrodes with rubber bands or elastic ties so that they do not loosen or fall off when the patient moves. Ensure that the patient's circulation is not impaired (risk of necrosis).
- ▶ Never use wet towels or electropastes.

- ▶ Ensure that no liquids (e.g. cleaning fluids, disinfectants, blood, urine) get between the patient and the neutral electrode.
- ▶ Do not place the neutral electrode under the patient's buttocks or back.
- ▶ Ensure that there are no ECG electrodes in the current path of the HF device.

Example application using a disposable electrode

- ▶ Remove the protective film and attach the self-adhesive disposable electrode to the patient. Ensure that the long side of the disposable electrode faces the operation site and the electrode is fully in contact with the skin. This avoids excessive current concentration on the short side.
- ▶ Using both hands, press the self-adhesive disposable electrode firmly against the patient's skin.
- ▶ Clamp the electrode tab to the neutral electrode cable.
- ▶ After the operation, remove the disposable electrode carefully to avoid skin damage.

Use of a one-piece neutral electrode

- ▶ Check the one-piece neutral electrode during the surgery.

Use of a split neutral electrode

- ▶ Apply the split neutral electrode correctly and without any additional objects, as the HF device does not recognize the bridging of the section surfaces by other objects.



See chapter EASY neutral electrode monitoring (EASY monitoring), page 31, for additional information about monitoring the neutral electrode.

3. Functionality

The HF device is controlled by a microprocessor and converts the mains voltage into a high-frequency alternating current for monopolar or bipolar applications.

The "ARC Control" regulator reduces the output power to the minimum level necessary, depending on the tissue and its resistance.

3.1. Monopolar modes

In monopolar operation, the HF device has the following operating modes:

- "Cut" for cutting in low-resistance tissue
- "Moderate Coag" for contact coagulation
- "Forced Coag" for coagulation with light contact
- "Spray Coagulation" for contactless surface coagulation

Instruments can be connected to monopolar output (socket connector **29/30**).

3.1.1. "Cut" mode

In this mode a powerful HF current with a low crest factor is used for cutting in biological tissue. The maximum power is 250 W with the ARC 250, or 300 W with the ARC 303. The ARC CONTROL regulator quickly adjusts the output power to the minimum level necessary in response to variations in the tissue and changes in the cutting surface or cutting speed.

When setting the blend function between level 0 and 9, it is possible to set a variably adjustable degree of surface scabbing.

3.1.2. "Moderate Coag" mode

This mode is used in contact coagulation for stopping hemorrhagic oozing, hemostasis of larger tissue areas, and coagulation over smaller surfaces.

3.1.3. "Forced Coag" mode



If you wish to change the settings for "Forced Coag" mode, see section Menu program 3 "Forced Coag Mode", page 46.

This mode is used for contact coagulation extending over a short distance in the tissue, preferably using electrodes with fine tips or small surfaces.

Three sub-modes are available in "Forced Coag" mode:

| Mode | Characteristics | Application |
|--------------|---|--|
| Non Cutting | High coagulation rate Minimal cutting tendency | Requirements for good coagulation without cutting tissue |
| Mixed Mode | High coagulation rate Moderate cutting effect | All standard applications (factory setting) |
| Cutting Mode | Good hemostasis Outstanding cutting effect | Preparatory cutting with the blue key |

The simultaneous activation of two monopolar connection ports makes it possible to use two manually controlled instruments at the same time. Handles with finger switches can be connected to connection ports **29/30**. The handles are activated with the "Coag" button on the handle. Both handles can be switched on or off independently of one another.



The set power applies to both connection ports. The distribution of the power depends on the tissue structure and may change during the application.

3.1.4. "Spray Coagulation" mode

This mode is used for contactless surface coagulation via arcing.

This mode is used for hemostasis in parenchymal tissue or in poorly accessible crevices and in conjunction with argon coagulation.

The simultaneous activation of two monopolar connection ports makes it possible to use two manually controlled instruments at the same time. Handles with finger switches can be connected to connection ports **29/30**. The handles are activated with the "Coag" button on the handle. Both handles can be switched on or off independently of one another.



The set power applies to both connection ports. The distribution of the power depends on the tissue structure and may change during the application.

3.1.5. "GastroCut" mode



If you wish to change the settings for "GastroCut" mode, see section Menu program 3A "GastroCut-Modes", page 47.

This mode consists of a pulse sequence of cutting current and coagulation phase.

This mode is used for the removal of polyps or for making incisions in papillae. The following applies:

- Blend 0 = low coagulation rate
- Blend 9 = high coagulation rate

Three sub-modes are available in "GastroCut" mode:

| Mode | Characteristics | Application |
|--------|---|--|
| Slow | Cutting characteristics: Slower pulse sequence | Recommended for particularly intricate tasks |
| Medium | Cutting characteristics: Dynamic | Recommended for skilled users (default setting) |
| Fast | Cutting characteristics: Dynamic and fast pulse sequence | Recommended for experienced users in this specialist area |

3.2. Bipolar modes



Special instruments are necessary in order to achieve optimal results using the bipolar method (particularly with minimally invasive surgery).

Advantages of the bipolar method:

- The required high-frequency output is only one-fourth of the output required for the monopolar method.
- It is not necessary to apply a neutral electrode to the patient, which eliminates the associated risks to the patient.

Instruments can be connected to the bipolar output (socket connector **31**).

The AUTOSTART mode can be activated only for bipolar coagulation.

In the AUTOSTART mode, the coagulation current is automatically added after low-resistance tissue contact of the connected bipolar instruments. Thus activation using the foot switch is not necessary.

If an output operating in AUTOSTART mode is activated using the foot switch, AUTOSTART mode is deactivated and the foot switch signal is used.

This type of current can be used for bipolar cutting instruments.

This type of current is suitable for the application of bipolar scissors, e.g. BOWA BiZZER.



To prevent activation problems in AUTOSTART mode, we recommend limiting the bipolar cable length to 4.5 meters or less.

Forceps

Under moist conditions the forceps may be released accidentally, for example by contact with blood. This can cause an undesirable increase in the duration of the surgical therapy.

When the forceps are set aside with AUTOSTART enabled, inadvertent activation with associated risk of injury may occur when the forceps are wiped with a moist cloth or come in contact with metallic components, such as other instruments.

3.3. Activation and alarm signals in monopolar and bipolar mode



The activation and alarm signals are output at volume level 1. The minimum volume is level 1. The volume of the activation signal should be increased as necessary for use in relatively noisy surroundings. The maximum volume is level 10. The alarm tone is not adjustable.

| Mode | Indicator in menu program | Frequency (Hz) | Signal type |
|----------------|---------------------------|----------------|-----------------------------|
| Monopolar Cut | Sound Level 1 | 500 | Continuous sound |
| Monopolar Coag | Sound Level 2 | 420 | Continuous sound |
| Bipolar Coag | Sound Level 3 | 340 | Continuous sound |
| Sim Coag | – | 800 | Continuous sound |
| GastroCut end | – | – | Pulsating alternating sound |
| Alarm | – | 1000 | Intermittent |

3.4. Emergency shutoff

The HF device can be switched off at any time by using on/off switch **27** for emergency shutoff.

3.5. Monitoring functions

3.5.1. Self-test

When the HF device is switched on, it runs a self-test that checks the operating elements, acoustic signal, microprocessor and hardware for proper operation. If errors occur, see section Detecting and correcting faults, page 51.

3.5.2. Cyclical test during operation

During operation, safety-relevant functions and signals are tested cyclically. If errors are detected, the HF generator will shut itself off. An error message appears on the display. For further information, see section Detecting and correcting faults, page 51.

3.6. ARC Control technology

The "ARC Control" regulator takes varying cutting surfaces and cutting speeds into account, detects differences in tissue and the resulting changes in resistance, and adjusts the output power to the minimum level necessary under actual conditions.

3.7. Neutral electrode monitoring



Always use the largest possible electrode when attaching a neutral electrode.

3.7.1. General information



BOWA recommends using split neutral electrodes, since only this type of electrode allows the HF device to detect detachment of the neutral electrode if this occurs.

Monitoring of the neutral electrode minimizes the risk of burns at the site where the neutral electrode is attached.

Two types of neutral electrodes can be monitored:

- One-piece neutral electrodes
- Split neutral electrodes.

The split neutral electrodes are shown on display **20**, and the one-piece neutral electrodes are shown on display **19**, see chapter Error Display in EASY monitoring, page 55.

3.7.2. EASY neutral electrode monitoring (EASY monitoring)



Children's electrodes cannot be monitored by the EASY system, because their resistance is too high due to their small surfaces.

The EASY monitoring system measures changes in resistance between the patient and the high-frequency surgery device both before and during HF activation. If required, it requests personnel to intervene via an optical and acoustic alarm. For this purpose, a split neutral electrode with corresponding contact surfaces and suitable transition resistances which is attached to the patient according to the manufacturer's instructions is required. The EASY system does not monitor partial currents in the two contact pads of the split neutral electrode.

The min. pad area of the electrode must be set to 110 cm² for the "Resection" program and the "Moderate Coagulation" mode.

3.8. Foot switch

In addition to the manual switch, the foot switch can be used to activate various operating modes.

A foot switch can be connected to socket connector **32**. The HF device automatically detects whether a foot switch is connected.

The following foot switch systems can be connected to the HF device:

| Article No. | Designation |
|-------------|---|
| 901-011 | Single-pedal foot switch with pushbutton (SP+) |
| 901-021 | Double-pedal foot switch (DP) |
| 901-031 | Double-pedal foot switch with pushbutton (DP+) |
| 901-032 | Double-pedal foot switch with pushbutton and clip (DP+) |

3.9. Memory functions

The generators in the ARC family allow the parameter settings of all programs to be stored.



















To do this, set parameters such as output, blend factor, coagulation mode and foot switch assignment and then store them by pressing the AUTOSTART key **26** and keeping it pressed. This storage procedure only stores the current program.

The individual device settings and entered settings can be retrieved with the press of a button, see section Basic program settings, page 40.

The saved values will be stored even when the device is switched off.

4. Description

4.1. Icons on the device

| Symbol | Designation |
|---|--|
|  | Foot switch connector |
|  | Neutral electrode isolated from ground for HF |
|  | CF-type device with defibrillation protection |
|  | Equipotential bonding |
|  | Fuse |
|  | Alternating current |
|  | On/off switch |
|  | During activation (of the HF device) RF energy in the radio frequency range 9 kHz to 400 GHz is applied, which produces electromagnetic radiation. |
|  | Labeling of electrical and electronic devices in accordance with Directive 2002/96/EC (WEEE), see Disposal |
|  | Identification of (active) HF output; caution: dangerous electrical voltage! |
|  | Manufacturer |
|  | Date of manufacture |
|  | Comply with the user manual |
|  | Foot switch |
|  | Finger switch |
|  | AUTOSTART |
|  | Fiber-optic signal input |
|  | Fiber-optic signal output |

4.1.1. Rating label

| | | | |
|--------------------------------|----------|---|---------------|
| NETZSPANNUNG LINE VOLTAGE | 230 V~ | SCHUTZKLASSE / CLASS I IP 21 | REF 900250 |
| NETZFREQUENZ LINE FREQUENCY | 50/60 Hz | MONOPOLAR 300 W/500 Ohm BIPOLAR 120 W/75 Ohm | SN 25000098 |
| NETZSTROM INPUT CURRENT | 3,0 A | FREQUENZ FREQUENCY | 330 kHz |
| SICHERUNG LINE FUSE | T 3,15 A | BETRIEBSART OPERATING MODE | INT 10 s/30 s |
| BOWA-electronic GmbH & Co. KG | | Heinrich-Hertz-Strasse 4-10 D- 72810 Gomaringen | |

Figure 4-1: ARC 250 rating label
 (An ARC 250 rating label is shown here. REF and SN are different for the ARC 303 (e.g. REF 900-303, SN 30300815))

4.2. Scope of delivery

You'll find detailed information on the scope of delivery in the current catalogs.

4.3. Components required for operation

- Power cable
- Foot switch
- Neutral electrode
- Electrode handle for monopolar applications with finger keys or activation via foot switch
- Working electrode
- Connection cable

4.4. Operating conditions

Temperature: +10 °C to +40 °C
Relative humidity: 30% to 75%, non-condensing
Atmospheric pressure: 700 hPa to 1600 hPa
Max. operating altitude: 3000 m a.s.l.

5. Preparation

5.1. Setting up the HF device



NOTE

When the HF device is used as intended, electromagnetic fields are generated. This can affect other devices.

- ▶ Ensure that no electronic devices are set up in the vicinity of the HF device.



WARNING

Shock hazard!

- ▶ Always connect the HF device to a mains power system with a protective earth lead in order to prevent electric shock.



DANGER

Risk of burns to patients due to excessive leakage current!

- ▶ Do not place the HF device in the immediate vicinity of the patient, see section Ambient conditions, page 18.



HF devices may be used only in rooms used for medical purposes that meet the requirements of DIN VDE 0100-710.



If the HF device was previously stored or transported at temperatures below +10 °C, it will take approximately three hours to adjust to room temperature.

1. Observe and comply with the operating conditions, see chapter Operating conditions, page 33
2. Place the HF device on one of the following platforms:
 - a table,
 - an equipment trolley,
 - a console suspended from a ceiling support or wall-mounted brackets.
 - if necessary, position the HF generator on the additional device ARC PLUS




Except for the additional device ARC PLUS, do not place any other devices on the HF device

3. Set up the HF device with sufficient clearance to other electronic devices, see section EMC, page 86.
4. Position the HF device with the front of the device facing the patient/surgeon.
5. Do not place any other objects on or above the HF device.
6. Do not set up the HF device on other devices.
7. Connect the power cable.

5.2. Switching on the HF device



Do not use the HF device if the indicator elements are not working. For error correction, see section Detecting and correcting faults, page 51.

1. Switch the HF device on using the on/off switch **27**.
 The HF device carries out a self-test: all indicator elements light up and blink alternately with the display.
 All modes that can be set in the menu programs are displayed alternately. For more information about the setting options, see section Menu programs, page 45.
2. Check whether all the indicators (**2, 7, 9, 12, 13, 14, 15, 22, 25, 26**) and LEDs (**1, 8, 18, 19, 20, 21**) on the front panel light up and flash alternately with the display.
3. Press any key to end the self-test.
 The HF device is ready for operation.
 The parameters of the most recently selected program appear on the display.
 A self-test is carried out if the device is switched off for longer than 15 to 20 seconds after being used. The default parameters of the most recently selected program subsequently appear.

5.3. Connecting instruments

- Before connecting instruments, ensure that the following conditions are met:
 - Combinations of accessories not mentioned in the operating manual may be used only if they are explicitly designed for the intended use. Performance features as well as safety requirements must always be taken into account.
 - The insulation of the accessories (e.g. HF cables, instruments) must be sufficient for the maximum output peak voltage (see IEC 60601-2-2 and IEC 60601-2-18).
 - Do not use accessories with defective insulation.



In order to arrange and protect all cables connected to the HF device, use the pull-out cable guide on the left underside of the device.

5.3.1. Instruments for monopolar applications

1. Plug the neutral electrode cable into the socket for the neutral electrode **28**.
2. Check EASY monitoring for a one-piece neutral electrode **19** or EASY monitoring for a split neutral electrode **20** to ensure that it corresponds to the type of neutral electrode connected.
3. Connect the electrode handpiece to the active socket connector **29/30**.
 - or –
With accessories lacking finger buttons: connect a foot switch to socket connector **32**, and connect the monopolar connection cable to the Bovie jack on connection port **30**.
 - or –
Connect the monopolar cable for endoscopy to the socket connector for monopolar instruments **30** (left).

5.3.2. Instruments for bipolar applications

1. Connect the bipolar cable with the instrument, e.g. the tweezers.
 2. Connect the bipolar cable to the active socket connector **31**.
 3. For bipolar use without AUTOSTART, connect a foot switch to socket connector **32**.
 - or –
For bipolar use with AUTOSTART, press the AUTOSTART key **26**.
- ☞ Once the contact is closed, the application starts after the configured response time.

5.3.3. Connecting the foot switch

- ▶ Connect the desired foot switch to the foot switch socket connector **32**.
- ☞ Standard arrangement:
Single-pedal foot switch → monopolar coagulation (with ARC 303 connection port **30**).
Double-pedal foot switch → cutting and monopolar coagulation.

5.3.4. Assigning a foot switch output

1. Press the extra button on the dual foot pedal switch (e.g. for "Bipolar Output" **31**).
– or –
Key/indicator for "Foot Switch" **25**.
 - The "Bipolar Foot Switch" indicator **25** will light up and an alternating acoustic signal will be emitted for acoustic confirmation of the switchover process. The blue foot switch pedal is now activated for bipolar coagulation.
2. Press the key/display for AUTOSTART **26** for longer than 5 seconds.
 - The configured HF parameters will be saved and the symbol -> appears on the display or main display **15**.

5.4. Functional test

5.4.1. Autotest function

The HF device automatically carries out a self-test after being switched on and a cyclical test during operation. If errors occur, see section Detecting and correcting faults, page 51.

5.4.2. Functional test execution

Perform the following functional test before putting the device into service:



The accessories must be designed for the indicated maximum voltage.

1. Connect the neutral electrode and attach it to the patient's arm.
 - The EASY neutral electrode indicator **19/20** changes to green.
2. Remove the neutral electrode.
 - The indicator **18** changes to red, acoustic signals sound, and the EASY neutral electrode monitoring indicator **19/20** goes dark.
3. Press the surfaces of the neutral electrode against each other.
 - The EASY neutral electrode monitoring indicator **19/20** changes back to green.



The neutral electrode used for this test may not later be used for an operation.

4. Connect a monopolar HF handpiece to a monopolar socket connector **29/30** and use the hand and foot switches to individually activate "Cut" and "Coag".

5. Check the settings on the display.
6. Now change to the bipolar output and connect bipolar tweezers.
7. Press the key/display for AUTOSTART **26** again and use the foot switch to activate the bipolar output. Check the settings and indicators in the bipolar section.
8. Press the key/display for AUTOSTART **26** again and use the foot switch to activate the bipolar output. Check the settings and indicators in the bipolar section.

5.4.3. Actions in case of problems

Proceed as follows in case of functional problems:

1. Immediately disconnect the patient from the HF device.
2. Inspect the HF device and perform a functional test.
3. Report incidents and near-accidents to the German Federal Institute for Medications and Medical Products in accordance with Section 3 of the German Ordinance on the Installation, Operation and Use of Medical Products (MPBetreibV). Observe the provisions of the in-house reporting system in this regard.
4. Contact the service center, see section Technical service, page 59.

5.4.4. EASY neutral electrode electrode monitoring (EASY monitoring)



NOTE

Risk of incorrect application of the neutral electrode!

- Ensure compliance with the specifications for correct application of the neutral electrode with regard to size, adhesive properties and full-surface contact of the complete electrode.

The following functions can be tested for split and one-piece neutral electrodes:

| Actual status | Output | Measure |
|---|--|--|
| Cable for one-piece or split neutral electrode not connected | Indicators for EASY monitoring of split neutral electrode 20 or EASY monitoring of one-piece neutral electrode 19 do not light up | ► Plug in the cable for the one-piece or split neutral electrode. |
| Only the cable for the one-piece or split neutral electrode is connected | Indicators for EASY monitoring of split neutral electrode 20 or EASY monitoring of one-piece neutral electrode 19 light up | ► Check the cable for a short circuit. |
| Cable with split neutral electrode plugged in but not attached to patient. | Indicators for EASY monitoring of split neutral electrode 20 or EASY monitoring of one-piece neutral electrode 19 light up | ► Check whether the electrode is correctly attached to the cable connection. |
| The cable for the split or one-piece neutral electrode is plugged in and attached to the patient. | The indicators for EASY monitoring of the split neutral electrode 20 or EASY monitoring of the one-piece neutral electrode 19 light up green, but the type of neutral electrode is not correctly detected. | ► Based on the assessment of benefit and harm, decide whether you should activate the HF device. |

6. Operation

6.1. Program overview

An overview of the programs that can be executed with the HF device is displayed below.

| Program number | Program name | ARC 250 | ARC 303 |
|----------------|--------------|------------------|------------------|
| 0 | Standard | X | X |
| 1 | Macro | X | X |
| 2 | Micro | X | X |
| 3 | Resection | X | X |
| 4 | Argon | GastroCut option | GastroCut option |
| 5 | Argon-Flex | GastroCut option | GastroCut option |
| 6 | Gastro LOOP | GastroCut option | GastroCut option |
| 7 | Gastro KNIFE | GastroCut option | GastroCut option |



The data about settings, points of application, application duration, and the application of instruments are based on clinical practice. However, these are only basic guidelines which must be tested and approved for suitability by the operator. Depending on the individual conditions, it may be necessary to deviate from the specified data. Medicine is continuously evolving and growing due to R&D and clinical practice. These developments may also make deviations from the specified data necessary.



All programs have basic settings, e.g. operating language, sound or display and memory options, which can be changed for individual applications, see section Menu programs, page 45.

6.2. Basic program settings

6.2.1. Calling up a program

Call up each of the selectable programs with the following procedure:

1. Press the program key **16/17** repeatedly until the corresponding program is shown on the display.
2. Connect the instruments, see section Connecting instruments, page 35.

6.2.2. Changing the program



The preconfigured programs can be selected from 0 to 7. The parameters of the preconfigured programs can be changed, and the new parameters can be saved. Only the specific types of current cannot be changed. To change the parameters, make settings such as power level, blend factor, coagulation mode and foot switch assignment and then store them by pressing the AUTOSTART key **26** and keeping it pressed. Programs 8 to 99 are fully user configurable. These programs output standard types of current.

You can change the following factory settings:

Select cutting settings

- Press the power limitation key for monopolar cutting **3** or **4**.

Set blend factor

1. Press key **5** or **6** for the monopolar scabbing level.
2. Set the blend factor from 1 to 9, or to 0 for coagulation-free cutting.

Select current type for coagulation current

1. Press key/display **12** for "Moderate Coagulation" current
 – or –
 Press key/display **13** for "Forced Coagulation" current
 – or –
 Press key/display **14** for "Spray Coagulation" current
2. Set the power limit for the monopolar coagulation current using the keys for power limitation for monopolar coagulation **10/11**.
 – or –
1. Set the power limit for the bipolar coagulation current using the keys for power limitation for bipolar coagulation **23/24**.

6.3. Program descriptions

The following recommended settings for standard programs are based on empirical values and must be verified in each individual case by the surgeon.

6.3.1. Program 0 "Standard"

This program is used for monopolar/bipolar cutting and coagulation in standard applications.

6.3.2. Program 1 "Macro"

This program is used in plastic surgery of the hand and maxillofacial region.

6.3.3. Program 2 "Micro"

This program is used in the lower output range with fine electrodes for microscopic tissue structures.

6.3.4. Program 3 "Resection"



- Both cutting and coagulation are possible with monopolar operation.
- Use the socket connector for monopolar instruments **29/30** for monopolar Resection/TUR.
- Only the Standard coagulation current is available at the "Bipolar Output" **31**.

This program is used for underwater cutting during transurethral and transvaginal resection and vaporisation on prostata, bladder, and uterus.

In this program, the resection snare is used for cutting and coagulation. Arc control technology generates the cutting effect with simultaneously minimized output power.

ARC control facilitates immediate cutting and prevents adhesion of the electrodes.

- ☒ The key/display for "Monopolar Output" **29/30** and "Bipolar Output" **31** are preconfigured.
- ▶ Connect the monopolar resectoscope to the "Monopolar Output" **29/30**.

6.3.5. Program 4 "Argon" (only with GastroCut option)

In this program, open surgical interventions are carried out with the additional device ARC PLUS for argon electrocoagulation. When suitable instruments are connected, argon coagulation can be carried out with rigid electrodes and argon cutting.

1. Connect the additional device ARC PLUS.
2. Connect the argon handpiece with the rigid probes to the ARC PLUS.
3. Connect the surgical handpiece to the HF device.

6.3.6. Program 5 "Argon-Flex" (only with GastroCut option)

This program is used in argon electrosurgery with ARC PLUS.

In this program, surgical interventions are carried out with endoscopic use of flexible probes with the additional device ARC PLUS for argon electrocoagulation.



The connection port **29** has no function in the "Argon-Flex" program.

- ☒ The key/display "Monopolar Output" **30** is preconfigured.
1. Connect the additional device ARC PLUS.
 2. Connect the flexible probes to "Monopolar Output" **30** of the HF device.

6.3.7. Program 6 "Gastro LOOP" (only with GastroCut option)

This program is used in gastroenterology.

In this program, polypectomy snares are used for cutting and coagulation.

Arc control technology generates the cutting effect with simultaneously minimized output power.

ARC control facilitates immediate cutting and prevents adhesion of the electrodes.



The degree of coagulation increases with an increasing blend factor.



The connection port **29** has no function with the programs "Gastro LOOP" and "Gastro KNIFE".



Three modes are available in this program:
fast (approximately 3 cutting pulses per second),
medium (approximately 1.6 cutting pulses per second) and
slow (approximately 1 cutting pulse per second).

For more information on "GastroCut" mode, see section "GastroCut" mode, page 27.

- ☒ The key/display "Monopolar Output" **30** is preconfigured.
- 1. Connect the polypectomy snares to the socket for "Monopolar Output" **30** (use an adapter if necessary).
- 2. Connect the foot switch to the HF device.
- 3. Activate the HF current via the yellow key of the foot switch for cutting.
– or –
Activate the HF current via the blue key of the foot switch for coagulation.
- 4. Set the coagulation level using the keys for scabbing level **5/6**.
- 5. Press keys **3** and **4** to switch between:
slow (non-accelerated) GastroCut Pol;
dynamic (medium speed; default) GastroCut Pol;
fast dynamic (accelerated) GastroCut Pol.
- 6. In the case of hemorrhages:
Press the key/display for "Forced Coagulation" current **13** or use a clip.
- 7. If necessary, remove the polypectomy snares and connect the argon probe and the ARC PLUS argon unit.
- 8. Press the key/display for "Spray Coagulation" current" **14**.
- 9. Press the blue key of the foot switch for coagulation.

6.3.8. Program 7 "Gastro KNIFE" (only with GastroCut option)

This program is used in gastroenterology. Papillotomes and endoscopic resection instruments are used for cutting and coagulation.

ARC control technology generates the cutting effect with simultaneously minimized output power.

ARC control facilitates immediate cutting and prevents adhesion of the electrodes.



The connection port **29** has no function with the programs "Gastro LOOP" and "Gastro KNIFE".



Three modes are available in this program:
 fast (approximately 2.5 cutting pulses per second),
 medium (approximately 1.8 cutting pulses per second) and
 slow (approximately 1.4 cutting pulses per second).

For more information on "GastroCut" mode, see section "GastroCut" mode, page 27.

- ☒ The key/display "Monopolar Output" **30** is preconfigured.
- 1. Connect the papillotome to the socket for "Monopolar Output" **30** (use an adapter if necessary).
- 2. Connect the foot switch to the HF device.
- 3. Activate the HF current via the yellow key of the foot switch for cutting.
 – or –
 Activate the HF current via the blue key of the foot switch for coagulation.
- 4. Set the coagulation level using the keys for scabbing level **5/6**.
- 5. Press keys **3** and **4** to switch between:
 slow "Gastro KNIFE" (non-accelerated),
 dynamic "Gastro KNIFE" (medium speed; default) and
 fast dynamic "Gastro KNIFE" (accelerated).
- 6. In the case of hemorrhages:
 Press the key/display for "Forced Coagulation" current **13** or use a clip.
- 7. If necessary, remove the papillotome and connect the argon probe and the ARC PLUS argon unit.
- 8. Press the key/display for "Spray Coagulation" current **14**.
- 9. Press the blue key of the foot switch for coagulation.

6.4. Menu programs


The menu programs are standard programs for specifying basic parameters, such as the operating language, sound, display and memory options of the main programs.

6.4.1. Overview

The following menus are available:

- Menu program 1 "Set Language"
- Menu program 2 "Sound Level"
- Menu program 3 "Forced Coag Mode"
- Menu program 3A "GastroCut-Modes"
- Menu program 4 "Show Prev Inf-No"
- Menu program 5 "Hide Fix Prog"
- Menu program 6 "AutoStart Delay"
- Menu program 7 "Edit Prog Names"
- Menu program 8 "Restore Programs"
- Menu program 9 "Panel Check"

Selecting a menu program

1. When switching on the device, simultaneously press the on/off switch **27** and the program selection switch **17** to see the list of menu programs.
 The current software version is displayed on the display/main display **15**.
2. Press the menu selection switch **16** to select a menu program.
3. Press the power limitation key for monopolar cutting **4** to launch the selected program.

Exiting a menu program

- ▶ Press the power limitation key for monopolar cutting **3** to return to the list of menu programs.



When the HF device is switched off, the new settings will be saved automatically.

6.4.2. Menu program 1 "Set Language"



The language of the menu programs is English and cannot be changed.

Use menu program "Set Language" to set the language for the standard programs (language codes D = Deutsch; E = English; F = Français; I = Italiano; S = Español; T = Türk; P = Polski).

1. Press the power limitation key for monopolar cutting **4**.
2. Press the key for scabbing level **5/6** to select the appropriate language.
3. Press the power limitation key for monopolar cutting **3** to return to the menu programs.

After the front panel test has been run after the device is switched on, the selected language is shown by the language code letter on the "Bipolar Coag" display **22**.

6.4.3. Menu program 2 "Sound Level"

Use "Sound Level" to set the volume of the individual activation signals.

1. Press the power limitation key for monopolar cutting **4**.
2. Press the key for scabbing level **5/6** to change the volume.
3. Press the power limitation key for monopolar cutting **11** to select the next acoustic signal.
4. Press the power limitation key for monopolar cutting **3** to return to the menu programs.

6.4.4. Menu program 3 "Forced Coag Mode"

Use "Forced Coag Mode" to set the cutting and coagulation parameters of the "Forced Coag" current.



For more information on "Forced Coag" mode see section "Forced Coag" mode, page 26.

1. Press the power limitation key for monopolar cutting **4**.
2. Press the key for scabbing level **5/6** to change the forced coagulation mode.
3. Press the power limitation key for monopolar cutting **3** to return to the menu programs.

6.4.5. Menu program 3A "GastroCut-Modes"



For more information on "GastroCut-Modes", see section "GastroCut" mode, page 27.



You can configure a control tone for each cutting pulse in the "GastroCut" program. This setting can only be made in the Service program, and it applies to both "Gastro LOOP" and "Gastro KNIFE".

Changing the cutting speed for "Gastro LOOP"

1. Press the power limitation key for monopolar cutting **4**.
2. Press the key for scabbing level **5/6** to switch between slow "Gastro LOOP" (non-accelerated), dynamic "Gastro LOOP" (medium speed; default), and fast dynamic "Gastro LOOP" (accelerated).
3. Press the power limitation key for monopolar cutting **3** to return to the menu programs.

Changing the cutting speed for "GastroCut Pap"

1. Press the power limitation key for monopolar cutting **4**.
2. Press the key for monopolar coagulation **10/11** to switch between slow "Gastro KNIFE" (non-accelerated), dynamic "Gastro KNIFE" (medium speed; default), and fast dynamic "Gastro KNIFE" (accelerated).
3. Press the power limitation key for monopolar cutting **3** to return to the menu programs.

Enabling or disabling the control tone for cutting pulses

1. Press the power limitation key for monopolar cutting **4**.
2. Press the key for power limitation bipolar coagulation **23/24** to enable or disable the control tone for cutting pulses.
3. Press the power limitation key for monopolar cutting **3** to return to the menu programs.

6.4.6. Menu program 4 "Show Prev Inf-No"

The errors saved in the HF device are called up in the "Show Prev Inf-No" menu program.

1. Press the power limitation key for monopolar cutting **4**.
2. Press the key for scabbing level **5/6** to call up individual errors.
⇒ The error number will appear on the main display **15**.
3. Press the key/display for AUTOSTART **26** to call up the last 10 errors.
⇒ The error number will appear on the main display **15**.
4. Press the power limitation key for monopolar cutting **3** to return to the menu programs.



See the service manual for additional information on menu program 6.

6.4.7. Menu program 5 "Hide Fix Prog"

The "Hide Fix Prog" menu program hides standard programs that are not required.

1. Press the power limitation key for monopolar cutting **4**.
2. Press the power limitation key for bipolar coagulation **24** to display all standard programs.
⇒ The message "All FixPgm active" appears on the display/main display **15**.
3. Press the power limitation key for bipolar coagulation **23** to hide all standard programs.
⇒ The message "No FixPgm active" appears on the display/main display **15**.
– or –
Press the key/display for AUTOSTART **26** to show or hide individual standard programs.
4. Press program key **16/17** to browse the standard programs.
5. Press the power limitation key for monopolar coagulation **10** to hide the standard program.
– or –
Press the power limitation key for monopolar coagulation **11** to show the standard program.
6. Press the power limitation key for monopolar cutting **3** to return to the menu programs.

6.4.8. Menu program 6 "Autostart Delay"

Use menu program "Autostart Delay" to change the delay time in AUTOSTART mode.

1. Press the power limitation key for monopolar cutting **4**.
2. Press the power limitation key for monopolar coagulation **10/11** to adjust the start-up delay in 50 ms increments (from 50 to 2500 ms).
3. Press the power limitation key for monopolar cutting **3** to return to the menu programs.

6.4.9. Menu program 7 "Edit Prog Names"

Use the menu program "Edit Prog Names" to edit the text shown on the display/main display for user-defined programs.

- Press the power limitation key for monopolar cutting **4**.

Editing text in the display/main display

1. Press the program key **16/17** to select the program to be edited.
2. Press the key/display **12** for moderate coagulation in order to enable editing mode.
- ↳ Both EASY indicators **19/20** will light up.
3. Press the key for scabbing level **5** or **6** to select a letter or number.
4. Press the power limitation key for monopolar coagulation **10/11** to toggle between upper and lower case.
5. Press the power limitation key for monopolar cutting **4** to select the next letter or character.
6. Press the power limitation key for monopolar cutting **3** to delete the last letter or character.
7. Press the key/display for AUTOSTART **26** to save entered names.
8. Press the power limitation key for monopolar cutting **3** to return to the menu programs.

Deleting the text in the display/main display



All HF parameters of the deleted programs will also be deleted.

1. Press the power limitation key for bipolar coagulation **23** and the key/display for AUTOSTART **26** to delete the entire text entry for the selected program.
– or –
2. Press the power limitation key for bipolar coagulation **24** and the key/display for AUTOSTART **26** to delete all entries in the freely selectable HF programs (8–99).
3. Press the power limitation key for monopolar cutting **3** to return to the menu programs.

6.4.10. Menu program 8 "Restore Programs"

Menu program "Restore Programs" resets all modified parameters of standard programs in the HF device to the factory default settings.

1. Press the power limitation key for monopolar cutting **4** to reset the standard programs (0-7).
 2. Press the key/display for AUTOSTART **26** to confirm the reset.
- ➡ After the restoration procedure has been completed, the program automatically returns to the menu programs.

6.4.11. Menu program 9 "Panel Check"

Menu program "Panel Check" activates all illuminated indicators and displays on the control panel.

1. Press the power limitation key for monopolar cutting **4** to activate all lighting components.
2. Press the power limitation key for monopolar cutting **3** to return to the menu programs.

7. Detecting and correcting faults

Two types of faults can occur:

- system faults
- EASY monitoring faults

7.1. System errors

When a system error occurs, the error indicator **18** lights up red. "INF" appears on the "Monopolar Cut" display **2**, and a one- to three-digit error code appears on the "Monopolar Coag" display **9**.

7.1.1. Error list



Errors not listed

- ▶ Contact the service center in case of errors not shown in the error list, see section Technical service, page 59.
- ▶ If the expected change in the tissue does not occur and no error message appears, check the parameters and the accessory connections.


Visual and acoustic signals indicating errors

The error messages are accompanied by visual and acoustic signals. Furthermore, the generator cancels activation if certain errors occur and the system is reset.



























Optical and acoustic signals:





































| Signals | Designation |
|---|---|
|  | "Output error" indicator lights up red |
| Inf | Display and storage of the message number |
|  | Acoustic warning signal sounds |







System events:

| System events | Designation |
|---|------------------------------|
| RESET | System reset |
|  | Generator cancels activation |

- ▶ Contact the service center if the suggested corrective measure does not eliminate the error, see section Technical service, page 59.

| Error no. (INF) | Signals/ System events | Cause | Corrective measures |
|-----------------|---|--|--|
| 1 |  | Defective cable or output set too low | <ul style="list-style-type: none"> ▶ Check/Replace the cable. ▶ Set the output higher. |
| 2 |   InF  | Defective cable or output set too low | <ul style="list-style-type: none"> ▶ Check/Replace the cable. ▶ Set the output higher. |
| 6 |   InF  | Internal error | <ul style="list-style-type: none"> ▶ Restart the device. If the error recurs, contact the service center. |
| 11 |   InF  | Constant power is output at a constant resistance over a longer period. | <ul style="list-style-type: none"> ▶ Check the connection and the accessories. |
| 22 |   InF  | Internal error | <ul style="list-style-type: none"> ▶ Restart the device. If the error recurs, contact the service center. |
| 40 |   InF  | Additional device ARC PLUS not connected / not switched on / offline | <ul style="list-style-type: none"> ▶ Switch the additional device ARC PLUS on. ▶ Check the connection to the interface. |
| 43 |  InF  | Key on front panel pressed when switching on the unit | <ul style="list-style-type: none"> ▶ Switch on the device with the on/off switch 27 while taking care not to press any other key at the same time. |
| 44 |  InF  | Finger or foot switch activation is pending when the device is switched on | <ul style="list-style-type: none"> ▶ Switch on the device with the on/off switch 27 while taking care not to press any other key at the same time. |
| 45 |   InF  | Both keys of the handpiece have been actuated at the same time | <ul style="list-style-type: none"> ▶ Press only one key of the handpiece at a time. |
| 46 |   InF  | Both pedals of the double-pedal foot switch have been activated simultaneously | <ul style="list-style-type: none"> ▶ Activate only one pedal of the double-pedal foot switch. |

| Error no. (INF) | Signals/ System events | Cause | Corrective measures |
|-----------------|---|---|---|
| 47 |  InF  | No power set for the activated output |  Set the power for the activated output. |
| 49 |   InF  | Connection socket activated via finger and foot switches At the end of activation a different activation signal is pending for the same socket |  Activate the output via the finger or foot switch one after the other. |
| 61 |   InF  | Tissue contact is already pending upon activation of the AUTOSTART mode |  Remove the instrument from the tissue and re-activate AUTOSTART. |
| 90 |   InF  | Papillotome or snare is not applied |  Apply the papillotome or the snare. |
| 91 |   InF  | Instrument for GastroCut application defective or short circuit |  Replace the Gastro instrument.  Select a new point of application. |
| 92 |   InF  | Excessive low-resistance activation (e.g. in saline) |  Ensure that the instrument has sufficient contact with the tissue for coagulation or cutting before activating the device. |
| 100-104 |   InF  | EASY neutral electrode error |  Check the neutral electrode and the neutral electrode cable, see section Neutral electrode monitoring, page 30. |
| 146 |   InF  | Internal error |  Restart the device. If the error recurs, contact the service center. |
| 147 |   InF  | Internal error |  Restart the device. If the error recurs, contact the service center. |

| Error no. (INF) | Signals/ System events | Cause | Corrective measures |
|-----------------|---|---|--|
| 149 |   InF  | <ul style="list-style-type: none"> 3-pin plug of the handpiece has been inserted incorrectly Handpiece possibly defective Monopolar 4-mm connecting cable plugged into the right-hand monopolar output socket 29/30 | <ul style="list-style-type: none"> ▶ Check the handpiece. ▶ Replace the handpiece. ▶ Plug the 4-mm connecting cable into the left-hand 4-mm monopolar output socket 29/30. |
| 150 – 255 |   InF  | Internal error | <ul style="list-style-type: none"> ▶ Restart the device. If the error recurs, contact the service center. |

7.2. Error Display in EASY monitoring

When working with a split neutral electrode, the following errors may occur:

| EASY monitoring 20 | Cause | Indicator | Corrective measures |
|---------------------------------------|--|--|---|
| Blinks yellow | Significant increase in resistance Heat may develop under the neutral electrode depending on indication | – | Application need not be terminated. |
| Switches from green to continuous red | When the monopolar current is activated, a significant problem occurs | An acoustic signal sounds. A corresponding "INF - xxx" message appears on the "Monopolar Cut" 7-segment display 2 and the "Monopolar Coag" 7-segment display 9 . | <ul style="list-style-type: none"> ▶ Check the neutral electrode and the neutral electrode cable, see section Neutral electrode monitoring, page 30 ▶ Check the neutral electrode cable for proper contact and external damage. |
| | Loosening electrode | An acoustic signal sounds. A corresponding "INF – xxx" message appears. The device disables the monopolar outputs to sockets 29/30 and 31 . | <ul style="list-style-type: none"> ▶ Correct the position of the neutral electrode. In the case of continuing error messages, replace the neutral electrode. |

8. Preparation

8.1. Disinfection and cleaning



NOTE

Incorrect handling of the HF device can cause damage to the unit!

- ▶ Never sterilize the ARC 250 / 303 device. Instead, clean or disinfect it.



WARNING

Risk of electric shock and fire!

- ▶ Unplug the power connection before cleaning the device.
- ▶ For cleaning surfaces, use the approved cleaning agents/disinfectants only as specified by the manufacturer.
- ▶ Ensure that no liquid penetrates the device.
- ▶ Ensure that the AUTOSTART function is deactivated.

1. Apply the cleaning agent and disinfectant.
2. Wipe the agent off with a sponge moistened with clean water or with a cloth.
3. Dry the device using a clean, lint-free cloth.

9. Maintenance and repair

9.1. Maintenance



DANGER

Infection hazard!

- ▶ Carry out a surface disinfection and wrap the device in addition to the shipping packaging material before allowing the device to leave the hospital or office to avoid spreading germs and infections.

- ▶ Check the device, the device trolley and the accessories (e.g. foot switch, cable) after each use for damage or defects. In particular, make sure that the insulation is intact on all cables.
- ▶ Do not use any damaged device, damaged device trolley or damaged accessories.
- ▶ Replace defective accessories immediately.
- ▶ Have the safety inspection for the device performed once a year. Please consult and comply with the respective service instructions for additional technical information.

9.1.1. Safety inspection

Safety inspections must be performed once a year.

- ▶ The device and accessories may be inspected only by persons who have the required training, knowledge or experience and who can perform the inspection independently.
- ▶ With regard to the safety inspection, you must comply with the country-specific rules and regulations.

The inspector documents the inspection results and measured values corresponding to the printed inspection protocol.

In the case of severe deviations from the values of the attached final acceptance report, or if the specified maximum values were exceeded:

- ▶ Send the HF device to the service center, see section Technical service, page 59.

9.2. Repairs

NOTE



You can damage the HF device by doing your own repairs and modifications of medical equipment!

- ▶ If a repair is necessary, have it done only by the service center specified below.
 - ▶ Never carry out any repairs yourself.
-

BOWA is liable for safety, reliability and performance of the HF device under the following conditions:

- full compliance with all instructions regarding the installation and proper use for the intended purpose contained in this operating manual was maintained.
 - changes, repairs, new settings and similar procedures were carried out only by persons authorized to do this work by BOWA.
 - the electrical installations in the relevant room meet the local requirements and statutory provisions.
-



Fast and satisfactory repairs can only be guaranteed when all required data have been supplied in full.

The following information is required for returning the device:

- complete address
 - model number
 - serial number
 - software version
 - ▶ Describe the problem, the appropriate application and the accessories used.
- or –
- ▶ Describe the repairs to be made.

9.3. Technical service

Contact the following service center for maintenance and repair work:

BOWA-electronic GmbH & Co. KG

Heinrich-Hertz-Strasse 4–10

72810 Gomaringen, Germany

Phone +49 (0) 7072-6002-0

Fax +49 (0) 7072-6002-33

E-Mail service@bowa.de

or visit our website:

www.bowa-medical.com

10. Storage

- ▶ If you store the HF device for longer than one year, pay specific attention to the indicators during automatic functional testing, see section Functional test, page 37.
- ▶ Clean the HF device thoroughly before you put it into storage.
- ▶ Store the HF device in a clean, dry place in accordance with the storage conditions.

Storage conditions:

- Temperature: -20 °C to +50 °C
- Relative humidity 0% to 75 %, non-condensing
- Atmospheric pressure: 500 hPa to 1600 hPa

11. Technical specifications

11.1. Technical specifications of ARC 250 and ARC 303 HF devices

| Insulation type / Classification | |
|--|---|
| EMC | IEC 60601-1-2 |
| Level of protection provided by the housing | IP 21 |
| Protection class according to EN 60601-1 | I |
| Type of application component as specified in EN 60601-1 | CF |
| Compliance with standards | IEC 60601-1: 2005, IEC 60601-1-2: 2007, IEC 60601-2-2: 2009, ISO 14971: 2007, ISO 13485: 2003 + Cor.1_2009 |
| Classification as per EC Directive 93/42/EEC | IIb |

| Power connection | |
|--|----------|
| Power consumption in standby mode | 25 VA |
| Line frequency | 50/60 Hz |
| Maximum power consumption with 300 W HF output power | 500 VA |
| Connection for potential equalization line | Yes |

| Voltage range: 230 V | |
|--|----------------------|
| Input voltage range | 198 V to 260 V |
| Current consumption in standby mode | 110 mA |
| Current consumption at maximum HF output | 3.0 A |
| Mains fuses | 2 x 3.15 A slow-blow |

| Voltage range: 100 V, 115 V | |
|--|---------------------|
| Input voltage range | 90 V to 130 V |
| Current consumption in standby mode | 220 mA |
| Current consumption at maximum HF output | 6.0 A |
| Mains fuses | 2 x 6.3 A slow-blow |

| Dimensions and weight | |
|--|-----------------|
| External dimensions: width x height x depth (mm) | 430 x 150 x 400 |
| Weight | Approx. 10 kg |

| Programs | |
|---|-----|
| Number of programs in the device | 100 |
| Standard programs, factory set | √ |
| Individually programmable | √ |
| Program number and information shown on the display | √ |

| Monitoring of the neutral electrode | |
|--|------------------|
| EASY: Electrode Application System | √ |
| Indicator for one-piece or split electrode on the front panel | √ |
| Transition resistance between the individual surfaces (CQM) of split neutral electrodes shown on the display | √ |
| Lead resistance shown on the display when using a one-piece neutral electrode (CM continuity monitor) | √ |
| Maximum resistance between the sections of split electrodes (CQM) | 999 Ω |
| Maximum allowable resistance between the sections of split electrodes | 220 Ω |
| Warning signal in the case of risk under the neutral electrode | Visual, acoustic |
| Warning indicator as a text on the display: | √ |

| Safety features | |
|---|---|
| ISSys: Integrated Safety System | √ |
| Continuous monitoring of the HF leakage current with error messages | √ |
| Monitoring of the dosage, error message on the display | √ |
| Continuous self-test | √ |
| Continuous status indication on the display | √ |
| Display of operating errors on the display | √ |
| Display of system errors on the display | √ |

| Documentation | |
|---|---|
| Recording and storage of data in the device | √ |
| Error statuses | √ |
| Operating errors | √ |
| Retrieval of this data via the display | √ |

| Communication | |
|--|---|
| External interface for communication with the ARC PLUS | √ |
| External PC interface using BOWA software | — |
| Service support using BOWA software | — |

| Service support | |
|---|---|
| Service support integrated in the device via service programs | √ |
| Service support via ISSys | √ |

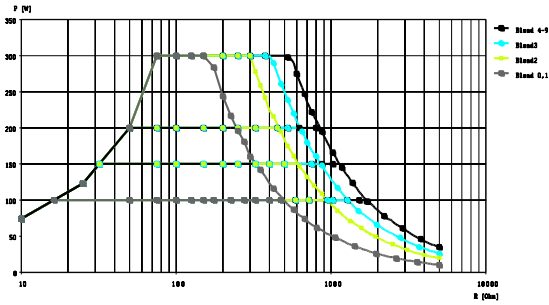
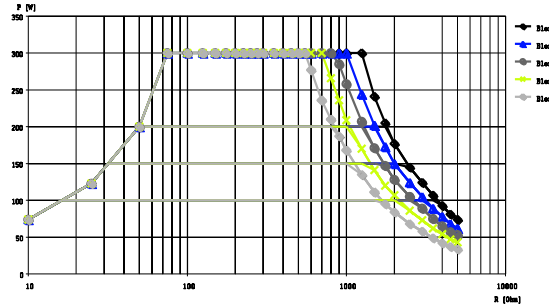
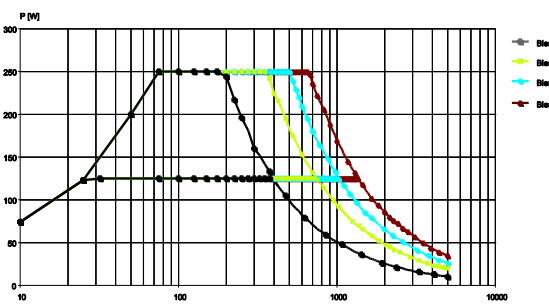
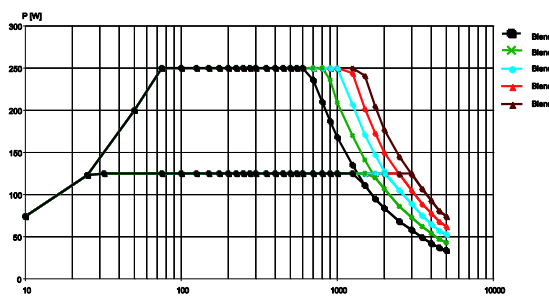
| Cooling | |
|----------------------------|---|
| Convection | √ |
| Temperature-controlled fan | — |

| Duty factor | |
|--------------|----------------------|
| Intermittent | 10 s / 30 s (on/off) |

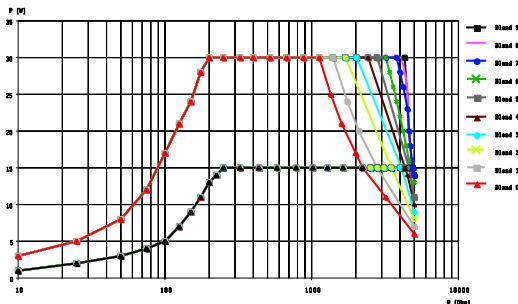
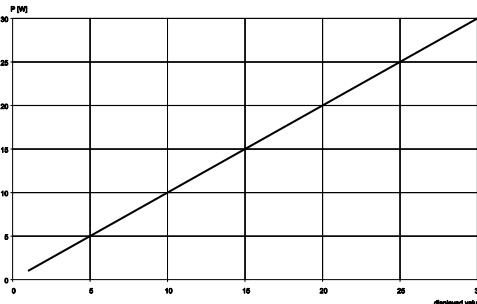
| Setting | CCS | ARC control | Form of HF voltage | Nominal frequency | Max. peak voltage | Display of output 7-segment display | Max. power output | HF power limitation | Accuracy of HF power limitation | Blend/Effect setting | Outputs | Max. output current |
|---|-----|-------------|--------------------------|-------------------|---|--|--|---|---------------------------------------|----------------------|--|---------------------|
| Monopolar cutting | yes | yes | sinusoidal | 330 kHz | 950 Vp for "Monopolar Cut" | 3 places | 250 W (ARC 250) 300 W (ARC 303) | 1 to 300 W, adjustable in 1 W steps | ± 20 % | 10 levels | 1, type 3 pin + Bovie | |
| | | | | | 570 Vp for "MicroCUT/MacroCUT" | 2 places | 30 W for "MicroCUT" 75 W for "MacroCUT" | 1 to 30 W, adjustable in 1 W steps 1 to 75 W, adjustable in 1 W steps | | | Activation with finger switch and foot switch | |
| Monopolar cutting "Gastro LOOP" Mode: Slow | yes | yes | sinusoidal, modulated | 330 kHz | 800 Vp | 10 levels | | | | 10 levels | ARC 303: +1 type 3 pin with finger switch 1, type 3 pin, 4 mm + Bovie | |
| Monopolar cutting "Gastro LOOP" Mode: Medium | yes | yes | sinusoidal, modulated | 330 kHz | 800 Vp | 10 levels | | | | 10 levels | Activation with foot switch 1, type 3 pin, 4 mm + Bovie | |
| Monopolar cutting "Gastro LOOP" Mode: Fast | yes | yes | sinusoidal, modulated | 330 kHz | 800 Vp | 10 levels | | | | 10 levels | Activation with foot switch 1, type 3 pin, 4 mm + Bovie | |
| Monopolar cutting "Gastro KNIFE" Mode: Slow | yes | yes | sinusoidal, modulated | 330 kHz | 800 Vp | 10 levels | | | | 10 levels | Activation with foot switch 1, type 3 pin, 4 mm + Bovie | |
| Monopolar cutting "Gastro KNIFE" Mode: Medium | yes | yes | sinusoidal, modulated | 330 kHz | 800 Vp | 10 levels | | | | 10 levels | Activation with foot switch 1, type 3 pin, 4 mm + Bovie | |
| Monopolar cutting "Gastro KNIFE" Mode: Fast | yes | yes | sinusoidal, modulated | 330 kHz | 800 Vp | 10 levels | | | | 10 levels | Activation with foot switch 1, type 3 pin, 4 mm + Bovie | |
| Monopolar "Moderate Contact Coagulation" | | | sinusoidal | 330 kHz | 150 Vp for "Standard" 150 Vp for "Micro Moderate Coag" | 3 places 2 places | 120 W 30 W for "Micro Moderate Contact Coagulation" | 1 to 120 W, adjustable in 1 W steps 1 to 30 W, adjustable in 1 W steps | ± 20 % | | 1, type 3 pin + Bovie Activation with finger switch and foot switch ARC 303: +1 type 3 pin with finger switch | 2.0 A |

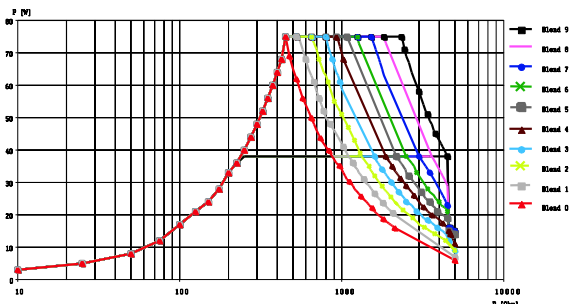
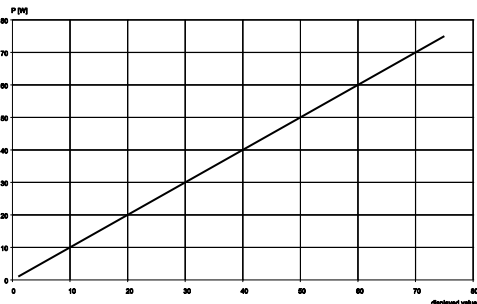
| Setting | CCS | ARC control | Form of HF voltage | Nominal frequency | Max. peak voltage | Display of output, 7-segment display | Max. power output | HF power limitation | Accuracy of HF power limitation | Blend/Effect setting | Outputs | Max. output current |
|--------------------------------------|-----|---|--------------------|-------------------|--|--------------------------------------|-------------------------------------|-------------------------------------|---------------------------------|--|-----------------------|--|
| Monopolar "Forced Coagulation" | | | pulse, modulated | 1 MHz | 1 660 Vp for "Cutting Mode" | 2 places | 75 W | 1 to 75 W, adjustable in 1 W steps | ± 20 % | | 1, type 3 pin + Bowie | Activation with finger switch and foot switch ARC 303: +1 type 3 pin with finger switch |
| | | 3 180 Vp for "Mixed Coag Mode" | | | 3 places | 120 W | 1 to 120 W, adjustable in 1 W steps | | | | | |
| | | 4 770 Vp for "Non Cutting Mode" | | | | | | | | | | |
| | | 1 020 Vp for "Micro Cutting Mode" | | | 2 places | 30 W | 1 to 30 W, adjustable in 1 W steps | | | | | |
| | | 2 610 Vp for "Micro Mixed Mode" | | | | | | | | | | |
| | | 4 000 Vp for "Micro Non Cutting Mode" | | | | | | | | | | |
| | | | | | 3 700 Vp for "GastroCUT Forced COAG" | | 50 W | 1 to 50 W, adjustable in 1 W steps | | Activation with foot switch | | |
| Monopolar "Spray Coagulation" | | | pulse, modulated | 1 MHz | 4 600 Vp for "Spay COAG" | 3 places | 120 W | 1 to 120 W, adjustable in 1 W steps | ± 20 % | | 1, type 3 pin + Bowie | Activation with finger switch and foot switch ARC 303: +1 type 3 pin with finger switch |
| | | 3 450 Vp for "Micro Spray Coagulation" | | | 2 places | 30 W | 1 to 30 W, adjustable in 1 W steps | | | | | |
| Monopolar "Argon Plasma Coagulation" | | | pulse, modulated | 1 MHz | 4 600 Vp for program Argon flex "Spray COAG I" | 3 places | 120 W | 1 to 120 W, adjustable in 1 W steps | ± 20 % | | 1, type 3 pin + Bowie | |
| | | 3 840 Vp for program Argon Open "Spray COAG II" | | | | | | | | Activation with finger switch and foot switch ARC 303: +1 type 3 pin with finger switch | | |
| Bipolar "Contact Coagulation" | | | sinusoidal | 330 kHz | 175 Vp for "Standard COAG" | 3 places | 120 W | 1 to 120 W, adjustable in 1 W steps | ± 20 % | | 1, type 2 pin | 2.0 A |
| | | | | | 140 Vp for "Micro Bipolar Coag" | 2 places | 50 W | 1 to 50 W, adjustable in 1 W steps | | Activation with foot switch Activation with AUTO START | | |

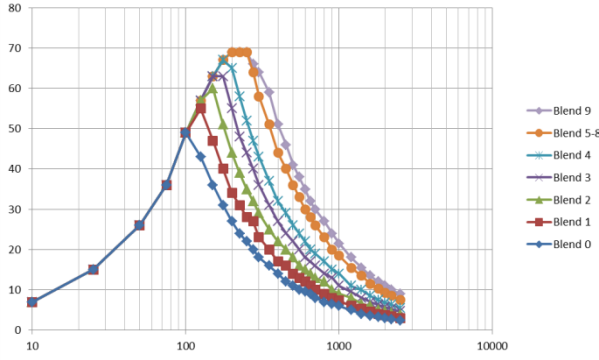
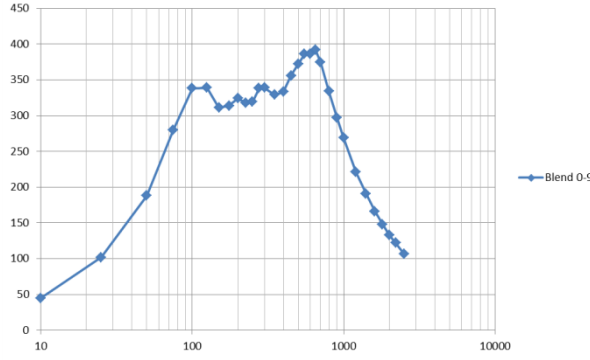
11.2. Power, voltage and current charts

| Setting | Program |
|--|--|
| Monopolar CUT | 0, 3, 8-99 |
|  <p>Values measured on ohmic resistances without arc formation for ARC 303</p> <ul style="list-style-type: none"> Output power P [W] versus load resistance R [Ω] with "Monopolar Cut" settings 300 W, 200 W, 150 W and 100 W |  <p>Values measured on ohmic resistances with prior arc formation for ARC 303</p> <ul style="list-style-type: none"> Output power P [W] versus load resistance R [Ω] with "Monopolar Cut" settings 300 W, 200 W, 150 W and 100 W |
|  <p>Values measured on ohmic resistances without arc formation for ARC 250</p> <ul style="list-style-type: none"> Output power P [W] versus load resistance R [Ω] with "Monopolar Cut" settings "Monopolar Cut" = 250 W/125 W |  <p>Values measured on ohmic resistances with prior arc formation for ARC 250</p> <ul style="list-style-type: none"> Output power P [W] versus load resistance R [Ω] with "Monopolar Cut" settings "Monopolar Cut" = 250 W/125 W |

| Setting | Program | | | | | | | | | | | | | | | | | | | | | | |
|--|--|-------|-------------------|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|
| Monopolar CUT | 0, 3, 8-99 | | | | | | | | | | | | | | | | | | | | | | |
| <ul style="list-style-type: none"> Output power P [W] versus "Monopolar Cut" setting. Rated load resistance = 500 Ω | <table border="1"> <thead> <tr> <th>Blend</th><th>HF voltage U [Vp]</th></tr> </thead> <tbody> <tr><td>0</td><td>590</td></tr> <tr><td>1</td><td>590</td></tr> <tr><td>2</td><td>680</td></tr> <tr><td>3</td><td>760</td></tr> <tr><td>4</td><td>760</td></tr> <tr><td>5</td><td>760</td></tr> <tr><td>6</td><td>880</td></tr> <tr><td>7</td><td>880</td></tr> <tr><td>8</td><td>950</td></tr> <tr><td>9</td><td>950</td></tr> </tbody> </table> <ul style="list-style-type: none"> Maximum HF output voltage U [Vp] versus "Monopolar Cut" setting (no load) | Blend | HF voltage U [Vp] | 0 | 590 | 1 | 590 | 2 | 680 | 3 | 760 | 4 | 760 | 5 | 760 | 6 | 880 | 7 | 880 | 8 | 950 | 9 | 950 |
| Blend | HF voltage U [Vp] | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 590 | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 590 | | | | | | | | | | | | | | | | | | | | | | |
| 2 | 680 | | | | | | | | | | | | | | | | | | | | | | |
| 3 | 760 | | | | | | | | | | | | | | | | | | | | | | |
| 4 | 760 | | | | | | | | | | | | | | | | | | | | | | |
| 5 | 760 | | | | | | | | | | | | | | | | | | | | | | |
| 6 | 880 | | | | | | | | | | | | | | | | | | | | | | |
| 7 | 880 | | | | | | | | | | | | | | | | | | | | | | |
| 8 | 950 | | | | | | | | | | | | | | | | | | | | | | |
| 9 | 950 | | | | | | | | | | | | | | | | | | | | | | |

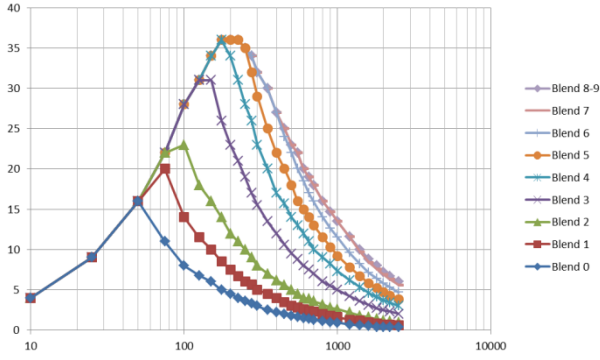
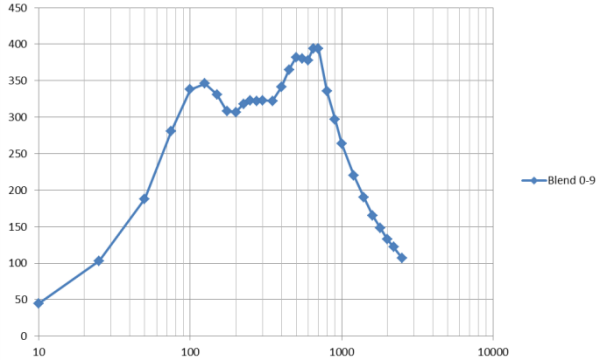
| Setting | Program | | | | | | | | | | | | | | | | | | | | | | |
|---|--|---------------------|---|-----|---|-----|---|-----|---|-----|---|-----|--|-----|---|-----|---|-----|---|-----|---|-----|--|
| Monopolar MicroCUT | 2 | | | | | | | | | | | | | | | | | | | | | | |
|  <p>Values measured on ohmic resistances</p> <ul style="list-style-type: none"> Output power P [W] versus load resistance R [Ω] with "MicroCUT" settings 30 W and 15 W |  <ul style="list-style-type: none"> Output power P [W] versus "MicroCUT" setting. Rated load resistance = 500 Ω. | | | | | | | | | | | | | | | | | | | | | | |
| <table border="1"> <thead> <tr> <th>Blend</th><th>HF voltage U [Vp]</th></tr> </thead> <tbody> <tr><td>0</td><td>200</td></tr> <tr><td>1</td><td>280</td></tr> <tr><td>2</td><td>310</td></tr> <tr><td>3</td><td>340</td></tr> <tr><td>4</td><td>370</td></tr> <tr><td></td><td>400</td></tr> <tr><td>6</td><td>430</td></tr> <tr><td>7</td><td>470</td></tr> <tr><td>8</td><td>510</td></tr> <tr><td>9</td><td>570</td></tr> </tbody> </table> <ul style="list-style-type: none"> Maximum HF output voltage U [Vp] versus Blend setting (no load) | Blend | HF voltage U [Vp] | 0 | 200 | 1 | 280 | 2 | 310 | 3 | 340 | 4 | 370 | | 400 | 6 | 430 | 7 | 470 | 8 | 510 | 9 | 570 | |
| Blend | HF voltage U [Vp] | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 200 | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 280 | | | | | | | | | | | | | | | | | | | | | | |
| 2 | 310 | | | | | | | | | | | | | | | | | | | | | | |
| 3 | 340 | | | | | | | | | | | | | | | | | | | | | | |
| 4 | 370 | | | | | | | | | | | | | | | | | | | | | | |
| | 400 | | | | | | | | | | | | | | | | | | | | | | |
| 6 | 430 | | | | | | | | | | | | | | | | | | | | | | |
| 7 | 470 | | | | | | | | | | | | | | | | | | | | | | |
| 8 | 510 | | | | | | | | | | | | | | | | | | | | | | |
| 9 | 570 | | | | | | | | | | | | | | | | | | | | | | |

| Setting | Program | | | | | | | | | | | | | | | | | | | | | | |
|--|--|-----------------|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|--|
| Monopolar MacroCUT | 1 | | | | | | | | | | | | | | | | | | | | | | |
|  <p>Values measured on ohmic resistances</p> <ul style="list-style-type: none"> Output power P [W] versus load resistance R [Ω] with "MacroCUT" settings 75 W and 38 W |  <p>Values measured on ohmic resistances</p> <ul style="list-style-type: none"> Output power P [W] versus "MacroCUT" setting. Rated load resistance = 500 Ω | | | | | | | | | | | | | | | | | | | | | | |
| <table border="1"> <thead> <tr> <th>Blend</th><th>HF voltage [Vp]</th></tr> </thead> <tbody> <tr><td>0</td><td>260</td></tr> <tr><td>1</td><td>280</td></tr> <tr><td>2</td><td>310</td></tr> <tr><td>3</td><td>340</td></tr> <tr><td>4</td><td>370</td></tr> <tr><td>5</td><td>400</td></tr> <tr><td>6</td><td>430</td></tr> <tr><td>7</td><td>470</td></tr> <tr><td>8</td><td>510</td></tr> <tr><td>9</td><td>570</td></tr> </tbody> </table> <ul style="list-style-type: none"> Maximum HF output voltage U [Vp] versus Blend setting (no load) | Blend | HF voltage [Vp] | 0 | 260 | 1 | 280 | 2 | 310 | 3 | 340 | 4 | 370 | 5 | 400 | 6 | 430 | 7 | 470 | 8 | 510 | 9 | 570 | |
| Blend | HF voltage [Vp] | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 260 | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 280 | | | | | | | | | | | | | | | | | | | | | | |
| 2 | 310 | | | | | | | | | | | | | | | | | | | | | | |
| 3 | 340 | | | | | | | | | | | | | | | | | | | | | | |
| 4 | 370 | | | | | | | | | | | | | | | | | | | | | | |
| 5 | 400 | | | | | | | | | | | | | | | | | | | | | | |
| 6 | 430 | | | | | | | | | | | | | | | | | | | | | | |
| 7 | 470 | | | | | | | | | | | | | | | | | | | | | | |
| 8 | 510 | | | | | | | | | | | | | | | | | | | | | | |
| 9 | 570 | | | | | | | | | | | | | | | | | | | | | | |

| Setting | Program | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--|-----------------|----------------|---|----|-----|---|----|-----|---|----|-----|---|----|-----|---|----|-----|---|----|-----|---|----|-----|---|----|-----|---|----|-----|---|----|-----|--|-------|-----------------|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|
| Gastro LOOP | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Values measured on ohmic resistances | Values measured on ohmic resistances | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <ul style="list-style-type: none">Output power P [W] versus rated load resistance R [Ω] with "Gastro LOOP", "Blend 0–9" setting, COAG phase | <ul style="list-style-type: none">Output power P [W] versus load resistance R [Ω] with "Gastro LOOP", "Blend 0–9" setting, CUT phase | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table><tr><th>Blend</th><th>Coag share in W</th><th>Cut share in W</th></tr><tr><td>0</td><td>36</td><td>370</td></tr><tr><td>1</td><td>36</td><td>370</td></tr><tr><td>2</td><td>36</td><td>370</td></tr><tr><td>3</td><td>36</td><td>370</td></tr><tr><td>4</td><td>36</td><td>370</td></tr><tr><td>5</td><td>36</td><td>370</td></tr><tr><td>6</td><td>36</td><td>370</td></tr><tr><td>7</td><td>36</td><td>370</td></tr><tr><td>8</td><td>36</td><td>370</td></tr><tr><td>9</td><td>36</td><td>370</td></tr></table> | Blend | Coag share in W | Cut share in W | 0 | 36 | 370 | 1 | 36 | 370 | 2 | 36 | 370 | 3 | 36 | 370 | 4 | 36 | 370 | 5 | 36 | 370 | 6 | 36 | 370 | 7 | 36 | 370 | 8 | 36 | 370 | 9 | 36 | 370 | <table><tr><th>Blend</th><th>HF voltage [Vp]</th></tr><tr><td>0</td><td>800</td></tr><tr><td>1</td><td>800</td></tr><tr><td>2</td><td>800</td></tr><tr><td>3</td><td>800</td></tr><tr><td>4</td><td>800</td></tr><tr><td>5</td><td>800</td></tr><tr><td>6</td><td>800</td></tr><tr><td>7</td><td>800</td></tr><tr><td>8</td><td>800</td></tr><tr><td>9</td><td>800</td></tr></table> | Blend | HF voltage [Vp] | 0 | 800 | 1 | 800 | 2 | 800 | 3 | 800 | 4 | 800 | 5 | 800 | 6 | 800 | 7 | 800 | 8 | 800 | 9 | 800 |
| Blend | Coag share in W | Cut share in W | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 36 | 370 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 36 | 370 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | 36 | 370 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | 36 | 370 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | 36 | 370 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | 36 | 370 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | 36 | 370 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | 36 | 370 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | 36 | 370 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | 36 | 370 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Blend | HF voltage [Vp] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 800 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 800 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | 800 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | 800 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | 800 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | 800 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | 800 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | 800 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | 800 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | 800 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <ul style="list-style-type: none">Output power P [W] versus Blend setting for "Gastro LOOP". Rated load resistance: Coag 75 Ω, Cut 500 Ω | <ul style="list-style-type: none">HF output voltage U [Vp] versus "Gastro LOOP" "Blend 0–9" (no load) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

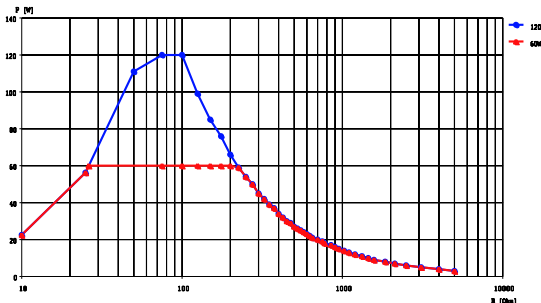
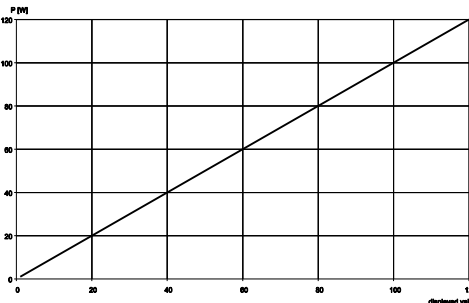
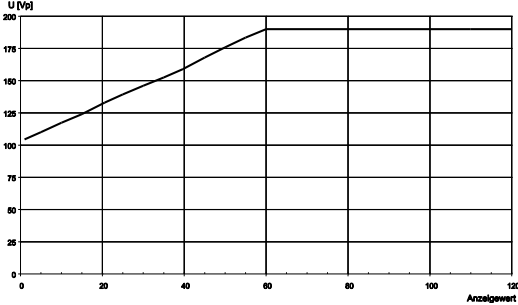


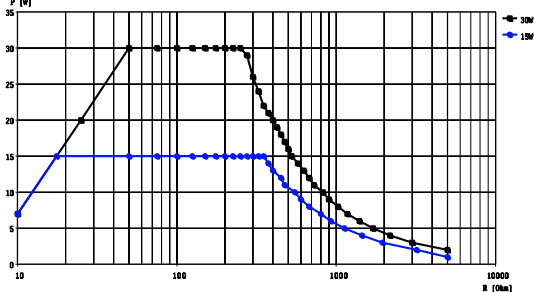
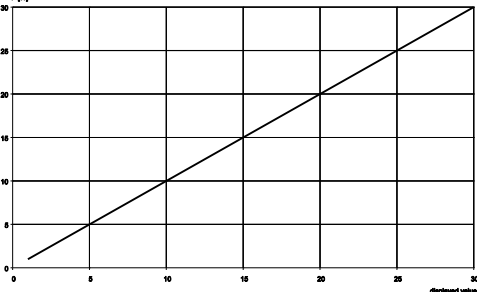
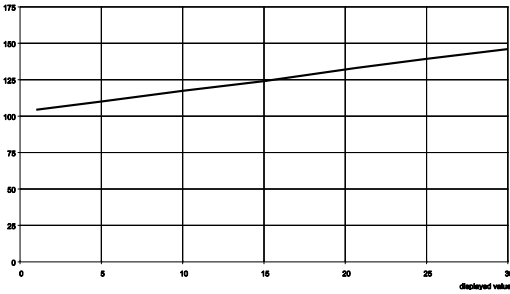
The short-term peak power exceeds 400 W, but this is permissible because the mean value over 1 second is below 400 W.

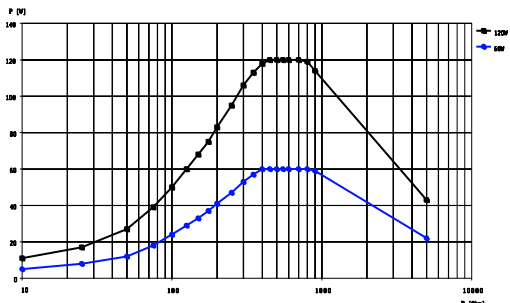
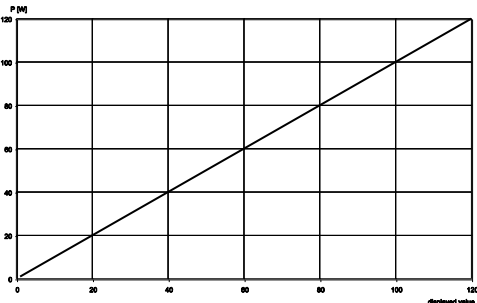
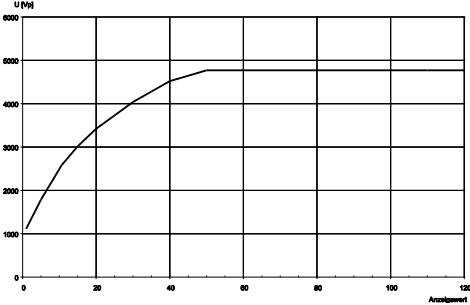
| Setting | Program | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--|-----------------|----------------|---|----|-----|---|----|-----|---|----|-----|---|----|-----|---|----|-----|---|----|-----|---|----|-----|---|----|-----|---|----|-----|---|----|-----|--|-------|-----------------|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|-----|
| Gastro KNIFE | 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Values measured on ohmic resistances | Values measured on ohmic resistances | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <ul style="list-style-type: none">Output power P [W] versus load resistance R [Ω] with "Gastro KNIFE", "Blend 0–9" setting, COAG phase | <ul style="list-style-type: none">Output power P [W] versus load resistance R [Ω] with "Gastro KNIFE" setting during Cut phase | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table><tr><th>Blend</th><th>Coag share in W</th><th>Cut share in W</th></tr><tr><td>0</td><td>11</td><td>390</td></tr><tr><td>1</td><td>20</td><td>390</td></tr><tr><td>2</td><td>22</td><td>390</td></tr><tr><td>3</td><td>22</td><td>390</td></tr><tr><td>4</td><td>22</td><td>390</td></tr><tr><td>5</td><td>22</td><td>390</td></tr><tr><td>6</td><td>22</td><td>390</td></tr><tr><td>7</td><td>22</td><td>390</td></tr><tr><td>8</td><td>22</td><td>390</td></tr><tr><td>9</td><td>22</td><td>390</td></tr></table> | Blend | Coag share in W | Cut share in W | 0 | 11 | 390 | 1 | 20 | 390 | 2 | 22 | 390 | 3 | 22 | 390 | 4 | 22 | 390 | 5 | 22 | 390 | 6 | 22 | 390 | 7 | 22 | 390 | 8 | 22 | 390 | 9 | 22 | 390 | <table><tr><th>Blend</th><th>HF voltage [Vp]</th></tr><tr><td>0</td><td>800</td></tr><tr><td>1</td><td>800</td></tr><tr><td>2</td><td>800</td></tr><tr><td>3</td><td>800</td></tr><tr><td>4</td><td>800</td></tr><tr><td>5</td><td>800</td></tr><tr><td>6</td><td>800</td></tr><tr><td>7</td><td>800</td></tr><tr><td>8</td><td>800</td></tr><tr><td>9</td><td>800</td></tr></table> | Blend | HF voltage [Vp] | 0 | 800 | 1 | 800 | 2 | 800 | 3 | 800 | 4 | 800 | 5 | 800 | 6 | 800 | 7 | 800 | 8 | 800 | 9 | 800 |
| Blend | Coag share in W | Cut share in W | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 11 | 390 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 20 | 390 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | 22 | 390 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | 22 | 390 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | 22 | 390 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | 22 | 390 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | 22 | 390 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | 22 | 390 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | 22 | 390 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | 22 | 390 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Blend | HF voltage [Vp] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 800 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 800 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | 800 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | 800 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | 800 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | 800 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | 800 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | 800 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | 800 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | 800 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <ul style="list-style-type: none">Output power P [W] versus Blend setting for "Gastro KNIFE". Rated load resistance: Coag 75 Ω, Cut 500 Ω | <ul style="list-style-type: none">HF output voltage U [Vp] versus "Gastro KNIFE", "Blend 0–9" (no load) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

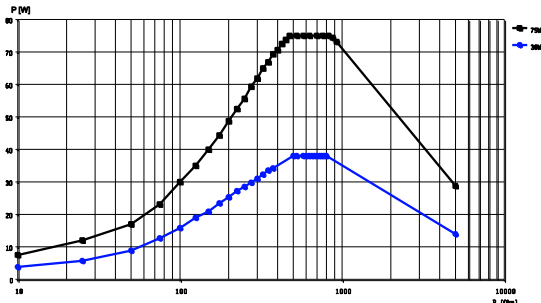
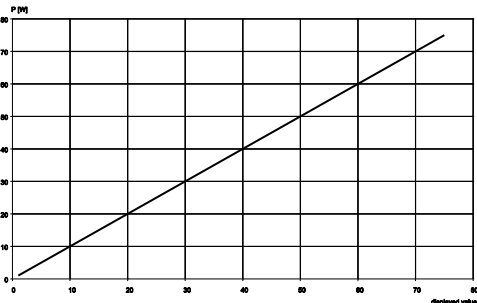
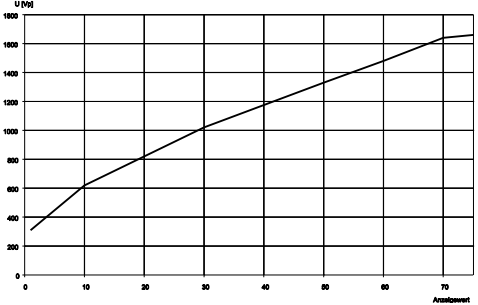


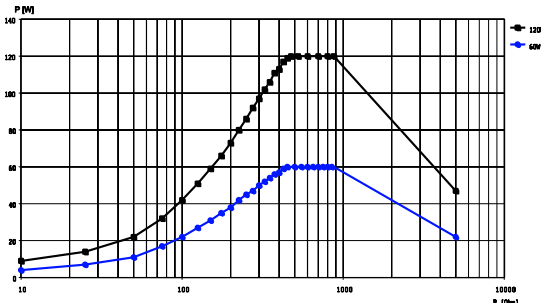
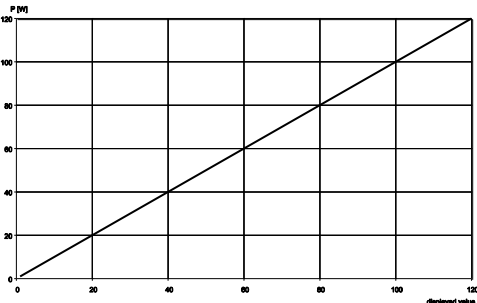
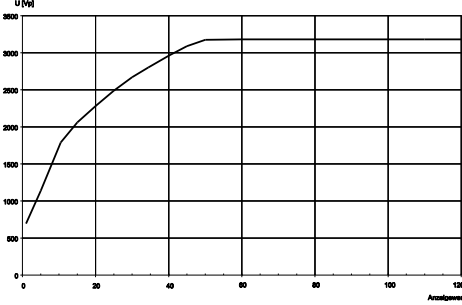
The short-term peak power exceeds 400 W, but this is permissible because the mean value over 1 second is below 400 W.

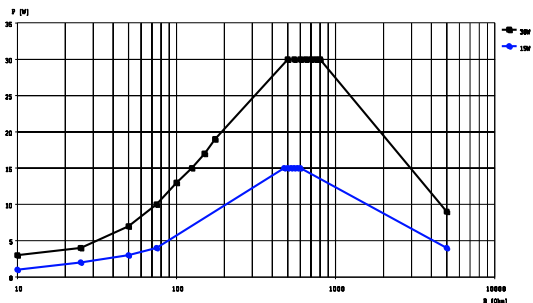
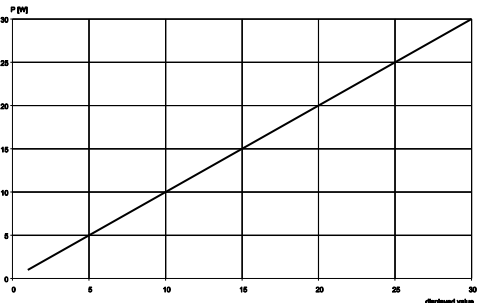
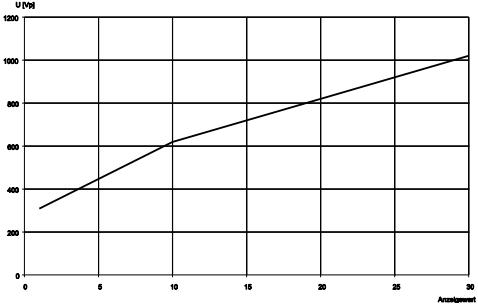
| Setting | Program |
|--|--|
| Moderate COAG Standard | 0-1, 3-4, 6-99 |
| <div></div> <p>Values measured on ohmic resistances</p> <ul style="list-style-type: none">• Output power P [W] versus load resistance R [Ω] with "Moderate COAG" Standard settings 120 W and 60 W | <div></div> <ul style="list-style-type: none">• Output power P [W] versus "Moderate COAG" Standard setting. Rated load resistance = 75 Ω |
| <div></div> <ul style="list-style-type: none">• HF output voltage U [Vp] versus "Moderate COAG" Standard setting (no load) | |

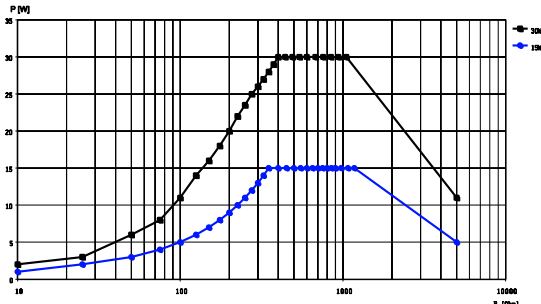
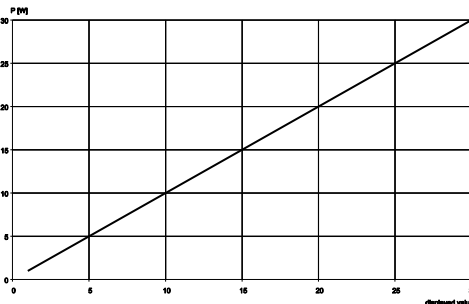
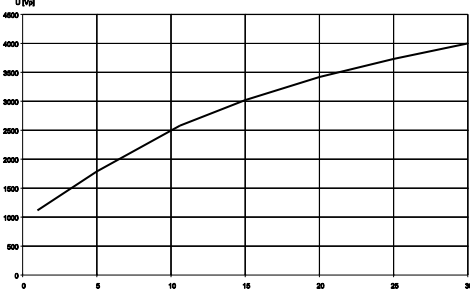
| Setting | Program |
|---|--|
| Micro Moderate COAG | 2 |
|  <p>Values measured on ohmic resistances</p> <ul style="list-style-type: none"> Output power P [W] versus load resistance R [Ω] with "Micro Moderate COAG" settings 30 W and 15 W |  <ul style="list-style-type: none"> Output power P [W] versus "Micro Moderate COAG" setting. Rated load resistance = 125 Ω |
|  <ul style="list-style-type: none"> HF output voltage U [Vp] versus "Micro Moderate COAG" setting (no load) | |

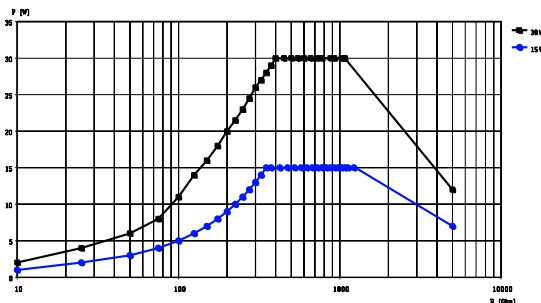
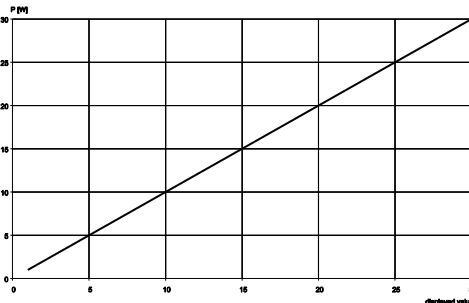
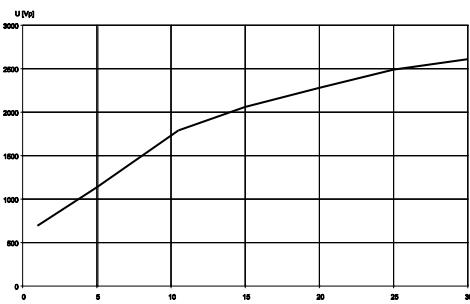
| Setting | Program |
|--|---|
| Forced COAG Non Cutting | 0-1, 3-4, 8-99 |
|  <p>Values measured on ohmic resistances</p> <ul style="list-style-type: none"> Output power P [W] versus load resistance R [Ω] with "Forced COAG Non Cutting" settings 120 W and 60 W |  <ul style="list-style-type: none"> Output power P [W] versus "Forced COAG Non Cutting" setting. Rated load resistance = 500 Ω |
|  <ul style="list-style-type: none"> HF output voltage U [Vp] versus "Forced COAG Non Cutting" setting (no load) | |

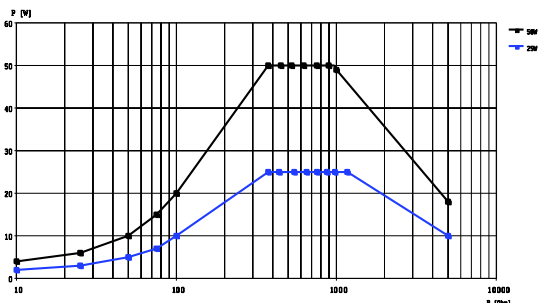
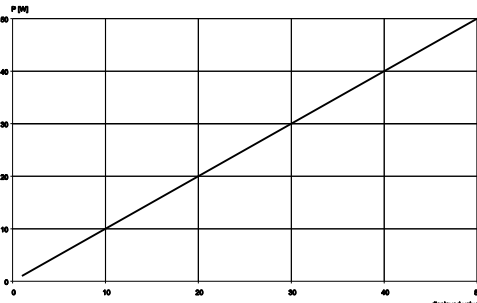
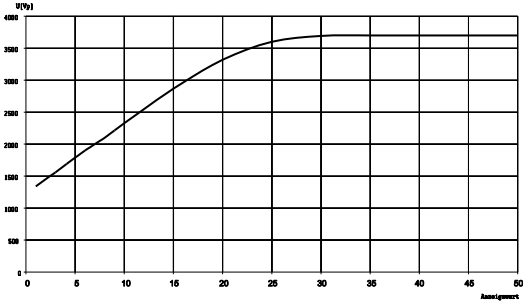
| Setting | Program |
|---|---|
| Forced COAG Cutting | 0-1, 3-4, 8-99 |
|  <p>Values measured on ohmic resistances</p> <ul style="list-style-type: none"> Output power P [W] versus load resistance R [Ω] with "Forced COAG Cutting" settings 75 W and 38 W |  <ul style="list-style-type: none"> Output power P [W] versus "Forced COAG Cutting" setting. Rated load resistance = 500 Ω |
|  <ul style="list-style-type: none"> HF output voltage U [Vp] versus "Forced COAG Cutting" setting (no load) | |

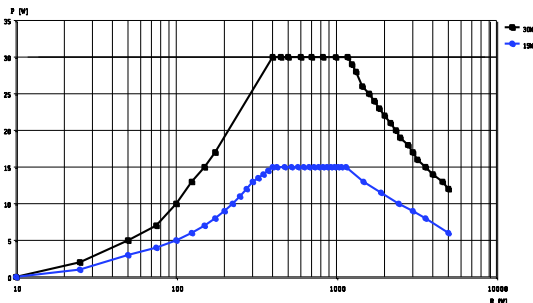
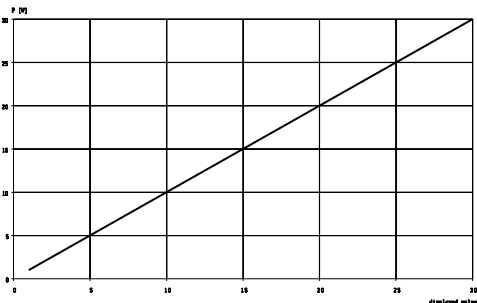
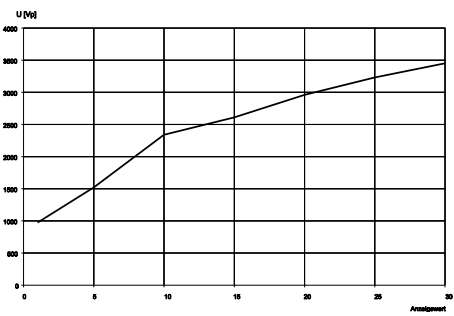
| Setting | Program |
|--|--|
| Forced COAG Mixed | 0-1, 3-4, 8-99 |
|  <p>Values measured on ohmic resistances</p> <ul style="list-style-type: none"> Output power P [W] versus load resistance R [Ω] with "Forced COAG Mixed" settings 120 W and 60 W |  <ul style="list-style-type: none"> Output power P [W] versus "Forced COAG Mixed" setting. Rated load resistance = 500 Ω |
|  <ul style="list-style-type: none"> HF output voltage U [Vp] versus "Forced COAG Mixed" setting (no load) | |

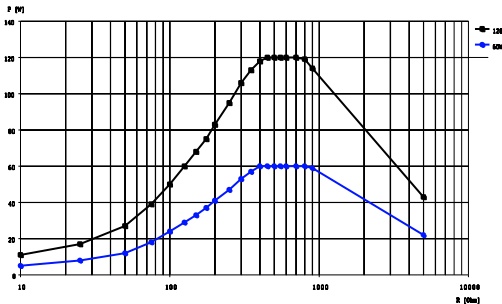
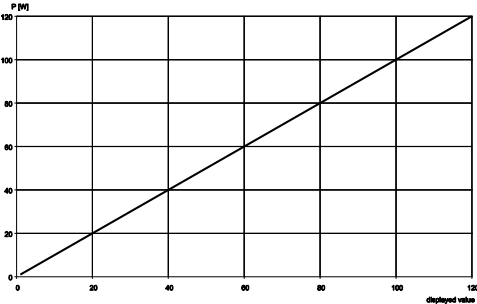
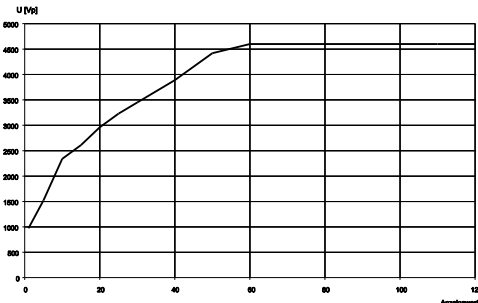
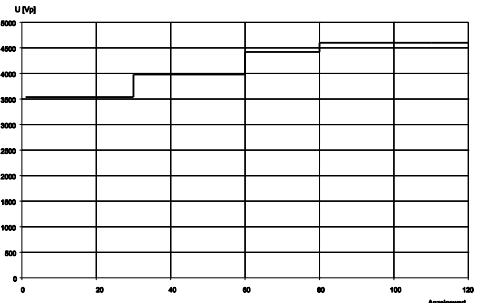
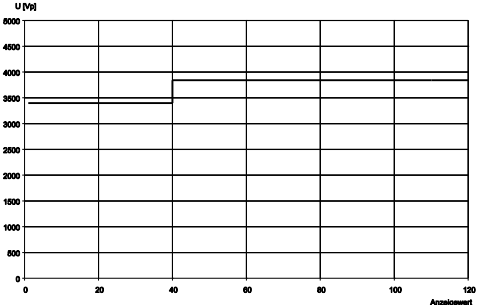
| Setting | Program |
|---|--|
| Forced COAG Micro Cutting | 2 |
|  <p>Values measured on ohmic resistances</p> <ul style="list-style-type: none"> Output power P [W] versus load resistance R [Ω] with "Forced COAG Micro Cutting" settings 30 W and 15 W |  <ul style="list-style-type: none"> Output power P [W] versus "Forced COAG Micro Cutting" setting. Rated load resistance = 500 Ω |
|  <ul style="list-style-type: none"> HF output voltage U [Vp] versus "Forced COAG Micro Cutting" setting (no load) | |

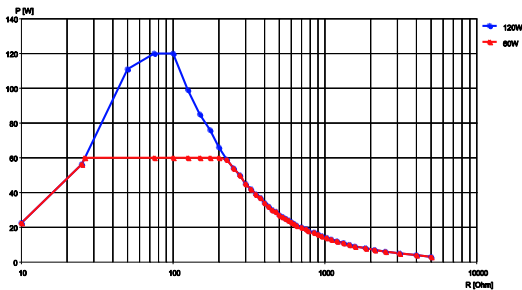
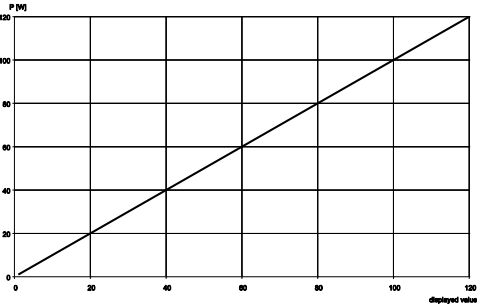
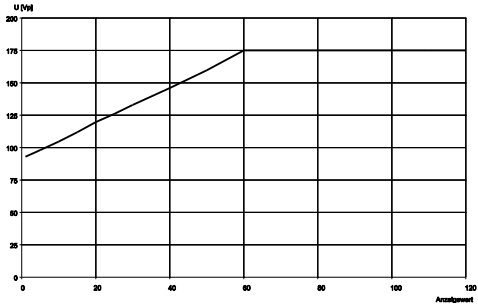
| Setting | Program |
|---|--|
| Forced COAG Micro Non Cutting | 2 |
|  <p>Values measured on ohmic resistances</p> <ul style="list-style-type: none"> Output power P [W] versus load resistance R [Ω] with "Forced COAG Micro Non Cutting" settings 30 W and 15 W |  <ul style="list-style-type: none"> Output power P [W] versus "Forced COAG Micro Non Cutting" setting. Rated load resistance = 500 Ω |
|  <ul style="list-style-type: none"> HF output voltage U [Vp] versus "Forced COAG Micro Non Cutting" setting (no load) | |

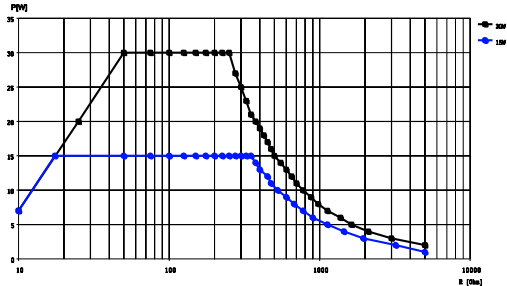
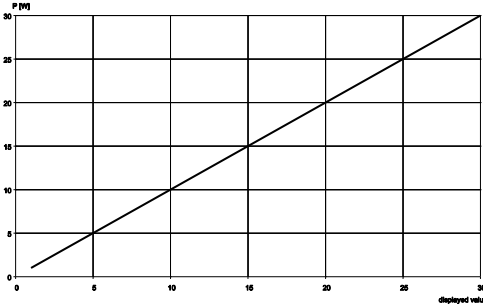
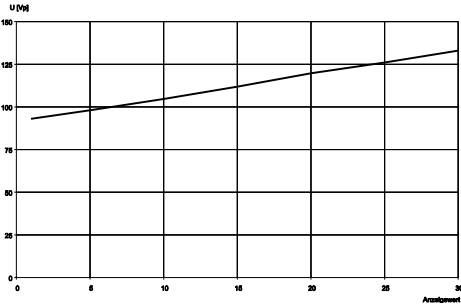
| Setting | Program |
|---|--|
| Forced COAG Micro Mixed | 2 |
|  <p>Values measured on ohmic resistances</p> <ul style="list-style-type: none"> Output power P [W] versus load resistance R [Ω] with "Forced COAG Micro Mixed" settings 30 W and 15 W |  <ul style="list-style-type: none"> Output power P [W] versus "Forced COAG Micro Mixed" setting. Rated load resistance = 500 Ω |
|  <ul style="list-style-type: none"> HF output voltage U [Vp] versus "Forced COAG Micro Mixed" setting (no load) | |

| Setting | Program |
|--|---|
| GastroCut ForcedCOAG | 6, 7 |
|  <p>Values measured on ohmic resistances</p> <ul style="list-style-type: none"> Output power P [W] versus load resistance R [Ω] with "GastroCut ForcedCOAG" settings 50 W and 25 W |  <ul style="list-style-type: none"> Output power P [W] versus "GastroCut ForcedCOAG" setting. Rated load resistance = 500 Ω |
|  <ul style="list-style-type: none"> HF output voltage U [Vp] versus "GastroCut ForcedCOAG" setting (no load) | |

| Setting | Program |
|--|---|
| Micro Spray COAG | 2 |
|  <p>Values measured on ohmic resistances</p> <ul style="list-style-type: none"> Output power P [W] versus load resistance R [Ω] with "Micro Spray COAG" settings 30 W and 15 W |  <ul style="list-style-type: none"> Output power P [W] versus "Micro Spray COAG" setting. Rated load resistance = 500 Ω |
|  <ul style="list-style-type: none"> HF output voltage U [Vp] versus "Micro Spray COAG" setting (no load) | |

| Setting | Program |
|---|---|
| Spray COAG | 0, 1, 3, 8-99 |
| Argon-Flex Spray COAG I | 5-7 |
| Argon Spray Open COAG II | 4 |
|  <p>Values measured on ohmic resistances</p> <ul style="list-style-type: none"> Output power P [W] versus load resistance R [Ω] with "Spray COAG", "Argon-Flex Spray COAG I", "Argon Spray COAG II" settings 120 W and 60 W |  <ul style="list-style-type: none"> Output power P [W] versus "Spray COAG", "Argon-Flex Spray COAG I", "Argon Spray COAG II" setting. Rated load resistance = 500 Ω |
|  <ul style="list-style-type: none"> HF output voltage U [Vp] versus "Spray COAG" setting (no load) |  <ul style="list-style-type: none"> HF output voltage U [Vp] versus "Argon-Flex Spray COAG" setting (no load) |
|  <ul style="list-style-type: none"> HF output voltage U [Vp] versus "Argon Spray COAG II" setting | |

| Setting | Program |
|--|---|
| Bipolar COAG | 0, 1, 3-99 |
|  <p>Values measured on ohmic resistances</p> <ul style="list-style-type: none"> Output power P [W] versus load resistance R [Ω] with "Bipolar" settings 120 W and 60 W |  <ul style="list-style-type: none"> Output power P [W] versus "Bipolar COAG" setting. Rated load resistance = 75 Ω |
|  <ul style="list-style-type: none"> HF output voltage U [Vp] versus "Bipolar COAG" setting (no load) | |

| Setting | Program |
|--|--|
| Bipolar Micro COAG | 2 |
|  <p>Values measured on ohmic resistances</p> <ul style="list-style-type: none"> Output power P [W] versus load resistance R [Ω] with "Bipolar Micro COAG" settings 30 W and 15 W |  <ul style="list-style-type: none"> Output power P [W] versus "Bipolar Micro COAG" setting. Rated load resistance = 75 Ω |
|  <ul style="list-style-type: none"> HF output voltage U [Vp] versus "Bipolar Micro COAG" setting (no load) | |

12. Accessories and replacement parts

Original BOWA accessories are suitable for use with the ARC Series and ARC PLUS devices. When using accessories made by other manufacturers, the user must ensure that they are designed for and compatible with the maximum HF peak voltage of the HF device.

For the use and correct preparation of the autoclavable devices, compliance with the relevant instruction manuals accompanying these devices is required.


Detailed information on accessories and replacement parts is available in the current accessories catalog.

13. EMC

13.1. Guidelines and manufacturer's declaration in accordance with IEC 60601-1-2, Section 6.8.3.201

| Electromagnetic interference (IEC 60601-1-2, Table 201) | | |
|---|----------------------------------|---|
| The ARC 250 and ARC 303 are intended to be used in an electromagnetic environment as described below. The customer or user of the ARC 250 and ARC 303 should ensure that these devices are operated in such an environment. | | |
| Interference measurements | Interference measurements | Interference measurements |
| HF emissions as per CISPR 11 | Group 2 | The ARC 250 and ARC 303 must emit electromagnetic energy in order to perform their intended functions. Nearby electronic devices may be affected. |
| HF emissions as per CISPR 11 | Class B | The ARC 250 and ARC 303 devices are suitable for use in facilities other than those suitable for a residential environment or the like connected directly to the public power grid, which also supplies power to buildings used for residential purposes. |
| Emission of harmonics as per IEC 61000-3-2 | Class A | |
| Emission of voltage fluctuations/flicker as per IEC 61000-3-3 | Conforms | |

| Electromagnetic resistance to interference (IEC 60601-1-2, Table 202) | | | |
|---|--|--|--|
| The ARC 250 and ARC 303 are intended to be used in the electromagnetic environment described below. The customer or user of the ARC 250 and ARC 303 should ensure that these devices are operated in such an environment. | | | |
| Tests for resistance to interference | Tests for resistance to interference | Tests for resistance to interference | Tests for resistance to interference |
| Electrostatic discharge (ESD) according to IEC 61000-4-2 | ± 6 kV contact discharge | ± 6 kV contact discharge | Floors should be made of wood or cement or covered with ceramic tiles. If the floor is covered with synthetic material, the relative humidity must be at least 30 %. |
| | ± 8 kV air discharge | ± 8 kV air discharge | |
| Fast transient electrical interference (bursts as per IEC 61000-4-4 | ± 2 kV for power supply lines | ± 2 kV for power supply lines | The quality of the mains power should correspond to that of a typical business or hospital environment. |
| | ± 1 kV for input and output lines | ± 1 kV for input and output lines | |
| Surges as per IEC 61000-4-5 | ± 1 kV voltage outer conductor-outer conductor | ± 1 kV voltage outer conductor-outer conductor | The quality of the mains power should correspond to that of a typical business or hospital environment. |
| | ± 2 kV voltage outer conductor to ground | ± 2 kV voltage outer conductor to ground | |
| Voltage collapses, brief interruptions and fluctuations in the power supply as per IEC 61000-4-11 | < 5 % U_T for ½ period (> 95 % collapse) 40 % U_T for 5 periods (60 % collapse) 70 % U_T for 25 periods (30 % collapse) < 5 % U_T for 5 s (> 95 % collapse) | < 5 % U_T for ½ period (> 95 % collapse) 40 % U_T for 5 periods (60 % collapse) 70 % U_T for 25 periods (30 % collapse) < 5 % U_T for 5 s (> 95 % collapse) | The quality of the mains power should correspond to that of a typical business or hospital environment. If the user of the ARC 200, ARC 250, ARC 300e and ARC 303 requires it to continue operating even in the event of mains power dropout, it is recommended to use an uninterruptable power source or battery to supply power the ARC 250 and ARC 303. |
| Note: U_T is the AC supply voltage prior to the application of the test level. | | | |

| Electromagnetic resistance to interference (IEC 60601-1-2, Table 204) | | | |
|---|---|--------------------------------------|--|
| The ARC 250 and ARC 303 are intended to be used in the electromagnetic environment described below. The customer or user of the ARC 250 and ARC 303 should ensure that these devices are operated in such an environment. | | | |
| Tests for resistance to interference | Tests for resistance to interference | Tests for resistance to interference | Tests for resistance to interference |
| Conducted HF interference as per IEC 61000-4-6 | 3 Vrms value 150 kHz to 80 Hz | 10 V | Portable and mobile wireless devices, as well as their cables, should not be used within the recommended protective distance from the ARC 250 and ARC 303 as calculated using the formula appropriate to the transmission frequency. Recommended protective working distance: $d = 0.35 \times \sqrt{P}$ $d = 0.35 \times \sqrt{P}$ for 80 MHz to 800 GHz $d = 0.7 \times \sqrt{P}$ for 800 MHz to 2.5 GHz where P is the nominal transmitter output in watts (W) specified by the transmitter manufacturer and d is the recommended protective distance in meters (m). The field strength of stationary transmitters as determined by on-site measurements ^a should be lower than the compliance level ^b at all frequencies. Interference is possible in the vicinity of devices that bear the following symbol.  |
| Radiated HF interference as per IEC 61000-4-3 | 3 V/m 80 MHz to 2.5 Hz | 7.5 V/m | |
| Note 1 | The higher frequency range applies to 80 MHz and 800 MHz. | | |
| Note 2 | These guidelines may not be applicable in all cases. The propagation of electromagnetic waves is influenced by their absorption and reflection by buildings, objects and people. | | |
| ^a | Field strengths from stationary transmitters such as base stations for wireless telephones and land mobile radios, amateur radio, AM and FM radio broadcasting and TV broadcasting cannot be predicted theoretically with accuracy. A study of the electromagnetic phenomena at the location should be done to determine the electromagnetic environment resulting from stationary transmitters. If the measured field strength at the location where the ARC 250 and ARC 303 is used exceeds the aforementioned compliance level, the ARC 250 and ARC 303 should be monitored to verify that it is operating as intended. If unusual performance characteristics are observed, additional measures may be necessary, such as repositioning or relocation of the ARC 250 and ARC 303. | | |
| ^b | The field strength should be lower than 10 V/m over the frequency range of 150 kHz to 80 MHz. | | |

| Recommended protective distances between portable and mobile HF telecommunications devices and the ARC 250 and ARC 303 (IEC 60601-1-2, Table 206) | | | |
|--|--|--|---|
| The ARC 250 and ARC 303 are designed to be used in an electromagnetic environment in which HF interference is controlled. The customer or user of the ARC 250 and ARC 303 can help avoid electromagnetic interference by complying with the minimum distance between portable and mobile HF telecommunication devices (transmitters) and the ARC 250 and ARC 303. This distance depends on the output power of the communication device concerned, as specified below. | | | |
| Nominal transmitter output (W) | Protective distance (m) depending on transmission frequency | | |
| | 150 kHz to 80 MHz $d = 0.35 \times \sqrt{P}$ | 80 MHz bis 800 MHz $d = 0.35 \times \sqrt{P}$ | 800 MHz to 2.5 GHz $d = 0.7 \times \sqrt{P}$ |
| 0.01 | 0.01 | 0.01 | 0.01 |
| 0.1 | 0.1 | 0.1 | 0.1 |
| 1 | 1 | 1 | 1 |
| 10 | 10 | 10 | 10 |
| 100 | 100 | 100 | 100 |
| For transmitters whose maximum nominal output is not specified in the table above, the recommended protective distance d in meters (m) can be determined using the equation in the corresponding column, where P is the maximum nominal output power of the transmitter in watts (W) as specified by the transmitter manufacturer. | | | |
| Note 1 | The higher frequency range applies in case of 80 MHz and 800 MHz. | | |
| Note 2 | These guidelines may not be applicable in all cases. The propagation of electromagnetic waves is influenced by their absorption and reflection by buildings, objects and people. | | |

14. Disposal



Always comply with the national regulations of the relevant country when disposing of or recycling the device or its components.

| Symbol | Designation |
|--------|--|
| | A device marked with this symbol must be put into the separate waste collection for electrical and electronic devices. Disposal is carried out free of charge by the manufacturer within the European Union. |

- If you have any questions regarding product disposal, contact the service center, see section Technical service, page 59.

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CE marked according to Medical
Device 93/42/EWG