



## TEKNO TOM 500

200W and 400W





## INTENDED USERS

These devices are to be used only for the purposes described in this guide and only in operating rooms or suitable clinics. from qualified users who are familiar with electrosurgery and its risks and side effects, and who observe all the information and warnings listed in this manual.

## HOW TO USE THE MANUAL

Read the manual carefully before use and check the performance before using the device on patients. Don't rely solely on experience with similar devices. Keep the manual at the place of use of the device and replace it if lost. If the manual is not sufficient for your specific requirements, contact TEKNO-MEDICAL or your local dealer directly for the necessary information or to replace the manual in case of loss.



### TEKNO-Medical Optik Chirurgie GmbH

Sattlerstr. 11  
78532 Tuttlingen  
GERMANY  
SRN: DE-MF-000005822

Phone: +49 (0) 7461 / 17 01 0  
Fax: +49 (0) 7461 / 17 01 50

Mail: [mail@tekno-medical.com](mailto:mail@tekno-medical.com)

Web: [www.tekno-medical.com](http://www.tekno-medical.com)

The manufacturer is responsible for its function, reliability, and safety only if the equipment is used in an area that complies with all applicable IEC standards, if the installation and use is carried out in accordance with the information contained in this manual using original accessories, and if repairs or periodic checks are carried out by authorized personnel using genuine spare parts. Upon request, TEKNO-MEDICAL will provide users with the relevant wiring diagrams and any other technical or practical information.



Content

1 INTRODUCTION AND DIRECTIONS OF USE ..... 6
1.1 RISKS CAUSED BY THE USE OF HF CURRENTS ..... 6
1.2 DIRECTIONS FOR USE ..... 6
2 BASIC WARNINGS..... 7
2.1 GENERAL INFORMATION ..... 7
2.2 USE OF FLAMMABLE SUBSTANCES OR EXPLOSIVE GASES ..... 7
2.3 ELECTRO-MAGNETIC INTERFERENCES..... 7
2.4 PREPARING AND POSITIONING OF THE PATIENT ..... 8
2.5 USE OF THE NEUTRAL ELECTRODE ..... 8
2.6 USE OF CURRENTS AND POWERS..... 9
2.7 USE OF ALL ACTIVE ACCESSORIES ..... 9
2.8 SPECIFIC USE OF THE INSTRUMENTS FOR LAPAROSCOPY ..... 9
2.9 SPECIFIC USE OF THE BIPOLAR INSTRUMENTS FOR VESSEL SEALING ..... 9
3 INFORMATIONS TO USE THE BIPOLAR MODE..... 9
3.1 USE OF BIPOLAR SCISSORS ..... 9
3.2 STICKING OF THE TISSUE ON THE TIPS OF BIPOLAR INSTRUMENTS ..... 9
3.3 CHECK THE BIPOLAR INSTRUMENT BEFORE USE..... 10
4 GENERAL TECHNICAL FEATURES ..... 10
5 CURRENTS AND RELATED FEATURES ..... 11
5.1 CURRENTS FOR MONOPOLAR CUTTING AND COAGULATING CUTTING ..... 11
5.2 CURRENTS FOR MONOPOLAR COAGULATION ..... 11
5.3 CURRENTS FOR BIPOLAR CUTTING..... 11
5.4 CURRENTS FOR BIPOLAR COAGULATION AND VESSEL-SEALING ..... 11
5.5 ELECTRICAL FEATURES OF THE CURRENTS (200W) ..... 12
5.6 ELECTRICAL FEATURES OF THE CURRENTS (400W) ..... 12
6 6 CONTROL DEVICES, SOCKETS FOR CONNECTIONS AND SYMBOLS..... 13
6.1 PEDAL-1 and PEDAL-2 sockets (backside) ..... 14
6.2 NEUTRAL PLATE socket ..... 14
6.3 MONOPOLAR- socket..... 14
6.4 MONOPOLAR - 2 sockets..... 15
6.5 BIPOLAR-1 and BIPOLAR-2 sockets ..... 15
7 TOUCH-SCREEN..... 16
8 GENERAL MENU ..... 16
8.1 SELF-CHECK ..... 17
9 INITIAL CHECKS AND EQUIPOTENTIAL CONNECTION ..... 18
10 DATA STORING AT THE SWITCHING ON..... 18
11 CHECK OF THE HF LEAKAGE CURRENTS TO EARTH ..... 19
12 CONTROL CIRCUIT OF THE NEUTRAL ELECTRODE ..... 19
12.1 SETTING OF THE OPERATION MODE ..... 19
12.2 SETTING OF THE SOCKET TO CONNECT THE NEUTRAL ELECTRODE..... 20
12.3 OPERATION OF THE CIRCUIT ..... 20
13 STANDBY ..... 21
14 USE OF THE FOOT-SWITCHES ..... 21
15 MEMORIZATION AND USE OF THE PROGRAMS ..... 22
16 SELECTION OF A MEMORY ..... 23
17 BLINKING OF A MEMORY NUMBER ..... 23
18 CANCELLATION OR MEMORIZATION OF THE CHANGES OF SETTING ..... 23
19 FIRST SETTING ..... 24
19.1 Identification of a memory by a text. .... 25
20 ADJUSTMENTS DURING THE USE ..... 26
21 SECTION 1 (MEMORIES FROM 1 TO 64) ..... 27





- 21.1 WARNINGS AND PRECAUTIONS FOR THE OPERATION..... 27
- 21.2 SETTING OF THE CURRENTS ..... 27
- 21.3 CONNECTION OF THE FOOT-SWITCHES ..... 27
- 21.4 CONNECTION OF THE ACCESSORIES ..... 27
- 21.5 INDICATIONS FOR THE SUITABLE CURRENTS ..... 28
- 22 SECTION 2 (MEMORIES FROM 65 TO 74) ..... 31
  - 22.1 WARNINGS AND PRECAUTIONS FOR THE OPERATION..... 31
  - 22.2 SETTING OF THE CURRENTS ..... 31
  - 22.3 CONNECTION OF THE FOOT-SWITCHES ..... 32
  - 22.4 CONNECTION OF THE ACCESSORIES ..... 32
  - 22.5 INDICATIONS FOR THE SUITABLE CURRENTS ..... 33
    - 22.5.1 CURRENTS FOR MONOPOLAR CUTTING OR COAGULATING CUTTING..... 33
    - 22.5.2 CURRENTS FOR MONOPOLAR COAGULATION. .... 33
    - 22.5.3 DELIVERY OF THE MONOPOLAR CURRENTS..... 33
    - 22.5.4 DELIVERY OF THE“SOFT MICRO BICOAG” BIPOLAR COAGULATION ..... 33
    - 22.5.5 THE ALARM SIGNALS DURING USE..... 34
- 23 SECTION 3 (MEMORIES FROM 75 TO 84) ..... 34
  - 23.1 WARNINGS AND PRECAUTIONS FOR THE OPERATION..... 34
  - 23.2 SETTING OF THE CURRENTS ..... 34
  - 23.3 CONNECTION OF THE FOOT-SWITCHES ..... 34
    - 23.3.1 NEUTRAL ELECTRODE ..... 35
    - 23.3.2 RESECTOSCOPE OR OTHER INSTRUMENT FOR ENDOSCOPY OR ARTHROSCOPY..... 35
  - 23.4 INDICATIONS FOR THE SUITABLE CURRENTS ..... 35
  - 23.5 DELIVERY OF THE CURRENTS ..... 36
- 24 SECTION 4 (MEMORIES FROM 85 TO 92) Use for the, in saline, endoscopy of the bipolar currents..... 36
  - 24.1 WARNINGS AND PRECAUTIONS FOR THE OPERATION..... 36
  - 24.2 SETTING OF THE CURRENTS ..... 36
  - 24.3 CONNECTION OF THE FOOT-SWITCHES ..... 36
  - 24.4 CONNECTION OF THE ACCESSORIES ..... 37
    - 24.4.1 NEUTRAL ELECTRODE ..... 37
  - 24.5 INDICATIONS FOR THE SUITABLE CURRENTS: ..... 37
  - 24.6 DELIVERY OF THE CURRENTS ..... 38
    - 24.6.1 THE ALARM SIGNALS DURING USE..... 38
- 25 SECTION 5 (MEMORIES FROM 93 TO 99). ..... 38
  - 25.1 WARNINGS AND PRECAUTIONS FOR THE OPERATION..... 38
  - 25.2 SETTING OF THE CURRENTS ..... 38
  - 25.3 CONNECTION OF THE FOOT-SWITCHES ..... 38
  - 25.4 CONNECTION OF THE ACCESSORIES ..... 38
    - 25.4.1 NEUTRAL ELECTRODE ..... 38
    - 25.4.2 BIPOLAR INSTRUMENTS ..... 39
  - 25.5 INDICATIONS FOR THE SUITABLE CURRENTS ..... 39
    - 25.5.1 CURRENTS FOR BIPOLAR CUTTING..... 39
    - 25.5.2 CURRENTS FOR BIPOLAR COAGULATION AND SEALING OF BIG VESSELS..... 39
  - 25.6 DELIVERY OF THE CURRENTS ..... 40
    - 25.6.1 CURRENTS FOR CUTTING OR COAGULATION WITH FOOT-SWITCHED ACTIVATION ..... 40
    - 25.6.2 CURRENT FOR VESSEL SEALING “SEALING”..... 40
    - 25.6.3 CURRENT FOR COAGULATION “AUTO SOFT MICRO BICOAG” ..... 40
    - 25.6.4 CURRENT FOR VESSEL SEALING “AUTO SEALING” ..... 40
    - 25.6.5 ALARM SIGNALS DURING USE ..... 40
- 26 CLEANING AND STERILIZATION ..... 41
- 27 USE, STORAGE, MAINTENANCE, DISPOSAL..... 41
- 28 ADAPTORS..... 41
- 29 TECHNICAL FEATURES ..... 42



30	DIAGRAMS OF THE MONOPOLAR CURRENTS (200W) .....	43
31	DIAGRAMS OF THE BIPOLAR CURRENTS (200W) .....	48
32	DIAGRAMS OF THE MONOPOLAR CURRENTS (400W) .....	51
33	DIAGRAMS OF THE BIPOLAR CURRENTS (400W) .....	56
34	ACCESSORIES.....	58
34.1	REUSABLE NEUTRAL ELECTRODES .....	58
34.2	FOOT-SWITCHES.....	58



## 1 INTRODUCTION AND DIRECTIONS OF USE

### (Physical and electrical principles of the HF currents – Related risks)

When electrical currents flow across biological tissues, they produce 3 effects: Electrolytic, Faradic and Thermal.

By applying a current, with frequency higher than 300kHz (named HF current), the electrolytic / faradic phenomena disappear or are very limited and the thermal one remains. This effect is exploited to obtain the desired surgical result; in fact when an electric current with such characteristics crosses with sufficient density the cellular liquid of the tissues, it warms it and generates what follows:

- A heating so rapid that the vapor pressure into the internal and external liquids of cells breaks their membranes and provokes their division: **Pure Cut**;
- A heating, slower, which permits to the liquid to evaporate very slowly; in this way, the coagulating parts of the tissues can coagulate: **Coagulation**;
- A process which is in the middle between the two phenomena described above: **Coagulating Cut**.



This device allows the use of the HF currents in 2 ways: **MONOPOLAR** and **BIPOLAR MODE**

### MONOPOLAR MODE

This mode requires the use of two electrodes (the active one, small and used on the point of operation; the neutral one, large and fixed on a different part of the patient's body) and the current flows from the active to the neutral electrode. The thermal effect affects all tissues included between electrodes.

### BIPOLAR MODE

Also this mode requires two electrodes, but they are included in the same instrument and are very closed. In this case the thermal effect produced by the current affects only a very small quantity of tissues.

#### 1.1 RISKS CAUSED BY THE USE OF HF CURRENTS

The HF surgical devices are basic to solve surgical needs, but the use of HF currents, mainly when the monopolar mode is used, presents also some risks. Here under some examples are detailed:

- **Burns, on the patient's tissues** where the neutral electrode is placed, caused by not sufficient contact.
- **Burns on the surgeon's hand** when the insulation of the active electrodes/instruments is damaged);
- **Severe burns of patients /users** caused by the ignition/explosion of flammable/explosive gases or substances.
- In fact, the normal sparks generated during the delivery of power can ignite them.
- **Bad functioning of other devices** (pace-maker, video systems) provoked by EMC interferences emitted during the delivery of the HF currents;
- **Damages of the patient's tissues** caused by a delivery of too high powers.
- **Slight neuromuscular stimulation**, notably while using currents for coagulation, where the active electrode and neutral electrode are used. This stimulation can be felt by patients or surgeons like "an electrical discharge".

#### 1.2 DIRECTIONS FOR USE

**These devices allow the surgeons to perform the following:**

During operations of major or medium surgery (Open Surgery, Laparoscopy/MIS, Endoscopic Surgery) in O.T. or equivalent places: Monopolar Cutting (Pure or Coagulating), Monopolar Coagulation (low, medium and high voltage).

**These units are intended to be used for:**

GYNAECOLOGY, ORTHOPAEDICS, ORL, UROLOGY, MAXILLOFACIAL SURGERY, DERMATOLOGY, PLASTIC SURGERY, VASCULAR SURGERY, GENERAL OR THORACIC SURGERY, PAEDIATRIC SURGERY, EMERGENCY SURGERY, GASTROENTEROLOGY, VETERINARY AND OTHER.



## 2 BASIC WARNINGS

HF surgical units are basic to solve many surgical needs, but the use of these currents both causes specific risks and provokes undesired side effects. Since the behaviour of users is basic to reduce many risks, the International IEC Standards for the safety of these devices establish:

- All the hardware and software countermeasures needed to reduce risks.
- All the warnings to detail in the user manual in order to use them.

Because of previous reasons it is very important the following:

- That the device is used, only for the purposes listed in this manual, by qualified operators who are experienced in electro-surgery and all the related problems, risks or undesired side effects.
- That users read this manual, very carefully, before using the device.
- That operators use this device when applying all the warnings detailed in this manual.

### 2.1 GENERAL INFORMATION

- When using an HF unit for endoscopic procedures under liquid, it is advisable the monitoring of the quantity of irrigation fluids in the patients (input and output volumes), mainly if they have a poor renal function or cardiovascular insufficiency.
- Never use the unit if the electrical plant and the installations of the operating theatre do not comply with the current safety standards. Never use extensions for the mains cord and, if many devices are connected at the same time, ask the Technical Service about their compatibility.
- Try to follow the suggested working times.
- The smoke produced during the use of all HF units is biologically noxious. In USA, ENGLAND and so on the Governmental and Technical Bodies recommend the use of Smoke evacuators to reduce this risk.
- Always place the patient properly for the operation, especially in case of a long operation. The risk of both burns and decubitus lesion rises in this case.

The unit is provided with self-check systems which detect all faults, the mistakes of use, the absence or the decrease of the power, the delivery of a power higher than that expected.

- The systems perform an auto-check at the switching on and checks the functioning during use.
- If the systems detect problems during the auto-check, they block the usability of the unit.
- If the systems detect problems during use, they stop the functioning.

In all cases, the systems inform the users by acoustic or visual signals and codes.

Because of this reason:

- If, during use, the device doesn't deliver the power (the normal powers appear less efficacious), but it has properly passed the auto-check at the switching on and the systems do not signal problems, users must not both increase too much the power and think that the problem depends on the unit.

**Users must check:**

- The good contact between the neutral electrode and patient's tissues while using monopolar currents.
- The conditions of cables and connectors, by bending and pulling them (They mainly break close to the instrument).
- The assembly and the internal connections of all instruments, mainly if for endoscopy or laparoscopy.
- The insulation of the blades of all bipolar scissors.
- (The continuous sliding damages it and causes a short circuit which does not allow the current to reach tissues).

**Users must clean:**

**The tips of all electrodes and instruments (If dirty, the current doesn't reach tissues).**

**The joints of the bipolar instruments for laparoscopy (If dirty the current doesn't reach tissues).**

### 2.2 USE OF FLAMMABLE SUBSTANCES OR EXPLOSIVE GASES

Never use flammable substances (cleaning substances, disinfectants and so on) or explosive anaesthetic gases (i.e., oxygen, nitrogen protoxide) when using a HF device ! It is very dangerous since the spark generated, during use, by the HF currents may cause the explosion of gases or the fire of flammable materials and materials (cotton, gauze, sheets) which are oxygen saturated or soaked with flammable substances.

Remember that, during use, a spark may cause the explosion of endogenous gases (I.E. Inside the intestine).

### 2.3 ELECTRO-MAGNETIC INTERFERENCES

The unit complies with all EMC standards, but it can, mainly during the monopolar use, damage the functioning of:

- **Other devices used in O.T.** (i.e. monitoring devices, video-cameras, and so on).  
To reduce this problem, connect the ESU to a mains socket different from that used to supply these devices and, if necessary, ask for qualified technical assistance.
- **Pace-Makers, neuromuscular stimulators or other implanted devices**  
When operating on patients with these devices, ask for qualified advice from the Cardiology Division.  
Remember that the bipolar mode is the best solution to operate these patients.



## 2.4 PREPARING AND POSITIONING OF THE PATIENT

Operators, when using a HF unit, must avoid all causes which can badly affect the path of the current and the related thermal effect inside tissues because they cause the following risk:

**Burns of the patient's tissues where the density of current is too high. For example:**

- An implanted metallic prosthesis concentrates the passage of the current in the surrounding tissues.
- Damp/wet sheets placed under or around the patient and the metallic trocars for laparoscopy can
- cause an anomalous passage of the current.

**To reduce this risk users must do the following:**

- Take all the metallic objects off the patient (rings, etc.), remember also that the metallic elements (prosthesis, catheters, etc.) on the path of the current may cause increases of density of current;
- When performing a laparoscopic procedure, check the insulation of trocars and instruments;
- With dry sheets or other suitable materials insulate the patient from any metallic part connected to earth or which may conduct electricity (operating table, supports). In the same way insulate the patient from the heating mattress and the secreting parts of the body or the contacts skin-to-skin (i.e. between arms and body).
- Remember that also the sweat can affect the insulation.
- During the operation, mainly if the patient is moved or liquids are poured, verify if the insulation remains good.
- When preparing the operating field, don't use flammable disinfectants and take care that the used disinfectants do not wet the sheets positioned under or around the patient. Also dry the traces of disinfectant on the skin.
- Place all the not specifically protected monitoring electrodes as far away as possible from the electrodes of the HF unit. Avoid, if possible, the use of needle type or very small monitoring electrodes;

## 2.5 USE OF THE NEUTRAL ELECTRODE

When using monopolar currents, the bad contact of the neutral electrode causes two specific risks:

**Burns** on the tissues where the neutral electrode is fixed because the passage of the current is not homogeneous (it flows through areas with better contact and worse contact) and it produces, in the areas with better contact, a thermal effect so high to cause burns.

The bad functioning of the HF unit which leads users to raise the delivered powers and increases, in this way, the risk of burns where the neutral electrode is positioned (higher power = higher risk).

In order to obtain the best and homogeneous contact, choose, use and place the neutral electrode (NE) as follows:

- Check that the NE, if it is a reusable type, is not either worn or damaged.
- Place it on an area of the body as close as possible to the intervention point (the ideal is a soft part without hairs, protuberant bones or superficial differences), but which not get wet both when preparing or disinfecting the operating field and during use. Clean this area, shave it and massage it in order to improve the circulation.
- Normally, the better points are calf and thigh, but obviously if the operation does not affect these areas.
- Fix the NE properly with the best possible contact, without placing anything in between, but do not press
- it too much, in order to avoid ischemic zones. Avoid anomalous contacts (i.e. When positioning the patient's arm on the operating table, insulate the hand/ the fingers from the neutral electrode).
- When preparing and disinfecting the operating field, avoid wetting the NE or the related area.
- During use, mainly if the patient is moved or liquids are poured, verify if the intended contact remains constant.
- For the choice, according to specific needs) of the best "disposable" NE; contact the Technical Service.
- Use a disposable NE only once and follow its instructions. The right dimensions are approx. 136cm<sup>2</sup> for patients with body weight higher than 15 Kg; approx. 84cm<sup>2</sup> for children with body weight from 5 to 15 Kg.
- When using adhesive NE, do not rely on their characteristics only. The use of a supplementary fixing grants a more reliable contact (i.e. an elastic bandage, able to cover the entire NE, but without pressing it too much).
- Remember that, mainly when high powers are used, if a "Split" NE is not used, the control circuit of the unit can't verify the contact between the NE and patient's tissues; that is, it does not guarantee the intended safety.
- When fixing a "Split" NE, set it to obtain the same distance between both the parts of the NE and the operation area (i.e. when intervening on the abdominal area, if the NE is on the thigh, place it lengthwise on the leg).
- As the space between the NE and the operating area represents a sort of "path" for the HF current, be sure that it does not cross diagonally the body or it crosses the heart.



## 2.6 USE OF CURRENTS AND POWERS

- Check the features of its currents before using a new HF unit without considering the previous experience with similar devices. Anyway, always start an operation with very low powers and then raise them until the required result is reached.
- Always use the lowest possible power. Do not exceed 1/4 of the maximum power of monopolar currents, when using neutral electrodes for paediatrics, or 1/6 when using neutral electrodes for new-born;
- Use the bipolar mode when operating on delicate or much innervated tissues, on small portions of tissue
- or cavities, on patients with pace-makers or similar devices and when the use of the neutral electrode is difficult.
- Remember that the use of too low powers can cause unexpected risks.

## 2.7 USE OF ALL ACTIVE ACCESSORIES

**Never use accessories (active electrodes, pencils, instruments, cables, connectors):**

- Not compliant with all the applicable technical / legislative Rules (I.E. Not EC approved).
- Not well working or with damaged insulations (The bad insulation is the cause of the burns on the hand of surgeons) and worn or dirty because they do not guarantee the safety, because they produce useless superficial sparks and they cause an unstable functioning which can lead operators to increase powers to dangerous levels. Always check them before the operation, mainly if they are for endoscopy.
- **Not suitable for the working voltages of the device:**
  - **7600 Vpp** (3800 Vp) for the monopolar currents with crest factor equal or higher than 2.
  - **3600 Vpp** (1800 Vp) for the monopolar currents with crest factor lower than 2.
  - **1100 Vpp** (550 Vp) for the bipolar currents with crest factor equal or lower than 2.

The manual, for each current, includes a specific diagram (Increase of voltages with regard to the Increase of powers) to set the power to use without exceeding the insulation features of an accessory and the International Standards establish that these features (named rated voltage) must be detailed on the label or in the manual of accessories.

- When positioning the cables of the electrodes, avoid their contact both with the patient and with other cables or conductive parts. During use, place the unused electrodes or instruments on insulating materials.
- If the carbonization of the tissues is not required, do not activate the monopolar currents (mainly the currents for coagulation with high sparking) if the electrode does not touch the tissue.
- The standard monopolar pencils are suitable to connect electrodes with stem  $\varnothing$  2, 3 mm.

## 2.8 SPECIFIC USE OF THE INSTRUMENTS FOR LAPAROSCOPY

- Use the instrument under visual control and, after each withdrawal, check that all parts are present.
- Maintain a correct distance between the ends of the instrument and sensitive structures of the tissue.
- Activate the current only if the ends of the instrument are in contact with the tissues to cut /coagulate/seal.
- Never use, during the operation, a hot instrument (it means an instrument with hot ends) for preparation.
- Never use currents with automatic start/stop system.

## 2.9 SPECIFIC USE OF THE BIPOLAR INSTRUMENTS FOR VESSEL SEALING

In addition to the previous warnings use these instruments, mainly if for laparoscopy, as follows:

- Prudentially perform at least 2 seals (to the left and to the right of the point to cut) and verify if vessels are well coagulated / sealed before cutting it.
- About the sticking of the tissue on the ends of the instrument, see the specific advices detailed in the paragraph "INFORMATIONS TO USE THE BIPOLAR MODE"

## 3 INFORMATIONS TO USE THE BIPOLAR MODE

### 3.1 USE OF BIPOLAR SCISSORS

Coagulate tissues by using "BLEND BICUT" or "MICRO" currents while cutting them mechanically.

### 3.2 STICKING OF THE TISSUE ON THE TIPS OF BIPOLAR INSTRUMENTS

The sticking of the tissue on the tips of forceps/clamps is a normal a problem when surgeons are using the bipolar currents for coagulation and vessel sealing. To reduce it do the following:

- When using forceps/clamps, irrigate , if possible, tissues with physiological solution.
- Use all forceps/clamps damp or wet by physiological solution their tips. For example:
  - Damp tips before the use by a gauze and damp them again after 3 / 4 coagulations.
  - Immerse tips in a bowl and wet again them in the same way after 3 / 4 coagulations.



## 3.3 CHECK THE BIPOLAR INSTRUMENT BEFORE USE

- Set a coagulation current (20/30)
- Wet a gauze with physiological solution, and hold it without touching the wet part.
- Touch the wet gauze with both ends of the instrument and activate the delivery.

The smoke produced signals the good functioning, otherwise check the connecting cable, the connections among different parts of the instrument and the insulation of the ends (i.e. When the insulation of bipolar scissors is damaged, this breakage causes a short circuit which does not allow the current to reach tissues).

## 4 GENERAL TECHNICAL FEATURES

**The unit is provided with a computerized system to automatically control the functioning.**

- It performs a main self-check at the switching **ON** (It is automatically repeated every about 30 minutes).
- It stops the power delivery in case of breakages or mistakes of use by informing users with acoustic and visual signals (**ERROR CODES**).
- It stores the detected problems to help the following technical assistance.

The unit is provided with computerized self-control and self-adjustment of currents with **PER** (Power Efficiency Rating > 98%).

- It automatically controls all currents according to the features of tissues with two different systems:  
**ADC System – Self adjusting with constant power**  
**APC System - Self adjusting with constant voltage**
- It also checks that the power delivery corresponds to intended settings and it stops the activation in case of hardware or software breakages which could cause an anomalous delivery.

**The unit allows the memorization of 99 programs.**

The programs can be also identified by a text (Name of users or kind of use).

All settings of a program can be changed whenever users like

The unit includes some programs with specific presetting to facilitate their use.

**The unit has 15 memories for the bipolar use only, without the neutral electrode.**

**The unit is always usable by one or two bipolar instruments:**

- Bipolar instruments are normally usable by foot-switch, but the unit also includes some currents with automatic “impedance sensing” start/stop system.

**The unit is usable by one or two twin foot-switches.**

- By the standard **tk 90016-01** foot-switch provided with a foot controlled selector to activate either the monopolar currents or the bipolar currents.
- By a twin foot-switch (**tk 90017-00**) which activates the bipolar currents only.
- By both foot-switches (**tk 90016-01** and **tk 90017-00**).
- By the tk 90016-01 twin foot-switch to activate the monopolar currents for cutting and the bipolar currents for coagulation or vessel sealing.

**The unit has a control circuit of the neutral electrode which allows the users the following:**

- The use either with normal electrodes for adults or with small electrodes for peadiatrics or new born.
- The use of either Single section “Non Split” neutral electrodes or Double section “Split” neutral electrodes.
- The use of connecting cables with different connectors: European standard and USA standard.

**The unit is provided with the STANDBY mode.**

- It allows the disconnection of the neutral electrode without the intervention of the related control circuit.

**The unit is provided with the function automatic reset.**

- It, at the switching on, resets all the settings used at the switching on.

**The unit is provided with an automatic circuit to control the HF leakage currents to earth.**



## 5 CURRENTS AND RELATED FEATURES

The unit delivers **15 monopolar** currents and **9 bipolar** currents which are automatically controlled, in real time, by microprocessors according to the features “impedances / resistances” of tissues. The self-control is different according to the operative need of the currents:

### **ADC System – Self-control with constant power.**

The power of these currents is shown, on the touch-screen, as Watts regarding the rated load.

### **APC System - Self-control with constant voltage.**

The power of these currents is shown, on the touch-screen, as effects (10 for each current) and, for each effect, it is also shown the maximum power.

**The usability and the advisable starting setting of all the currents is detailed in the SECTIONS dedicated to the different surgical uses.**

### 5.1 CURRENTS FOR MONOPOLAR CUTTING AND COAGULATING CUTTING

- **PURE CUT (Self-control ADC System).** Current for cutting without coagulating effect.
- **BLEND CUT 1 (Self-control ADC System).** Current for cutting with soft coagulating effect.
- **BLEND CUT 2 (Self-control ADC System).** Current for cutting with very strong coagulating effect.
- **PURE CUT PULSED (Self-control ADC System).** Current for pulsed cutting without coagulating effect.
- **BLEND CUT PULSED (Self-control ADC System).** Current for fast pulsed cutting with coagulating effect.
- **AUTO PURE MICRO (Self-control APC System).** Current for delicate cutting without coagulating effect.
- **AUTO BLEND CUT MICRO (Self-control APC System).** Current for delicate cutting with coagulating effect.
- **AUTO PAPILO PURE CUT (Self-control APC System).** Current for continuous or pulsed cutting without coagulating effect.
- It has 4 delivery modes:
  - **continuous** or
  - **pulsed with slow modulation, medium modulation and fast modulation.**
- **AUTO POLIPO BLEND CUT (Self-control APC System).** Current for continuous or pulsed cutting with efficacious coagulating effect. It has 4 delivery modes: continuous or pulsed with slow modulation, medium modulation and fast modulation.
- **AUTO ENDO CUT (Self-control APC System).** Current with phases of cutting and coagulation.
- It has 4 delivery modes with different percentages of cutting and coagulation.

### 5.2 CURRENTS FOR MONOPOLAR COAGULATION

- **FULG FORCED COAG (Self-control ADC System).** Current for coagulation with strong sparking.
- **SPRAY COAG (Self-control ADC System).** Current for no-contact coagulation with very strong sparking.
- **PULSED SPRAY COAG.** Current identical the SPRAY, but with the pulsed (more delicate) delivery.
- **PIN POINT CONTACT COAG (Self-control ADC System).** Current for with medium superficial sparking.
- **SOFT MICRO COAG (Self-control ADC System).** Current for with very low sparking.

### 5.3 CURRENTS FOR BIPOLAR CUTTING

- **STANDARD BICUT (Self-control ADC System).** Current for cutting of dried or wet tissues.
- **BLEND BICUT (Self-control ADC System).** Current for cutting with strong coagulation (95% coagulation).
- **SALINE URO-GYN CUT (Self-control ADC System).** Current for the endoscopic cutting in saline.
- **SALINE ARTHRO CUT (Self-control ADC System).** Current for the arthroscopic use in saline.

### 5.4 CURRENTS FOR BIPOLAR COAGULATION AND VESSEL-SEALING

- **SOFT MICRO BICOAG (Self-control APC System).** Current for delicate and precise coagulation.
- **FORCED MICRO BICOAG (Self-control ADC System).** Current for fast coagulation.
- **AUTO SOFT MICRO BICOAG (Self-control APC System).** Current identical to the SOFT MICRO BICOAG, but with automatic “impedance sensing” start/stop.
- **SEALING (Self-control APC System).** Current, to coagulate/seal vessels with diameter up to 8 mm, with automatic “impedance sensing” stop.
- **AUTO SEALING (Self-control APC System).** Current identical to the SEALING, but with automatic “impedance sensing” start/stop.



5.5 ELECTRICAL FEATURES OF THE CURRENTS (200W)

MONOPOLAR	Max Power	Rated Load	Vpp	Frequency (F) – Crest Factor (CF) Modulation (M) - Duty Cycle (DT)	Acoustic and luminous signals
PURE CUT	200 W	400 Ω	2550	F: 440 kHz - CF: 1,46 - M: 0 - DT: 100%	Low sound, Yellow
BLEND CUT 1	200 W	400 Ω	3390	F: 440 kHz - CF: 1,94 - M: 17kHz - DT:95%	Ditto
BLEND CUT 2	200 W	400 Ω	3330	F: 440 kHz - CF: 2,29 - M: 17kHz - DT: 65%	Ditto
PURE CUT PULSED	200 W	400 Ω	2640	F: 440 kHz - CF: 2 - M: 3kHz - DT: 50%	Ditto
BLEND CUT PULSED	200 W	400 Ω	3330	F: 440 kHz - CF: 3,2 - M: 50Hz - DT: 50%	Ditto
AUTO PURE MICRO	200 W	300 Ω	1137	F: 440 kHz - CF: 1,5 - M: 0 - DT: 100%	Ditto
AUTO BLEND CUT MICRO	200 W	300 Ω	1500	F: 440 kHz - CF: 1,98 - M: 17kHz - DT: 90%	Ditto
AUTO PAPILO PURE CUT	200 W	300 Ω	1140	F: 440 kHz - CF: 1,5 - M: 0 - DT: 100%	Ditto
AUTO POLIPO BLEND CUT	200 W	300 Ω	1490	F: 440 kHz - CF: 1,98 - M: 17kHz - DT: 95%	Ditto
AUTO ENDO CUT	200 W	300 Ω	1670	50% AUTO PURE 50% AUTO BLEND	Ditto
FULG FORCED COAG	150 W	300 Ω	4500	F: 440 kHz - CF: 6,4 - M: 60kHz - DT: 18%	Acute Sound, Blue
SPRAY COAG	200 W	700 Ω	7750	F: 440 kHz - CF: 7,75 - M: 30kHz - DT: 7%	Ditto
PIN POINT CONTACT COAG	200 W	400 Ω	3700	F: 440 kHz - CF: 2,2 - M: 17kHz - DT: 85%	Ditto
SOFT MICRO COAG	200 W	300 Ω	2875	F: 440 kHz - CF: 2,1 - M: 17kHz - DT: 75%	Ditto
PULSED SPRAY COAG	200 W	700 Ω	7850	F: 440 kHz - CF: 11,5 - M: 3 Hz - DT: 50%	Ditto

BIPOLAR	Max Power	Rated Load	Vpp	Frequency (F) – Crest Factor (CF) Modulation (M) - Duty Cycle (DT)	Acoustic and luminous signals
STANDARD BICUT	200 W	300 Ω	1070	F: 440 kHz - CF: 1,5 - M: 0 - DT: 100%	Acute Sound, Blue
BLEND BICUT	160 W	200 Ω	740	F: 440 kHz - CF: 1,6 - M: 17kHz - DT: 95%	Ditto
SALINE URO-GYN CUT	300 W	350 Ω	1070	F: 440 kHz - CF: 1,5 - M: 0 - DT: 100%	Ditto
SALINE ARTHRO CUT	230 W	350 Ω	1070	F: 440 kHz - CF: 1,5 - M: 0 - DT: 100%	Ditto
SOFT MICRO BICOAG AUTO SOFT MICRO BICOAG	140 W	100 Ω	460	F: 440 kHz - CF: 1,6 - M: 0 - DT: 100%	Acute Sound, Blue light.
FORCED MACRO BICOAG	200 W	100 Ω	550	F: 440 kHz - CF: 1,6 - M: 0 - DT: 100%	Ditto
SEALING e AUTO SEALING	320 W	50 Ω	320	F: 440 kHz - CF: 1,46 - M: 0 - DT: 100%	Ditto

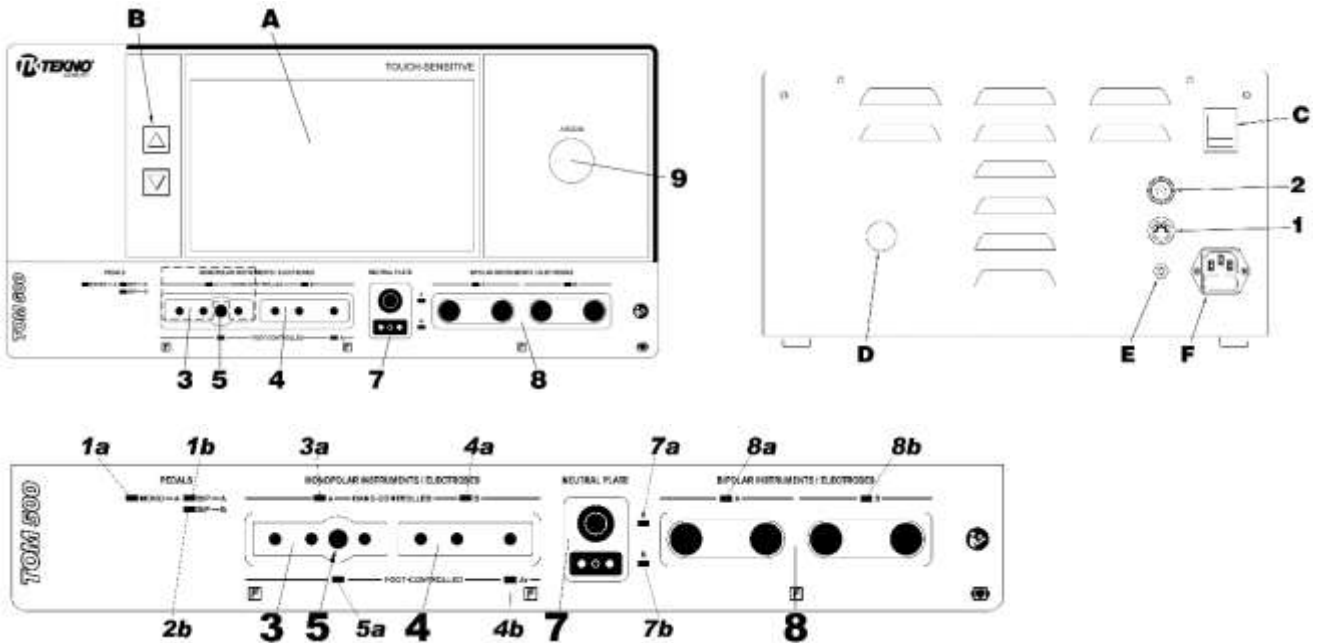
5.6 ELECTRICAL FEATURES OF THE CURRENTS (400W)

MONOPOLAR	Max Power	Rated Load	Vpp	Frequency (F) – Crest Factor (CF) Modulation (M) - Duty Cycle (DT)	Acoustic and luminous signals
PURE CUT	400 W	400 Ω	2550	F: 440 kHz - CF: 1,46 - M: 0 - DT: 100%	Low sound, Yellow light.
BLEND CUT 1	300 W	400 Ω	3390	F: 440 kHz - CF: 1,94 - M: 17kHz - DT:95%	Ditto
BLEND CUT 2	250 W	400 Ω	3330	F: 440 kHz - CF: 2,29 - M: 17kHz - DT: 65%	Ditto
PURE CUT PULSED	400 W	400 Ω	2640	F: 440 kHz - CF: 2 - M: 3Hz - DT: 50%	Ditto
BLEND CUT PULSED	250 W	400 Ω	3330	F: 440 kHz - CF: 3,2 - M: 50Hz - DT: 50%	Ditto
AUTO PURE MICRO	300 W	300 Ω	1137	F: 440 kHz - CF: 1,5 - M: 0 - DT: 100%	Ditto
AUTO BLEND CUT MICRO	300 W	300 Ω	1500	F: 440 kHz - CF: 1,98 - M: 17kHz - DT: 90%	Ditto
AUTO PAPILO PURE CUT	300 W	300 Ω	1140	F: 440 kHz - CF: 1,5 - M: 0 - DT: 100%	Ditto
AUTO POLIPO BLEND CUT	300 W	300 Ω	1490	F: 440 kHz - CF: 1,98 - M: 17kHz - DT: 95%	Ditto
AUTO ENDO CUT	300 W	300 Ω	1670	50% AUTO PURE 50% AUTO BLEND	Ditto
FULG FORCED COAG	150 W	300 Ω	4500	F: 440 kHz - CF: 6,4 - M: 60kHz - DT: 18%	Acute Sound, Blue light.
SPRAY COAG	200 W	700 Ω	7750	F: 440 kHz - CF: 7,75 - M: 30kHz - DT: 7%	Ditto
PIN POINT CONTACT	300 W	400 Ω	3700	F: 440 kHz - CF: 2,2 - M: 17kHz - DT: 85%	Ditto
SOFT MICRO COAG	280 W	300 Ω	3300	F: 440 kHz - CF: 2,1 - M: 17kHz - DT: 75%	Ditto
PULSED SPRAY COAG	200 W	700 Ω	7850	F: 440 kHz - CF: 11,5 - M: 3 Hz - DT: 50%	Ditto



BIPOLAR	Max Power	Rated Load	Vpp	Frequency (F) – Crest Factor (CF) Modulation (M) - Duty Cycle (DT)	Acoustic and luminous signals
STANDARD BICUT	200 W	300 Ω	1070	F: 440 kHz - CF: 1,5 - M: 0 - DT: 100%	Acute Sound, Blue light.
BLEND BICUT	160 W	200 Ω	740	F: 440 kHz - CF: 1,6 - M: 17kHz - DT: 95%	Ditto
SALINE URO-GYN CUT	300 W	350 Ω	1070	F: 440 kHz - CF: 1,5 - M: 0 - DT: 100%	Ditto
SALINE ARTHRO CUT	230 W	350 Ω	1070	F: 440 kHz - CF: 1,5 - M: 0 - DT: 100%	Ditto
SOFT MICRO BICOAG AUTO SOFT MICRO BICOAG	140 W	100 Ω	460	F: 440 kHz - CF: 1,6 - M: 0 - DT: 100%	Acute Sound, Blue light.
FORCED MACRO BICOAG	200 W	100 Ω	550	F: 440 kHz - CF: 1,6 - M: 0 - DT: 100%	Ditto
SEALING e AUTO SEALING	320 W	50 Ω	320	F: 440 kHz - CF: 1,46 - M: 0 - DT: 100%	Ditto

**6 6CONTROL DEVICES, SOCKETS FOR CONNECTIONS AND SYMBOLS**



The lights of the sockets switch ON, according to the selected use, to highlight the usable socket

- (A) Touch-screen
- (B) PS Keys to set the power of currents
- (1, 2) Sockets to connect the twin foot-switches (see details on next page)
- (3, 5) Sockets to connect the monopolar accessories
- (4) Socket to connect a monopolar accessory
- (7) Socket to connect the neutral electrode
- (8) Sockets to connect the bipolar accessories
- (9) Not used in this model
- (C) Mains switch
- (D) Not used in this model
- (E) Plug for the equipotential connection
- (F) Socket for the supply cord with fuse block

	Alternating current (on the data label)		Earth protection (inside the unit)
	Read the use manual before using the unit		
	Unit of Class I Type CF, protected against the defibrillator effects, suitable for direct heart application. This type guarantees the highest level of safety against direct and indirect contacts, notably for the leakage currents. The F type applied part is protected from the earth at high and low frequencies		



## 6.1 PEDAL-1 and PEDAL-2 sockets (backside)

### Connection of the foot-switches:

- **PEDAL-1 socket:** Connection of the **tk 90016-01** standard foot-switch provided with a foot-selector to activate either the monopolar currents or the bipolar currents.
- **PEDAL-2 socket:** Connection of the **tk 90017-00** foot-switch to activate the bipolar currents only.
- When connecting both foot-switches, the **tk 90016-01** activates the monopolar currents, the **tk 90017-00** activates the bipolar currents.



## 6.2 NEUTRAL PLATE socket

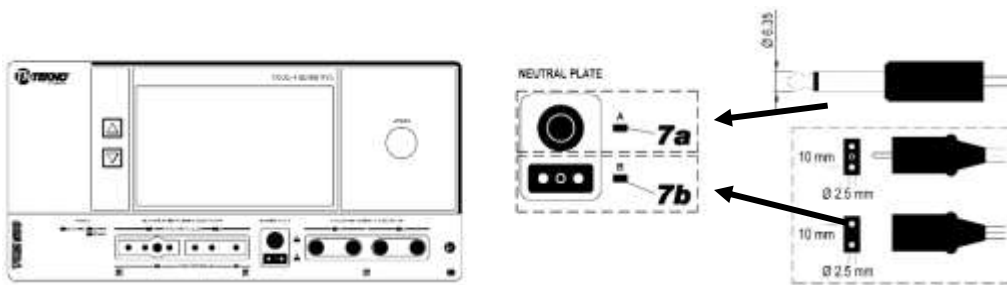
### Connection of the neutral electrode.

#### (When the 7a NP-1 light is ON):

The related socket allows the use of a cable with the standard, European, connector (Jack Ø 6, 35 mm).

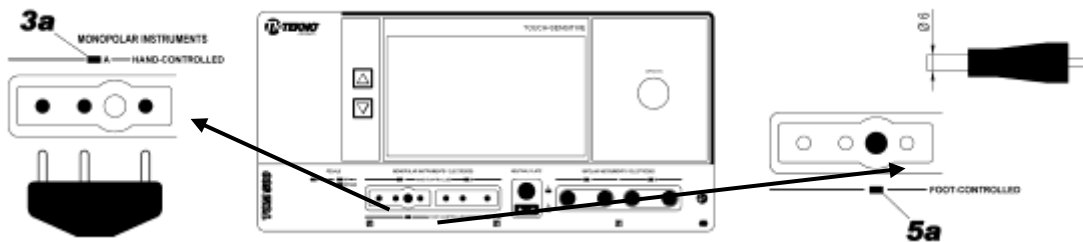
#### (When the 7b NP-2 light is ON):

The related socket allows the use of a cable with the American connector “Valleylab” standard.



## 6.3 MONOPOLAR- socket

### Connection of monopolar accessories.



#### When the 3a HAND-SWITCHED light is ON:

- It allows the use of a hand-switched handle or instrument.
- The socket allows the use of accessories with the connector “3 pins - international type”.

#### When the 5a FOOT SWITCHED light is ON:

- It allows the use of a foot-switched accessory (Handle, instrument, endoscope and resectoscope).
- The socket allows the use of accessories with the connector “plug Ø 6 mm with hole Ø 4 mm”.

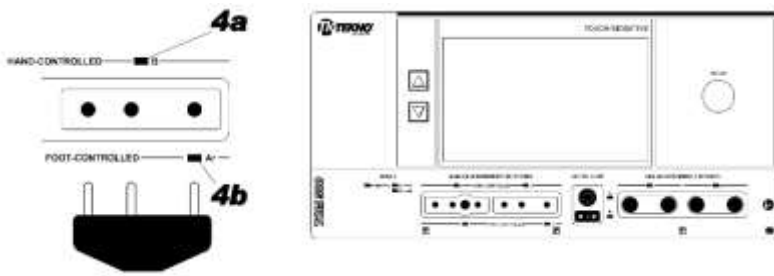
#### Use the tk 90302-21 adaptor to use accessories with cables having all the following connectors different from the standard one:

- Cables with “MARTIN” connector or equivalent
- Cables with “diameter from 2 to 5 mm” plug (ERBE, STORZ, and so on)
- Cables with “diameter 8mm” plug (USA, VALLEYLAB, and so on)
- The instructions to use the adaptor are detailed on its packaging



## 6.4 MONOPOLAR – 2 sockets

Connection of Monopolar handle for normal surgery.



The **4a HAND SWITCHED** light is ON:

- The socket allows the use, for normal surgery, of a hand-switched handle or instrument.
- The socket allows the use of accessories with the connector “3 pins - international type”.

The socket **4b** (For the connection of a foot-controlled accessory for the argon use), is not usable in this model.

## 6.5 BIPOLAR–1 and BIPOLAR-2 sockets

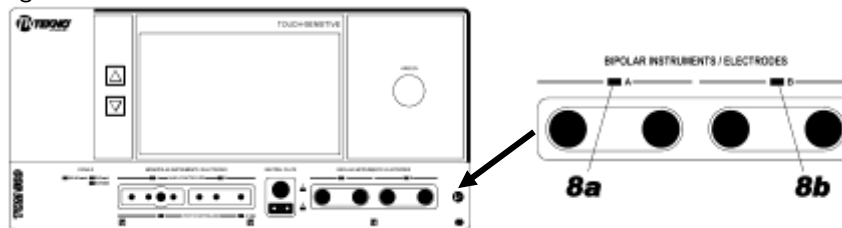
Connection of the bipolar accessories.

(When the **8b** light is ON) Only the **BIPOLAR-2** socket is usable.

- All the currents, for cutting and coagulation or vessel sealing, are delivered through it.

(When **8b** and **8a** lights are ON) Both sockets, **BIPOLAR-1** e **BIPOLAR-2**, are usable.

- The currents for cutting are delivered through the first socket, the currents for coagulation or vessel sealing are delivered through the second socket.



- The sockets allow the use of accessories with connector “Valleylab type” or “2 x flying plugs Ø 4 mm”.
- To select them, see the GENERAL MENU, section “**bipolar output selection**”.



7 TOUCH-SCREEN

<p><b>GENERAL IMAGE</b></p> <p>In this case the unit allows the use of the monopolar and bipolar currents</p>	5.1		5.3
	5.2		5.4
	1, 2		
		<p>6                      3                      4</p>	

1	STANDBY key – It allows the selection of the STANDBY mode. See the paragraph: “STANDBY”	
2	MENU key – It allows the selection of the GENERAL MENU of functioning. See, in the next page, the paragraph “GENERAL MENU”.	
3	Keys and display to memorize and use the programs. See the paragraph “MEMORIZATION AND USE OF PROGRAMS”.	
4	Keys and lights of the control circuit of the neutral electrode. See the paragraph “CONTROL CIRCUIT OF THE NEUTRAL ELECTRODE”.	
Area to select and set currents and powers. See the paragraph “FIRST SETTING”		
5	5.1 – Monopolar cutting and coagulating cutting.	5.2 – Monopolar coagulation.
	5.3 – Bipolar cutting	5.4 – Bipolar coagulation and vessel sealing.
6	HF LEAK alarm light of the control circuit of HF leakage currents to earth. See the paragraph “CONTROL OF HF LEAKAGE CURRENTS TO EARTH”.	

8 GENERAL MENU

This menu allows the performing of the general, modes of functioning. To select it push the **menu** key on the touch-screen. To exit push the **EXIT** key.



	2.3	2.2	2.1	
	<p>NEUTRAL PLATE SOCKET SELECTION</p> <p>NP-1      NP-2</p>	<p>BEEP ON/OFF</p>	<p>SOUND</p>	
2.4	<p>ACTIVATION PEDAL 1 SELECTION</p> <p>MONO    BP    MONO BP</p>	<p>LCD COLOR</p>		2.7
2.5	<p>BIPOLAR OUTPUT SELECTION</p> <p>BIP 2      BIP 1+2</p>	<p>AUTO BIP START DELAY</p> <p>0      REC</p>		2.6



2.1		<p><b>SECTION: SOUND</b></p> <p>By rotating the control when the BEEP is ON, users can change the level of the sounds which signal both the delivery of currents and the use of keys. All acoustic alarm signals are fixed, not adjustable.</p>
2.2		<p><b>SECTION: BEEP ON/OFF.</b></p> <p>By pushing the key, users can set the acoustic signal of the keys on the panel.</p>
2.3		<p><b>SECTION: NEUTRAL PLATE SOCKET SELECTION</b></p> <p>By using the key, users can select the socket to connect the neutral electrode: Socket to connect a cable with European, standard (jack Ø 6,35 mm) connector. Socket to connect a cable with American, Valleylab type, connectors. See the paragraph “CONTROL CIRCUIT OF THE NEUTRAL ELECTRODE”.</p>
2.4		<p><b>SECTION: ACTIVATION PEDAL 1 SELECTION</b></p> <p>By pushing the key, users can manually set the functioning mode of the standard, main, twin foot-switch tk 90016-01.</p>
2.5		<p><b>SECTION: BIPOLAR OUTPUT SELECTION</b></p> <p>By pushing the key, users can select the sockets to connect the bipolar instruments: Only the BIPOLAR-2 socket / Both sockets: BIPOLAR-1 and BIPOLAR-2.</p>
2.6		<p><b>SECTION: AUTO BIP START DELAY</b></p> <p>By rotating the control, users can set the delay (from 0.1 to 5 seconds) of activation of the bipolar currents with automatic “impedance sensing” start/stop: AUTO SOFT MICRO BICOAG for coagulation / AUTO SEALING for vessel sealing.</p>
2.7		<p><b>SECTION: LCD color</b></p> <p>By pushing the key, users can set the colour (green/red) of the numbers on the touch screen.</p>

## 8.1 SELF-CHECK

### THE UNIT IS PROVIDED WITH A SELF-CHECK SYSTEM OF THE FUNCTIONING

- The system, at the switching ON, performs a complete self-check:
- The check ends only if the unit operates perfectly.
- This phase is signalled, on the touch-screen, by specific codes which switch OFF when the test ends.

### The system, during use, performs the following:

- It always checks both the functioning and the delivered powers.
- It repeats, every about 20 minutes the complete self-test without disturbing the normal use.
- It also checks the mistakes of use (For example the not correct use of an activation switch).

### In all cases, if the system detects an anomalous functioning, breakages and mistakes:

- It blocks the delivery of powers and it signals the problem by acoustic and visual signals (**ERROR CODES**).

### In case of the signals detailed in the TABLE I, users can do the following:

- Intervene to eliminate the cause.

### In case of other signals, users can do the following:

- Switch the unit OFF/ON to verify the alarm and, if it is confirmed, ask for the Technical assistance.

### MEMORIZATION OF THE DETECTED ERROR CODES.

- The unit stores the detected error codes to help the Technicians in finding a solution for the problems.
- The procedure to perform the related control is detailed in the Service Manual.



## BECAUSE OF THE PREVIOUS REASONS, DURING USE:

- Users must not both increase too much the power and think that the problem depends on the unit:
- If the unit doesn't deliver the power (The normal powers appear less efficacious), but it has properly passed the auto-check at the switching on and the systems do not signal problems,

## Users must check:

- The good contact between the neutral electrode and patient's tissues while using monopolar currents.
- The conditions of cables and connectors, by bending and pulling them (They mainly break close to the instrument).
- The assembly and the internal connections of all instruments, mainly if for endoscopy or laparoscopy.
- The insulation of the blades of all bipolar scissors. (The continuous sliding damages it and causes a short circuit which does not allow the current to reach tissues).

## Users must clean:

- The tips of all electrodes and instruments (If dirty, the current doesn't reach tissues).
- The joints of the bipolar instruments for laparoscopy (If dirty the current doesn't reach tissues).

CAUSE OR PROBLEM.	Acoustic Signal	Visual alarm or Error code on the touch screen
When using "SPLIT- Double section" neutral electrodes. <b>Cause:</b> The contact between the electrode and patient's tissues is not perfect.	Not	Light 1 ON. Symbols (EL or ES) ON with the same color of the light
When using "SPLIT- Double section" neutral electrodes . <b>Cause:</b> The contact between the electrode and patient's tissues is poor.	1 Tone	Lights 1and 2 ON. Symbols (EL or ES) ON with the same color of the 2 light
When using "SPLIT- Double section" neutral electrodes. <b>Cause:</b> The contact between the electrode and patient's tissues is very poor.	2 Tones	Lights 1, 2 and 3 ON. Symbols (EL or ES) ON with the same color of the 3 light.
When using "SPLIT- Double section" neutral electrodes. <b>Cause:</b> The electrode has a not sufficient and dangerous contact with patient's tissues. When using both "SPLIT- Double section" and "Non SPLIT- Single section" neutral electrodes. <b>Cause:</b> The electrode is disconnected from its cable, the cable is broken, the cable is disconnect from the unit.	Continuous, pulsed, tone	Lights 1, 2, 3 and 4 ON. Symbols (EL or ES) ON (red). + "Neutral plate alarm".
Not allowed activation of either a hand- switch or a foot-switch.	Yes	Not allowed handle or pedal activation.
Simultaneous, not allowed, activation of two hand-switches or foot-switches.	Yes	Simultaneous handle or pedal activation.
Delivery of currents longer than 40 seconds. Stop the delivery for an instant and then start it again.	Yes	Over Time Activation Error. It is for information only!

## 9 INITIAL CHECKS AND EQUIPOTENTIAL CONNECTION

- Verify that the mains power supply corresponds to the technical data (see the data label on the back).
- Connect the unit to the mains supply with the mains switch (**C, green - on the back**) off.
- To perform, if needed, the equipotential connection, use the specific plug (**E - on the back**).

## 10 DATA STORING AT THE SWITCHING ON

The unit always re-sets at the switching on, intentional or caused by a temporary loss of supply, the settings used at the switching off. It does not maintain the selection of the "AUTO SOFT MICRO BICOAG" and "AUTO SEALING" bipolar currents with automatic "impedance sensing" start/stop. (IEC Standards establish that a current with automatic start/stop system has to be intentionally selected by users at the switching **ON**). If the memory number is blinking at the switching **OFF**, it blinks again at the following switching **ON** and the unit resets the same setting.

About the blinking of the memory number see "BLINKING OF A MEMORY NUMBER".



## 11 CHECK OF THE HF LEAKAGE CURRENTS TO EARTH

All HF currents also generate leakage currents to earth which, according to the safety standards for the electrosurgical devices, have to be lower than 150 mA to reduce the risk of burns on patient's tissues.

The unit is provided with a specific circuit which checks these currents and, if they go over the allowed limit, intervenes as follows:

- It automatically reduces the output power (These currents depend on the power)
- It informs users by an alarm signal (**HF LEAK light ON**).

**HF LEAK**

## 12 CONTROL CIRCUIT OF THE NEUTRAL ELECTRODE

The monopolar use requires the positioning, on the patient's body, of a neutral electrode to use by carefully applying all the warnings of the paragraph "**BASIC WARNINGS**"

The unit is provided with a control circuit which allows the users the following:

- The use with electrodes for adults (Dimensions of ,at least, 136 cm<sup>2</sup>).
- The use with small electrodes for paediatrics (Dimensions of ,at least, 86 cm<sup>2</sup>) or new born.
- The use of all neutral electrodes: Single section "**Non Split**" and Double section "**Split**".
- The use with both reusable, normal, electrodes and with single use, adhesive, electrodes.

**The use of connecting cables with different connectors:**

- European standard jack Ø 6,35 mm.
- USA standard with 2 pins (I.E. Valleylab type).
- The keys, the symbols and the lights of the circuit are in the same area of the screen.

<p><b>SETTING key:</b></p> <p><b>It is used to select the operation mode:</b></p> <ul style="list-style-type: none"> <li>• Large (EL symbols ON) = With electrodes for adults.</li> <li>• Small (ES symbols ON) = With electrodes for paediatrics or new born.</li> </ul> <p><b>EL / ES Symbols:</b></p> <p>They are used to identify the operation mode and they change the color according to the operation of the control circuit.</p> <p style="text-align: center;"><b>1, 2, 3, 4 Alarm Lights.</b></p>	
--	--

**The circuit operates in different ways according to the electrode (Split, Non-Split).**

**The circuit does not intervene when selecting the memories for the bipolar use only.**

In this case the **1, 2, 3, 4** lights and the **EL, ES** symbols are **ON**, but for information only.

### 12.1 SETTING OF THE OPERATION MODE

The circuit has two operation modes: With electrodes for either adults or paediatrics / new born.

To set the operation mode push the **SETTING** key (The triangle shows the selected mode).

**LARGE – EL symbols ON (Use with standard electrodes for adults).**

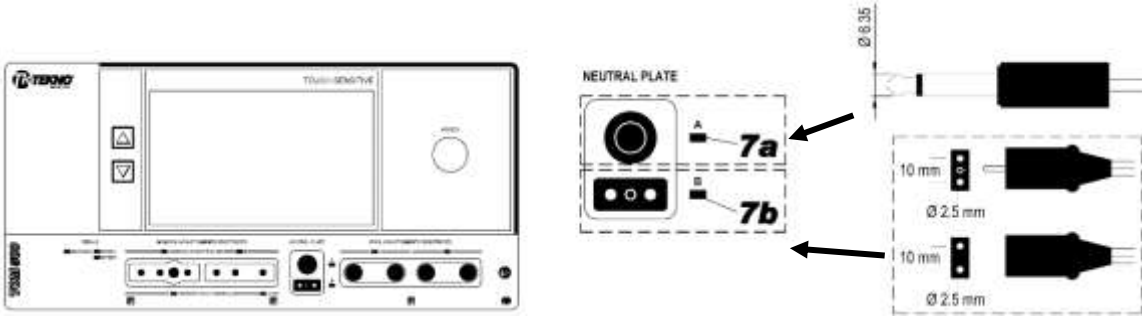
This mode allows the delivery of the maximum available power.

**SMALL – ES symbols ON (Use with small electrodes for paediatrics or new born)**

This mode allows the delivery of maximum 150W.



12.2 SETTING OF THE SOCKET TO CONNECT THE NEUTRAL ELECTRODE



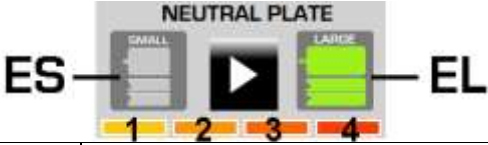
- By pushing the **MENU** key of the touch screen, select the **GENERAL MENU**.
- By pushing the key of the section “neutral plate socket selection”, select the socket: **NP-1** socket (**Light 7a ON**) to use the connector jack
- Ø 6,35 mm (European and ALSA standard) **NP-2** socket (**Light 7b ON**) to use the connector “2 pins” (USA, Valleylab, Conmed standard).
- Exit from the GENERAL MENU by pushing the EXIT key.

12.3 OPERATION OF THE CIRCUIT

(If switching on of the symbols (ES or EL) does not change it operation).

The circuit, when using the “NON-SPLIT , single section” electrodes, checks only the connection of the cable:

- If the cable is connected to both the electrode and the unit.
- If the cable is broken.



CABLE	ALARM SIGNALS		POWER DELIVERY	MAXIMUM POWER	
	Acoustic	Visual		Mode LARGE	Mode SMALL
Well connected.	No	No	Yes	Not limited	Max. 150W.
Not connected either to the unit or to the electrode. Broken.	Continuous Intermittent tone.	Lights 1, 2, 3, 4 ON. Symbols EL , ES ON (red). Error code “Alarm neutral plate”.	Blocked	Power delivery blocked	Power delivery blocked

The circuit, when using the “SPLIT” electrodes checks the following:  
Both the connection of the cable and the good contact between the electrode and the patient’s tissues.

CONTACT Electrode/Tissues	ALARM SIGNALS		POWER DELIVERY	MAXIMUM POWER	
	Acoustic	Visual		Mode LARGE	Mode SMALL
Good	No	No	Yes.	Not limited	Max. 150W.
Not totally good	No	Light 1 ON. (1) Symbols EL or ES ON with the same colour of the 1 light.	Yes.	Not limited	Max. 150W.
Poor	1 Tone.	Lights 1, 2 ON. Symbols EL or ES ON with the same colour of the 2 light.	Yes, but limited	Max. 150W	Max. 80W.
Insufficient	2 Tones.	Lights 1, 2, 3 ON. Symbols EL or ES ON with the same colour of the 3 light.	Yes, but limited.	Max. 150W	Max. 80W.
Totally Insufficient	Continuous Intermittent tone.	Lights 1, 2, 3, 4 ON. Symbols EL or ES ON with the same colour of the 3 light. (red). Error code “Alarm neutral plate”	Blocked.	Power delivery blocked	Power delivery blocked

**The switching ON of the 1 light is normal when using small electrodes for new born**



### 13 STANDBY

The unit is provided with the STANDBY mode. When selecting it the unit operates as follows:

- The unit is totally usable, but the power delivery is blocked.
- The control circuit of the neutral electrode does not emit alarm signals if users disconnect the neutral electrode.

**To select the standby**, push the **STANDBY** key of the touch-screen **(It blinks)**

**To exit from the standby**, push the **STANDBY** key of the touch-screen **(It switches OFF)**



### 14 USE OF THE FOOT-SWITCHES

The TOM500 is usable with two twin foot-switches:

The **tk 90016-01** model and the **tk 90017-00** model.

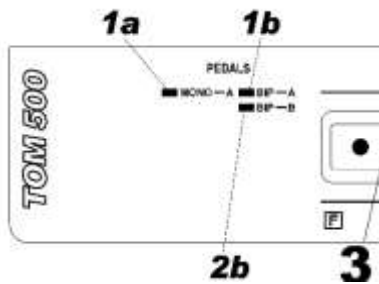
The standard **tk 90016-01** pedal is provided with a foot selector to allow the surgeon to selected either the activation of the monopolar currents or the activation of the bipolar currents.

**It has a connector with 5 pins.**



The **tk 90017-00** pedal (on request) allows the activation of the bipolar currents only.

**It has a connector with 7 pins**



The lights which signal the setting of the foot-switches are on the front panel



The sockets to connect the foot-switches are on the back of the unit.

Two pedals of the foot-switches can't be simultaneously pressed! The self-check system of the unit detects this mistake of use, it blocks the current delivery and it informs users by an acoustic and visual alarm

**(Error code "Simultaneous handle or pedal activation") .**

**The unit allows the choice of four modes to use the foot-switches:**

- **Use of the tk 90016-01** to activate either the monopolar currents or the bipolar currents.
- **Use of the tk 90017-00** to activate the bipolar currents only.

**Independent use of the previous foot-switches** to activate the monopolar and the bipolar currents.

**Use of the tk 90016-01** to activate both the monopolar currents for cutting and the bipolar currents for coagulation or vessel sealing.

**The foot-switches are not needed to activate the following bipolar currents:**

**AUTO SOFT MICRO BICOAG for coagulation and AUTO SEALING for vessel sealing.**

**Both currents are provided with automatic "impedance sensing" start/stop.**

The delivery starts, with a delay adjustable from 0,1 to 5 seconds in the section **"AUTO BIP START DELAY"** of the GENERAL MENU, when the tips of the instrument come in contact with damp or bleeding tissues.

**Use of the tk 90016-01 to activate either the monopolar or the bipolar currents.**

Connect the tk 90016-01 to the PEDAL-1 socket.



To deliver the **monopolar** currents push , for an instant, the foot selector:

- **The unit signals the selection in three ways: “MONO”** word by digital speech, **MONO 1** image **ON** for 2 seconds on the touch-screen. **(1a – MONO light )** of the **PEDAL-1** socket **ON**.
- To activate the delivery push the pedals: **Yellow** (cutting), **Blue** (coagulation).

To deliver the bipolar currents push , for an instant, the foot selector:

- **The unit signals the selection in three ways: “BIP”** word by digital speech, **BIP 1** image ON for 2 seconds on the touch-screen.
- **(1b – BIP light )** of the **PEDAL-1** socket ON.
- To activate the delivery push the pedals: **Yellow** (Cutting), **Blue** (Coagulation or Vessel sealing).

**The tk 90016-01 is also usable without using the foot selector even if this mode is less easy.**

- Push the **MENU** key to select the GENERAL MENU.
- By pushing the key of the “activation pedal 1 selection” select the image 1 MONO to deliver monopolar currents.
- By pushing the key of the “activation pedal 1 selection” select the image 1 BIP to deliver bipolar currents.

Independent use of both foot-switches (tk 90016-01 and tk 90017-00) to activate all the monopolar and the bipolar currents. The unit, when connecting both foot-switches, sets this mode automatically.

Connect the **tk 90016-01 to the PEDAL-1** socket and the **tk 90017-00 to the PEDAL-2** socket.

The 1a light of the **PEDAL-1** socket switches **ON**, the 2a light of the **PEDAL-2** socket switches **ON**

Use of the **tk 90016-01** to activate the **monopolar** currents for cutting and the **bipolar** currents for coagulation or vessel sealing.

This mode can be useful if surgeons prefer the use of one foot-switch only, but they are accustomed to use, mainly for laparoscopic surgery, the monopolar currents for cutting and the bipolar currents for coagulation or vessel sealing.

This mode does not allow the use of the foot selector of the foot-switch.

This mode does not allow the use of the tk 90017-00 foot-switch.



Connect the **tk 90016-01** to the **PEDAL-1** socket. Push the **MENU** key to select the GENERAL MENU. By pushing the key of the “activation pedal 1 selection” select the image **MONO CUT / BIP COAG**. The 1a light of the **PEDAL-1** socket switches **ON**, the 2a light of the **PEDAL-2** socket switches **ON**.

To activated the delivery, push the pedals:

- **Yellow (Monopolar Cutting).**
- **Blue (Bipolar Coagulation or Vessel sealing).**

## 15 MEMORIZATION AND USE OF THE PROGRAMS

The unit is provided with 100 memories which allow the memorization of 99 programs including all the settings for a specific surgical use. The programs can be also identified by a text (Name of users or kind of use). The unit allows the fast selection of a program before use. The unit includes 15 memories for the bipolar use only, without the neutral electrode.

The unit includes some programs with a specific presetting to facilitate their use.

All settings of a program can be changed whenever users like

**The memories (from 1-to-64) are for open or laparoscopic surgery by delivering:**

All normal, monopolar and bipolar, currents.

**The memories (from 65-to-74) are for the flexible endoscopy by delivering:**

All normal, monopolar and bipolar, currents.

**The memories (from 75 to 84) are for the, under liquid, monopolar endoscopy in UROLOGY, GYNAECOLOGY AND ARTHROSCOPY.**

**The memories (from 85 to 99) are for the bipolar use only.**

The memories from **85 to 88** are for the endoscopy in saline (UROLOGY and GYNAECOLOGY).

The memories from **89 to 92** are for the arthroscopy.



The memories from **93 to 99** are for open or laparoscopic surgery.



## All the controls to use memories are in the same area of the touch-screen

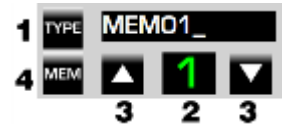
- To select a memory, see part: **“SELECTION OF A MEMORY”**.
- To perform the first setting and the memorization of a program, see the part: **“FIRST SETTING”**
- To change the setting memorized in a program, see the part: **“ADJUSTMENTS DURING THE USE”**.
- To either cancel or memorize the changes of settings, see the part: **“CANCELLATION OR MEMORIZATION OF THE CHANGES OF THE SETTING”**.

## 16 SELECTION OF A MEMORY

Select the memory, either to program or to select for the use, as follows:

### 1 – By scrolling all memory numbers.

- Push any of two keys **3**.



### 2 – By selecting the memory number.

- Push the 2 area (The screen 1 appears).
- In the screen write the memory number.
- Push the EXIT/BACK TO MAIN PAGE key



**Users can select a new memory only if the memory number is not blinking !**

See the following paragraph.

## 17 BLINKING OF A MEMORY NUMBER

The memory number blinks when users either perform the first setting of a memory or, during use, they change the already memorized settings. The blinking does not signal problems and the unit goes on operating normally. If the number is blinking at the switching **OFF**, it blinks again at the following switching **ON** and the unit resets the, previously used, settings.

The unit doesn't reset the selection of two bipolar currents: **AUTO SOFT MICRO BICOAG, AUTO SEALING”**.

These currents are provided with automatic start/stop and IEC 60601-2-2 standards for the safety of HF surgical units establish that users must select currents with automatic start/stop only intentionally.

The memory number stops blinking:

- When users, during the first setting of a memory, memorize the settings.
- When users, during use, either cancel or memorize the changes of setting.

## 18 CANCELLATION OR MEMORIZATION OF THE CHANGES OF SETTING

Whenever users like, they can both change settings and cancel or memorize the changes. To memorize a new setting or to memorize the change of a setting, do the following:

- Push the 4 – MEM key (It is the quickest way when setting a new memory) or
- Push either the 2 area or any of two 3 keys

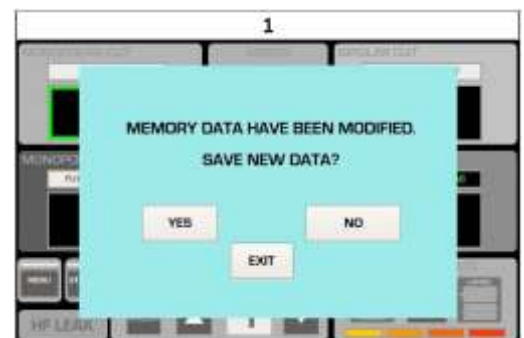
Push the **YES** key. The screen disappears and the number stops blinking.

To cancel a change, do the following:

- Push either the 2 area or any of two 3 keys
- The 1 screen appears.
- Push the **NO** key
- The 1 screen disappears and the number stops blinking.

To cancel the 1 screen in case of mistakes of use:

- Push the **EXIT** key.





## 19 FIRST SETTING

### Starting:

- Switch the unit ON and, when the self-check ends, push the STANDBY key.
- Selection of a memory.
- Users can select the memory both by scrolling all memories and by setting a specific one.
- To do it, see the paragraph “**SELECTION OF A MEMORY**” on the previous page.

### Setting of the general modes of use:

- By pushing the **MENU** key of the touch screen select the related screen and set, as it is detailed in the paragraph “GENERAL MENU” the following:
  - The socket for the cable of the neutral electrode (With european plug or “Valleylab” connector).
  - The mode to use the main foot-switch (It is not needed when using tk 90016-01)
  - The sockets (1 or 2) to connect and use the bipolar accessories.

### The level of the acoustic signals of activation.

The colour (red or green) of the numbers /symbols of the touch screen.

The starting delay of the **AUTO SOFT MICRO BICOAG, AUTO SEALING** bipolar currents.



At the end of this setting, to go back to the main screen, push the **EXIT** key

Setting of both the monopolar currents and the bipolar currents:

- To set the currents push the area of the section.
- Monopolar cut.
- Monopolar coag
- Bipolar cut.
- Bipolar coag.
- When pushing them, the following screens appear



To set the currents of each section, have to do the following:

- **1**: Area of visualization of powers
- **2**: Area of visualization of currents
- **3**: **EXIT** key
- **CS**: Keys to select currents by up/down scrolling
- **PS**: Keys, on the panel, to set powers by up/down scrolling



Users can set a current only:

- By the **CS** keys, select the current.
- By the **PS** keys on the panel set the power.
- Push the **EXIT** key.

Users can set more currents:

- Set, as above detailed, the first current.
- Do **not** push the **EXIT** key and repeat the same way for further currents.
- By the **CS** keys, select the first current to use when starting the operation.
- Push the **EXIT** key.

**Remember that, when scrolling the currents, their powers change on the 1 area.**

Two different systems self-controls, according to the features of tissues, the currents:

**ADC System – Self-adjustment with constant power.**

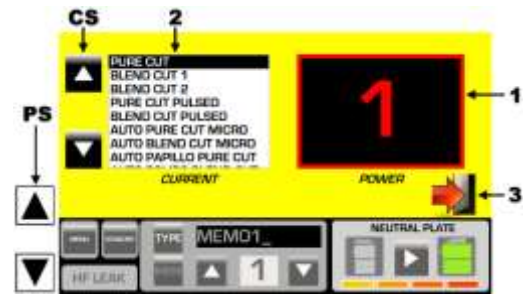
**APC System – Self-adjustment with constant voltage.**



## Currents with ADC System

In this case the power is shown as follows:

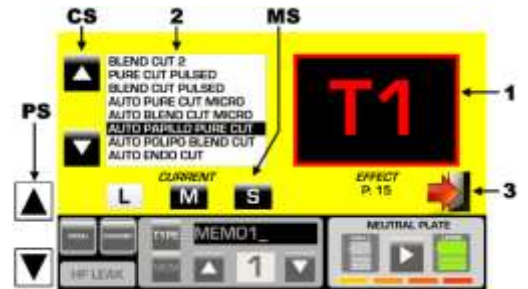
- Watts in relation to the rated load.



## Currents with APC System

In this case the power is shown as follows:

- Effects (10 for each current) and **PWR**.
- **PWR** = Max power deliverable for each effect.



## When selecting the current Auto papillo pure cut:

- Auto polipo blend cut and Auto Endo cut for the cutting in the flexible endoscopy,
- the screen also shows the MS keys (They switch ON/OFF when users push them) which allow the following delivery:

Current	Keys	Delivery
<b>Auto papillo pure cut. Auto polipo blend cut.</b>	All keys are OFF: The first key is ON: The second key is ON: The third key is ON:	Continuous delivery. Pulsed delivery (fast modulation). Pulsed delivery (medium modulation). Pulsed delivery (slow modulation).
<b>Auto Endo cut.</b>	All keys are OFF: The first key is ON: The second key is ON: The third key is ON:	The delivery is 90% cutting, 10% coagulation. The delivery is 80% cutting, 20% coagulation. The delivery is 70% cutting, 30% coagulation. The delivery is 50% cutting, 50% coagulation.

Blinking of the memory number:

Remember that, when users start setting a memory, the memory number blinks.

See the paragraph "BLINKING OF A MEMORY NUMBER"

### 19.1 Identification of a memory by a text.

Before memorizing the setting of a program, do the following:

- Push exit key (1). The screen 1 appears.



Write the text (max 10 characters).  
When going over 10 types, the screen changes.

In the screen (2):

- Push the back key to go back to the previous screen.



In the screen (1).

Delete excessive types by using the key.

Write again the text (max. 10 types)





## Memorization of the setting:

- When arranging one program only.
- By pushing the 4 – MEM key, memorize the setting of the memory.
- The memory number stops blinking.
- Push the EXIT key.



## When arranging more programs:

- By pushing the 4 – MEM key, memorize the setting of the first memory.
- The memory number stops blinking.
- Select a new memory as it is detailed in the paragraph “SELECTION OF A MEMORY”.
- Perform its setting, by repeating the same way.
- By pushing the 4 – MEM key, memorize the setting of the new memory.

**The unit allows the memorization of 99 memories!**

## Return to the normal use:

- Connect the neutral electrode when selecting the memories from 1 to 84 which allow the monopolar use!
- Select the memory to use as it is detailed in the paragraph “SELECTION OF A MEMORY”.
- Push the STANDBY key (It switches OFF) to use the unit. allows the memorization of 99 memories!



## 20 ADJUSTMENTS DURING THE USE

### The setting of a program can be changed, during the use, in two ways:

- While not activating the power delivery, all the setting of a program can be changed.
- While activating the delivery, the power of the current can be changed.

### Blinking of the memory number.

When users change a memory, its number blinks, but the blinking does not signal problems and the unit goes on operating normally. The memory number stops blinking when users either cancel or memorize the changes of setting. See the paragraph “BLINKING OF A MEMORY NUMBER”

### Change of the setting of a program while not activating the power delivery.

To change the general modes of functioning do the following:

- By the MENU key of the touch-screen, select the GENERAL MENU and perform the setting as it is detailed in the paragraph “GENERAL MENU”.
- To change the setting of the monopolar or bipolar currents for the normal use do the following:
- Follow the instructions detailed in the paragraph “FIRST SETTING”, point “4) Setting, in all memories, of the monopolar and bipolar currents for the normal use”.

### Change of the power of delivered current while activating the power delivery.

When users activate a current, on the touch-screen the image of the current appears.

Two examples are here under included:

- **MONOPOLAR PURE CUT** with **ADC** self –control (Indication of the power = Watts).
- **MICRO PURE CUT** with **APC** self –control (Indication of the power = Effects).

### Change of the Monopolar Pure Cut current.

- Push the **PS** keys on the panel.
- **On the area (1) the watts change.**



### Change the Auto Pure Micro current.

- Push the PS keys on the panel.
- On the area (1), the following changes:
- The effects (from 1 to 10).
- The PWR (max. power deliverable with the effect).
- Change these currents with care!
- When changing the effect, the power changes notably!





## 21 SECTION 1 (MEMORIES FROM 1 TO 64)

Use, in open or laparoscopic surgery, of the monopolar and bipolar currents

**These memories allow the use of the monopolar and bipolar currents for the normal surgical use.**

### 21.1 WARNINGS AND PRECAUTIONS FOR THE OPERATION



**Always remember that all operations must be performed by carefully following all the warnings detailed in the paragraph BASIC WARNINGS !**

### 21.2 SETTING OF THE CURRENTS

To set, memorize and change the currents, follow the instructions of the paragraph **“FIRST SETTING”**.

To choose the best currents and the starting powers for the specific need. See, in this section, the paragraph **”INDICATIONS FOR THE SUITABLE CURRENTS”**.

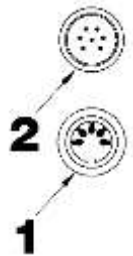
### 21.3 CONNECTION OF THE FOOT-SWITCHES

The unit can be used by 1 or 2 twin foot-switches, provided with different connectors to avoid mistakes:

The standard **tk 90016-01** model with a foot selector to activate either the monopolar currents or the bipolar currents. (To avoid mistakes of use, the selector can be blocked).

The **tk 90017-00** model, available on request, which activates the bipolar currents only.

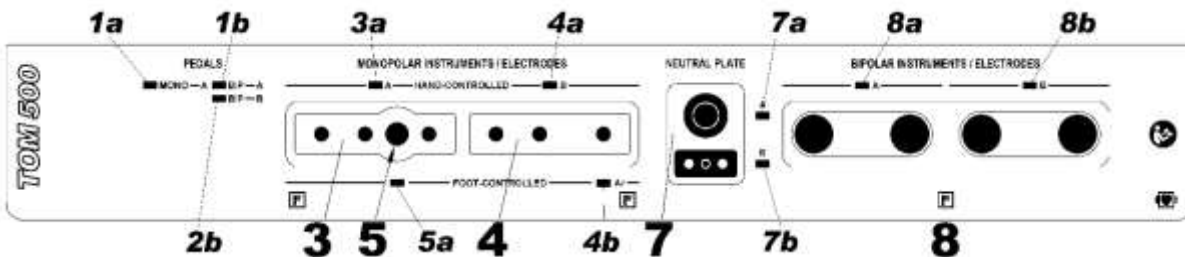
When connecting both, the **tk 90016-01** activates the monopolar currents and the **tk 90017-00** activates the bipolar currents.



**See, in the paragraph “ USE OF THE FOOT-SWITCHES”, the complete use of the foot-switches.**

To connect the **tk 90016-01**, use the **1** socket, to connect the **tk 90017-00** use the **2** socket.

### 21.4 CONNECTION OF THE ACCESSORIES



#### NEUTRAL ELECTRODE.

To use the neutral electrode follow all the related warnings of the part **“BASIC WARNINGS”**.

For the operation of its control circuit see the part **“CONTROL CIRCUIT OF THE NEUTRAL ELECTRODE”**.

The electrode, during pauses in use, can be disconnected. See the part **”STANDBY”**.

Connect the electrode to the **7** socket (either **7a** or **7b** according to the connector of the cable).



## MONOPOLAR INSTRUMENTS

The following accessories are usable:

- One hand-switched or one foot-switched handle / instrument.
- One hand-switched handle /instrument and one foot-switched handle /instrument.
- Two hand-switched handles.
- Connect to the 4 socket (Usable when the 4a light is ON) the hand-switched handle /instrument. (The plug of the cable is the "3 pins" type).
- Connect to the 5 socket (Usable when the 5a light is ON) the foot-switched handle /instrument. (The plug of the cable is the "Ø 6mm" type).

CONNECT ACCESSORIES WITH CABLES HAVING A DIFFERENT CONNECTOR:

The tk 90302-21 adaptor (it allows the use of all plugs). See the part: Adaptors for connection and use of the tk 90302-21 adaptor.

To connect two hand-switched handles, use the 3 and 4 sockets (Usable when the 3a and 3b lights are ON)

(The plug of the cable is the "3 pins" type).

## BIPOLAR INSTRUMENTS

The unit allows the connection and the use of one or two instruments by performing the setting of the related sockets according to the instructions detailed in the paragraph "GENERAL MENU", Point 2.5.

<b>By using one instrument:</b>	All currents are delivered through it.
<b>By using two instruments:</b>	The currents for cutting are delivered through by first instrument. The currents for coagulation/vessel sealing are delivered by the second instrument.

Connect to the 8b socket (Usable when the 8b light is ON) one instrument.

Connect to the 8a and 8b sockets (Usable when both lights, 8a and 8b, are ON) two instruments.

(The connector is "2 x Ø 4mm plugs" type and it doesn't require a specific polarity of connection).

CONNECT ACCESSORIES WITH CABLES HAVING A DIFFERENT CONNECTOR:

Specific adaptors (They allow the use of all connectors). Specific cables (Model and connector of the instrument must be specified). See the part: Adaptors for connection and use of the tk 90302-21 adaptor.

## 21.5 INDICATIONS FOR THE SUITABLE CURRENTS

### CURRENTS FOR MONOPOLAR CUTTING OR COAGULATING CUTTING.

**PURE CUT** - Cutting without coagulating effect. It is suitable for the following:

- To cut, without coagulating effect, all tissues in all operating fields when using (starting from 40/50) either needle or knife electrodes for Open surgery or the hook / the side of a dissector for Laparoscopy.
- To reduce the smoke in Laparoscopy, the intermittent activation, while grazing the tissues with the electrode, is advisable.

**BLEND CUT-1** - Cutting with soft coagulating effect. It is suitable for the following:

- To cut, with soft coagulating effect, all tissues in all operating fields when using (starting from 40/50) either needle or knife electrodes for Open surgery or the hook / the side of a dissector for Laparoscopy.
- To reduce the smoke in Laparoscopy, the intermittent activation, while grazing the tissues with the electrode, is advisable.

**BLEND CUT 2** - Current for cutting with very strong coagulating effect. It is suitable for the following:

- To dissect, with very strong "SPRAY" coagulating effect, all tissues in all operating fields when using (starting from 50/60) either needle or knife electrodes for Open surgery or the hook / the side of a dissector for Laparoscopy.
- To reduce the smoke in Laparoscopy, the intermittent activation, while grazing the tissues with the electrode, is advisable.

**PURE CUT PULSED** - Current for pulsed cutting without coagulating effect. It is suitable for the following:

- For the same use of the *PURE CUT* current (starting from 40/50) while grazing the tissues with the electrode.
- It is very useful for the Laparoscopy, to reduce the smoke.

**BLEND CUT PULSED** - Current for pulsed cutting with coagulating effect. It is suitable for the following:

- For the same uses of the *PURE CUT PULSED* current (starting from 40/50).



**AUTO PURE MICRO** - Current for delicate cutting without coagulating effect. It is suitable for the following:

- For the same uses of the PURE CUT current (starting from the 6 effect). when users prefer a more delicate effect.

**AUTO BLEND CUT MICRO** - Current for delicate cutting with coagulating effect. It is suitable for the following:

- For the same uses of the BLEND CUT 1 current (starting from the 6 effect). when users prefer a more delicate effect.

**AUTO PAPPILLO PURE CUT, AUTO POLIPO BLEND CUT and AUTO ENDO CUT** currents are not suitable for this use

## CURRENTS FOR MONOPOLAR COAGULATION.

**FULG FORCED COAG** - Coagulation with strong sparking. It is suitable for the following:

- To coagulate (starting from 40/50), with strong superficial and deep effect, all tissues in all operating fields, both by grazing the tissues with the active electrode and by touching them with surgical forceps / instruments.
- To also dissect (starting from 60/70), with strong coagulating effect, all tissues in all fields, while grazing them with the active electrode.

**SPRAY COAG** - No-contact coagulation with very strong sparking. It is suitable for the following:

- To coagulate (starting from 40/50), with very strong superficial effect, all tissues in all operating fields, both by grazing the tissues with the active electrode and by touching them with surgical forceps / instruments.
- To also dissect (starting from 60/70), with strong coagulating effect, all tissues in all fields, while grazing them with the active electrode.

**PIN POINT CONTACT COAG** - Coagulation with medium sparking. It is suitable for the following:

- For the same use of the *FULG FORCED COAG* current (identical starting setting), but it has a slightly lower superficial effect.

**SOFT MICRO COAG** - Coagulation with low sparking. It is suitable for the following:

- To perform delicate coagulations (starting from 40/50) when using surgical forceps
- To perform micro coagulations (starting from 10/20) when using thin active electrodes or micro needles.
- It is not suitable to coagulate tissues with heavy bleeding and to cut the tissues with coagulating effect.

## CURRENTS FOR BIPOLAR CUTTING

**STANDARD BICUT** - Current for cutting of dried or wet tissues. It is suitable for the following:

- To dissect (starting from 50/60) the tissues in Open surgery, by performing fast nips of the tissue with forceps with thin tips.
- To dissect (starting from 80/90) the tissues in Laparoscopic surgery, by using bipolar hook or bipolar rigid needles.

**BLEND BICUT** - Current for strongly coagulating cutting (5% cutting, 95% coagulation)

- It can be also considered a current for coagulation only and it is very useful if users have to use a bipolar instrument for coagulation and a bipolar instrument for vessel sealing. It is suitable for the following:
- To use the traditional forceps for Open surgery (starting from 1/5 if the tips are 0, 5/1 mm, from 10/20 if the tips are 1,5 or 2mm).
- To use (starting from 30/40 according to the dimensions of the tips) forceps for laparoscopy.
- To use (starting from 30/40) all scissors, for open or laparoscopic surgery.
- To use (starting from 30/40) rigid needle electrodes (i.e. for turbinals or tonsillectomy)

**SALINE URO-GYN CUT and SALINE ARTHRO CUT** currents are not suitable for this use.

## CURRENTS FOR BIPOLAR COAGULATION AND SEALING OF BIG VESSELS

**SOFT MICRO BICOAG** - Coagulation delicate and precise.

It is the best current for all the uses in Open / Laparoscopic surgery) and it is usable as follows:

- To use the traditional forceps for Open surgery (starting from 1/5 if the tips are 0, 5/1 mm, from 10/20 if the tips are 1,5 or 2mm).
- To use (starting from 30/40 according to the dimensions of the tips) forceps for laparoscopy.
- To use (starting from 30/40) all scissors, for open or laparoscopic surgery.
- To use (starting from 30/40) rigid needle electrodes (i.e. for turbinals or tonsillectomy)



## **FORCED MICRO BICOAG** – Fast and strong coagulation.

It is similar to the *MICRO* coagulation and it can be used in the same way, but it produces an effect more similar to that of the monopolar coagulation. Because of this reason it is not suitable to perform delicate coagulations by using the traditional forceps for Open surgery.

**AUTO SOFT MICRO BICOAG** - Current identical to the SOFT MICRO BICOAG, with automatic “impedance sensing” start/stop:

- The delivery starts, with a delay adjustable from 0,1 to 5 seconds in the GENERAL MENU (Section 2.6), when the ends of the instruments come in contact with damp or bleeding tissues.
- The delivery stops either when the surgeon opens the ends of the instrument or when tissues are coagulated.

The current is suitable for the following:

- The current is suitable, in open surgery, for the same uses of the SOFT MICRO BICOAG current.
- The current is not suitable for the laparoscopic surgery since the automatic start/stop is not safe in this case.

**SEALING** - Current, to coagulate/seal vessels with diameter up to 8 mm, with activation by foot-switch and automatic “impedance sensing” stop.

It is suitable, in open or laparoscopic surgery, to use clamps with jaws from 3 to 10 mm. The current is delivered by pushing the pedal until it stops, when tissues are coagulated/sealed, automatically.

The current is suitable for the following:

- To use clamps with strong mechanical pressure (starting from the 5/7 effect if the clamps have jaws of 5/6 mm.).
- To use clamps with strong mechanical pressure (starting from the 9 effect if the clamps have jaws of 10 mm).

**AUTO SEALING** - Current identical to the SEALING, with automatic “impedance sensing” start/stop.

The delivery starts, with a delay adjustable from 0,1 to 5 seconds in the GENERAL MENU (Section 2.6), when the ends of the instruments come in contact with damp or bleeding tissues. The delivery stops either when the surgeon opens the ends of the instrument or when tissues are coagulated.

The current is suitable for the following:

- The current is suitable, in open surgery, for the same uses of the SEALING current.
- The current is not suitable for the laparoscopic surgery since the automatic start/stop is not safe in this case.

## **DELIVERY OF THE MONOPOLAR CURRENTS**

### **CURRENTS FOR CUTTING, COAGULATING CUTTING OR COAGULATION.**

**CUTTING / COAGULATING CUTTING:** By using hand-switched handles / instruments push the yellow button.

**CUTTING / COAGULATING CUTTING:** By using foot-switched handles / instruments push the yellow pedal.

The delivery is signalled by an acoustic signal (low, adjustable in the GENERAL MENU) and by the big image on the touch screen.

**COAGULATION:** By using hand-switched handles / instruments push the blue button.

**COAGULATION:** By using foot-switched handles / instruments push the blue pedal.

The delivery is signalled by an acoustic signal (acute, adjustable in the GENERAL MENU) and by the big image on the touch screen



**BE CAREFUL !** The simultaneous use of two handles is possible only when delivering the **FULG FORCED COAG** or the **SPRAY COAG** . The **FULG FORCED COAG** is very suitable to perform the coagulation cutting.

## **DELIVERY OF THE BIPOLAR CURRENTS**

The currents are usable by one or two instruments. See the part “ **CONNECTION OF ACCESSORIES**”.



**BE CAREFUL!** To use the bipolar scissors:

Use only either the **BLEND BICUT** or the **MICRO** current and cut tissues mechanically.

**To reduce the, well known, phenomenon of the sticking of the tissue on the tips of instruments:**

- See the part: “STICKING OF THE TISSUE ON THE TIPS OF THE BIPOLAR INSTRUMENTS FOR COAGULATION”

**To check the functioning of the bipolar instruments when starting the operation:**

- See the part: “CHECK OF THE BIPOLAR INSTRUMENTS BEFORE USE”.



## CURRENTS FOR CUTTING OR COAGULATION WITH FOOT-SWITCHED ACTIVATION

**CUTTING:** Push the yellow pedal. The delivery is signalled by an acoustic signal (low, adjustable in the GENERAL MENU) and by the big image on the touch screen.

**COAGULATION:** Push the blue pedal. The delivery is signalled by an acoustic signal (acute, adjustable in the GENERAL MENU) and by the big image on the touch screen.

## CURRENT FOR VESSEL SEALING “SEALING”.

Clamp tissues between the jaws of the instrument and push the blue pedal of the foot-switch until the delivery stops automatically either when tissues are sealed or if the surgeon opens the jaws. The delivery is signalled by an acoustic signal (acute, adjustable in the GENERAL MENU) and by the big image on the touch screen. The sound ends with a different tone when the delivery stops.

## CURRENT FOR COAGULATION “AUTO SOFT MICRO BICOAG”.

Clamp tissues between the tips of the instrument. The delivery starts/stops as under detailed. The delivery starts, with a delay adjustable from 0,1 to 5 seconds in the GENERAL MENU (Section 2.6), when the ends of the instruments come in contact with damp or bleeding tissues. The delivery stops either when the surgeon opens the ends of the instrument or when tissues are coagulated. The delivery is signalled by an acoustic signal (acute, adjustable in the GENERAL MENU) and by the big image on the touch screen.

## CURRENT FOR VESSEL SEALING “AUTO SEALING”.

Clamp tissues between the jaws of the instrument. The delivery starts and stops as above detailed for the AUTO SOFT MICRO BICOAG current. The delivery is signalled by an acoustic signal (acute, adjustable in the GENERAL MENU) and by the big image on the touch screen. The sound ends with a different tone when the delivery stops.

## ALARM SIGNALS DURING USE

During the use, in case of breakages, problems or mistakes of use, the self-check system stops the power delivery and it informs users by acoustic and visual signals.

In case of immediately solvable problems, users can intervene to eliminate causes.

For other signals users can switch the unit OFF/ON to verify them and ask for technical assistance.

**The complete functioning of the self-check system is detailed in the par. SELF-CHECK SYSTEM.**

Alarms or error codes (EC)	THE MOST COMMON SIGNALS
All lights and symbols of the control circuit of the neutral electrode are ON. EC “Alarm neutral plate” + Acoustic alarm	Intervention of the control circuit of the neutral electrode See the paragraph “CONTROL CIRCUIT OF THE NEUTRAL ELECTRODE”.
<b>HF LEAK</b> light ON	Intervention of the control circuit of the High Frequency leakage currents to earth. See the paragraph: CONTROL OF HF LEAKAGE CURRENTS TO EARTH..
EC “Simultaneous handle or pedal activation”. + Acoustic signal	2 activation switches are simultaneously pressed. An activation switch is used against the use mode selected on the control panel.
EC “Over Time Activation Error” + Acoustic signal	It is an information only (Continuous delivery of currents for 40/50 seconds). Stop the activation for an instant and then restart.

## 22 SECTION 2 (MEMORIES FROM 65 TO 74)

### Use, in flexible endoscopy, of the monopolar and bipolar currents.

These memories allow the use of the following currents for the flexible endoscopy:

- The monopolar currents for cut and coagulation.
- The current **MICRO SOFT BICOAG** for the bipolar coagulation (It is the only current suitable).

### 22.1 WARNINGS AND PRECAUTIONS FOR THE OPERATION



**Always remember** that all operations must be performed by carefully following all the warnings detailed in the paragraph “**BASIC WARNINGS**”.

### 22.2 SETTING OF THE CURRENTS

To set, memorize and change the currents, follow the instructions of the paragraph “**FIRST SETTING**”.

To choose the best currents and the starting powers for the specific need, see, in this section, the paragraph “**INDICATIONS FOR THE SUITABLE CURRENTS**”.

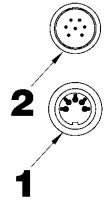


### 22.3 CONNECTION OF THE FOOT-SWITCHES

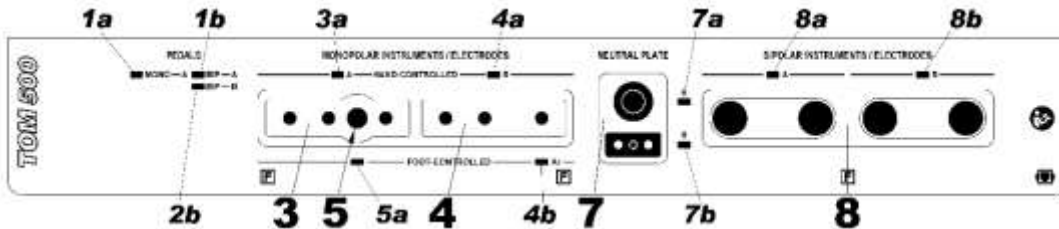
The unit, theoretically usable with two foot-switches, for the endoscopy is usable by the standard **tk 90016-01** model provided with a foot selector to activate either the monopolar currents or the bipolar currents.

**See, in the paragraph “USE OF THE FOOT-SWITCHES”,** the complete use of the foot-switches.

To connect the **tk 90016-01**, use the **1** socket (on the back).



### 22.4 CONNECTION OF THE ACCESSORIES



#### NEUTRAL ELECTRODE

To use the neutral electrode, follow all the related warnings of the part. “BASIC WARNINGS”. For the operation of its control circuit see the part: “CONTROL CIRCUIT OF THE NEUTRAL ELECTRODE”. The electrode, during pauses in use, can be disconnected. See the part: ”STANDBY”.

**Connect the electrode to the 7 sockets** (either **7a** or **7b** according to the connector of the cable).

#### MONOPOLAR FLEXIBLE ELECTRODE

**Connect to the 5 socket** (Usable when the **5a** light is ON) the foot-switched flexible electrode. (The plug of the cable is the “Ø 6mm” type).

To connect the flexible electrode are available specific cables:

- The cable, 3 mt. long, to use electrodes with male connection Ø 3 mm.
- The cable, 5 mt. long, to use electrodes with male connection Ø 3 mm.
- The cable, 3 mt. long, to use electrodes with female connection Ø 4 mm.
- The cable, 3 mt. long, to use electrodes with female connection Ø 4 mm.
- To connect an electrode already provided with a cable with plug different from the standard one, use the tk 90302-21 adaptor.
- See the par: Adaptors for connection and use of the tk 90302-21.

#### ACCESSORIES WITH CABLES DIFFERENT FROM THE STANDARD ONE, USE:

- Specific cables (Model and connector of the instrument must be specified). Specific adaptors (They allow the use of all connectors).
- See the part: Adaptors for connection and use of the tk 90302-21 adaptor.

#### BIPOLAR FLEXIBLE ELECTRODE

The unit allows the connection and the use of one or two instruments by performing the setting of the related sockets according to the instructions detailed in the paragraph “GENERAL MENU”, Point 2.5.

In flexible endoscopy, users can use an electrode only:

- Connect to the 8b socket (Usable when the 8b light is ON) the instrument.
- (The connector is “2 x Ø 4mm plugs” type and it doesn’t require a specific polarity of connection).

#### ACCESSORIES WITH CABLES DIFFERENT FROM THE STANDARD ONE, USE:

- Specific cables (Model and connector of the instrument must be specified). Specific adaptors (They allow the use of all connectors).
- See the part: Adaptors for connection and use of the tk 90302-21 adaptor.



## 22.5 INDICATIONS FOR THE SUITABLE CURRENTS

### 22.5.1 CURRENTS FOR MONOPOLAR CUTTING OR COAGULATING CUTTING

**PURE CUT.** It is suitable to cut (starting from 20/30) without coagulating effect. It is suitable for papillotomy, sphinterotomy, cut of mucosa and so on).

**BLEND CUT 1** or **BLEND CUT PULSED.** They are suitable to cut (starting from 20/30) with coagulating effect. They are suitable for polipectomies and so on.

**To perform the cutting and the coagulating cutting are especially suitable the following currents:**

**AUTO PAPILO PURE CUT:** It is suitable for papillotomy, sphinterotomy, cut of mucosa and so on). Starting setting: Effect 2.

**AUTO POLIPO BLEND CUT:** It is suitable for polipectomies and so on. Starting setting: Effect 2.

**AUTO ENDO CUT:** It is suitable for all procedures. Starting setting: Effect 2.

When selecting these currents, the screen also shows the MS keys which switch ON/OFF by pushing them and allow the users to select the preferred delivery as under detailed

Current	Keys	Delivery
<b>Auto papillo pure cut.</b> <b>Auto polipo blend cut.</b>	All keys are OFF: The first key is ON: The second key is ON: The third key is ON:	Continuos delivery. Pulsed delivery (fast modulation). Pulsed delivery (medium modulation). Pulsed delivery (slow modulation).
<b>Auto endo cut.</b>	All keys are OFF: The first key is ON: The second key is ON: The third key is ON:	The delivery is 90% cutting, 10% coagulation. The delivery is 80% cutting, 20% coagulation. The delivery is 70% cutting, 30% coagulation. The delivery is 50% cutting, 50% coagulation.

### 22.5.2 CURRENTS FOR MONOPOLAR COAGULATION.

**FULG FORCED COAG** or **PIN POINT CONTACT COAG** currents. They are suitable for the following:

- To coagulate (starting from 20/30) by grazing or touching tissues.
- To perform, with strong coagulating effect, a polypectomy (starting from 20/30) if users like this current to perform this procedure.

CURRENTS **SPRAY COAG**” and **SOFT MICRO COAG**. They are not suitable for this use.

CURRENTS FOR BIPOLAR CUTTING (They are not used for the flexible endoscopy).

CURRENTS FOR BIPOLAR COAGULATION.

**SOFT MICRO BICOAG:** It is the only usable current and it is suitable for the following:

To coagulate (starting setting 20/30) tissues during these procedures.

### 22.5.3 DELIVERY OF THE MONOPOLAR CURRENTS

**CUTTING / COAGULATING CUTTING** Push the yellow pedal. The delivery is signalled by an acoustic signal (low, adjustable in the GENERAL MENU) and by the big image on the touch screen.

**COAGULATION** Push the blue pedal. The delivery is signalled by an acoustic signal (acute, adjustable in the GENERAL MENU) and by the big image on the touch screen

### 22.5.4 DELIVERY OF THE“SOFT MICRO BICOAG” BIPOLAR COAGULATION

Push the blue pedal. The delivery is signalled by an acoustic signal (acute, adjustable in the GENERAL MENU) and by the big image on the touch screen.



## 22.5.5 THE ALARM SIGNALS DURING USE

During the use, in case of breakages, problems or mistakes of use, the self-check system stops the power delivery and it informs users by acoustic and visual signals. In case of immediately solvable problems, users can intervene to eliminate causes. For other signals users can switch the unit OFF/ON to verify them and ask for technical assistance.

**The complete functioning of the self-check system is detailed in the part: SELF-CHECK SYSTEM.**

Alarms or error codes (EC)	THE MOST COMMON SIGNALS
All lights and symbols of the control circuit of the neutral electrode are ON. EC “Alarm neutral plate” + Acoustic alarm	Intervention of the control circuit of the neutral electrode See the paragraph “CONTROL CIRCUIT OF THE NEUTRAL ELECTRODE”.
<b>HF LEAK</b> light ON	Intervention of the control circuit of the High Frequency leakage currents to earth. See the paragraph: CONTROL OF HF LEAKAGE CURRENTS TO EARTH..
EC “Simultaneous handle or pedal activation”. + Acoustic signal	2 activation switches are simultaneously pressed. An activation switch is used against the use mode selected on the control panel.
EC “Over Time Activation Error” + Acoustic signal	It is an information only (Continuous delivery of currents for 40/50 seconds). Stop the activation for an instant and then restart.

## 23 SECTION 3 (MEMORIES FROM 75 TO 84)

Use for under liquid endoscopy of the monopolar currents (UROLOGY, GYNAECOLOGY AND ARTHROSCOPY).

**These memories allow the use, by a foot- switched resectoscope or instrument of the following currents for the, under liquid, use:**

The monopolar currents specifically suitable for the use in UROLOGY and GYNAECOLOGY.

The monopolar currents specifically suitable for the use in ARTHROSCOPY.

### 23.1 WARNINGS AND PRECAUTIONS FOR THE OPERATION



**Always remember that all operations must be performed by carefully following all the warnings detailed in the paragraph BASIC WARNINGS !**

### 23.2 SETTING OF THE CURRENTS

To set, memorize and change the currents, follow the instructions of the paragraph “FIRST SETTING”.

To choose the best currents and the starting powers for the specific need, see, in this section, the paragraph ”INDICATIONS FOR THE SUITABLE CURRENTS”.

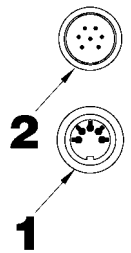
### 23.3 CONNECTION OF THE FOOT-SWITCHES

The unit, for these procedures, is usable by the standard **tk 90016-01** model.

See, in the paragraph “ USE OF THE FOOT-SWITCHES”, the complete use of the foot-switches.

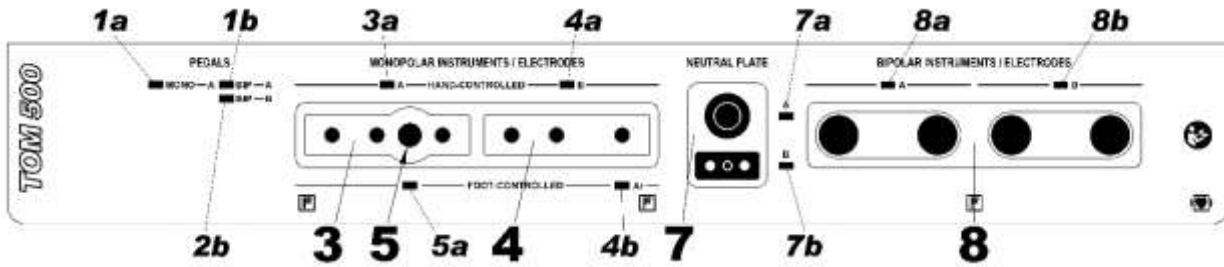
To connect the **tk 90016-01**, use the **1** socket (on the back).

**To avoid mistakes of use, the foot selector of the tk 90016-01 can be blocked.**





## CONNECTION OF THE ACCESSORIES



### 23.3.1 NEUTRAL ELECTRODE

To use the neutral electrode follow all the related warnings of the Par. "BASIC WARNINGS". For the operation of its control circuit see the Par. "CONTROL CIRCUIT OF THE NEUTRAL ELECTRODE". The electrode, during pauses in use, can be disconnected. See the Par. "STANDBY".

**Connect the electrode to the 7 socket** (either 7a or 7b according to the connector of the cable).

### 23.3.2 RESECTOSCOPE OR OTHER INSTRUMENT FOR ENDOSCOPY OR ARTHROSCOPY.

- **Connect to the 5 socket** (Usable when the 5a light is ON) the resectoscope / other instrument. The plug of the cable is the "Ø 6mm" type.

To connect resectoscopes / other instruments are available specific cables (Specify the device and the connector).

To connect resectoscopes / other instruments already provided with a cable with a different plug, use the tk 90302-21 adaptor. See the par: Adaptors for connection and use of the tk 90302-21 adaptor.

## 23.4 INDICATIONS FOR THE SUITABLE CURRENTS

TURP	ELECTRODE	CURRENTS AND STARTING SETTING
PURE CUTTING	Wire loop	"PURE CUT": 110/120 or "AUTO PURE MICRO": Effect 8
COAGULATING CUTTING	Wire loop	"BLEND CUT 1": 110/120 or "AUTO BLEND MICRO": Effect 8
PURE CUTTING	Ribbon loop.	"PURE CUT": 130/140 or "AUTO PURE MICRO": Effect 9
COAGULATING CUTTING	Ribbon loop.	"BLEND CUT 1": 110/120 or "AUTO BLEND MICRO": Effect 9
COAGULATION	Wire loop/Ribbon loop	FULG FORCED COAG: 70/80 or "SPRAY COAG: 60/70
COAGULATION	Ball or Roll	"FULG FORCED COAG": 80/90 or "SPRAY COAG": 70/80

TURV / GYNAECOLOGY	ELECTRODE	CURRENTS AND STARTING SETTING
PURE CUTTING	Wire loop	"PURE CUT": 100/110 or "AUTO PURE MICRO": Effect 7/8
COAGULATING CUTTING	Wire loop	"BLEND CUT 1": 110/120 or "AUTO BLEND MICRO": Effect 8
PURE CUTTING	Ribbon loop.	"BLEND CUT 1": 100/110 or "AUTO BLEND MICRO": Effect 8
COAGULATING CUTTING	Ribbon loop.	"BLEND CUT 1": 120/130 or "AUTO BLEND MICRO": Effect 9
COAGULATION	Wire loop/Ribbon loop	FULG FORCED COAG: 70/80 or "SPRAY COAG: 60/70
COAGULATION	Ball or Roll	"FULG FORCED COAG": 80/90 or "SPRAY COAG": 70/80
VAPORIZATION	Ball or Roll (3mm)	"PURE CUT": 140/150
VAPORIZATION	Ball or Roll (5mm)	"PURE CUT": 190/200
PURE CUTTING	Knife "L"	"PURE CUT": 60/70 or "AUTO PURE MICRO": Effect 5
COAGULATING CUTTING	Knife "L"	"BLEND CUT 1": 60/70 or "AUTO BLEND MICRO": Effect 5
ARTHROSCOPY	Reduce the previous setting to about the 50%	



**23.5 DELIVERY OF THE CURRENTS**

**CUTTING / COAGULATING CUTTING:** Push the **yellow** pedal. The delivery is signalled by an acoustic signal (low, adjustable in the GENERAL MENU) and by the big image on the touch screen.

**COAGULATION:** Push the **blue** pedal. The delivery is signalled by an acoustic signal (acute, adjustable in the GENERAL MENU) and by the big image on the touch screen

**THE ALARM SIGNALS DURING USE**

During the use, in case of breakages, problems or mistakes of use, the self-check system stops the power delivery and it informs users by acoustic and visual signals. In case of immediately solvable problems, users can intervene to eliminate causes.

For other signals users can switch the unit OFF/ON to verify them and ask for technical assistance.

**The complete functioning of the self-check system is detailed in the par. SELF-CHECK SYSTEM.**

Alarms or error codes (EC)	THE MOST COMMON SIGNALS
All lights and symbols of the control circuit of the neutral electrode are ON. EC “Alarm neutral plate” + Acoustic alarm	Intervention of the control circuit of the neutral electrode See the paragraph “CONTROL CIRCUIT OF THE NEUTRAL ELECTRODE”.
<b>HF LEAK</b> light ON	Intervention of the control circuit of the High Frequency leakage currents to earth. See the paragraph: CONTROL OF HF LEAKAGE CURRENTS TO EARTH..
EC “Simultaneous handle or pedal activation”. + Acoustic signal	2 activation switches are simultaneously pressed. An activation switch is used against the use mode selected on the control panel.
EC “Over Time Activation Error” + Acoustic signal	It is an information only (Continuous delivery of currents for 40/50 seconds). Stop the activation for an instant and then restart.

**24 SECTION 4 (MEMORIES FROM 85 TO 92) Use for the, in saline, endoscopy of the bipolar currents**

**(UROLOGY, GYNAECOLOGY AND ARTHROSCOPY).**

These memories allow the delivery of the only currents suitable for this use, **SALINE** and **MICRO** currents, which usable by foot-switched bipolar accessories:

- A resectoscope, another instrument (for example a flexible, bipolar, 5Cr needle for gynaecology) and an instrument for arthroscopy.

In the memories, from 85 to 88, for UROLOGY (TURPis, TURVis, other uses) or GYNAECOLOGY, the suitable currents are already preset: **SALINE URO-GYN CUT** current for cutting / **SOFT MICRO BICOAG** current for coagulation.

In the memories, from 89 to 92, for ARTHROSCOPY, the suitable, currents are already preset **SALINE ARTHRO CUT** for cutting / **SOFT MICRO BICOAG** for coagulation.

**24.1 WARNINGS AND PRECAUTIONS FOR THE OPERATION**



**Always remember that all operations must be performed by carefully following all the warnings detailed in the paragraph BASIC WARNINGS !**

**24.2 SETTING OF THE CURRENTS**

To set, memorize and change the currents. Follow the instructions of the paragraph “FIRST SETTING”. To choose the best currents and the starting powers for the specific need. See, in this section, the paragraph “INDICATIONS FOR THE SUITABLE CURRENTS”.

**24.3 CONNECTION OF THE FOOT-SWITCHES**

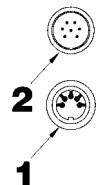
The unit, for these procedures, is usable by the standard **tk 90016-01** model.

It is also available, on request, a larger version (**tk 90016-01** code) for the endoscopic use.

**See, in the paragraph “USE OF THE FOOT-SWITCHES”, the complete use of the foot-switches.**

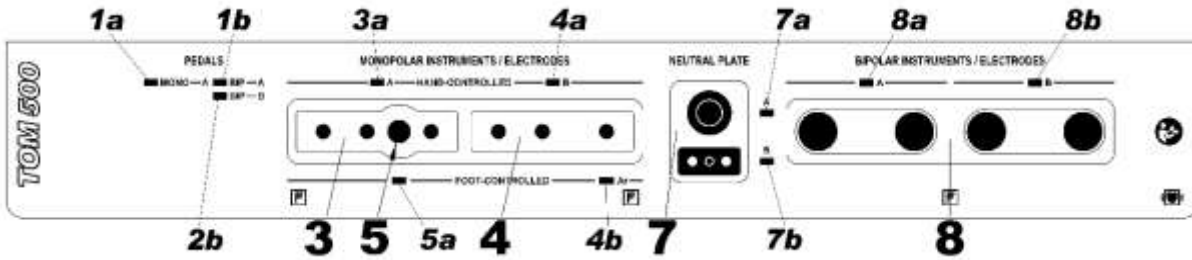
To connect the **tk 90016-01**, use the **1** socket (on the back).

**To avoid mistakes of use, the foot selector of the tk 90016-01 can be blocked.**





24.4 CONNECTION OF THE ACCESSORIES



24.4.1 NEUTRAL ELECTRODE

The electrode is not required and the control circuit is blocked. The alarm lights are ON, but for information only RESECTOSCOPE OR OTHER INSTRUMENT FOR ENDOSCOPY OR ARTHROSCOPY

In the GENERAL MENU, point 2.5, select the 8b socket. Connect to the 8b socket (Usable when the 8b light is ON) the cable of the instrument. (The connector is “2 x Ø 6mm plugs” type and it doesn’t require a specific polarity of connection).

TO CONNECT ACCESSORIES WITH CONNECTOR DIFFERENT FROM THE STANDARD ONE, USE:

- Specific cables (Model and connector of the instrument must be specified). Specific adaptors (They allow the use of all connectors).
- See the par: Adaptors for connection and use of the tk 90302-21 adaptor.

24.5 INDICATIONS FOR THE SUITABLE CURRENTS:

*SALINE URO-GYN CUT, SALINE ARTHRO CUT and SOFT MICRO BICOAG.*

**To obtain the intended functioning** use saline solutions (0,9% of sodium chloride) and not solutions with different salts (I.E. The Ringer solution which includes potassium chloride).

**To obtain the best result, when delivering the current for cutting,** slightly warm the saline solution (warm it by the heating device for the bags or for their flow).

**To coagulate,** touch vessels until the coagulating effect reaches the surrounding tissues.

**To avoid problems when using a resector,** mainly when sterilizing it by liquids, dry very careful all its parts and the connecting cable since even the only humidity can cause two risks:

- The resector operates in unstable way or it doesn’t operate since the current doesn’t reach the operative end of the electrode.
- The insulation of the instrument could be damaged.

TURPis in UROLOGY	ELECTRODE	CURRENTS AND STARTING SETTING
CUTTING	Wire loop / Ribbon loop.	SALINE URO-GYN CUT: Effect 8
COAGULATION	Wire loop / Ribbon loop.	SOFT MICRO BICOAG: 70/80
COAGULATION	Ball / Roll	SOFT MICRO BICOAG: 110

TURVIs in UROLOGY / GYNAECOLOGY	ELECTRODE	CURRENTS AND STARTING SETTING
CUTTING	Wire loop / Ribbon loop.	SALINE URO-GYN CUT: Effect 7
COAGULATION	Wire loop / Ribbon loop.	SOFT MICRO BICOAG: 130
COAGULATION	Ball / Roll	SOFT MICRO BICOAG: 130
VAPORATION	Ball / Roll	SALINE URO-GYN CUT: Effect 8
CUTTING	“L” Knife	SALINE URO-GYN CUT: Effect 5

ARTHROSCOPY	Decrease the starting setting to about the 50% of the previous ones When using the SALINE ARTHRO CUT current: Effect 4/5
-------------	---



## 24.6 DELIVERY OF THE CURRENTS

**CUTTING:** Push the yellow pedal. The delivery is signalled by an acoustic signal (low, adjustable in the GENERAL MENU) and by the big image on the touch screen.

**COAGULATION:** Push the blue pedal. The delivery is signalled by an acoustic signal (acute, adjustable in the GENERAL MENU) and by the big image on the touch screen

### 24.6.1 THE ALARM SIGNALS DURING USE

During the use, in case of breakages, problems or mistakes of use, the self-check system stops the power delivery and it informs users by acoustic and visual signals.

In case of immediately solvable problems, users can intervene to eliminate causes.

For other signals users can switch the unit OFF/ON to verify them and ask for technical assistance.

**The complete functioning of the self-check system is detailed in the par. SELF-CHECK SYSTEM.**

Alarms or error codes (EC)	THE MOST COMMON SIGNALS
EC “Simultaneous handle or pedal activation” + Acoustic signal	2 activation switches are simultaneously pressed. An activation switch is used against the use mode selected on the control panel.
EC “Over Time Activation Error” + Acoustic signal	It is an information only (Continuous delivery of currents for 40/50 seconds). Stop the activation for an instant and then restart.

## 25 SECTION 5 (MEMORIES FROM 93 TO 99).

Use for open or laparoscopic surgery and for other needs, of the bipolar currents only

These memories allow the use of all the following currents:

- All the bipolar currents by one or two foot-switched instruments.
- The **AUTO MICRO SOFT** and **AUTO SEALING** currents are provided with automatic “impedance sensing” start/stop.

### 25.1 WARNINGS AND PRECAUTIONS FOR THE OPERATION



Always remember that all operations must be performed by carefully following all the warnings detailed in the paragraph BASIC WARNINGS !

### 25.2 SETTING OF THE CURRENTS

To set, memorize and change the currents. Follow the instructions of the paragraph “FIRST SETTING”.

To choose the best currents and the starting powers for the specific need, see paragraph ”INDICATIONS FOR THE SUITABLE CURRENTS”.

### 25.3 CONNECTION OF THE FOOT-SWITCHES

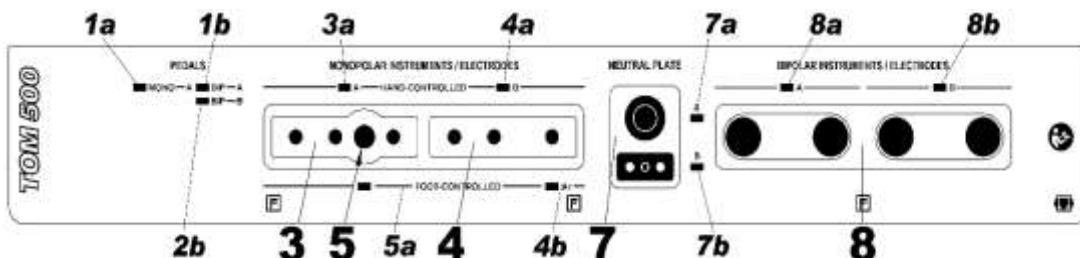
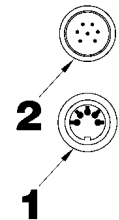
The unit is usable by the standard tk 90016-01 model.

See, in the paragraph “USE OF THE FOOT-SWITCHES”, the complete use of the foot-switches.

To connect the tk 90016-01, use the 1 socket (on the back).

To avoid mistakes of use, the foot selector of the tk 90016-01 can be blocked.

### 25.4 CONNECTION OF THE ACCESSORIES



#### 25.4.1 NEUTRAL ELECTRODE

The electrode is not required and the control circuit is blocked. The alarm lights are ON, but for information only.



## 25.4.2 BIPOLAR INSTRUMENTS

The unit allows the connection and the use of one or two instruments by performing the setting of the related sockets according to the instructions detailed in the paragraph “GENERAL MENU”, Point 2.5.

<b>By using one instrument:</b>	All currents are delivered through it.
<b>By using two instruments:</b>	The currents for cutting are delivered through by first instrument. The currents for coagulation/vessel sealing are delivered by the second instrument.

**Connect to the 8b socket** (Usable when the **8b** light is ON) one instrument.

**Connect to the 8a and 8b sockets** (Usable when both lights, **8a** and **8b**, are ON) two instruments.

(The connector is “2 x Ø 4mm plugs” type and it doesn’t require a specific polarity of connection).

### TO CONNECT ACCESSORIES WITH CONNECTOR DIFFERENT FROM THE STANDARD ONE, USE:

Specific cables (Model and connector of the instrument must be specified). Specific adaptors (They allow the use of all connectors).

See the par: Adaptors for connection and use of tk 90302-21 adaptor.

## 25.5 INDICATIONS FOR THE SUITABLE CURRENTS

### 25.5.1 CURRENTS FOR BIPOLAR CUTTING

**STANDARD BICUT** - Current for cutting of dried or wet tissues. It is suitable for the following:

- To dissect (starting from 50/60) the tissues in Open surgery, by performing fast nips of the tissue with forceps with thin tips.
- To dissect (starting from 80/90) the tissues in Laparoscopic surgery, by using bipolar hook or bipolar rigid needles.

**BLEND BICUT** - Current for strongly coagulating cutting (5% cutting, 95% coagulation).

It can be also considered a current for coagulation only and it is very useful if users have to use a bipolar instrument for coagulation and a bipolar instrument for vessel sealing. It is suitable for the following:

- To use the traditional forceps for Open surgery (starting from 1/5 if the tips are 0, 5/1 mm, from 10/20 if the tips are 1,5 or 2mm).
- To use (starting from 30/40 according to the dimensions of the tips) forceps for laparoscopy.
- To use (starting from 30/40) all scissors, for open or laparoscopic surgery.
- To use (starting from 30/40) rigid needle electrodes (i.e. for turbinals or tonsillectomy)

**SALINE URO-GYN CUT** and **SALINE ARTHRO CUT** currents are not suitable for this use.

### 25.5.2 CURRENTS FOR BIPOLAR COAGULATION AND SEALING OF BIG VESSELS

**SOFT MICRO BICOAG – Coagulation delicate and precise:** It is the best current for all the uses in Open / Laparoscopic surgery) and it is usable as follows:

- To use the traditional forceps for Open surgery (starting from 1/5 if the tips are 0, 5/1 mm, from 10/20 if the tips are 1,5 or 2mm).
- To use (starting from 30/40 according to the dimensions of the tips) forceps for laparoscopy.
- To use (starting from 30/40) all scissors, for open or laparoscopic surgery.
- To use (starting from 30/40) rigid needle electrodes (i.e. for turbinals or tonsillectomy)

**FORCED MICRO BICOAG – Fast and strong coagulation:** It is similar to the **MICRO** coagulation and it can be used in the same way, but it produces an effect more similar to that of the monopolar coagulation. Because of this reason it is not suitable to perform delicate coagulations by using the traditional forceps for Open surgery.

**AUTO SOFT MICRO BICOAG** - Current identical to the **SOFT MICRO BICOAG**, with automatic “impedance sensing” start/stop. The delivery starts, with a delay adjustable from 0, 1 to 5 seconds in the GENERAL MENU (Section 2.6), when the ends of the instruments come in contact with damp or bleeding tissues. The delivery stops either when the surgeon opens the ends of the instrument or when tissues are coagulated. The current is suitable for the following:

The current is suitable, in open surgery, for the same uses of the SOFT MICRO BICOAG current.

The current is not suitable for the laparoscopic surgery since the automatic start/stop is not safe in this case.

**SEALING** - Current, to coagulate/seal vessels with diameter up to 8 mm, with activation by foot-switch and automatic “impedance sensing” stop.

It is suitable, in open or laparoscopic surgery, to use clamps with jaws from 3 to 10 mm. The current is delivered by pushing the pedal until it stops, when tissues are coagulated/sealed, automatically. The current is suitable for the following:

- To use clamps with strong mechanical pressure (starting from the 5/7 effect if the clamps have jaws of 5/6 mm.).
- To use clamps with strong mechanical pressure (starting from the 9 effect if the clamps have jaws of 10 mm).



**AUTO SEALING** - Current identical to the **SEALING**, with automatic “impedance sensing” start/stop.

The delivery starts, with a delay adjustable from 0,1 to 5 seconds in the GENERAL MENU (Section 2.6), when the ends of the instruments come in contact with damp or bleeding tissues. The delivery stops either when the surgeon opens the ends of the instrument or when tissues are coagulated. The current is suitable for the following:

- The current is suitable, in open surgery, for the same uses of the SEALING current.

**The current is not suitable for the laparoscopic surgery since the automatic start/stop is not safe in this!**

## 25.6 DELIVERY OF THE CURRENTS

The currents are usable by one or two instruments. See the part: “CONNECTION OF THE ACCESSORIES”.

### BE CAREFUL!



**Bipolar scissors:** Use only either the BLEND BICUT or the MICRO current and cut tissues mechanically.

**To reduce sticking of the tissue on the tips of instruments:** See chapter. “STICKING OF THE TISSUE ON THE TIPS OF THE BIPOLAR INSTRUMENTS FOR COAGULATION”

Check the functioning of the bipolar instruments when starting the operation: See chapter: “CHECK OF THE BIPOLAR INSTRUMENTS BEFORE USE”.

### 25.6.1 CURRENTS FOR CUTTING OR COAGULATION WITH FOOT-SWITCHED ACTIVATION

**CUTTING:** Push the yellow pedal. The delivery is signalled by an acoustic signal (low, adjustable in the GENERAL MENU) and by the big image on the touch screen.

**COAGULATION:** Push the blue pedal. The delivery is signalled by an acoustic signal (acute, adjustable in the GENERAL MENU) and by the big image on the touch screen.

### 25.6.2 CURRENT FOR VESSEL SEALING “SEALING”

Clamp tissues between the jaws of the instrument and push the **blue** pedal of the foot-switch until the delivery stops automatically either when tissues are sealed or if the surgeon opens the jaws. The delivery is signalled by an acoustic signal (acute, adjustable in the GENERAL MENU) and by the big image on the touch screen. The sound ends with a different tone when the delivery stops.

### 25.6.3 CURRENT FOR COAGULATION “AUTO SOFT MICRO BICOAG”

Clamp tissues between the tips of the instrument. The delivery starts, with a delay adjustable from 0,1 to 5 seconds in the GENERAL MENU (Section 2.6), when the ends of the instruments come in contact with damp or bleeding tissues.

The delivery stops either when the surgeon opens the ends of the instrument or when tissues are coagulated.

The delivery is signalled by an acoustic signal (acute, adjustable in the GENERAL MENU) and by the big image on the touch screen.

### 25.6.4 CURRENT FOR VESSEL SEALING “AUTO SEALING”

Clamp tissues between the jaws of the instrument. The delivery starts and stops as above detailed for the AUTO SOFT MICRO BICOAG current. The delivery is signalled by an acoustic signal (acute, adjustable in the GENERAL MENU) and by the big image on the touch screen. The sound ends with a different tone when the delivery stops.

### 25.6.5 ALARM SIGNALS DURING USE

During use, in case of breakages, problems or mistakes of use, the self-check system stops the power delivery and it informs users by acoustic and visual signals. In case of immediately solvable problems, users can intervene to eliminate causes. For other signals users can switch the unit OFF/ON to verify them and ask for technical assistance.

The complete functioning of the self-check system is detailed in the par. SELF-CHECK SYSTEM.

Alarms or error codes (EC)	THE MOST COMMON SIGNALS
<b>HF LEAK</b> light ON	<b>Intervention of the control circuit of the High Frequency leakage currents to earth.</b> See the paragraph: CONTROL OF HF LEAKAGE CURRENTS TO EARTH.
<b>EC “Simultaneous handle or pedal activation”.</b> + Acoustic signal	<b>2 activation switches are simultaneously pressed. An activation switch is used against the use mode selected on the control panel.</b>
<b>EC “Over Time Activation Error”</b> + Acoustic signal	<b>It is an information only (Continuous delivery of currents for 40/50 seconds).</b> Stop the activation for an instant and then restart.



## 26 CLEANING AND STERILIZATION

Clean the unit with a simple soap solution, **by taking care that no liquid goes inside** and then wipe it with a dry cloth. Clean the foot-switches in the same way or by using a cold disinfecting solution.

**Be careful; at the moment of the sale, the accessories are not sterile.** The packaging of all the accessories includes a label with the instructions for use and the sterilization mode.

The accessories are sterilizable by autoclave (121°C for 20 minutes or 134°C for 10 minutes) or by cold solutions:

- All monopolar handles and all monopolar active electrodes.
- All monopolar and bipolar instruments.
- All monopolar and bipolar connecting cables.
- The reusable neutral electrodes are sterilizable by cold solutions.

During the sterilization, do not bend the connection cables too much and wipe, before use, all the parts of the accessories very well in order to eliminate all the traces of humidity. The best thing to do is to centrifuge them.

## 27 USE, STORAGE, MAINTENANCE, DISPOSAL

The unit must not be used at less than 30cm from the wall or other objects that can obstruct the ventilation areas. It must be placed on a trolley or a support. When the unit is not used, it must be kept in a dry place, not dusty. Be careful that no liquid is poured on it. Always store with care the unit and all accessories in order to avoid damages.

The unit does not include consumables or materials with limited service life.

The unit must be regularly checked (once per year according to the applicable standards) by qualified personnel or by the manufacturer.

According to the requirements of the standards for all the medical devices the following must be carried out:

- The checks of electrical safety (Low Frequency Leakage currents, Resistance of the protective earth conductor and so on).
- The check of the general functioning, of the mains fuses, of the supply cord and so on.

According to the requirements of the Standards for the HF surgical units, the following must be carried out:

- The checks of electrical safety (High Frequency Leakage currents and so on).
- The check of the functioning of the control circuit of the neutral electrode.
- The check of the delivered powers, according to the values which are specified in this manual (for the powers higher than 10% of the maximum power of each current, the tolerance is 20%).
- Always check all accessories (They are dangerous if old, worn, damaged or broken).

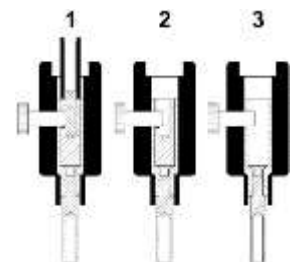
Perform the final disposal must according to the specific National Laws, but remember the following:

- The unit does not include dangerous substances or materials.
- The accessories which come in contact with the patient's tissues must be sterilized before the disposal.

## 28 ADAPTORS

tk 90302-21 UNIVERSAL ADAPTOR FOR MONOPOLAR CABLES, to connect cables with connectors different from the standard ones, many adaptors are available. The adaptor allows the connection of all kinds of plugs:

- **1:** The MARTIN (Similar cables) with plug diameter 4 mm. can be connected.
- **2:** The cables with plug having a diameter from 2 to 4 mm. can be connected. Unscrew the knob, insert the plug and block it by screwing the knob.
- **3:** The cables with plug having a diameter from 4,5 to 8 mm can be connected. (i.e. ERBE, STORZ or similar ones and VALLEYLAB, similar ones). Unscrew the knob, take away the internal part, insert the plug and block it by screwing the knob.



To use the bipolar cables with connector Martin type ask for the specific adaptor.

To use the bipolar cables with connector ERBE type ask for the specific adaptor.



## 29 TECHNICAL FEATURES

**Electronic generator:** It complies with IEC 60601-1 and IEC 601-2-2 Standards.

**Classification IEC 601-1:** Class I - Type CF.

**Classification 93/42 + 2007/47 MDD:** IIB.

**Monopolar and Bipolar working frequency:** 440kHz +- 10%.

**Output circuit:** Floating out (insulated from earth at the high and low frequencies, protected against the use of the defibrillator).

**Protection against liquids:** Enclosure protected (IPN3N2) / Foot-switches: water-proof (IPN8).

**Cooling system:** By convection, without fan.

**Monopolar use:** By 1 or 2 handles / instruments with hand or foot switched activation.

**Bipolar use:** By 1 or 2 instruments with foot switched activation.

**Use of the bipolar AUTO MICRO SOFT COAG:** By automatic “impedance sensing” start/stop system.

**Use of the bipolar SEALING current:** Activation by foot-switch with automatic “impedance sensing” deactivation.

**Use of the bipolar AUTO SEALING current:** By automatic “impedance sensing” start/stop system.

**Automatic start/stop system:** (0-30Ω = Delivery blocked, 30-900Ω = Delivery starts, 1000 a 1700Ω = Delivery stops).

**Starting delay of the automatic start/stop system:** Adjustable from 0,1 to 5 seconds

**Auto-check system:** By microprocessor with self-check at the switching on and continuous control during the functioning.

**Setting modes:** By keys

**Control circuit:** By twin microprocessor with complete self-check.

**Neutral electrode control:** Circuit with acoustic alarms and visual alarms (alarm lights and ERROR CODES).

**Mains and Absorption:** 100-230 V ~ 50/60 Hz - 828 VA / **Mains Fuses:** T 10 A / **General mains switch:** green (0/I).

**Discontinuous functioning:** max. 1 hour (10s ON/30s OFF).

**Dimensions and weight: (LxDxH)** 38x35x21cm - 13Kg. / **Mains cable:** 3 meters long, section 3x1mm.

## ENVIRONMENTAL AND ATMOSPHERIC CONDITIONS FOR USE, TRANSPORT AND STORAGE

The environmental conditions for the use are the following ones:

- Temperature (°C) +10 ÷ +40. Humidity 30% ÷ 75%. Pressure (hPa): 700 ÷ 1060.

The environmental conditions for the transport and storage are the following ones:

- Temperature (°C) -40 ÷ +70. Humidity 10% ÷ 95%. Pressure (hPa): 500 ÷ 1060.

CONFORMITY EMC/DIRECTIVE 89/336/CEE: CATEGORY A (Distances to be kept from not vital devices)		
Source of the Current RF	Typical Power (W)	Distance (m)
Microcellular telephones CT1,CT2,CT3	0.01	0.4
Mobile telephones DECT, Wireless devices (modems, LANs)	0.25	2
Mobile telephones (USA)	0.6	3
Hand mobile telephones (GSM, NMT, Europe) (DECS 1800)	2 8	6 11
Walkie-talkie (police, firemen, protection, maintenance)	5	9
Bag mobile telephones	16	16
Mobile radio (police, firemen, protection)	100	40
For broadcasting stations which use frequencies less than 800MHz, the distance can be established by using the equation: A: $d = 4\sqrt{P}$		
For broadcasting stations which use frequencies between 800MHz and 2.5GHz, the distance can be established by using the equation: B: $d = 2.3\sqrt{P}$		
P = Nominal power of the transmitter in watt (W), established by the manufacturer.		

## INFORMATION TO THE USERS



According to the article no. 13 of the Legislative Decree no. 151 dated 25<sup>th</sup> July 2005 “Fulfilment of the Directives 2002/95/CE, 2002/96/CE and 2003/108/CE, for the reduction in the use of dangerous substances in electric and electronic devices, as well as for the waste disposal”: The symbol on the left is present either on the unit or on its packaging and it indicates that the product must be separately disposed of.

The separate waste collection of this kind of unit is arranged and managed by the manufacturer. Therefore, the user, to dispose of an old unit, must contact the producer and follow the procedure which it established. The correct separate collection for the recycling process, for the treatment and the eco-friendly disposal of the old unit, contributes to avoid any possible negative effects on the environment or on human health and it helps the recycling of the materials that compose the unit. The illegal disposal of the product by the user implies the imposition of the fines established in the Legislative Decree no. 22/1997 (art. 50 and following).

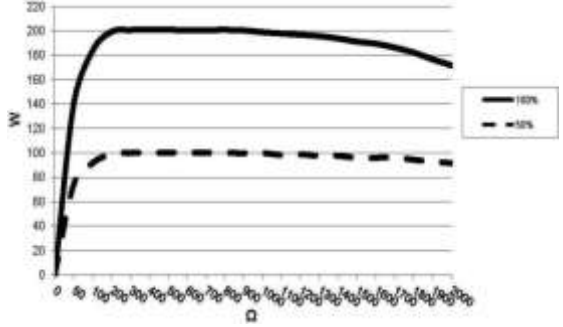
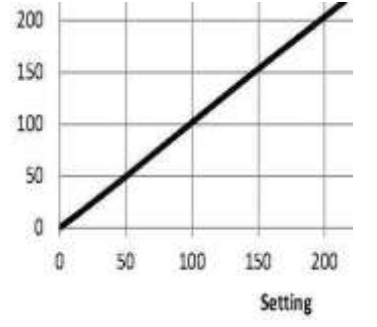
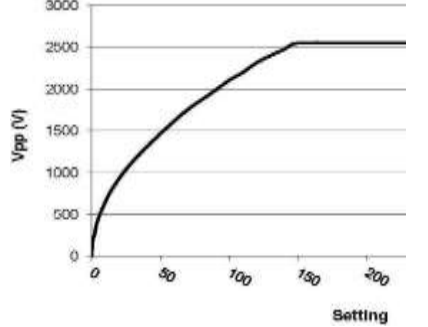
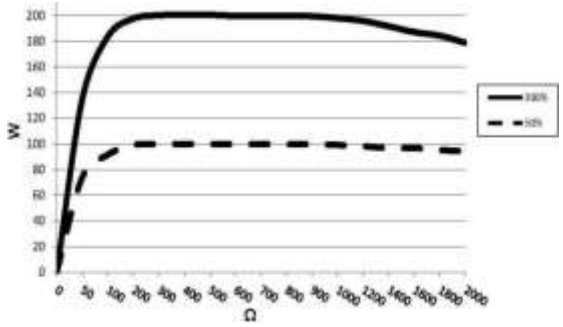
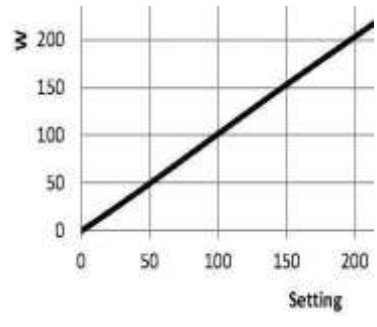
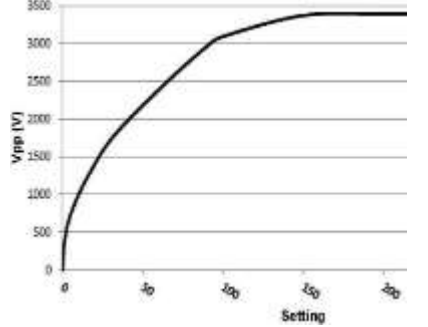
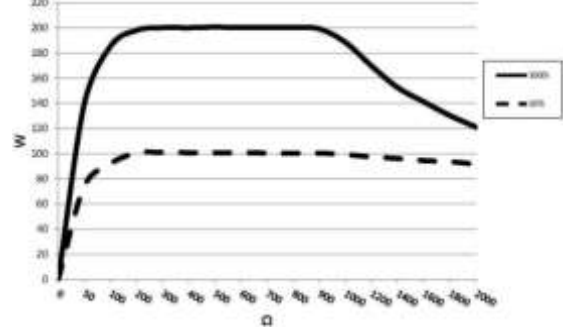
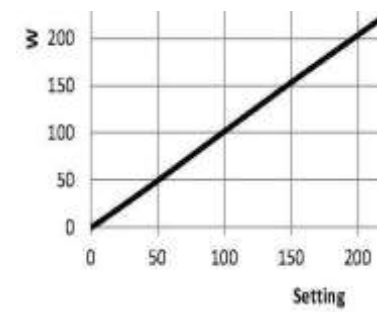
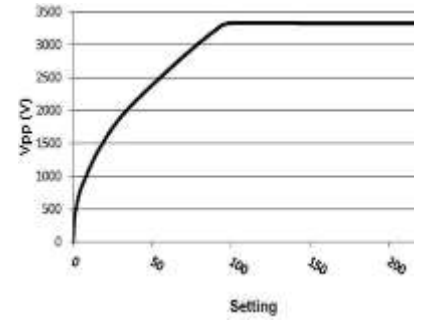


## 30 DIAGRAMS OF THE MONOPOLAR CURRENTS (200W)

Values measured within 3 seconds, by excluding the transients lower than 1 second, as established in IEC 60601-2-2.

With regard to the powers, we stress the following:

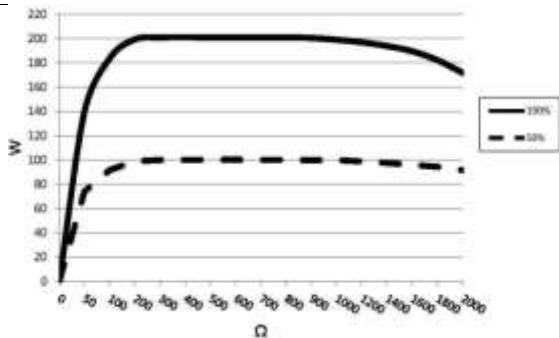
- The allowed tolerance is  $\pm 20\%$  for the powers higher than the 10% of the maximum power of the current.
- The measurements have to consider the tolerance of the devices used to perform the measurement. The maximum deliverable power is 400W and because of this reason the *PURE CUT* current is calibrated to not go over this limit.

PURE CUT current.		
Delivery of the power with power setting = 50% and 100% of the maximum power. When varying the loads from 50 to 2000Ω	Delivery of the power. When varying the power at the rated load.	Increase of the Vp voltage. When varying the power setting. (It is measured with open circuit)
		
BLEND CUT 1 current		
Delivery of the power with power setting = 50% and 100% of the maximum power. When varying the loads from 50 to 2000Ω	Delivery of the power. When varying the power at the rated load.	Increase of the Vp voltage. When varying the power setting. (It is measured with open circuit)
		
BLEND CUT 2 current		
Delivery of the power with power setting = 50% and 100% of the maximum power. When varying the loads from 50 to 2000Ω	Delivery of the power. When varying the power at the rated load.	Increase of the Vp voltage. When varying the power setting. (It is measured with open circuit)
		

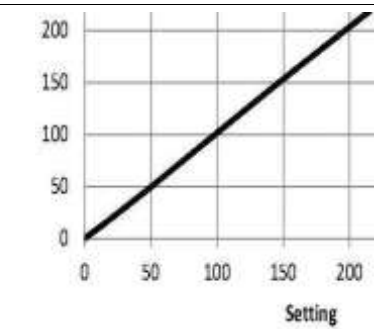


**PURE CUT PULSED current.**

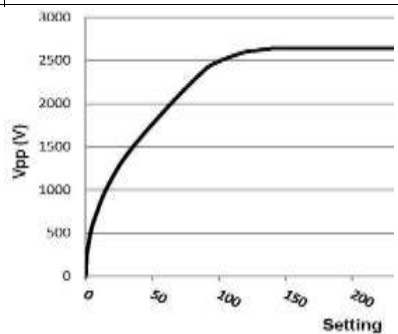
Delivery of the power with power setting = 50% and 100% of the maximum power .  
When varying the loads from 50 to 2000Ω



Delivery of the power.  
When varying the power at the rated load.

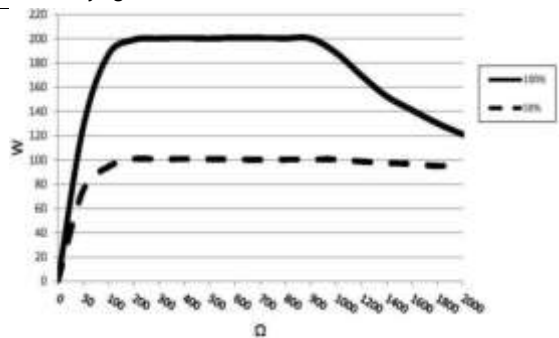


Increase of the Vp voltage.  
When varying the power setting.  
(It is measured with open circuit)

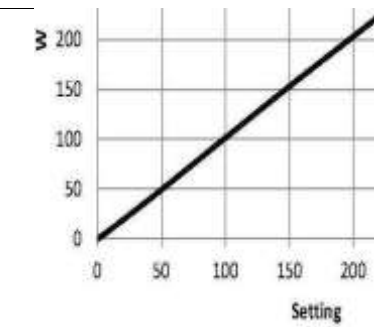


**BLEND CUT PULSED current.**

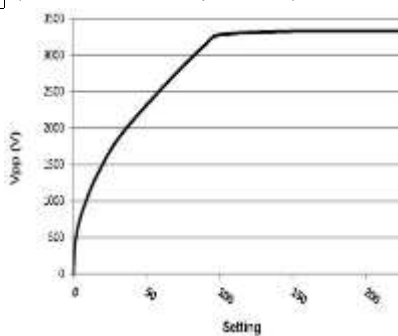
Delivery of the power with power setting = 50% and 100% of the maximum power  
When varying the loads from 50 to 2000Ω



Delivery of the power.  
When varying the power at the rated load.

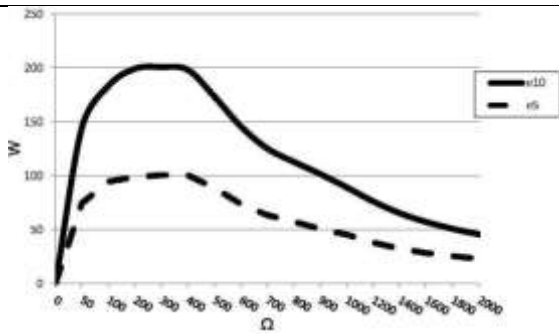


Increase of the Vp voltage  
When varying the power setting.  
(It is measured with open circuit)

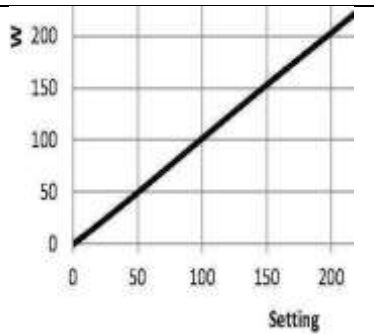


**AUTO PURE MICRO current.**

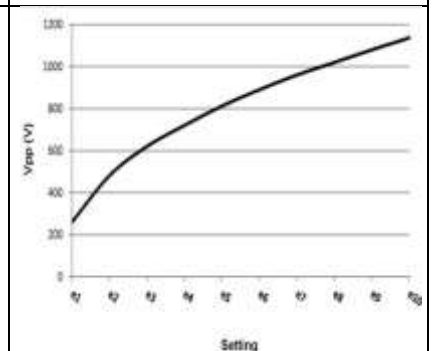
Delivery of the power with power setting = 50% and 100% of the maximum power  
When varying the loads from 50 to 2000Ω



Delivery of the power.  
When varying the power at the rated load.



Increase of the Vp voltage  
When varying the power setting.  
(It is measured with open circuit)



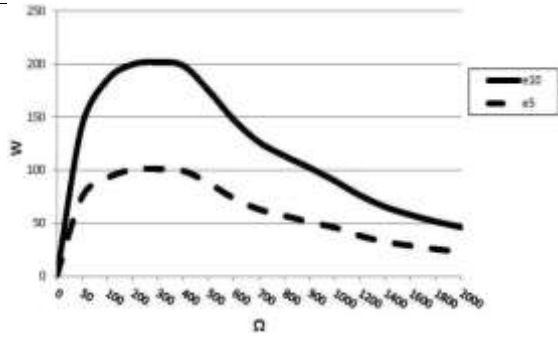


AUTO BLEND CUT MICRO current.		
Delivery of the power with power setting = 50% and 100% of the maximum power When varying the loads from 50 to 2000Ω	Delivery of the power. When varying the power at the rated load.	Increase of the Vp voltage When varying the power setting. (It is measured with open circuit)
AUTO PAPILO MICRO current.		
Delivery of the power with power setting = 50% and 100% of the maximum power When varying the loads from 50 to 2000Ω	Delivery of the power. When varying the power at the rated load.	Increase of the Vp voltage When varying the power setting. (It is measured with open circuit)
AUTO POLIPO MICRO current.		
Delivery of the power with power setting = 50% and 100% of the maximum power When varying the loads from 50 to 2000Ω	Delivery of the power. When varying the power at the rated load.	Increase of the Vp voltage When varying the power setting. (It is measured with open circuit)

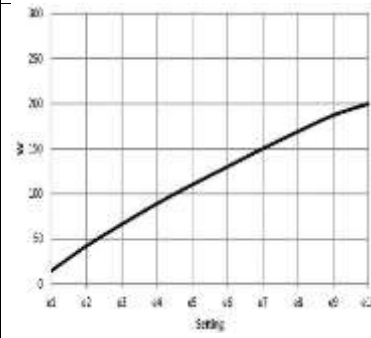


**AUTO ENDO CUT current.**

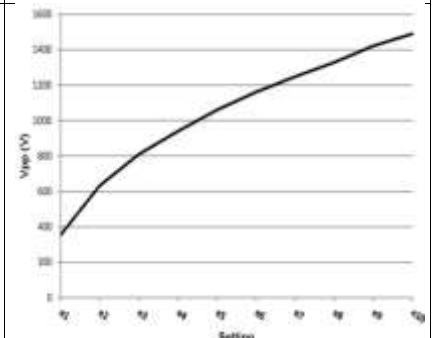
Delivery of the power with power setting = 50% and 100% of the maximum power When varying the loads from 50 to 2000Ω



Delivery of the power. When varying the power at the rated load.

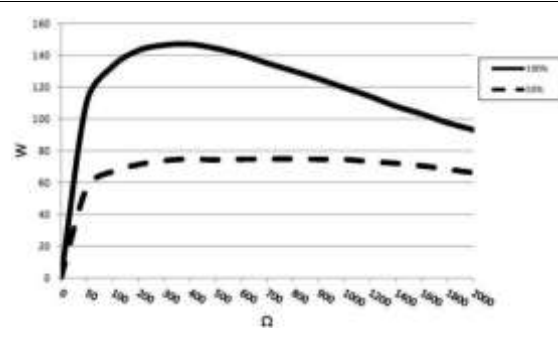


Increase of the Vp voltage When varying the power setting. (It is measured with open circuit)

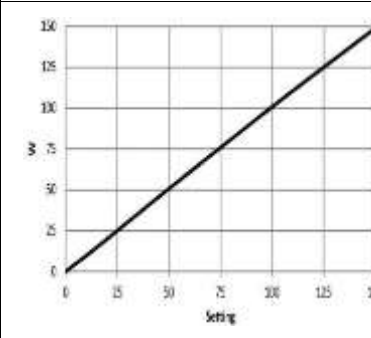


**FULG FORCED COAG current.**

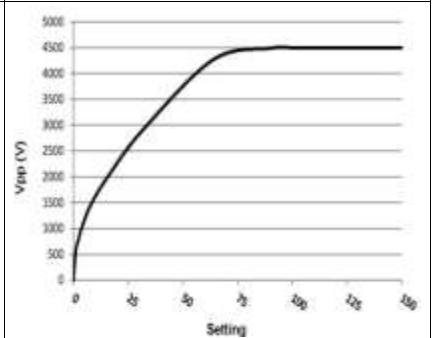
Delivery of the power with power setting = 50% and 100% of the maximum power When varying the loads from 50 to 2000Ω



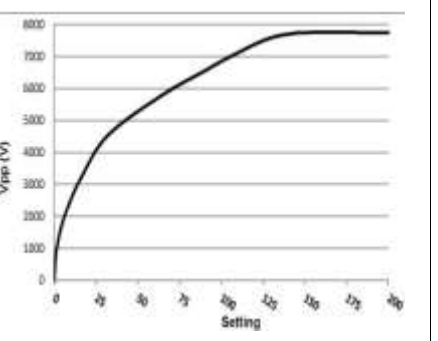
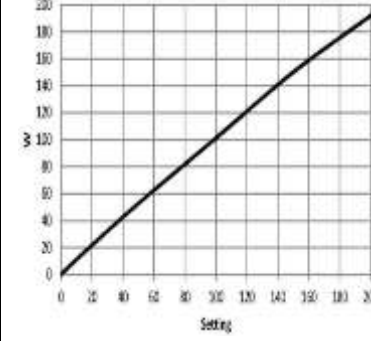
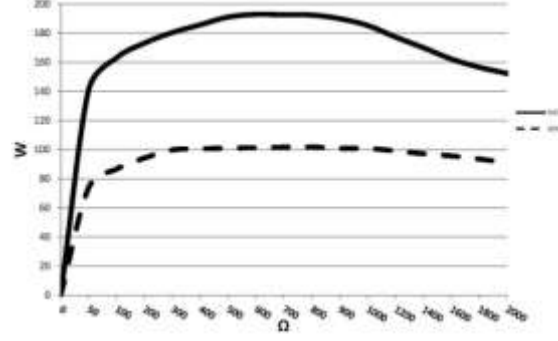
Delivery of the power. When varying the power at the rated load.



Increase of the Vp voltage When varying the power setting. (It is measured with open circuit)



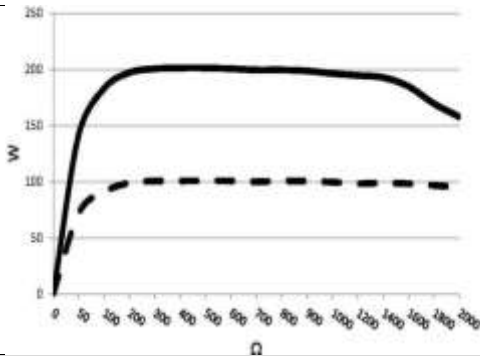
**SPRAY COAG and PULSED SPRAY COAG currents**



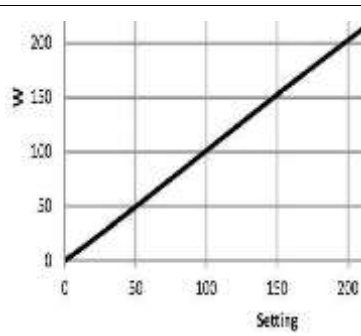


## PIN POINT CONTACT COAG current.

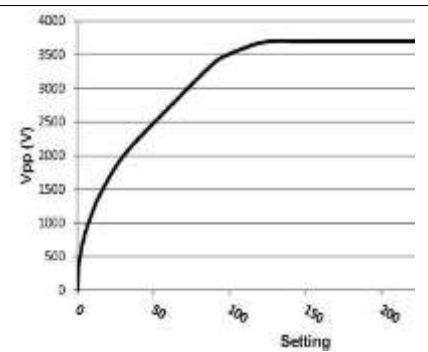
Delivery of the power with power setting = 50% and 100% of the maximum power  
When varying the loads from 50 to 2000Ω



Delivery of the power.  
When varying the power at the rated load.

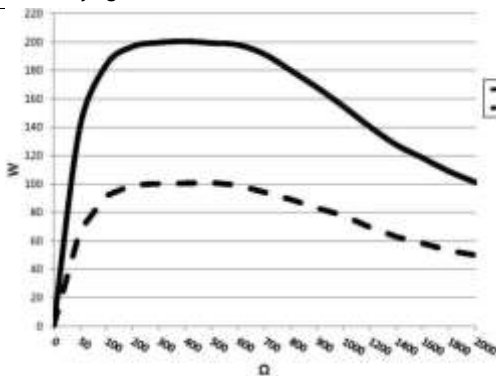


Increase of the Vp voltage  
When varying the power setting.  
(It is measured with open circuit)

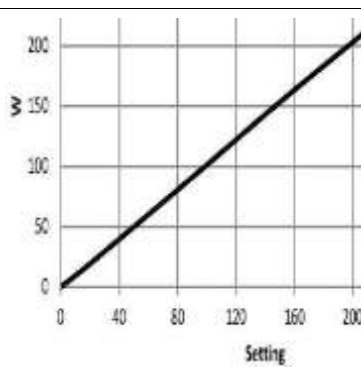


## SOFT MICRO COAG current.

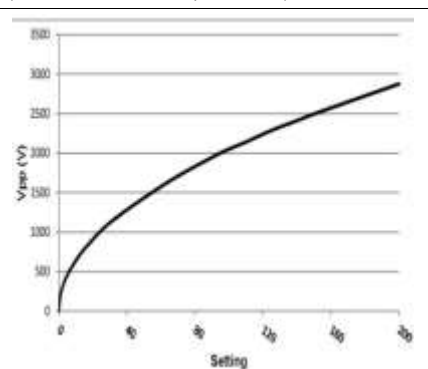
Delivery of the power with power setting = 50% and 100% of the maximum power  
When varying the loads from 50 to 2000Ω



Delivery of the power.  
When varying the power at the rated load.



Increase of the Vp voltage  
When varying the power setting.  
(It is measured with open circuit)





**31 DIAGRAMS OF THE BIPOLAR CURRENTS (200W)**

Values measured within 3 seconds, by excluding the transients lower than 1 second, as established in IEC 60601-2-2. With regard to the powers, we stress the following:

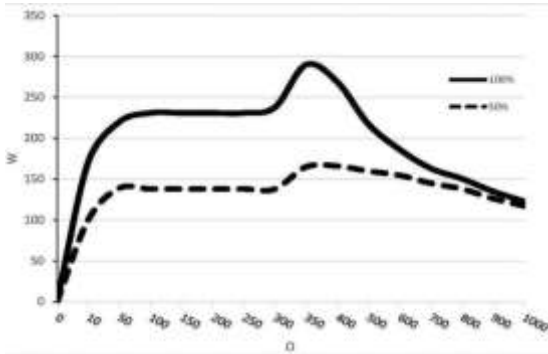
- The allowed tolerance is  $\pm 20\%$  for the powers higher than the 10% of the maximum power of the current.
- The measurements have to consider the tolerance of the devices used to perform the measurement.

STANDARD BICUT current.		
Delivery of the power with power setting = 50% and 100% of the maximum power When varying the loads from 10 to 1000Ω	Delivery of the power. When varying the power at the rated load.	Increase of the Vp voltage When varying the power setting. (It is measured with open circuit)
BLEND BICUT current.		
Delivery of the power with power setting = 50% and 100% of the maximum power When varying the loads from 10 to 1000Ω	Delivery of the power. When varying the power at the rated load.	Increase of the Vp voltage When varying the power setting. (It is measured with open circuit)

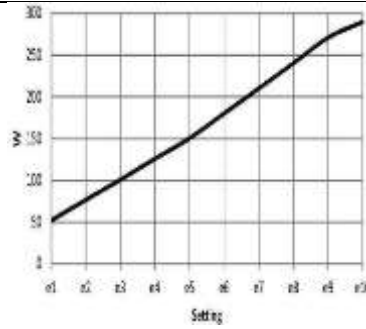


## SALINE URO-GYN CUT current.

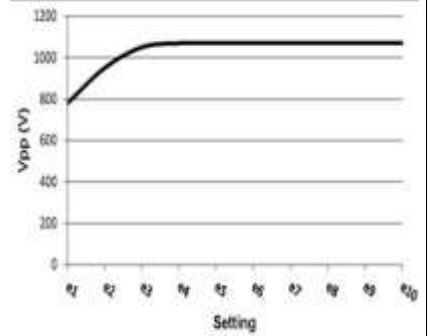
Delivery of the power with power setting = 50% and 100% of the maximum power When varying the loads from 10 to 1000Ω



Delivery of the power. When varying the power at the rated load.

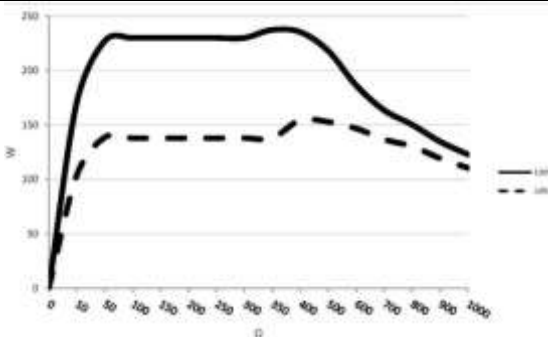


Increase of the Vp voltage When varying the power setting. (It is measured with open circuit)

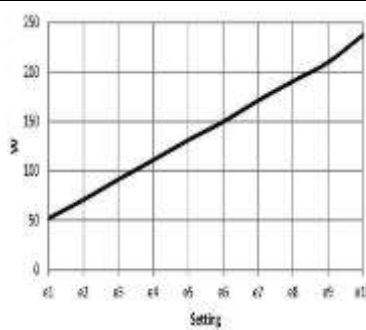


## SALINE ARTHRO CUT current.

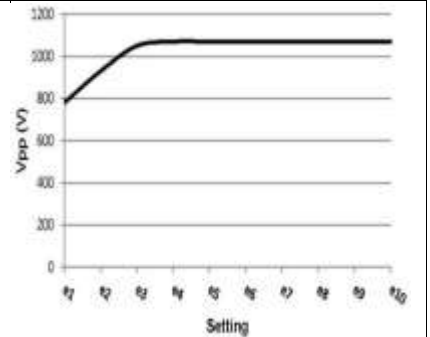
Delivery of the power with power setting = 50% and 100% of the maximum power When varying the loads from 10 to 1000Ω



Delivery of the power. When varying the power at the rated load.

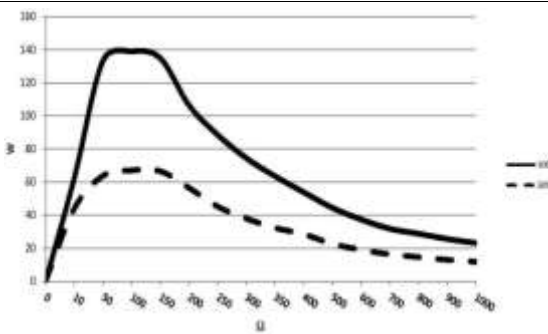


Increase of the Vp voltage When varying the power setting. (It is measured with open circuit)

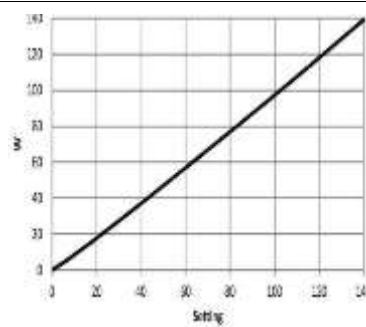


## SOFT MICRO BICOAG and AUTO SOFT MICRO BICOAG currents.

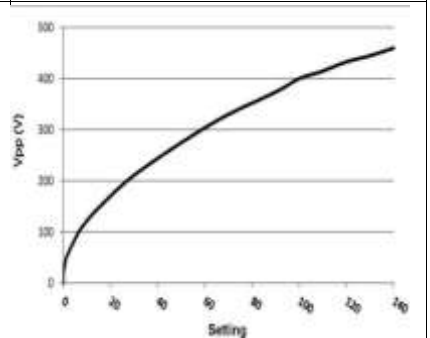
Delivery of the power with power setting = 50% and 100% of the maximum power When varying the loads from 10 to 1000Ω



Delivery of the power. When varying the power at the rated load.



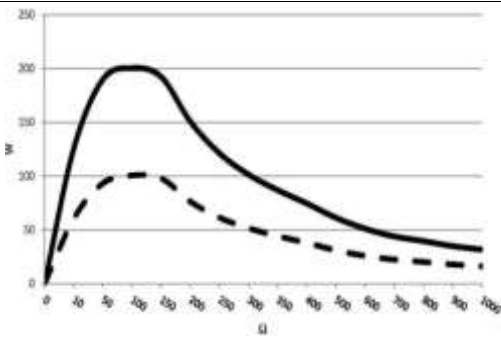
Increase of the Vp voltage When varying the power setting. (It is measured with open circuit)



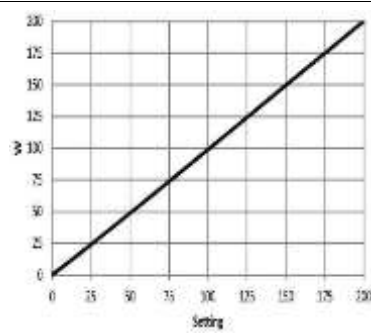


**FORCED MICRO BICOAG current.**

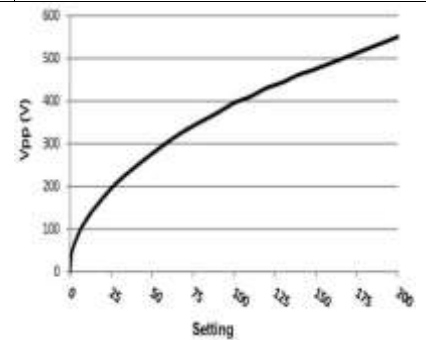
Delivery of the power with power setting = 50% and 100% of the maximum power When varying the loads from 10 to 1000Ω



Delivery of the power. When varying the power at the rated load.

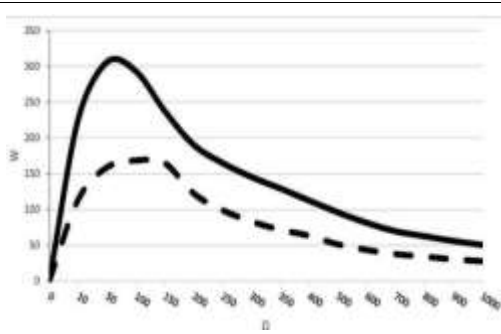


Increase of the Vp voltage When varying the power setting. (It is measured with open circuit)

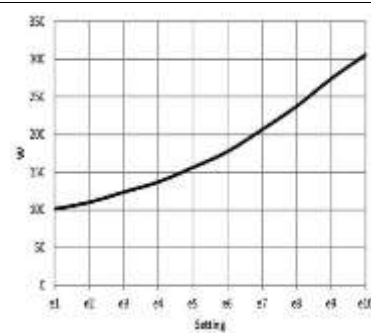


**SEALING and AUTO SEALING currents.**

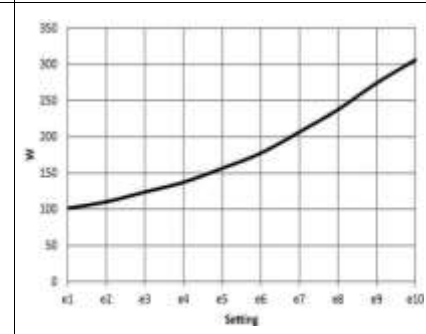
Delivery of the power with power setting = 50% and 100% of the maximum power When varying the loads from 10 to 1000Ω



Delivery of the power. When varying the power at the rated load.



Increase of the Vp voltage When varying the power setting. (It is measured with a load of 2000 Ω)

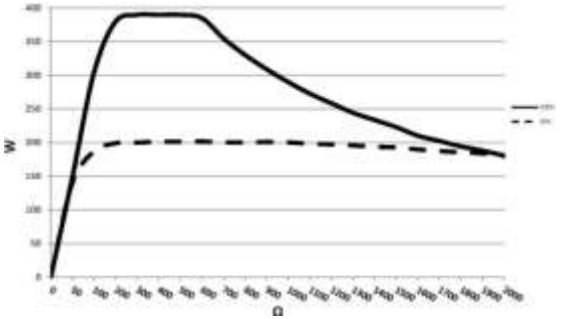
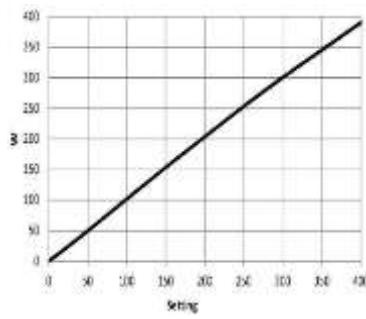
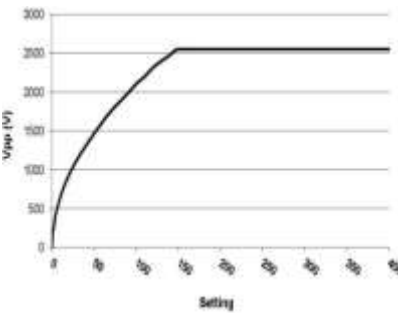
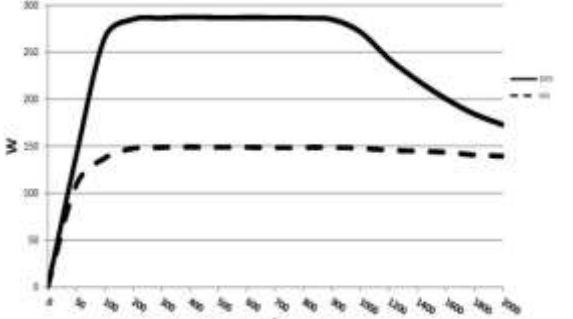
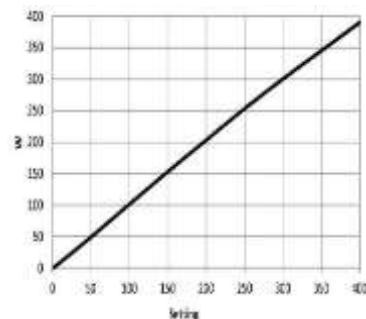
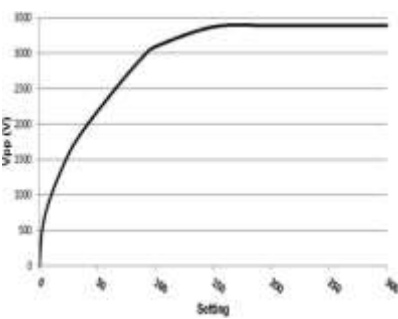
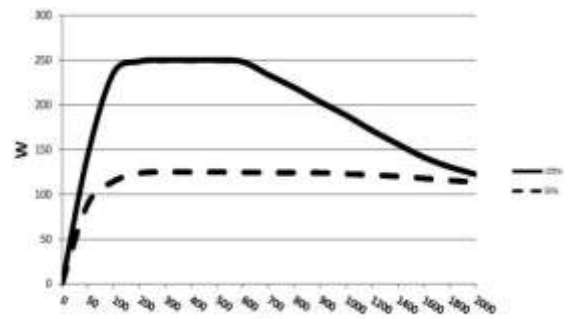
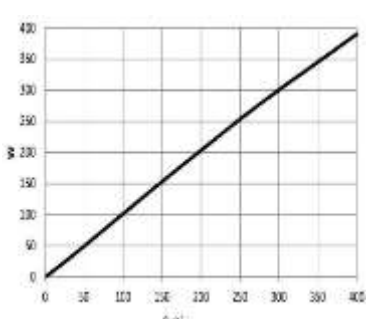
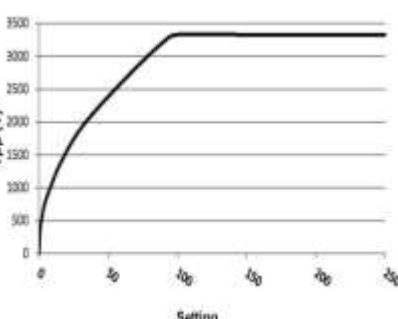




## 32 DIAGRAMS OF THE MONOPOLAR CURRENTS (400W)

Values measured within 3 seconds, by excluding the transients lower than 1 second, as established in IEC 60601-2-2. With regard to the powers, we stress the following:

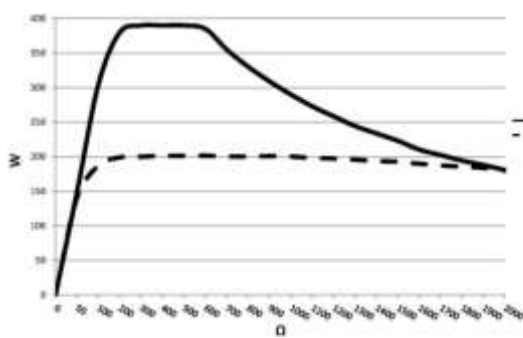
- The allowed tolerance is  $\pm 20\%$  for the powers higher than the 10% of the maximum power of the current.
- The measurements have to consider the tolerance of the devices used to perform the measurement. The maximum deliverable power is 400W and because of this reason the **PURE CUT** current is calibrated to not go over this limit.

PURE CUT current.		
Delivery of the power with power setting = 50% and 100% of the maximum power When varying the loads from 50 to 2000 $\Omega$	Delivery of the power. When varying the power at the rated load.	Increase of the Vp voltage When varying the power setting. (It is measured with open circuit)
		
BLEND CUT 1 current.		
Delivery of the power with power setting = 50% and 100% of the maximum power When varying the loads from 50 to 2000 $\Omega$	Delivery of the power. When varying the power at the rated load.	Increase of the Vp voltage When varying the power setting. (It is measured with open circuit)
		
BLEND CUT 2 current.		
Delivery of the power with power setting = 50% and 100% of the maximum power When varying the loads from 50 to 2000 $\Omega$	Delivery of the power. When varying the power at the rated load.	Increase of the Vp voltage When varying the power setting. (It is measured with open circuit)
		

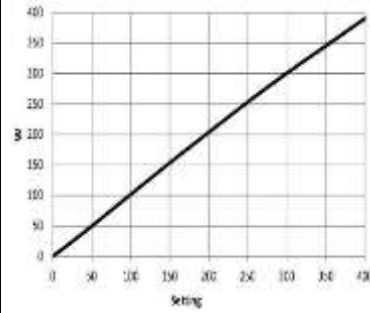


**PURE CUT PULSED current.**

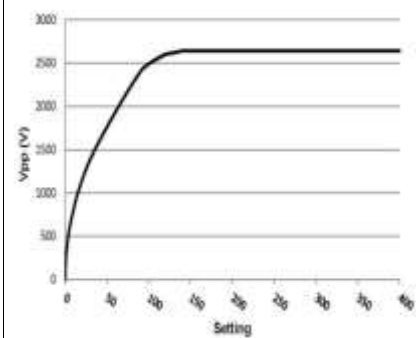
Delivery of the power with power setting = 50% and 100% of the maximum power When varying the loads from 50 to 2000Ω



Delivery of the power. When varying the power at the rated load.

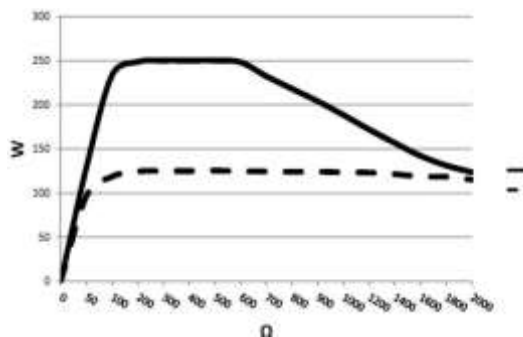


Increase of the Vp voltage When varying the power setting. (It is measured with open circuit)

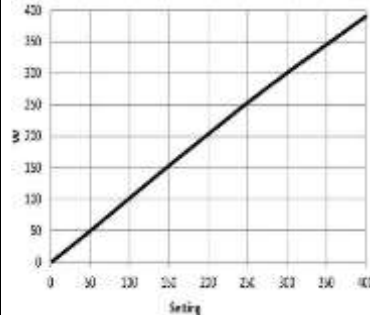


**BLEND CUT PULSED current.**

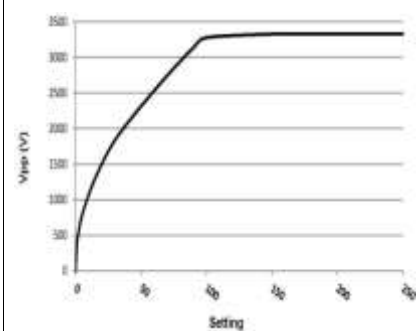
Delivery of the power with power setting = 50% and 100% of the maximum power When varying the loads from 50 to 2000Ω



Delivery of the power. When varying the power at the rated load.

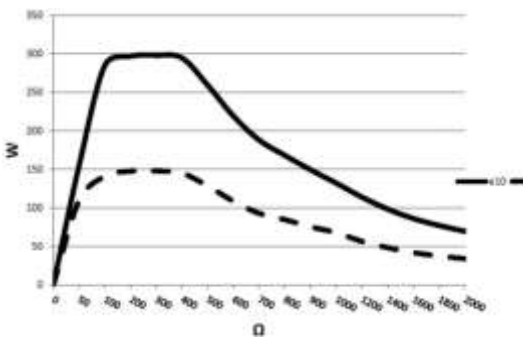


Increase of the Vp voltage When varying the power setting. (It is measured with open circuit)

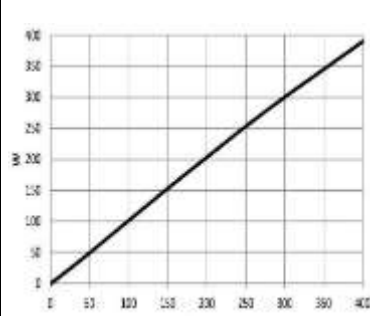


**AUTO PURE MICRO current.**

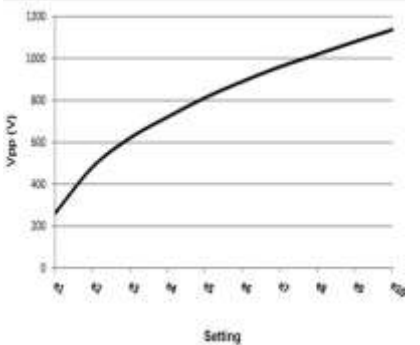
Delivery of the power with power setting = 50% and 100% of the maximum power When varying the loads from 50 to 2000Ω



Delivery of the power. When varying the power at the rated load.



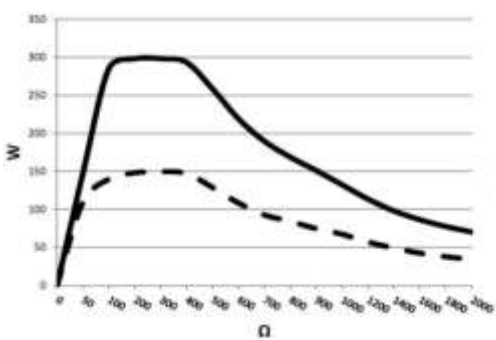
Increase of the Vp voltage When varying the power setting. (It is measured with open circuit)



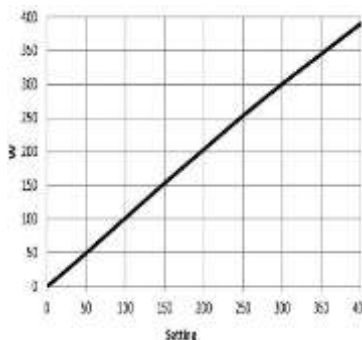


## AUTO BLEND CUT MICRO current.

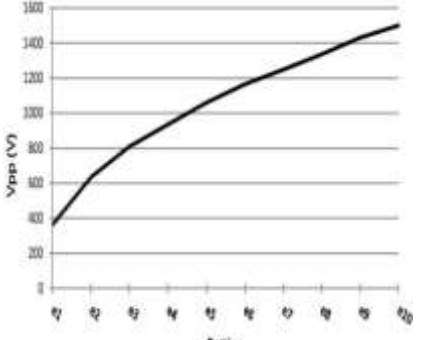
Delivery of the power with power setting = 50% and 100% of the maximum power When varying the loads from 50 to 2000Ω



Delivery of the power. When varying the power at the rated load.

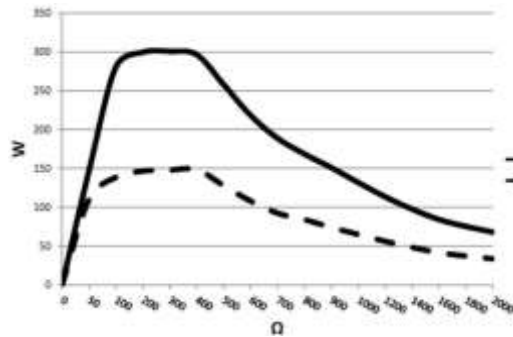


Increase of the Vp voltage When varying the power setting. (It is measured with open circuit)

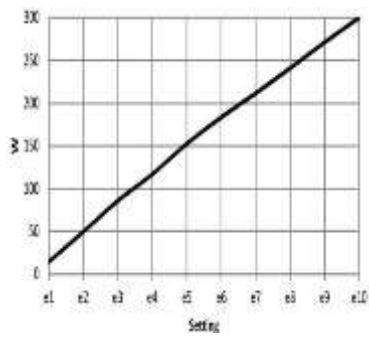


## AUTO PAPILO MICRO current.

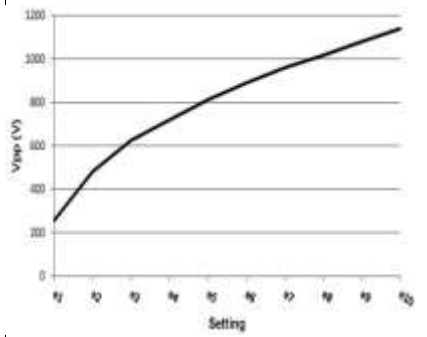
Delivery of the power with power setting = 50% and 100% of the maximum power When varying the loads from 50 to 2000Ω



Delivery of the power. When varying the power at the rated load.

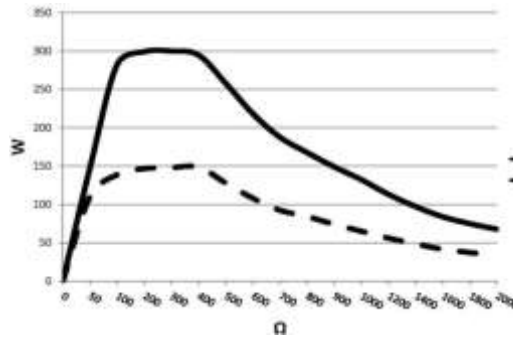


Increase of the Vp voltage When varying the power setting. (It is measured with open circuit)

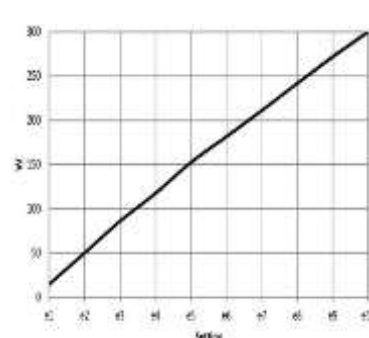


## AUTO POLIPO MICRO current.

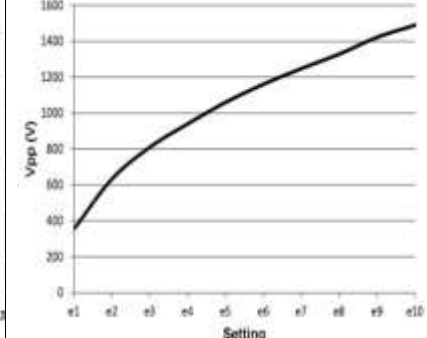
Delivery of the power with power setting = 50% and 100% of the maximum power When varying the loads from 50 to 2000Ω



Delivery of the power. When varying the power at the rated load.



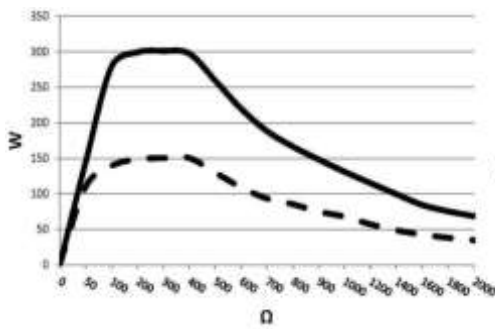
Increase of the Vp voltage When varying the power setting. (It is measured with open circuit)



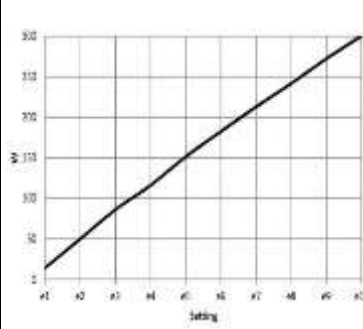


### AUTO ENDO CUT current.

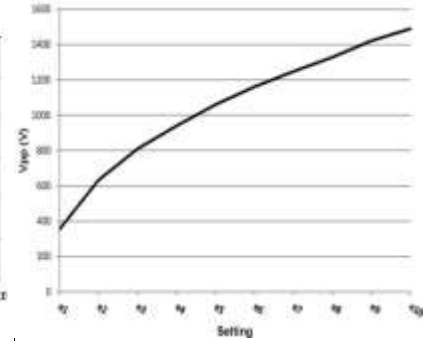
Delivery of the power with power setting = 50% and 100% of the maximum power When varying the loads from 50 to 2000Ω



Delivery of the power. When varying the power at the rated load.

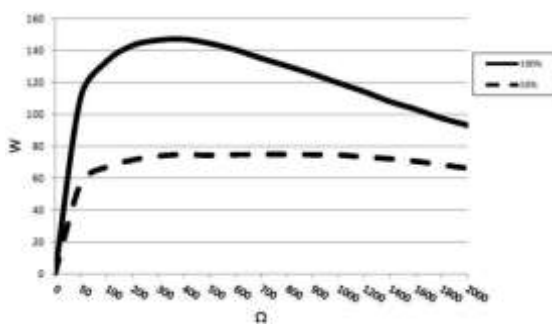


Increase of the Vp voltage When varying the power setting. (It is measured with open circuit)

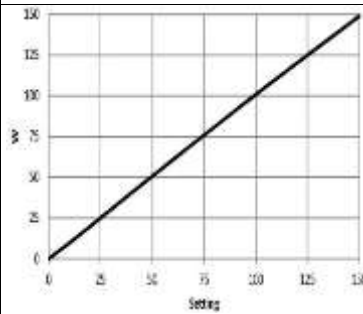


### FULG FORCED COAG current.

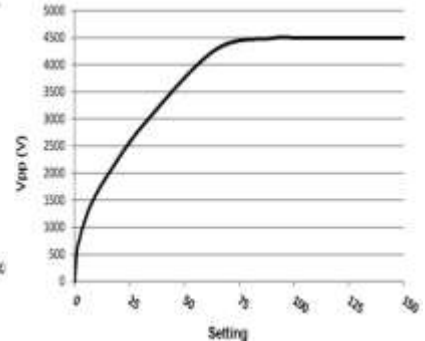
Delivery of the power with power setting = 50% and 100% of the maximum power When varying the loads from 50 to 2000Ω



Delivery of the power. When varying the power at the rated load.

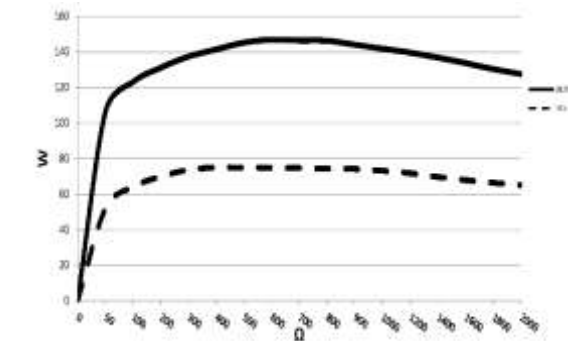


Increase of the Vp voltage When varying the power setting. (It is measured with open circuit)

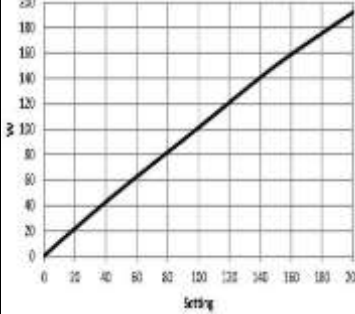


### SPRAY COAG and PULSED SPRAY COAG currents.

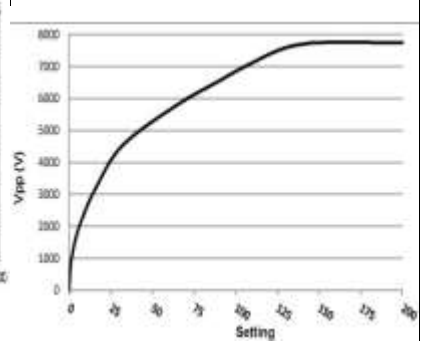
Delivery of the power with power setting = 50% and 100% of the maximum power When varying the loads from 50 to 2000Ω



Delivery of the power. When varying the power at the rated load.



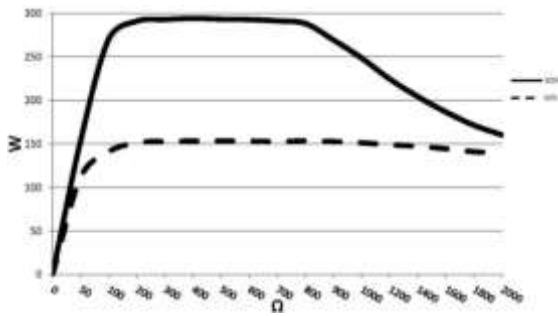
Increase of the Vp voltage When varying the power setting. (It is measured with open circuit)



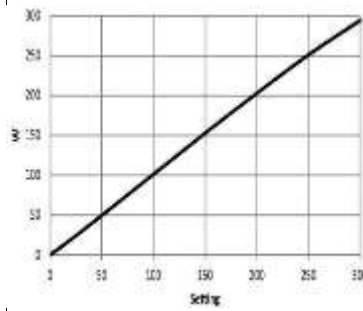


## PIN POINT CONTACT current.

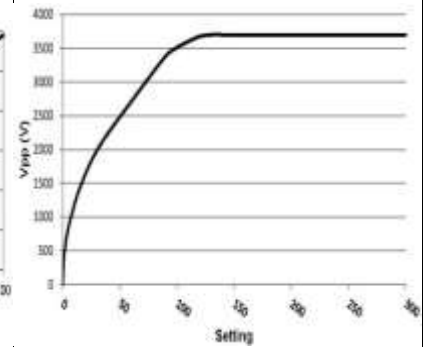
Delivery of the power with power setting  
= 50% and 100% of the maximum power  
When varying the loads from 50 to 2000Ω



Delivery of the power.  
When varying the power at the rated  
load.

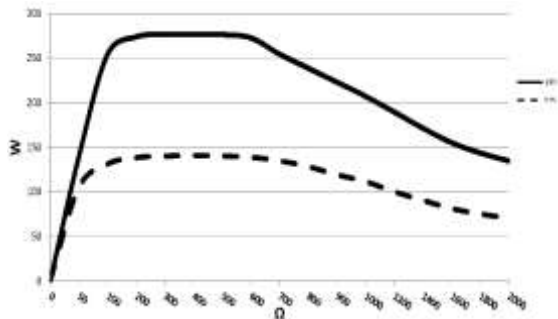


Increase of the Vp voltage  
When varying the power setting.  
(It is measured with open circuit)

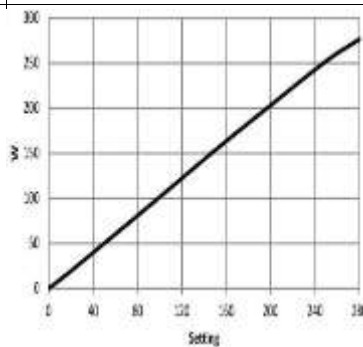


## SOFT MICRO COAG current.

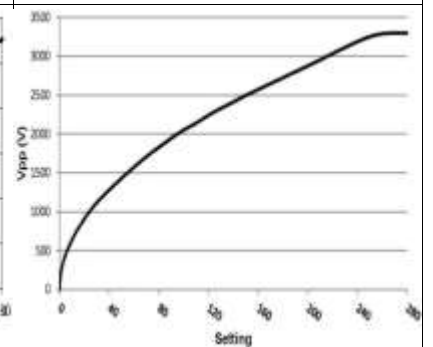
Delivery of the power with power setting  
= 50% and 100% of the maximum power  
When varying the loads from 50 to 2000Ω



Delivery of the power.  
When varying the power at the rated  
load.



Increase of the Vp voltage  
When varying the power setting.  
(It is measured with open circuit)





### 33 DIAGRAMS OF THE BIPOLAR CURRENTS (400W)

Values measured within 3 seconds, by excluding the transients lower than 1 second, as established in IEC 60601-2-2.

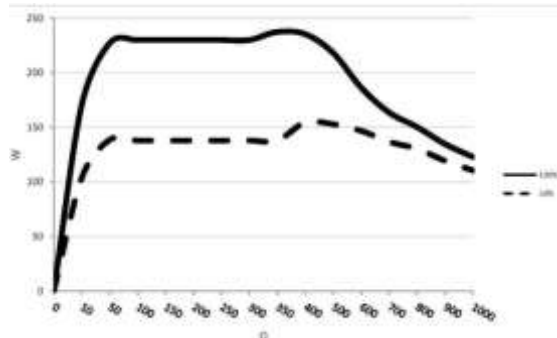
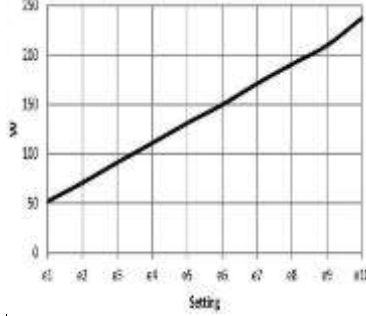
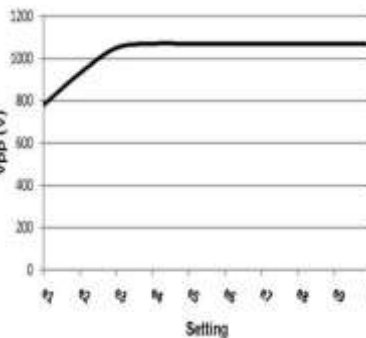
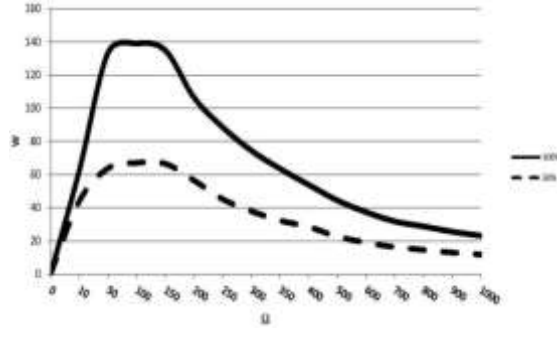
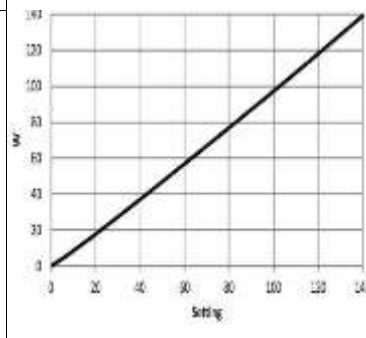
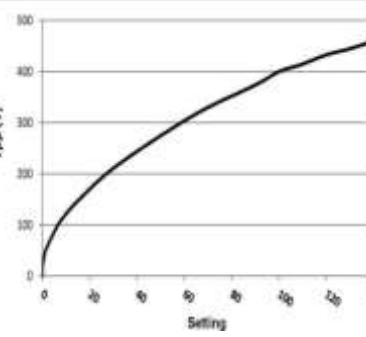
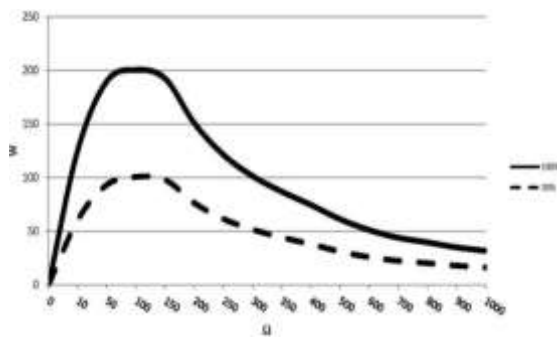
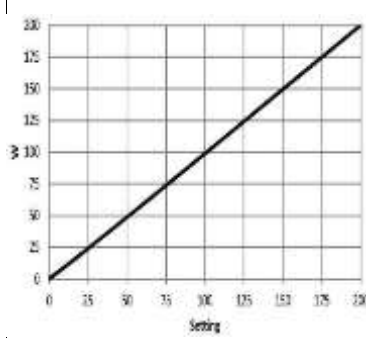
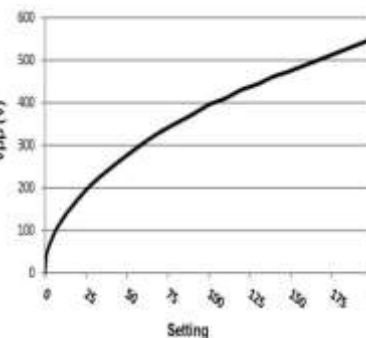
With regard to the powers, we stress the following:

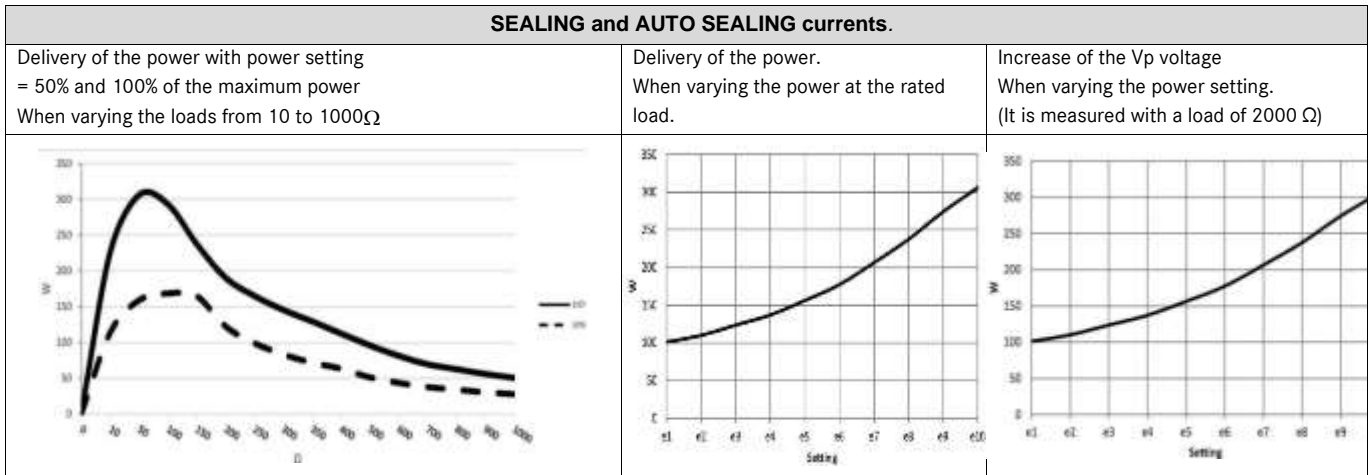
The allowed tolerance is  $\pm 20\%$  for the powers higher than the 10% of the maximum power of the current.

The measurements have to consider the tolerance of the devices used to perform the measurement.

STANDARD BICUT current.		
Delivery of the power with power setting = 50% and 100% of the maximum power When varying the loads from 10 to 1000 $\Omega$	Delivery of the power. When varying the power at the rated load.	Increase of the Vp voltage When varying the power setting. (It is measured with open circuit)
BLEND BICUT current.		
Delivery of the power with power setting = 50% and 100% of the maximum power When varying the loads from 10 to 1000 $\Omega$	Delivery of the power. When varying the power at the rated load.	Increase of the Vp voltage When varying the power setting. (It is measured with open circuit)
SALINE URO-GYN CUT current.		
Delivery of the power with power setting = 50% and 100% of the maximum power When varying the loads from 10 to 1000 $\Omega$	Delivery of the power. When varying the power at the rated load.	Increase of the Vp voltage When varying the power setting. (It is measured with open circuit)



SALINE ARTHRO CUT current.		
Delivery of the power with power setting = 50% and 100% of the maximum power When varying the loads from 10 to 1000Ω	Delivery of the power. When varying the power at the rated load.	Increase of the Vp voltage When varying the power setting. (It is measured with open circuit)
		
SOFT MICRO BICOAG and AUTO SOFT MICRO BICOAG currents.		
Delivery of the power with power setting = 50% and 100% of the maximum power When varying the loads from 10 to 1000Ω	Delivery of the power. When varying the power at the rated load.	Increase of the Vp voltage When varying the power setting. (It is measured with open circuit)
		
FORCED MICRO BICOAG current.		
Delivery of the power with power setting = 50% and 100% of the maximum power When varying the loads from 10 to 1000Ω	Delivery of the power. When varying the power at the rated load.	Increase of the Vp voltage When varying the power setting. (It is measured with open circuit)
		



### 34 ACCESSORIES

#### 34.1 REUSABLE NEUTRAL ELECTRODES

<b>tk 90029-00</b>	Flexible, autoclavable, neutral electrode (Made of conductive silicone) for adults. 25 x 12 cm. Patients with weight higher than 15 Kg. Connecting cable 4.0m long.	
<b>tk 90029-01</b>	Flexible, autoclavable, neutral electrode (Made of conductive silicone) for adults. 19 x 8 cm. Patients with weight from 5 to 15 Kg. Connecting cable 4.0m long.	

#### 34.2 FOOT-SWITCHES

<b>tk 90016-01</b>		Twin foot-switch (About 22x18 cm.) with protective bridge and foot-selector to activate either the monopolar currents or the bipolar currents. (Connector with 5 pins)
<b>tk 90017-00</b>		Twin foot-switch (About 22x18 cm.) without the foot-selector to activate the bipolar currents only.