» TEKNO TOM 500 ARGON «

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Index

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 WARNINGS 7
2.1 GENERAL INFORMATION 7
2.2 USE OF FLAMMABLE SUBSTANCES OR EXPLOSIVE GASES 8
2.3 ELECTRO-MAGNETIC INTERFERENCES 8
2.4 PREPARING AND POSITIONING OF THE PATIENT 8
2.5 USE OF THE NEUTRAL ELECTRODE 9
2.6 USE OF CURRENTS AND POWERS 9
2.7 USE OF ALL ACTIVE ACCESSORIES 9
2.8 SPECIFIC USE OF THE MONOPOLAR AND BIPOLAR INSTRUMENTS FOR LAPAROSCOPY 10
2.9 SPECIFIC USE OF THE BIPOLAR INSTRUMENTS FOR VESSEL SEALING 10
3 INFORMATIONS TO USE THE BIPOLAR MODE 10
3.1 USE OF BIPOLAR SCISSORS 10
3.2 STICKING OF THE TISSUE ON THE TIPS OF BIPOLAR INSTRUMENTS 10
3.3 CHECK OF THE BIPOLAR INSTRUMENT BEFORE USE 10
4 INFORMATION ABOUT THE PROBLEMS DURING THE USE WITH THE ARGON GAS. 10
5 GENERAL TECHNICAL FEATURES 11
6 CURRENTS - PULSED TECHNOLOGY 12
6.1 CURRENTS FOR MONOPOLAR CUT AND COAGULATING CUT. 12
6.2 CURRENTS FOR MONOPOLAR COAGULATION. 12
6.3 CURRENTS FOR ARGON COAGULATION. 12
6.4 CURRENTS FOR BIPOLAR CUT. 12
6.5 CURRENTS FOR BIPOLAR COAGULATION AND VESSEL-SEALING. 12
6.6 TECHNICAL FEATURES OF THE CURRENTS 13
7 CONTROL DEVICES, SOCKETS FOR CONNECTIONS AND SYMBOLS 14
7.1 PEDAL- 1 and PEDAL – 2 sockets (On the back). 15
7.2 NEUTRAL PLATE socket. 15
7.3 MONOPOLAR – 1 socket. Connection of monopolar accessories. 15
7.4 MONOPOLAR – 2 socket. 16
7.5 ARGON socket. 16
7.6 BIPOLAR – 1 and BIPOLAR -2 sockets. 16
8 TOUCH SCREEN 17
9 GENERAL MENU 18
10 SELF-CHECK 19
11 CONNECTION, SELF-CHECK AND USE OF THE ARGON GAS 21
12 INITIALS CHECKS AND EQUIPOTENTIAL CONNECTION 21
13 DATA STORING AT THE SWITCHIN ON 21
14 CHECK OF THE HF LEAKAGE CURRENTS TO EARTH 21
15 CONTROL CIRCUIT OF THE NEUTRAL ELECTRODE 22
16 STANDBY 24
17 USE OF THE FOOT-SWITCHES 24
18 MEMORIZATION AND USE OF THE PROGRAMS 26
19 SELECTION OF A MEMORY 27
20 BLINKING OF A MEMORY NUMBER 27
21 CANCELLATION OR MEMORIZATION OF THE CHANGES OF SETTING 27
22 FIRST SETTING 28
22.1 Setting of the monopolar and bipolar currents for the normal use (memories from 1 to 64). 29
22.2 Setting of the monopolar currents to use with the argon gas (memories from 1 to 54 and from 65 to 84). 30
22.3 Setting of the monopolar currents to use with the argon gas (memories from 55 to 64). 32
22.4 Identification of a memory by a text. 32
22.5 Memorization of the setting 33
22.6 Return to the normal use 33

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CE 0483

23 ADJUSTMENTS DURING THE USE 33
24 SECTIONS 35
24.1 SECTION 1 (MEMORIES FROM 1 TO 54) 35
24.1.1 WARNINGS AND PRECAUTIONS FOR THE OPERATION 35
24.1.2 SETTING OF THE CURRENTS 36
24.1.3 CONNECTION OF THE FOOT-SWITCHES 36
24.1.4 CONNECTION OF THE ACCESSORIES 36
24.1.5 INDICATIONS FOR THE SUITABLE CURRENTS 38
24.2 SECTION 2 (MEMORIES FROM 55 TO 64) 41
24.3 SECTION 3 (MEMORIES FROM 65 TO 74) 41
24.3.1 WARNINGS AND PRECAUTIONS FOR THE OPERATION 41
24.3.2 SETTING OF THE CURRENTS 42
24.3.3 ARGON GAS SUPPLY AND RELATED SELF-CHECK 42
24.3.4 CONNECTION OF THE FOOT-SWITCHES 42
24.3.5 CONNECTION OF THE ACCESSORIES 42
24.3.6 INDICATIONS FOR THE SUITABLE CURRENTS 44
24.4 SECTION 4 (MEMORIES FROM 74 TO 84) 45
24.4.1 WARNINGS AND PRECAUTIONS FOR THE OPERATION 45
24.4.2 SETTING OF THE CURRENTS 45
24.4.3 CONNECTION OF THE FOOT-SWITCHES 45
24.4.4 INDICATIONS FOR THE SUITABLE CURRENTS 46
24.4.5 DELIVERY OF THE CURRENTS 46
24.5 SECTION 5 (MEMORIES FROM 85 TO 92) 47
24.5.1 WARNINGS AND PRECAUTIONS FOR THE OPERATION 47
24.5.2 SETTING OF THE CURRENTS 47
24.5.3 CONNECTION OF THE FOOT-SWITCHES 47
24.5.4 CONNECTION OF THE ACCESSORIES 48
24.5.5 INDICATIONS FOR THE SUITABLE CURRENTS: 48
24.5.6 DELIVERY OF THE BIPOLAR CURRENTS 49
24.6 SECTION 6 (MEMORIES FROM 93 TO 99) 49
24.6.1 WARNINGS AND PRECAUTIONS FOR THE OPERATION 49
24.6.2 SETTING OF THE CURRENTS 49
24.6.3 CONNECTION OF THE FOOT-SWITCHES 50
24.6.4 CONNECTION OF THE ACCESSORIES 50
24.6.5 INDICATIONS FOR THE SUITABLE CURRENTS 51
24.6.6 DELIVERY OF THE CURRENTS 52
25 CLEANING AND STERILIZATION 53
26 USE, STORAGE, MAINTENANCE, DISPOSAL 53
27 ADAPTORS FOR CONNECTION AND USE OF THE TK 90302-21 ADAPTOR 53
28 TECHNICAL FEATURES 54
28.1 ENVIRONMENTAL AND ATMOSPHERIC CONDITIONS FOR USE, TRANSPORT AND STORAGE 54
29 DIAGRAMS OF THE MONOPOLAR CURRENTS 55
30 DIAGRAMS OF THE BIPOLAR CURRENTS 60
31 ACCESSORIES 62
31.1 REUSABLE NEUTRAL ELECTRODES 62
31.2 FOOT-SWITCHES 62

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Attention

- Read this manual very carefully, without considering previous experiences with similar devices, before starting the use of this unit
- Keep the manual where the unit is used and replace it in case of loss.
- Contact the company, before starting any procedure, if the manual is not clear for the specific need.
- Contact the company, either directly or through the local distributor, both to obtain the needed
- information and to replace the manual.
-

This unit is manufactured by TEKNO-MEDICAL Optik-Chirurgie GmbH, Tuttlingen (Germany), which is responsible for its functioning, liability and safety only if:

The device is used in an area that meets IEC Standards

If both the installation and the use are performed according to the information of this manual.

If checks or repairs are performed by authorized personnel who use original spare parts.

On request, TEKNO MEDICAL will provide the user with the related electric diagrams and/or any further technical or practical information.

In accordance with the requirements of the Medical Device Regulation EU MDR 2017/745 and our quality management system, even the smallest problems with this product should always be reported to TEKNO.
If you cannot reach us directly for reportable events, please send an e-mail to: safety@tekno-medical.com.
Serious incidents must also be reported to the competent authority in your country.

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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 3 ways:
MONOPOLAR MODE , ARGON GAS ENHANCED MONOPOLAR MODE 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
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.

ARGON GAS ENHANCED MONOPOLAR MODE
Argon is an inert and not dangerous gas usable, combined with all monopolar currents, by specific accessories.
The use of this gas allows the obtaining of some special effects:

- The reduction of the smoke or bad smells when it is combined with all monopolar currents
- The ARGON COAGULATION when is combined with the monopolar, high voltage, SPRAY current.
  This coagulation, with maximum deep of 3mm, is very efficient and useful to coagulate, in a very quick and constant way, bleeding tissues without damaging them. (For example the hepatic parenchyma).

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 using the monopolar mode, also presents 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) csused by EMC interferences emitted by the unit.

Damages of the patient's tissues caused by a delivery of too high powers.

Slight neuromuscular stimulation, mainly while using currents for coagulation, where the active electrode and neutral one are used. This stimulation can be felt by patients or surgeons like "an electrical discharge**";**
Risk of embolism, when using the argon coagulation, if it doesn't produce a rapid eschar on the targettissues.

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 CUT (Pure or Coagulating), Monopolar Coagulation (low, medium and high voltage), Argon gas enhanced monopolar CUT and coagulation, Bipolar Cutting, Bipolar Coagulation (Micro, Macro, Sealing of vessels and so on).

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.

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2 WARNINGS

The HF electrosurgical units are vital to solve many surgical needs, but the use of the HF currents also causes specific risks and undesired side effects.
Since the behavior of users is vital 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 use them in the safest way which have to be included in the use manual.

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 well experienced in electro-surgery and all the related problems, risks or undesired side effects.
- That users, before using the device, read this manual, very carefully.
- That operators use this device when applying all the warnings detailed in this manual.

2.1 GENERAL INFORMATION

- 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.
- 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.

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 they check 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).

In case of units with argon gas enhanced currents, users have to check:
All accessories according to the specific information detailed in the paragraph
"INFORMATION ABOUT THE PROBLEMS DURING THE USE OF THE ARGON GAS"

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2.2 USE OF FLAMMABLE SUBSTANCES OR EXPLOSIVE GASES

- Never use flammable substances (cleaning substances, disinfectants) or explosive anesthetic gases (i.e. oxygen, nitrogen protoxide) when using a HF device ! It is very dangerous since the spark normally 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.
- 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 use 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 do not wet the sheets placed under or around the patient with disinfectants. 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;

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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 NE is fixed because the not homogeneous passage of the current 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:

- If the NE is a reusable type, check it to verify if is 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 to avoid ischemic zones. Avoid anomalous contacts (i.e. When positioning the patient's arm on the operating table, insulate hands/ 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 2 for patients with body weight higher than 15 Kg; approx. 84cm2 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 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 across diagonally the body or it crosses the heart.

2.6 USE OF CURRENTS AND POWERS

- Check its features before using a new HF unit and do not consider previous experiences with similar devices. Always start the use with low powers and then raise them until reaching the required result.
- Always use the lowest possible power. Do not exceed 1/4 of the maximum power of monopolar currents when using neutral electrodes for pediatrics, 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.
- For example, when using the Argon gas coagulation, the risk of embolism rises if the power level is not sufficient to produce a rapid and impermeable eschar on the target tissues;

2.7 USE OF ALL ACTIVE ACCESSORIES

(ELECTRODES, PENCILS, INSTRUMENTS, CABLES, CONNECTORS)

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 can 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:
  - Approx. 7600 Vpp. "4000 Vp" for the monopolar currents with crest factor equal or higher than 2.
  - Approx. 3600 Vpp "1800 Vp" for the monopolar currents with crest factor lower than 2.
  - Approx. 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 ∅ 2, 3 mm.

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2.8 SPECIFIC USE OF THE MONOPOLAR AND BIPOLAR INSTRUMENTS FOR LAPAROSCOPY

- Use the instrument under visual control and, after each with-drawal, 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, 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 CUT it.
- About the sticking of the tissue on the ends of the instrument, see the following paragraph

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 problem when surgeons are using the bipolar currents for coagulation and vessel sealing. To reduce it do the following:

A) When using forceps/clamps, irrigate , if possible, tissues with physiological solution.

B) 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 / 4coagulations.
- Immerse tips in a bowl and wet again them in the same way after 3 / 4coagulations.

3.3 CHECK OF 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 INFORMATION ABOUT THE PROBLEMS DURING THE USE WITH THE ARGON GAS.

The functioning of the accessories for argon gas surgery can be affected by the following reasons:

- **Breakage of the conductor for the electrical currents of all accessories.**
  The SPRAY current does not reach the end of the electrode and it is not able to ignite the gas.
  To check this problem move, bend and pull cables and all flexible conductors.
  For example this problem is quite normal when using the probes for flexible endoscopy.
- **Breakage of the pipe which "brings" the gas to the end of the accessory.**
  The SPRAY current reaches the end of the electrode, but the gas flow is absent or too low and it is not able to generate the argon coagulation. To check this problem move, bend and pull all pipes.
  Also in this case the problem is quite normal when using the probes for flexible endoscopy.
- **Total or partial obstruction of the probes for flexible Endoscopy, caused by the liquid used to clean or sterilize them.**
  The gas flow is absent or intermittent and it is not able to generate the argon coagulation.
  In this case blow air inside the pipe (For example by using a syringe).

Remember that, to produce the argon coagulation, the HF unit delivers a minimum gas flow of 5/6 lt/min at the pressure of about 2 atm, this flow) and this flow can cause a specific problem during laparoscopic procedures, mainly if the cavity is small (i.e. in paediatric surgery).
The flow, in fact, can increase the normal pressure which is obtained by insufflating the CO_2 inside the cavity and insufflators can signal it by a specific alarm signal (I.E. Over PRESSURE).
To avoid this problem do the following:

- Use TEKNO'S smoke evacuators which, as soon the power delivery starts, evacuate smokes and the excessive gas.
  Or
- Open, for an instant, the Luer-Lock tap of any trocar when start using the argon gas.

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5 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 setting and, in case of hardware/software failures which could cause an anomalous delivery, it blocks the delivery.

The unit is provided with monopolar and bipolar currents usable with continuous and pulsed delivery.

The second one is very useful for the following:

- It reduces the smoke both in open-sky surgery and in laparoscopic surgery.
- It reduces undesired effects of currents (i.e. the excessive carbonization of tissues).
- It reduces the delivered power by 50%.

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 usable by one or two monopolar handles or instruments:
When the argon section is off, the unit is usable:
By one hand-switched handle/instrument and/or by one foot-switched handle/instrument.
By two hand-switched handles.
When the argon section is on, the unit is usable:
Either by one hand-switched handle/instrument or by a foot-switched handle/instrument.
By a hand or foot switched handle/instrument for the argon gas enhanced use.
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 with neutral electrodes either “Single section - Non Split” or “Double section - Split”.
- 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.

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6 CURRENTS - PULSED TECHNOLOGY

All the monopolar and bipolar currents 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 = **pwr.**

The usability and the advisable starting setting of each current is detailed in the SECTIONS dedicated to different surgical uses.

Some currents both for monopolar cut or coagulation and one current for bipolar coagulation are usable both with the normal continuous delivery and with the pulsed delivery that is very useful because of the following:

- It reduces the smoke both in open-sky surgery and in laparoscopic surgery.
- It reduces undesired effects of currents (i.e. the excessive carbonization of tissues).
- It reduces the delivered power by 50%.

6.1 CURRENTS FOR MONOPOLAR CUT AND COAGULATING CUT.

Pure Cut (ADC System Control). Cut without coagulating effect.
Blend Cut 1 (ADC System Control). Cut with soft coagulating effect.
Blend Cut 2 (ADC System Control). Cut with very strong coagulating effect (2% cut, 98% coagulation).
Pure Cut Pulsed (ADC System Control). Cut without coagulating effect and pulsed delivery.
Blend Cut Pulsed (ADC System Control). Cut with coagulating effect and pulsed delivery.
Auto Pure Micro (APC System Control). Delicate cut without coagulating effect.
Auto Blend Cut Micro (Self-control APC System). Delicate cut with coagulating effect.
Auto Papillo Pure Cut (APC System Control). Pure cut.
It has 4 delivery modes: continuous or pulsed (slow, medium and fast).
Auto Polipo Blend Cut (APC System Control). Coagulating cut.
It has 4 delivery modes: continuous or pulsed (slow, medium and fast).
Auto Endo Cut (APC System Control). Current with four different phases of cut and coagulation.

6.2 CURRENTS FOR MONOPOLAR COAGULATION.

Fulg Forced Coag (ADC System Control). Coagulation with strong superficial sparking with continuous or pulsed delivery**.**
Spray Coag (ADC System Control). No-contact coagulation with very strong sparking**.**
Pin Point Contact Coag (ADC System Control). Coagulation with medium superficial sparking with continuous or pulsed delivery
Soft Micro Coag (ADC System Control). Coagulation with very low superficial sparking.

6.3 CURRENTS FOR ARGON COAGULATION.

Spray Coag (ADC System Control). Continuous argon coagulation.
Pulsed Spray Coag (ADC System Control). Delicate argon coagulation with pulsed delivery.

6.4 CURRENTS FOR BIPOLAR CUT.

Standard Bicut (ADC System Control). Cut of dried or wet tissues**.**
Blend Bicut (ADC System Control). Cut with very strong coagulation (2% cut, 98% coagulation).
Saline Uro-Gyn Cut (ADC System Control). Cut for the endoscopic use in saline with continuous or pulsed delivery.
Saline Arthro Cut (ADC System Control). Cut for the arthroscopic use in saline with continuous or pulsed delivery.

6.5 CURRENTS FOR BIPOLAR COAGULATION AND VESSEL-SEALING.

Soft Micro Bicoag (APC System Control). Delicate and precise coagulation with continuous or pulsed delivery
Forced Micro Bicoag (ADC System Control). Fast coagulation.
Auto Soft Micro Bicoag (APC System Control). Coagulation identical to the SOFT MICRO BICOAG**.**
It has an automatic “impedance sensing” start/stop system.
Sealing (APC System Control). Coagulation/vessel sealing of vessels with diameter up to 8 mm.
It starts by using the foot-switch, but has an automatic “impedance sensing” stop system.
Auto Sealing (APC System Control). Current identical to the SEALING**.**
It has an automatic “impedance sensing” start/stop system.

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6.6 TECHNICAL FEATURES OF THE CURRENTS

MONOPOLAR CURRENTS	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:	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: 5OHz - 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:	Ditto
AUTO PAPILLO 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:	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 COAG	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 CURRENTS.	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 e AUTO SOFT MICRO BICOAG	140 W	150 Ω	460	F: 440 kHz - CF: 1,6 - M: 0 - DT: 100%	Acute Sound, Blue light.
FORCED MACRO BICOAG	200 W	150 Ω	550	F: 440 kHz - CF: 1,6 - M: 0 - DT: 100%	Ditto
SEALING e AUTO SEALING	320 W	100 Ω	320	F: 440 kHz - CF: 1,46 - M: 0 - DT: 100%	Ditto

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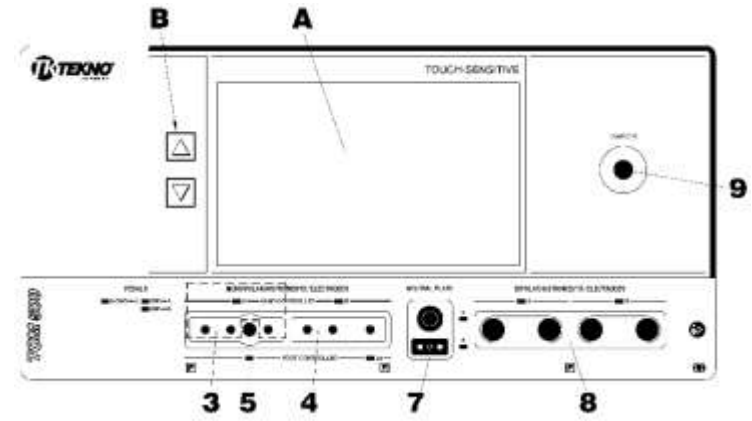
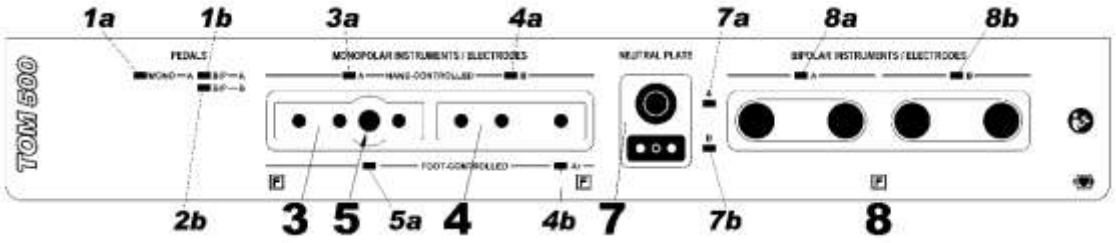
7 CONTROL DEVICES, SOCKETS FOR CONNECTIONS AND SYMBOLS





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 either the power of currents or the Argon gas flow.

(1, 2) Sockets to connect the twin foot-switches, on the back

(3, 5) Sockets to connect the monopolar accessories.

(4) Socket to connect either a monopolar accessory or the electrical cable of the accessories for the ARGON.

(7) Socket to connect the neutral electrode.

(8) Sockets to connect the bipolar accessories.

(9) Socket to connect the gas pipe of the cable of the accessories for the ARGON enhanced use.

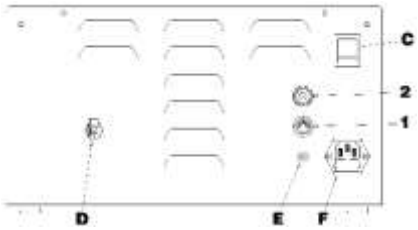
(C) Mains switch.

(D) Connector for the pipe of the argon supply

(E) Plug for the equipotential connection.

(F) Socket for the supply cord with fuse block

(G, N) Not used.



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

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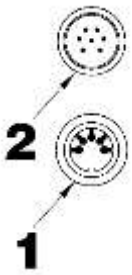
7.1 PEDAL- 1 and PEDAL – 2 sockets (On the back).



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.

7.2 NEUTRAL PLATE socket.

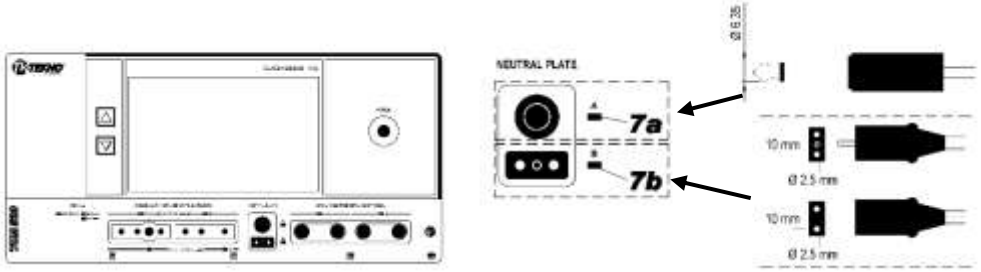
Connection of the neutral electrode.

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

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

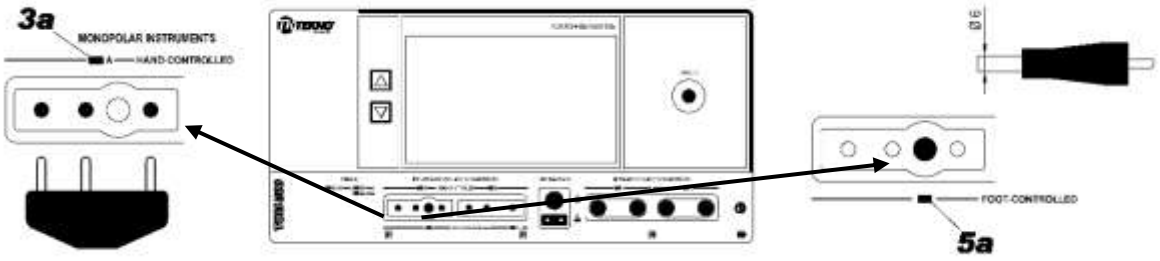
(When the 7b NP-2 light is ON)

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



- For the complete functioning of the control circuit and for the selection of the socket, see the paragraph ”CONTROL CIRCUIT OF THE NEUTRAL ELECTRODE”.

7.3 MONOPOLAR – 1 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

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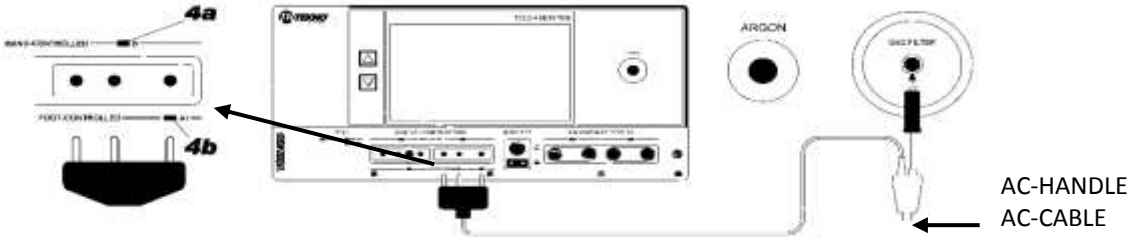
7.4 MONOPOLAR – 2 socket.

Connection of the following monopolar accessories:

- Monopolar handle for normal surgery.
- Monopolar accessories for argon surgery.



ARGON OFF (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".

ARGON SECTION ON (The 4a HAND SWITCHED light is ON. It blinks).

The socket allows the connection of the electrical cable of the hand-switched "AC/HANDLE"(tk90301-10)for the Argon surgery in open or laparoscopic surgery.

ARGON SECTION ON (The 4b FOOT SWITCHED light is ON. It blinks).

The socket allows the connection of the electrical cable of the "AC/CABLE" for the use of the foot-switched electrodes / probes for surgery or flexible endoscopy with the Argon gas.

7.5 ARGON socket.

Connection of the gas pipe of the AC/HANDLE (tk90301-10) or AC/CABLE.

To do it, the filter with the metallic connector have to be screwed to the socket

7.6 BIPOLAR – 1 and BIPOLAR -2 sockets.

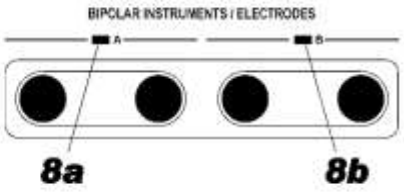
Connection of the bipolar accessories.

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

All the currents, for CUT 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.

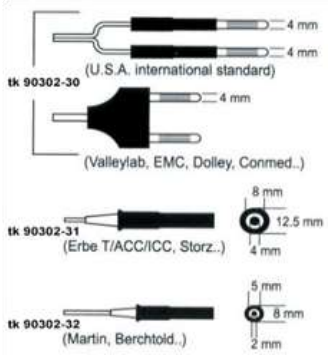
The currents for CUT are delivered through the first socket, the currents for coagulation or vessel sealing are delivered through the second socket.



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

To use accessories with cables having connectors different from the standard one, use the following adaptors:

tk 90302-30: To use cables with 2 flying plugs Ø 4 mm.
tk 90302-30: To use cables with connector Valleylab type.
tk 90302-31: To use cables with connector ERBE, STORZ type.
tk 90302-32: To use cables with connector MARTIN type.



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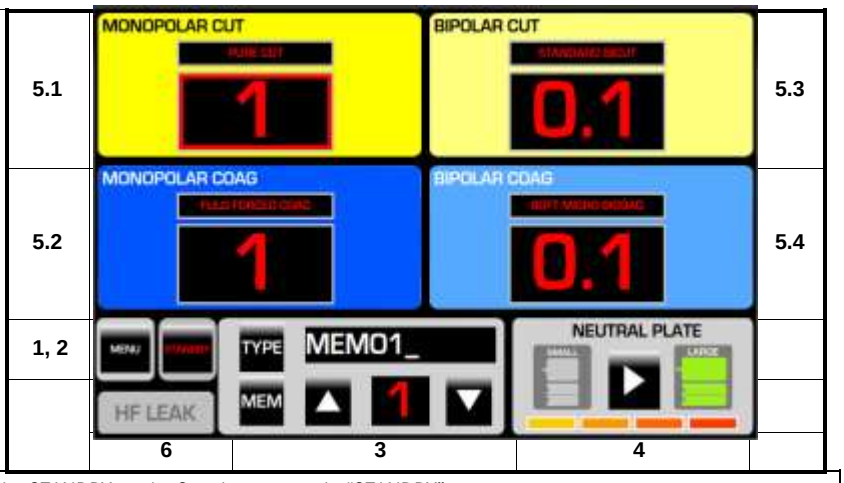
8 TOUCH SCREEN

GENERAL IMAGE
WITHOUT THE ARGON SECTION.

In this case the unit allows the use
of the monopolar and bipolar currents



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".	
5	Area to select and set currents and powers. See the paragraph "FIRST SETTING"	
	5.1 – Monopolar CUT and coagulating CUT.	5.2 – Monopolar coagulation.
	5.3 – Bipolar CUT	5.4 – Bipolar coagulation and vessel sealing.
6	HF LEAKAGE alarm light of the control circuit of HF leakage currents to earth. See the paragraph " CONTROL OF HF LEAKAGE CURRENTS TO EARTH".	

GENERAL IMAGE INCLUDING THE ARGON SECTION.

The ARGON section is usable only if the gas supply is well connected as detailed in the paragraph "CONNECTION, SELF-CHECK AND USE OF THE ARGON GAS".

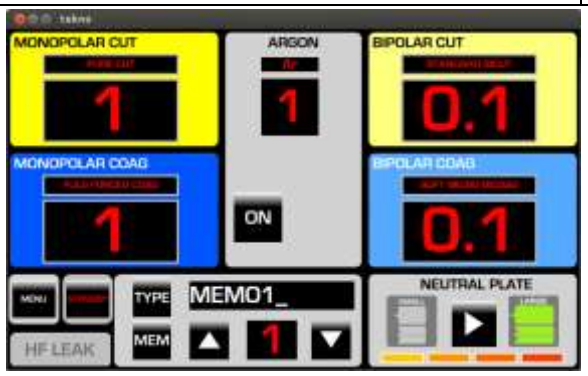
The visibility mode of the section can be set by pushing the AR key of the general menu:

Ar It is always visible.	Ar It is visible only when the gas supply is well connected.

Starting image when selecting memories from 1 to 54 and from 65 to 84.

The unit allows the use of the following:

- All monopolar and bipolar currents.
- The monopolar currents for cutting with a flow of argon gas to reduce smokes and bad smells.
- The argon coagulation (normal or pulsed).



Starting image when selecting memories from 55 to 64.

The unit allows the use of the following:

- All monopolar and bipolar currents.
- All monopolar currents with a flow of argon gas to reduce smokes and bad smells.

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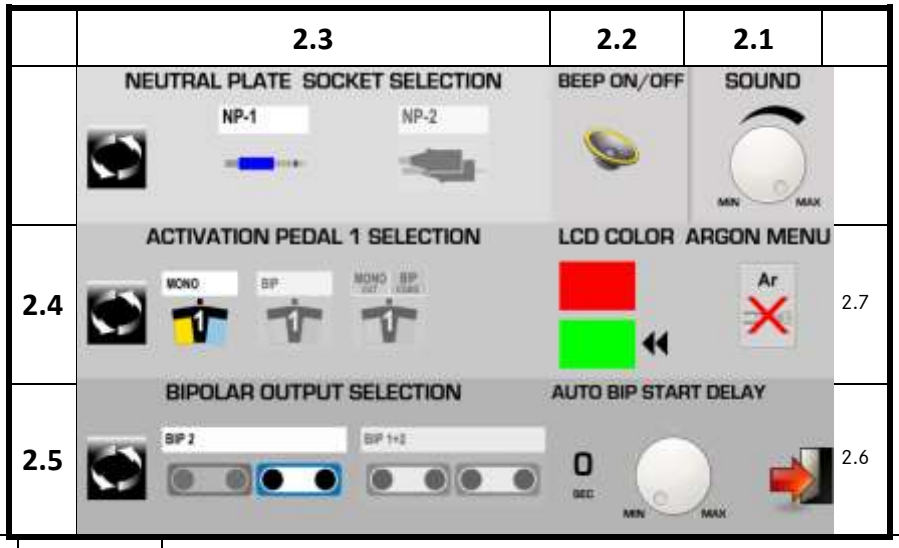
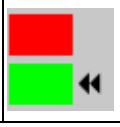
9 GENERAL MENU

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.



2.1		**SECTION: SOUND** 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.**
2.2		**SECTION: BEEP ON/OFF.** By pushing the key, users can set the acoustic signal of the keys on the panel.
2.3		**SECTION: NEUTRAL PLATE SOCKET SELECTION** 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”.
2.4		SECTION: ACTIVATION PEDAL 1 SELECTION By pushing the key, users can manually set the functioning mode of the standard, main, twin foot-switch tk 90016-01
2.5		SECTION: BIPOLAR OUTPUT SELECTION 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.
2.6		SECTION: AUTO BIP START DELAY 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.
2.7		SECTION: ARGON. By pushing the key, users can select the mode of visibility of the ARGON section: Always / Only if the gas supply is well connected to the unit. See the paragraph “CONNECTION, SELF-CHECK AND USE OF THE ARGON GAS”
		SECTION: LCD color By pushing the key, users can set the colour (green/red) of the numbers on the touch screen.

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10 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 which ends only if the unit operates perfectly. The unit signals this phase, by specific codes on the touch screen.

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).

The system also checks the ARGON SECTION as follows:

- When users connect the Argon gas supply, it checks the related pressure.
- When users switch the ARGON SECTION ON, it checks again the gas pressure.
- During use, it checks the residual gas (The gas is finishing if its pressure is lower than 2,5 atm).

In all cases the system, if it detects both breakages and mistakes of use, blocks the the delivery of powers by signalling the problem with specific alarms and error codes. In case of the signals detailed in the TABLE I, users can eliminate the cause. In case of other signals, users can 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
The assembly and the internal connections of all instruments, mainly if for endoscopy or laparoscopy.
The insulation of the blades of all bipolar scissors.

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).

In case of units with argon gas enhanced currents, users have to check:
All accessories according to the specific information detailed in the paragraph
"INFORMATION ABOUT THE PROBLEMS DURING THE USE OF THE ARGON GAS"

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CE 0483

TABLE I		
CAUSE OR PROBLEM.	**Acoustic Signal**	**Visual alarm or Error code on the touch screen**
Fairly good contact of a "SPLIT- Double section" neutral electrode (When using this type).	**Not**	**Light 1 ON. Symbols (EL or ES) black.**
Poor contact of a "SPLIT- Double section" neutral electrode (When using this type).	**1 Tone**	**Lights 1and 2 ON. Symbols (EL or ES) black.**
Very poor contact of a "SPLIT- Double section" neutral electrode (When using this type).	**2 Tones**	**Lights 1, 2 and 3 ON. Symbols (EL or ES) black.**
• **Not sufficient contact of the "SPLIT- Double section" neutral electrode (When using this type).** • **All the neutral electrodes "SPLIT- Double section or NON SPLIT- Single section" are not connected to the unit. (When using any of these types).** • **The cable of the neutral electrodes is broken.**	**Continuous, pulsed, tone**	**Lights 1, 2, 3 and 4 ON. Symbols (EL or ES) ON (red). + "Neutral plate alarm".**
HF Leakage currents to earth too high. See the par."Check of the HF Leakage currents to earth		**Light** H.F. LEAKAGE
Not allowed use of an activation switch.	**Yes**	**Not allowed handle or pedal activation.**
Not allowed use of two activation 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!**
ARGON SECTION - WHEN CONNECTING THE GAS SUPPLY.		
Gas pressure too high (> 4,5 atm). **Cause:** Breakage or wrong setting of the gas pressure control devices (outside or inside the unit).	**Yes**	**High input Argon pressure.**
An internal breakage causes losses of gas.	**Yes**	**Argon Loss!**
ARGON SECTION - WHEN SWITCHING THE SECTION ON.		
Gas pressure too low (lower than 2,5 atm). **Cause**: The gas supply is not connect, The gas is finishing.	**Yes**	**Light "gas pressure low".** 
Gas pressure too high (> 4,5 atm).	**Yes**	**High input Argon pressure.**
When switching the section on		
Gas pressure too low (lower than 2,5 atm).	**Yes**	Light "gas pressure low". 
Gas pressure too high (> 4,5 atm).	**Yes**	High input Argon pressure.
ARGON SECTION - DURING THE USE.		
Gas pressure too low (lower than 2,5 atm). **Cause:** The gas is finishing.	**Yes**	**Light "gas pressure low"+ Insufficient input Argon pressure** 
Gas pressure too high (> 4,5 atm).	**Yes**	**High input Argon pressure.**

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CE 0483

11 CONNECTION, SELF-CHECK AND USE OF THE ARGON GAS

To use the argon surgery, the unit has to be connected to a gas supply (cylinder or centralized supply)

The visibility mode of this section can be set by pushing the ARGON key (2.7) of the GENERAL MENU.

It is always visible.
This mode allows the continuous check of the section.

It is visible only when the gas supply is well connected.
This mode can be set, if users prefer it.

The ARGON section is usable by pushing the **ON/OFF** key of the section only:

- If the gas supply is connected.
- The pressure of the gas supply is about 3,5 atm.

GAS PRESS. LOW

Otherwise the section is blocked and the GAS PRESS.LOW light is ON.
The pressure is already fixed when using original cylinders.
Users have to set it when using both different cylinders and a centralized gas supply

CONNECTION OF THE GAS SUPPLY.

- **Connect to the D socket (on the back) the connector of the gas pipe.**

To insert the connector of the pipe: Push the PUSH button over the socket and insert it.
To disconnect the connector of the pipe: Push the PUSH button over the socket and pull it.

- **Rotate the knob over the cylinder to open it.**

The main manometer over the cylinder shows the remaining quantity of gas.
When the cylinder is full the manometer shows 200 atm. (They decrease when consuming the gas).

The self-check system of the unit checks the ARGON SECTION (gas pressure, problems).
See, in the TABLE I of the previous paragraph, the detail of related alarm signals

12 INITIALS 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)**.

13 DATA STORING AT THE SWITCHIN 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 following:

- 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)
- The switching ON of the ARGON section.

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 the Par "BLINKING OF A MEMORY NUMBER.

14 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 LEAKAGE light ON).**

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CE 0483

15 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:

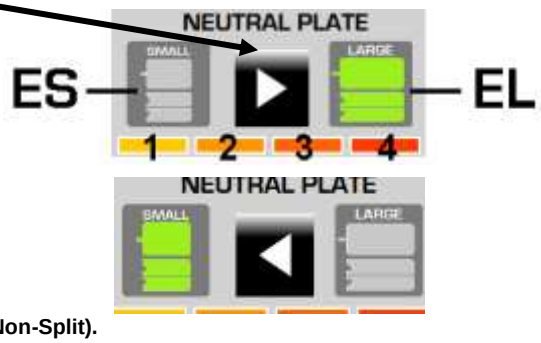
- The use with electrodes for adults (Dimensions of ,at least, 136 cm²).
- The use with small electrodes for paediatrics (Dimensions of ,at least, 86 cm²) or new born.
- The use of all neutral electrodes: Single section "Non Split" and Double section "Split".
- The use with both reusable, normal, electrodes 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.

SETTING key:
It is used to select the operation mode:

- Large = With electrodes for adults.
- Small = With electrodes for paediatrics or new born.

EL / ES Symbols:
They are used to identify the operation mode and they change the color according to the operation of the control circuit.
1, 2, 3, 4 Alarm Lights.

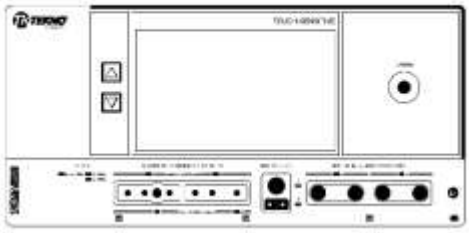


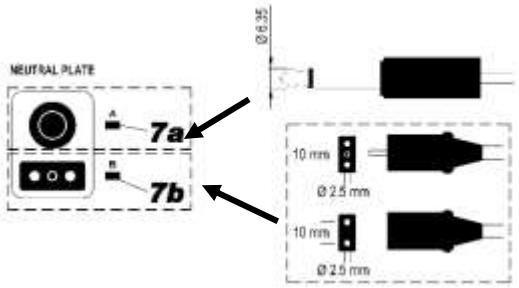
The circuit operates in different ways according to the electrode (Split, Non-Split).
The circuit does not intervene when selecting the memories for the bipolar use only.
In this case the 1, 2, 3, 4 lights and the EL, ES symbols are ON, but for information only.

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 (Use with standard electrodes for adults).
This mode allows the delivery of maximum available power.

SMALL – ES (Use with small electrodes for paediatrics or new born)
This mode allows the delivery of maximum 150W.

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 Tekno 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.

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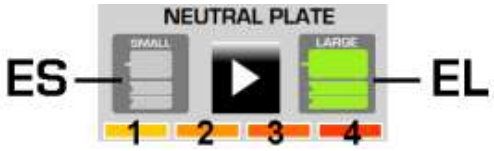
OPERATION OF THE CIRCUIT

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

- If the cable is well connected to the electrode.
- If the cable is well connected to the unit.
- If the cable is broken.
- **The circuit operates as follows**:



CABLE	ALARM SIGNALS		POWER DELIVERY	MAXIMUM DELIVERED POWERS	
	Acoustic	**Visual**		**Mode LARGE**	**Mode SMALL**
Well connected.	Not	Not	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:

- The connection of the cable as above detailed.
- If the electrode is well connected to the patient's tissues.

The circuit operates as follows:

CONTACT Electrode/Tissues	ALARM SIGNALS		POWER DELIVERY	MAXIMUM DELIVERED POWERS	
	Acustico	Visivo		**Mode. LARGE**	**Mode. SMALL**
Good	Not.	No	Yes.	Not limited	Max.150W.
Fairly good.	Not.	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 **E**L **or ES** ON with the same colour of the **2** light.	Yes, but. limited	Max.150W	Max.80W.
Very poor	2 Tones.	Lights **1, 2, 3** ON. Symbols **E**L or **ES** ON with the same colour of the **3** light.	Yes, but limited.	Max.150W	Max.80W.
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

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

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CE 0483

16 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)

17 USE OF THE FOOT-SWITCHES

The units are usable with two twin foot-switches:

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

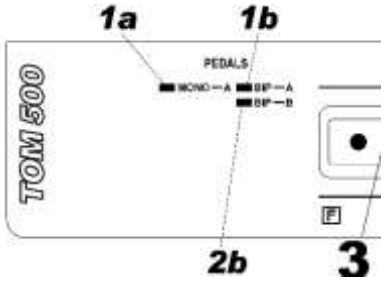
The standard **tk 90016-01** pedal is provided with a foot selector to allow the surgeon

to selected either the activation of the monopolar currents or the activation of the bipolar currents.

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

 tk 90016-01	 tk90017-00
it has a connector with 5 pins	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.

- AThe sockets to connect them are : PEDAL-1 = tk 90016-01), PEDAL-2 = tk 90017-00
- The use by foot-switch is mistake proof!
- If surgeons press two pedals simultaneously, the self-check system of the unit blocks the power delivery and it informs users by an acoustic alarms with and additional visual information (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.
- Use of both foot-switches (tk90016-01 and tk90017-00) to activate monopolar and bipolar currents.
- Use of the tk90016-01 to activate both the monopolar currents for CUT and the bipolar currents for
- coagulation or vessel sealing.

Block of the foot selector of the tk 90016-01.
To avoid mistakes of use, the foot selector can be easily blocked by a specific system.
In this case the foot selector can’t be used.

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The foot-switches are not needed to activate the following bipolar currents:
AUTO SOFT MICRO BICOAG for coagulation and **AUTO SEALING** for vessel sealing.
Which 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/jaws of the instrument come in contact with bleeding vessels.
- The delivery stops both when vessels are coagulated /sealed and if the surgeon opens the tips/jaws.

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

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

TK 90016-01

2) **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).

3) **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.

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 the tk 90016-01 to deliver the monopolar currents: Yellow (Cutting), **Blue** (Coagulation).
  Use the tk 90017-00 to deliver the bipolar: Yellow (Cutting), **Blue** (Coagulation or Vessel sealing).

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 accustom 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 CUT).
  Blue (Bipolar Coagulation or Vessel sealing).

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18 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 list of memories can be seen as it is detailed in the following paragraph SELECTION OF A MEMORY (LIST OF MEMORIES).**

- **The memories (from 1-to-54) are for open or laparoscopic surgery by delivering:**
  All normal, monopolar and bipolar, currents.
  The monopolar currents for CUT, argon gas enhanced to reduce smokes and bad smells.
  The argon coagulation (continuous or pulsed).
  Users, when selecting these memories, can set, for the argon enhanced use, currents or powers different from those set for the normal use.
  For example. They can deliver both the FULG-FORCED coagulation with 60W for the normal use and the SPRAY coagulation with 120W for the argon coagulation.

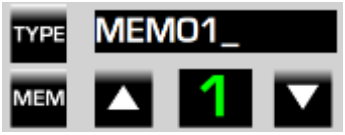
- **The memories (from 55-to-64) are for the same use of memories from 1 to 54, but they are different with regard to the use of the argon enhanced currents.**
  In fact, these memories allow the use of the argon gas with all monopolar currents to reduce smokes and bad smells.
  When selecting these memories, the monopolar currents delivered for either the normal use or for the use with the gas are identical.
  For example. If users set the FULG FORCED coagulation with 60W, they deliver this current when using it both without gas and with gas.

- **The memories (from 65-to-74) are for the flexible endoscopy by delivering:**
  All normal, monopolar and bipolar, currents.
  The argon coagulation (continuous or pulsed).
  Users, when selecting these memories, can set, for the argon coagulation, currents or powers different from those set for the normal use.
  For example. They can deliver both the FULG-FORCED coagulation with 40W for the normal use and the SPRAY coagulation with 100W for the argon coagulation.

- **The memories (from 75 to 84) are for the, under liquid, monopolar endoscopy**

- **The memories (from 85 to 99) are for the bipolar use only.**
  - The memories from 85 to 89 are for the endoscopy in saline.
  - 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 the Par. “SELECTION OF A MEMORY”.
- To perform the first setting and the memorization of a program, see the Par. “FIRST SETTING”
- To change the setting memorized in a program, see the Par. “ADJUSTMENTS DURING THE USE”.
- To either cancel or memorize the changes of settings, see the Par.“CANCELLATION OR MEMORIZATION OF THE CHANGES OF THE SETTING”.

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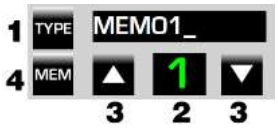
19 SELECTION OF A MEMORY

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.

20 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, the unit operates normally.
- If users switch it OFF while the number is blinking, it resets the same state/setting at the following switching ON.

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 unit doesn't reset the switching ON of the ARGON section

The memory number stops blinking (See the following paragraph) **as follows**:

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

21 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
  The 1 screen appears.
- Push the SI/YES key.
- The 1 screen switches off 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/NOT key
  The 1 screen switches off and the number stops blinking.
- **To exit from the 1 screen in case of mistakes:**Push the **EXIT** key.

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CE 0483

22 FIRST SETTING

1) Starting

Switch the unit ON and, when the self-check ends, push the STANDBY key 

2) 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.

3) 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 use modes of the standard foot-switch
- 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.
- The visibility mode of the ARGON section.

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

4) Setting of both the monopolar currents (without or with argon gas) and the bipolar currents.

Users, according to the selection of the memory, can see three starting images.

The 4a) image, if the ARGON section is not visible or usable (All memories).
In this case, users can only set the monopolar and bipolar currents for the normal use.

The 4b) image including the ARGON section (Memories from 1 to 54 and from 65 to 84).
In this case, users can set all the following currents:
The monopolar and bipolar currents for the normal use.
The monopolar currents for cutting combined with the gas to reduce smokes/bad smells.
The argon coagulation (Continuous or pulsed).

The 4c) image including the ARGON section (Memories from 55 to 64 only).
In this case, users can set all the following currents:
The monopolar currents which are usable both normally and combined with the gas to reduce smokes/bad smells.
The bipolar currents.

Visibility and usability of the ARGON section
The visibility can be set by the **argon** key (2.7) of the GENERAL MENU.

It is always visible.
This mode allows the continuous check of the section.

It is visible only when the gas supply is well connected.
This mode can be set, if users prefer it.

See the previous paragraph ”CONNECTION, SELF-CHECK AND USE OF THE ARGON GAS”

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”

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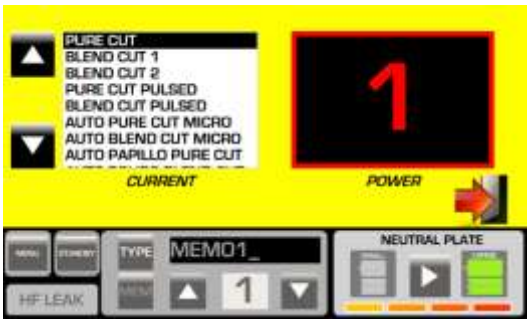
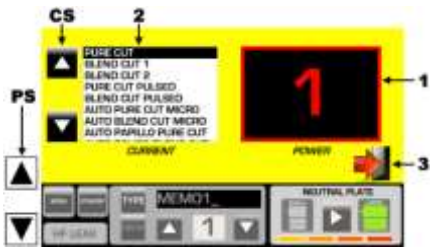
22.1 Setting of the monopolar and bipolar currents for the normal use (memories from 1 to 64).

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

MONOPOLAR CUT	MONOPOLAR COAG
	
BIPOLAR CUT	**BIPOLAR COAG**
	

Users, 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 corrent only.

- By the CS keys, select the current.
- By the PS keys on the panel set the power.
- Push the 3 - EXIT key.



Users can set more currents.

- Set, as above detailed, the first current.
- Do not push the 3 -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 3- EXIT key.

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

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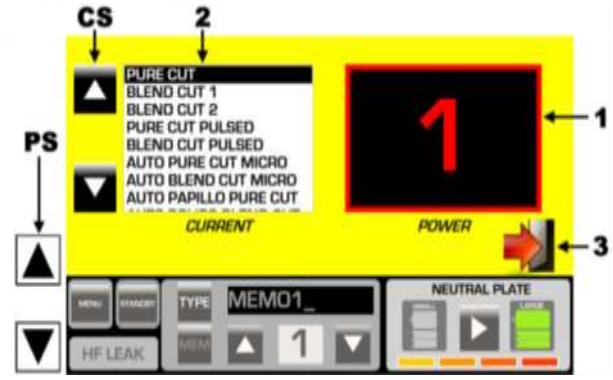
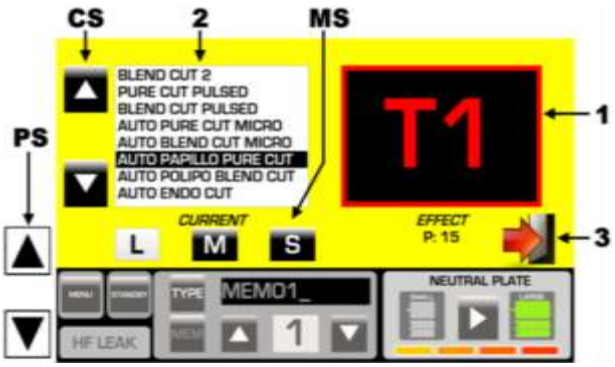
All the currents are self controlled, according to the features of tissues, with two different systems:
ADC System – Self-adjustment with constant power.
APC System – Self-adjustment with constant voltage.
In base al sistema le potenze sono visibili, nell'area **1** di ogni sezione, come segue:

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 corrents, **Auto papillo pure cut, Auto polipo blend cut and Auto Endo cut**, which are suitable 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:

Currents: ***Auto papillo pure cut.*** ***Auto polipo blend cut.***	**All keys are OFF:**	Continuos delivery.
	The first key is ON:	Pulsed delivery (fast modulation).
	The second key is ON:	Pulsed delivery (medium modulation).
	The third key is ON:	Pulsed delivery (slow modulation).
Currents: ***Auto Endo cut.***	**All keys are OFF:**	The delivery is 90% cutting, 10% coagulation.
	The first key is ON:	The delivery is 80% cutting, 20% coagulation.
	The second key is ON:	The delivery is 70% cutting, 30% coagulation.
	The third key is ON:	The delivery is 50% cutting, 50% coagulation.

22.2 Setting of the monopolar currents to use with the argon gas (memories from 1 to 54 and from 65 to 84).

When users select these memories and the ARGON section is visible and usable as it is detailed in the paragraph "CONNECTION, SELF-CHECK AND USE OF THE ARGON GAS", the unit allows the setting and the delivery of the following currents:

- All the monopolar or bipolar currents for normal surgery.
- The monopolar currents for cutting combined with the gas to reduce smokes and bad smells.
- The, continuous or pulsed, argon coagulation.

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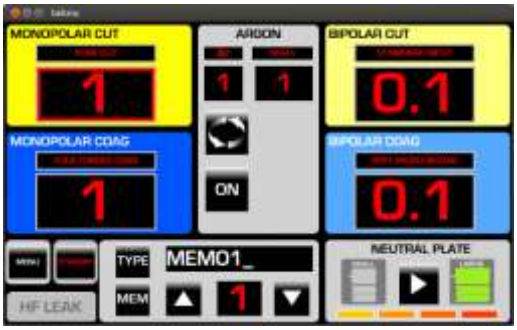
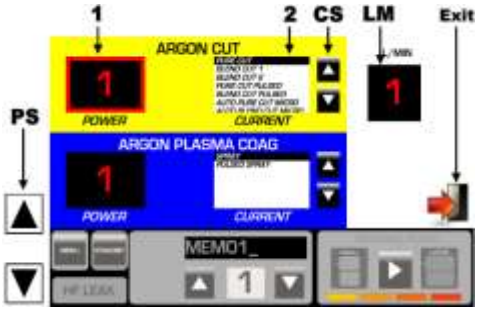


ARGON ON/OFF key:
It allows the switching ON/OFF of the argon section.
Only if the gas supply is well connected as it is detailed in the par. CONNECTION, SELF-CHECK AND USE OF THE ARGON GAS.

S key:
It allows the use/setting of the ARGON section

To set all the currents for the normal surgery, follow the instructions of the point:
"4a) Setting, in all memories, of the monopolar and bipolar currents for the normal use".

To set, independently from the previous ones, the monopolar currents for the use with the argon gas, push the **S** key and follow the way here under detailed.



Remember that, when using these memories and switching the ARGON section ON, they are preset:

- **A value for the gas flow.**
- **A value for the SPRAY currents needed to produce the argon coagulation.**

Both levels can be changed, according to the surgeon's preference.

Setting of the ARGON gas flow if the preset value (12lt/min) has to be changed.

- Push the LM area (Its frame switches ON) and, by the PS keys on the panel, set the gas flow.

In the ARGON CUT area select, if the surgeon likes, the current for cutting + gas to reduce smokes and bad smells.

- By the CS keys select the current in the 2 area.
- Push the 1 area (Its frame switches ON) and, by the PS keys on the panel, set its power.
- Repeat the same way to set further currents for cutting.

In the ARGON PLASMA COAG area set the argon coagulation.

- By the CS keys select the current in the 2 area (Continuous = SPRAY, Pulsed = PULSED SPRAY).
- Push the 1 area (Its frame switches ON) and, by the PS keys on the panel, set its power if the preset value has to be changed.
- Repeat to set both modes.

At the end push the **Exit** key.

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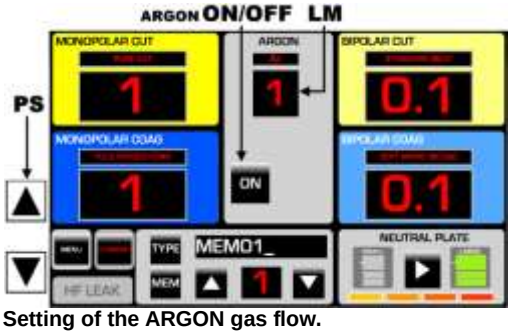
22.3 Setting of the monopolar currents to use with the argon gas (memories from 55 to 64).

When users select these memories and the ARGON section is visible and usable as it is detailed in the paragraph "CONNECTION, SELF-CHECK AND USE OF THE ARGON GAS", the unit allows the setting and the delivery of the following currents:

- All the monopolar currents, usable either for normal surgery or combined with the gas to reduce smokes and bad smells.
- All the bipolar currents.



ARGON ON/OFF key:
It allows the switching ON/OFF of the argon section.
Only if the gas supply is well connected as it is detailed in the par. CONNECTION, SELF-CHECK AND USE OF THE ARGON GAS

Remember that, when using these memories and switching the ARGON section ON, it is already preset a starting gas flow which can be changed, according to the surgeon's preference, as under detailed.

Setting of the ARGON gas flow.

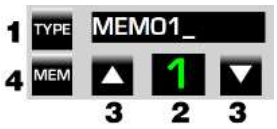
- Push the LM area (Its frame switches ON) and, by the PS keys on the panel, set the gas flow.

Setting of the monopolar currents to use.

- Follow the instructions of the point:
  "4a) Setting, in all memories, of the monopolar and bipolar currents for the normal use".

Remember that, also in this case, the delivery of a SPRAY current generates the argon coagulation if its power level is higher than about 50/60W.

22.4 Identification of a memory by a text.



Before memorizing the setting of a program, do the following:
Push the **type/exit** key (1). The screen 1 appears:

1

2

In the screen (1).

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

In the screen (2).

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

In the screen (1).

- Cancel excessive types by using the key.

- Write again the text (max. 10 types)
- Push the **EXIT** key.

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22.5 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.

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!
Remember that the system, if the memory number is blinking, does not allow the selection of a new memory!

22.6 Return to the normal use

Connect the neutral electrode when selecting the memories for the monopolar use (1 – 84)!

- Select the memory to use as the paragraph SELECTION OF A MEMORY details.
- Push the **standby** key (It switches OFF) to use the unit.

23 ADJUSTMENTS DURING THE USE

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

- While not activating the power delivery, all the setting of a program (modes of use, currents, powers and the argon flow) can be changed completely.
- While not activating the power delivery, both the power of the selected currents and the argon flow can be changed.
- While activating the power delivery, both the power of the delivered current and the argon flow 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"

1) 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 "4a) Setting, in all memories, of the monopolar and bipolar currents for the normal use".

To change the setting of the monopolar currents to use with the argon gas, do the following:

- Follow the instructions detailed in the paragraph "FIRST SETTING", point "4b) Setting of the monopolar currents to use with the argon gas when selecting the memories from 1 to 54 and from 65 to 84".

or

- Follow the instructions detailed in the paragraph "FIRST SETTING", point "4c) Setting of the monopolar currents to use with the argon gas when selecting the memories from 55 to 64".

2) Change of either the power of delivered current or the argon gas flow while activating the power delivery.

When users activate a current, on the touch-screen the image of the current appears.
Three 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).
- ARGON COAGULATION (Indication of the power = Watts and Indication of the gas flow = liters/minute).

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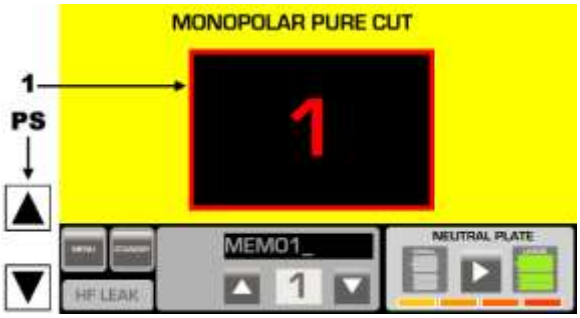
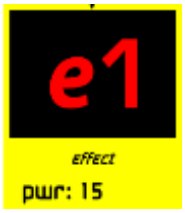
Change of the Monopolar Pure Cut current.
Push the **PS** keys on the panel.
On the area (1) the watts change.



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!



To change the power and /or the gas flow of the argon coagulation, do the following:

Change of the gas flow.

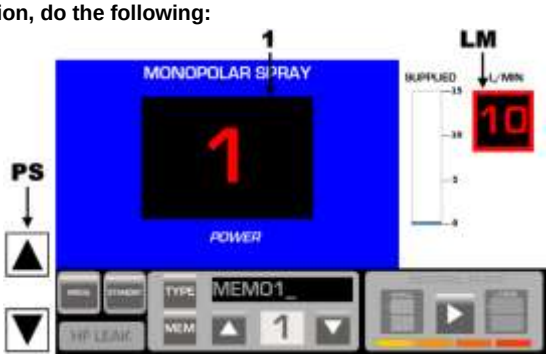
- Push the **LM** area (Its frame switches ON).
- Push the **PS** keys on the panel.

On the **LM** area, the liters change.

Change of the SPRAY coagulation.

- Push the **1** area (Its frame switches ON).
- Push the **PS** keys on the panel.

On the area (**1**) the watts change.



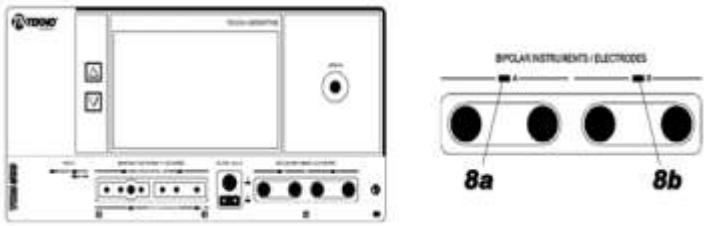
SIMULTANEOUS USE OF TWO MONOPOLAR INSTRUMENTS

Two operators can use two monopolar instruments simultaneously. Do as follows:

- Connect monopolar accessories (both hand-switched or one hand-switched and one foot-switched).
- Set currents (cut and/or coagulation) with related powers normally.
- Both accessories are usable simultaneously by delivering identical currents and powers (i.e. both accessories
- with a current for cut or both accessories with a current for coagulation).
- If operators try to use different currents (cut and coagulation), the self-check system stops the delivery and signals the wrong usage with the specific Error code (acoustic and visual).

USE OF TWO BIPOLAR INSTRUMENTS

- Since the unit includes two bipolar sockets, it allows the use of either one or two bipolar instruments.
- The factory setting enables the socket
- BIPOLAR-2 (8b) and the unit delivers all
- currents for Cut or Coagulation/Vessel
- Sealing through the instrument connected
- to this socket.



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Use of two instruments by delivering a current for Cut and a current for Coagulation / Vessel Sealing

- Push the menu key of the touch-screen to open the General menu
- In the menu, push the key of the area BIPOLAR OUTPUT SELECTION and
- set BIP 1+2 (the setting enables both sockets BIPOLAR-1 and 2)
- This setting allows the alternated use of two instruments:
- The currents for Cut are delivered by the instrument connected to the BIPOLAR-1 socket (to activate the
- delivery push the yellow foot-switch).
- The currents for Coagulation or Vessel Sealing are delivered by the instrument connected to the
- BIPOLAR- 2 socket (to activate the delivery push the blue foot-switch).
- Currents Auto Soft Micro Bicoag and Auto Sealing have the automatic “impedance sensing” start/stop”.

The current Sealing is activated by foot-switch, but it has the automatic “impedance sensing” stop”.

Use of two instruments by always delivering currents for Coagulation/Vessel Sealing through two instruments connected to BIPOLAR – 1 and BIPOLAR- 2 sockets.

- Select the section CUT of the touch-screen in the
  BIPOLAR area by pushing the related key.
  In the section, set the current BLEND BICUT (HIGH COAG).
  This current is practically a coagulation current.
  It is 98% coagulation and is suitable to obtain a strong
  coagulation by using bipolar forceps or scissors.
  The power setting is identical to that of the MACRO BIP COAG.
  Scissors MUST be used with a coagulation current,
  to coagulate tissues while cutting them mechanically!

This setting allows the alternated use of two instruments:

- The current BLEND BICUT (HIGH COAG) for coagulation is delivered by the instrument connected to the
  BIPOLAR-1 socket (to activate the delivery push the yellow foot-switch).
  The currents for Coagulation or Vessel Sealing are delivered by the instrument connected to the
  BIPOLAR- 2 socket (to activate the delivery push the blue foot-switch).
  Currents Auto Soft Micro Bicoag and Auto Sealing have the automatic “impedance sensing” start/stop”.

The current Sealing is activated by foot-switch, but it has the automatic “impedance sensing” stop”.

24 SECTIONS

24.1 SECTION 1 (MEMORIES FROM 1 TO 54)

Use, in open or laparoscopic surgery, of both the monopolar (without or with the argon gas) and the bipolar currents.

These memories allow the use of all the following currents:

- All the monopolar and bipolar currents for the normal surgical use.
- The monopolar currents for CUT with the argon gas to reduce smokes and bad smells.
- The both continuous and pulsed argon coagulation (SPRAY or SPRAY PULSED currents + gas).

ARGON SECTION OFF - All the monopolar currents for normal surgery are usable by:

- One hand-switched or foot- switched handle / instrument.
- One foot-switched handle / instrument and one hand-switched handle.
- Two hand-switched handles.

ARGON SECTION ON – All the monopolar currents for normal surgery are usable by:

- One hand-switched or foot- switched handle / instrument.

ARGON SECTION ON – The monopolar currents for CUT with the gas to reduce smokes or bad smells and the argon coagulation (Normal or pulsed) are usable by:

- The specific accessories (The hand-switched AC/HANDLE (tk90301-10) with the special AC/E electrodes).

THE BIPOLAR CURRENTS are always usable by either one or two foot-switched instruments:

- Two currents, AUTO MICRO SOFT and AUTO SEALING, are provided with automatic start/stop.

24.1.1 WARNINGS AND PRECAUTIONS FOR THE OPERATION

To perform all operations, carefully apply all the warnings of the paragraph BASIC WARNINGS !

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24.1.2 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”.
ARGON GAS SUPPLY AND RELATED SELF-CHECK
To use the argon enhanced modes, connect the unit to an argon supply (cylinder or centralized system)
as it is detailed in the paragraph “CONNECTION, SELF-CHECK AND USE OF THE ARGON GAS”

24.1.3 CONNECTION OF THE FOOT-SWITCHES

The unit can be used by 1 or 2 twin foot-switches

- The standard tk90016-01 model provided with a foot selector to activate either the monopolar currents or the bipolar currents.
- The tk 90017-00 model, on request, which activates the bipolar currents only.

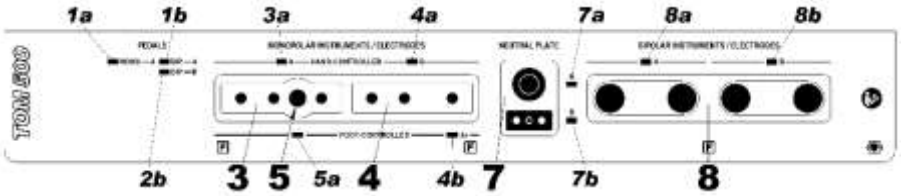
See, in the paragraph “ USE OF THE FOOT-SWITCHES”, the complete use of the foot-switches.

- To connect the tk90016-01 use the 1 socket, to connect the tk 90017-00 use the 2 socket.

Use of the tk90016-01 foot-switch.
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 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.

Use of the foot-switches tk90016-01 and tk 90017-00.
The monopolar currents are activated by the tk90016-01, the bipolar ones by the tk 90017-00
When connecting both foot-switches, the unit selects this mode automatically.



24.1.4 CONNECTION OF THE ACCESSORIES

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 (either7a or 7b according to the connector of the cable).**

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MONOPOLAR INSTRUMENTS USABLE WHEN THE ARGON SECTION IS OFF

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).

TO CONNECT ACCESSORIES WITH CABLES HAVING A CONNECTOR TO THE UNIT DIFFERENT FROM THE STANDARD ONE, USE:
The tk 90302-21 adaptor (it allows the use of all plugs). See the par: 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).

MONOPOLAR INSTRUMENTS USABLE WHEN THE ARGON SECTION IS ON

For the normal surgery is usable one either hand-switched or foot-switched handle/instrument.

- **Connect to the 3 socket** (Usable when the 3a 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).

For the argon gas surgery is usable the specific hand-switch handle with the related electrodes.

- **Screw to the 9 - ARGON socket** the bacterial filter with the related metallic connector.
- **Connect to the 4 socket**(Usable when the 4a light is ON.It blinks) the connector of the electrical cable of the
- hand-switched AC/HANDLE (tk90301-10) (Insert in to the handle the electrodes AC/E series.)
Connect to the gas filter the connector of the gas pipe of the AC/HANDLE. (tk90301-10)

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

BIPOLAR INSTRUMENTS

The unit allows the use of one or two instruments by performing a specific setting according to the instructions of the point 2.5 of the paragraph "GENERAL MENU".

By using one instrument:	All currents are delivered through it.
By using two instruments:	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 6mm plugs" type and it doesn't require a specific polarity of connection).

TO CONNECT ACCESSORIES WITH CABLES HAVING A CONNECTOR TO THE UNIT DIFFERENT FROM THE STANDARD ONE, USE:
Specific adaptors (They allow the use of all connectors). Specific cables (Model and connector of the instrument must be specified). See the par: Adaptors for connection and use of the tk 90302-21 adaptor.

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24.1.5 INDICATIONS F0R THE SUITABLE CURRENTS

CURRENTS FOR MONOPOLAR CUT OR COAGULATING CUT

To reduce both the delivered power and the smoke during open-sky and laparoscopic operations, users can use currents PURE CUT PULSED and BLEND CUT PULSED because they are pulsed.

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 – It includes cut (2%) and coagulation (98%) and it allows the obtaining all the effects of the FULG FORCED COAG, it means efficacious coagulation and cut with 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.
- To coagulate tissues only, by using the above accessories.

It is also suitable to alternate the use of two coagulations with different effects and/or powers.

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

CURRENTS FOR MONOPOLAR COAGULATION

To reduce both the delivered power and the smoke during open-sky and laparoscopic operations, users can set the pulsed delivery for currents FULG FORCED COAG and PIN POINT CONTACT COAG SOFT (Push the P key).

The current SPRAY PULSED COAG is always pulsed.

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.

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CURRENTS FOR ARGON COAGULATION

SPRAY COAG - Current for continuous argon coagulation. It is suitable for the following:

- To perform the argon coagulation in all operating fields (Starting setting: SPRAY =120W, GAS FLOW = 12 lt/min).

PULSED SPRAY COAG - Current for pulsed argon coagulation. It is suitable for the following:

- For the same uses of the SPRAY current, but with a more delicate effect.

CURRENTS FOR BIPOLAR CUT. Cut of dried or wet tissues. It is suitable for the following:

STANDARD BICUT - Cut 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 98% coagulation + 2% cut.

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.

To reduce both the delivered power and the smoke during open-sky and laparoscopic operations, users can set the pulsed delivery of the current SOFT MICRO BICOAG (Push the P key).

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 form 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 form 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.

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DELIVERY OF THE MONOPOLAR AND BIPOLAR CURRENTS

As far as the use of the foot-switches see the previous point “Connection and use of the foot-switches”

(**ARGON SECTION OFF) Monopolar currents.**

- (CUT / COAGULATING CUT) Push the **yellow** button of hand-switched handles / instruments.

  Push the **yellow** pedal of foot-switched handles / instruments.
  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 of hand-switched handles / instruments.

  Push the **blue** pedal of foot-switched handles / instruments.
  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 first current is very suitable to perform the coagulation CUT.

(ARGON SECTION ON) Monopolar currents for the use without argon.

- (CUT / COAGULATING CUT) Push the **yellow** button of hand-switched handles / instruments.

  Push the **yellow** pedal of foot-switched handles / instruments.
  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 of hand-switched handles / instruments.

  Push the **blue** pedal of foot-switched handles / instruments.
  The delivery is signalled by an acoustic signal (acute, adjustable in the GENERAL MENU) and by the big image on the touch screen

(ARGON SECTION ON) Monopolar currents for cut with a gas flow to reduce smokes

- Push the y**ellow** button of the AC/HANDLE(tk90301-10) while using the AC/E electrodes (knife or needle).

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

(ARGON SECTION ON). Normal or pulsed argon coagulation.

- Push the **blue** button of the AC/HANDLE while using the AC/E electrodes (those for coagulation).

  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!
When, in the memories from 1 to 54, users switch the argon section on, a gas flow= 12 lt/min and a power for the SPRAY, PULSED SPRAY currents = 120 is already preset.
They can be changed (up to 15 lt/min and 150/160 of power) and memorized to optimize the effect.

(ARGON SECTION ON/OFF) Bipolar currents for cut with foot-switched activation.

- 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.

(ARGON SECTION ON/OFF) Bipolar currents for coagulation with foot-switched activation.

- 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.

(ARGON SECTION ON/OFF) Bipolar current “SEALING” for vessel 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.

(ARGON SECTION ON/OFF) Bipolar current “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 form 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.

(ARGON SECTION ON/OFF) Bipolar current “AUTO SEALING” for vessel 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.

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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 par. "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 par."CHECK OF THE BIPOLAR INSTRUMENTS BEFORE THE USE".

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 MOST COMMON SIGNALS:
See the TABLE I of the paragraph SELF-CHECK SYSTEM where the complete operation of the self-check system is detailed.

24.2 SECTION 2 (MEMORIES FROM 55 TO 64)

Use, in open or laparoscopic surgery, of the monopolar currents with the argon gas to reduce smokes and bad smells.

<u>These memories:</u>

- **When the ARGON section is OFF, are identical to those from 1 to 54. They allow the same usability of the monopolar currents.**
- **When the ARGON section is ON, are different from those from 1 to 54. They allow the delivery of the argon gas with all monopolar currents to reduce smokes and bad smells.**
- For this use the currents have to be used, as for the memories from 1 to 54, by the specific accessories (Hand-switched AC/HANDLE (tk90301-10) and AC/E electrodes).
- In this case the argon gas does not change the features of the current, but it reduces smokes and bad smells.
- In these memories, when switching the ARGON section ON, it is only preset a starting flow for the argon gas since the currents are identical to those used normally.
- The argon gas flow = 12 lt/min (It can be changed and memorized to obtain the best result).

- **When the ARGON section is OFF/ON, are identical to those from 1 to 54 as fa as the usability of the bipolar currents.**
  The setting of these memories is very simple and it is performed as it is detailed in the Paragraph "FIRST SETTING", Point 4c) Setting of the monopolar currents to use with the argon gas when selecting the memories from 55 to 64.
  Also in these memories the argon coagulation is obtainable when the power of the SPRAY current is higher than 60/80W!

24.3 SECTION 3 (MEMORIES FROM 65 TO 74)

Use, in flexible endoscopy, of the monopolar (without /with argon gas) and bipolar currents.

<u>These memories allow the use of the following currents for the flexible endoscopy:</u>

- The monopolar currents for the normal surgical use.
- The continuous or pulsed argon coagulation (Currents ***SPRAY*** or ***SPRAY PULSED*** + the gas flow).
- The current ***MICRO SOFT BICOAG*** for the bipolar coagulation (It is the only current suitable).

ARGON SECTION OFF - All the monopolar currents for this specific use are usable by a monopolar, foot-switched, flexible electrode
ARGON SECTION ON - The continuous or pulsed argon coagulation is usable by the specific, footswitched, flexible probes.
ARGON SECTION OFF/ON - The "MICRO SOFT BICOAG" bipolar coagulation, which is the only current suitable for this use, is usable by a bipolar, foot-switched, flexible electrode.

24.3.1 WARNINGS AND PRECAUTIONS FOR THE OPERATION

To perform all operations, carefully apply all the warnings of the paragraph BASIC WARNINGS !

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24.3.2 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”.

24.3.3 ARGON GAS SUPPLY AND RELATED SELF-CHECK

To use the argon enhanced modes, connect the unit to an argon supply (cylinder or centralized system)as it is detailed in the paragraph “CONNECTION, SELF-CHECK AND USE OF THE ARGON GAS”

24.3.4 CONNECTION OF THE FOOT-SWITCHES

The unit can be used by 1 or 2 twin foot-switches

- The standard tk90016-01 model provided with a foot selector to activate either the monopolar currents or the bipolar currents.
- The tk 90017-00 model, on request, which activates the bipolar currents only.
  See, in the paragraph “ USE OF THE FOOT-SWITCHES”, the complete use of the foot-switches.

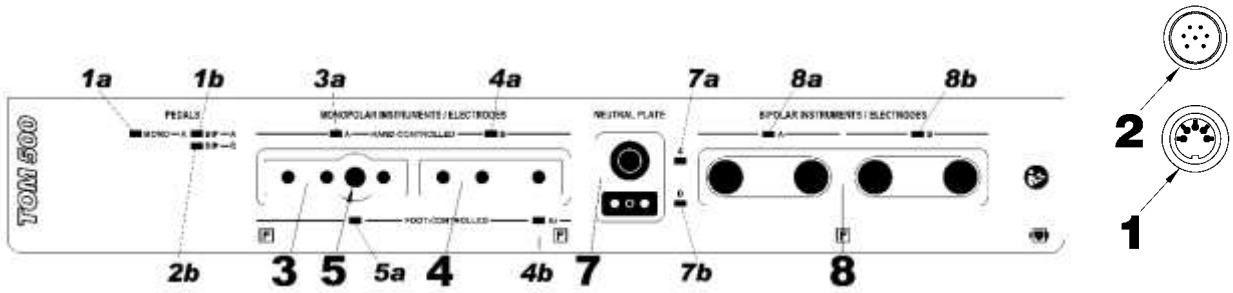
The unit, for the endoscopy is normally used by the tk90016-01 model.
Use of the tk90016-01 foot-switch.

- Connect the tk90016-01 to the 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 deliver the bipolar current for coagulation 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.



24.3.5 CONNECTION OF THE ACCESSORIES

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).

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FLEXIBLE ELECTRODE USABLE WHEN THE ARGON SECTION IS OFF.

- **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 ∅ 3 mm.
The cable, 5 mt. long, to use electrodes with male connection ∅ 3 mm.
The cable, 3 mt. long, to use electrodes with female connection ∅ 4 mm.
The cable, 3 mt. long, to use electrodes with female connection ∅ 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.

PROBE FOR THE ARGON COAGULATION USABLE WHEN THE ARGON SECTION IS ON.

- **Screw to the 9 - ARGON socket** the bacterial filter with the related metallic connector.
- **Connect to the 4 socket**(Usable when the **4a** light is ON. It blinks*)* the connector of the electrical cable of connecting cable of the flexible probes for the argon coagulation
- **Connect to the gas filter** the connector of the gas pipe of the connecting cable for the flexible probes.

BIPOLAR ELECTRODE (ALWAYS USABLE).

- **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 electrode.
  (The connector is "2 x Ø 6mm plugs" type and it doesn't require a specific polarity of connection).

TO CONNECT ACCESSORIES WITH CABLES HAVING A CONNECTOR TO THE UNIT 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.

DELIVERY OF THE MONOPOLAR AND BIPOLAR CURRENTS
As far as the use of the foot-switches see the previous point "Connection and use of the foot-switches"

(ARGON SECTION OFF) Monopolar currents.

- CUT / COAGULATING CUT) 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

(ARGON SECTION ON) Argon 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 values preset for this use (Gas flow =8 lt/min – Power of the SPRAY or SPRAY PULSED current = 100W)
  can be increased (10Lt/min, 110/130W) and memorized to improve its effect and the starting ignition.
  The delivery is signalled by an acoustic signal (acute, adjustable in the GENERAL MENU) and by the big image on the touch screen

(ARGON SECTION OFF) "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.

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 MOST COMMON SIGNALS:
See the TABLE I of the paragraph SELF-CHECK SYSTEM where the complete operation of the self-check system is detailed.

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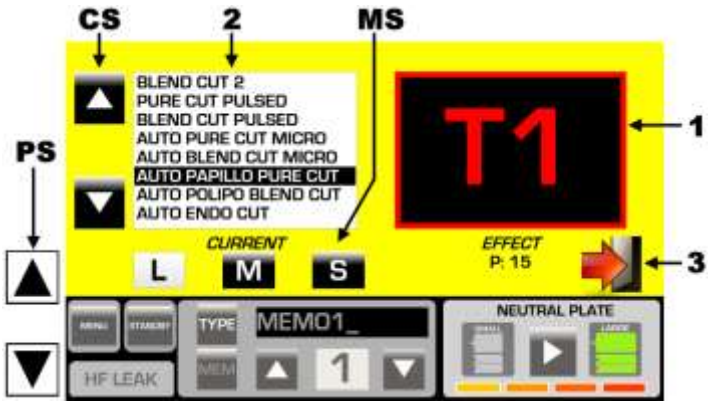
24.3.6 INDICATIONS FOR THE SUITABLE CURRENTS

The following pulsed currents are usable for the cut and the coagulating cut "AUTO PAPILLO PURE CUT", "AUTO POLIPO BLEND CUT" and "AUTO ENDO CUT".



AUTO PAPILLO PURE CUT.
It is suitable (starting from the effect 2) to cut without coagulating effect (I.e. for papyllotomy, sphynterotomy cut of mucosa).

AUTO POLIPO BLEND CUT.
It is suitable (starting from the effect 2) to cut with efficacious coagulating effect. (I.E. for polipectomy).

AUTO ENDO CUT.
It is suitable (starting from the effect 2) to cut/coagulate with phases of CUT and coagulation.

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

Auto papillo pure cut. **Auto polipo blend cut.**	**All keys are OFF:**	Continuos delivery.
	The first key is ON:	Pulsed delivery (fast modulation).
	The second key is ON:	Pulsed delivery (medium modulation).
	The third key is ON:	Pulsed delivery (slow modulation).
Auto Endo cut.	**All keys are OFF:**	The delivery is 90% cutting, 10% coagulation.
	The first key is ON:	The delivery is 80% cutting, 20% coagulation.
	The second key is ON:	The delivery is 70% cutting, 30% coagulation.
	The third key is ON:	The delivery is 50% cutting, 50% coagulation.

The following currents are suitable for the monopolar or bipolar coagulation:
To reduce the delivered power, users can set the pulsed delivery of both monopolar currents "FULG FORCED COAG" or "PIN POINT CONTACT COAG and bipolar current SOFT MICRO BICOAG (Push the P key).
"FULG FORCED COAG" or "PIN POINT CONTACT COAG" monopolar coagulations.

- They are suitable (starting from 20/30) to coagulate by both touching and grazing the tissue.

"SOFT MICRO BICOAG" bipolar coagulation (The only current usable for this endoscopy).

- It is suitable (starting from 20/30) to coagulate during all procedures.

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24.4 SECTION 4 (MEMORIES FROM 74 TO 84)

Use for the, under liquid, endoscopy of the monopolar currents

These memories allow the use 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.

24.4.1 WARNINGS AND PRECAUTIONS FOR THE OPERATION

To perform all operations, carefully apply all the warnings of the paragraph BASIC WARNINGS !

24.4.2 SETTING OF THE CURRENTS

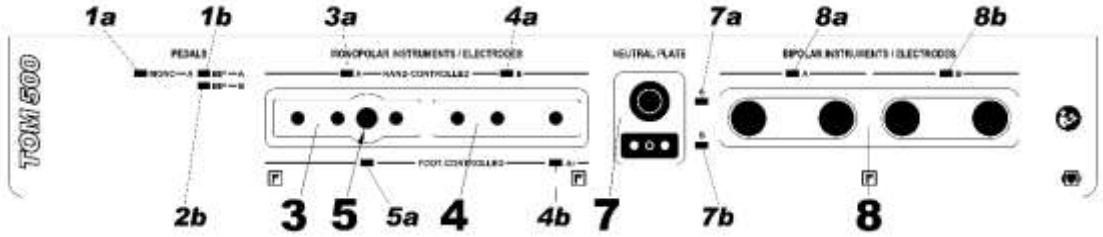
To set, memorize and change the currents.
Follow the instructions of the paragraph “FIRST SETTING”.
To choose the best currents and the starting powers for the specific need.
See, in this section, the paragraph ”INDICATIONS FOR THE SUITABLE CURRENTS”.

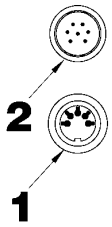
24.4.3 CONNECTION OF THE FOOT-SWITCHES

The unit, for this endoscopy, is normally used by the tk 90016-01 model provided with a foot selector to activate either the monopolar currents or the bipolar currents.

- Connect the tk 90016-01 to the 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 avoid mistakes of use, block the foot selector of the tk 90016-01 by the specific device.





23.4.4 CONNECTION OF THE ACCESSORIES

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).

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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.

24.4.4 INDICATIONS FOR THE SUITABLE CURRENTS

TURP	ELECTRODE	CURRENTS AND STARTING SETTING
PURE CUT	Wire loop	"PURE CUT": 110/120 or "AUTO PURE MICRO": Effect 8
COAGULATING CUT	Wire loop	"BLEND CUT 1": 110/120 or "AUTO BLEND MICRO": Effect 8
PURE CUT	Ribbon loop.	"PURE CUT": 130/140 or "AUTO PURE MICRO": Effect 9
COAGULATING CUT	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		
PURE CUT	Wire loop	"PURE CUT": 100/110 or "AUTO PURE MICRO": Effect 7/8
COAGULATING CUT	Wire loop	"BLEND CUT 1": 110/120 or "AUTO BLEND MICRO": Effect 8
PURE CUT	Ribbon loop.	"BLEND CUT 1": 100/110 or "AUTO BLEND MICRO": Effect 8
COAGULATING CUT	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 CUT	Knife "L"	"PURE CUT": 60/70 or "AUTO PURE MICRO": Effect 5
COAGULATING CUT	Knife "L"	"BLEND CUT 1": 60/70 or "AUTO BLEND MICRO": Effect 5
ARTHROSCOPY	Reduce the previous setting to about the 50%	

24.4.5 DELIVERY OF THE CURRENTS

As far as the use of the foot-switches see the previous point "**Connection and use of the foot-switches**"

- **(CUT / COAGULATING CUT)** 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 MOST COMMON SIGNALS:
See the TABLE I of the paragraph SELF-CHECK SYSTEM where the complete operation of the self-check system is detailed.

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24.5 SECTION 5 (MEMORIES FROM 85 TO 92)

Use for the, in saline, endoscopy of the bipolar currents

These memories allow the delivery of the only currents suitable for this use:
The SALINE current for CUT and the SOFT MICRO or FORCED MACRO currents for coagulation usable by a foot-switched bipolar accessory: resectoscope, another instrument (for example a flexible, 5Cr, needle for gynaecology) and an instrument for arthroscopy.

In the memories, from 85 to 88, for UROLOGY (TURPis, TURVis) or GYNAECOLOGY, the suitable currents are already preset:

- SALINE URO-GYN CUT current for cut with continuous or pulsed delivery.
- SOFT MICRO BICOAG and FORCED MACRO BICOAG currents for coagulation.
-

In the memories, from 89 to 92, for ARTHROSCOPY, the suitable, currents are already preset:

- SALINE ARTHRO CUT current for cut with continuous or pulsed delivery.
- SOFT MICRO BICOAG and FORCED MACRO BICOAG currents for coagulation.

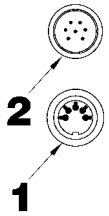
24.5.1 WARNINGS AND PRECAUTIONS FOR THE OPERATION

To perform all operations, carefully apply all the warnings of the paragraph BASIC WARNINGS!

24.5.2 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”.

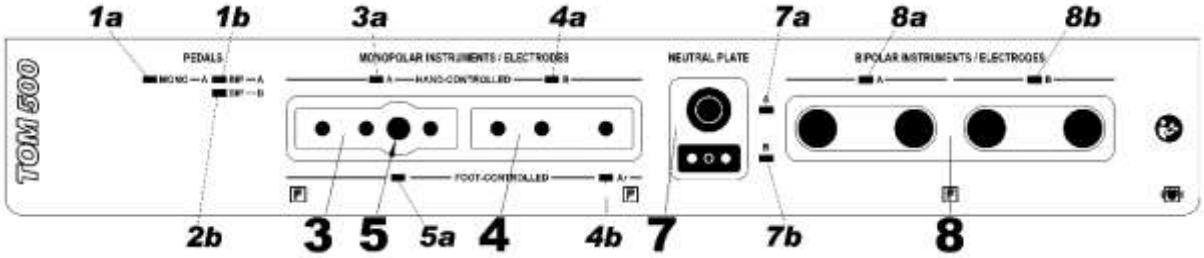
24.5.3 CONNECTION OF THE FOOT-SWITCHES



The unit can be used by 2 different twin foot-switches.

- The standard tk 90016-01 model provided with a foot selector to activate either the monopolar currents or the bipolar currents.
- The tk 90017-00 model, on request, which activates the bipolar currents only.

See, in the paragraph “USE OF THE FOOT-SWITCHES”, the complete use of the foot-switches.
When selecting the programs for the bipolar use only (from 85 to 99) all foot-switches activate the bipolar currents only (The foot-selector of the model tk 90016-01 doesn’t operate).
To use the tk 90017-00 only connect it to the 2 sockets



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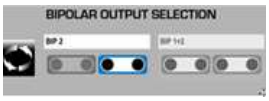
24.5.4 CONNECTION OF THE ACCESSORIES

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 CABLES HAVING A CONNECTOR TO THE UNIT 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.**

24.5.5 INDICATIONS FOR THE SUITABLE CURRENTS:

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 a cut very precise and perfectly controlled, for example while using small resectoscopes in gynaecology, select the pulsed delivery.
To obtain the best result, when delivering the current for cut, 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:
Either the resector operates in unstable way (It doesn't operate since the current doesn't reach the operative end of the electrode) or the insulation of the instrument could be damaged.

TURPis in UROLOGY	ELECTRODE	CURRENTS AND STARTING SETTING
CUT	Wire loop / Ribbon loop.	SALINE URO-GYN CUT: Effect 6/9 (Continuous delivery)
COAGULATION	Wire loop / Ribbon loop.	SOFT MICRO BICOAG: 125 FORCED MACRO BICOAG: 125
COAGULATION	Ball / Roll	SOFT MICRO BICOAG: 125 FORCED MACRO BICOAG: 125
TURVis or GYNAECOLOGY with normal resectoscopes		
CUT	Wire loop / Ribbon loop.	SALINE URO-GYN CUT: Effect 4/7 (Continuous delivery or Pulsed delivery)
COAGULATION	Wire loop / Ribbon loop.	SOFT MICRO BICOAG: 125 FORCED MACRO BICOAG: 125
COAGULATION	Ball / Roll	SOFT MICRO BICOAG: 125 FORCED MACRO BICOAG: 125
VAPORIZATION	Ball / Roll	SALINE URO-GYN CUT: Effect 8 (Continuous delivery)
CUT	"L" Knife	SALINE URO-GYN CUT: Effect 3/5 (Continuous delivery or Pulsed delivery)
TURVis or GYNAECOLOGY with mini resectoscopes		
CUT	Wire loop / Ribbon loop.	SALINE URO-GYN CUT: Effect 3/5 (Continuous delivery or Pulsed delivery)
COAGULATION	Wire loop / Ribbon loop.	SOFT MICRO BICOAG: 70/80
COAGULATION	Ball / Roll	SOFT MICRO BICOAG: 110
VAPORIZATION	Ball / Roll	SALINE URO-GYN CUT: Effect 8 (Continuous delivery)
CUT	Ball / Roll	SALINE URO-GYN CUT: Effect 3/5 (Continuous delivery or Pulsed delivery)
ARTHROSCOPY	Decrease the starting setting to about the 50% of the previous ones When using the SALINE ARTHRO CUT current: Effect 4/5	

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24.5.6 DELIVERY OF THE BIPOLAR CURRENTS

As far as the use of the foot-switches, see the previous point Connection and use of the foot-switches.

- **(CUT WITH CONTINUOUS DELIVERY)**

Push the P key to switch OFF it and 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.

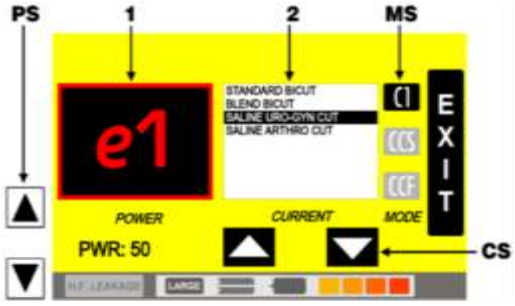
- **(CUT WITH PULSED DELIVERY)**

Push the P key to switch ON it and 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

Continuous or pulsed delivery of the currents:
Saline Uro-Gyn Cut and Saline Arthro Cut.
Use **MS** keys that switch ON/OFF by pushing them.
Keys OFF: By pushing the foot-switch, the current delivery is continuous.
C1 key ON: By pushing the foot-switch, the current delivery is continuous, but pulsed (Slow modulation).
CCS key ON: By pushing the foot-switch, the current delivery is continuous, but pulsed (Slow modulation).
CCF keyON: By pushing the foot-switch, the current delivery is continuous, but pulsed (Fast modulation).



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 MOST COMMON SIGNALS:
See the TABLE I of the paragraph SELF-CHECK SYSTEM where the complete operation of the self-check system is detailed.

24.6 SECTION 6 (MEMORIES FROM 93 TO 99)

Use the bipolar currents only.

<u>These memories allow the use of all the following currents:</u>
These memories allow the use of all the bipolar currents by one or two instruments with either foot-switched activation or automatic “impedance sensing” start/stop.

24.6.1 WARNINGS AND PRECAUTIONS FOR THE OPERATION

To perform all operations, carefully apply all the warnings of the paragraph BASIC WARNINGS !

24.6.2 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”.

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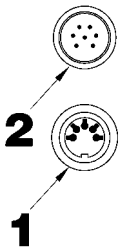
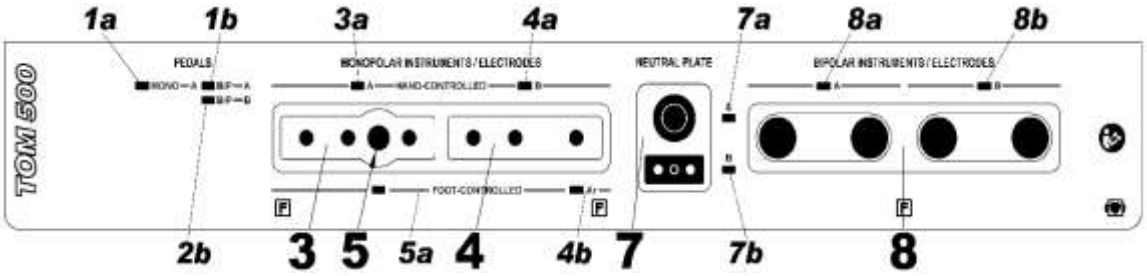
24.6.3 CONNECTION OF THE FOOT-SWITCHES



The unit can be used by 2 different twin foot-switches.

- The standard tk 90016-01 model provided with a foot selector to activate either the monopolar currents or the bipolar currents.
- The tk 90017-00 model, on request, which activates the bipolar currents only.
  See, in the paragraph " USE OF THE FOOT-SWITCHES", the complete use of the foot-switches.
  Use by the tk 90016-01.
- Connect the tk 90016-01 to the 1 socket.
- 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 avoid mistakes of use, block the foot selector by the specific device.

To use the tk 90017-00, only connect it to the 2 socket.



24.6.4 CONNECTION OF THE ACCESSORIES

NEUTRAL ELECTRODE

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

BIPOLAR INSTRUMENTS

The unit allows the connection and the use of one or two instruments by performing a specific setting.
To perform the setting follow the instructions detailed in the paragraph "GENERAL MENU", Point 2.5.

By using one instrument: All currents are delivered through it.

By using two instruments: 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 6mm plugs" type and it doesn't require a specific polarity of connection).

TO CONNECT ACCESSORIES WITH CABLES HAVING A CONNECTOR TO THE UNIT 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 tk 90302-21 adaptor.

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24.6.5 INDICATIONS FOR THE SUITABLE CURRENTS

CURRENTS FOR BIPOLAR CUT

***STANDARD BICUT* - Current for cut 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 98% coagulation + 2% cut.**

It can be considered a current for coagulation only and it is very useful if users have to use two bipolar instruments connected to two sockets. 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

To reduce both the delivered power and the smoke during open-sky and laparoscopic operations, users can set the pulsed delivery of the current SOFT MICRO BICOAG (Push the P key).

***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 form 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 form 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

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24.6.6 DELIVERY OF THE CURRENTS

As far as the use of the foot-switches see the previous point **"Connection and use of the foot-switches"**

Bipolar currents for cut with foot-switched activation.

- 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.

Bipolar currents for coagulation with foot-switched activation.

- 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.

Bipolar current "SEALING" for vessel 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.

Bipolar current "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 form 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.

Bipolar current "AUTO SEALING" for vessel 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.

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 par. "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 par."CHECK OF THE BIPOLAR INSTRUMENTS BEFORE THE USE".

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 MOST COMMON SIGNALS:
See the TABLE I of the paragraph SELF-CHECK SYSTEM where the complete operation of the self-check system is detailed.

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25 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 following 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.

26 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, even better if 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.**

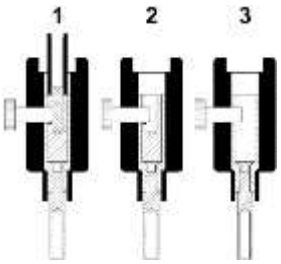
According to the requirements of the Standards for the HF surgical units, the following must be carried out:

- **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.

27 ADAPTORS FOR CONNECTION AND USE OF THE TK 90302-21 ADAPTOR

To connect cables with connectors different from the standard ones, many adaptors are available.



TK 90302-21 UNIVERSAL ADAPTOR FOR MONOPOLAR CABLES.

The adaptor allows the connection of all kinds of plugs:

IMAGE 1: The MARTIN (Similar cables) with plug diameter 4 mm. can be connected.

IMAGE 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.

IMAGE 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.

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CE 0483

28 TECHNICAL FEATURES

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

Argon Section

Gas supply: Either by 1 or 2 cylinders (5 liters) with setting of the gas IN pressure (Full cylinder = pressure of 200 atm) or by centralized supply (**Max IN gas pressure**: 3,5 atm).

Connection of the gas supply: Quick coupling connector.
Gas control: By self-check and additional safety valve.
Gas flow control: Electronic with automatic optimization according to the diameter of the electrode.
Max pressure of functioning: 2 atm. / Max gas flow: 15 lt/min / Gas flow setting: From 1 to 15 lt/min.
Bacterial protection of the delivered gas: By specific bacterial filter.

28.1 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.

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: By1 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.

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)**	**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.
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	

INFORMATION TO THE USERS

According to the article no. 13 of the Legislative Decree no. 151 dated 25th July 2005 "Fulfillment 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).

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CE 0483

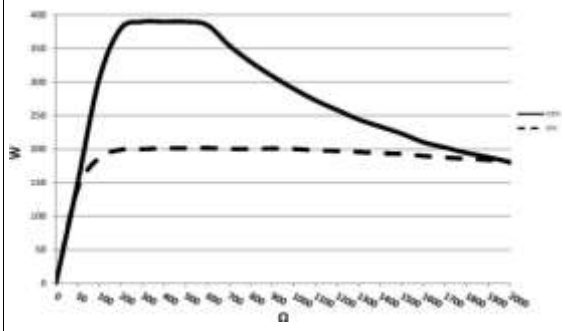
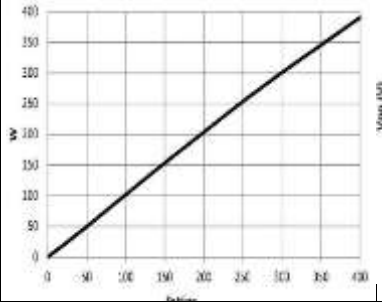
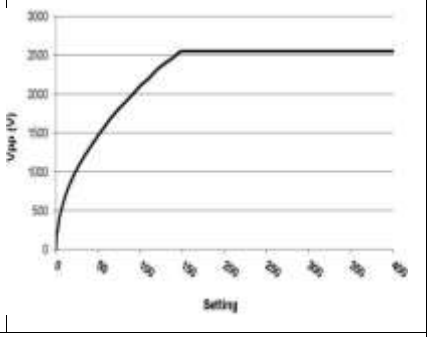
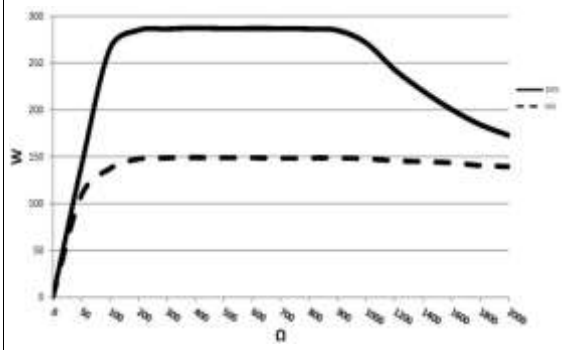
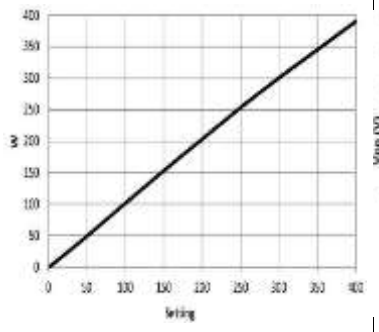
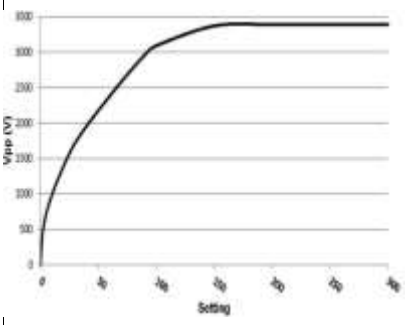
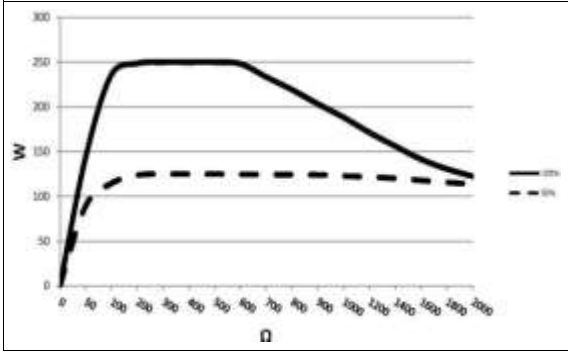
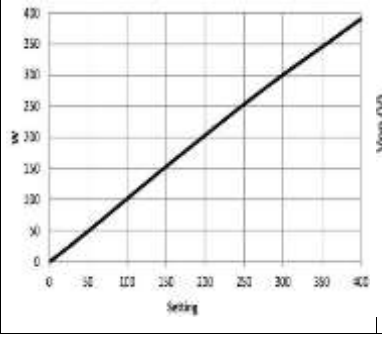
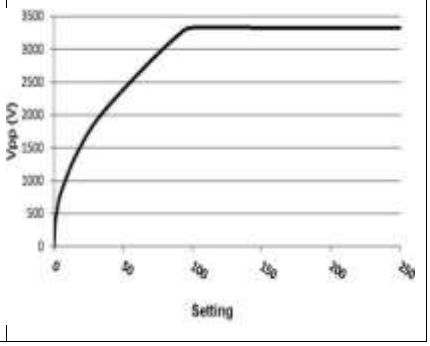
29 DIAGRAMS OF THE MONOPOLAR CURRENTS

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 ± 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)
		

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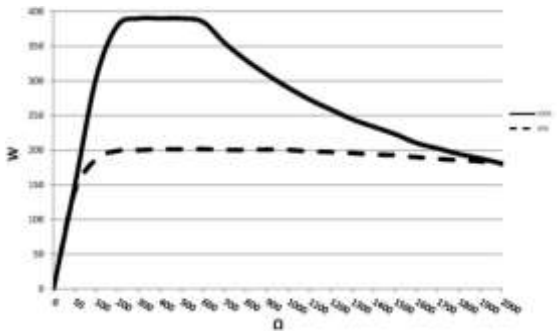
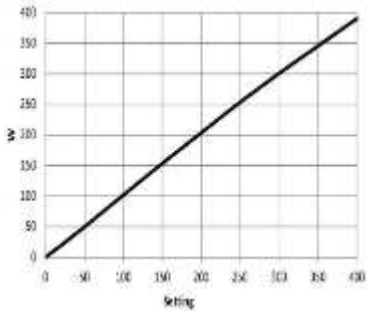
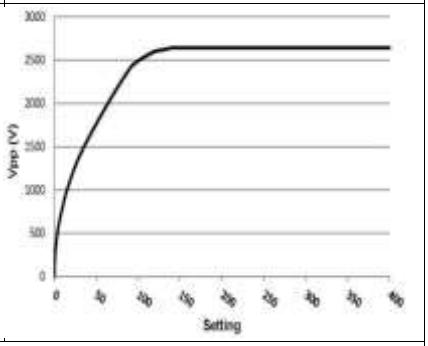
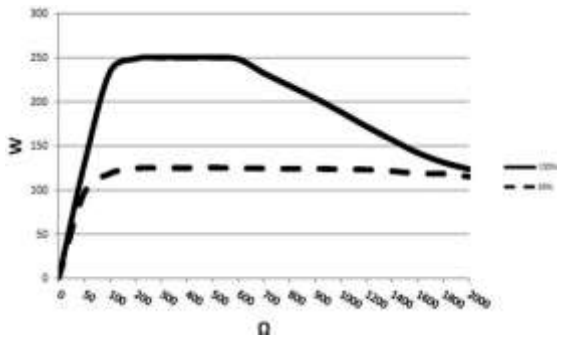
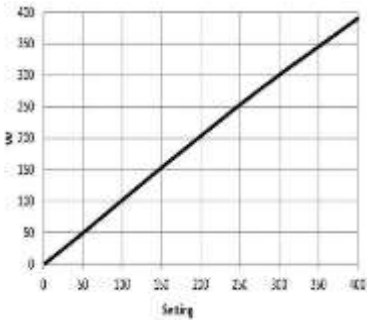
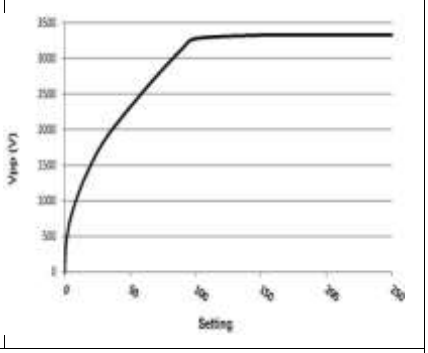
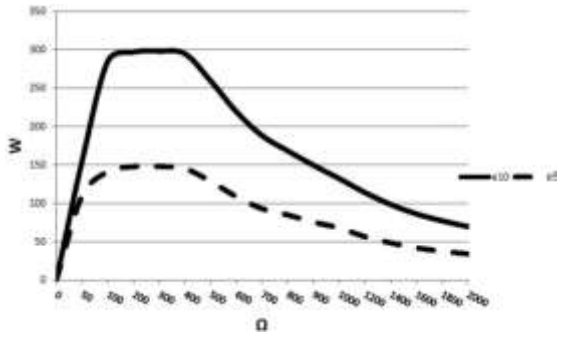
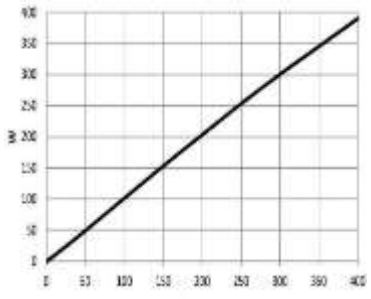
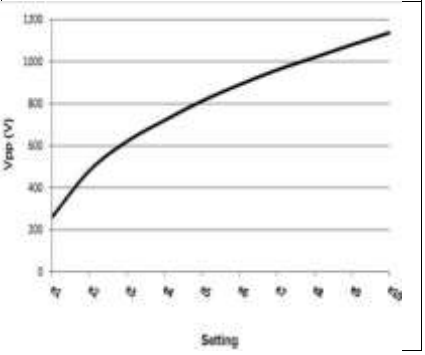
CE 0483

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)
		

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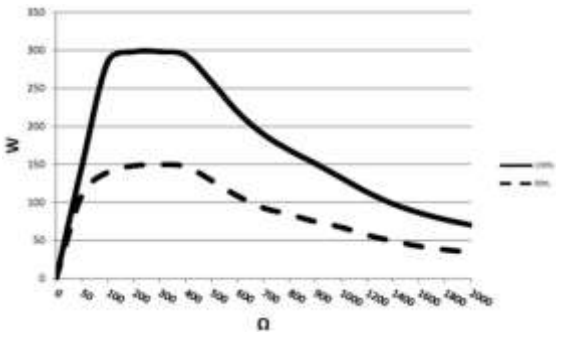
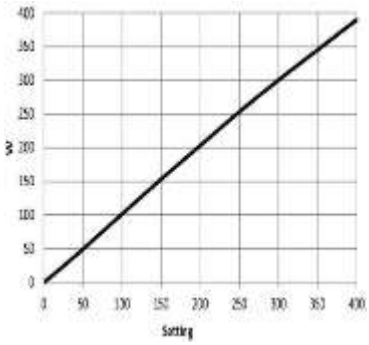
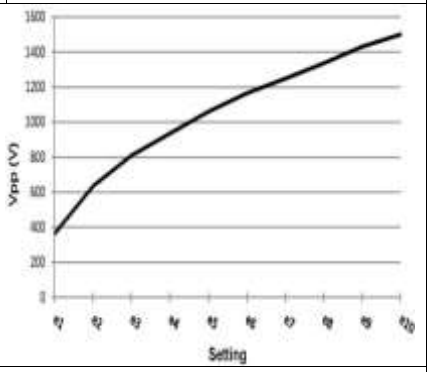
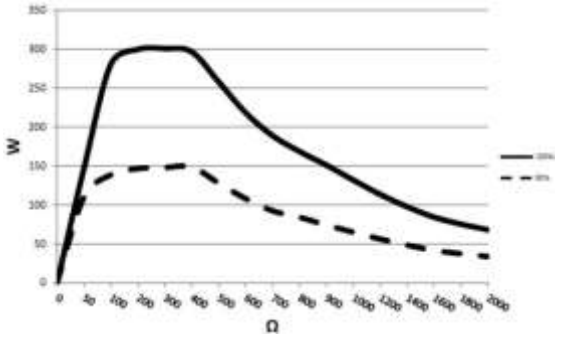
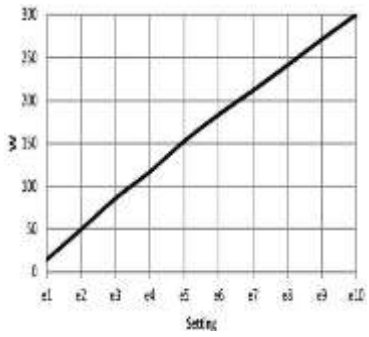
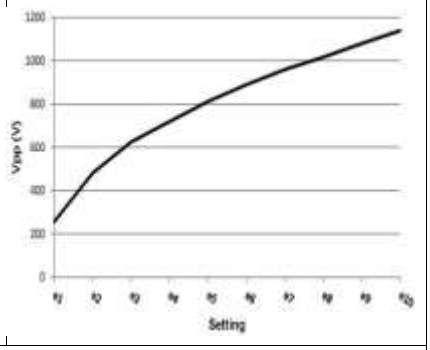
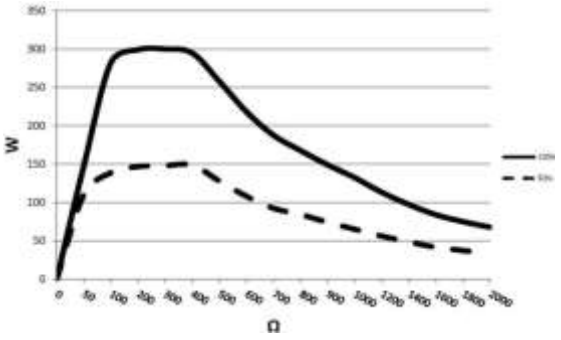
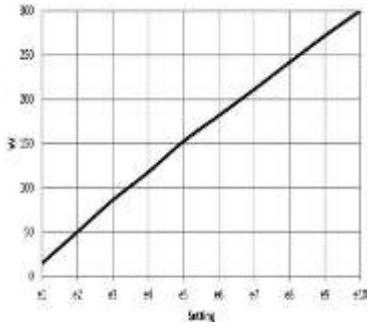
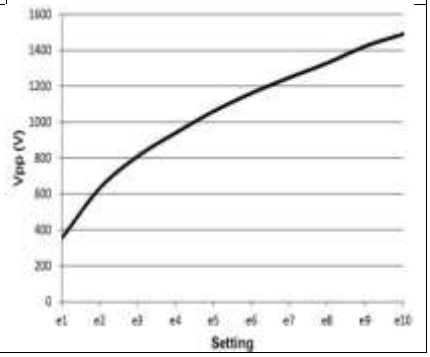
AUTO BLEND CUT MICRO current		
Delivery of the power with power setting = 50% and 100% of the maximum power When varying the loads from 50 to 2000Ω	Delivery of the power. When varying the power at the rated load.	Increase of the Vp voltage When varying the power setting. (It is measured with open circuit)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

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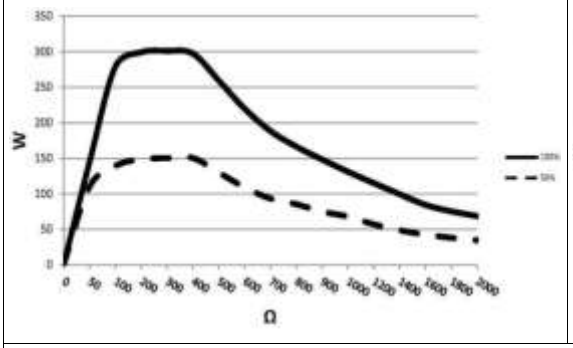
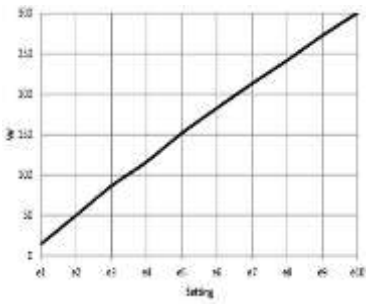
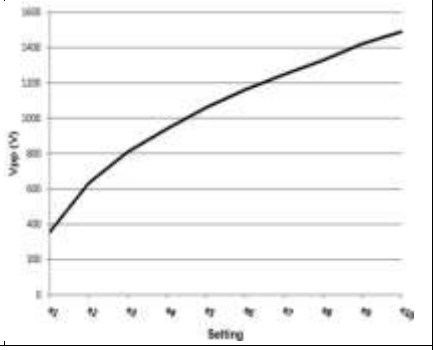
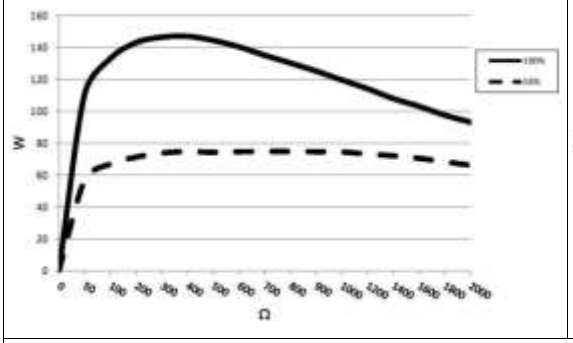
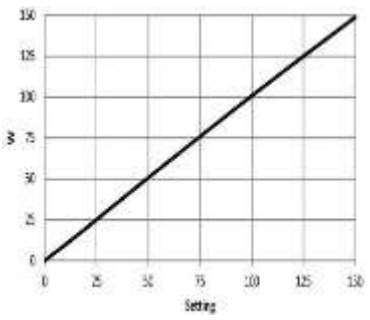
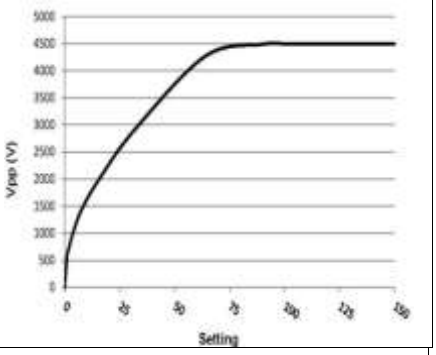
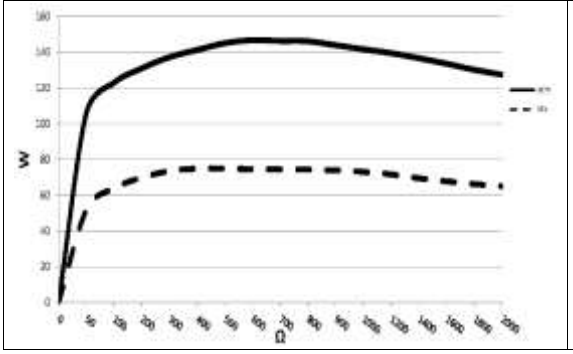
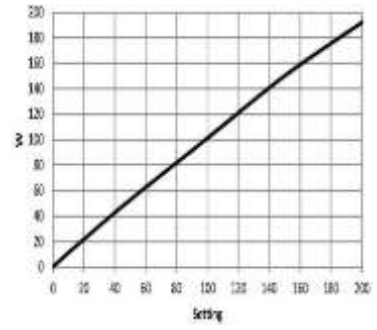
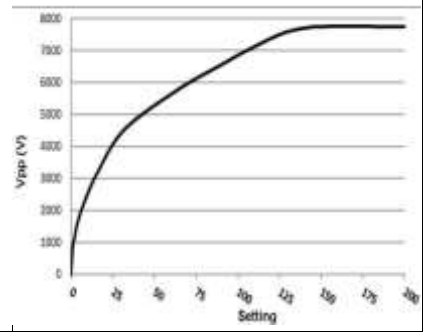
AUTO ENDO CUT current		
Delivery of the power with power setting = 50% and 100% of the maximum power When varying the loads from 50 to 2000Ω	Delivery of the power. When varying the power at the rated load.	Increase of the Vp voltage When varying the power setting. (It is measured with open circuit)
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

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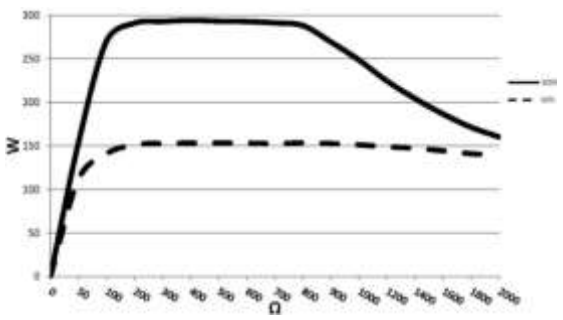
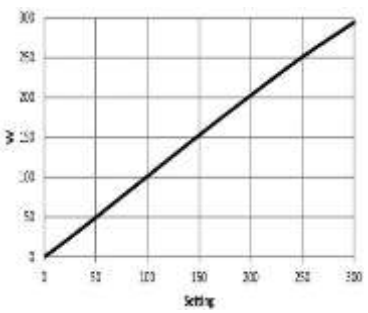
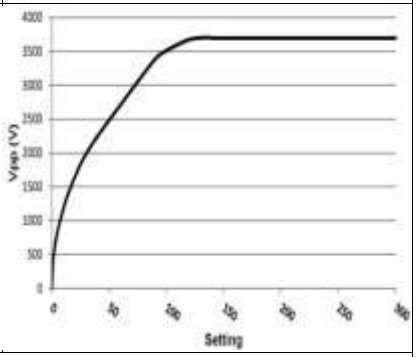
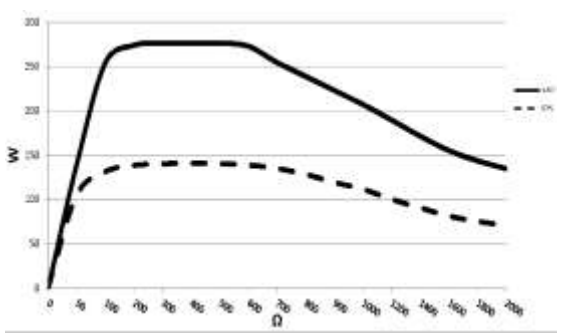
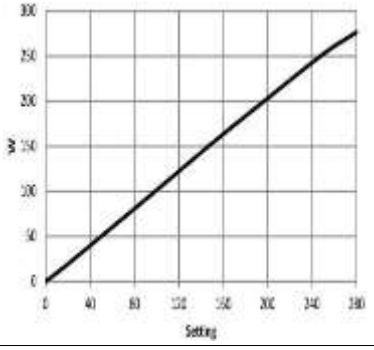
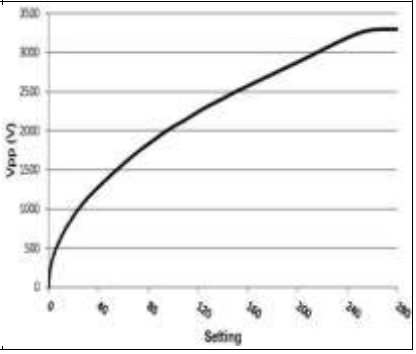
CE 0483

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)
		

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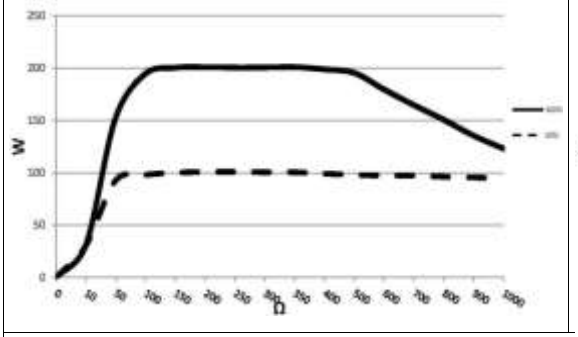
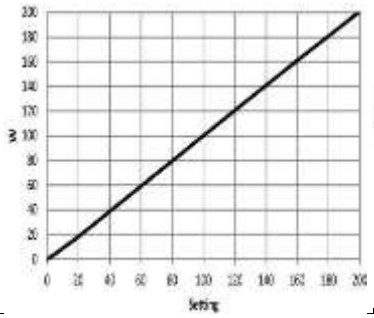
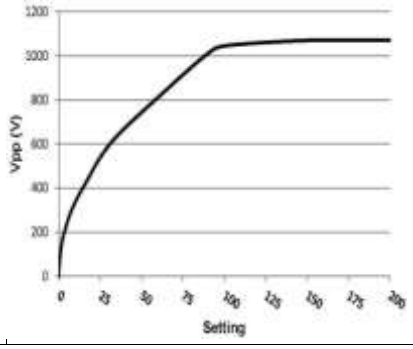
CE 0483

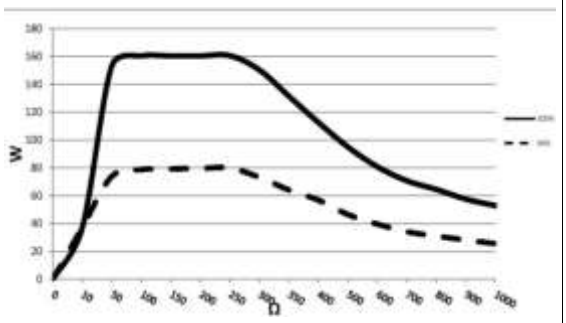
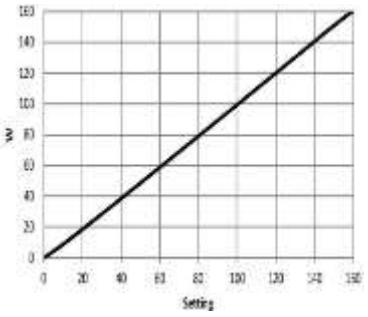
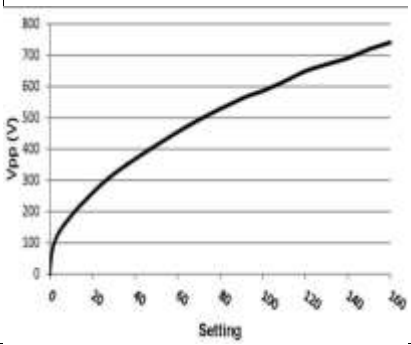
30 DIAGRAMS OF THE BIPOLAR CURRENTS

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 ± 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.

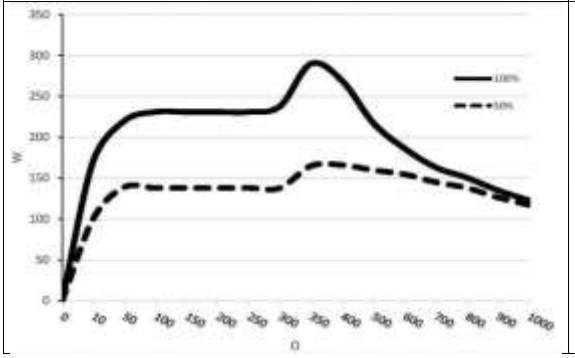
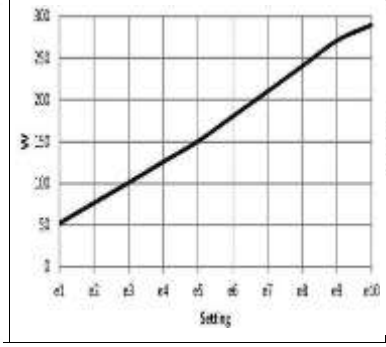
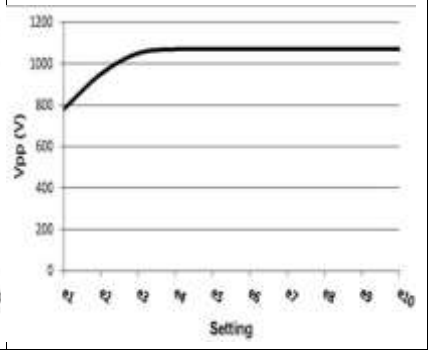
STANDARD BICUT current

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)
		

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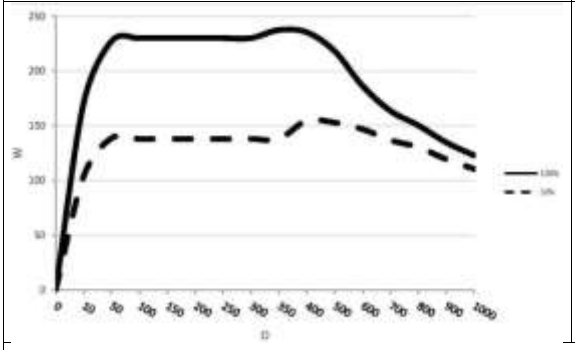
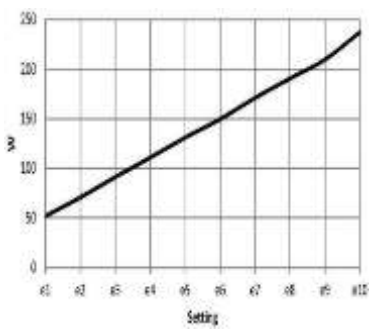
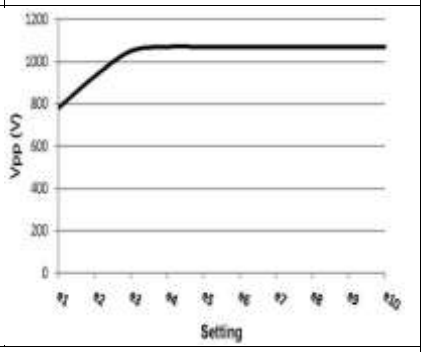
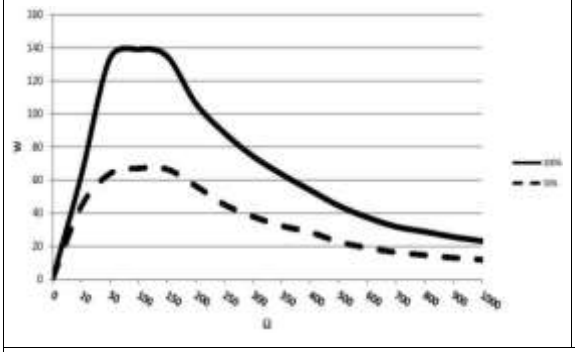
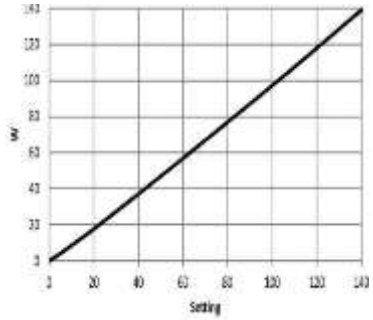
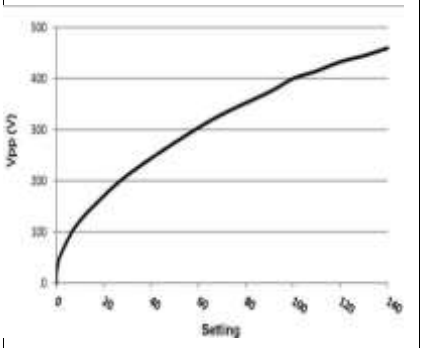
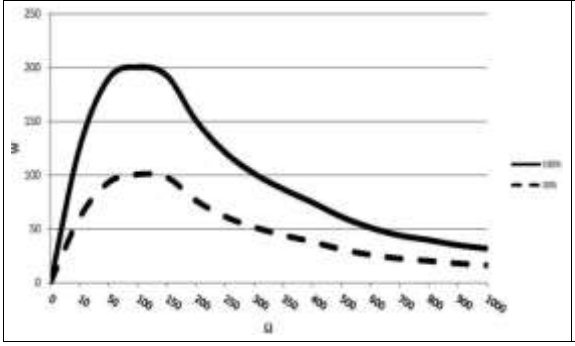
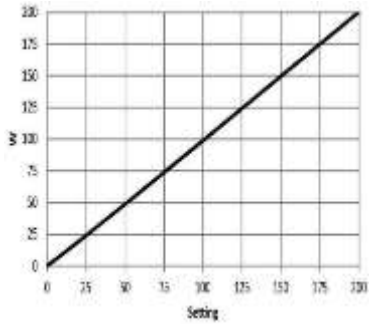
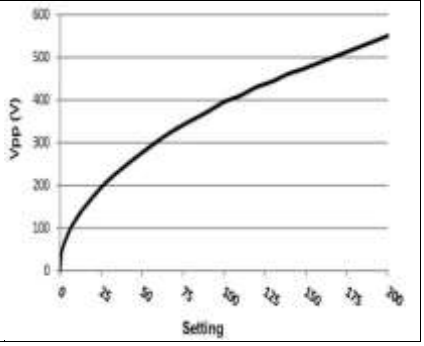
SALINE ARTHRO CUT current

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)
		

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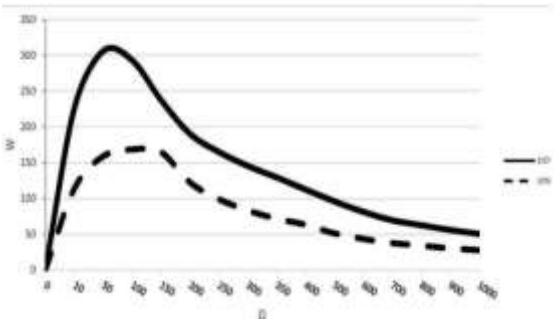
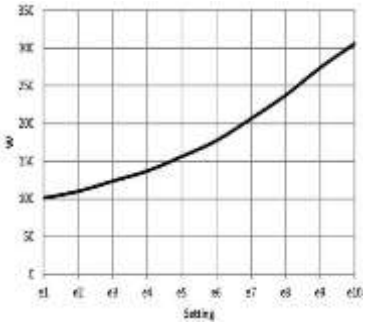
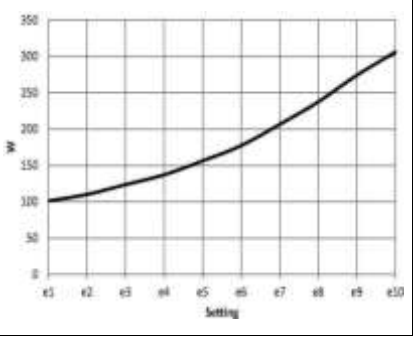
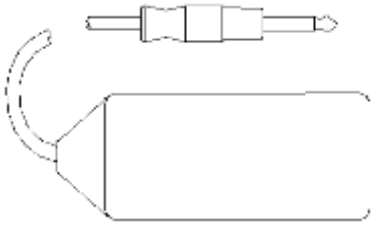
SEALING and AUTO SEALING currents		
Delivery of the power with power setting = 50% and 100% of the maximum power When varying the loads from 10 to 1000Ω	Delivery of the power. When varying the power at the rated load.	Increase of the Vp voltage When varying the power setting. (It is measured with a load of 2000 Ω)
		

31 ACCESSORIES

31.1 REUSABLE NEUTRAL ELECTRODES

tk 90029-00:	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.	
tk 90029-01:	Flexible, autoclavable, neutral electrode (Made of conductive silicone) for adults (19 x 8 cm). (Patients with weight from5 to 15 Kg). Connecting cable 4.0m long.	

31.2 FOOT-SWITCHES

tk 90017-00	tk 90017-00: Twin foot-switch (About 22x18 cm.) without the foot-selector to activate the bipolar currents only.	
tk 90016-01	tk 90016-01: 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)	

SEE ALSO TEKNO CATALOGUE FOR ELECTRO SURGERY:

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