

*MANUALE D'ISTRUZIONI / INSTRUCTION'S MANUAL /  
MANUAL DE INSTRUCCIONES*

# DIATERMO

## MB122 – MB132 – MB160



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M30540 (MA036IGBEa)

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**IMPORTANTE / IMPORTANT / IMPORTANTE**

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Queste istruzioni operative costituiscono una parte fondamentale dell'apparecchiatura per chirurgia ad alta frequenza, in quanto ne descrivono il funzionamento e l'uso, pertanto devono essere lette attentamente prima di iniziare l'installazione e l'uso dell'apparecchiatura.

Tutte le istruzioni di sicurezza o note di avvertimento devono essere osservate. Siate certi che queste istruzioni operative siano fornite insieme all'apparecchiatura quando è trasferita ad altro personale operativo.

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Produttore / Manufacturer

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## 1. INTRODUCTION

### 1.1 DESTINATION OF USE / SECTORS OF APPLICATION

The use of HF electro surgical equipment **DIATERMO MB122, MB160** and **MB132** has reserved to specialized medical personnel. The equipment has destined to a temporary use, for surgical operations in emergency room. It has foreseen its use in the monopolar cut, cut coagulated or coagulation mode or in bipolar coagulation mode.

The equipment is conceived for being used in the following sectors:

descrizione	DIATERMO		
	MB122	MB160	MB132
Electrosurgical unit code GIMA	30540	30541	30544
Electrosurgical unit code LED	GMA10100.20A	GMA10100.30A	GMA10300.10A
Causalty	●	●	●
Dental	○	-	○
Dermatology	●	●	●
Endoscopy	-	○	-
Gastroenterology	-	○	-
Gynecology	○	●	○
Neurosurgery	-	○	-
Orthopedics	-	○	-
Otorhinolaryngology	○	●	○
Pediatric surgery	-	○	-
Plastic surgery	-	○	-
Pneumology	-	○	-
Urology	-	○	-
Vascular surgery	●	●	●
Veterinary	●	●	●

● = Recommended

○ = Usable

- = Not Recommended / Not Usable

**1.2 STANDARD AND OPTIONAL COMPOSITION**

Code GIMA	Code LED	description	DIATERMO		
			MB122	MB160	MB132
-	-	Electrosurgical unit code GIMA	30540	30541	30544
-	-	Electrosurgical unit code LED	GMA10100.20A	GMA10100.30A	GMA10300.10A
30644	00498.04	Bipolar adpter	○	○	○
30560	00500.L11	Needles for micro-surgery	○	○	●/10
-	00100.05	Power supply cable 2m 3x1mm GB-IEC	○	○	○
-	00100.00	Power supply cable 2m 3x1mm ITALY-IEC	○	○	○
-	00100.03	Power supply cable 2m 3x1mm SIEMENS-IEC	●/1	●/1	●/1
-	00100.04	Power supply cable 2m 3x1mm USA-IEC	○	○	○
-	00100.01	Power supply cable 5m 3x1.5mm SIEMENS-IEC	○	○	○
30563	00404.06	Cable for connection disposable/5365 neutral plate	●/1	●/1	●/1
30561	00404.01	Cable for connection neutral plate 5046	○	○	○
30508	00500.L8	Noose electrode (L8) (5pcs) 5 cm	○	○	○
30528	00500.L8/L	Noose electrode (L8/L) (5pcs) 10 cm	○	○	○
30507	00500.L7	Drop electrode (L7) (5pcs) 5 cm	○	○	○
30527	00500.L7/L	Drop electrode (L7/L) (5pcs) 10 cm	○	○	○
30671	0210	Disposable blade electrode 7 cm	○	○	○
30675	0210/L	Disposable blade electrode 15 cm	○	○	○
30672	0230	Disposable ball electrode 7 cm	○	○	○
30676	0230/L	Disposable ball electrode 15 cm	○	○	○
30670	0220	Disposable needled electrode 7 cm	○	○	○
30674	0220/L	Disposable needled electrode 15 cm	○	○	○
30503	00500.L3	Loop electrode Ø 4mm (L3) (5pcs) 5 cm	○	○	○
30523	00500.L3/L	Loop electrode Ø 4mm (L3/L) (5pcs) 10 cm	○	○	○
30504	00500.L4	Loop electrode Ø 8mm (L4) (5pcs) 5 cm	○	○	○
30524	00500.L4/L	Loop electrode Ø 8mm (L4/L) (5pcs) 10 cm	○	○	○
30502	00500.L2	Bent thin wire electrode (L2) (5pcs) 5 cm	○	○	○
30522	00500.L2/L	Bent thin wire electrode (L2/L) (5pcs) 10 cm	○	○	○
30506	00500.L6	Bent thick wire electrode (L6) (5pcs) 5 cm	○	○	○
30526	00500.L6/L	Bent thick wire electrode (L6/L) (5pcs) 10 cm	○	○	○
30509	00500.L10	Bent ball electrode Ø 3mm (L10) (5pcs) 5 cm	○	○	○
30529	00500.L10/L	Bent ball electrode Ø 3mm (L10/L) (5pcs) 10 cm	○	○	○
30505	00500.L5	Bent hook electrode (L5) (5pcs) 5 cm	○	○	○
30525	00500.L5/L	Bent hook electrode (L5/L) (5pcs) 10 cm	○	○	○
30501	00500.L1	Straight thin wire electrode (L1) (5pcs) 5 cm	○	○	○
30521	00500.L1/L	Straight thin wire electrode (L1/L) (5pcs) 10 cm	○	○	○
30510	00500.L9	Straight ball electrode Ø 3mm (L9) (5pcs) 5 cm	○	○	○
30530	00500.L9/L	Straight ball electrode Ø 3mm (L9/L) (5pcs) 10 cm	○	○	○
30564	2818C	Conductive rubber neutral electrode	○	○	○
30561	5046	Steel neutral electrode for 00404.01	○	○	○
5365	5365	Steel neutral electrode for 00404.06	●/1	●/1	●/1
30562	0350	Disposable neutral electrode	○	○	○
30565	F7920	Disposable split neutral electrode	○	○	○
28323	00602.100	Fasting bandage 100 cm	○	○	○
30531	00500.00/L	Kit of assorted electrodes (10pcs) 10cm	○	○	○
30500	00500.00	Kit of assorted electrodes (10pcs) 5cm	○	●/1	●/1
-	00500.03	Kit of assorted electrodes (6pz) (L1-2-4-7-9-10) 5cm	●/1	○	○
EQUIKIT1	EQUIKIT1	Kit for equipotential connection	○	○	○
30551	-	Handle with finger switches GIMA	○	○	○
30518	-	Handle without finger switches GIMA	○	○	○
30552	00201.01	Handle for microsurgical needle	○	○	●/1
30550	-	Handle with finger switches GIMA	●/1	●/1	○
30549	2835A	Reusable handle with finger switches ROI	○	○	●/1
30519	BWA435-030	Reusable handle without finger switches	○	○	○
M30540	MA036IGBE	Manual of instructions	●/1	●/1	●/1
30568	00300.00	Not waterproof foot switch	●/1	●/1	●/1
30571	00302.00	Waterproof foot switch	○	○	○
30570	00301.03	Double waterproof foot switch	○	○	○
-	F7520	Electrode cleaning sponge	○	○	○

●/pcs= STANDARD

○= OPTIONAL

**1.3 GENERAL DESCRIPTION**

**DIATERMO MB122, MB160 and MB132** are electro-surgical equipments suited to deliver current for monopolar cut, soft coagulation, forced coagulation or bipolar coagulation. The current can be delivered for the whole time of activation of the output circuit or, with the model MB132, for an interval of time which can be preset. The preset time delivery can repeated from 2 to 9 times.

It is possible to use either single plate neutral reference electrodes or electrodes with split conductive zone so to watch the plate to patient contact during the surgical intervention.

Control of the units is via front panel keys and display; mains inlet is located on the rear panel.

The units have automatic control systems that, monitoring the internal parameters, signal the possible damages/errors that are found.

The operational parameters that are used are constantly stored so that, every time the unit is switched on or the operative method is changed, the last utilized parameters are recalled.

The level of the emission sound can vary; every operator can choose his own level according to the noise of his working ambient.

Power output can be activated either through holder-handles with pushbuttons or through single or double foot switch command. Moreover, applying a special optional adapter it is possible the unit connection to bipolar forceps.

### ***1.4 MONOPOLAR CUT***

Monopolar cut is the sectioning of the biological tissue achieved by the high-density passage of HF current, which is concentrated at point of the active electrode. The HF current, when it is applied to the tissue, through the point of the active electrode, it creates intense molecular heat in the cells so high that explosion of it is caused.

The cut effect is achieved by moving the electrode through the tissue and destroying the cells one after the other. The movement of the electrode prevents the propagation of the side heat in the tissue, thus limiting to a single line the cells' destruction.

The best HF current for cutting is pure sine wave without any modulation that cuts very smoothly and provides the least thermal effect with poor haemostasis while cutting. Because its effects can be precisely controlled, it can be used safely without damage to the bone, but since good coagulation while cutting is one of principal benefits of using electrosurgery a current with a certain amount of modulation is desirable.

The following rules help the operator to obtain good cutting, however every user must follow first of all his professional judgement as he does every time in his practice.

- Keep the tissues moist but not wet
- Survey the stroke before activate the electrode
- Keep the electrode perpendicular to the tissue
- Activate the electrode before making contact with the tissue
- Maintain clean the electrode's tip (the optional sponges F7520 to clean the electrodes are advised).
- Wait at least five seconds before to repeat a stroke.

When the output power is properly set there should be:

- no resistance to the electrode movement through the tissue
- no change in the cut surfaces colour
- no fibres of tissue remained onto the electrode

### ***1.5 MONOPOLAR COAGULATION***

Monopolar coagulation is the haemostasis of small blood vessel of the bodily tissue through passing of high frequency current in correspondence of active electrode. When the current density is reduced and a broad-surfaced electrode is used, to dissipate the energy over a larger area, the effect is to dry out the surface cells, without deep penetration, resulting in coagulation. These coagulate surface cells then serve as a layer of insulation, preventing heat derived by successive applications of current from penetrating too deeply.

The current normally used for coagulation is modulated and depending from the modulation percentage is the smoothness of cutting, goodness of haemostasis and likelihood of tissue destruction. Deeper current modulation brings to somewhat roughly cutting and the chance of some slight depth of tissue destruction but more efficient coagulation.

The following rules help the operator to obtain good coagulation: however every user must follow first of all his professional judgement as he does every time in his practice.

- Select a ball or heavy wire electrode



- Locate the bleeder, after have wiped the excess blood from the area, contact lightly the bleeder before activating the electrode
- Stop the electrode activation as soon as the tissue blanches to avoid tissue damage.
- Maintain clean the electrode's tip (the optional sponges F7520 to clean the electrodes are advised).

### ***1.6 BIPOLAR CUT AND COAGULATION***

Bipolar cut consists in the sectioning of the biological tissue due to the passage of HF current concentrated on the tips of the bipolar forceps.

When the HF current is applied to the tissue, between the two tips of the forceps, an intense molecular heat in the cell is created, so that the cell explodes.

Bipolar coagulation consists in the hemostasis of small blood vessels of the body tissue between the two tips of the forceps.

When the current density is reduced, the drying of the cellular surface is obtained, without deep penetration and its consequent coagulation. These superficially coagulated cells act as a layer of insulation that prevent the heat, due to successive current applications, to penetrate too deeply.

## 2. SAFETY

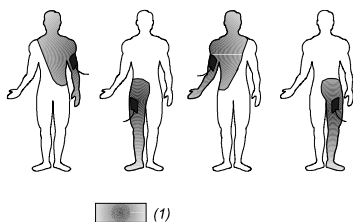
**WARNING:** Electrosurgery can be dangerous. Careless use of any element in the electrosurgical system may subject the patient to a serious burn. Read and understand all warnings, precautions, and directions for use before attempt to use any active electrode. Neither LED S.p.A., Frosinone, Italy nor any of the subsidiary sales organisations can be considered responsible for personal, material or consequential injury, loss or damage that results from improper use of the equipment and accessories.

The accessories supplied with the unit have characteristics compatible with this supplied unit, they could be incompatible with others electrosurgical units; the user must check, before connecting other accessories to this unit, that they have characteristics of insulation compatible with those of this unit (see Technical Characteristics).

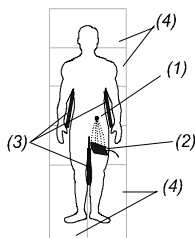
### 2.1 GENERAL

The following precautions reduce the risk of accidental burnings.

- The whole surface of the patient plate must be placed on a well-vascularized muscle as next as possible to surgical area. Avoid connecting the patient plate to bony protrusions, prosthesis, cicatricial tissues, and parts of the body subjected to liquid accumulation or that present subcutaneous adipose tissue. The part of the body must be without hair, dry and clean. Do not use alcohol to clean the skin. The use of gelatinoid substances for the electrodes is not advised.
- The patient does not must be in contact with metal parts that are connected to the earth or have a large electrical coupling capacity to the earth (for example: operating-table or metallic support). The use of antistatic sheets is advised.
- Avoid the skin to skin contact (for example between arm and body of the patient). Insert an interface material like dry surgical gauze. Moreover, the parts of the body subjected to abundant perspiration must be maintained dry.



(1) Treatment area



(1) Active electrode - (2) Reference electrode  
(3) Dry gauze - (4) Antistatic cloth

- When high frequency electrosurgical unit and physiological monitoring devices are used at a time in the same patient, all the monitoring electrodes, that has not resistive or inductive elements tested in high frequency interference environment, must be as far as possible from the electrodes of the electrosurgical unit. Avoid the use of monitoring needles.
- The connection to the electrodes should be located in such a way to avoid the contact both with the patient and with other cables.
- For surgical procedures where the HF current could flow through parts of the body having a relatively small cross-sectional area; the use of bipolar techniques may be desirable in order to avoid unwanted coagulation.
- The power level should be the lowest useful to the work to do.
- Always check the return plate whenever electrosurgical unit fails to produce the desired effect. Reason for a low output power level, or for an incorrect functioning of the electrosurgical unit when arranged for a normal output, may be lack of connection of the return plate or its imperfect placement.
- The use of flammable anaesthetics, of oxygen and of nitrogen protoxide should be avoid in the case of operation at the head or at chest level except the possibility of evacuating gas. Flammable materials used to clean, or to disinfect, should be let to evaporate before the use of the electrosurgical unit. There is risk of stagnation of flammable solutions under the patient or in body cavities as the umbilicus and the vagina. The

fluid that deposits in these areas should be removed before the equipment use. The danger of endogenous gas ignition has to be considered. Some materials like cotton wool or gauze, when saturated with oxygen, may burst into flames because of the sparks produced by the equipment in the normal use.

- There is a risk for the patients fitted with heart pacemaker or other stimulation electrode: interference may occur with the stimulator signal or the stimulator itself can be damaged. Please refer to Cardiology Unit when in doubt.
- Electrosurgical equipment does emit unnoticed radiation of high frequency energy that may effect other medical equipment, unrelated electronics, telecommunications, and navigational systems.
- The accessory must be regularly checked, particularly the cables for the electrodes and the possible accessories for the endoscopy to verify that the insulation is not damaged.
- To avoid the connection of incompatible accessories to the unit, the insulation characteristics of the items to be replaced must be requested to the manufacturer and compared to those of the supplied unit (see Technical Characteristics).
- Attention: a damage of the electrosurgical unit could result in an unwanted increase of the output power.
- Inadvertent stimulation of a patient's muscle and nerves can be caused by low frequency currents originating in electric sparks between electrode and tissue of the patient. Should neuromuscular stimulation occur stop surgery and check all connections to generator. If this does not solve the problem, qualified service personnel must inspect generator.

## 2.2 INSTALLATION

- The electric safety is insured only when the same are correctly connected to an efficient net linked to the earth in conformity with the actual safety requirements. It is necessary to verify this fundamental safety requisite and, in case of doubt, to require an accurate control of the plant from part of qualified personnel. The manufacturer cannot be considered responsible for possible damages caused from the lack of efficient connection to earth of the installation. Operation without a protective earth connection is forbidden.
- Before connect the equipment ascertain that the required voltage (showed on the rear panel) corresponds to the available mains.
- In case of incompatibility between the available wall socket and the feeding cable of the equipment, replace only with legally approved connectors and accessory items. The use of adapters, multiple connections or cable extensions is not advised. Should their use become necessary it is mandatory to use only simple or multiple adapter conforming to the actual safety requirements.
- Don't let the apparatus exposed to atmospheric agents. The unit must be protected from seepage of liquids.
- Don't obstruct openings or cracks of ventilation or heathsink
- Don't leave the equipment uselessly inserted. Switch off the equipment when not in use.
- The use of the unit is not suited in explosive rooms.
- **DIATERMO MB** must be destined only to the use for that have expressly designed. Any other use is to be considered improper and dangerous. The manufacturer can not be considered responsible for possible damages due to improper, wrong and unreasonable uses.
- It is dangerous to modify or try modifying the characteristic of the equipment.
- Before effect any operation of cleaning or maintenance, disconnect the apparatus from the electric net, either unplugging it from the mains or switching off the mains switch of the plant.
- In case failure and/or bad operation of equipment switch off it. For the possible reparation address only to an authorised service centre and ask for the use of original spare parts. The lack to follow the above requirements could risk the safety of the equipment and can be dangerous for the user.
- Do not reduce or disable the audible signal warning the activation of the generator. A functioning activation signal can minimise or prevent patient or staff injury in the event of accidental activation.
- Avoid verifying the functioning of the unit by shorting the active electrode with the reference one or the active electrode with metallic parts.

**WARNING:** When the electrosurgical unit is used in operating rooms it is necessary to just use waterproof foot-switches

(REF 00302.00 Water-proof pedal with single switch – REF 00301.03 Water-proof pedal with double switches)

### 3. INSTALLATION

- Inspect the unit for damages during transport. The claims for possible damages will be accepted only in case they are immediately communicated to the carrier; the damages that are found must be written down and presented to LED SpA or to your own retailer. If the unit is returned to the LED SpA or to your own retailer, it is necessary to use the original equipment's package or another equivalent one, to guarantee the safety during the transport.
- Unpack the equipment and carefully study the documentation and operating instruction supplied. Mains voltage, indicated above the inlet, must agree with the local mains voltage (mains voltage frequency: 50-60 Hz). The correct voltage setting is selected by turning the voltage selector when available. Insert the correct fuses in the module referring to the value written on the label.
- Connect mains cable to a mains outlet having good earth connection

#### OPERATION OF THE EQUIPMENT WITHOUT EARTH CONNECTION IS FORBIDDEN

- The unit must be installed on a level surface, with dimension, at least, correspondent to those of the base of the unit itself. Around the unit must be left a space of 25cm, at least.
- Connect the mains cable to the mains socket on the rear panel of the unit.
- Connect the equipotential binding post located at the left of the unit's back panel to equipotential socket of the plant.
- Connect the single foot switch or the double foot switch (optional) to the connector on the rear panel.
- Connect handle, in the case of use of handle without finger switch it shall be connected on the black buckle.
- In case of use of bipolar forceps (see BIPOLAR operation paragraph 4.4.5) it is necessary to use the special optional adapter (**REF** 00498.04).
- Let unit work in dry environment only. Any verified condensate must be let evaporate before putting in operation the unit. Don't exceed the temperature environment or the allowed moisture. Environmental conditions: Temperature: 10/40°C - Relative moisture: 30/75% - Pressure: 70/106k Pa
- When the unit is switched on, through the on/off switch on the frontal panel, after having checked the internal parameters, it will work with the function and the power level utilized during the last switching (when the unit is switched for the first time the level will be 00).
- Before using the unit, it is necessary connect the cable to the patient plate. Single plate electrodes and split plate electrodes can be. If the value of the impedance is acceptable, the OC indicator light will stop flashing and the alarm to sound.
- Having:

**Holder-handle with two pushbuttons without foot switch:** press the yellow pushbutton on the holder-handle to deliver the cutting current (the choice between CUT or BLEND must be done pressing the correspondent pushbutton on the unit); or the blue pushbutton on the holder handle to deliver coagulating current (the choice between FORCED COAG, SOFT COAG or BIPOLAR must be done pressing the correspondent pushbutton on the unit).

**Holder handle with two pushbuttons and a single foot switch:** choose the cutting current CUT or BLEND and the coagulation current FORCED COAG, SOFT COAG or BIPOLAR. Preset through the yellow pushbutton on the holder handle, the function for the cut that appears on the unit or, through the blue pushbutton on the holder handle, the function for the coagulation that appears on the unit. The current delivery takes place through the foot switch.

**Holder handle with two pushbuttons and double foot switch:** press the yellow foot switch or the yellow pushbutton of the holder handle to pre-set and deliver the cutting current (the choice between CUT or BLEND must be done pressing the correspondent pushbutton on the unit) or the blue foot switch or the blue pushbutton of the holder handle to pre-set and deliver the coagulating current (the choice between FORCED COAG, SOFT COAG or BIPOLAR must be done pressing the correspondent pushbutton on the unit).

**Holder handle without pushbuttons and single foot switch:** connect the holder handle to the black binding post and pre-set the current for the cut (CUT or BLEND) or the coagulation (FORCED COAG, SOFT COAG or BIPOLAR), press the foot switch to deliver the pre-set current.

**Holder handle without pushbuttons and double foot switch:** connect the holder handle to the black binding post and press the yellow footswitch to pre-set and deliver the cutting current (the choice between CUT or BLEND must be done pressing the correspondent pushbutton on the unit); press the blue foot switch to pre-set and deliver the coagulating current (the choice between FORCED COAG, SOFT COAG or BIPOLAR must be done pressing the correspondent pushbutton on the unit).

**Bipolar forceps and single foot switch:** connect the optional adapter (**REF** 00498.04) (see paragraph 4.4.5). The equipment will select the BIPOLAR operative mode. To deliver the current press the foot switch. To avoid the forcep's damage don't make short circuit with its tips.

**Bipolar forceps and double foot switch:** connect the optional adapter (**REF** 00498.04) (see paragraph 4.4.5). The equipment will select the BIPOLAR operative mode. To deliver the current press the foot switch for the coagulation (blue). To avoid the forcep's damage don't make short circuit with its tips.

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## 4. CONNECTORS AND CONTROLS

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### 4.1 LABEL ON THE REAR PANEL

The requirements for the safety of H.F. surgical equipment ask data and graphic symbols must be printed on the cabinet or on at least one of the panels of generator unit to define its features and oversee its condition of work.

#### 4.1.1 MANUFACTURER'S IDENTIFICATION DATA

**DIATERMO MB122, MB160** and **MB132** HF electrosurgical unit are designed, manufactured and tested by the LED SpA in its own laboratories in Aprilia (LT) - Italy.

#### 4.1.2 MEANING OF GRAPHIC SYMBOLS

The meaning of the graphic symbols printed on **DIATERMO**'s cabinet is the following:

1. Floating Patient's plate: neither at low-frequency nor at high frequency earth connected
2. The equipment is protected against Cardiac Defibrillator discharge.
3. Not Ionising Radiation emitted
4. Read carefully INSTRUCTION MANUAL before to attempt the use of the equipment.



1



2



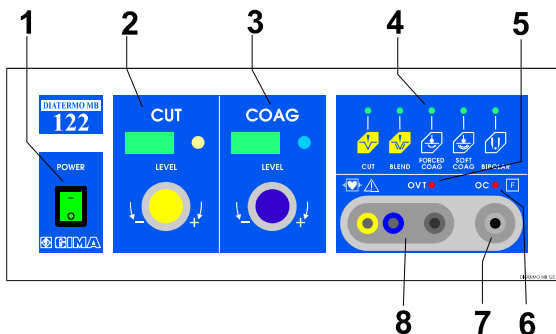
3



4

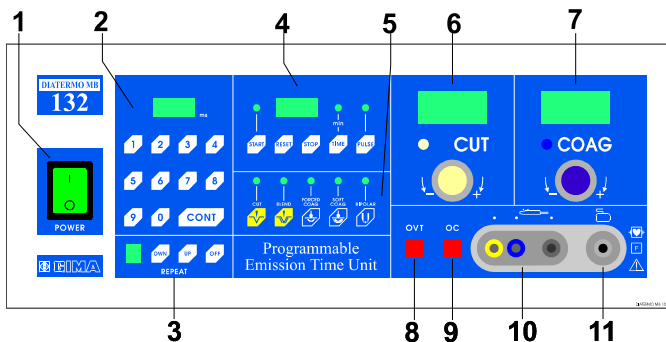
## 4.2 FRONTAL PANEL

## MB122 – MB160



- 1 Mains switch
- 2 Section of level control and indication of cut current
- 3 Section of level control and indication of coagulation current
- 4 Function keyboard
- 5 Alarm warning for current delivery over time
- 6 OC (open circuit) alarm
- 7 Handle connection
- 8 Return plate connection

## MB132



- 1 Mains switch
- 2 Pulse time selector
- 3 Pulse repetition selector
- 4 Session time/flash counter
- 5 Function keyboard
- 6 Section of level control and indication of cut current
- 7 Section of level control and indication of coagulation current
- 8 Alarm warning for current delivery over time
- 9 OC (open circuit) alarm
- 10 Handle connection
- 11 Return plate connection

## 4.3 OPERATION MODE

### 4.3.1 SWITCHING ON

When switched on the electrosurgical unit performs automatically a test to establish the correct operation of itself and of the connected accessories as well. In case anomaly is found an alphanumeric message it is shown coded according to the chart codes brought in the chapter MAINTENANCE. This test lasts about 10 seconds. At the end of the control the equipment restores last use operational conditions.

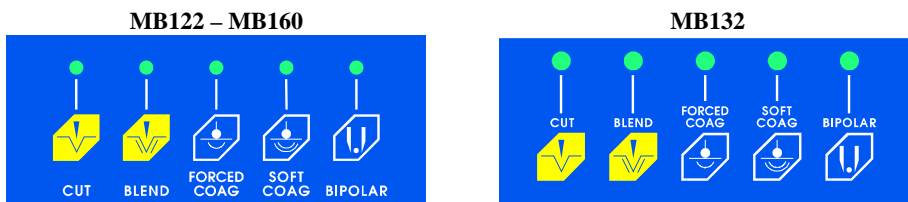
### 4.3.2 NEUTRAL ELECTRODE'S CIRCUIT

The neutral electrode is continually watched by a special circuit that prevents, danger of burns to the patient due the loss of contact between the reference plate and the patient skin, if split electrode is used. The circuit also watched the connection of the plate to the unit.

If the impedance value of the patient circuit is less than 200 ohm the value is not accepted.

## 4.4 PRESELECTION OF THE DELIVERABLE CURRENT

The deliverable current for the surgical operations can have preselected through push button for:



### 4.4.1 CUT CURRENT (CUT)

The best current for the cut is the pure sinusoidal wave without modulation that means with duty-cycle 100%. Such current, proper for cut without coagulation.

### 4.4.2 COAGULATED -CUT CURRENT (BLEND)

The coagulated-cut current (BLEND) it is suited for coagulated cut when a deep coagulation together the cut is desired. This current is made by sine current e suited for the cut associated to low voltage current suited for coagulation (soft coag). With this blending, a current suited for cut coagulated in absence of eschar and carbonization is obtained, particularly suitable for endoscopic surgery.

### 4.4.3 SUPERFICIAL COAGULATION CURRENT (FORCED COAG)

The modulated current (FORCED COAG) it is characterized by good property of surface coagulation behaving at the time it probable production of eschar and partial carbonization of the tissue. The advantage of this type of coagulation resides in the rapidity with which the effect is gotten.

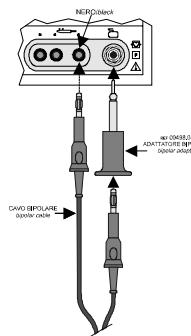
### 4.4.4 DEEP COAGULATION CURRENT (SOFT COAG)

The low voltage and low modulation current (SOFT COAG) it is suited for coagulation of deep layers of the tissue in which the coagulation of the cellular albumin is gotten in absence of carbonization and without production of eschar. The process of coagulation is in this case more time expensive than that of the forced coagulation.

### 4.4.5 BIPOLAR COAGULATING CURRENT (BIPOLAR)

This current is low voltage pure sine current suited for coagulation without carbonization either monopolar or bipolar. The use of bipolar forceps it is allowed only with this current. To allow the connection of the cable for bipolar forceps it is necessary the use of an optional adapter (REF 00498.04) that prevents any other type of current from delivering.

Particularly interesting it is the automatic termination of the bipolar coagulation through the presetting of the time of current delivery (only for MB132 model).





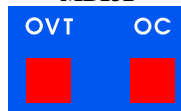
#### 4.5 SIGNALING OF EXCESSIVE TIME OF DELIVERY (OVT)

If the operator exceeds the maximum time of disbursement, recommended by the international norms, that is 10 seconds, the equipment produces a signal of warning consisting of bright intermittent signal OVT. If despite the signal of warning the operator insists in the continuous delivering, after a time depending from the type of current, and from the level of the same one, the signal of warning is transformed in impediment to the delivering of current that is signalled through the signal OVT constantly illuminated. The interdiction lasting of the current delivery depends from the previous conditions of delivery.

MB122 – MB160

OVT ●      OC ●

MB132



#### 4.6 SIGNALING OF EXCESSIVE IMPEDANCE IN THE CIRCUIT OF NEUTRAL ELECTRODE (OC)

For the meaning of this warning signal please refer to the previous description of the neutral electrode circuit.

#### 4.7 ADJUSTMENT OF THE ACOUSTIC SIGNAL LEVEL

To modify the emission acoustic signal it is necessary to follow those indications:

1. Switch on the unit through the mains switch while the CUT pushbutton is maintained pressed
2. When the unit has finished to check internal parameters, on the display CUT appears the message SOU., while on the COAG one, the value of the preset level. Now, the CUT pushbutton can be released.
3. Through the COAG knob it is possible varying the emission acoustic level. During the variation the sound emitted by the unit corresponds to the preset level.
4. Press the CUT pushbutton to confirm the level.

Level	Sound emission until 1m distance from the frontal panel
1	55 dBA
2	60 dBA
3	65 dBA
4	70 dBA
5	75 dBA

#### 4.8 AUTOMATIC CONTROL OF THE INTERNAL PARAMETERS

The unit has an automatic control system of some of the internal parameters. When switched on, the control is indicated on the display through the message SEL FCh. If there are not errors, the message PAS Sed appears; if there are errors, Err 001 appears. See Guide to the Problems' Solution for further information.

#### 4.9 CONNECTORS

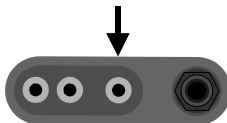
##### Connector for return plate

This is the point of connection of the return plate or of the bipolar optional adapter (**REF 00498.04**) for BIPOLAR function.



##### Connector for handle

This is the point of connection of electrode handle. In the case of use of handle without finger switch it shall be connected to the black buckle.



#### 4.10 MB132 UNITS' EXTRA FUNCTIONS

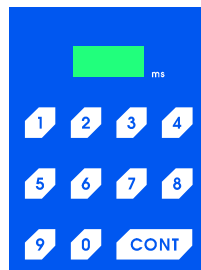
This control apply only to the electrosurgical unit model **MB132** that has the following added characteristics:

Output power delivery time	from 1/1000 up 999/1000 sec
Repetition of delivery actuation	from 2 to 9 times
Session time measurement	up to 999 min
Output power stroke counter number	up to 999

##### 4.10.1 EMISSION TIME PRESETTING

If the model **MB132** is used, the actuation time for the delivery of the high frequency current can be preset with high accuracy. When timed emission is requested the control of the active time is effected on the frontal panel by the digitation of the value on the keyboard.

The emission of the high frequency current will occur for the preset time each time one foot-switch or one hand-switch will be pushed. If, after have done the timed work, it is necessary to return to the normal work it is sufficient to push the CONT push button to do it.



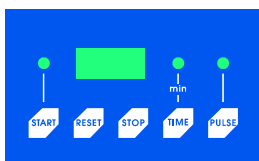
##### 4.10.2 REPETITION OF TIMED DELIVERY

The timed high frequency current emission can be automatically repeated from 2 to 9 times each time one foot-switch or one hand switch is pushed. The number of the repetitions, selected through the pushbutton UP and DOWN, it is pointed out on the corresponding display. To annul the command of repetition is necessary to press the pushbutton OFF, in this condition the display has not turned on.



##### 4.10.3 TREATMENT TIME COUNTER

With the **MB132** model it is possible to obtain automatically the elapsed treatment time by presetting the function by the TIME push-button and starting the counter by the START push-button. To arrest the counting it is necessary to push the STOP push-button and the RESET push-button is used for the counter zeroing.

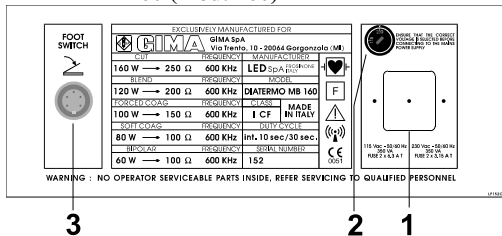


##### 4.10.4 COUNTER OF THE NUMBER OF TIMED EMISSION

With the **MB132** model it is possible automatically collect the number of the high frequency current emission by presetting the function by the PULSE push-button and starting the counter by the START push-button. To arrest the counting it is necessary to push the STOP push-button and RESET push-button is used for the counter zeroing.

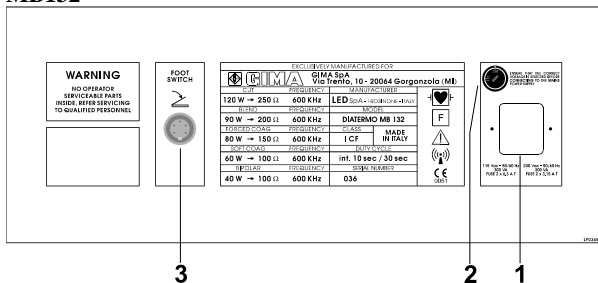
## 4.11 BACK PANEL

### MB122-MB160 (mod. 160)



- 1 Mains voltage connector
- 2 Voltage selector
- 3 Connector for pedal

### MB132



#### 4.11.1 POWER SUPPLY MODULE

Power supply module is the connection point of mains voltage feeding to the unit. This module is provided with line fuses.

**WARNING:** before switch on the unit, operator has to verify that requested mains voltage corresponds to the voltage available from the electrical net.

#### 4.11.2 PEDAL CONNECTOR

On the left part of the back panel it is pedal connector.



#### 4.11.3 TURNABLE VOLTAGE SELECTOR

On the power supply block can be present a voltage selector suitable for the selection of 115Vac or 230Vac mains voltage. Before powering the unit, it is necessary to preset the correct mains voltage by properly set the voltage selector. The unit is factory preset to 230Vac.



## 5. TECHNICAL CHARACTERISTICS

Toll.	Description	DIATERMO		
		MB122	MB160	MB132
–	Electrosurgical unit code GIMA	30540	30541	30544
–	Electrosurgical unit code LED	GMA10100.20A	GMA10100.30A	GMA10300.10A
± 0%	Minimum preselectable power	0	0	0
–	Level step	1	1	1
–	Digital level display	●	●	●
± 20%	Maximum output power CUT (W)	120 → 250Ω	160 → 250Ω	120 → 250Ω
± 20%	Maximum output power BLEND (W)	90 → 200Ω	120 → 200Ω	90 → 200Ω
± 20%	Maximum output power COAG FORCED (W)	80 → 150Ω	100 → 150Ω	80 → 150Ω
± 20%	Maximum output power COAG SOFT (W)	60 → 100Ω	80 → 100Ω	60 → 100Ω
± 20%	Maximum output power BIPOLAR (W)	40 → 100Ω	60 → 100Ω	40 → 100Ω
± 5%	Modulation factor CUT	Puro 100%	Puro 100%	Puro 100%
± 5%	Modulation factor BLEND	Puro 100%	Puro 100%	Puro 100%
± 5%	Modulation factor COAG FORCED	Mod. 60%	Mod. 60%	Mod. 60%
± 5%	Modulation factor COAG SOFT	Mod. 90%	Mod. 90%	Mod. 90%
± 5%	Modulation factor BIPOLAR	Puro 100%	Puro 100%	Puro 100%
± 0.2	Crest Factor CUT	1.5	1.5	1.5
± 0.3	Crest Factor BLEND	2.1	2.1	2.1
± 0.3	Crest Factor COAG FORCED	2.0	2.0	2.0
± 0.3	Crest Factor COAG SOFT	1.7	1.7	1.7
± 0.2	Crest Factor BIPOLAR	1.5	1.5	1.5
± 10%	Working frequency	600 kHz	600 kHz	600 kHz
± 15%	Maximum output voltage CUT (Vpp on5.2kΩ)	1050	1050	1050
± 15%	Maximum output voltage BLEND (Vpp on5.2kΩ)	1050	1050	1050
± 15%	Maximum output voltage FORCED (Vpp on5.2kΩ)	1050	1050	1050
± 15%	Maximum output voltage SOFT (Vpp on5.2kΩ)	540	540	540
± 15%	Maximum output voltage BIPOLAR (Vpp on5.2kΩ)	540	540	540
± 0.5	Weight Kg	7	7	8
± 10	Size HxLxD mm	260x110x265	260x110x265	360x150x265
± 5%	Selectable power (Vac)	115–230	115–230	115–230
± 1%	Mains frequency (Hz)	50-60	50-60	50-60
± 0	Fuses (230Vac) 5x20 type TIMED	2x 3.15A	2x 3.15A	2x 3.15A
± 0	Fuses (115Vac) 5x20 type TIMED	2x 6.3A	2x 6.3A	2x 6.3A
± 10%	Electrical input power (VA)	300	350	300
± 10%	Electrical input current (230Vac) (A)	1.3	1.5	1.3
± 10%	Electrical input current (115Vac) (A)	2.6	3	2.6
± 5	Five steps adjustable sound level (from 55 to 75dBA)	●	●	●
–	Self-check	●	●	●
–	Power accuracy output warning	●	●	●
–	Split or not split patient plate allowed	●	●	●
–	Repetition of timed delivery	–	–	Da 2 a 9
–	Timed delivery	–	–	1 – 999 ms
–	Last working condition storing	●	●	●
–	Electrical Class (EN60601-1)	I CF	I CF	I CF
–	MDD 93/42/EEC Class	II b	II b	II b
–	EN55011 (CISPR 11) Class (Class/Group)	2 / B	2 / B	2 / B
–	Patient circuit	<b>F</b>	<b>F</b>	<b>F</b>
–	Duty Cycle (action / pause) in seconds	10 / 30	10 / 30	10 / 30
–	Output power control by foot-switch or finger-switch	●	●	●
–	Defibrillation-proof	●	●	●
–	Ten seconds delivery warning (OVT)	●	●	●
–	Equipotential binding	○	○	○
–	Metallic cabinet RAL5028 painted	●	●	●
–	Polycarbonate covered panels	●	●	●
–	Conform to EN60601-1 (1997)	●	●	●
–	Conform to EN60601-1-2 (1995)	●	●	●
–	Conform to IEC60601-2-2 (1998)	●	●	●
–	Conform to EN60601-1-4 (1998)	●	●	●

○ = OPTIONAL

● = STANDARD

– = NOT PRESENT

## 6. MAINTENANCE

### 6.1 GENERAL

No user adjustable parts are within the equipment, either for calibration or service purposes. The equipment housing must not be opened: the warranty is invalidated by any unauthorized entry into the unit. In the event any repair or adjustment work being necessary, the whole equipment should be returned to the LED S.p.A. Service Centre 04010 APRILIA (LT) - ITALY, or to a other Authorised Centre, together with a description of the fault.

Maintenance work by the user is mainly the cleaning of the exterior of the cabinet, cleaning and sterilisation of the accessory items and checking of the equipment before each use. Carrying out function and safety check for verification of the parameters is demanded to specialised technical people.

### 6.2 CLEANING OF THE CABINET

Switch the equipment off completely and disconnect the mains supply before any cleaning is undertaken. Clean the outside of the cabinet with a damp cloth. No chemical should be used; a mild non abrasive cleanser may be used when necessary.

### 6.3 CLEANING AND STERILISATION OF THE ACCESSORY ITEMS

The best thing to do is to use only one time use accessories and discard them after use. Since some of the accessory items are to be used more than once it is mandatory to clean carefully and sterilise those accessories before the new use. The best way to clean and sterilise the reusable items is to follow the direction of the supplier of each item. When original reusable accessories supplied by LED S.p.A. are applied, the cleaning by using soft cleanser and sterilization through steam sterilisation at 121 °C is recommended.

### 6.4 GUIDE TO THE SOLUTION OF THE PROBLEMS

In case of problems before all it is advised to check for the correct installation of the unit and for the correct connection of the accessories.

<b>Problems</b>	<b>Probable Cause</b>	<b>Solution</b>
The equipment doesn't switch on.	Interruption or absence of the main feeding	Verify the connection of the main cable. Verify the fuses and replace them, where necessary, with new ones of the propre type.
Alarm OC always active.	Interruption or lack of contact on the neutral electrode circuit	Check the connection of the cable to the neutral electrode. Replace the cable of connection of the neutral electrode.
The unit doesn't respond to the command of activation.	Breakdown of the handpiece or of the pedal - Wrong connection of the handpiece or of the pedal - Alarm OVT activated	Replace the handpiece or the pedal. Verify the connection of the handpiece or of the pedal. Wait for the OVT warning signal getting out.
Error Code 001	Current delivery control activated during switching on	Disconnect the handpiece or the pedal and switch on the unit again.
Error Code 002	Error in the management board	Call for Service
Error Code 003	Error in the management board	Call for Service
Error Code 004	Error in the data conversion circuit	Call for Service
Error Code 005	Error of the reference voltage value	Verify the main voltage. Call for Service
Error Code 009	Error in the output power activation circuit	Call for Service
Error Code 010	Error in the output power activation circuit	Call for Service

## 6.5 REPAIRS

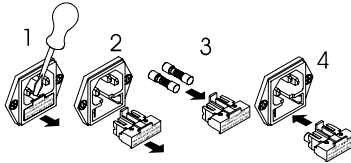
High frequency cables and electrode holder handle cannot be repaired. Always substitute a damaged part with a new one.

### 6.5.1 FUSE SUBSTITUTION

**Before substituting the fuse, disconnect the unit from the mains system.**

Only use fuse of the kind 5x20; they must have those characteristics: 3.15AT (slow) (230Vac mains voltage), 6.3A (115Vac mains voltage), proceed as follows:

- 1-2 Extract, with a small screwdriver, the drawer under the mains socket
- 3 Extract the damaged fuse and insert two new ones
- 4 Reinsert the drawer



## 6.6 CHECKING OF THE EQUIPMENT BEFORE EACH USE

Each time the use of the electrosurgical equipment is planned a check of the most important safety aspects has to be implemented considering at least the following:

- Check the integrity of cords, connections, wires breakage, etc.
- Assure that all the electrical equipment is properly grounded
- Assure that all the accessories that should be used are available and sterilised.
- Check, by disconnecting the reference electrode cable, the functioning of the OC light and sound alarm warning.
- Check, by activating the CUT and COAG power switch, the functioning of the emission lights and sounds warnings.

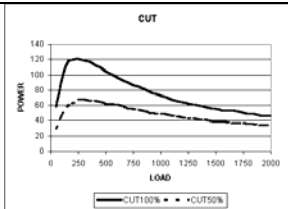
## 6.7 FUNCTION AND SAFETY CHECK AND TEST

At least once a year, the biomedical engineering department or other qualified personnel should do the following check and test:

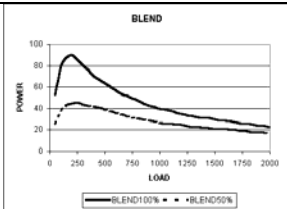
- Check of the connectors and mains supply cord conditions;
- Visual check of the mechanical protections;
- Check of the protections against the danger due to liquid's pouring, dripping, moisture, liquid's penetration, cleanliness, sterilization and disinfection.
- Check of the Equipment's Datas on the Label
- Check of the availability of the Instruction's Manual
- Check the functioning of the H.F. output controls
- Check the uniformity of the resistance through the surface of the patient plate.
- Test the earth conductivity resistance.
- Test the earth leakage current.
- Test H.F. leakage current.
- Control of the neuromuscular stimulation.
- Control of the accuracy of the output power.

**GRAFICI / DIAGRAMS / GRAFICOS**

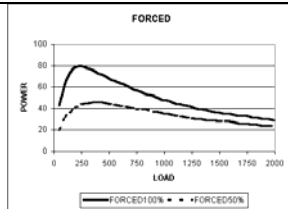
**DIATERMO MB122 – MB132**



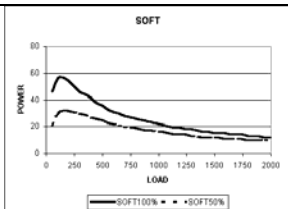
*Diagrams of half and maximum output power versus impedance load 100-2000Ω CUT*



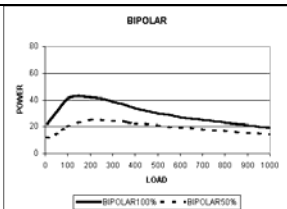
*Diagrams of half and maximum output power versus impedance load 100-2000Ω BLEND*



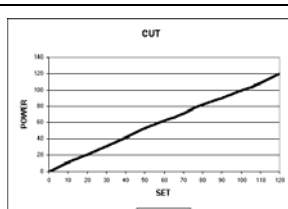
*Diagrams of half and maximum output power versus impedance load 100-2000Ω FORCED*



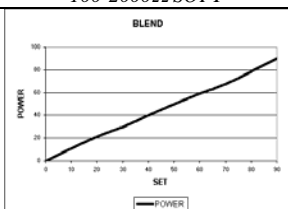
*Diagrams of half and maximum output power versus impedance load 100-2000Ω SOFT*



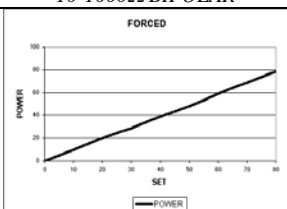
*Diagrams of half and maximum output power versus impedance load 10-1000Ω BIPOLAR*



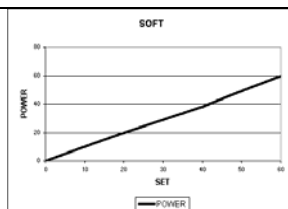
*Diagrams of output power CUT versus nominal value*



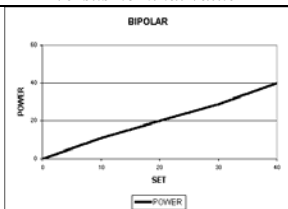
*Diagrams of output power BLEND versus nominal value*



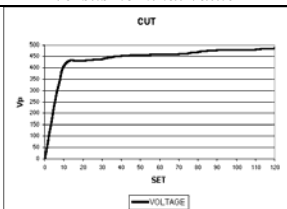
*Diagrams of output power FORCED versus nominal value*



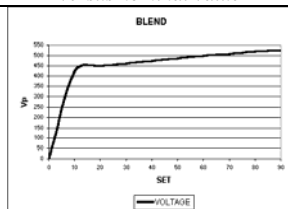
*Diagrams of output power SOFT versus nominal value*



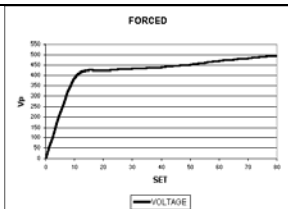
*Diagrams of output power BIPOLAR versus nominal value*



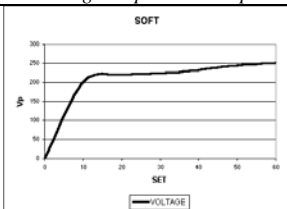
*Diagrams of CUT maximum mains voltage output versus Vp*



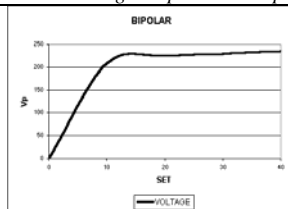
*Diagrams of BLEND maximum mains voltage output versus Vp*



*Diagrams of FORCED maximum mains voltage output versus Vp*

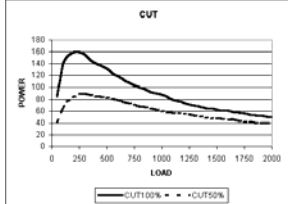


*Diagrams of SOFT maximum mains voltage output versus Vp*

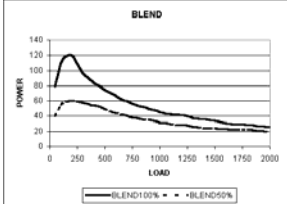


*Diagrams of BIPOLAR maximum mains voltage output versus Vp*

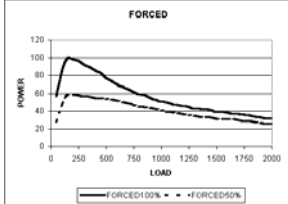
**DIATERMO MB160**



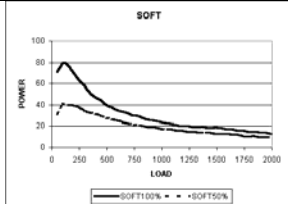
*Diagrams of half and maximum output power versus impedance load 100-2000Ω CUT*



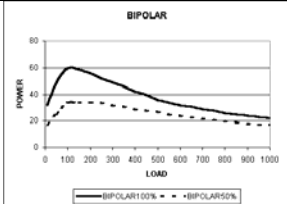
*Diagrams of half and maximum output power versus impedance load 100-2000Ω BLEND*



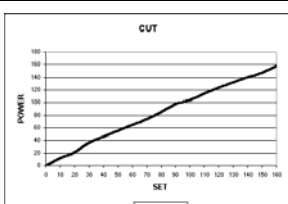
*Diagrams of half and maximum output power versus impedance load 100-2000Ω FORCED*



*Diagrams of half and maximum output power versus impedance load 100-2000Ω SOFT*



*Diagrams of half and maximum output power versus impedance load 10-1000Ω BIPOLAR*



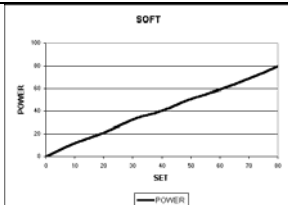
*Diagrams of output power CUT versus nominal value*



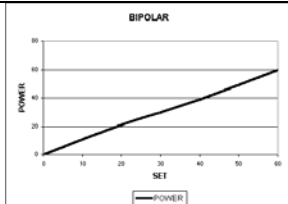
*Diagrams of output power BLEND versus nominal value*



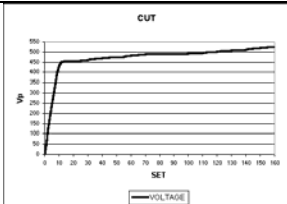
*Diagrams of output power FORCED versus nominal value*



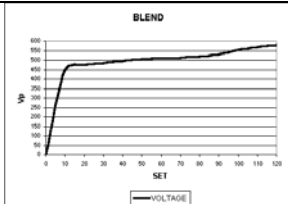
*Diagrams of output power SOFT versus nominal value*



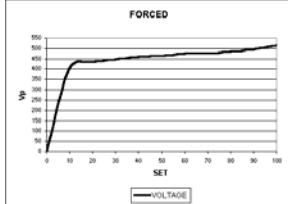
*Diagrams of output power BIPOLAR versus nominal value*



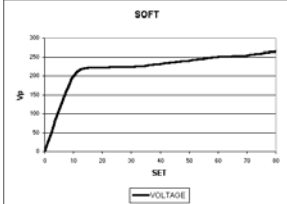
*Diagrams of CUT maximum mains voltage output versus Vp*



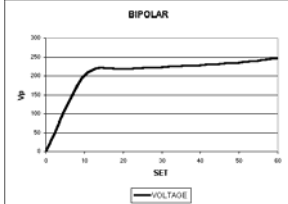
*Diagrams of BLEND maximum mains voltage output versus Vp*



*Diagrams of FORCED maximum mains voltage output versus Vp*



*Diagrams of SOFT maximum mains voltage output versus Vp*



*Diagrams of BIPOLAR maximum mains voltage output versus Vp*



**Informazioni in base all'Art. 13 del D.Lgs. 151/05 del 25/07/2005 "Attuazione delle Direttive 2002/95/CE e 2003/108/CE, relative alla riduzione di sostanze pericolose nelle apparecchiature elettriche ed elettroniche, nonché allo smaltimento dei rifiuti.**



A fine vita il presente prodotto non deve essere smaltito come rifiuto urbano, lo stesso deve essere oggetto di una raccolta separata.

Se il rifiuto viene smaltito in modo non idoneo è possibile che alcune parti del prodotto (ad esempio eventuali accumulatori) possano avere effetti potenzialmente negativi per l'ambiente e sulla salute umana.

Il simbolo a lato (contenitore di spazzatura su ruote barrato) indica che il prodotto non deve essere gettato nei contenitori per i rifiuti urbani ma deve essere smaltito con una raccolta separata.

In caso di smaltimento abusivo di questo prodotto sono previste delle sanzioni.

**Information about elimination of this product (Applicable in the European Union and other European countries with separate collection systems)**



On the end of the life, the present product mustn't be eliminated as urban refusal, but it must be eliminated in a separated collection.

If the product is eliminated in unsuitable way, it is possible that some parts of the product (for example some accumulators) could be negative for the environment and for the human health.

The symbol on the side (barred dustbin on wheel) denotes that the products mustn't throw into urban refuses container but it must be eliminated with separate collection.

In case of abusive elimination of this product, could be foreseen sanctions.

**Información sobre la eliminación de este producto (Aplicable en la Unión Europea y en países europeos con sistemas de recogida selectiva de residuos)**



En el final de la vida, el actual producto no se debe eliminar como denegación urbana, sino que debe ser eliminado en una colección separada.

Si el producto se elimina de manera inadecuada, es posible que algunas partes del producto (por ejemplo algunos acumuladores) podrían ser negativas para el ambiente y para la salud humana.

Este símbolo indica que el presente producto no puede ser tratado como residuos domésticos normales, sino que deben entregarse en el correspondiente punto de recogida de equipos eléctricos y electrónicos.

En caso de que de eliminación abusiva de este producto, podrían estar las sanciones previstas.