

Electrosurgical Unit

Mano Medical Vet HF-M



User Manual

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1. Introduction

1.1. Destination and fields of application

APPLICATION: *Minor and medium surgery*
DESTINATION: *Suitable for medical, dental and veterinary offices and clinics*

1.2. Functions

Mano Medical Vet HF-M is an intelligent, microprocessor controlled electrosurgical unit. **This economic model** contains the most used functions in monopolar electrosurgery. It characterizes with reliable operation, operating comfort and patient's safety.

The unit has **100W maximal output power** and **4 operating modes**, allowing the surgeon to obtain a different tissue effects:

- **CUT** - smooth cutting,
- **CUT1** - cutting with increased degree of haemostasis,
- **COAG1** - standard coagulation,
- **COAG2** - superficial coagulation

Each of these modes has independent power setting, shown by digital LED indication. A digital memory stores the last power settings. The unit can be activated by footswitch. Overheating (OH) and Power failure (PF) sensors increase the patient's safety. A status monitor on the front panel indicates if some of the controlled parameters are out of the norm. If this happen, the control circuit immediately switches off the output power and generates a sound alarm.

1.3. Technical characteristics

Technical characteristics of <i>Mano Medical Vet HF-M</i>		
	Maximal output power	Crest Factor
CUT	100W / 500 Ohms	1.5
CUT1	100W / 500 Ohms	2.1
COAG1	90W / 500 Ohms	3.0
COAG2	45W / 500 Ohms	5.0

Working frequency [KHz]	500
Modulating frequency [KHz]	33
Activation method	By footswitch
Dimensions (W x D x H) in mm	256 x 200 x 82
Weight [kg]	5

2. Description of the unit

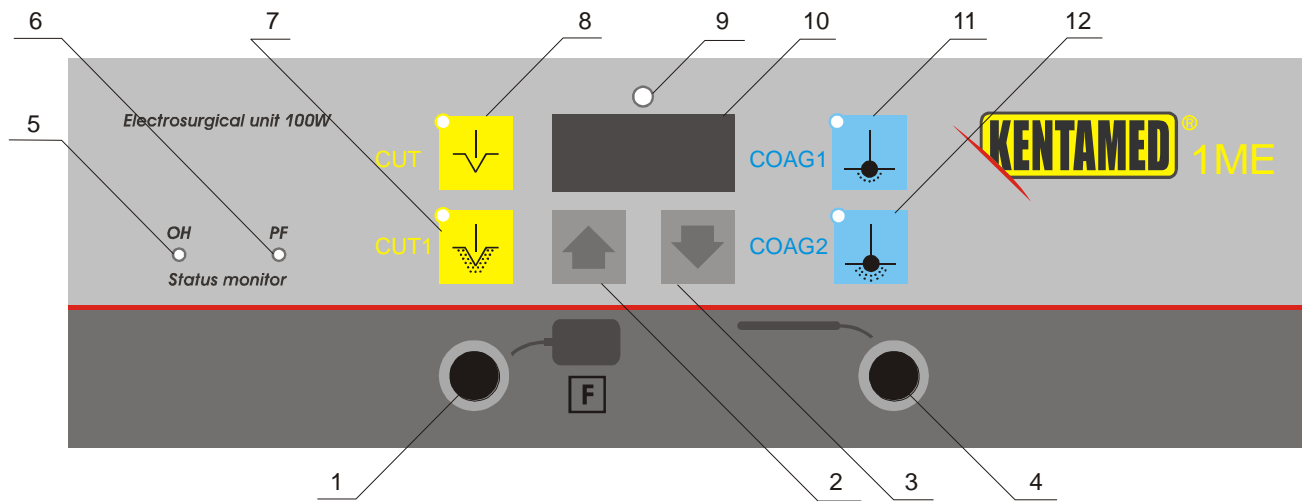
2.1. Basic components of the unit

The basic components of the electrosurgical unit **KENTAMED 1ME** are a power supply module, a power generator and a control module. The unit is built in a plastic housing with a

front panel and a rear panel and conveniently placed on it controls, indications and connectors for the accessories.

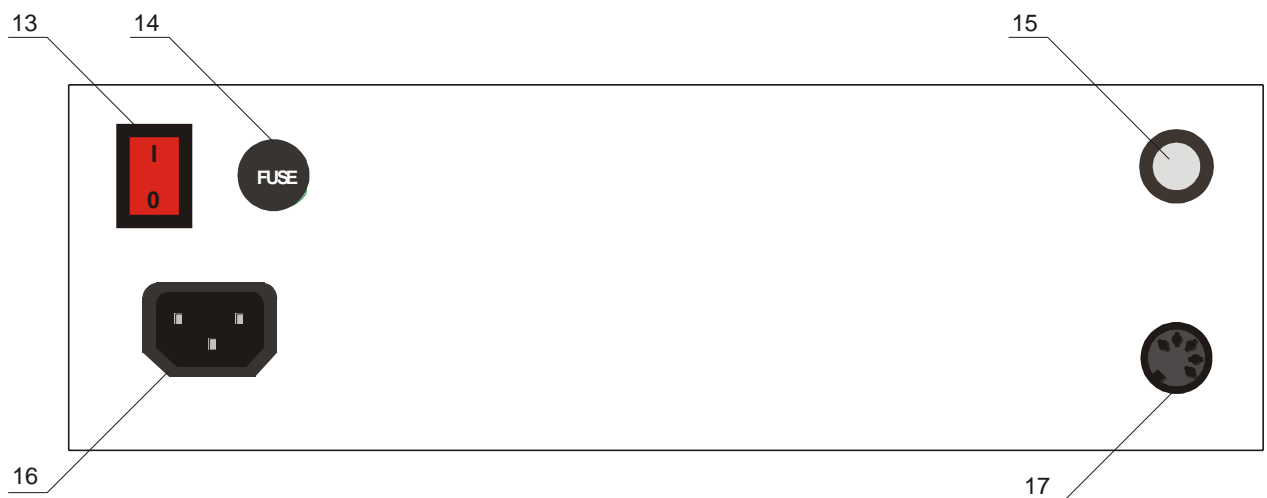
2.2. Controls, indications and connectors

FRONT PANEL OF THE UNIT



1. Socket for the Neutral Electrode's cable.
2. Push-button for increasing the power setting
3. Push-button for decreasing the power setting
4. Socket for active electrodes handle
5. Red LED indicating an Over Heating (OH) of a power module of the unit. If this happen the output power is immediately switching down and a sound alarm is generated. The normal work can continue after several minutes, when the power module of the unit comes to normal operating temperature.
6. Red LED indicating a Power Failure (PF) in a situation when the output power exceeds the desired power setting. If this happen the output power is immediately switching down and a sound alarm is generated.
7. Push-button, selecting the **CUT1** mode – cutting with more haemostasis
8. Push-button, selecting the **CUT** mode – a smooth cutting, similar to classic scalpel
9. Green LED indicating the activation of output power at pre-selected operating mode
10. Digital display indicating the output power setting corresponding to selected operating mode
11. Push-button, selecting the **COAG1** – a standard monopolar coagulation
12. Push-button, selecting the **COAG2** – a superficial monopolar coagulation

REAR PANEL OF THE UNIT



13. Power ON/OFF switch (I = ON, 0 = OFF)
14. Socket for safety fuse 2.5A / 220V

15. *Potentiometer for acoustic signal volume adjustment.*
16. *Socket for the mains power cable*
17. *Socket for footswitch coupling*

2.3. Instruments and accessories

The most used accessories are:

- Mains power cable
- Footswitch with 3m cable
- Handpiece (sometimes called “pencil”) for active monopolar electrodes
- A set of different monopolar electrodes for cutting and coagulation
- Neutral Electrode with a cable for it.

3. Method of operation

3.1. Installation

- The unit is placed on a specially selected place in Operating Room (OR) so it can be accessible to the people, who are responsible for setting the working modes and the necessary output power during the operation. In the same time the distance to the operating field must provide the surgeon and his assistants enough operating space, having in mind that the patient cables are with 3 meters length typically.
- The footswitch must be placed on the floor in the suitable for the surgeon place.
- The electrical installation of the OR must be in perfect condition.

3.2. Connecting of the accessories to the unit

- Check if the power switch 13 is in position “0” – off. Connect consecutively the mains power cable to the socket 16 of the rear panel and to the mains power socket on the wall of OR.
- Connect the cable of the footswitch to the socket 17 on rear panel.
- Connect the 6mm jack connector of the neutral electrode cable to the socket 1 on the front panel.
- Connect the connector of the electrode handle to the socket 4 on the front panel.

3.3. Switching ON/OFF the unit

The unit can be switched-on by turning the power switch 13 in position “1”. All LED indicators on the front panel, including all segments of the digital indicator 10 must go on for a few seconds. This is an initial LED-test, allowing the operator to see if all indicators are working properly. After the initial test is finishing, all indicators must go out, except two indicators:

- The LED on the push-button (7, 8, 11 or 12), corresponding to the pre-selected operating mode
- The digital indicator, showing the power setting for the pre-selected operating mode.

You can switch-off the unit by turning the power switch 13 in position “0”.

3.4. Setting the operation mode

- You can select the desired operating mode by pushing the corresponding push-button, after which the corresponding button-indicator is switching on.
- It is not possible to select two or more working modes in the same time simultaneously

3.5. Activation of the output

The preliminary selected working mode can be activated and the pre-settled output power can be delivered to the patient's tissue pressing the footswitch. Switching on the green LED indicator 9 and corresponding sound (different for every operating mode) accompany the activation of the output power. The output power will be activated as long as the footswitch will be pushed. If Over Heating or Power Failure is occurred during the activation of output, the output power is automatically switched off; the corresponding LED indicator (OH or PF) and a sound alarm are switched on as is described above (see p. 2.2).

3.6. Neutral electrode placement

The purpose of the neutral electrode is to close the circuit of the high frequency current passing through the active electrode and a patient's tissue back to the unit. The next rules must follow up when the NE is attached to the patient's body:

- Place the NE as close as possible to the operating field to minimize the rout of the HF current through the patient's body;
- Select a good vascularized tissue for NE placement to ensure relative good electrical conductivity;
- Ensure a maximal contact surface and direct contact between the NE and the patient's body. If the contact surface is not enough, thermal injuries can be occurred.
- In the case when is necessary to place the NE on a hairy surface, shave the hairs **firstly** or put enough quantity of electro-conductive gel (for example ECG gel) between the NE and the patient's body to ensure the electrical contact;
- Ensure enough contact pressure between the NE and patient's body:
 - By use of elastic belt, pressing the NE to the body;
 - By placing the NE under the seat of the patient, counting on the patient's weight;
- In the veterinary medicine also can use a rectal neutral electrode with suitable diameter and length, counting on the natural elasticity of the rectum as well as on it good contact conductivity;
- When a self-sticking disposable NE is used, the contact quality is guaranteed by the conductive function of the sticking gel, covering the NE. Check the expiration date of the NE before use;

3.7. Output power setting

The maximal output power can be settled separately for each operating mode using the push buttons 2 and 3 on the front panel the unit. You must have in mind the next:

- Every single and short push of the button 2 will increase the settled maximal output power with a single step of 1W. Respectively every single and short push of the button 3 will decrease the settled maximal output power with a single step of 1W. This can be observed in the digital display 10 on the front panel of the unit.
- If you keep pushing the buttons longer than 1 sec., a sequence of 1W-steps will be made in the direction, corresponding to the pushed button. The longer you push the button, the more steps of 1W will count out the digital display. The changes will stop after depressing the button, or after reaching the minimal- or respectively maximal possible setting. The range of possible output power settings for the different modes is as follows:
 - For **CUT** – from 1W to 100W;
 - For **CUT1** - from 1W to 100W;

- For **COAG1** -from 1W to 90W;
- For **COAG2** -from 1W to 45W.
- The individual power setting for each operating mode is stored in a digital memory.
- Even when you switch off the unit and will switching it on again after a long time, the digital display will show the last settings for each mode.
- You can make many changes of the power setting – the digital memory will store the last one.
- During the real operation the output power is changed automatically depending of the actual electrical resistance of the tissue between the active and neutral electrodes. This dependency is analyzed by so called Power Distribution Test (see the diagrams on fig.1 – fig.3). When the surgeon makes the output power setting, in fact he sets the maximal output power, which the unit can give at the characteristic tissue resistance (at about 500 Ohms for the model KENTAMED 1ME).

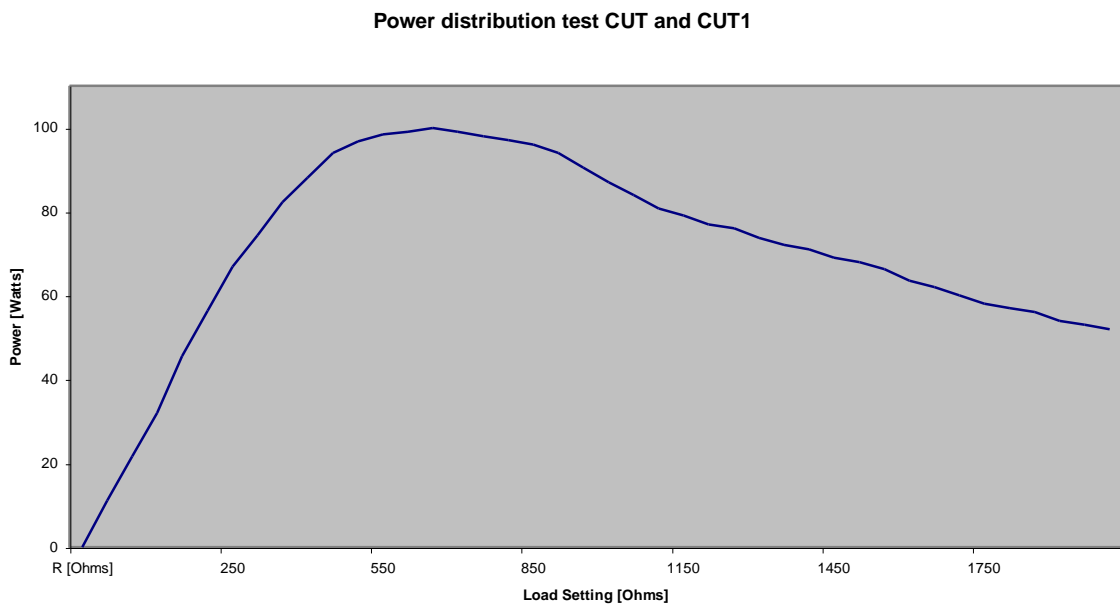


Fig.1

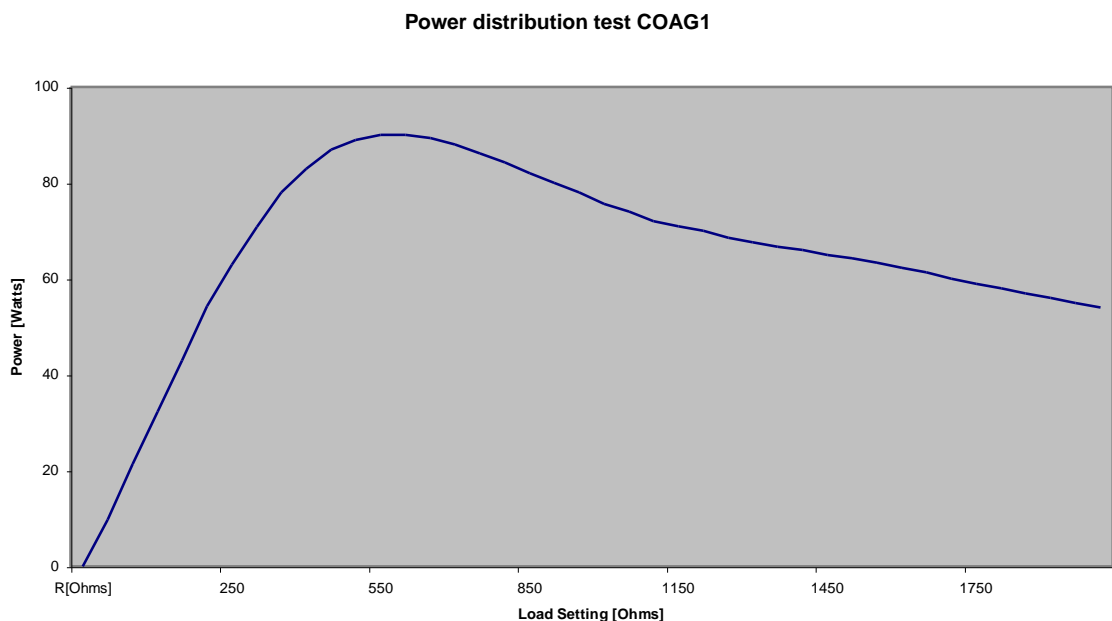


Fig.2

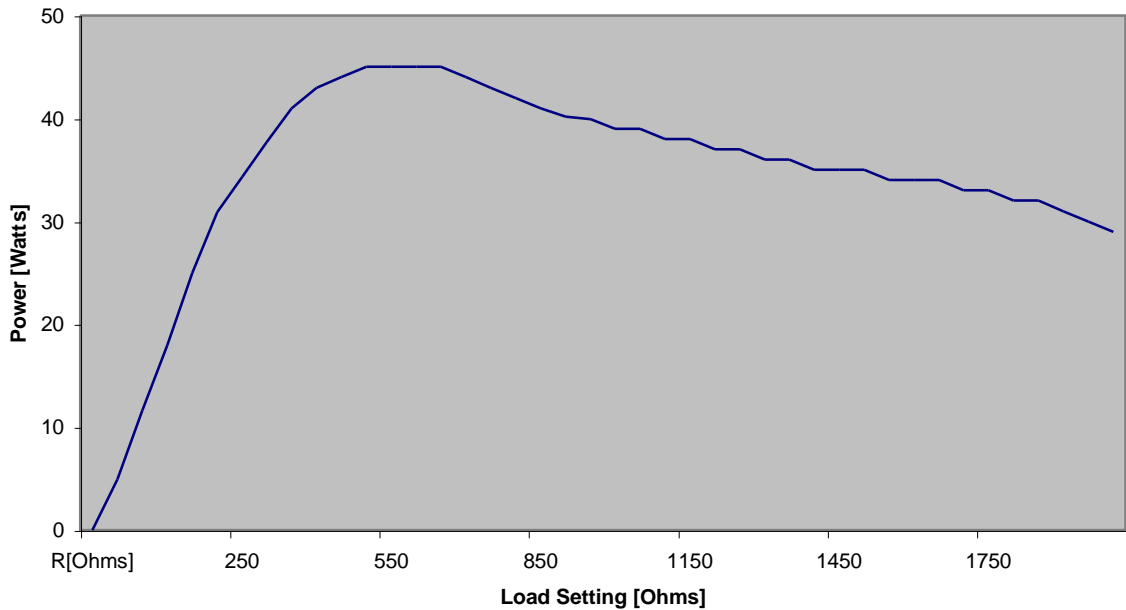


Fig.3.

3.8. Acoustic signal volume adjustment

When the footswitch is pressed, an acoustic signal is generated (different for the different modes).

- At normal work of the unit the volume of the acoustic signal can be adjusted by potentiometer 15 on the rear panel. It is not possible to decrease the volume till “zero” – even adjusted to minimal level the sound must be audible by security reasons.
- At an overheating of the unit (OH) or at output power failure (PF) a special acoustic signal is generated. Its volume can't be adjusted.

3.9. Cleaning the unit and the accessories

- **Cleaning the corpus of the unit** – it is recommended to use a soft material (tampon, gauze, etc.) and a cleaning liquid, such as ethyl alcohol etc., which would not damage the superficial coverage of the corpus. It is absolutely undesirable the penetration of a cleaning liquid inside the unit, because it can provoke an electrical damage of the electronic modules. That's why the tampon or the gauze must be only lightly damped.
- **Cleaning the footswitch, neutral electrode, electrode handle and the patient cables** – this can be made by the above-mentioned method. To enlarge the life of the cables and to avoid its damage do not bend it in immediate vicinity of the connectors. If it is necessary to wind the cable, leave a larger loop near the connector and the handle.
- **Cleaning the active electrodes** – before the sterilization as well as periodically during the operations it must be cleaned from carbonized tissue and blood, adhered to the metallic surface during the cutting and coagulation. Use gauze and suitable solvents such as ethyl alcohol, de-ionized water etc.

3.10. Sterilization

Follow up the instructions for the different accessories.

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