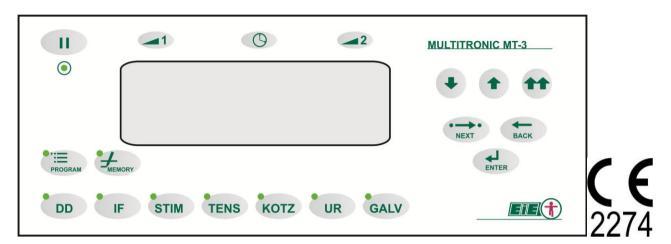
## MULTITRONIC MT-3

## Multi-current electrotherapy stimulator



# INSTRUCTIONS FOR USE

**NOTICE!** PROTECT THE MANUAL FROM LOSS. THIS MANUAL IS PART OF THE EQUIPMENT

NUMBER: .....

In the case of loss, instructions are sold after this number is given.

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## MANUFACTURER: Elektronika i Elektromedycyna M.Lewandowski Sp.J. 05–402 OTWOCK, ul. Zaciszna 2, tel./fax +48 22 779 42 84; tel. +48 22 710 08 39 www.eie.com.pl e-mail: office@eie.com.pl

#### **WARRANTY CARD**

Name and model of the product: <b>MULTITR</b>	CONIC MT-3
Serial number	Date of production
Warranty period: 24 months from the date	of purchase.
3. Exploitation of the product must be of	the fully fit equipment to the customer. date of sale stamped and signed by the seller. conducted according to the instructions for use. irs will be done by the manufacturer or by the
exploitation (electrodes, cables, banda.  2. Mechanical damages which did not a	rise from the fault of the producer.  Ig and the like), which can happen under the
The warranty ceases to be valid in the case  1. Expiry of the warranty period.  2. Lack of required periodic technical to a content of the case of the	ests.
All customer complaints should be sent to t	he above address.
	Stomp and signature of the manufacturer
	Stamp and signature of the manufacturer
Date of purchase	Stamp and signature of the seller

## **Confirmations of technical service**

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#### I. APPLICATION

#### I.1. Meaning of symbols used in this manual.

<u>WARNING:</u> This symbol indicates that it is absolutely necessary to acquaint with and remember the following information regarding safety of use of the device. Failure to consider such warnings may cause deterioration of health or even death.

**IMPORTANT:** This symbol indicates essential advice helping to prevent the damage of the device or equipment as well as the important general information.

**NOTICE:** This symbol indicates useful hints making the operating of the device easier.

#### I.2. Intended purpose of the device

MULTITRONIC MT-3 is intended for use in professional healthcare facilities by a qualified physiotherapy technician.

MULTITRONIC MT-3 is a modern, microprocessor controlled unit for double-channel electrotherapy.

A detailed description of the therapeutic indications can be found in chapter VII. "MEDICAL DESCRIPTION".

**WARNING:** Any treatment with MULTITRONIC MT-3 should be performed carefully by a qualified physiotherapy technician.

<u>WARNING:</u> The manufacturer takes no responsibility for using this device in violation of the instructions for use recommendations, especially if the obligatory servicing is neglected or the device is used by the unqualified staff.

**IMPORTANT:** Device is an electrical device like a TV-set, radio or hair dryer so the operator should observe the basic safety precautions:

- do not pour water or other liquids on the device
- do not open the device's case
- do not cover the ventilation vents
- do not expose the device to shaking, moisture or dust.

**NOTICE**: The device has pre-programmed average treatment parameters for typical diseases (PROGRAM function) and has the option of their individual adjustment. You can also save settings of treatment parameters individually selected by the operator (MEMORY function).

## I.3. Other symbols used on the device

ON THE DEVICE  CE mark  MD  Medical device  Unique device identifier  Manufacturer													
C€	CE mark	MD	Medical device										
UDI	Unique device identifier	4	Manufacturer										
	Date of manufacture	SN	Serial number										
REF	Catalogue number	$\triangle$	Caution										
☀	Electrical device type BF		Fuse										
i	Consult instructions for use or consult electronic instructions for use		Equipment should be disposed of according to the regulations for disposing of electrical devices										
	ON THE	PACKAGE											
-x'Cmin.	Maximum allowed temperature range	Ť	Keep dry										
x kg max.	The maximum allowable load on the package	<u></u>	This side up										

#### II. TECHNICAL SPECIFICATION

Multitronic MT-3 is 2-channel device. This means that for all currents it is possible to carry out the treatment with the same current shape in both channels, but with separate adjustment of the current amplitude (intensity). The exceptions to this are currents using different current shapes in each channel: the interferential 4-electrode (IF-4P) and the current for tonolysis treatment.

#### II.1. Nominal operating conditions

Heating time 1 minTime of continuous work 24 h

Power supply (single phase)
 ~230 V 10%, 50 Hz, 70 VA

Insulation class
 Ambient temperature
 Relative humidity
 Atmospheric pressure
 Il type BF
 10°C ÷ 40°C
 up to 85%
 780-1060 hPa

#### II.2. Additional specifications

• Internal treatment clock (electrotherapy) 30 s ÷ 60 min

• Dimensions 335 x 270 x 125 mm

Weight (without accessories)
 2,7 kg

#### II.3. Technical data - electrotherapy

**NOTICE:** The values of currents and voltages below are given with accuracy ± 20%.

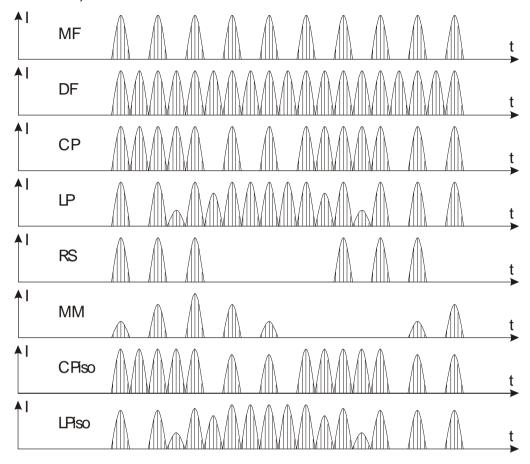
**NOTICE:** Times and frequencies below are given with accuracy ± 10%.

#### II.3.1. Diadynamic current

Medium frequency (10 kHz) amplitude modulated current with 10 ms half sinus of the following types:

- MF (monophasé fixé) modulation with one half of sinusoidal 50Hz wave
- **DF** (diphasé fixé) modulation with full wave rectified 50 Hz sinus; the **DF** modulation frequency is 100 Hz.
- **CP** (courant modulé en courtes périodes) current composed of the **DF** and **MF** waves, flowing alternately in two intervals, 1 sec. each.
- **LP** (courant modulé en longes périodes) current composed of the **DF** and **MF** waves, flowing alternately in two intervals, 6 sec. each. The **DF** and **MF** transition, and opposite, is smooth and takes about 1 sec.
- **CPiso** current composed of the **DF** and **MF** waves, flowing alternately in two intervals, 1 sec. each with the control of the so-called isodynamics, i.e. the change in sensation of the **MF** component relative to **DF** in these types of current.
- LPiso current composed of the DF and MF waves, flowing alternately in two
  intervals, 1 sec. each. The transition from DF to MF and vice versa is smooth and
  lasts about 1 s. with adjustment of the so-called isodynamics, i.e. the change in
  sensation of the MF component relative to DF in these types of currents.
- **RS** (rythmé syncopé) current composed of paused generation of **MF** current with equal times of pulse and break which is 1 sec.
- **MM** (monophasé modulé) current composed of **MF** current modulated in triangle; modulation and break times are equal (6 sec.).
- Average current intensity for **MF** I = (0 15) mA

- Average current intensity for **DF** I = (0 30) mA Different types of diadynamic currents may be combined into sequence, meaning that the device generates them automatically one after another.
  - Adjustment of time for single current type in sequence mode t=30 s 9 min (30 s increment)



#### II.3.2. Interferential current

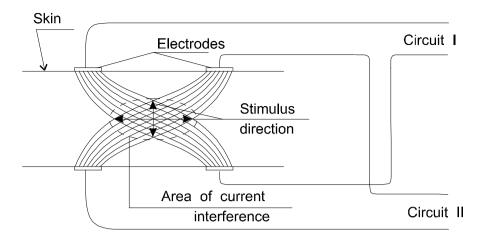
- static the same amplitude in both channels (2-channel) (4-pole /classic)
- static paused the same amplitude in both channels (2-channel) (4-pole /classic paused)
- static pre-modulated with introductory internal modulation by the device (1-channel) (2-pole /premodulated)
- **dynamic** with modulated amplitudes in counter-phase resulting in rhythmical reversal of direction of curative stimulus (2-channel) (4-pole /**isoplanar**)

 $f_N = 4000Hz$  carrier frequency

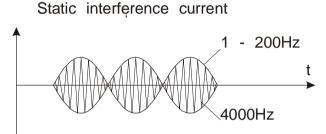
 $\mathbf{Fd} = (1 - \mathbf{Fg}) \, \mathsf{Hz}$  lower limit of change of interference frequency  $\mathbf{Fg} = (\mathbf{Fd} - 200) \, \mathsf{Hz}$  upper limit of change of interference frequency

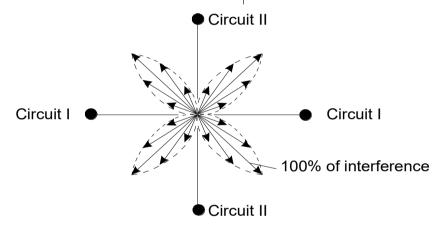
I = (0 - 60) mA RMS current intensity

Interferential current generated by MULTITRONIC MT-3 is a medium frequency alternating current. This type of current occurs in patient's body as a result of interference of two medium frequency (about 4000 Hz) currents, which flow through two independent treatment circuits. They are usually applied with 4 electrodes placed in transverse circuits. The intersection of the current streams should occur close to the ill region geometric centre. As a result of interference a therapeutic stimulus is created in the body region under treatment. The difference in frequencies of currents in each circuit creates therapeutic stimulus of frequency in biologically active range (1–200) Hz.



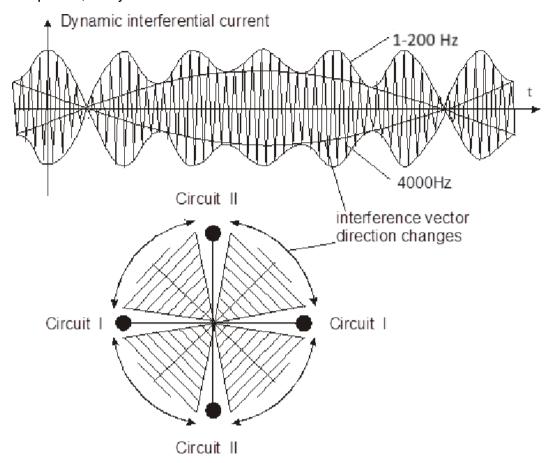
**STATIC** interferential current is generated when amplitudes in both channels have fixed value. Direction of action of stimulus is permanent and agrees with bisectors of angles formed by conceivable lines joining both pairs of electrodes.





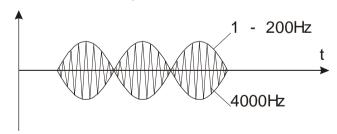
**Static interrupted** interferential current with the same amplitude in both channels (double-channel) (4-pole / **classic interrupted**) are generated with cyclic break of modulation of static interferential current. They can be set using electrogimnastics settings.

**DYNAMIC** interferential current is generated when amplitudes in both treatment channels are modulated. Through introducing the currents' amplitude modulation in both channels in counter-phase, a rhythmical reversal of action of the treatment stimulus is obtained.



The advantage of the therapy with dynamic interferential current is quite even distribution of therapeutic stimulus over all the body part contained between electrodes.

The interference currents, of the IF2P type generated by the MULTITRONIC MT-3 device, are medium-frequency (4000 Hz) amplitude-modulated alternating currents.



In the screen the present frequency is shown. Change of frequency takes 15 s rise and 15 s fall.

## II.3.3. Medium frequency impulse current

#### II.3.3.1 Flaccid paralysis stimulation

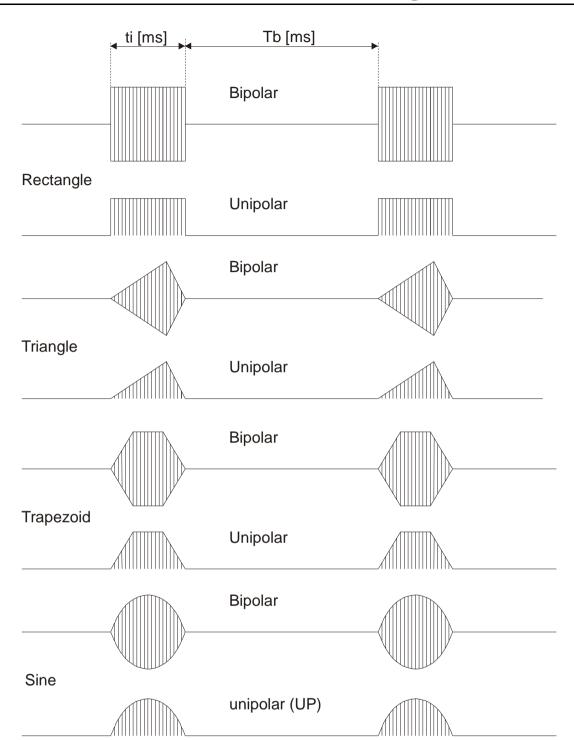
• current shaped as triangle, rectangle, trapezium or half-sinus - each one unipolar (onehalf) or bipolar (two-half; full)

• ti = (5 - 990) msimpulse time

• tp = (100 - 4000) ms break time, wherein  $ti \le tp$ 

• I = (0 - 100) mAamplitude of current

Modulated pulse current generated by MULTITRONIC MT-3 is medium frequency (5 kHz) pulse modulated current of shapes and parameters shown below.



#### II.3.3.2 Impulse current for TONOLYSIS

• in channel 1: as for amplitude of current

in channel 2: 200μs with amplitude of current

•  $t_i = (5 - 990) \text{ ms}$   $t_p$ 

 $t_p = (100 - 4000) \text{ ms}$ 

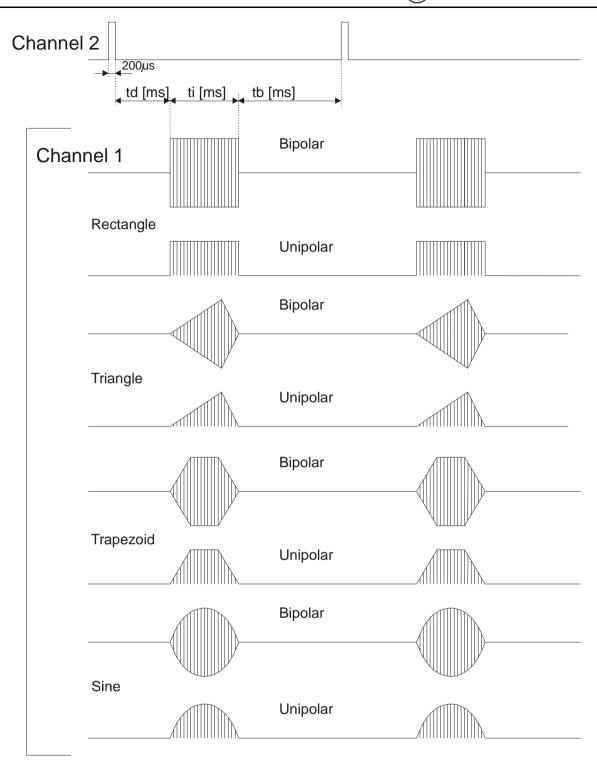
I = (0 - 100) mA

I = (0 - 100) mA

 $t_0 = (5 - 150) \text{ ms}$ 

t<sub>O</sub> – time of delay between impulses in channels 1 and 2

MULTITRONIC MT-3 in tonolysis mode generates rectangle pulse of 0,2 ms width in channel 2, and next, and after a delay time **td**, generates a similar pulse in channel 1. After the pause time **tp** these series of pulses are repeated. Shapes and parameters of pulses are as follows:



#### II.3.4. Electro-gymnastics

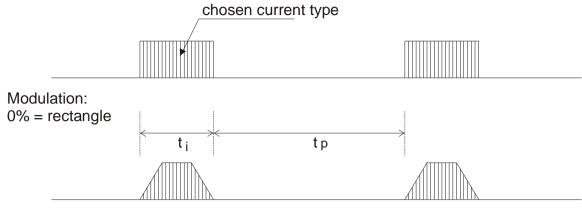
May be used with the following currents:

MF, DF, TENS (f=200Hz), KOTZ-STD, UR-STD, IF-2P

Impulse time Ti: 0,5 s ÷ 8,0 s (but max. Tp)
 Break time Tp: 1,0 s ÷ 16,0 s (but min. Ti)

• Percentage of shape: 0 ÷ 100 % (0=rectangle, 1÷99=trapezium, 100=triangle)

The value of slope adjusted 0÷100% sets the rise and fall time of modulation. It works as follows: 0% gives a rectangle, 1÷99% gives a trapezium and 100% gives a triangle.



Modulation:

1 do 99% = trapezium



Modulation:

100% = triangle

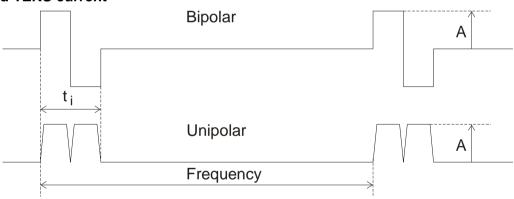
#### II.3.5. TENS current

#### • TENS

 $ti = (50 \div 250) \mu s$  impulse time  $f = (1 \div 200) Hz$  frequency

 $I = (0 \div 100) \text{ mA}$  current amplitude

#### **Standard TENS current**

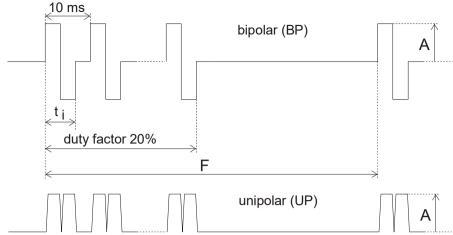


#### • TENS BURST

ti = (50 – 250)  $\mu s$  - batch of impulses (impulse every 10ms, 20% duty factor), repeated every 0,5-2s.

I = (0 - 100)mA amplitude of current

#### **TENS BURST**



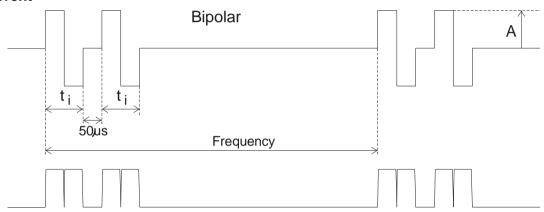
• **HV current** (interval in pair of pulses is 50 μs)

 $ti = (50 - 250) \mu s$  impulse time f = (1 - 200) Hz frequency

amplitude of current for HV

I = (0 - 100) mA for Umax = 250 V

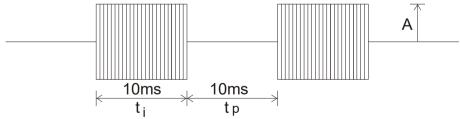
#### **HV** current



#### For all TENS types:

- polarity (for all types of TENS)
   pol = UP (unipolar) or BP (bipolar)
- irritant modulation (for all TENS types)
   M = 0 (OFF) or 1 (ON)

#### II.3.6. Kotz current



#### **Parameters of classic Kotz current**

• ti = 10 ms [pulse time]

• tp = 10 ms [breal time]

• f = 50 Hz [frequency of pulse repetition]

• fn = 2500 Hz [carrier frequency]

polarity BP (bipolar)

• I = 0÷100 mA [current]

#### Parameters of adjustable Kotz current

•  $ti = 1 \div 100 \text{ ms}$  [pulse time]

• tp = 2÷200 ms wherein ti < tp [pulse break]

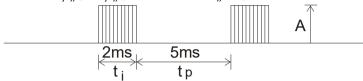
• fn = 2500÷10000 Hz [carrier frequency]

• polarity BP (bipolar)

• I = 0÷100 mA [current]

#### II.3.7. Träbert current

Träbert carrent, "UR", "Ultra Reiz" or "2-5".



#### • Standard:

o ti = 2 ms [pulse time]

o tp = 5 ms [pulse break]

o f = 143 Hz [frequency]

polarity UP (unipolar)

I = 0÷100 mA [amplitude]

#### Adjustable:

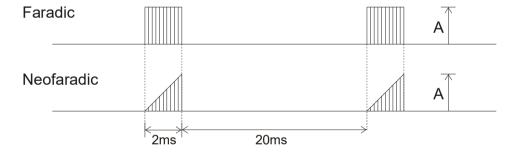
o  $ti = 1 \div 100 \text{ ms [pulse time]}$ 

o tp = 2÷200 ms [break time] wherein ti < tp

o polarity UP (unipolar)

 $\circ$  I = 0÷100 mA [amplitude]

#### II.3.8. Faradic current



#### Faradic

o ti = 2 ms [pulse time]

o tp = 20 ms [pulse break]

polarity UP (unipolar)

I = 0÷100 mA [amplitude]

#### Neofaradic

o ti = 2 ms [pulse time]

o tp = 20 ms [pulse break]

polarity UP (unipolar)

○ I = 0÷100 mA [amplitude]

#### II.3.9. Galvanic current

 $I = (0 \div 50) \text{ mA [average]}$ 

#### II.4. EMC requirements

This equipment requires special attention for EMC environment conditions and must be installed according to the information given below. The user should provide such conditions for proper functioning of the equipment.

#### **EMC** emission resistance

		Resistance test level				
	EMC Standard	Professional health care				
Subject	or Examination Method	facility environment and				
		home health care				
		environment				
Port on the casing						
ESD	PN-EN 61000-4-2:2011	± 8 kV contact, ± 2; 4; 8; 15 kV by air				
RF radiation	PN-EN 61000-4-3:2014	10 V/m rms before modulation) 80 MHz – 2,7 GHz , modulation: 80% AM, 1kHz				
Proximity RF fields from wireless radio equipment	PN-EN 61000-4-3:2014	p. 8.10 of the Standard (Table 9)				
AC. Mains Port						
Fast transients (BURST)	PN-EN 61000-4-4:2013	± 2 kV, freq. 100 kHz				
SURGES	PN-EN 61000-4-5:2014	Line to line ± 0,5 kV, ± 1 kV				
		Line to earth $\pm$ 0,5 kV, $\pm$ 1kV, $\pm$ 2 kV				
Disturbances conducted and induced	PN-EN 61000-4-6:2014	3 V (rms before modulation)				
from RF fields		0,15 – 80 MHz, 6 V (rms before modulation) in the ISM				
		band and in the radiofrequency bands				
		0,15 and 80 MHz,				
		modulation: 80% AM and 1 kHz				
Voltage drops DIP	PN-EN 61000-4-11:2007	0% U⊤: 0.5 T				
		in 0°, 45°, 90°, 135°, 180°, 225°, 270°,				
		315°				
		0% U⊤; 1 T;				
		and 70% U <sub>T</sub> ; 25 T;				
		single phase 0°				
Supply breaks	<b></b>	0% U⊤; 250 T				
Magnetic fields of the supply mains	PN-EN 61000-4-8:2010	30 A/m				
frequency		50 Hz				

<sup>\*)</sup> Radiation of stationary radio transmitters should not exceed the above declared levels.

Disturbances may be observed close to devices marked with the following label:



Emission levels for the professional medical care company and environment of the domestic medical care											
Subject	Applied Standard		requency bands MHz								
Harmonics of current	PN-EN 61000-3-2:2014	The device meets the requirement small power does nod require any	ents of the Standard and due to testings.								
Fluctuations of voltage and light flickering	PN-EN 61000-3-3:2013	·	The device meets the requirements of the Standard and due to small power does nod require any testings.								
_		66 dBµV (quasipeak.) 56 dBµV (avr.)	0,15 - 0,5								
Conducted RF emission	PN-EN 55011:2016 Group 1, Class B	56 dBµV (quasipeak.) 46 dBµV (avr.)	0,5 - 5								
		60 dBμV (quasipeak.) 50 dBμV (avr.)	5 - 30								
Radiated	PN-EN 55011:2016	Elecrical field a	t 10 m distance								
RF emission	Group 1, Class B	30 dBµV/m (quasipeak.)	30-230								
171 61111031011	Gloup 1, Glass B	37 dBµV/m (quasipeak.)	230-1000								

#### Cables used with the device:

- cables connecting the electrodes to the device up to 2,5 m
- mains cable up to 2,5 m

**IMPORTANT:** Using cables exceeding the limits may cause increased emission or lower resistance of the device.

<u>IMPORTANT:</u> Telecommunication equipment using radio frequencies may affect operation of this device.

Working environment: Health care facilities and domestic medical care environments.

#### II.5. Storage and transportation conditions

The device with accessories should be stored in the original packaging observing the following conditions:

• ambient temperature 5°C ÷ 40°C

relative humidity up to 85% condensation-free

atmospheric pressure 780-1060 hPa

The device with accessories should be transported in the original packaging observing the following conditions:

• ambient temperature -10°C ÷ 45°C

relative humidity
 up to 95% condensation-free

atmospheric pressure 780-1060 hPa

**NOTICE:** Do not expose the device or accessories to outdoor weather conditions.

#### III. ACCESSORIES

#### III.1. Equipment supplied with the device

•	E-S 50 silicone flat electrode with P-50 sponge cover	4 pcs
•	E-A 75 aluminium flat electrode with P-75 sponge cover	4 pcs
•	K-2L cable for 2 electrodes	2 pcs
•	OR-1 elastic strap, dimensions (50x500) (mm)	2 pcs
•	OR-2 elastic strap, dimensions (50x800) (mm)	2 pcs
•	T-0,315AL, 250V fuse	2 pcs
•	instructions for use	1 pcs

#### III.2. Basic accessories

#### **Basic accessories – electrotherapy:**

- E–P or E-P2 point electrode (with ball shaped and flat ends exchangeable)
- flat aluminium electrodes of different sizes E-A5, E-A10, E-A15, E-A50, E-A75, E-A100, E-A125
- flat electrodes of ...N type with plug connection instead of a socket (E-A5N, E-A10N, E-A15N, E-A50N, E-A75N, E-A100N, E-A125N)
- silicone electrodes E-S50, E-S75
- sponge covers of different sizes P-5, P-10, P-50, P-75, P-100, P-125, P-8M, P-8D, P-18, P-36
- velcro fixing straps O-R1, O-R2, O-R3
- velcro fixing straps of double width O-R1S, O-R2S, O-R3S
- · 2-electrode treatment cable with plug instead of a socket K-2LN
- 2-electrode treatment cable with polarization switch K-2LW
- cable for special electrodes K–J

<u>WARNING:</u> The manufacturer does not take any responsibility for using with MULTITRONIC MT-3 accessories other than those of EiE. It is acceptable to use the equipment having a certificate of compatibility with the EiE requirements.

<u>WARNING:</u> Regular control of electrodes is obligatory. Do not use electrodes with excessive resistance.

**IMPORTANT:** Regular control of connecting cables is recommended.

#### III.3. Connecting the device with accessories

The control device allows you to perform the treatments of individual therapies with the appropriate equipment. Without accessories, the device is not applicable. At least one pair of electrodes is needed for electrotherapy treatments.

#### IV. PREPARING OF THE DEVICE FOR USE

**WARNING:** Thoroughly read the instructions for use before using the device.

- 1. If the device was for some time in temperature below 0°C (e.g. in transport) it should be unpacked and left in room temperature for about 4-8 hours. Only then it can be plugged into mains and switched on.
- 2. The device should be placed in such a place that connected cables (especially the mains cables) are not exposed to pulling or tearing by persons passing by. Such a situation may expose people to an electric shock and the equipment to damage or destruction.

It is recommended to remove the protective sticker from the display. Gently lever up the sticker with your nail and remove it. Leaving the sticker on may impair the vision of the display.

**IMPORTANT:** Viscose pads should be washed out with running water before first use. Washing is necessary to remove the agent softening the viscose for storage and transport.

#### IV.1. Recommended workplace organization

The control unit should be positioned firmly in the workplace before treatment: on a table, desk or trolley, near the mains socket ~230 V 10% 50 Hz. The device should be placed at a suitable height which allows easy manipulation of controls on the front panel. Sunlight, or other bright light may dim the screen and decrease LEDs visibility, so the front panel should not be lit with direct light.

It is recommended that the workplace organization allow for easy and uninterrupted access to all controls and accessories. Special care must be taken to put the mains and connecting cables aside from the area where people move as this may cause accidental stumbles or pulling of the cable. Between treatments, the cables should be put aside safely not to be pressed or broken by a drawer or cabinet doors them from mechanical damage.

**NOTICE:** In particular, care should be taken to ensure easy access to the power switch (on the rear panel of the device).

#### IV.2. Connection of cables

The cables for treatment ought to be connected to appropriate sockets.

<u>IMPORTANT:</u> Connection and disconnection of electrotherapy cables must only be done when the device is switched off. Otherwise the patient may experience an unpleasant electrical shock.

<u>IMPORTANT:</u> Plug has an automatic lock protecting it from falling off from the socket (when connecting one should hear a "click"). The plug fits the socket only in the position with the arrow symbol up. When disconnecting, one should gently pull the plug out, but strong enough to unlock it, avoiding to turn the plug around while in the socket. When disconnecting, the plug should be held near the socket, avoid pulling the plug by the cable, otherwise the cable may be broken.

**NOTICE:** Channel 1 treatment cable socket is on the left and channel 2 is on the right.

**NOTICE:** For ionophoresis, metal electrode should be used as active one (the one with the medicine).

**NOTICE:** For unipolar and DC (galvanic) current: anode (plus) should be connected to the red cable's end and cathode (minus) to the black end.

#### IV.3. Switching on

<u>WARNING:</u> Do not switch on and off the device when electrodes are put on the patient. This may cause the patient to receive unpleasant electric shock.

**IMPORTANT:** This device is manufactured with the insulation of the first class. Connect the device to the socket with grounding pin.

The device is turned on by the POWER button on the back panel into position "I".

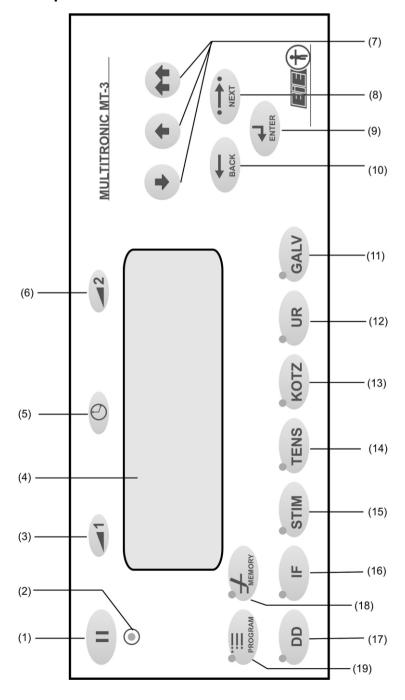
#### V. OPERATION AND HANDLING OF THE DEVICE

<u>WARNING:</u> All treatments using MULTITRONIC MT-3 should be performed carefully by a qualified physiotherapy technician. Otherwise, the therapeutic effects may be limited and the patient and staff may be exposed to health risks.

**NOTICE:** A number in parentheses, ex. (10) used in the test refers to a corresponding number on the front panel in the drawing in part V.1. "Front panel description".

**NOTICE:** If the character "+" accompanies an icon in this chapter, it means that two respective buttons should be pressed simultaneously (e.g. Hack means you should press and keeping it pressed press also BACK - similar as when using shift button in a PC computer).

#### V.1. Front panel description



## MULTITRONIC MT-3

L.p.	Symbol	O <sub>l</sub>	pis							
1		PAUSE and STOP button								
2		LED of the treatment activity								
3	1	Parameter edition for channel 1								
4		Edition of treatment time								
5		Display screen showing the present	parameters							
6	<b>2</b>	Parameter edition for channel 2								
	<b>1</b>		increase							
7		Parameter setting	decrease							
			fast increase							
8	BACK	Return to the previous screen								
9	ENTER	Accept the choice (for example: the chosen kind of current)								
10	●→● NEXT	Go to the next item								
11	•GALV	Select the galvanic current (ionophor	Select the galvanic current (ionophoresis)							
12	• UR	Select the Träbert's (Ultra Reiz) and	'faradic' currents							
13	KOTZ	Select the Kotz's currents (standard	or adjustable)							
14	•TENS	Select the TENS or HV currents								
15	<b>STIM</b>	Select the medium frequency programmestics or electro-diagnostics	oulse currents, tonolysis, electro-							
16	• IF	Select the interference current								
17	• DD	Select the diadynamic current								
18	MEMORY	User-saved sets of parameters – ind	lividually saved up by the staff							
19	PROGRAM	Pre-programmed parameter sets for	various treatments							

#### V.2. Preparation for treatment

#### V.2.1. Preparation of the apparatus

<u>WARNING:</u> All treatments using MULTITRONIC MT-3 should be performed carefully by a qualified physiotherapy technician. Otherwise, the therapeutic effects may be limited and the patient and staff may be exposed to health risks.

**WARNING:** In the case of abnormal functioning of the device, which may result in danger to the operator or patient, stop the treatment immediately and proceed as in chapter VI. "Maintenance".

**IMPORTANT:** Before switching on check the condition of the cables. If they are damaged, call for a qualified maintenance technician to repair them.

**IMPORTANT:** This device is manufactured with the insulation of class II. Do not connect the enclosure to the earthing system.

**NOTICE:** Do not bend the cables at acute angles and do not wind them up tight, because they can be damaged.

#### V.2.2. Work modes

Multitronic MT-3 has the following working modes:

#### V.2.2.1 STOP mode

During STOP mode the currents in the patient's circuits are switched off and it is possible to edit the majority of the current parameters, as well as to call up some functions (as, for example PROGRAM and MEMORY). LED (2) is extinguished in this mode.

It is possible to switch over from this mode to START by starting a treatment (See: V.2.6. "Start a treatment").

#### V.2.2.2 START mode

During START mode, the currents in the patient's circuits are switched on. Only some current parameters are enabled for edition here, and it is not possible to call up some functions (as, for example PROGRAM or MEMORY). LED (2) is switched on this mode. It is possible to switch over from this mode to STOP (See V.2.8. "End of treatment") or to PAUSE (See V.2.7. "Suspending a treatment").

#### V.2.2.3 PAUSE mode

This mode temporarily suspends the treatment and the currents in the patient's circuits. The current parameter edition is disabled and some functions are disabled (for example PROGRAM or MEMORY). LED (2) is switched on this mode.

It is possible to switch over from this mode to STOP (See V.2.8. "End of treatment") or to START (See: V.2.7. "Suspending a treatment").

#### V.2.3. Selection of the current type

Selection of one current from the available options is done by pressing one of the following buttons: "IT, "STIM, "TENS, "KOTZ, "LR, "GALV. If any button, but GALV (which has only one current type, so there is no choice of type) is pressed, a screen of the current type selection is displayed This is available only in the STOP mode.

#### V.2.4. Selection of the current sub-type

For all currents, apart from the galvanic, the current type ought to be chosen first. This is done by cyclic "shifting" the blinking cursor with from one item to the next, until the desired item is blinking and accepting it by pressing knies, which calls up the parameter editor screen for the chosen type of current.

You can return to the current type choice screen by pressing or with a button of the suitable current type.

In the following paragraphs, where the display screens are shown, the currents available for choice are grey shaded.

#### V.2.5. Edition of parameters

Some parameters of a chosen current are adjustable and can be edited on its screen. You can choose the parameter to be edited by a cyclic "shifting" the blinking cursor from one item to the next with NEXT. For editing time parameter press. Then the value of

## MULTITRONIC MT-3

the parameter can be adjusted by pressing . If any of the two buttons is kept pressed for longer than 0.5s, it speeds up the value change (except for current intensity). In the START mode some parameters can not be changed. In the following paragraphs, where the display screens are shown, the parameters accessible to edition (in the STOP mode) are grey shaded. Also either the min. and max. values, or the lists of the values of parameters to choose from, are shown there. V.2.6. Starting a treatment In STOP mode you start treatment by choosing the channel with button or all or and than increase the current volume with NOTICE: A treatment can be activated only from the screen of the current parameters. It is not possible to run a treatment from the current type screen or from the screens of MEMORY or PROGRAM functions. V.2.7. Suspending a treatment It is possible to temporarily suspend the active treatment by pressing current in the patient's circuits will gradually decrease to zero and the time countdown will stop. The word "PAUSE" will show up instead of the time remaining to the end of the treatment. The button [ ] is a toggle, i.e. pressing this button again softly ramps up the current to the set value and type – and to the START mode. It is also possible to terminate a treatment in the PAUSE mode -see V.2.8 'End of treatment by the user'- by pressing | | | | | | | | | | | | for more than 1.5s. V.2.8. End of treatment There are two possible ways of treatment termination. V.2.8.1 Expiration of the treatment time When the treatment time elapses, the apparatus will switch off the patient currents and will switch over to the STOP mode. Following this, an acoustic alarm with a modulated sound will switch on, stopping after ca. 10 s. or it can be muted by pressing any button. V.2.8.2 Termination of the treatment by the user The user can manually stop the treatment at any moment. To do this, one should press for at least 1.5s. The apparatus will turn off the patient currents and will switch over to the STOP mode. V.2.9. Setting the patient's current value You may choose the circuit for regulation by pressing \_\_\_\_\_\_\_ or \_\_\_\_\_\_. You may change the value of current by pressing Maximum current value depend on chosen current type and are described in the technical specification chapter. NOTICE: For safety reasons fast increase function by longer pressing the button is turned off. V.2.10. Circuit break detection

The patient currents are continually monitored. If a significant current value drop (in comparison to the set value) is detected, it triggers an acoustic alarm of a modulated sound and blinking of the current value parameter on the screen (of channel 1 or 2 respectively).

#### V.2.11. Saving the last treatment parameters

After a treatment goes to an end, its parameters are saved as default in the non-volatile memory. If the apparatus is then switched off and switched on later, the values used during the last treatment are automatically called up.

The parameters for other currents, which were used as last, are also saved in memory for the use in the future.

#### V.3. Setting the parameters of current

This chapter describes how to choose the current type and to set its relevant parameters. The screens corresponding to the used currents are shown, with the parameter available for setting and their respective value ranges.

The current parameters as such are described in VII. "MEDICAL DESCRIPTION".

#### V.3.1. Diadynamic current (DD)

To call up the diadynamic current menu press .

#### V.3.1.1 The main DD screen

D	I	Α	D	Υ	N	Α	M	I	С			С	U	R	R	Ε	N	Т	S
	S	е	q	u	е	n	С	е											
	M	F			С	Ρ			С	Ρ	i	s	0			М	М		
	D	F			L	Ρ			L	Ρ	i	s	0			R	S		

Only one of the 8 diadynamic currents can be chosen for edition at a time.

- MF, DF, CP, LP, CPiso, LPiso, MM, RS the diadynamic currents
- **Sequence** a sequence of diadynamic currents

#### V.3.1.2 Screens of the consecutive DD currents

The screens of the consecutive DD currents are much alike and remind the below shown. They differ only with the diadynamic current type symbol placed in the left lower corner.

1	2		3	m	Α	1	5	:	0	0			2		3	0	m	Α
	М	F				D	ı	Α	D	Υ	Ν	Α	М	I	С			

#### **Current parameters:**

• Time of treatment: 30 s ÷ 60 min.

#### V.3.1.3 Screen of the DD current sequence

Up to 3 sequence elements can be defined. For each element type of DD current and the time in the range 30 s to 9 min can be chosen, with accuracy of 30 s.

To add a new sequence element, position the cursor on the new element of the sequence and, using 1 and 1, choose the current type.

To remove the last sequence element (only from the 3rd position), set the cursor on the last sequence element and choose, instead of the current type, the characters "----".

The total treatment time is counted automatically and displayed in the centre of the upper screen.

	0			m	Α	0	1	:	0	0		0		0	0	m	Α
S	е	q	u	-		1			M	F			0	:	3	0	
-	е	n	С	е		2		^	D	F			0	:	3	0	

#### V.3.2. Interference current (IF)

To call up the interference current menu press • IF.

#### V.3.2.1 The main IF screen

I	N	Τ	Ε	R	F	Ε	R	Ε	N	С	Ε		С	U	R	R	Ε	N	Τ
		S	T	Α	T	ı	С						2	Ρ			4	Ρ	
		D	Υ	Ν	Α	М	I	С											
 		ı	Ν	Т	Ε	R	R	U	Р	Т	Ε	D							

One of the following interference current can be chosen at a time:

- **2P** static, 2-wire
- **4P** static, 4-wire
- **DYNAMIC** dynamic, 4-wire
- INTERRUPTED interrupted, 4-wire

V.3.3. The static IF screen - 2 pole

1	2		3	m	Α		1	5	:	0	0			2		٧.	3	0	m	Α
													f	=	1	V.	0	0	Н	Z
F	d	=	0	0	1	Н	z			F	g	=	2	0	0	V.	Н	z		
										I	F	-	S	Т	Α	V.	Т	-	2	Ρ

#### **Current parameters:**

• Time of treatment: 30 s ÷ 60 min.

• Lower modulation frequency limit **Fd**: 1 Hz ÷ **Fg** 

Upper modulation frequency limit Fg: Fd ÷ 200 Hz

As 'f' the present frequency is displayed. The frequency sweep between **Fd** and **Fg** takes 15 s for the rise and 15 s for the fall.

V.3.3.1 The static IF screen - 4 pole

		_			_							_		_					
1	2		3	m	Α		1	5	:	0	0			2		3	0	m	Α
													f	=	1	0	0	Н	z
F	d	=	0	0	1	Н	Z			F	g	=	2	0	0	Н	Z		
										Ī	F	-	S	Т	Α	Т	-	4	Р

#### **Current parameters:**

• Time of treatment: 30 s ÷ 60 min.

• Lower modulation frequency limit **Fd**: 1 Hz ÷ **Fg** 

• Upper modulation frequency limit **Fg**: **Fd** ÷ 200 Hz

As 'f' the present frequency is displayed. The frequency sweep between **Fd** and **Fg** takes 15 s for the rise and 15 s for the fall.

V.3.3.2 The dynamic IF screen - 4 pole

		_	<u>- , , , , , , , , , , , , , , , , , , ,</u>	•••	~			_		_	•			_	• • •	_			
1	2		3	m	Α		1	5	:	0	0			2		3	0	m	Α
													f	=	1	0	0	Н	Z
F	d	II	0	0	1	Н	Z			F	g	=							
											Ī	F	-	D	Υ	N	-	4	Р

#### **Current parameters:**

• Time of treatment: 30 s ÷ 60 min.

• Lower modulation frequency limit **Fd**: 1 Hz ÷ **Fg** 

• Upper modulation frequency limit **Fg**: **Fd** ÷ 200 Hz

As 'f' the present frequency is displayed. The frequency sweep between **Fd** and **Fg** takes 15 s for the rise and 15 s for the fall.

## V.3.3.3 The dynamic interrupted current IF screen - 4 pole

		_	<u> </u>																_
1	2		3	m	Α		1	5	:	0	0			2		3	0	m	Α
													f	=	1	0	0	Н	Z
F	d	=	0	0	1	Н	z			F	g	=	2	0	0	Н	Z		
									I	F		I	Ν	Т	Ε	R	-	4	Ρ

#### **Current parameters:**

• Time of treatment: 30 s ÷ 60 min.

Lower modulation frequency limit Fd: 1 Hz ÷ Fg

• Upper modulation frequency limit **Fg**: **Fd** ÷ 200 Hz

As 'f' the present frequency is displayed. The frequency sweep between **Fd** and **Fg** takes 15 s for the rise and 15 s for the fall.

Time of current flow and pause time are equal - 1 second.

### V.3.4. Stimulation current (STIM)

To call up the stimulation current menu press (STIM).

#### V.3.4.1 The main STIM screen

S	Τ	I	M	U	L	Α	T	I	N	G		С	U	R	R	Ε	N	Τ	S
	Ρ	Α	L	S	ı	Ε	S				Т	0	Ν	0	L	Υ	S	I	S
	G	Υ	M	N	Α	S	T	I	С	S			Ε	L	-	D	I	Α	G

The following stimulation currents are available:

- PALSIES stimulation palsy current
- TONOLYSIS stimulation current tonolysis
- **GIMNASTICS** electro-gymnastics
- **EL-DIAG** electro-diagnostics

#### V.3.4.2 The screen of the stimulation current - palsy

1	2		3	m	Α		1	5	:	0	0			1		2	3	m	Α
t	i	=		0	0	5	m	s		f	=	0	9		5	2	Н	z	
t	р	=	0	1	0	0	m	s		s	h	=	Т	R	I	Α	-	U	Р
								S	T	I	M	-	Р	Α	L	S	I	Ε	S

#### **Current parameters:**

Time of treatment: 30 s ÷ 60 min.
Pulse width ti: 5 ms ÷ 990 ms
Break time tp: 100 ms ÷ 4000 ms

The current shape shap: TRAP-UP — unipolar trapezoid, TRAP-BP — bipolar trapezoid, TRI-UP — unipolar triangle, TRI-BP — bipolar triangle, SIN-UP — unipolar sinus, SIN-BP — bipolar sinus, REC-UP — unipolar rectangle, REC-BP — bipolar rectangle

As 'f' the frequency resulting from the **ti** and **tp** times is displayed.

#### V.3.4.3 The screen of the stimulation current – tonolysis

1	2		3	m	Α		1	5	:	0	0			2		3	0	m	Α
t	i	=		0	0	5	m	s		t	0	=		0	0	5	m	s	
t	р	=	0	1	0	0	m	s		s	h	=	T	R	I	Α	-	U	Р
						S	Т	I	М	-	Т	0	Ν	0	L	Υ	S	I	S

#### **Current parameters:**

Time of treatment: 30 s ÷ 60 min.
Delay time to: 5 ms ÷ 150 ms
Pulse width ti: 5 ms ÷ 990 ms
Break time tp: 100 ms ÷ 4000 ms

 The current shape shap: TRAP – trapezoid, TRI – triangle, SIN – sinus, REC – rectangle

• The current polarisation **pol**: UP – unipolar, BP - bipolar

#### V.3.5. TENS current

To call up the TENS current menu press \*\*TENS

#### V.3.5.1 The main screen of the TENS current

Т	Ε	Ν	S			С	U	R	R	Ε	Ν	T	S			
				Т	Ε	N	S	-	S	Т	D					
				T	Ε	N	S	-	В							
				T	Ε	Ν	S	-	Н	٧						

One of the following current types can be chosen at a time:

- TENS-STD standard TENS current
- TENS-B -TENS B (Burst) current
- TENS-HV –TENS HV (High Voltage) current

#### V.3.5.2 TENS-STD current screen

1	2		3	m	Α		1	5	:	0	0			2		3	0	m	Α
t	i	=	2	5	0	u	s		M	=	0		р	0	I	=	U	Ρ	
f		=	2	0	0	Н	Z												
												T	Е	Ν	S	-	S	T	D

#### **Current parameters:**

Time of treatment: 30 s ÷ 60 min.
Pulse width ti: 50 µs ÷ 250 µs
Frequency f: 1 Hz ÷ 200 Hz

• The "irritating" modulation  $\mathbf{M}$ :  $0 \div 1 (0=Off, 1=On)$ 

• The current polarisation **pol**: UP – unipolar, BP - bipolar

#### V.3.5.3 TENS-BURST current screen

1	2		3	m	Α		1	5	:	0	0		2		3	0	m	Α
t	i	=	2	5	0	u	s		M	=	0	р	0	I	=	U	Р	
f		=	1	0	0	Н	z		F	=	0	5	Н	z				
													Т	Ε	Ν	S	-	В

#### **Current parameters:**

Time of treatment: 30 s ÷ 60 min.
Pulse width ti: 50 µs ÷ 250 µs
The "irritating" modulation M: 0 ÷ 1 (0=Off, 1=On)
Frequency of modulation F: 0,5 Hz ÷ 2,0 Hz

• The current polarisation **pol**: UP – unipolar, BP - bipolar

Frequency f=100Hz is constant.

#### V.3.5.4 TENS-HV current screen

1	2		3	m	Α		1	5	:	0	0		2		3	0	m	Α
t	i	=	2	5	0	u	s		M	=	0	р	0	I	=	U	Р	
f		=	2	0	0	Н	Z											
												Т	Е	Ν	S	-	Н	٧

#### **Current parameters:**

Time of treatment: 30 s ÷ 60 min.
Pulse width ti: 50 µs ÷ 250 µs
Frequency f: 1Hz ÷ 200 Hz

• The "irritating" modulation  $\mathbf{M}$ :  $0 \div 1 (0=Off, 1=On)$ 

• The current polarisation **pol**: UP – unipolar, BP – bipolar

#### V.3.6. KOTZ's current (the Russian stimulation)

To call up the KOTZ's current menu press (KOTZ).

#### V.3.6.1 The main screen of the KOTZ's current

K	0	Т	Ζ		С	U	R	R	Ε	N	T	S			
				S	Т	Α	Ν	D	Α	R	D				
				R	Ε	G	U	L	Α	T	Ε	D			

One of the following current types can be chosen at a time:

- STANDARD standard KOTZ's -current
- **REGULATED** regulated KOTZ's current

#### V.3.6.2 The screen of the KOTZ – standard current

1	2		3	m	Α		1	5	:	0	0			2		3	0	m	Α
t	i	=	1	0	m	s								р	0	I	=	В	Ρ
t	р	=	1	0	m	s					f	n	=	2	5	0	0	Н	z
												Κ	0	T	Ζ	-	S	T	D

#### **Current parameters:**

• Time of treatment: 30 s ÷ 60 min.

#### V.3.6.3 The screen of the KOTZ – regulated current

1	2		3	m	Α		1	5	:	0	0			2		3	0	m	Α
t	i	=	0	2	0	m	s							р	0	I	=	В	Ρ
t	р	II	0	3	0	m	S				f	n	=	2	5	0	0	Н	z
												Κ	O	Т	7	-	R	F	G

#### **Current parameters:**

• Time of treatment: 30 s ÷ 60 min.

Pulse width ti: 2 ms ÷ 100 ms (but max. tp)
Break time tp: 2 ms ÷ 200 ms (but min. ti)

• Carrier frequency **fn**: 2500 Hz ÷ 5000 Hz

The current polarisation pol: always BP bipolar.

#### V.3.7. The current UR (Träbert's) and faradic (UR)

To call up the UR current menu press .

#### V.3.7.1 The main screen of the UR current

Т	R	Α	В	Ε	R	T	-	U	R		С	U	R	R	Ε	N	T	S	
					S	Т	Α	Ν	D	Α	R	D							
					R	Ε	G	U	L	Α	T	Ε	D						
					F	Α	R	Α	D	I	С								

One of the following current types can be chosen at a time:

• **STANDARD** – UR – standard current

• **REGULATED** – UR – regulated current

FARADIC – faradic and neofaradic currents

#### V.3.7.2 The screen of the UR - standard current

1	2		3	m	Α		1	5	:	0	0		2		3	0	m	Α
t	i	=		2	m	s							р	0	ı	=	U	Ρ
t	р	=		5	m	s												
													U	R	-	S	Т	D

#### **Current parameters:**

Time of treatment:

 $30 s \div 60 min.$ 

#### V.3.7.3 The screen of the UR - regulated current

1	2		3	m	Α		1	5	:	0	0		2		3	0	m	Α
t	i	=	0	1	0	m	s						р	0	I	=	U	Ρ
t	р	=	0	2	0	m	s											
													U	R	-	R	Ε	G

#### **Current parameters:**

• Time of treatment: 30 s ÷ 60 min.

Pulse width ti: 2 ms ÷ 100 ms (but max. tp)
Break time tp: 2 ms ÷ 200 ms (but min. ti)

The current polarisation **pol**: always UP unipolar.

#### V.3.7.4 Faradic current screen

1	2		3	m	Α		1	5	:	0	0		2		3	0	m	Α
t	i	=		2	m	s							р	0	ı	=	U	Ρ
t	р	=	2	0	m	s												
												F	Α	R	Α	D	ı	С

#### **Current parameters:**

Time of treatment: 30 s ÷ 60 min.

• Current type: FARADIC, NEOFARADIC

#### V.3.8. The Galvanic current (GALV)

To call up the GALV current menu press GALV

#### V.3.8.1 The main screen of the GALV current

1	2	3	m	Α	1	5	:	0	0		2		3	0	m	Α
											G	Α	L	٧	Α	Ν

#### **Current parameters:**

• Time of treatment: 30 s ÷ 60 min.

#### V.4. Electro-gymnastics

To start electrogimnastics, enter the stimulation menu pressing (STIM), which calls up the following menu:

S	T	I	M	U	L	Α	T	I	N	G		С	U	R	R	Ε	N	T	S
	Ρ	Α	L	S	ı	Е	S				Т	0	Ν	0	L	Υ	S	I	S
	G	Υ	М	Ν	Α	S	Т	I	С	S			Е	L	-	D	ı	Α	G

Then choose "GIMNASTICS" using the buttons NEXT, , and accept it with

#### V.4.1. Electro-gymnastics screen

1	2		3	m	Α		1	5	:	0	0			2		3	0	m	Α
T	i	=		1		0	s		m	0	=	M	F						
T	р	=	0	2		0	s			%	=	0	2	0					
										G	Υ	М	Ν	Α	S	Т	ı	С	S

#### Parameters:

• Time of treatment: 30 s ÷ 60 min.

• The current type mode: MF, DF, TENS-STD, KOTZ-STD, UR-STD, INT-2P

Pulse width Ti: 0,5 s ÷ 8,0 s (but max. Tp)
 Break time Tp: 1,0 s ÷ 16,0 s (but min. Ti)

• Relative slopes %: 0 ÷ 100 (0=rectangle, 1÷99=trapezoid, 100=triangle)

#### V.5. i/t curve

The medical description of Electrodiagnostics can be found in VIII.1.3. "i/t curve". Below we only show how to operate this function of Multitronic MT-3.

#### V.5.1. Procedure of electrodiagnostics

The electrodiagnostics is available from the stimulation current menu. To activate it press stimulation, which calls up the following menu:

S	Т	I	M	U	L	Α	Т	I	N	G		С	U	R	R	Ε	N	Т	S
	Ρ	Α	L	S	I	Ε	S				T	0	N	0	L	Υ	S	I	S
	G	Υ	M	N	Α	S	T	I	С	S			Ε	L	-	D	I	Α	G

Then using the choose the item "EL-DIAG" and accept it by pressing which will display the following two options to choose from:

ш	I	е	С	t	r	0	d	i	а	g	n	0	s	t	i	С	s	:	
Р	r	е	٧	i	0	u	s		r	е	С	0	r	d					
Ν						0			d	u	r	е							

#### where:

- Previous record shows the results of the recently performed electrodiagnostics
- New procedure new measurement

These two options are described below.

#### V.5.1.1 View of the electrodiagnostics results

The results of performed electrodiagnostics are saved in the non-volatile memory of Multitronic MT-3. It means that even after switching off the power supply and switching on again, these results are accessible.

The results are presented in the following 9 screens:



					,							,			
R E C	1	0	Ť	Ť	**********	•		• • • • • • • • • • • • • • • • • • • •	÷			÷	·····	ļ	
1 / 9					m										
		2			m			0	0		0	m	Α	ļ	
		1	0	0	m	S		0	0		0	m	Α		
REC			5	0	m	s		0	0		0	m	Α		
2 / 9			2	0	m	s		0	0		0	m	Α	Ī	
			1	0	m	s									
					m			· <del>*</del> · · · · · · · · · · · · ·	·····			·	·		
REC				2	m	s		0	0		0	m	Α		
3 / 9		·	İ	*	m	•			0	*		m	•	İ	
		5	O	<b>†</b>	u	•		· <del>†</del> · · · · · · · · · ·	<b>†</b>			<b>†</b>	•		
					u			•••••	•			•	•	<b>†</b>	
	<u> </u>				-			. •		-				<u> </u>	<u> </u>
REC		1	n	n	u	9		0	n		n	m	Δ		
4 / 9		<b>!</b>	U	U	u	3		U	U	•	U	111		-	
4 / 3			-		ļ			-		-		ļ		ļ	
								-						ļ	
														<u> </u>	
TDI	4	0	Λ	Λ		_		0	Λ		Λ		Λ		
T R I 5 / 9					m			• • • • • • • • • • • • • • • • • • • •	0	÷		·····	·····	ļ	
5 / S		2	•	<b></b>	<b></b>	<b></b>			<b></b>	<b></b>		m	·····	ļ	
		·÷·····	0	<b>†</b>	m	•		. •	0	<b>+</b>		m	<b></b>		
		<u> </u>	U	U	m	5		U	U		U	III	Α	<u> </u>	
<del>-</del>		1	-	_		-		_	_		_			1	
TRI				·	m	·····		0				m	·····	ļ	
6 / 9		ļ	2		m			· <del>†</del> ·····	0	<u> </u>		m		ļ	
			1		m			•	0			m	•	ļ	
				5	m	S		0	0		0	m	Α		
T R I				2	m	s		0	0		0	m	Α		
7 / 9					m			0				m			
i n d	r	h	e	O	b	а	s	e	=	0	0		0	0	m /
8 / 9	***************************************	h						i							u
- , , ,								d			n	n	n	•	0
	11	S													u
	u	J	<u> </u>	<u> </u>	<u> </u>	<u>. •</u>	<u> </u>	;111	<u>. U</u>	<u> </u>			<u>, J</u>	<u> </u>	u :
		1			l										
i n d		р	t	ı	m	•	ı	m	р			t	i	m	е:
9 / 9		-		-				0	U	0	u	S	ļ	ļ	
								ļ						-	

There is one of the following mnemonics in the upper left corner whose meanings are:

- REC rectangular pulse data
- TRI triangular pulse data
- ind computed characteristic indices

The description " $\chi$ 09" below means: the screen number x of 9.

Still underneath, if the screen in question concerns a pulse, in the middle column the pulse width data is given and in the right hand side the current.

For the indices the following mnemonics are used:

- rheobase
- rheobase
- chronaxie
- chronaxie

## MULTITRONIC MT-3

- accomod.
- accommodation coefficient
- usef.time
- effective time
- optim.imp. time
- optimal impulse time (width)

You can switch from one screen to the next/ previous pressing and . To exit the screen review of results press ACK.

The electrodiagnostics results can be shown as a plot I(t), according to the template enclosed to this manual (VIII.1.6. "i/t curve card").

#### V.5.1.2 Conducting a new electrodiagnostics

The electrodiagnostics procedure is performed using the channel no.1.

It consists of two pulse series – first the rectangular and then the triangular pulses. In each of the series the pulses go from the longest ones (1000 ms) to the shortest (1 ms for triangles and 100  $\mu$ s for rectangles).

For the pulses of each length the currents are generated, from small (1 mA at the beginning) and then steadily rising, until enter is pressed, or the value reaches the maximum (100 mA). Pressing enter saves the current value for the given pulse width and reduces the pulse length.

Having chosen the item "New procedure" in the electrodiagnostics menu we access the following screen:

Ε	I	е	С	t	r	0	d	i	а	g	n	0	s	t	i	С	s	
b	r	е	а	k		t	i	m	е		=	2		5	s			
s	0	u	n	d		:		Υ	Ε	S								

#### where:

- Break time time between the successive pulses; the range: 1.0÷9.9 s
- Sound acoustic alarm accompanying the pulses (YES/NO)

After a possible change in settings, press ENTER, which will call up the screen informing about the beginning of the rectangular pulse series:

Р	r	е	S	s		а	n	v		k	е	٧					
Ε	I	-	d	i	а	g	:		r	е	С	t	i	m	р		

The pulse series starts when any button is pressed. Then the following screen shows up:

0	1		0	m	Α								0		0	0	m	Α
Ε	I	-	d	i	а	g	:		r	е	С	t	i	m	р			
t	i	=	1	0	0	0	m	s										
X	X	X	X	X														

The 3-rd line shows the time of the currently generated pulse

The 4-th line is filled with "X" characters. If the entire line is filled up it indicates the end of the inter-pulse break and a transition to the next pulse.

The value of current for the active pulse is shown in the appropriate place on the screen.

At the moment the reaction of the muscle to which the electrodes are connected is detected press ENTER. Then, for the current pulse width, the current value of the pulse

generated a moment ago will be stored. From this moment the characters "-", instead of "X" will fill up the line to its end. Before the pulse series of a new width there is an additional 2s pause. In order to reduce the time of diagnostics, the pulses of the new width start at the current of 3 steps lower than the recently saved value.

It is possible to temporarily suspend the pulse series by pressing . The 4-th line will show then the message "Pause.....". To go back to the pulse generation press again, which resumes the generation of the pulses of the width that has not yet been saved, starting with the current value from the beginning.

To exit electrodiagnostics immediately, press ACK. The 3-rd line will show the message "End of series", and pressing any button will switch the control to the stimulation current menu. In such a case the electrodiagnostics data will not be saved.

If for given pulse width the current reached the maximum current value, and the button has not been pressed, the following screen will show up:

1	0	0	m	Α										0	0		0	m	Α
Ε	I	-	d	i	а	g	:		i	m	р		r	е	С	t			
Ν	0								m	а	t	i	0	n	!	!			
Ε	Ν	Т	Ε	R		-	r	е	р	е	а	t		s	е	r	i	е	s

Pressing BACK terminates electrodiagnostics.

Pressing ENTER repeats the series from the beginning (for the last time interval).

After the normal termination of the rectangular pulse series (i.e. when the current parameters of the shortest pulse have been saved) the 3-rd line will show "End of series". Then pressing any button transfers the process to the triangle pulse series, which will be signalled with the following screen:

Ε	I	-	d	i	а	g	:		i	m	р		t	r	i	а	n	
Ρ	r	е	s	s		а	n	у		k	е	У						

Pressing any button now will start the triangle pulse series. The rule to proceed is identical to the one for the rectangle pulses – see above.

When the electrodiagnostics with triangle pulses has been completed, the results will be saved in the non-volatile memory and the apparatus will switch over to the results review (see: point V.5.1.1 "View of the electrodiagnostics results").

#### V.6. PROGRAM Function (preprogrammed settings)

**PROGRAM** contains the factory pre-programmed settings for a chosen collection of illnesses (cases).

#### V.6.1. Entering the PROGRAM

To enter the **PROGRAM** function press PROGRAM. The LED in this button will light then and the following screen will show up:

0	0	1						D	D	1	s	е	q	u	е	n	С	е	
R	а	у	n	а	u	d	-	s		d	ï	S	е	а	S	е			
-	n	0		u	I	С	е	r	а	t	i	0	n						

In the left upper corner the number of the screen is displayed (here: "001").

The right hand upper corner shows the group of currents and the individual current from this group ascribed to the given illness (here: "DD/sequence" = diadynamic current sequence). The lines 2-4 give the description of the case.

#### V.6.2. Selection of the position

The list of illnesses can be scrolled with the following buttons:

- scroll to next
- buttons of current ( TENS, STIM), TENS, KOTZ, GALV) jump to the first illness for the given current.

#### V.6.3. Abandon without a change

To exit **PROGRAM** without a change in current settings press PROGRAM or BACK. The apparatus will switch over to the current parameter edition screen, which had been recently used – without changing any parameter.

#### V.6.4. Exit with save

To exit from **PROGRAM** with a change of parameters (i.e. having accepted the choice) press FITTER. The apparatus will switch over to the current parameter edition screen relevant to the chosen program position. This value can be used as it is, or can be modified.

#### V.7. MEMORY (user's settings)

**MEMORY** is a cache memory for keeping the user's individual parameter settings. It is particularly useful if certain settings are frequently used – there is no need to adjust all the parameters from the very beginning after the apparatus has been s witched on and they can be recalled (for this reason this function bears the name MEMORY). This chapter describes how to make use of this function.

#### V.7.1. Entering MEMORY

To enter **MEMORY** press MEMORY. Then the LED on this button will light and the following screen will show up:

ľ	0	0	1								1				2	Р
l	D	е	s	С	r	i	р	t	i	0	n					
ľ																
ľ																

In the left upper corner the no. of the item in the **MEMORY** is displayed (here: "001").

The right hand upper corner shows the group of currents and the individual current from this group ascribed to the given item (here: "IF/Static 2P", which means interference 2-wire current).

The lines 2–4 contain the item description (here: "Description")

If the selected item is empty (no write up yet), the screen looks like this:

0	0	1	 -	-		р			I	0	t		

#### V.7.2. Choosing an item

Scrolling the **MEMORY** is done with the following buttons:

previous item

↓ J- next item

#### V.7.3. Exit without change (cancel)

To exit **MEMORY** without changes of settings press MEMORY or MACK. The apparatus will then switch over to the current parameter edition screen that had been recently used — without any parameter change.

#### V.7.4. Exit with saving

To exit **MEMORY** and save the current parameter changes (i.e. to accept the item choice) press ENTER. The apparatus will then switch over to the current parameter edition screen associated with the chosen item and takes the respective default values. This setting can be used as it is, or modified – as needed.

If the chosen item is empty, pressing causes no action (i.e. the status will remain within the **MEMORY** function).

#### V.7.5. Edition and saving an item

To save a current value and its other parameters do the following:

- Choose (in an usual way) the current and adjust its parameters
- Enter the MEMORY function and choose the location (ex. an empty item) under which the presently edited item is to be saved.
- Edit the item description and accept it.

To save presently chosen current with its parameters enter **MEMORY** (point. V.7.1. "Entering MEMORY") and choose the location under which the presently edited item is to be saved (point. V.7.2. "Choosing an item"). Then press (NEXT) + (ENTER) together and the apparatus will switch over to the description edition.

One should remember that if the chosen location is not empty, it will be overwritten with new data (although the description will initially remain the same – i.e. subject to edition)

The following activities are available during the description edition.

#### V.7.5.1 Moving the cursor

The following buttons are used to move the cursor:

- move to the next character
- BACK move to the previous character

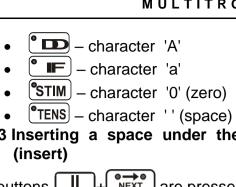
#### V.7.5.2 Changing the character under the cursor

The following characters are available, arranged in the following order:

(space).,;-"/+()!aąbcćdeęfghijklłmnńoópqrsśtuvwxyzźżA ĄBCĆDEĘFGHIJKLŁMNŃOÓPQRSŚTUVWXYZŹŻ012345678 9

The following buttons enable us to select a character – as explained below.

- previous (cyclically, i.e. "9" follows the space)
- 1 next (cyclically, i.e. the space follows "9")



V.7.5.3 Inserting a space under the cursor and moving characters to the right (insert)

If the buttons II + NEXT are pressed simultaneously, it inserts a space under the cursor and shifts the characters positioned to the right of the cursor by 1 position (like insert on the computer keyboard).

# V.7.5.4 Deleting the character preceding cursor and moving characters to the left (Backspace)

Simultaneous pressing deletes the character to the left and shifts the characters located on the right of the cursor left (as the BACKSPACE does on the computer keyboard)

### V.7.5.5 Deleting the whole description or the whole item

If you press simultaneously + BACK and keep them pressed for 2s, it calls up the query "Delete?" / "Enter=yes, another=no", which means: Delete the item? Enter=yes, another button=no. Then pressing enter deletes the whole item (changes it into an empty one), while pressing any other button deletes only the description (fills it up with spaces).

### V.7.5.6 Exiting the description edition without saving

Pressing exits edit mode without saving (both: the description and the associated parameters will remain unchanged) and the apparatus will return to the item selection in the **MEMORY** mode (point V.7.2. "Choosing an item").

### V.7.5.7 Saving an item

Pressing saves the description with all the accompanying parameters. A message will show up then "Item saved" (about 2s), and the apparatus will exit **MEMORY** and will switch over to the parameter edition screen of the recently edited current.

### V.7.6. Copying an item from PROGRAM

In order to copy an item from **PROGRAM** to **MEMORY** do the following:

- Enter **PROGRAM** and choose the desired item (point V.6.2. "Selection of the illness"))
- Press simultaneously

The apparatus will check up whether there is enough memory to complete the saving operation. If so, the chosen item will be saved at the first free memory location, and the apparatus will switch over to the description editing in the **MEMORY** mode. If no, the necessary space can be obtained by deleting redundant items. Then follow up the procedure given in point V.7.5.5. "Edition and saving an item".

#### V.8. Treatment counter

The apparatus records the number and time of performed treatments.

You can review these records from the main menu of any current (in the **STOP** mode).

Pressing BACK calls up the following screen:

		m							
		0							

Choose "Treatments counter" and press ENTER, the following screen will appear:

											_							
Т	r	е	а	t	m	е	n	t	S		i	n	f	0				
t	i	m	е	=	0	0	0	0	0	1	:	2	3	:	4	5		
n	u	m	b	е	r	=	0	0	0	1	2	3						

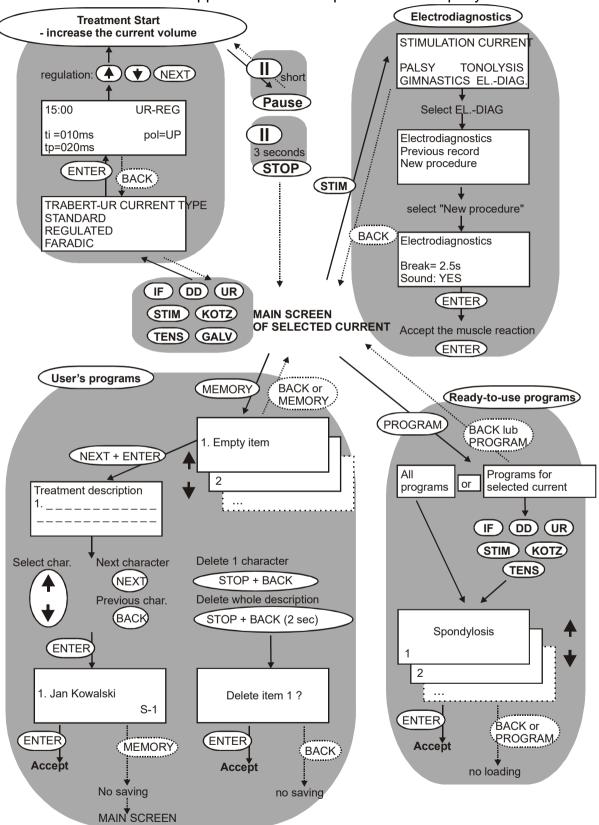
The following data is shown:

- Number of treatments only the complete treatments (i.e. which time finished completely) are counted (see point V.2.8.1. "Expiration of the treatment time").
- Treatment time shows the total time of all treatments, independently of their termination. The time format is: "hhhhhh:mm:ss", where:
  - o hhhhhh hours
  - o mm -minutes
  - ss seconds

To exit this screen press

### V.9. Schematic diagram of use

The following diagram shows the most important interface screens and the buttons to control the functions of the apparatus. All descriptions are exemplary.



### V.10. Safety of treatments

<u>WARNING:</u> In the event of any serious incident related to the use of a device, it is essential to report this information to the manufacturer and to the relevant competent authority of the Member State dealing with the safety of medical devices. In Poland, such an authority is:

Urząd Rejestracji Produktów Leczniczych, Wyrobów Medycznych i Produktów Biobójczych

Al. Jerozolimskie 181C, 02-222 Warsaw

e-mail: incydenty@urpl.gov.pl

fax: +48 (22) 492 11 29

<u>WARNING:</u> It is necessary to interview the patient about the contraindications against the treatment, before the treatment is started.

<u>WARNING:</u> In case of untypical device behaviour, which may be dangerous to the patient or staff, stop the treatment immediately and follow the guidelines of the chapter VI. "Maintenance".

**WARNING:** Do not make any modifications to the device.

**WARNING:** The use of the therapy for patients under the age of 8 years is possible following a positive specialist medical opinion.

**IMPORTANT:** Operating the device in close proximity (up to a few metres) to a source of short-wave or microwave therapy may cause the output signal to be unstable and the device to malfunction.

<u>IMPORTANT:</u> Care should be taken not to transfer bacteria from one patient to another or to the staff. Pay attention to the hygiene of patients and staff. Applicators and eyewear must be properly cleaned and disinfected with proper agent (70% solution of ethyl alcohol or a suitable disinfectant is recommended).

The application of the agent should be checked up in the manufacturer's datasheet. It is also advised to put it to test on a small area of a probe and check on the possible damage after some time (e.g. after 24 hours).

<u>WARNING:</u> For the patients with lowered sensitivity the current amplitude must not be adjusted according to the patient's sensitivity. Instead adjust according to the current density. This density depends on the shape of electrodes, place of treatment and type of treatment. The exact methodology is described in professional literature. Neglecting those rules can cause the patient to negative consequences, like burn because of too high current. (Particularly important for ionophoresis).

**WARNING:** Do not perform treatment with electrode without moistured pad – it may cause burns to the patient.

**WARNING:** Electrodes may be placed only on healthy skin and always with properly moistured pads.

**WARNING:** Electrodes should be placed on patient when the device is switched on (POWER button in position I). Otherwise, the patient may feel an unpleasant electric shock at switching on the power supply.

**WARNING:** Do not turn on or off the device (with the POWER button) when electrodes are placed on a patient. This may cause temporary unpleasant feelings.

**WARNING:** Electrical stimulation should not be used across or over the head, directly over the eyes, covering the mouth, at the front of the neck (especially the carotid sinus), with electrodes crossing over the heart, in the upper back or on the chest.

<u>WARNING:</u> The application of electrodes in the thoracic region increases this risk of cardiac fibrillation.

**IMPORTANT:** When using electrodes with a surface area of less than 51 cm<sup>2</sup> (E-A5, E A10, E-A15, E-A50, E-S50), staff should pay particular attention during treatment, as the density of the set current may exceed the safe limit of 2 mA/cm<sup>2</sup>.

**IMPORTANT:** Remember that using pads with electrodes is necessary for proper current flow. This is the reason why adequate moist and thickness of pads must be kept.

**IMPORTANT:** Before the treatment check if the patient did not use ointment in the area of electrode placement and clean the skin if necessary (ointment may cause incorrect current flow). Similarly, excessive hair growth should be shaved in places of electrode placement (thick hair obscures proper current flow).

**NOTICE:** Cathode (plus) is connected to the red end of cable and anode (minus) is connected to black end of cable.

### **VI. MAINTENANCE**

**NOTICE:** The addresses of authorised service are available at the manufacturer's office (see: the cover of this manual).

### VI.1. Checking the proper operation of the device

- The unit should be periodically checked every 12 months throughout the time of exploitation.
- The checking can be done only by the manufacturer or authorised service having a manufacturer's certificate.
- The periodical technical tests should be made at the user's workplace, because the work environment of the unit has to be checked.

<u>IMPORTANT:</u> If the device fell down, before the next switching on call for the authorised service to inspect the device. There may be invisible damages that can bring about a faulty operation.

#### VI.2. Proper working environment

Observing the recommendations given below will help keep the device in good technical condition and will assure a long and undisturbed use.

- Power supply mains should be checked systematically, there should be no breaks, sparking or similar disturbances.
- Equipment should not work in humid environment or one with steam, salts, sulphides etc. in the air. Pay attention there are no any rooms for inhalation, hydrotherapy, pools or similar if in vicinity. If you cannot avoid such situation, the room with electrotherapy equipment must be insulated from such influences.
- Work environment should not be dusted or littered, because the fan may get blocked by the accumulated dust and dirt. Break-down of the device may occur, similarly to a PC computer. This may be avoided by systematic (e.g. once a month) cleaning of the fan with a vacuum-cleaner (see VI.1. "Repairs").
- The device should not be heated by an external radiator, heater, direct sunlight etc. Overheated electric devices may break down.

### VI.3. Repairs

Should any faulty operation occur, the equipment ought to be delivered to an authorised service having a manufacturer's certificate for such repairs or directly to the manufacturer for check up or repair.

If the mains switch indicating that the device is switched on is not illuminated, have the fuse, located on the rear panel of the device (a spare fuse is provided) checked and replaced if necessary by a qualified service technician.

**IMPORTANT:** All repairs can be performed only by the manufacturer or authorised service.

**NOTICE:** When sending equipment to the service or manufacturer, remember to enclose all cables and accessories used with the unit and also a detailed description of failure (conditions of work, features of error etc.), your address and contacts (phone, e-mail).

**NOTICE:** Check the service authorization certificate for it may not be authorized to conduct specific controls or repairs.

### VI.4. Maintenance and cleaning

The device should be cleaned of accumulating dirt.

- At least once a month clean the fan on the back panel and ventilating holes at the bottom of the device. Turn the power off and remove dust with a vacuum-cleaner, keeping the muzzle for at least 1 min at the apertures.
- Clean the device with a soft moistened cloth or sponge, but not too wet, not to let water inside.

**NOTICE:** Do not use paint or varnish solvents to clean the device.

**NOTICE:** The manufacturer of the viscose material used in the electrode pads attached to the device states that this material can be machine-cleaned at 60°C with detergent.

#### VI.5. Maintenance of electrodes

- Immediately after every treatment, electrodes should be removed from their pouches (pads) and dried up in room temperature.
- During the removal, an electrode should be held by its body and not by the wire to avoid the cable damages.
- Pads and electrodes should be disinfected after each treatment. A 70% ethanol solution or a suitable disinfectant is recommended. The intended use of the disinfectant should be checked in the manufacturer's instructions, or a test should be carried out on a small area and checked after a sufficiently long period of time to ensure that no adverse material changes have occurred (e.g. after 24 hours).
- From time to time (not less than every 7 days), the electrode terminals ought to be inspected, whether they are not loose or damaged.
- The damaged electrodes and cables (loose terminals, dirt, breakings or splitting of wires) can be a source of not dangerous but unpleasant sensations for the patient. Every possible electrode repair should be done by a qualified maintenance technician.

**WARNING:** Silicone ("rubber") electrodes lose their electric conductivity after some time of use. This time depends on the intensity of usage and for this reason they should be checked periodically e.g. with the function of electrode test (at least once a week).

**NOTICE:** Do not bind viscose pads when they are dry. It may cause the pouch/pad to break and prohibit its further use.

**NOTICE:** Never keep the electrodes in wet pouches. Otherwise they lose their effective electric conductivity quickly.

**NOTICE:** Silicone electrodes should not be used for ionophoresis because they lose electric conductivity quickly and in effect must not be used for further treatments.

### Electrode testing:

- if the electrode has a resistance of up to 500 ohms, it is fully functional
- if the electrode shows a resistance of 501 to 1000 ohms, it can be used, provided that stricter control of its condition is ensured
- if the electrode shows a resistance above 1000 ohms, stop using it for treatment purposes, as it may cause discomfort to the patient and even burns.

### VI.6. The most frequent problems in electrotherapy

### Most frequent problems:

- · difficulties in parameter setting
- inability to set treatment parameters
- too high local current density which may result in unpleasant feelings and even electric burns

### When these problems occur check the following:

- whether the pad is not too dry
- whether electrodes evenly adhere to patient's body and are properly pressed
- the electrode conductivity (whether it is not too low)
- · whether the cable is not damaged
- whether the patient did not use the ointment at treatment areas (clean it)
- the patient's hair growth (shave, if excessive)

If a power interruption occurs, the instrument itself will signal this with a sound and an interruption. The type of error will be displayed on the screen.

#### VI.7. Disposal of the warn out equipment

- Predicted exploitation time of the device is 10 years, provided that it is properly used and maintained according to user's manual and put to periodic technical service.
- After this time the device may be still used as long as it is serviced by the authorised service according to its condition. It can be further used if approved by the authorized service or by the manufacturer. Especially service intervals can be shortened in comparison to the nominal ones.
- After the exploitation time is over or end of usage, the device should be handed over for disposal to a company dealing with disposal of electronic equipment, in accordance with current legislation.

### VII. MEDICAL DESCRIPTION

<u>WARNING:</u> Recommendation of this manual are of general nature. They should be adjusted individually to every patient.

**WARNING:** In doubts consult a doctor of appropriate speciality.

<u>WARNING:</u> Treatments with Multitronic MT-3 must be done by a qualified physiotherapist under the supervision of a medical doctor. Otherwise the therapy effects may be limited and the patients may be exposed to the risk of health deterioration.

<u>WARNING:</u> Treatments must be conducted according to the instructions for use and all safety recommendations.

### VII.1. Intended patient group

The Multitronic MT-3 can be used with patients of all ages, taking into account the counterindications listed below in p. VII.3. "Contraindications".

#### VII.2. Indications

### VII.2.1. Basic indications for electrotherapy

- Rheumatology and musculoskeletal disorders
  - Osteoarthritis of the knee joints
  - o Raynaud's syndrome
  - Atherosclerotic disease of the peripheral arteries
  - Osgood-Schlatter disease
  - Degenerative kyphosis of the lumbar spine
  - Skeletal muscle atrophy and weakness
  - o Chronic, non-specific low back pain
  - o Lumbar disc herniation / sciatica syndrome
  - Cervical disc herniation
  - Cervical spine pain associated with cervical disc herniation
  - Lumbar spine pain
  - Supportive in chronic neck pain
  - o Shoulder pain
  - Fibriomyalgia
- Orthopedics and sports medicine
  - Subacromial tunnel syndrome
  - Tennis elbow
  - Chronic instability of the ankle joint (after dislocations, sprains)
  - o Injury to the metacarpophalangeal joint
  - Stiffened thumbs after injury to the ulnar collateral ligament of the metacarpophalangeal joint
  - Pain due to femoral head necrosis / Perthes disease
- Neurological conditions and neuropathies
  - Hemiplegic neuralgia
  - o Bell's palsy / facial nerve palsy
  - o Chronic migraine
  - Unilateral spastic cerebral palsy
  - o Peripheral nerve regeneration
  - Neuropathic pain
    - Spinal cord injuries
- Dentistry and oral disorders
  - o Temporomandibular joint function syndrome
  - o Dysphagia

- Rehabilitation and recovery of function
  - o Physical and functional support for patients with pneumonia
  - Urinary incontinence
  - Functional bowel constipation
  - Diseases of the trunk periphery
  - o Pain relief during childbirth
  - Myofascial pain
- Dermatology and tissue regeneration
  - Varicose leg ulcers
- Others:
  - Lowering hormone levels in thyroid therapy
  - o lontophoresis: introduction of therapeutically acting ions into tissues (painkillers, anti-inflammatory, antibacterial, antiviral, antifungal, vitamins, minerals and others exact indications depend on the drug).

#### VII.3. Contraindications

### VII.3.1. Contraindications to electrotherapy

- Purulent inflammations
- Blemishes
- Febrile conditions
- Inflammation of the skin
- Epidermis defects at the treatment site
- Excessive sensitivity to electric current
- Muscle spasmodic paralysis
- Patients with active implants
- Pregnancy

### VII.3.1.1 Particular contraindications to ionophoresis

- Moreover, when using ionophoresis drugs that cause allergies, such as procaine, lidocaine, iodine, antibiotics, an intradermal allergy test should be performed before starting the treatment.
- It should also be remembered that ions that are beneficial in the underlying disease may be contraindicated due to the patient's other conditions
- Cancer diseases and cancer risk states

### VII.4. Side effects

Side effects that can occur during electrotherapy include skin irritation and pain at the site of application of the currents. Burns may also occur if equipment is used inappropriately.

### VIII. METHODOLOGY OF TREATMENTS

<u>WARNING:</u> Treatments with Multitronic MT-3 must be done by a qualified physiotherapist. Otherwise the therapy effects may be limited and the patients and the staff may be exposed to the risk of health damage.

**NOTICE:** Treatments must be conducted according to the user's manual and especially all safety recommendations described in it must be observed.

### VIII.1. Methodology of electrotherapy treatment

The effectiveness of treatments using electric currents depends on:

- Proper selection of electrodes
- Electrode application sites
- The intensity of the applied currents
- The frequency of the applied currents
- The duration of the procedure
- Number of treatments

#### VIII.1.1. Electrodes

Proper choice of electrodes depends on many factors, most importantly place of application. Using small electrodes allows for greater current density at lower current as compared to larger electrodes. Flat metal aluminium foil electrodes of large sizes are used for treatments of large areas of body. In order to avoid unpleasant feeling during treatment it is most important that pads (sponge covers) are thick enough and adhere to skin. Pads should be thoroughly moistened with water or physiologic salt solution. Electrodes are fastened in place with elastic straps and are further pressed with a weight which easily adheres to the body shape (e.g. a sand bag).

**NOTICE:** Electrodes supplied with the device have the following area:

 $E-A 10 - 10 \text{ cm}^2$ ;  $E-A 50 - 50 \text{ cm}^2$ ;  $E-A 75 - 75 \text{ cm}^2$  ect.

**NOTICE:** For ionophoresis use metal electrodes as the active ones (with medication).

#### VIII.1.2. Preparation for treatment

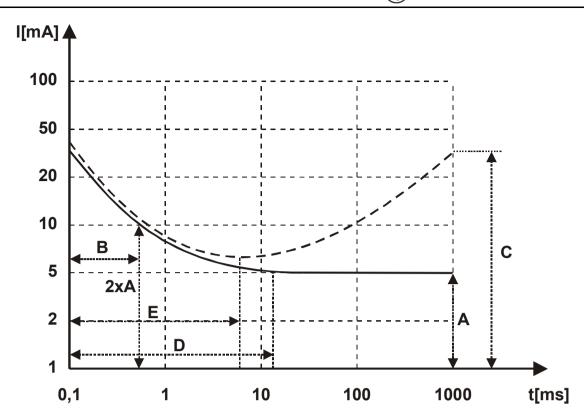
Preparation of the patient for treatment with electric current is the same as for other physiotherapy treatments.

- Before treatment it is necessary to inform the patient about his possible feelings. Examples of the patient's sensations: tingling, stinging, pressure, etc.
- Skin should be cleaned in place of treatment.
- Choice of electrodes depends on the size of area for treatment electrodes should be as large as possible.
- Pads/pouches under electrodes should be thick enough (around 4 mm) and thoroughly moistened with boiled water or physiologic salt solution.
- Electrodes should be firmly fastened to patient's body using elastic bandage, rubber or velcro straps, yet taking care to avoid blood flow obstruction.

#### VIII.2. i/t curve

#### VIII.2.1. i/t curve

An example of an **i/t** curve (for a healthy muscle) is shown below. Continuous line shows the results for rectangular pulses. The dashed line is for triangular pulses. Both axes are in logarithmical scale.



#### VIII.2.2. Definitions of indexes

Multitronic MT-3 automatically calculates values of the following indexes (marked on the picture above as A,B,C,D,E):

- Rheobase = A value of current for rectangular shape of 1000 ms width [mA]
- Chronaxie = B
   pulse width of rectangular shape for current value of double rheobase [ms]
- Accommodation coefficient =  $\frac{C}{A} \cdot 100\%$ ratio of current for triangular shape to that of rectangular for pulse width=1000 ms [%]
- Useful time = D
   the lowest pulse width of rectangular pulse for which current value is equal to
   rheobase [ms]
- Optimal pulse time = E
  pulse width of triangle shape of the lowest current intensity [ms]

### VIII.2.3. Interpretation of electrodiagnostics results

i/t curve. An exemplary drawing of i/t curve for a healthy muscle is shown in p. VII.2 "i/t curve". For partially or entirely denervated muscle the curve moves right and up – towards higher currents and longer pulses.

**Accommodation coefficient.** This coefficient shows the muscle ability of adaptation (called accommodation) to slowly increasing currents for triangle pulses. For normal nervous-muscular excitability its value is usually 3 to 6. The values lower than 3 show decreased adaptation of muscle, which means the muscle is damaged. The value close to

or equal to 1 means a complete degeneration. The values over 6 occur for the vegetative neurosis.

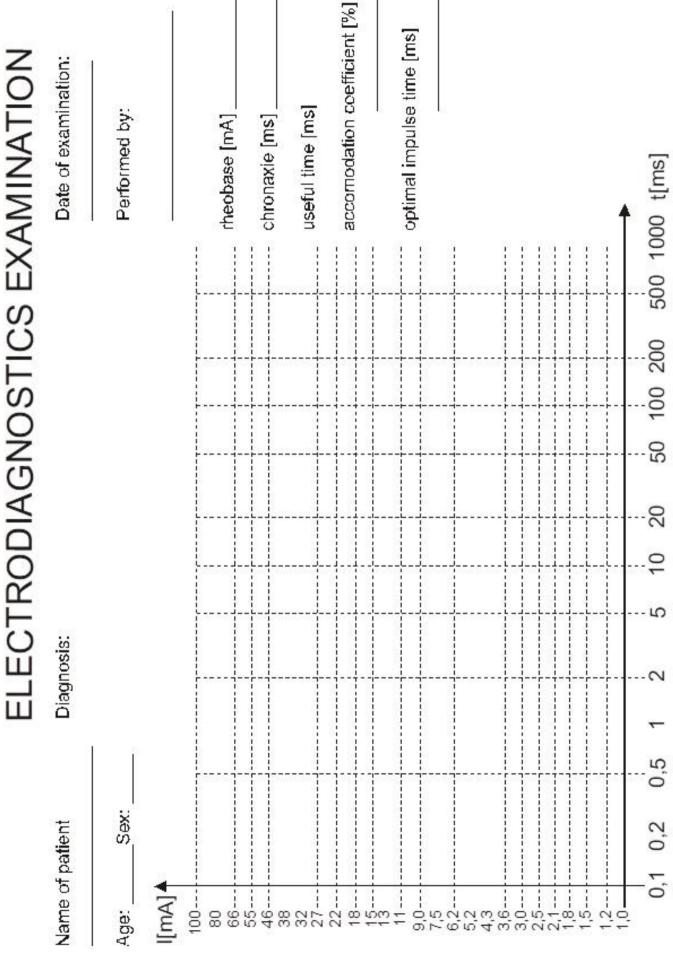
**Chronaxie.** This indicator shows excitability of the muscle. Its value is higher for lower excitability.

Comparing the results in the following tests (e.g. in a weekly cycle) we may assume an improvement of the muscle state, if the i/t curve moves towards lower currents and shorter pulse widths, the accommodation coefficient rises (in range of 3-6) and chronaxie drops down.

#### VIII.2.4. i/t curve card

On the next page there is an exemplary electrodiagnostics blank form for i/t curve drawing. For better clarity it is useful to draw the results for triangular and rectangular pulses in different colours.

Both axes of the graph are on a logarithmic scale. On both axes there are values of respectively times and currents generated by the device during the electrodiagnostics procedure, resulting in marking points of the graph at the intersection of dashed lines.



### IX. LITERATURE

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Please fill in the following questionnaire. Your opinions are very helpful in fulfilling your expectations concerning our equipment.

## **USER'S QUESTIONNAIRE**

Please pick your answer and mark it with an X.

Device's type				MT-3		Device's	number								
No				Question											
1.		o you gra nt produ		herapeutic effectiveness of the device in its treatments compared with similar devices of ?											
Ve	Very low		Low		Average		Good		Very good						
2.	What is	What is the reliability of the device during use?													
	Very reliable		Unreliable		Average		Rather reliable		Reliable						
3. How do you grade easiness of operating this device?															
	Very difficult		Difficult	Difficult		Average		Easy		Very easy					
4.	1. Does the device meet expectations?														
Very	ery poorly		Poorly	Poorly			Highly		Very highly						
5.	Is the information provided in the instructions for use and on the device clear and does it provide the neces information?							necessary							
Vei	y poor		Poor		Average		Good		Very good						
6.	If the d	levice ha	s been service	d (repaired)	) please eval	uate the qua	ality of the	service:							
Vei	y poor		Poor		Average		Good		Very good						
Has not been serviced															
			Car	the ease	of use be	improved <sup>4</sup>	? If so, ho	ow?							
		Yes		No		I cannot	decide								
Can the content of the instructions be improved? If so, what should be changed?															
Yes			No		I cannot										

## Please enter which conditions are most frequently treated:

THER	APY			DIS	SEASE
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What I	kind of another	r therapy would y	vou like to use	in your work	)
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Other	notes on the u	se of the device:			
Please	name the posi	ition of the perso	on filling in this	questionnair	e:
Please	name the kind	of place at whic	h the device is	used:	
Hospital	Outpatients	Physiotherapy	Home visits	Sanatorium	Other
	clinic	practice			(please name)
		1			

Thank you for filling in this questionnaire.

Pease send filled questionnaire by e-mail: office@eie.com.pl
or by post: EiE, 05–402 Otwock, ul. Zaciszna 2, Poland

