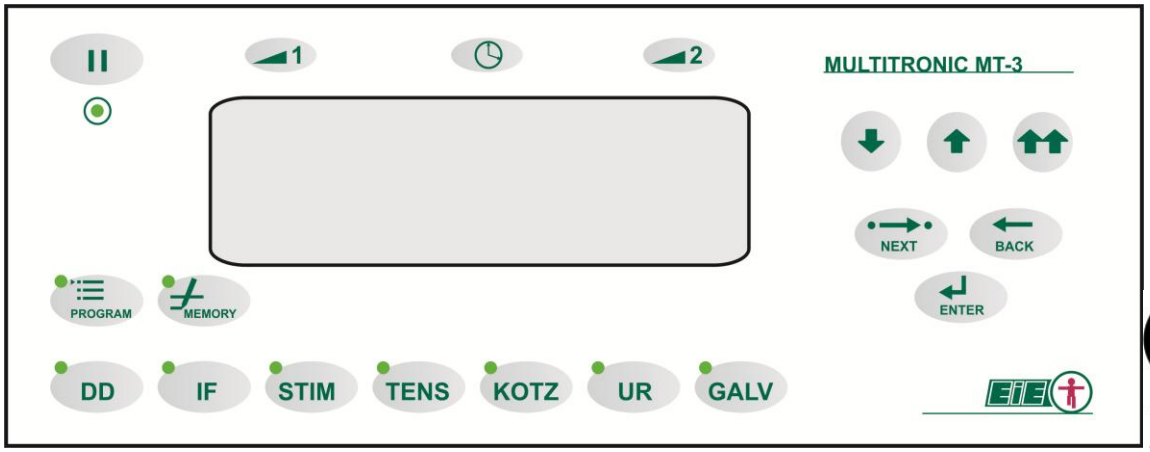
MULTITRONIC MT–3

Multi-current electrotherapy stimulator



CE 2274

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.

Digitally signed by Cobzari-Turcan Rodica
Date: 2025.10.21 12:30:58 EEST
Reason: MoldSign Signature
Location: Moldova
MOLDOVA EUROPEANĂ

Series: 2025-02/A

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**

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: **MULTITRONIC MT-3**

Serial number ..... Date of production.....

Warranty period: 24 months from the date of purchase.

Conditions of warranty:

1. The selling party is obliged to deliver the fully fit equipment to the customer.
2. Warranty card is valid only with the date of sale stamped and signed by the seller.
3. Exploitation of the product must be conducted according to the instructions for use.
4. All warranty and post–warranty repairs will be done by the manufacturer or by the authorised and qualified service.

The warranty does not cover:

1. Accessories which are subject to the natural wear and tear in the route of exploitation (electrodes, cables, bands, pads, sacks, eyewear, etc.).
2. Mechanical damages which did not rise from the fault of the producer.
3. Damage to cables (cracks, breaking and the like), which can happen under the intensive exploitation.
4. Occurrence of up to 2 bad pixels on graphic display.
5. Necessary periodic technical tests.

The warranty ceases to be valid in the case of:

1. Expiry of the warranty period.
2. Lack of required periodic technical tests.
3. Repairs done by the user or an unqualified service.
4. Non-observance of correct exploitation as described in the instructions for use.

All customer complaints should be sent to the above address.

.....

Stamp and signature of the manufacturer

.....

Date of purchase

.....

Stamp and signature of the seller

Confirmations of technical service

TABLE OF CONTENTS

I. APPLICATION

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

WARNING: 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".

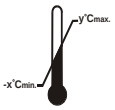
WARNING: Any treatment with MULTITRONIC MT-3 should be performed carefully by a qualified physiotherapy technician.

WARNING: 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		Medical device
	Unique device identifier		Manufacturer
	Date of manufacture		Serial number
	Catalogue number		Caution
	Electrical device type BF		Fuse
	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			
	Maximum allowed temperature range		Keep dry
	The maximum allowable load on the package		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 min
- Time of continuous work 24 h
- Power supply (single phase) ~230 V 10%, 50 Hz, 70 VA
- Insulation class II type BF
- Ambient temperature 10°C ÷ 40°C
- Relative humidity up to 85%
- Atmospheric pressure 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:

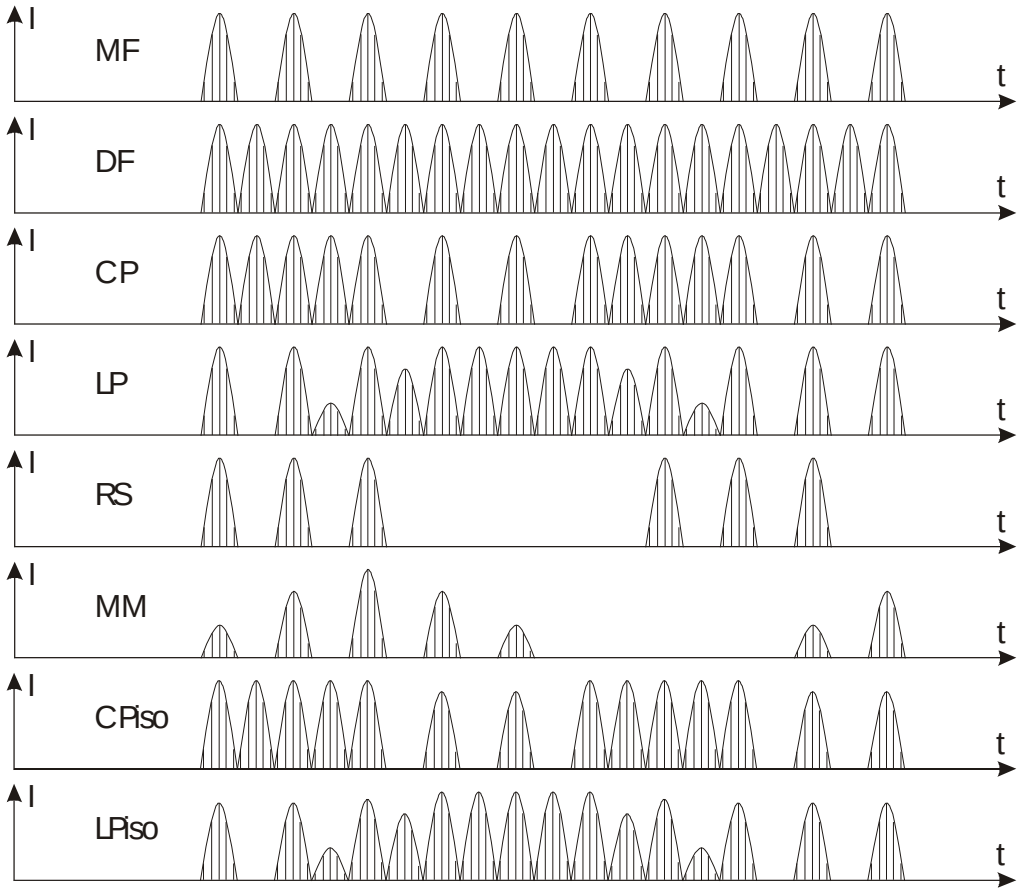
- **MF** (monophasé fixé) – modulation with one half of sinusoidal 50Hz wave
- **DF** (diphasé fixé) – modulation with full wave rectified 50 Hz sinus; the **DF** modulation frequency is 100 Hz.
- **CP** (courant modulé en courtes périodes) – current composed of the **DF** and **MF** waves, flowing alternately 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)

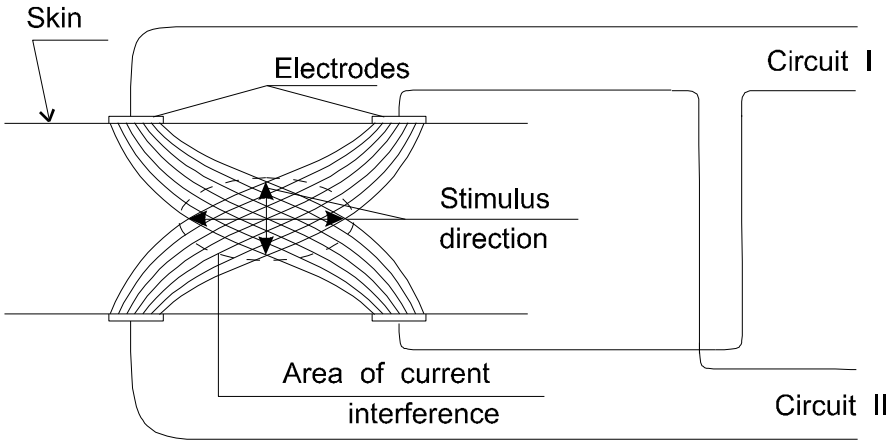


II.3.2. Interferential current

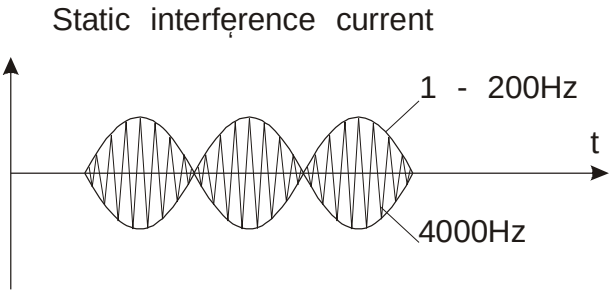
- **static -** the same amplitude in both channels (2-channel) (4-pole /**classic**)
- **static paused -** the same amplitude in both channels (2-channel) (4-pole /**classic paused**)
- **static pre-modulated** - with introductory internal modulation by the device (1-channel) (2-pole /**premodulated**)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

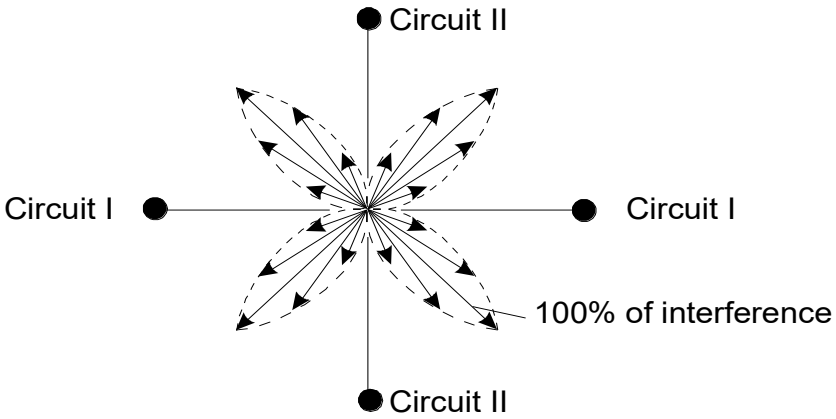
$\mathbf{f_N}$ = 4000Hz	carrier frequency
Fd = (1 – **Fg**) Hz	lower limit of change of interference frequency
Fg = (**Fd** – 200) Hz	upper limit of change of interference frequency
I = (0 – 60)mA	RMS current intensity

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.



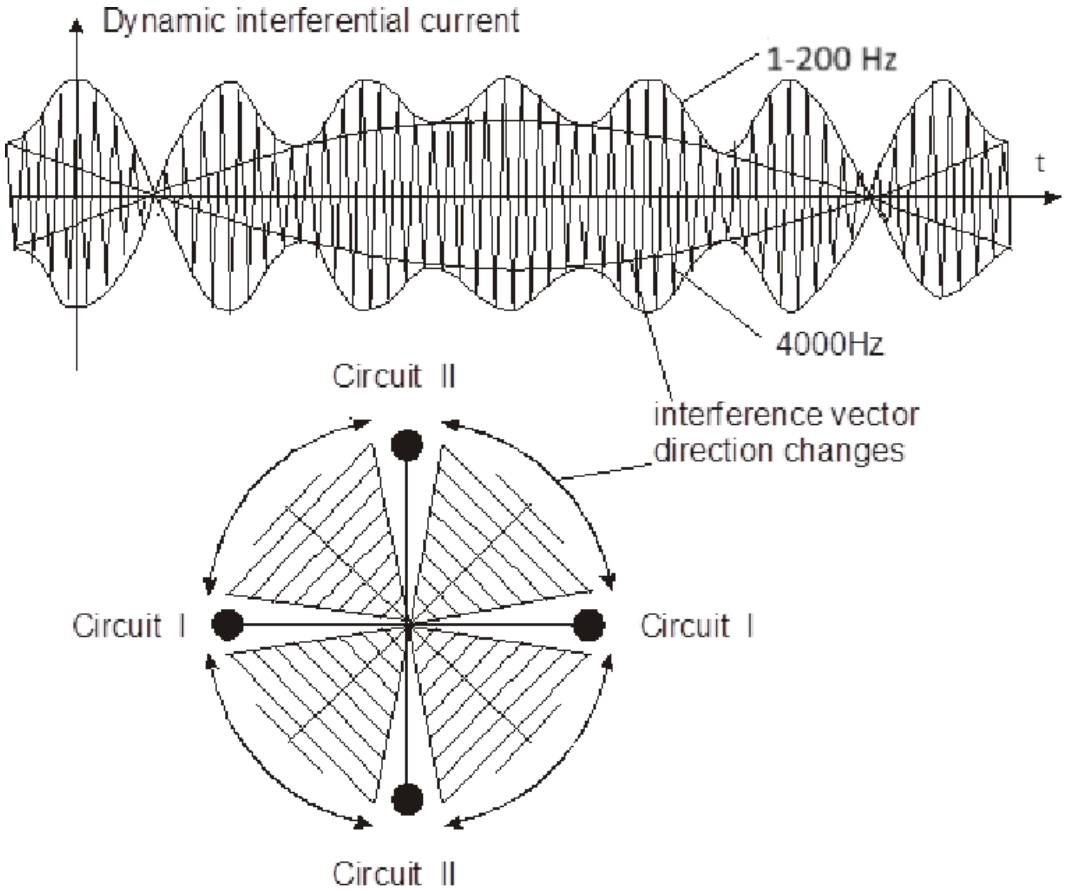
STATIC interferential current is generated when amplitudes in both channels have fixed value. Direction of action of stimulus is permanent and agrees with bisectors of angles formed by conceivable lines joining both pairs of electrodes.





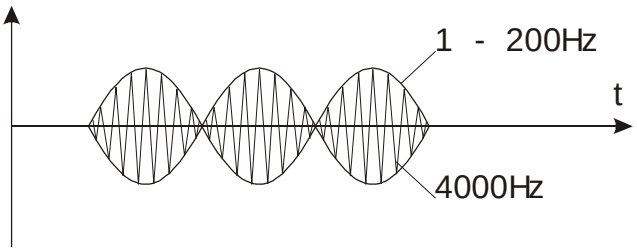
Static interrupted interferential current with the same amplitude in both channels (double-channel) (4-pole / **classic interrupted**) are generated with cyclic break of modulation of static interferential current. They can be set using electrogimnastics settings.

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.



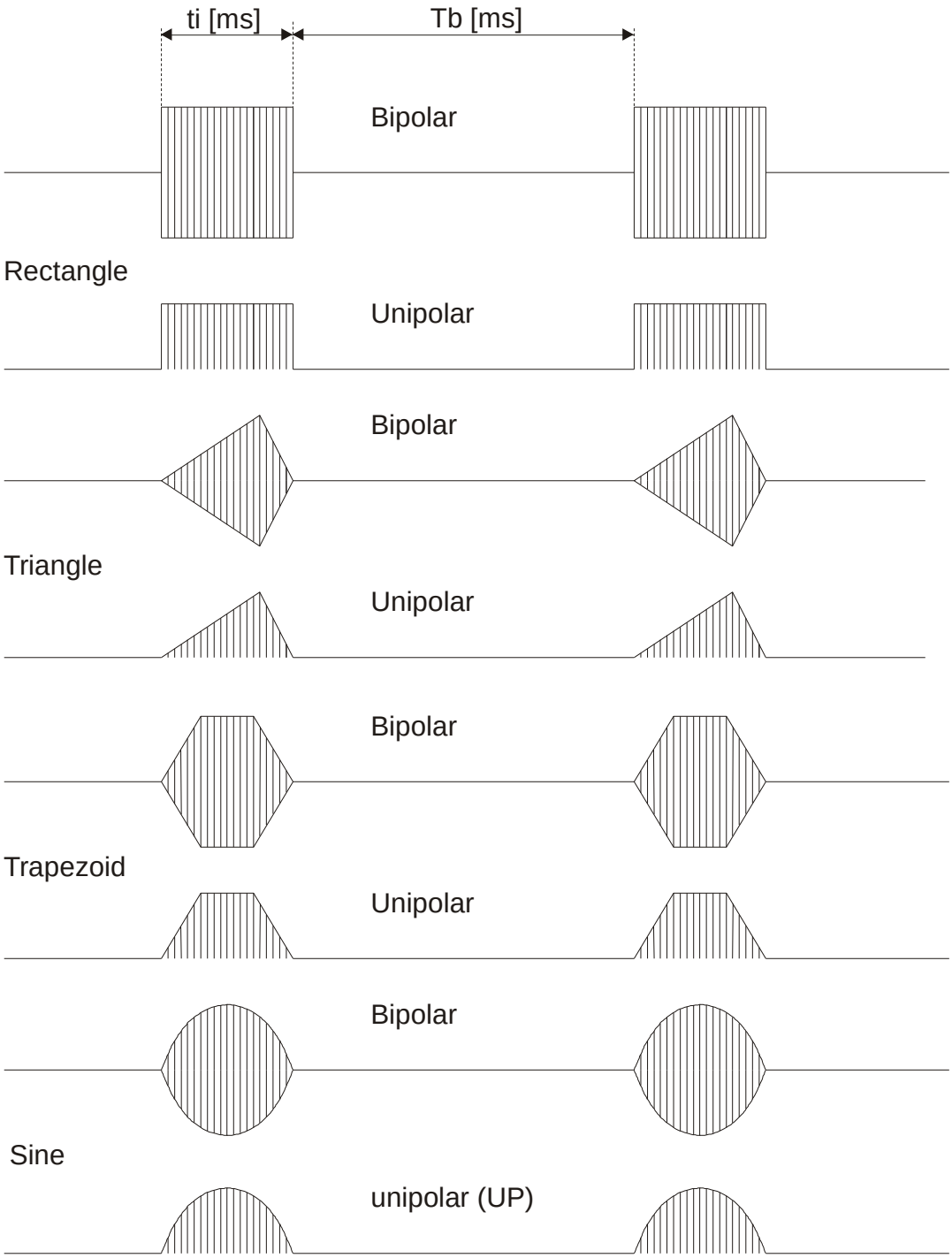
In the screen the present frequency is shown. Change of frequency takes 15 s rise and 15 s fall.

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 (one-half) or bipolar (two-half; full)
- ti = (5 – 990) ms impulse time
- tp = (100 – 4000) ms break time, wherein ti ≤ tp
- I = (0 – 100) mA amplitude of current

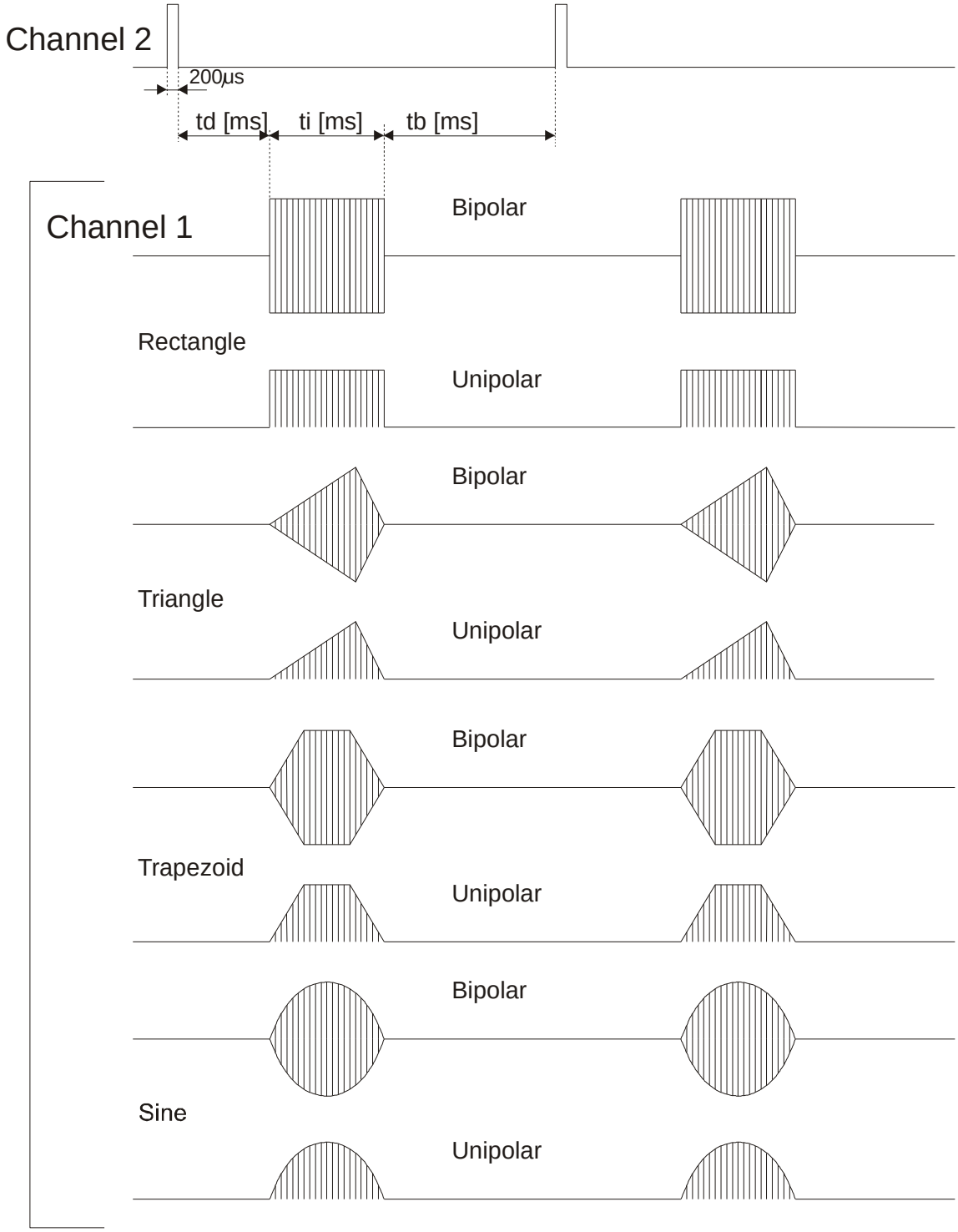
Modulated pulse current generated by MULTITRONIC MT-3 is medium frequency (5 kHz) pulse modulated current of shapes and parameters shown below.



II.3.3.2 Impulse current for TONOLYSIS

- in channel 1: as for amplitude of current I = (0 – 100) mA
- in channel 2: 200μs with amplitude of current I = (0 – 100) mA
- t_i = (5 – 990) ms t_p = (100 – 4000) ms t_O = (5 – 150) ms
- t_O – 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:

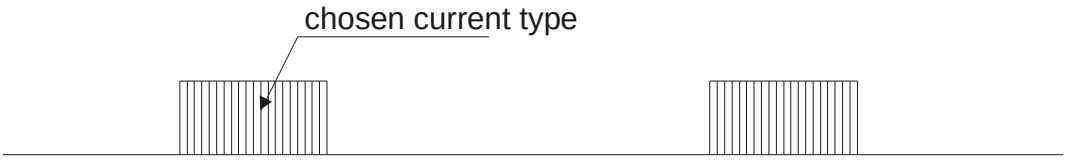


II.3.4. Electro-gymnastics

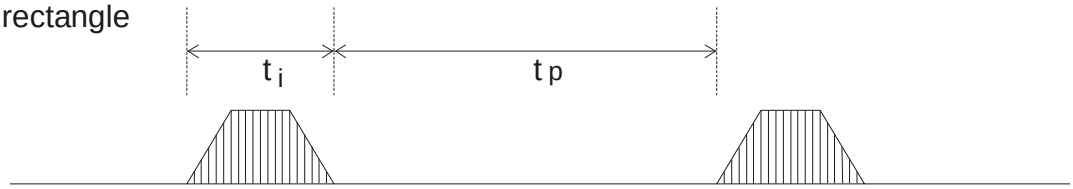
May be used with the following currents:
MF, DF, TENS (f=200Hz), KOTZ-STD, UR-STD, IF-2P

- 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:
0% = rectangle



Modulation:
1 do 99% = trapezium

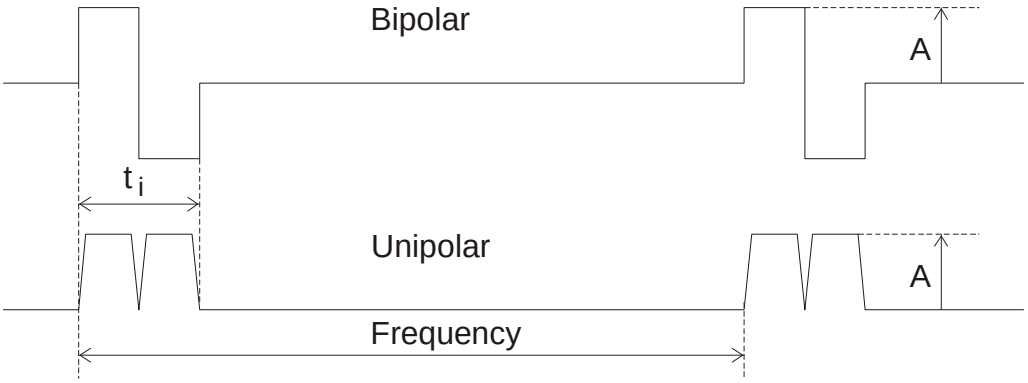
Modulation:
100% = triangle

II.3.5. TENS current

- **TENS**

ti = (50 ÷ 250) μs impulse time
f = (1 ÷ 200) Hz frequency
I = (0 ÷ 100) mA current amplitude

Standard TENS current

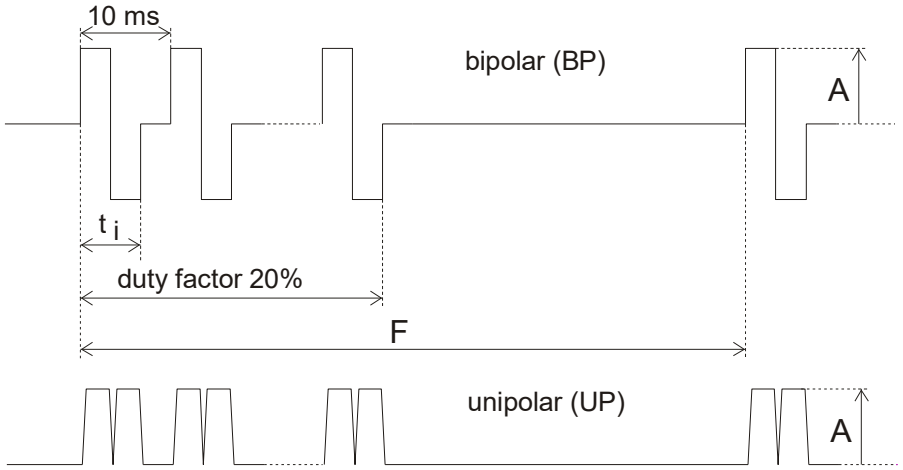


- **TENS BURST**

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

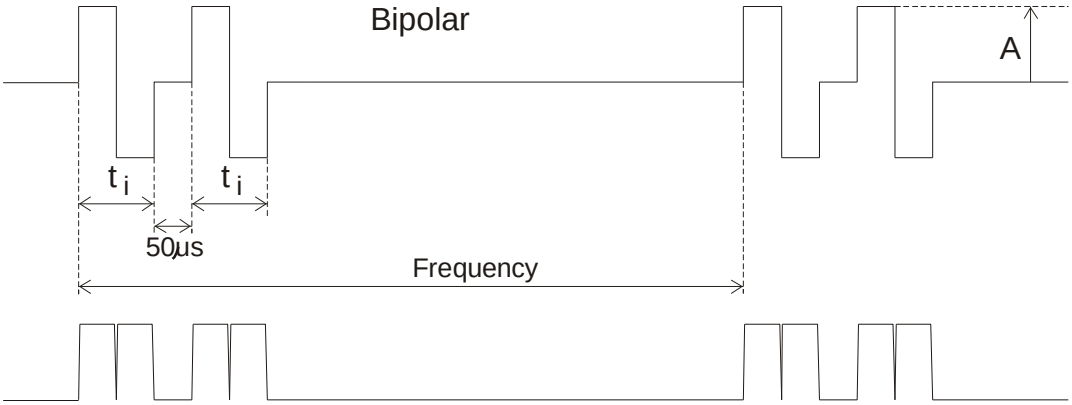
I = (0 – 100)mA amplitude of current

TENS BURST



- **HV current** (interval in pair of pulses is 50 μs)
  ti = (50 – 250) μs impulse time
  f = (1 – 200) Hz frequency
- amplitude of current for HV I = (0 – 100) mA for Umax = 250 V

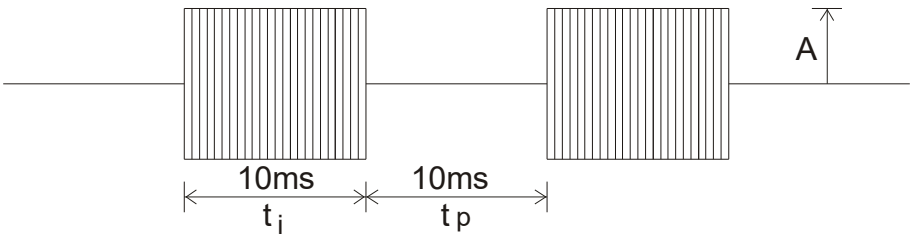
HV current



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

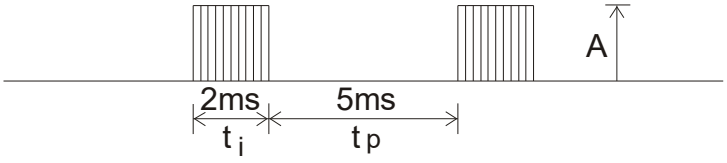
- ti = 10 ms [pulse time]
- tp = 10 ms [breal time]
- f = 50 Hz [frequency of pulse repetition]
- fn = 2500 Hz [carrier frequency]
- polarity BP (bipolar)
- I = 0÷100 mA [current]

Parameters of adjustable Kotz current

- ti = 1÷100 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]

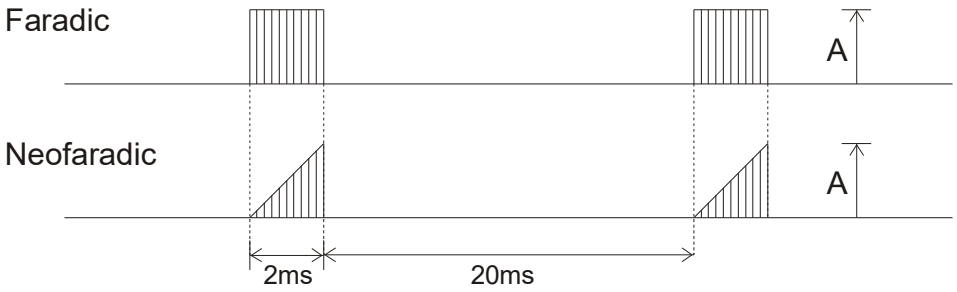
II.3.7. Träbert current

Träbert carrent, „UR", „Ultra Reiz" or „2–5".



- **Standard:**
  - ti = 2 ms [pulse time]
  - tp = 5 ms [pulse break]
  - f = 143 Hz [frequency]
  - polarity UP (unipolar)
  - I = 0÷100 mA [amplitude]
- **Adjustable:**
  - ti = 1÷100 ms [pulse time]
  - tp = 2÷200 ms [break time] wherein ti < tp
  - polarity UP (unipolar)
  - I = 0÷100 mA [amplitude]

II.3.8. Faradic current



- **Faradic**
  - ti = 2 ms [pulse time]
  - tp = 20 ms [pulse break]
  - polarity UP (unipolar)
  - I = 0÷100 mA [amplitude]
- **Neofaradic**
  - ti = 2 ms [pulse time]
  - tp = 20 ms [pulse break]
  - polarity UP (unipolar)
  - I = 0÷100 mA [amplitude]

II.3.9. Galvanic current

I = (0 ÷ 50) 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

Subject	EMC Standard or Examination Method	Resistance test level
		Professional health care 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 ± 0,5 kV, ± 1kV, ± 2 kV
Disturbances conducted and induced from RF fields	PN-EN 61000-4-6:2014	3 V (rms before modulation) 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_T; 0,5 T in 0º, 45º, 90º, 135º, 180º, 225º, 270º, 315º
		0% U_T; 1 T; and 70% U_T; 25 T; single phase 0º
Supply breaks		0% U_T; 250 T
Magnetic fields of the supply mains frequency	PN-EN 61000-4-8:2010	30 A/m 50 Hz

*) 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**	**Allowed levels and /frequency bands MHz**	
Harmonics of current	PN-EN 61000-3-2:2014	The device meets the requirements of the Standard and due to small power does nod require any 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.	
Conducted RF emission	PN-EN 55011:2016 Group 1, Class B	66 dBµV (quasipeak.) 56 dBµV (avr.)	0,15 - 0,5
		56 dBµV (quasipeak.) 46 dBµV (avr.)	0,5 - 5
		60 dBµV (quasipeak.) 50 dBµV (avr.)	5 - 30
Radiated RF emission	PN-EN 55011:2016 Group 1, Class B	**Elecrical field at 10 m distance**	
		30 dBµV/m (quasipeak.)	30-230
		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.

IMPORTANT: 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

WARNING: 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.

WARNING: 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.

3. 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.

IMPORTANT: 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.

IMPORTANT: 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

WARNING: 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”.

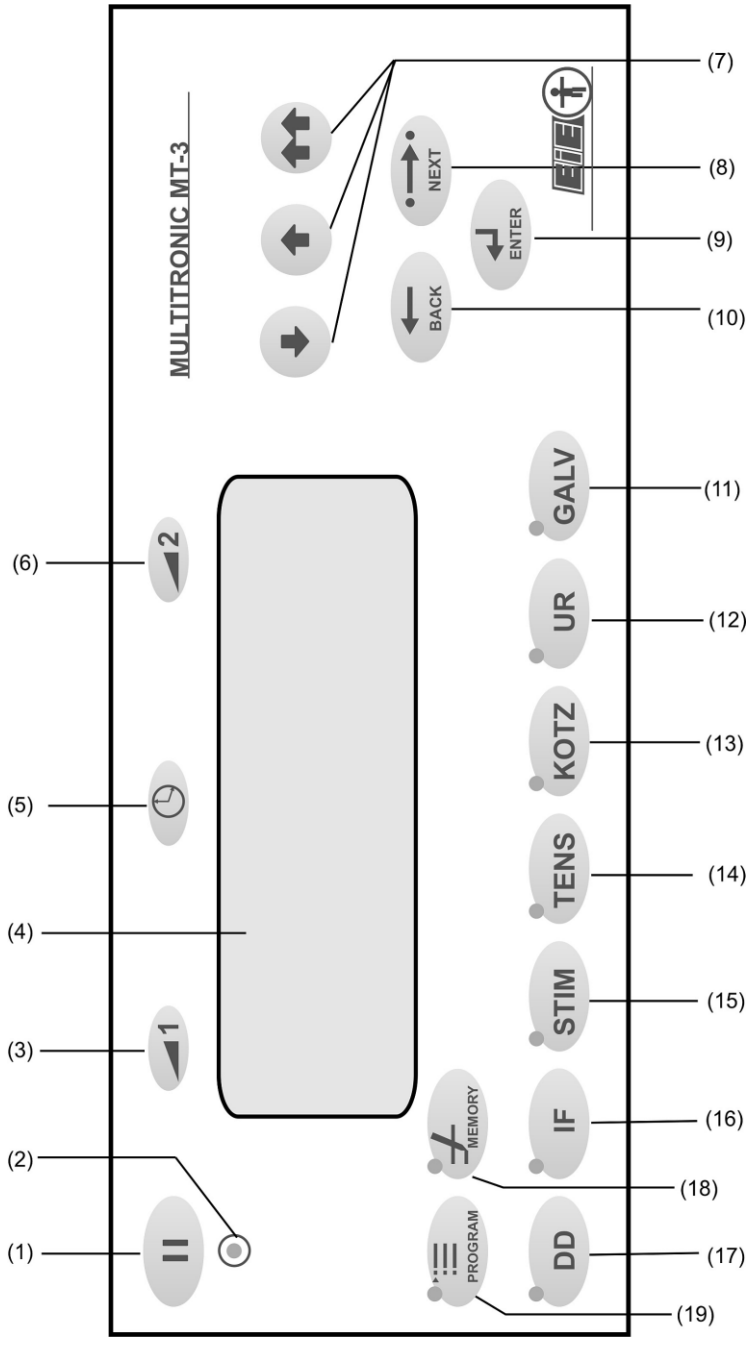
V. OPERATION AND HANDLING OF THE DEVICE

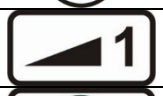
WARNING: All treatments using MULTITRONIC MT-3 should be performed carefully by a qualified physiotherapy technician. Otherwise, the therapeutic effects may be limited and the patient and staff may be exposed to health risks.

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. II + BACK means you should press II and keeping it pressed press also BACK - similar as when using shift button in a PC computer).

V.1. Front panel description



L.p.	Symbol	Opis	
1		PAUSE and STOP button	
2		LED of the treatment activity	
3		Parameter edition for channel 1	
4		Edition of treatment time	
5		Display screen showing the present parameters	
6		Parameter edition for channel 2	
7		Parameter setting	increase
			decrease
			fast increase
8		Return to the previous screen	
9		Accept the choice (for example: the chosen kind of current)	
10		Go to the next item	
11		Select the galvanic current (ionophoresis)	
12		Select the Träbert's (Ultra Reiz) and 'faradic' currents	
13		Select the Kotz's currents (standard or adjustable)	
14		Select the TENS or HV currents	
15		Select the medium frequency pulse currents, tonolysis, electro-gymnastics or electro-diagnostics	
16		Select the interference current	
17		Select the diadynamic current	
18		User-saved sets of parameters – individually saved up by the staff	
19		Pre-programmed parameter sets for various treatments	

V.2. Preparation for treatment

V.2.1. Preparation of the apparatus

WARNING: 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: DD, IF, STIM, TENS, KOTZ, UR, 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 NEXT from one item to the next, until the desired item is blinking and accepting it by pressing ENTER, which calls up the parameter editor screen for the chosen type of current.

You can return to the current type choice screen by pressing BACK 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

the parameter can be adjusted by pressing ↓ and ↑. 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 1 or 2 and than increase the current volume with ↑ or ↑↑.

> **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 II Then the 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 II 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 II 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 II 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 1 or 2. You may change the value of current by pressing ↓, ↑ or ↑↑. 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 DD.

V.3.1.1 The main DD screen

D	I	A	D	Y	N	A	M	I	C			C	U	R	R	E	N	T	S
	S	e	q	u	e	n	c	e											
	M	F			C	P			C	P	i	s	o			M	M		
	D	F			L	P			L	P	i	s	o			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	A		1	5	:	0	0			2	.	3	0	m	A
	M	F					D	I	A	D	Y	N	A	M	I	C			

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 ↑ and ↓, 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	0	.	0	m	A		0	1	:	0	0			0	.	0	0	m	A
S	e	q	u	-			1	.		M	F				0	:	3	0	
-	e	n	c	e			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	T	E	R	F	E	R	E	N	C	E		C	U	R	R	E	N	T
		S	T	A	T	I	C					2	P			4	P		
		D	Y	N	A	M	I	C											
		I	N	T	E	R	R	U	P	T	E	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	A		1	5	:	0	0			2	.	V.	3	0	m	A
													f	=	1	V.	0	0	H	z
F	d	=	0	0	1	H	z			F	g	=	2	0	0	V.	H	z		
										I	F	-	S	T	A	V.	T	-	2	P

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	A		1	5	:	0	0			2	.	3	0	m	A
													f	=	1	0	0	H	z
F	d	=	0	0	1	H	z			F	g	=	2	0	0	H	z		
										I	F	-	S	T	A	T	-	4	P

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

1	2	.	3	m	A		1	5	:	0	0			2	.	3	0	m	A
													f	=	1	0	0	H	z
F	d	=	0	0	1	H	z			F	g	=	2	0	0	H	z		
											I	F	-	D	Y	N	-	4	P

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

1	2	.	3	m	A		1	5	:	0	0			2	.	3	0	m	A
													f	=	1	0	0	H	z
F	d	=	0	0	1	H	z			F	g	=	2	0	0	H	z		
									I	F	-	I	N	T	E	R	-	4	P

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	T	I	M	U	L	A	T	I	N	G		C	U	R	R	E	N	T	S
	P	A	L	S	I	E	S				T	O	N	O	L	Y	S	I	S
	G	Y	M	N	A	S	T	I	C	S			E	L	-	D	I	A	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	A		1	5	:	0	0			1	.	2	3	m	A
t	i	=		0	0	5	m	s		f	=	0	9	.	5	2	H	z	
t	p	=	0	1	0	0	m	s		s	h	=	T	R	I	A	-	U	P
								S	T	I	M	-	P	A	L	S	I	E	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	A		1	5	:	0	0			2	.	3	0	m	A
t	i	=		0	0	5	m	s		t	o	=		0	0	5	m	s	
t	p	=	0	1	0	0	m	s		s	h	=	T	R	I	A	-	U	P
						S	T	I	M	-	T	O	N	O	L	Y	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

T	E	N	S			C	U	R	R	E	N	T	S						
				T	E	N	S	-	S	T	D								
				T	E	N	S	-	B										
				T	E	N	S	-	H	V									

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	A		1	5	:	0	0			2	.	3	0	m	A
t	i	=	2	5	0	u	s		M	=	0		p	o	l	=	U	P	
f		=	2	0	0	H	z												
												T	E	N	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 **M**: 0 ÷ 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	A		1	5	:	0	0			2	.	3	0	m	A
t	i	=	2	5	0	u	s		M	=	0		p	o	l	=	U	P	
f		=	1	0	0	H	z		F	=	0	.	5	H	z				
														T	E	N	S	-	B

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	A		1	5	:	0	0			2	.	3	0	m	A
t	i	=	2	5	0	u	s		M	=	0		p	o	l	=	U	P	
f		=	2	0	0	H	z												
													T	E	N	S	-	H	V

Current parameters:

- Time of treatment: 30 s ÷ 60 min.
- Pulse width **ti**: 50 µs ÷ 250 µs
- Frequency **f**: 1Hz ÷ 200 Hz
- The "irritating" modulation **M**: 0 ÷ 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	O	T	Z			C	U	R	R	E	N	T	S				
					S	T	A	N	D	A	R	D					
					R	E	G	U	L	A	T	E	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	A		1	5	:	0	0			2	.	3	0	m	A
t	i	=	1	0	m	s								p	o	l	=	B	P
t	p	=	1	0	m	s					f	n	=	2	5	0	0	H	z
												K	O	T	Z	-	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	A		1	5	:	0	0			2	.	3	0	m	A
t	i	=	0	2	0	m	s							p	o	l	=	B	P
t	p	=	0	3	0	m	s				f	n	=	2	5	0	0	H	z
												K	O	T	Z	-	R	E	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 UR.

V.3.7.1 The main screen of the UR current

T	R	A	B	E	R	T	-	U	R		C	U	R	R	E	N	T	S
					S	T	A	N	D	A	R	D						
					R	E	G	U	L	A	T	E	D					
					F	A	R	A	D	I	C							

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	A		1	5	:	0	0			2	.	3	0	m	A
t	i	=		2	m	s								p	o	l	=	U	P
t	p	=		5	m	s													
														U	R	-	S	T	D

Current parameters:

- Time of treatment: 30 s ÷ 60 min.

V.3.7.3 The screen of the UR – regulated current

1	2	.	3	m	A		1	5	:	0	0			2	.	3	0	m	A
t	i	=	0	1	0	m	s							p	o	l	=	U	P
t	p	=	0	2	0	m	s												
														U	R	-	R	E	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	A		1	5	:	0	0			2	.	3	0	m	A
t	i	=		2	m	s								p	o	l	=	U	P
t	p	=	2	0	m	s													
													F	A	R	A	D	I	C

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	A		1	5	:	0	0			2	.	3	0	m	A
														G	A	L	V	A	N

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	A	T	I	N	G		C	U	R	R	E	N	T	S
	P	A	L	S	I	E	S				T	O	N	O	L	Y	S	I	S
	G	Y	M	N	A	S	T	I	C	S			E	L	-	D	I	A	G

Then choose „GIMNASTICS” using the buttons NEXT, ↓, ↑ and accept it with ENTER.

V.4.1. Electro-gymnastics screen

1	2	.	3	m	A		1	5	:	0	0			2	.	3	0	m	A
T	i	=		1	.	0	s		m	o	=	M	F						
T	p	=	0	2	.	0	s			%	=	0	2	0					
										G	Y	M	N	A	S	T	I	C	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 STIM, which calls up the following menu:

S	T	I	M	U	L	A	T	I	N	G		C	U	R	R	E	N	T	S
	P	A	L	S	I	E	S				T	O	N	O	L	Y	S	I	S
	G	Y	M	N	A	S	T	I	C	S			E	L	-	D	I	A	G

Then using NEXT, ↓, ↑ choose the item „EL-DIAG” and accept it by pressing ENTER, which will display the following two options to choose from:

E	l	e	c	t	r	o	d	i	a	g	n	o	s	t	i	c	s	:	
P	r	e	v	i	o	u	s		r	e	c	o	r	d					
N	e	w		p	r	o	c	e	d	u	r	e							

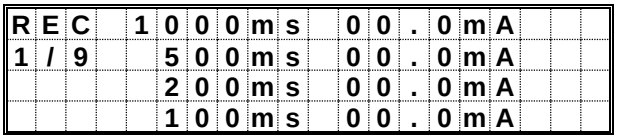
where:

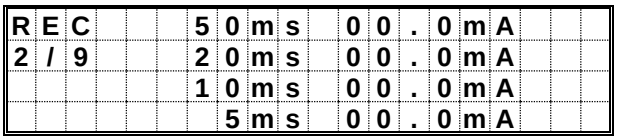
- **Previous record** – shows the results of the recently performed electrodiagnostics
- **New procedure** – new measurement

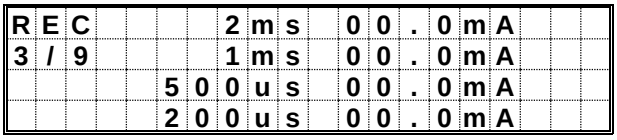
These two options are described below.

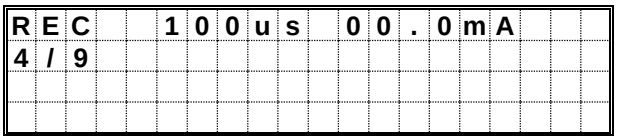
V.5.1.1 View of the electrodiagnostics results

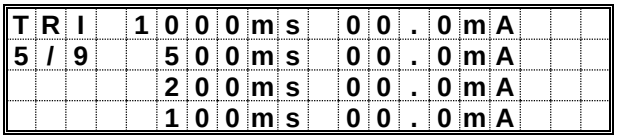
The results of performed electrodiagnostics are saved in the non-volatile memory of Multitronic MT-3. It means that even after switching off the power supply and switching on again, these results are accessible.
The results are presented in the following 9 screens:

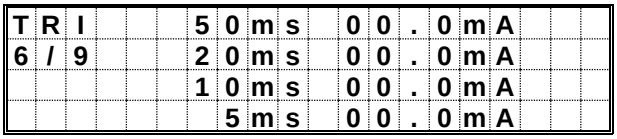


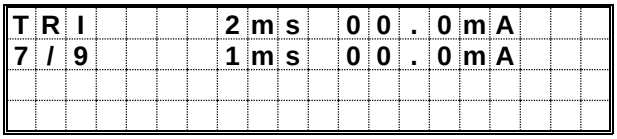


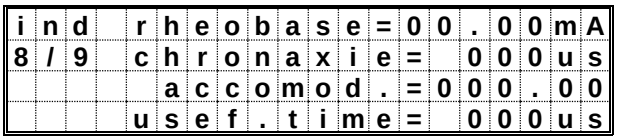


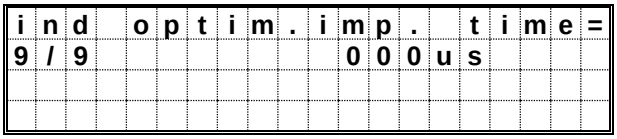












There is one of the following mnemonics in the upper left corner whose meanings are:

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

The description „X/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

- 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 BACK.

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 µs 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:

```
Electrodiagnostics
break time =2.5s
sound : YES
```

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:

```
El-diag: rect.imp.
Press any key.....
```

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

```
01.0mA 0.00mA
El-diag: rect.imp.
ti=1000ms
XXXXX
```

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 [II]. The 4-th line will show then the message „*Pause.....*". To go back to the pulse generation press [II] 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 [BACK]. 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 [ENTER] button has not been pressed, the following screen will show up:

1	0	0	m	A								0	0	.	0	m	A
E	l	-	d	i	a	g	:		i	m	p	.	r	e	c	t		
N	o		c	o	n	f	i	r	m	a	t	i	o	n	!	!		
E	N	T	E	R		-	r	e	p	e	a	t		s	e	r	i	e	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:

E	l	-	d	i	a	g	:		i	m	p	.	t	r	i	a	n	.
P	r	e	s	s		a	n	y		k	e	y	.	.	.			

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	/	s	e	q	u	e	n	c	e	
R	a	y	n	a	u	d	'	s		d	i	s	e	a	s	e		
-	n	o		u	l	c	e	r	a	t	i	o	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
- ↓ - scroll to previous
- buttons of current (DD, IF, STIM, TENS, KOTZ, UR, 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 ENTER. 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:

```
001          IF/Static 2P
Description
```

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:

```
001 - - empty slot
```

V.7.2. Choosing an item

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

- ↑ - previous item
- ↓ - next item

V.7.3. Exit without change (cancel)

To exit **MEMORY** without changes of settings press MEMORY or BACK. 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 ENTER 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:

- NEXT – 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) . , ; - " / + ( ) ! a ą b c ć d e ę f g h i j k l ł m n ń o ó p q r s ś t u v w x y z ź ż A Ą B C Ć D E Ę F G H I J K L Ł M N Ń O Ó P Q R S Ś T U V W X Y Z Ź Ż 0 1 2 3 4 5 6 7 8 9

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

- ↓ – previous (cyclically, i.e. “9” follows the space)
- ↑ – next (cyclically, i.e. the space follows “9”)

- [DD] – character 'A'
- [IF] – character 'a'
- [STIM] – character '0' (zero)
- [TENS] – character ' ' (space)

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 [II]+[BACK] 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 [II]+[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 [MEMORY] 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 [ENTER] 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 [NEXT]+[MEMORY]

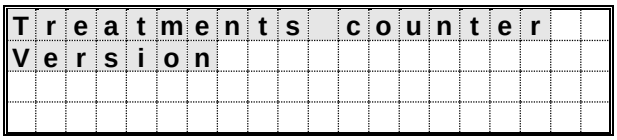
The apparatus will check up whether there is enough memory to complete the saving operation. If so, the chosen item will be saved at the first free memory location, and the apparatus will switch over to the description editing in the **MEMORY** mode**.** If no, the necessary space can be obtained by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

V.8. Treatment counter

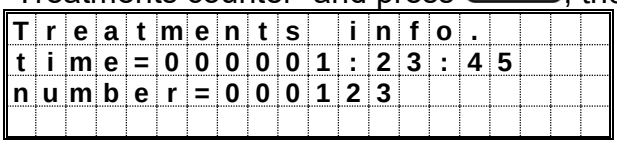
The apparatus records the number and time of performed treatments.

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

Pressing [BACK] calls up the following screen:



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



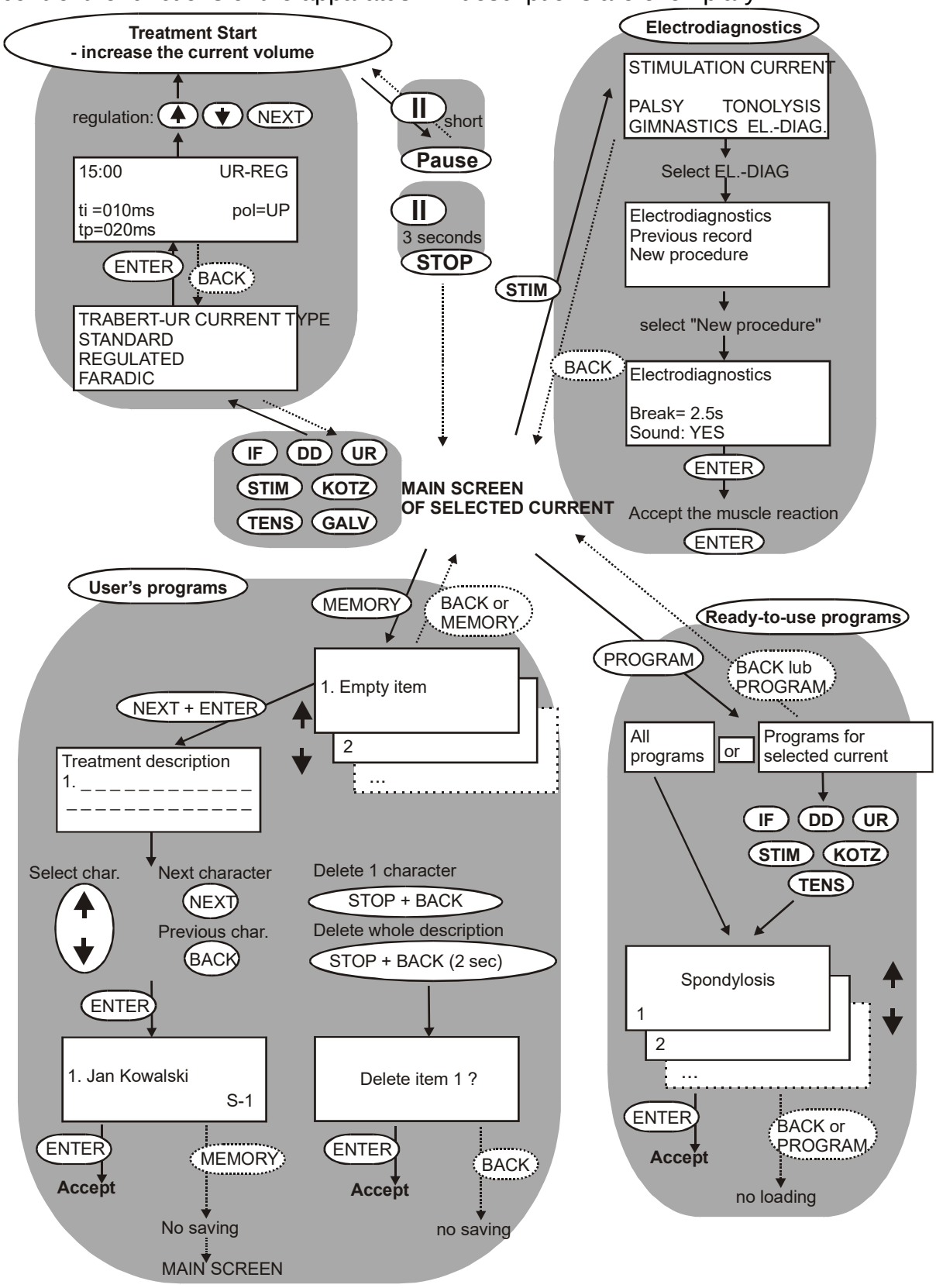
The following data is shown:

- 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:
  - hhhhhh – hours
  - mm –minutes
  - ss – seconds

To exit this screen press BACK.

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

WARNING: 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

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

WARNING: 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.

IMPORTANT: 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).

WARNING: 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.

WARNING: 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^2 (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^2.

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.

IMPORTANT: 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 60ºC 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

WARNING: 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.

WARNING: 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.

WARNING: 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
  - Raynaud's syndrome
  - Atherosclerotic disease of the peripheral arteries
  - Osgood-Schlatter disease
  - Degenerative kyphosis of the lumbar spine
  - Skeletal muscle atrophy and weakness
  - Chronic, non-specific low back pain
  - Lumbar disc herniation / sciatica syndrome
  - Cervical disc herniation
  - Cervical spine pain associated with cervical disc herniation
  - Lumbar spine pain
  - Supportive in chronic neck pain
  - Shoulder pain
  - Fibriomyalgia
- Orthopedics and sports medicine
  - Subacromial tunnel syndrome
  - Tennis elbow
  - Chronic instability of the ankle joint (after dislocations, sprains)
  - 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
  - Bell's palsy / facial nerve palsy
  - Chronic migraine
  - Unilateral spastic cerebral palsy
  - Peripheral nerve regeneration
  - Neuropathic pain
  - Spinal cord injuries
- Dentistry and oral disorders
  - Temporomandibular joint function syndrome
  - Dysphagia

- Rehabilitation and recovery of function
  - Physical and functional support for patients with pneumonia
  - Urinary incontinence
  - Functional bowel constipation
  - Diseases of the trunk periphery
  - Pain relief during childbirth
  - Myofascial pain
- Dermatology and tissue regeneration
  - Varicose leg ulcers
- Others:
  - Lowering hormone levels in thyroid therapy
  - Iontophoresis: 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

WARNING: 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 cm^2; E–A 50 – 50 cm^2; E–A 75 – 75 cm^2 ect.

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

VIII.1.2. Preparation for treatment

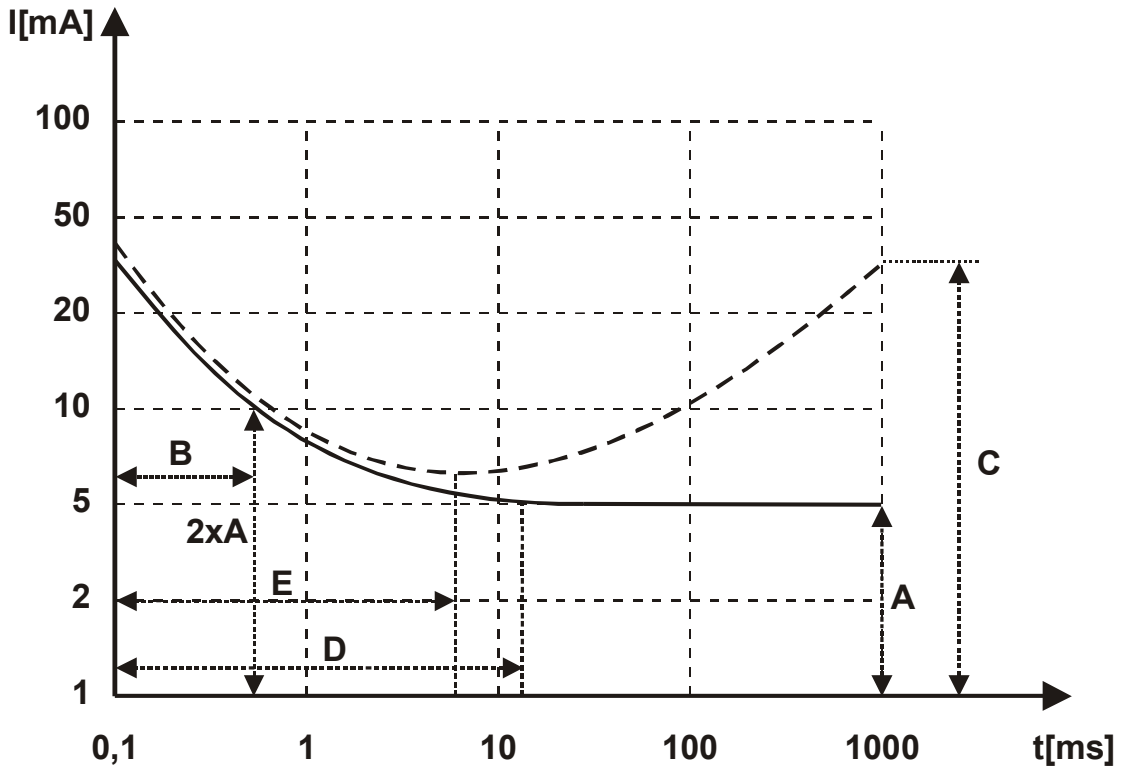
Preparation of the patient for treatment with electric current is the same as for other physiotherapy treatments.

- 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.

ELECTRODIAGNOSTICS EXAMINATION

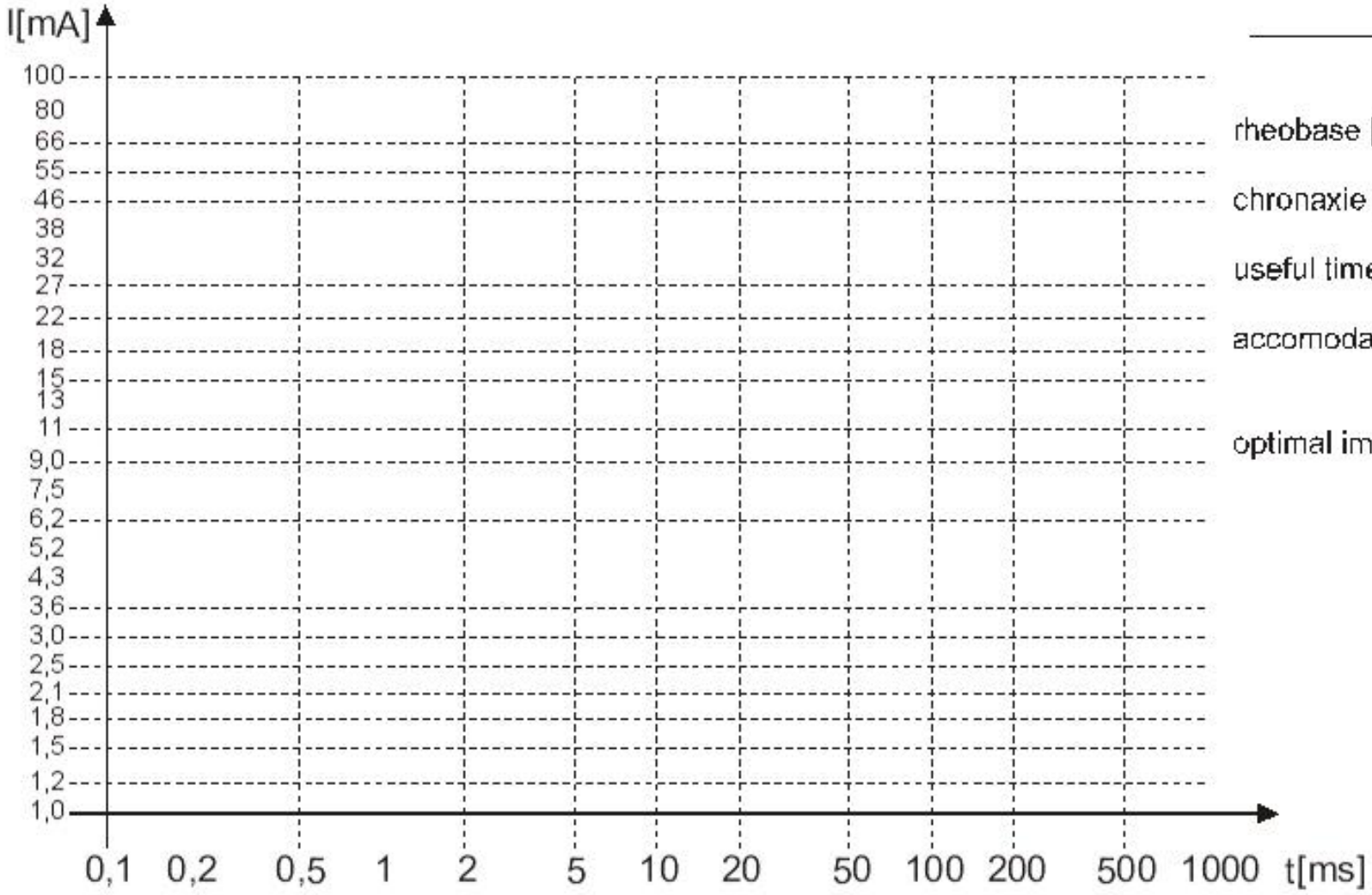
Name of patient _____

Diagnosis:

Date of examination: _____

Age: _____Sex: _____

Performed by: _____



rheobase [mA] _____

chronaxie [ms] _____

useful time [ms]

accomodation coefficient [%] _____

optimal impulse time [ms] _____

IX. LITERATURE

1. Kiwerski J.: „Rehabilitacja medyczna”. PZWL 2005
2. Kwolek A.: Rehabilitacja medyczna. Urban & Partner, 2003
3. Straburzyński G., Starburzyńska–Lupa A., "Fizjoterapia", PZWL, Warszawa 2003
4. Kahn J. "Elektroterapia", PZWL, 2002
5. Łazowski J.: Podstawy fizykoterapii. AWF Wrocław 2002
6. Mika T., Kasprzak W.: Fizykoterapia. PZWL, 2004
7. Straburzyński G., Straburzyńska-Lupa A.: Medycyna Fizykalna. PZWL, Warszawa 2000
8. Nowotny J.: Podstawy fizjoterapii. Część II. AWF Katowice 2000
9. Rehabilitacja medyczna”, red. Milanowska K., Dega W., PZWL, Warszawa 1999
10. "Fizjoterapia" TOM 7, Nr 1 1999
11. Nowotny J. "Podstawy Fizjoterapii", AWF, Katowice 1998
12. Edel H. „Fibel der Elektrdiagnostik und Elektrotherapie.” Verlag Theodor Steinkopf. Dresden 1977
13. Hansjurgens A. "Dynamische Interferenzstromtherapie" Physikalische Medizin und Rehabilitation 1974, 1, 24.
14. Nicolova–Troeva L. "Physiotherapie der chirurgischen Erkrankungen", Munchen 1970

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.	How do you grade therapeutic effectiveness of the device in its treatments compared with similar devices of different producers?

Very low		Low		Average		Good		Very good	

2.	What is the reliability of the device during use?

Very unreliable		Unreliable		Average		Rather reliable		Reliable	

3.	How do you grade easiness of operating this device?

Very difficult		Difficult		Average		Easy		Very easy	

4.	Does the device meet expectations?

Very poorly		Poorly		Average		Highly		Very highly	

5.	Is the information provided in the instructions for use and on the device clear and does it provide the necessary information?

Very poor		Poor		Average		Good		Very good	

6.	If the device has been serviced (repaired) please evaluate the quality of the service:

Very poor		Poor		Average		Good		Very good	

Has not been serviced	

Can the ease of use be improved? If so, how?

Yes		No		I cannot decide	

.....

.....

Can the content of the instructions be improved? If so, what should be changed?

Yes		No		I cannot decide	

.....

.....

Please enter which conditions are most frequently treated:

THERAPY	**DISEASE**
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....

What kind of another therapy would you like to use in your work?

a/.....
b/.....
c/.....

Other notes on the use of the device:

.....
.....
.....

Please name the position of the person filling in this questionnaire:

.....

Please name the kind of place at which the device is used:

Hospital	Outpatients clinic	Physiotherapy practice	Home visits	Sanatorium	Other (please name)

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