PART 1.  READ THIS BEFORE YOU BEGIN TO USE THE DEVICE

1-1  PTC 3200 ELECTROSTIM ELECTROTHERAPY UNIT

The PTC 3200 ELECTROSTIM electrotherapy unit is designed to meet the user's needs. The microcontroller-controlled unit is very versatile and easy to use. The user interface has clear seven segment displays, and the keyboard is based on modern membrane key technology. The unit conforms to IEC 601-1 and IEC 601-2-10 norms (classification BF), which guarantees that, when used correctly, the unit is safe for both the user and the patient.

The PTC 3200 ELECTROSTIM electrotherapy unit is based on a modern microcontroller technology, which makes it both versatile and able to meet the users' needs. There are altogether 80 treatment programs available.

Fig. 1. PTC 3200 ELECTROSTIM electrotherapy unit
Characteristics

-A possibility to interrupt the treatment (with the STOP key), retaining the set treatment parameters.
-The list of programs includes the following modes of treatment: diadynamic currents (MF, DF, CP, LP), TENS current, URS current, galvanic current, rectangular pulse, exponential pulse, acupuncture treatment and IT curve.
-Output with two or four electrodes.
-Digital displays, for indication of the selected treatment program, the remaining treatment time and the treatment current.
-Prevention of excessive current fluctuations; the program always starts at 0 mA current, which gradually increases up to the set value. When the treatment program is completed or interrupted, the current goes down to zero at a constant rate.
-Treatment time can be set at 0 to 99 minutes with an accuracy of one minute. When the treatment is completed, the unit gives an audible signal and decreases the current evenly down to zero.
-Treatment current can be set at 0 to 60 mA. The digital display shows the set value for one second and then begins to show the actual treatment current. The unit regulates the output automatically, until the current reaches the set value.
-It is possible to use the unit for combination therapy with a PTC 2100 ULTRASOUND unit.
-Poor electrode contact sensor

1-2 USES OF PTC 3200 ELECTROSTIM ELECTROTHERAPY UNIT

The PTC 3200 ELECTROSTIM electrotherapy unit can be used for various modes of electrotherapy. The purpose of electrotherapy is generally to relieve pain, improve circulation and promote the healing of injuries. An extensive list of programs is supplied, which includes most of the treatment currents and programs currently in use. The purpose of this manual is to describe, in general terms, the characteristics of the modes of electric current recognized by the unit, their uses and their effects. A single manual is, however, inadequate as an overall description of the entire field of physiotherapy. The user of the unit must therefore be familiar with the effects of electrotherapy and have an appropriate training. The literature on physiotherapy specifies the indications for using the different modes of treatment in an optimal manner. This will also enable the user to benefit maximally from the wide variety of programs.
GALVANIC CURRENT (PROGRAMS 000-001)

Galvanic current is the oldest electric method of pain relief still in use. The other modes of electrotherapy, which are now used less frequently, provide similar or better pain relief with lesser side-effects. The disadvantages include redness and irritation of the skin.

Contraindications:

- dermal diseases in the area being treated
- tumors within the range of the electrical field
- metal objects
- fever
- acute inflammation
- serious arterial constriction
- symptomatic heart disease
- risk of blood clots in the arteries and lungs
- symptomatic brain blood vessel conditions
- pacemaker

DIADYNAMIC CURRENTS (PROGRAMS 002-029)

MF
Indications:
- ligament sprains, MF is good for connective tissue toning
- chronic pain, degeneration and phantom pain

Contraindications:
- normal contraindications for electrotherapy
- conditions that are aggravated by thermal effects
- sensory capacity of the skin must be monitored

DF
Indications:
- problems that require improved circulation, DF has good analgesia (100 Hz), affects sympathetic inhibition
- has a good effect on peripheral circulation and for this reason it is good for therapy that is given in the water
- often used as a pretreatment for CP and LP, but is also good when used alone

Contraindications:
- same as for MF
- not to be used in an acute wound that is still bleeding
**CP**

Indications:
- various injuries, e.g., blunt traumas, muscle ligament traumas, acute and other injuries that have swelling. CP improves resorption and produces good analgesia
- heat may be a problem in acute cases and cold packs can be used along with DIDY in the area being treated, for example

Contraindications:
- same as for MF
- broken skin can be a problem with athletic injuries. A very small area can be "insulated" with a non-conductive cream. The impedance of broken skin is lower and the level of irritation may get too high before a suitable treatment intensity is reached

**LP**

Indications:
- neuralgia, myalgia, arthralgia and other chronic pain conditions, LP has a good analgetic effect and relaxes cross-grained muscles

Contraindications:
- same as for MF and DF

The intensity of the diadynamic currents should be kept just below the pain threshold. Muscles may occasionally contract, which can be permitted, if the contraction takes place at the 50 Hz stage (50 Hz stage for MF current or CP and LP. See Appendix 1 for a description of the different currents). This dosage suits all wave shapes, except in Sudeck's atrophy, where the intensity should be kept low, though still above the sensory threshold. When the intensity of current is increased, the following phenomena take place:

1. The sensory threshold is reached. The patient feels the current as vibration or pricking.

2. If the intensity of the current is increased, the motor nerves are activated and the muscles begin to contract

3. If the current is increased even further, the patient begins to experience slight pain.

In pathologic conditions, the pain threshold may come down to near the sensory threshold, below the motor nerve threshold.

If you use diadynamic currents, you should remember that:

- the polarity of the current should be taken into account. When low-frequency, and hence also diadynamic, currents are used, the negative electrode (the black wire when polarity is positive) stimulates more. The negative electrode also has a greater therapeutic effect.
- relatively large amount of electricity
-the amount of electricity is relatively great.
-the rise of temperature in the tissue to be treated must be taken into account.
-the treatment causes some skin irritation.
-as an after-care, the skin should be treated with an oily cream.

The patient's sensations must be observed during the treatment. The patient initially feels various kinds of pricking or vibration, which are a natural part of the treatment. When the current is increased, there is first a reaction of unpleasant pricking, but the user should continue to increase the current intensity. As soon as the intensity has been increased only slightly, the patient begins to feel a strong, but not unpleasant, sensation of vibration, which indicates that the correct therapeutic level has been reached. If the patient experiences a burning sensation or pain, the dosage is too high.

The patient generally feels the negative electrode more strongly than the positive one. This is due to electrolytic reactions taking place under the electrodes and the threshold difference between the sensory nerves under the electrodes. The electrodes should therefore be positioned with care; if the positive electrode is felt more strongly, it may cause a misinterpretation of the correct intensity of current.

If you want to change the polarity, just press the key for changing polarity on the PTC 3200 ELECTROSTIM electrotherapy unit. When this key is pressed, the unit automatically brings the current down to zero, changes the polarity and brings the current up to the previous level.

TENS CURRENTS, (200-208, 900-905)

Indications:
-acute and chronic pain and post-operative pain conditions
-stimulation of peripheral and coronary circulation
-improvement of physical performance capacity.

Contraindications, in addition to general electrotherapy contraindications:
do not treat a patient that has a pacemaker, as the pulses may effect its operation
-may cause arrhythmia in patients with heart disease if the electrodes are placed too near to the heart
-activation of the nerves in the carotis area may cause cramps in the laryngeal and pharyngeal muscles, resulting in breathing and blood pressure disorders
-not recommended in the vicinity of the head and neck in patients with epilepsy or circulatory disorders in the brain (e.g., TIA attacks or cerebral hemorrhages)
-anesthesized or injured skin
-directly over bone tissue
-care must be taken when treating the legs, lower back or stomach of a patient during pregnancy
**URS CURRENT (209-211)**

Indications:
- degenerative pains (e.g., spinal arthritis)
- excessive muscular tension
- neuralgia
- post-traumatic conditions
- circulatory disorders due to muscular tension and vascular cramps
- radiating pain of skeletal origin, e.g. chronic sciatica

**PROGRAMS 300-317**

The programs consist of galvanic and faradic currents, which are mainly used for electrostimulation of muscles to be strengthened. Using suitable current pulses, a muscle can be made to contract, which serves to strengthen it after a paralysis, for example. This mode is generally used in cases of peripheral nerve injury. In cases of paralysis originating from the central nervous system, this treatment is usually futile.

Contraindications as for general electrotherapy.

**IT CURVE CURRENTS**

This type of current is used for estimating the length and amplitude of an electric pulse needed to activate a muscle.

Contraindications as for general electrotherapy.

**1-3 WHAT SHOULD PTC 3200 ELECTROSTIM NOT BE USED FOR**

The PTC 3200 ELECTROSTIM electrotherapy unit has been designed for administering various physiotherapeutic treatments. The user should be aware of the risks involved in its use and the ways of minimizing these risks.

Below, a summary will be given of the contraindications for electrotherapy, but the user will be responsible for knowing all the contraindications, risks and correct dosage recommendations for different injuries and their treatments.

General contraindications for electrotherapy:

1. Dermal diseases in the area being treated
2. Diminished sensory capacity of the skin
3. Malignant tumors
4. Individual poor tolerance
5. Pace-maker
6. Metal present in the area to be treated
Each therapy mode also has its own contraindications which are described in conjunction with the description of the therapy mode. A faulty unit must not be used to give therapy, but should be repaired immediately.

1-4 SIGNS AND SYMBOLS USED IN THE PTC 3200 ELECTROSTIM MANUAL

DIDY
Diadynamic current. This current mode is rectified, sine-shaped alternating current. Diadynamic currents include the following: MF, DF, CP and LP.

MF
Abbreviation of "Monophase fixe". This current is a single phase of rectified, sine-shaped alternating current. Frequency 50 Hz, pulse length 10 ms. Used for treating sprains, for example.

DF
Diphase fixe". DF consists of whole-wave-rectified sine-shaped alternating current. Frequency 100 Hz, pulse length 10 ms. Used for stimulating circulation and often as pretreatment for CT and LP.

CP
"Courtes periodes". This current is created by altering the current mode between MF and DF at one-second intervals. Used for treating different injuries. Has an additional thermal effect.

LP
"Longues periodes". This current consists of alternating longer sequences of MF and DF: 5 seconds of modified DF and 10 seconds of MF.

TENS
"Transcutaneous Electro Nerve Stimulation". Used for pain relief, stimulation of circulation and improvement of physical performance capacity.

URS
"Ultra-Reizstrom". A current mode developed by Träbert in Germany. Pulsed direct current at a frequency of 143 Hz. Pulse length 2 ms, pulse interval 5 ms. Used for treating degenerative pains, such as rheumatoid spondylitis.

Indication
Injury or reason for giving treatment

Contraindication
Factors that prevent treatment
1-5 SAFETY PRECAUTIONS

The PTC 3200 ELECTROSTIM electrotherapy unit has been designed only for administering electrotherapy. The user must be familiar with the correct procedures, indications and contraindications. The user must also be aware of the risk factors involved in electrotherapy and the ways of minimizing the risks.

PATIENT SAFETY

The highest recommended current density is 2 mA / cm². This means that the effective current per 1 cm² under both electrodes must not exceed 2 mA. Appendix 3 contains a table that gives the maximum peak currents when using the small rubber electrodes that are provided with the PTC 3200 ELECTROSTIM unit. The recommended current cannot be exceeded with the larger rubber electrode. Always check the highest recommended current before beginning treatment!

Electrotherapy is often partly based on the generation of heat in tissues, which helps to improve the condition prevailing in the tissue. If an increase of temperature is known to be detrimental for the treatment of the injury, this must be taken into account.

Notify both the manufacturer and medical expert of possible harmful effects.

Make notes of the treatment of each patient. Write down all the treatment parameters, the unit you used and other factors that may have contributed to the success/failure of the treatment. Observe and evaluate patient reactions throughout the treatment.

Interrupt the treatment if the patient has inappropriate sensations or symptoms.

WARNINGS
1. The long-term effects of electrostimulation are not known in detail.

2. Electrostimulation should not be given during pregnancy.

3. If the patient has cardiac symptoms (e.g., arrhythmias) or epilepsy, the necessary precautions must be taken before his/her treatment.

4. When the neck or mouth region is treated, powerful contractions of the laryngeal and pharyngeal muscles may cause respiratory distress.

5. Electrotherapy must not be given to purulent, swollen or infected areas of skin (unless there are indications for it) or the cerebral region.

6. The unit must be kept away from children.

7. The user of the unit must have a sufficient medical training.

8. The unit must not be used within 1 meter of a functioning short-wave or microwave therapy device.

9. A patient that has electronic devices (e.g., a pacemaker) in his or her system must not be treated without permission from a specialist.

10. The unit's electrodes may cause burns or be damaged if treatment is given while the patient is connected to a high-frequency surgical device.

Adequate precautions must be taken whenever:
- the patient has a predisposition to bleeding after an acute trauma or fracture.
- a bleeding uterus is treated.
- the patient suffers from impaired sensory capacity of the skin.

Galvanic current causes chemical reactions to occur beneath the electrodes. Acids are formed under the positive electrode, or anode, and bases are formed under the negative electrode, or cathode. This may cause burns that are discernible as blisters and dermal necrosis. This should be taken into consideration when giving treatment with direct currents. The table at the end of this manual gives the direct current component of each treatment mode as a percentage of the peak current.

The output indicator lamps will light when the electrodes are connected to the electrical circuit. Removing the electrodes from the patient's skin at this stage may be painful to the patient. Likewise, fastening the electrodes to the patient's skin at this stage may give an electrical shock (this may happen even though the current meter indicates 0 mA)! Output lamps will blink to indicate that electrodes are disconnected from the circuit. At this stage, it is safe to connect/disconnect the electrodes.
ADVERSE EFFECTS

1. Skin irritation may occur under the electrodes, especially when galvanic or diadynamic current is used. The irritation is probably due to chemical changes taking place under the electrodes. It can be minimized by changing the polarity of the treatment from time to time.
2. Electrotherapy applied directly over a bone may cause pain.
3. Postoperative muscle contractions in the wound region may slow down the healing process.
PART 2. PTC 3200 ELECTROSTIM ELECTROTHERAPY UNIT, SPECIFICATIONS

2-1 TECHNICAL SPECIFICATIONS FOR THE ELECTROTHERAPY UNIT

GENERAL

PTC 3200 ELECTROSTIM is an easy-to-use and reliable electrotherapy unit. Its technical and visual solutions have been made on the basis of end user feedback. The user interface has been realized using membrane key technology and LED displays. The construction provides the user with a hygienic and pleasant interface for using the unit.

The output of the unit supplies electric current. During the treatment, the electric power is transmitted to the muscle being treated. The frequency of the treatment current ranges within 0-200 Hz, which makes for a skin impedance of 500-1000 ohms.

The highest peak power 60 mA is reached when the impedance between the electrodes is 0-500 ohms. As the impedance goes higher, the peak power decreases. The other parameters of the current modes (waveforms, pulse durations and pulse frequencies) remain as adjusted regardless of the load impedance.

The unit supplies treatment currents of the following kinds:
- diadynamic currents
- preprogrammed diadynamic treatment regimes
- TENS treatment
- URS treatment
- rectangular pulse
- exponential pulse
- acupuncture treatment
- IT curve current

The PTC 3200 ELECTROSTIM electrotherapy unit can be used together with the PTC 2100 ULTRASOUND unit to give combination therapy. When combination therapy is given, the ultrasound applicator of the ultrasound unit functions as one of the electrodes of the electrotherapy unit. As soon as the cable for combination therapy has been connected, the ultrasound applicator of the ultrasound unit becomes connected to the negative electrode of the electrotherapy unit.

The PTC 3200 ELECTROSTIM electrotherapy unit conforms to IEC 601-1 and IEC 601-2-10 standards and is a BF type unit.
The PTC 3200 ELECTROSTIM electrotherapy unit is manufactured by:

Innokas Medical Oy
Kasarmintie 8
FIN-90100 OULU
FINLAND

SPECIFICATIONS

Power input:
230 V ± 10 %, 50 Hz or 115 V ± 10 %, 60 Hz

Power consumption:
Max. 30 W

Current consumption:
Max. 130 mA / 230 V, max 260 mA / 115 V

Power fuses:
2 x T315 mA / 230 V, 2 x T630 mA / 115 V

Output fuses:
2 x F100 mA

Output current:
Adjustable from 0 to 60 mA

Polarity:
Adjustable, with automatic adjustment in some programs

Treatment time:
Adjustable from 0 to 99 minutes at one-minute intervals, with automatic adjustment in some programs
Treatment time display:
Indicates remaining treatment time with an accuracy of one second

Program list:
Altogether 80 programs, see appendix 1.

Current mode display:
Digital

Electrical safety:
The PTC 3200 ELECTROSTIM is manufactured according to IEC 601-1 and IEC 601-2-10 standards.

EMC compatibility:
The unit fulfils the EMC directive requirements set worth by the European Union.

Dimensions:
Height 85 mm
Width 330 mm
Depth 330 mm

Weight:
5 kg

2-2 PACKAGE AND TRANSPORTATION

The package consists of a cardboard box and cardboard packing material. The package is suitable for transportation in a temperature range of -40°C...+60°C. The packing material will keep the contents intact during normal transportation and handling.

CONTENTS OF THE PACKAGE UPON DELIVERY.

The standard contents of the package include:

- electrotherapy unit PTC 3200 ELECTROSTIM
- power cord
- rubber electrodes 40 mm x 60 mm (2) and electrode protectors (2)
- rubber electrodes 60 mm x 80 mm (2) and electrode protectors (2)
- wrap strap 5 x 60 cm
- wrap strap 5 x 90 cm
- treatment cable (2)
- spare fuses (4)
-operating instructions

The cable for combination therapy is available as an option.

2-3 KEEP THE PACKAGING MATERIAL

Keep the packaging material for possible later transportation of the unit. When you send the unit for regular servicing, use the original package to transport it.
PART 3.  OPERATION OF THE PTC 3200 ELECTROSTIM ELECTROTHERAPY UNIT

3-1  PREPARING THE UNIT FOR OPERATION

The unit is normally ready for operation as soon as it has been taken out of the package. You only need to connect the power cord and start learning how to operate the unit. Remember to read the operating instructions carefully before beginning to use the unit.

3-2  USER INTERFACE SIGNALS

FRONT PANEL

Fig. 2. Front panel

(1) = Indicator lamp POWER ON
(2) = Program number display
(3) = Treatment time display
(4) = Output current intensity display
(5) = Output current mode display
(6) = Connector key for output channel 2
(7) = Treatment program selector key, up
(8) = Treatment program selector key, down
(9) = Set treatment time key, increase
(10) = Set treatment time key, decrease
(11) = Start treatment key
(12) = Interrupt and terminate treatment key
(13) = Select polarity of treatment key
(14) = Adjust treatment current intensity key, increase
(15) = Adjust treatment current intensity key, decrease
(16) = Indicator lamp for output channel 1
(17) = Indicator lamp for output channel 2
CONNECTION PANEL

Fig. 3. Connector panel

(18) = Connector for output channel 1

(19) = Connector for output channel 2

(20) = This symbol conforms to standard IEC 601-1 and indicates that this is a BF-class device.

(21) = This symbol conforms to standard IEC 601-1 and indicates that the operating instructions for the unit must be read carefully before operation. If operated incorrectly, PTC 3200 ELECTROSTIM may cause physiological injuries to the patient.

WARNING: THE UNIT MUST ONLY BE PLUGGED INTO A GROUNDED POWER OUTLET.
BACK PANEL

Fig. 4. Back panel

(22) = Power switch
(23) = Power cord connector
(24) = Power fuse holders
(25) = This symbol means that the unit has been classified as type BF.

WARNING: THE UNIT MUST ONLY BE PLUGGED INTO A GROUNDED POWER OUTLET.

(26) = This symbol means that the unit fulfils the medical equipment requirements inside the European market area. The sign number means that the unit has been EC type tested by the VTT Automation Medical Device Technology in Finland.
DISPLAYS AND CONTROLS

(1) = Indicator lamp POWER ON

A green indicator lamp is illuminated when the main power switch 22 has been turned on and the power has been switched on in the unit.

(2) = Program number display

The display shows the number of the selected program. The list of programs at the end of the manual specifies the operation of each numbered program. The program is selected using keys 7 and 8.

(3) = Treatment time display

The display shows the remaining treatment time. The time is set using keys 9 and 10. The time is counted down at one-second intervals while electrotherapy is going on (after the START key has been pressed). The treatment stops when the time is reset to zero.

(4) = Output current intensity display (mA)

When the output current is changed, the display shows the set value for a second. After that the display shows the actual output current, which is adjusted by the unit to the set value at a suitable rate. The leftmost segment of the display shows the polarity of the current. ∪ = negative polarity, ∩ = positive polarity.

(5) = Output current mode display

The display shows the present current mode with two symbols. The explanations of the symbols are shown under the display. See also appendix 1, figures of current modes.

(6) = Connector key for output channel 2

When the key is pressed down, the output channel 2 is switched on. The function is only permitted when the treatment program is not on.
(7) = Treatment program selector key, up
(8) = Treatment program selector key, down

The keys are used to select a suitable treatment program. See the list of programs at the end of the manual.

(9) = Set treatment time key, increase
(10) = Set treatment time key, decrease

The keys are used to set a suitable treatment time in the programs where the time has not be pre-set.

(11) = Start treatment key

The key is used to start treatment.

(12) = Interrupt and terminate treatment key

When the key is pressed once, the treatment is interrupted and the treatment current slowly decreases down to zero. The treatment parameters are retained in the memory, and the treatment can be resumed, if necessary, by pressing key 11. The flashing current intensity display shows the set treatment current. The treatment can be terminated by pressing the key twice more, which resets the program.

(13) = Select polarity of treatment key

The key changes the output polarity.

(14) = Adjust treatment current intensity key, increase
(15) = Adjust treatment current intensity key, decrease

The keys are used to adjust the intensity of treatment current. The set value is shown on the current display for a second. See item 4.

(16) = Indicator lamp for output channel 1

The indicator lamp shows that channel 1 is being used. When lit continuously, output circuit is connected to the electrodes. When blinking, the electrodes are disconnected from the circuit.
(17) = Indicator lamp for channel 2

When this indicator lamp is on, channel 2 is being used. Channel 2 is switched on/off with key 6. Indicator lamp blinks when channel 2 is ready for use (but not yet connected to the output). Lamp is blank when channel 2 is not in use.

3-3 SETTINGS BEFORE A TREATMENT SESSION

1. Plug in the power cord to the mains connector. Use a grounded power outlet!

2. Switch on the power using the main power switch.

3. Choose the electrodes as recommended (see the current density recommendations in appendix 3) and connect them to the output connector 1. If you use two channels, connect the other electrodes to the output connector 2 and switch the channel on with key 6. Make sure that indicator lamp 17 is illuminated.

3-4 TREATMENT SESSION

4. Moisten the electrode protectors in warm water and attach the electrodes with their protectors at both sides of the area to be treated.

5. Select the treatment program with keys 7 and 8.

6. If the treatment time has not been pre-set, set the time with keys 9 and 10.


8. Press the START key. The treatment program starts, the timer begins to count down, and the output is switched on.

9. To adjust the output current intensity, use keys 14 and 15. The adjusted value is shown for a second after the change. As soon as an adjustment has been made, the unit slowly brings the output current to the set value.

10. To change the treatment current polarity, press key 13, whereupon current intensity gradually comes down to zero, polarity changes and current intensity increases up to its original value.

11. You can interrupt the treatment by pressing the STOP key, whereupon the output current intensity slowly comes down to zero. The current display begins to flash, indicating a pause condition. The treatment parameters are retained in the memory, and the treatment can be continued, if necessary. To continue treatment, press the START key, whereupon current intensity begins to
increase up to the previously adjusted value and the timer begins to count down. The treatment can also be terminated by pressing the STOP key twice.

12. When the treatment time countdown reaches zero, the unit gives a audible signal and brings the current down to zero. Note: Do not detach the electrodes before the current display shows 0 mA!

13. Detach the electrodes, clean and disinfect both the electrodes and the electrode protectors.

3-5 COMBINATION THERAPY

The PTC 3200 ELECTROSTIM electrotherapy unit can be used together with the PTC 2100 ULTRASOUND unit to give combination therapy. To do this, use the combination therapy cable to connect the electrotherapy unit to the ultrasound unit, whereupon the ultrasound electrode acts as a negative electrode of the electrotherapy unit.

Combination therapy is described in more detail in the manual for the ultrasound unit.

3-6 MAINTENANCE AND CLEANING

The unit must be serviced at least once a year. The electrodes must be cleaned after each treatment session, using a paper towel and 70 % alcohol. Clean the surface of the unit with a weak soap liquid or alcohol and wet cloth as necessary.

The unit must be handled with care; the rear part (the cooling plates !) should not be placed too near to a wall. Nor should the unit be used in direct sunlight or near a radiator.

The condition of the electrodes and the functioning of the connections must be checked often enough.
PART 4. TECHNICAL SUPPORT

4-1 SERVICING AND REGULAR MAINTENANCE

The PTC 3200 ELECTROSTIM electrotherapy unit has been inspected to conform to standards IEC 601-1 and IEC 601-2-10. To guarantee safe operation, the user should observe the following servicing instructions:

Following items must be checked once a month:

- rubber electrodes deteriorates when used. If electrodes has brustled, they must be changed. The conductivity of the electrodes is checked by connecting them against each other (ch1 electrodes together and ch2 electrodes together) and confirming that the current flows through the electrodes up to 99 mA.

- electrode wires must be checked. It can be done by twitching the wire. If the wire is not well connected (both in the connector and electrode end), it must be replaced. When testing this, the apparatus must NOT be connected to a patient!

The unit must be taken to an authorized service shop for regular servicing and checking of the outputs once a year.

4-2 GUARANTEE

The manufacturer guarantees the product for two years. The guarantee and product liability are only valid if the unit has been used in accordance with the operating instructions.

4-3 STORAGE

The unit is to be stored in a dry place. The storage temperature must be from -50°C to +60°C. If the storage temperature deviates more than 10°C from normal operating temperature +18°C...+30°C, the unit must be allowed to stand at least one hour at operating temperature before it is used. The storage place must prevent the unit from being exposed to physical shock and vibration.
APPENDIX 1. FIGURES OF CURRENT MODES

GALVANIC

Current mode means DC-current. The output of channel is continuous current seen in current display.

DF-current

MF-current

CP-current
LP-current

![LP-current waveforms](image)

Rectangular

![Rectangular waveforms](image)

Exponential pulse

![Exponential pulse waveforms](image)

Wave current modes

![Wave current modes waveforms](image)
APPENDIX 2. PROGRAMLIST

000  Galvanic current
001  Surging galvanic current, 5 s on, 5 s off. Starts within 30 s.
002  DF current
003  MF current
004  CP current
005  LP current
006  2 min DF + 5 min CP + alarm
007  2 min DF + 5 min LP + alarm
008  2 min DF + 2 min -DF + 3 min CP + 3 min -CP + alarm
009  2 min DF + 2 min -DF + 3 min LP + 3 min -LP + alarm
010  1 min DF + 1 min -DF + 1 min DF + 1 min -DF + 1 min DF + 1 min -DF + 1 min DF + 1 min -DF + 1 min DF + 1 min -DF + alarm
011  1 min CP + 1 min -CP + 1 min CP + 1 min -CP + 1 min CP + 1 min -CP + 1 min CP + 1 min -CP + alarm
012  1 min LP + 1 min -LP + 1 min LP + 1 min -LP + 1 min LP + 1 min -LP + 1 min LP + 1 min -LP + 1 min LP + 1 min -LP + alarm
013  2 min DF + 2 min -DF + 4 min CP + 4 min -CP + alarm
014  2 min DF + 2 min -DF + 5 min LP + alarm
015  3 min DF + 4 min LP + 5 min CP + alarm
016  5 min DF + 5 min -DF + alarm
017  3 min DF + 3 min -DF + 3 min DF + 3 min -DF + alarm
018  2 min DF + 2 min -DF + 2 min DF + 2 min -DF + 2 min DF + 2 min -DF + 2 min DF + 2 min -DF + alarm
019  5 min CP + 5 min -CP + alarm
020  1 min CP + 1 min -CP + 3 min LP + 3 min -LP + 1 min CP + 1 min -CP + alarm
021  2 min CP + 2 min -CP + 2 min LP + 2 min -LP + alarm
022  1 min CP + 1 min -CP + 1 min LP + 1 min -LP + 1 min CP + 1 min -CP + alarm
023  1 min CP + 1 min -CP + 1 min LP + 1 min -LP + 1 min CP + 1 min -CP + 1 min LP + 1 min -LP + alarm
024  3 min CP + 3 min -CP + 3 min CP + 3 min -CP + alarm
025  5 min LP + 5 min -LP + alarm
026  1 min LP + 1 min -LP + 3 min CP + 3 min -CP + 1 min LP + 1 min -LP + alarm
027  2 min LP + 2 min -LP + 2 min CP + 2 min -CP + alarm
028  1 min LP + 1 min -LP + 1 min CP + 1 min -CP + 1 min LP + 1 min -LP + alarm
029  3 min LP + 3 min -LP + 3 min LP + 3 min -LP + alarm
200  TENS current, rectangular pulse, pulse length 0.5 ms, frequency 8 Hz
201  TENS current, rectangular pulse, pulse length 0.5 ms, frequency 50 Hz
202  TENS current, rectangular pulse, pulse length 0.5 ms, frequency 100 Hz
203  TENS current with surging, rectangular pulse, pulse length 0.5 ms, frequency 8 Hz. Pulses for 2 s, 1-second pause, starts after 30 s
204  TENS current with surging rectangular pulse, pulse length 0.5 ms, frequency 50 Hz, pulses 2 s, 1-second pause, starts after 30 s
205  TENS current with surging, rectangular pulse, pulse length 0.5 ms, frequency 100 Hz. Pulses 2 s, 1-second pause, starts after 30 s
206  15-min TENS current, rectangular pulse, pulse length 0.5 ms, frequency 8 Hz
207  15-min TENS current, rectangular pulse, pulse length 0.5 ms, frequency 50 Hz
208  15-min TENS current, rectangular pulse, pulse length 0.5 ms, frequency 100 Hz
209  URS current, rectangular pulse, pulse length 2 ms, pulse interval 5 ms
210  8-min URS current, rectangular pulse, pulse length 2 ms, interval 5 ms
211  16-min URS current, rectangular pulse, pulse length 2 ms, interval 5 ms
300  Faradic current, rectangular pulse, pulse length 1 ms, frequency 100 Hz
301  Surging faradic current, rectangular pulse, pulse length 1 ms, frequency 100 Hz. 7 pulses with a 10-second pause.
302  Rectangular pulse, pulse length 1 ms, pulse interval 20 ms
303  Rectangular pulse, pulse length 10 ms, pulse interval 50 ms
304  Rectangular pulse, pulse length 30 ms, pulse interval 100 ms
305  Rectangular pulse, pulse length 50 ms, pulse interval 150 ms
306  Rectangular pulse, pulse length 100 ms, pulse interval 500 ms
307  Rectangular pulse, pulse length 200 ms, pulse interval 1 s
308  Rectangular pulse, pulse length 400 ms, pulse interval 2 s
309  Rectangular pulse, pulse length 1 s, pulse interval 2 s
310  Exponential pulse, pulse length 1 ms, pulse interval 20 ms
311  Exponential pulse, pulse length 10 ms, pulse interval 50 ms
312  Exponential pulse, pulse length 30 ms, pulse interval 100 ms
313  Exponential pulse, pulse length 50 ms, pulse interval 150 ms
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APPENDIX 3. INTENSITY RECOMMENDATIONS

The current meter in the unit displays the peak output current in milliamperes. The unit gives maximum 60 mA peak current, but it is recommended that intensity does not exceed 2 mA / cm². The table below show peak currents when output has the largest recommended intensity. The table shows also the DC-component proportions of the peak current. If the wave form consists of several different current modes, the table shows values of the largest current mode.

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