TensMed S84

PASSION FOR MOTION

ENRAF NONIUS

Partner for Life

TensMed S84

Operating Manual

CE 0197

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Contents

1 FOREWORD

1.1 This Manual

This manual has been written for the owners and operators of the TensMed S84. It contains general instructions on operation, precautionary practices, maintenance and parts information. In order to maximize the use, efficiency and lifespan of your unit, please read this manual thoroughly and become familiar with the controls as well as the accessories before operating the unit.

Specifications put forth in this manual were in effect at the time of publication. However, owing to Enraf-Nonius BV's policy of continual improvement, changes to these specifications may be made at any time without obligation on the part of Enraf-Nonius BV.

The TensMed S84 is a four channel nerve stimulator intended for both muscle rehabilitation (NMES) and pain relief (TENS). The stimulator features 107 preset programs and 15 custom programs. The channels are simultaneous, which means that a selected program applies for all channels.

2 PRODUCT LIABILITY

A law on Product Liability has become effective in many countries. This Product Liability law implies, amongst other things, that once a period of 10 years has elapsed after a product has been brought into circulation, the manufacturer can no longer be held responsible for possible shortcomings of the product.

To the maximum extent permitted by applicable law, in no event will Enraf-Nonius or its suppliers or resellers be liable for any indirect, special, incidental or consequential damages arising from the use of or inability to use the product, including, without limitation, damages for loss of goodwill, work and productivity, computer failure or malfunction, or any and all other commercial damages or losses, even if advised of the possibility thereof, and regardless of the legal or equitable theory (contract, tort or otherwise) upon which the claim is based. In any case, Enraf-Nonius's entire liability under any provision of this agreement shall not exceed in the aggregate the sum of the fees paid for this product and fees for support of the product received by Enraf-Nonius under a separate support agreement (if any), with the exception of death or personal injury caused by the negligence of Enraf-Nonius to the extent applicable law prohibits the limitation of damages in such cases.

Enraf-Nonius cannot be held liable for any consequence resulting from incorrect information provided by its personnel, or errors incorporated in this manual and / or other accompanying documentation (including commercial documentation)

The opposing party (product's user or its representative) shall disclaim Enraf-Nonius from all claims arising from third parties, whatever nature or whatever relationship to the opposing party.

3 INSTALLATION

- Install the battery in the battery compartment
- Connect the charger on connector [12] see paragraph 5.1
- Charge the battery during 4 hours before the first use.

WARNING!

- Use only rechargeable battery units supplied by Enraf-Nonius.
- Do not recharge the battery with a charger other than that supplied by Enraf-Nonius.
- Unplug the charger immediately if your TensMed S84 emits a continuous beeping sound or if you notice any abnormal heat, smells, or smoke from either the charger or the stimulator.
- Keep the stimulator, battery compartment and charger free of foreign matter (soil, water, metal, etc.)
- Do not use the TensMed S84 if any of the elements are damaged (case, cables, etc.) or if the battery compartment is open. There is a risk of electric shock.
- Do not use the TensMed S84 in water or humid environment (sauna, hydrotherapy pools, etc.)
- Do not use the TensMed S84 in oxygen-rich environments.
- Sudden temperature changes can cause condensation to build up inside the stimulator. To prevent this, allow it to reach ambient temperature before use.
- Do not use the TensMed at altitudes of higher 3'000 meters.

4 PRECAUTIONARY MEASURES

- Inspect the equipment prior to use.
- Use the stimulator only as stated in the operating instructions.
- Only Enraf-Nonius accessories should be used with the stimulator
- Never use the Tensmed S84 on patients who have sensitivity problems or are unable to let you know if they feel any discomfort, however slight

WARNING!

- People with implanted electronic equipment, such as pacemakers and intracardiac defibrillators, must not be treated with the TensMed S84.
- Pregnant women should not be treated with the TensMed S84 during the first trimester (12 weeks).
- Due to the location of the carotid arteries and the carotid bodies, do not stimulate the front or sides of the neck, since a drop in blood pressure can occur.
- Stimulation should not take place while the user is connected to high-frequency surgical equipment. It may cause burn injuries on the skin under the electrodes, as well as problems with the stimulator.
- Do not use the stimulator in the vicinity of shortwave or microwave therapy equipment, since this may affect the output power of the stimulator.
- Keep the stimulator out of reach of children.
- Never connect the stimulation cables to an external power source due to risk of electrical shock.

CAUTION

- Stimulate with precaution while treating angina pectoris and the thoracic region on patients with cardiac arrhythmia.
- The electrodes are only to be placed on healthy skin. Avoid skin irritation by ensuring that good contact is achieved between electrodes and skin.

- Do not place electrodes directly over the uterus or connect pairs of electrodes across the abdomen if you are pregnant. The reason is that, theoretically, the current could affect the foetus's heart (although there are no reports of it being harmful).
- If skin irritation should occur, treatment should be temporarily discontinued. If problems continue, contact your health care provider. Hypersensitivity to tape and gel can occur in isolated cases. The problem usually disappears when the tape or gel is changed to another type.
- Do not use electrodes with a surface < 16 cm2, as there will be a risk of suffering a burn injury. Caution should always be exercised with current densities > 2 mA/cm2.
- Observe caution when using electrotherapy at the same time as the patient is connected to monitoring equipment with body worn electrodes. The stimulation might interfere with the signals to the monitoring equipment.
- Never open the battery cover during stimulation in order to avoid electrical shock.
- Turn off the stimulation before removing the electrodes from the skin. If an electrode comes off, turn off the stimulation before picking it up. Getting electrical stimulation through the fingers is unpleasant but not harmful.
- Observe caution when stimulating in the immediate vicinity of cellular phones that are switched on, since this may affect the output power of the stimulator.
- Observe caution if you use the stimulator while driving. Unintentional stimulation changes might extract focus from the driving and create a hazardous situation.

5 INTENDED USE

1.2 5.1 TENS for Pain Management

TENS (Transcutaneous Electrical Nerve Stimulation) gives good results in acute and chronic pain conditions of many kinds. It is clinically proven and used daily by physiotherapists, other caregivers and top athletes around the world.

High-frequency TENS activates the pain-inhibiting mechanisms of the nervous system. Electrical impulses from electrodes, placed on the skin over or near the painful area, stimulate the nerves to block the pain signals to the brain, and the pain is not perceived. Low-frequency TENS stimulates the release of endorphins, the body's natural painkillers.

TENS is a safe treatment method and has, in contrast to drugs and other pain relief methods, no side effects. It may be sufficient as the only treatment form, but it is also a valuable complement to other pharmacological and/or physical treatments. TENS does not always treat the cause of pain. Consult your doctor if pain persists.

5.1.1 Indication/ Contraindications

Indications:

- Symptomatic relief of chronic, intractable pain. Management of pain associated with post-traumatic or postoperative conditions.

Contraindications:

- This device should not be used for symptomatic pain relief unless etiology is established or unless a pain syndrome has been diagnosed.
- This device should not be used on patients with demand-type cardiac pacemakers.

- This device should not be used over cancerous lesions.
- Electrode placements that apply current to the carotid sinus region (anterior neck) must be avoided.
- Electrode placements that apply current transcereberally (trough the head) must be avoided.
- Electrode placements that apply current transthoracically (the introduction of electrical current into the heart may cause cardiac arrhythmias) must be avoided.

Warnings:

- Benefits of TENS currents have not been established for pain of central origin.
- This device is to be used as a symptomatic treatment for pain and has no curative value. Patients should be cautioned and their activities regulated if pain that would otherwise serve as a protective mechanism is suppressed.
- The long-term effects of chronic electrical stimulation are unknown.
- Pregnant women should not be treated with the TensMed S84 during the first trimester (12 weeks).
- Stimulation should not be applied over swollen, infected, or inflamed areas of skin eruptions e.g., phlebitis, thrombophlebitis, varicose veins, etc.
- See also chapter 3, Precautionary Instructions, for general Warnings and Precautions.

Precautions:

- Isolated cases of skin rash may occur at the site of electrode placement following long-term applications. The irritation may be reduced by use of an alternate conductive medium or an alternative electrode placement.
- Effectiveness of this treatment is dependent upon patient selection.

Adverse Effects:

- In general TENS currents do not cause skin irritation and burns beneath the electrodes due to the characteristics of these currents.

5.2 NMES

NMES (Neuro Muscular Electrical Stimulation) is used successfully both in medical rehabilitation and in athletic training as a complement to on all levels.

The goal of electrical muscle stimulation is to achieve contractions or vibrations in the muscles. Normal muscular activity is controlled by the central and peripheral nervous systems, which transmit electrical signals to the muscles. NMES works similarly but uses an external source (the stimulator) with electrodes attached to the skin for transmitting electrical impulses into the body. The impulses stimulate the nerves to send signals to a specifically targeted muscle, which reacts by contracting, just as it does with normal muscular activity.

Electrical muscle stimulation is suitable for all the muscles in the body. It can be used to strengthen muscles weakened by surgery, a fracture, etc., and improve mobility. It is also an excellent tool for stroke rehabilitation, helping patients in handgrip and gait training.
Electrical muscle stimulation for rehabilitation purposes should be tried out individually by a physiotherapist or other caregiver for the best results.

5.3.1 Indication/Contraindications for NMES

Indications:

- Relaxation of muscle spasms.
- Prevention or retardation of disuse atrophy.
- Increasing local blood circulation.
- Muscle re-education.
- Immediate post-surgical stimulation of calf muscles to prevent venous thrombosis.
- Maintaining or increasing range of motion.

Contraindications:

- This device should not be used on patients with demand-type cardiac pacemakers.
- This device should not be used over cancerous lesions.
- Electrode placements that apply current to the carotid sinus region (anterior neck) must be avoided.
- Electrode placements that apply current transcereberally (through the head) must be avoided.
- Electrode placements that apply current transthoracically (the introduction of electrical current into the heart may cause cardiac arrhythmias) must be avoided.

Warnings:

- The long-term effects of chronic electrical stimulation are unknown.
- Safety has not been established for the use of therapeutic electrical stimulation during pregnancy.
- Stimulation should not be applied over swollen, infected, or inflamed areas of skin eruptions e.g., phlebitis, thrombophlebitis, varicose veins, etc.
- See also chapter 3, Precautionary Instructions, for general Warnings and Precautions.

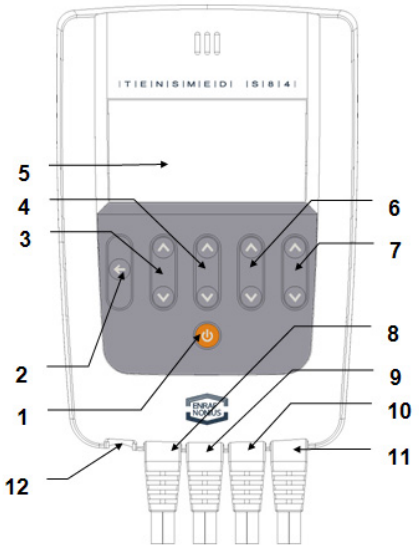
Precautions:

- Adequate precautions should be taken when treating individuals with suspected or diagnosed heart problems, or epilepsy.
- Caution should be used when there is a tendency to hemorrhage following acute trauma or fracture.
- Caution should be used following recent surgical procedures when muscle contraction may disrupt the healing process.
- Caution should be used over the menstruating uterus.
- Caution should be used over areas of the skin which lack normal sensation.
- Some patients may experience skin irritation or hypersensitivity due to electrical stimulation or electrical conductive medium. The irritation can usually be reduced by using an alternative conductive medium, or alternate electrode placement.

Adverse Effects:

- In general TENS currents do not cause skin irritation and burns beneath the electrodes due to the characteristics of these currents.

6.1 Overview Control Buttons



1. ON/OFF
Turns the stimulator on and off. Can be used for terminating the stimulation at all times.
2. RETURN BUTTON
To return to the previous menu
3. INCREASE/DECREASE
Increases and decrease the amplitude in channel 1 (intensity of stimulation).
Press and hold the button to increase or decrease the amplitude continuously.
Note! Always increase the amplitude cautiously.
4. INCREASE/DECREASE
Increases and decrease the amplitude in channel 2 (intensity of stimulation).
Press and hold the button to increase or decrease the amplitude continuously.
Note! Always increase the amplitude cautiously.
5. LCD Display
On this display menu you have the overview over all programs, parameters and settings
6. INCREASE/DECREASE
Increases and decrease the amplitude in channel 3 (intensity of stimulation).
Press and hold the button to increase or decrease the amplitude continuously.
Note! Always increase the amplitude cautiously.
7. INCREASE/DECREASE
Increases and decrease the amplitude in channel 4 (intensity of stimulation).
Press and hold the button to increase or decrease the amplitude continuously.
Note! Always increase the amplitude cautiously.

8. CONNECTOR PATIENT CABLE 1
9. CONNECTOR PATIENT CABLE 2
10. CONNECTOR PATIENT CABLE 3
11. CONNECTOR PATIENT CABLE 4
12. Connection for the charger

Disconnect all patient cables and connect here the battery charger. The charging time is about 2 hours.

Note! When the battery charger is connected the unit can not be operated.

Warning:

- Use only the rechargeable battery pack supplied by Enraf-Nonius.
- Never recharge the TensMed S84 without first disconnecting all stimulation cables.
- Do not recharge the battery with a charger other than that supplied by Enraf-Nonius.

6.2 Display Symbols

BROKEN CIRCUIT Broken circuit. The reason for a broken circuit may be too high resistance or cable breakage. See chapter TROUBLESHOOTING.	
BATTERY STATUS The charge state of the battery is indicated by a small battery icon on the screen. If the battery icon contains just two lines, this means that power is running low. Stop the session and recharge the unit. If the START symbol normally displayed above the channel 4 +/– button is not visible and the battery icon is flashing, this means that the battery is completely discharged. The stimulator can no longer be used. Recharge immediately. ⚠ Do not recharge the device in a confined environment	
TIME Remaining program time in minutes and seconds	
HIGH / LOW FREQUENCY High/low frequency indication for mixed frequency programs.	
PROGRAM STEPS This marker informs you about the active sequence during a program and during programming. There are 3 sequences available	
RAMP-UP	
HOLD TIME	
RAMP-DOWN	

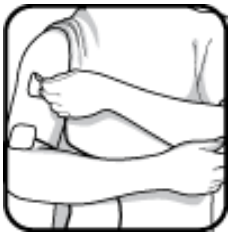
6.3 Step-by-Step-Use

The TensMed S84 can be used for TENS and NMES treatment. Use only those treatment programs that your health care provider has determined are the most effective for your needs. The stimulator has four simultaneous channels, which means that four channels stimulate with the same program.

Attach the electrodes

See instruction of the self-adhesive electrodes

Connect the electrodes to the cables



Attach the electrodes to the body

Connect the patient cables to the unit

Warning!

- Use only stimulation cables supplied by Enraf-Nonius.
- Do not place electrodes in water.
- Do not apply solvent of any kind to the electrodes.
- For hygiene reasons, each patient must have his own set of electrodes. Never use the same electrodes on different patients.

1. Change language

Press the ON/OFF [1] continuously during 5 seconds. The different languages appear in the screen

Press the button ▲▼ to select the desired language

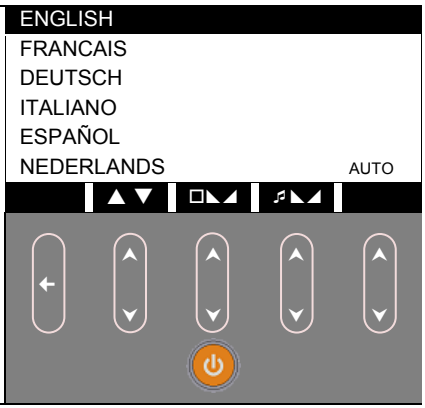
Push the ON/OFF [1] again to confirm

Note!

In this screen you can also change:

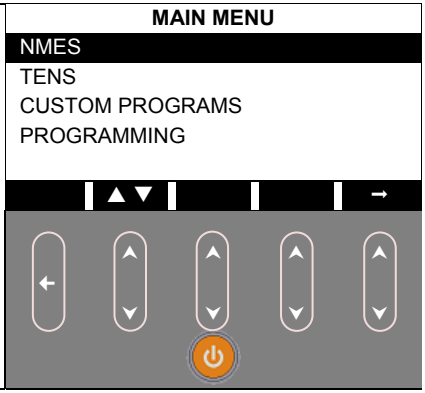
- the contrast under □◣◢
- volume of the beep ♬◣◢
- backlight, ON, OFF, AUTO(matic)

.



1. Switch the stimulator ON

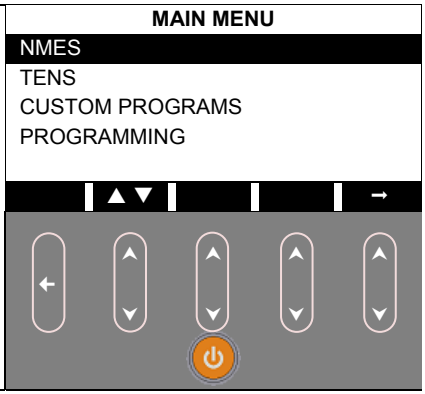
Press the ON/OFF [1]. This button can be used for terminating the stimulation at all times.



2.Select a function in the MAIN MENU

Press the button ▲▼ to select a function.

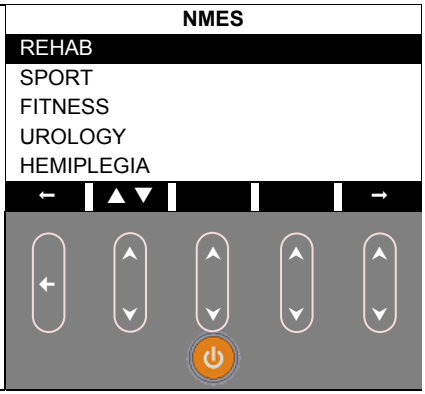
Push confirmation button ➞ to select.



3.Select application field

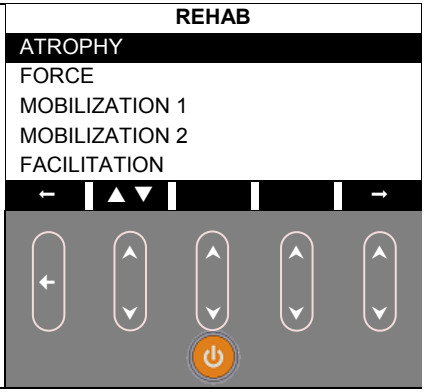
Press the button ▲▼ to select an application field

Push confirmation button ➞ to select.



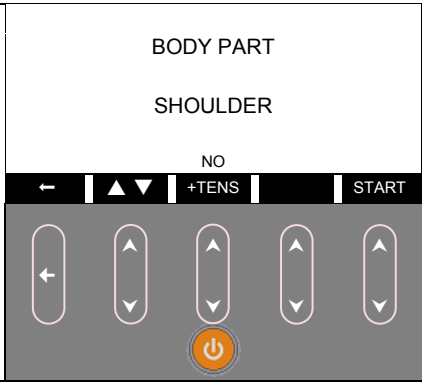
4.Select Indication

Press the button ▲▼ to select an indication
Push confirmation button ➞ to select.



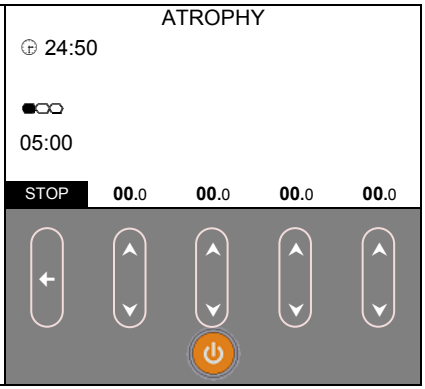
5.Select BODY PART

Press the button ▲▼ to select a Body Part
Push START button.

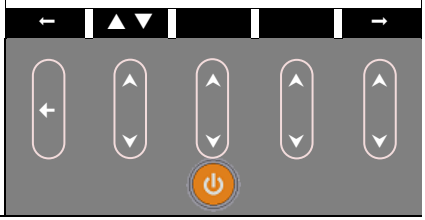
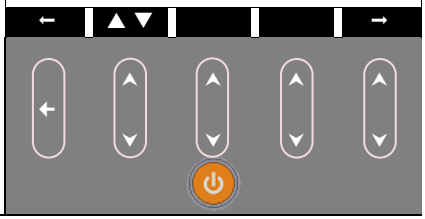
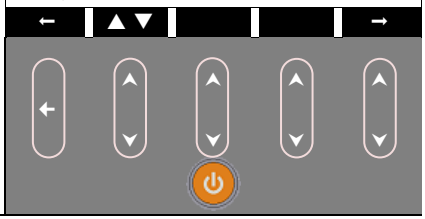


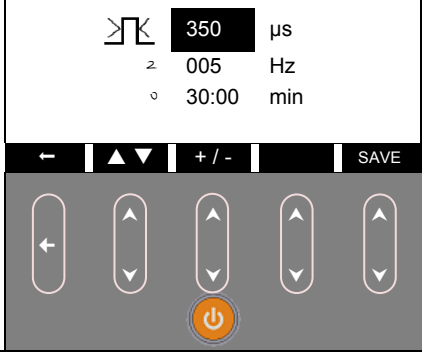
6.Start the therapy

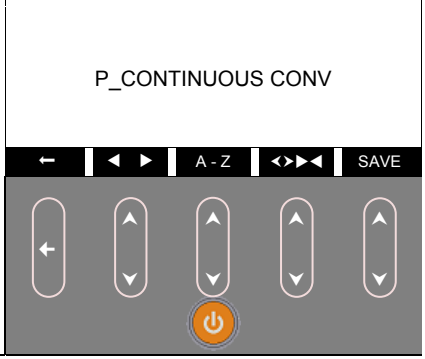
Press the button ▲▼ to adjust in channel 1 and all other channels if desired.
Push the STOP to interrupt the treatment
Push the return button ← to return to the previous menu.



6.4 Single programming

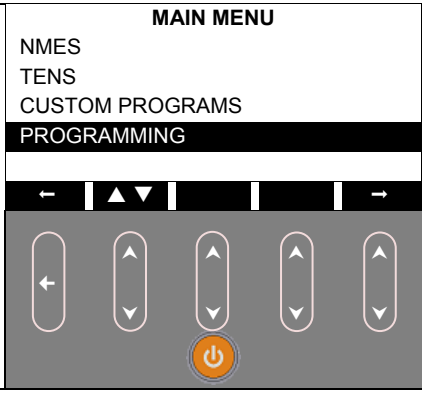
Step 1 Press the button ▲▼ to select programming Push confirmation button → to select	**MAIN MENU** NMES TENS CUSTOM PROGRAMS PROGRAMMING 
STEP 2 Press the button ▲▼ to select a function. Push confirmation button → to select.	**PROGRAMMING** NMES TENS 
STEP 3 Press the button ▲▼ to select an application field Push confirmation button → to select.	**NMES** CONVENTIONAL MOD. PHASE DURATION MODULATED FREQUENCY BURST SEQUENTIAL CONVENT. 

STEP 4 Press the button ▲▼ to select a parameter Modify the parameter with the buttons ▲▼ under symbols + / - Push SAVE button to store.	**P_CONVENTIONAL** 

STEP 5 Overwrite the name and push the SAVE button to store the program. You can retrieve the program under CUSTOM PROGRAMS in the main menu	**ENTER NAME** 

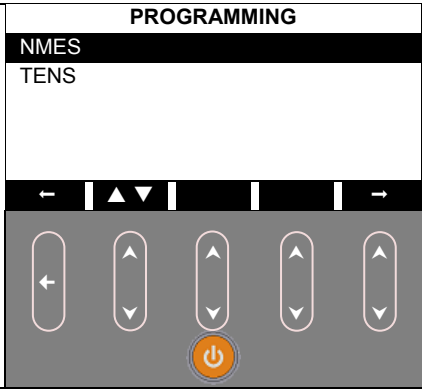
6.5 Sequential programming

Note! Sequential programming is only possible with NMES

Step 1 Press the button ▲▼ to select programming Push confirmation button ➞ to select	**MAIN MENU** 

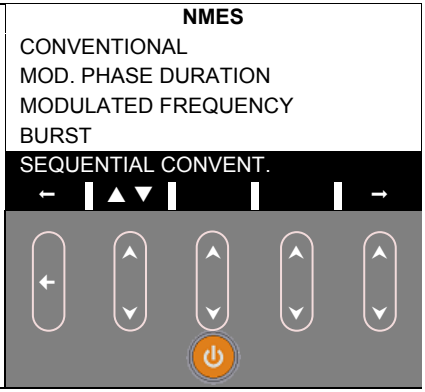
STEP 2

Press the button ▲▼ to select a function.
Push confirmation button → to select.
Note! Sequential programming is only possible with NMES



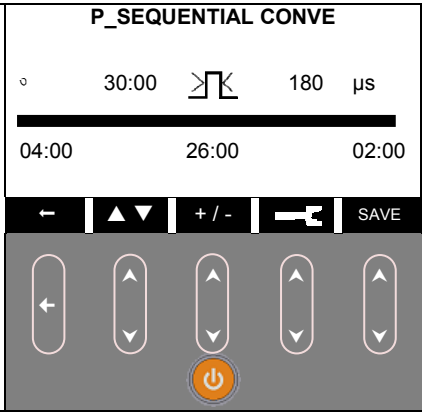
STEP 3

Press the button ▲▼ to select SEQUENTIAL CONVENT. or SEQ. MOD. FREQUENCY
Push confirmation button → to select.



STEP 4

Press the button ▲▼ to pulse width.
Modify the parameter with the buttons ▲▼ under symbols + / -

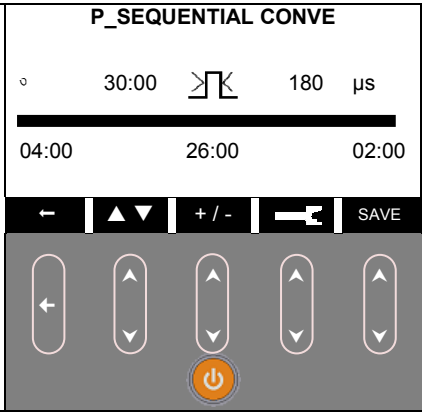


STEP 5

Press the button ▲▼ to select the phase duration. Modify the with the buttons ▲▼
Press the button ▲▼ to select the time in sequence 1. Modify the with the buttons ▲▼

Push the + button under

Modify the frequency with the buttons ▲▼ under symbols + / - in sequence 1



STEP 6

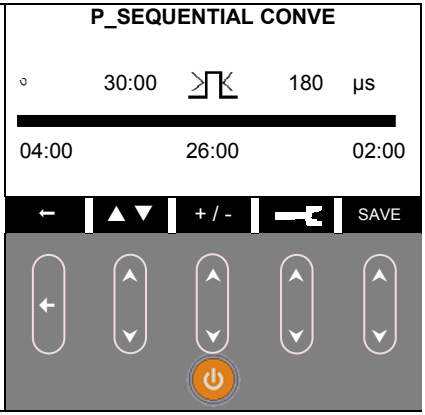
Press the button ▲▼ to select the time in sequence 2. Modify the with the buttons ▲▼

Push the + button under

Modify the frequency with the buttons ▲▼ under symbols + / - in sequence 2 and also the ramp-up, Hold time, ramp down time in seconds for sequence 2

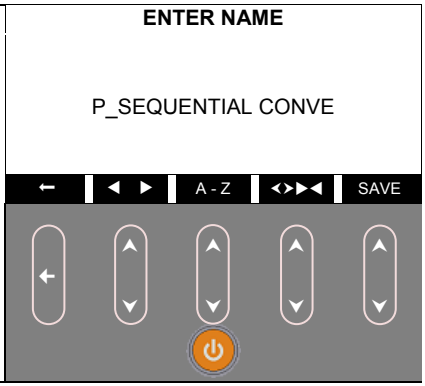
Repeat step 5 for sequence 3

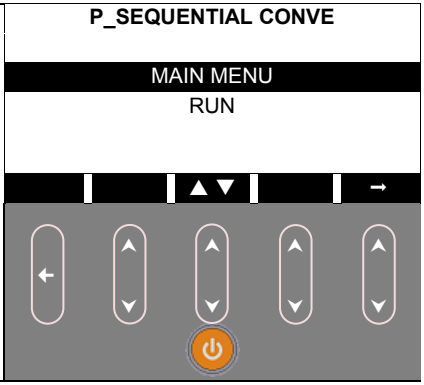
Push SAVE button to store.



STEP 7

Overwrite the name and push the SAVE button to store the program.
You can retrieve the program under CUSTOM PROGRAMS in the main menu



STEP 8 Press the button ▲▼ to select RUN to start the treatment or push the button → to return to the main menu. The program is stored under de selected name and can be retrieved via Custom Programs in the main menu.	

7 PROGRAMS

7.1 Preset Programs – TENS

The TensMed S84 has 32 preset TENS programs for pain relief. These programs are created under 3 groups:

- GENERAL
- NOCICEPTIVE
- NEUROGENIC

For information on treating various pain conditions with TENS, see the clinical guide last in this manual.
Some programs offers a second TENS option. When the TENS option is selected channel 1 and 2 having the parameters from the selected program. Channel 3 and 4 will have a modulated TENS program.

7.2 Preset Programs – NMES

The TensMed S84 offers additional to the TENS programs 75 NMES programs, adjusted to either smaller or larger muscle groups. These programs are created under 5 groups:

- REHAB
- SPORT
- FITNESS
- UROLOGY
- HEMIPLEGIA

For information on treating various conditions with NMES, see the clinical guide last in this manual. Some programs offers a TENS option. When the TENS option is selected channel 1 and 2 having the parameters from the NMES program. Channel 3 and 4 will have a modulated TENS program.

7.3 Custom Programs

With the TensMed S84 it is possible to create and store 15 custom programs for patient-specific treatment.
To create a custom program, follow the programming procedure below. To use a custom program, follow the instructions in the CHAPTER 5.4 and 5.5

8 ACCESSORIES

The TensMed electrodes will eventually wear out and have to be replaced. It is recommended to replace the electrodes after approximately 20–40 times of usage.

The cables are best preserved if left attached to the stimulator between sessions.

For purchase information see paragraph 12, contact your Enraf-Nonius dealer or visit www.enraf-nonius.com

9 MAINTENANCE

Taking care of and cleaning the Enraf-Nonius equipment is simple with the following instructions:

- Keep stimulator and accessories in the original case when they are not in use. It may, however, be practical to allow the electrodes to remain on the body between treatments. Carbon rubber electrodes can generally remain for 2–3 hours without the electrode gel drying out (does not apply to adhesive gel). They must then be taken off, washed, and dried before being applied again. This is especially important for persons with sensitive skin. In connection with stimulation, make sure that the electrodes are firmly in place.
- When using carbon rubber electrodes, use plenty of electrode gel and avoid drying out by applying tape around all the edges of the electrodes. Rinse the carbon rubber electrodes and the skin with water after use. Do not use detergent for the electrodes.
  Self-adhesive multi-use electrodes are re-moistened if necessary with a few drops of water and kept air-tight (in a plastic bag) on protective paper when they are not in use.
- Never expose the stimulator to water. Wipe it off with a damp cloth if necessary.
- Do not jerk cables or connections.
- Do not bending the patient cables to mush when rolling them around the stimulator..

10 TROUBLESHOOTING

THE STIMULATION DOES NOT FEEL THE SAME AS USUAL

- Check that all settings are correct (see section STEP-BY-STEP-USE) and make sure that the electrodes are correctly placed.
- Slightly change the position of the electrodes.

THE STIMULATION FEELS UNPLEASANT

- The skin is irritated. For advice on skin care, see chapter PRECAUTIONARY MEASURE.
- The electrodes begin to lose their stickiness and do not stick properly to the skin. Moisten the adhesive surface with a few drops of water before placing on the skin.
- The electrodes are worn out and need to be replaced.
- There is insufficient electrode gel on the carbon rubber electrodes.
- Slightly change the position of the electrodes.

THE STIMULATION FEELS WEAK OR NOT AT ALL

- Check if the battery pack needs to be recharged.
- Electrodes are too old and need replacement.

THE BROKEN CIRCUIT SYMBOL IS SHOWN ON THE DISPLAY SYMBOL

The broken circuit symbol indicates that the resistance is too high, or that a cable is broken or unplugged.

- A too high resistance can be caused by a bad connection between the electrodes and your skin, or that the electrodes need to be replaced.
- A cable breakage can be checked by pressing the cable's pins against one another while increasing the amplitude for the corresponding channel to 11 mA. If the amplitude now drops to 0.0 mA and the broken circuit symbol is flashing, the cable needs to be replaced.

Note! Never increase the amplitude above 20 mA when you check for cable breaks, since this can damage the stimulator.

THE STIMULATOR IS NOT WORKING

If the error symbol appears on the display when you start the stimulator, it means that the stimulator is broken and needs to be replaced or reprogrammed.

Note! Do not use the stimulator – contact your Enraf-Nonius dealer.
Enraf-Nonius will only be responsible for service and repairs performed by Enraf-Nonius or a distributor appointed by Enraf-Nonius.

11 FREQUENTLY ASKED QUESTIONS

CAN ANYONE USE ELECTRICAL STIMULATION?

People with implanted electrical equipment, for example a pacemaker or an intracardiac defibrillator, must not be treated with electrical stimulation. Pregnant women should not use electrical stimulation during the first 12 weeks of the pregnancy. Read the safety precautions in this manual (PRECAUTIONARY MEASURES).

WHAT DOES ACTIVE REST MEAN?

It means that low frequency stimulation is active during rest time, causing muscle vibrations to maintain circulation. The Active Rest stimulation helps eliminate lactic acid and waste products, thereby reducing muscle soreness afterwards and keeping the muscle prepared for the next contraction.
Note! The amplitude level must be set for both contractions and Active Rest.

HOW LONG WILL THE ELECTRODES LAST?

The self-adhesive electrodes last for approximately 20 to 40 occasions. The durability depends on how good the care and maintenance instructions are followed.

WHICH DISTANCE SHOULD I HAVE BETWEEN THE ELECTRODES?

It is recommended to have a distance of 3 to 30 cm between the electrodes.

HOW DO I FIND THE OPTIMAL POSITION OF THE ELECTRODES FOR NMES?
Use carbon rubber electrodes and gel. Slide the electrodes slowly over the muscle while stimulating at 2 Hz. The optimal position for the electrodes is where the strongest motor response occurs.

FOR HOW LONG CAN I STIMULATE?
TENS (80 Hz): Can be used without an upper limit, but at least 30 min at each occasion.
TENS (2 Hz): Can cause sore muscles but normally 20–45 min three times a day is recommended.

NMES: Depending on the muscle's status and where the patient is in the rehabilitation process, treatment can last from 5 to 60 minutes and be repeated from three times a week to twice a day. Remember that the patient may develop sore muscles after NMES treatment.

12 TECHNICAL DATA

The TensMed S84 is a four channel stimulator for both muscle rehabilitation (NMES) and pain relief (TENS) and features 107 preset programs and 15 custom programs.

Treatment with electrical stimulation requires the stimulation current to penetrate the resistance of the skin and the electrode, about 1000 ohms. The TensMed's can penetrate this resistance and maintain a current of up to 99.5 mA. With a change in load from 100 to 1000 ohms, the stimulation current changes less than 10% from the set value.

The stimulator operates on a rechargeable battery pack, rechargeable with the adapter.

12.1 Specifications

TensMed S84

Number of channels	4 (non-independent)
Constant current	Up to a resistance of 1000 ohm
Stimulation current/channel	0–99,5 mA
Waveform	Symmetrical biphasic pulse, 100% compensated
Number of preset programs	107
Number of custom programs	15 (total free places, 7 templates)
Stimulation forms	• Conventional • Burst • Modulated frequency/pulse duration • Mixed frequency • Alternated modulated frequency • Intermittent
Max pulse duration	400 µs
Max frequency	120 Hz
Timer	1 to 99 min.

Environment for storage and shipping	Temperature -20º C–45º C Air humidity 30%–75% Air pressure 700 hPa–1060 hPa
Environment for use	Temperature 10º C–40º C Air humidity 30%–75% Air pressure 700 hPa–1060 hPa
Power source	Accumulator 4.8 V, 2000 mAh
Current consumption for one channel, 80 Hz, 30 mA	Depends on the skin impedance
I r.m.s. max/channel	31 mA
Size	140 x 92 x 32 mm
Weight	Ca.285 gr.

12.2 Used Symbols

	Caution: read the user manual or operating instructions before to use (symbol no.0434 IEC 06878)
	Protection class: the TensMed S84 is a Class II device with internal electric power (symbol no.05172 IEC 06878)
	Degree of protection of applied parts: type BF applied parts complying with IEC 60601-1 (symbol no.05333 IEC 06878)
	Waste electrical and electronic equipment (WEEE) marking according to EN 50419 standard. Dispose of the worn-out stimulator in accordance with local and national regulations
Water protection index IPX0 (IEC 60529)	
There is no need to apply sterilization or disinfection method when using the Tensmed S84	
The Tensmed S84 is not suitable for use in the presence of flammable anaesthetic mixtures with air or with oxygen or nitrous oxide enriched environments	
The mode of operation defined for the Tensmed S84 is “continuous operation”	

12.3 EMC details

INFORMATION RELATED TO ELECTROMAGNETIC COMPATIBILITY (EMC).

The TensMed S84 is designed to be used in typical domestic or clinical environments and is approved according to the EMC safety standard of EN 60601-1-2.
The TensMed S84 emits very low levels in the radio frequency (RF) interval. Therefore it is not likely to cause any interference in nearby electronic equipment (radios, computers, telephones etc.).The TensMed S84 is designed to withstand foreseeable disturbances originating from electrostatic discharges, mains supply magnetic fields and radio frequency transmitters (such as mobile telephones).

Guidance and manufacturer's declaration – electromagnetic immunity			
The TensMed S84 is intended for use in the electromagnetic environment specified below. The customer or the user of the TensMed S84 should assure that it is used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment – guidance**
Electrostatic discharge (ESD) IEC 61000-4-2	± 6 kV contact ± 8 kV air	± 6 kV contact ± 8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30 %.
Electrical fast transient/burst IEC 61000-4-4	± 2 kV for power supply lines ± 1 kV for input/output Lines	not applicable	.
Surge IEC 61000-4-5	± 1 kV line(s)to line(s) ± 2 kV line(s)to earth	not applicable	
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5 %*U* T (>95 %dip in U_T) for 0,5 cycle 40 %*U* T (60 %dip in *U* T) for 5 cycles 70 % *U* T (30 %dip in *U* T) for 25 cycles <5 % *U* T (>95 %dip in *U* T) for 5 sec	not applicable	
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3A / m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical computer room.
NOTE *U* T is the a.c.mains voltage prior to application of the test level.			

Guidance and manufacturer's declaration – electromagnetic immunity			
The TensMed S84 is intended for use in the electromagnetic environment specified below. The customer or the user of the TensMed S84 should assure that it is used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment –guidance**
 Conducted RF IEC 61000-4-6 Radiated RF IEC 61000-4-3	3 Vrms 150 kHz to 80 MHz 3 V/ m 80 MHz to 2,5 GHz	3 V 3 V/ m	Portable and mobile RF communications equipment should be used no closer to any part of the Tensmed S84, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. **Recommended separation distance** $d = [3,5/3]\sqrt{P}$ $d = [3,5/3]\sqrt{P}$ 80 MHz to 800 MHz $d = [7/3]\sqrt{P}$ 800 MHz to 2,5 GHz where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey,[a] should be less than the compliance level in each frequency range.[b] Interference may occur in the vicinity of equipment marked with the following symbol:

NOTE 1 At 80 MHz and 800 MHz, the higher frequency range applies.
NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

A Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the TensMed S84 is used exceeds the applicable RF compliance level above, the TensMed S84 should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the 6-series.

B Over the frequency range 15 kHz to 8 MHz, field strengths should be less than 3 V / m.

Recommended separation distances between portable and mobile RF communications equipment and the TensMed S84

The TensMed S84 is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the TensMed S84 can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the TensMed S84 as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter [W]	Separation distance according to frequency of transmitter [m]		
	150 kHz to 80 MHz $d = [3,5/V_1]\sqrt{P}$	80 MHz to 800 MHz $d = [3,5/E_1]\sqrt{P}$	800 MHz to 2,5 GHz $d = [7/E_1]\sqrt{P}$
0,01	0,12	0,12	0,23
0,1	0,37	0,37	0,74
1	1,17	1,17	2,33
10	3,69	3,69	7,38
100	11,67	11,67	23,33

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE 1 At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.
NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people

13 ORDERING DETAILS

1427.980 TensMed S84

Standard accessories

3444.220 Set Patient cables 4 pc.
Self adhesive electrodes 2 sets of 4 pc.
1427.781 Operating manual TensMed S84
3444.344 Carrier case
3444.345 Belt clip
3444.325 Charger
3444.330 Battery pack

Optional accessories

3444.056 Self adhesive electrodes, size 32mm Ø, 1 pack = 10 sheets of 4 pc
3444.135 Self adhesive electrodes, size 50mm Ø, 1 pack = 10 sheets of 4 pc
3444.143 Self adhesive electrodes, size 70mm Ø, 1 pack = 10 sheets of 4 pc
3444.057 Self adhesive electrodes, size 50x50mm, 1 pack = 10 sheets of 4 pc
3444.058 Self adhesive electrodes, size 50x90mm, 1 pack = 10 sheets of 4 pc
3444.146 Self adhesive electrodes with double lead, size 50x100mm, 1 pack = 10 sheets of 2 pc
3444.118 Vaginal probe
3444.119 Anal probe

14 CLINICAL GUIDE

14.1 Introduction to Neuromuscular Electrical Stimulation, NMES

NMES is used successfully both in medical rehabilitation and as a complement to athletic training on all levels. NMES is a clinical, internationally well-established treatment method in orthopaedics and neurology. NMES stimulates motor nerves to create muscle contractions or vibrations and is usually applied to innervated muscles. It also stimulates sensory nerves, which eases pain.

Applied to central or partial peripheral nerve damage, NMES can create motor responses in patients with reduced capacity for voluntary muscular activity.

NMES can also be used as a treatment for urinary incontinence. Electric stimulation through perineal nerves is useful for treating both urge and stress incontinence, and also provides an analgesic effect.

14.1.1 Integrated Training

NMES is a complement to other motion and training therapy, and can freely be combined with active training of mobility, strength, co-ordination and functional training. Muscular stimulation can be active during both the concentric and eccentric phases of a movement, or only during one of them.

14.1.2 Indications

- Neuromuscular facilitation
- Maintaining and increasing range of motion
- Circulation increase
- Prevent atrophy/hypotrophy
- Reduction of spasticity
- Peroneal nerve stimulation
- Incontinence treatment
- Pain relief

14.1.3 Placement of electrodes

The placement of the electrodes is significant for the best results. Select the electrode size according to the muscle group to be treated. We suggest placing two larger or four smaller electrodes over the motor point i.e. the area on the skin, which requires the least amount of current to activate the underlying muscle.
Try various placements for the best possible muscle contraction. The distance between the electrodes must be at least 3 cm and no more than 30 cm. Each program has a diagram with suggested placements of two or more electrodes.

14.1.4 Stimulation

The aim of the treatment is to create muscle contractions. Increase the amplitude above the somatosensory threshold until a motor response occurs. The contraction must not be painful. Often the patient needs to get used to the stimulation, so the treatments do not reach therapeutic intensity right away; you have to increase the amplitude during the course of the treatment. Intense muscle contractions created by electric current sometimes cause muscle aches, just like voluntary training. Stretching after an NMES treatment can be a good idea.

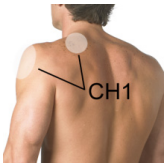
15.1 REHAB
15.1.1 ATROPHY

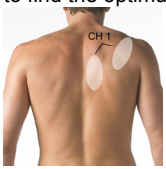
The training focuses on aerobic metabolism, training mainly type I fibres to improve stamina in the muscle. Each program consists of two sequences. The first is a warm-up sequence that prepares the patient for the second – the training sequence. During the training sequence, the amplitude must be set so that visible muscle contractions occur.
When the sequence changes, the amplitude sinks to half the previous level to allow a comfortable transition. This means that the amplitude must be increased when a new sequence starts.

ATROPHY

Indication
Post-operative, muscles that have been immobilized for some time or are weakened.

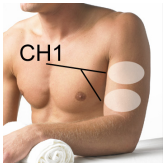
Body Zone	**SHOULDER**
Muscle	deltoid, infraspinal, supraspinal, teres minor
Placement of the electrodes	Use 4 small or 2 large electrodes. Vary the placement to find the optimum location

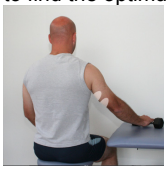
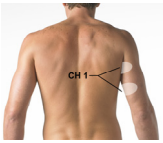




Feel free to combine training with active movements

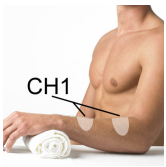
Body Zone	**UPPERARM**
Muscle	brachial, brachial biceps, brachial triceps
Placement of the electrodes	Use 4 small or 2 large electrodes. Vary the placement to find the optimum location

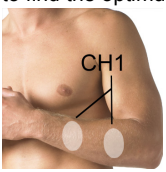


Feel free to combine training with active movements

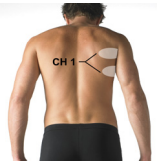
Body Zone	**LOWER ARM**
Muscle	carpal flexors, carpal extensors, brachioradial muscle
Placement of the electrodes	Use 4 small or 2 large electrodes. Vary the placement to find the optimum location

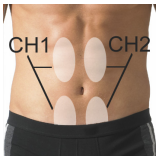




Feel free to combine training with active movements

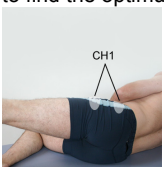
Body Zone	**BACK – TRUNK**
Muscle	latissimus dorsi, pectorals, abdominals, spinal erectors
Placement of the electrodes	Use 4 small or 2 large electrodes. Vary the placement to find the optimum location





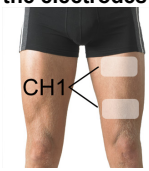
Feel free to combine training with active movements

Body Zone	**HIP**
Muscle	gluteus medius, gluteus maximus, tensor fascia latae
Placement of the electrodes	Use 4 small or 2 large electrodes. Vary the placement to find the optimum location



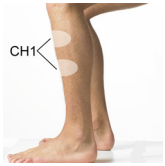
Feel free to combine training with active movements

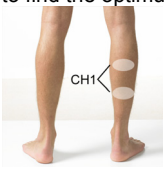
Body Zone	**THIGH – KNEE**
Muscle	Quadriceps (rectus femoris)
Placement of the electrodes	Use 4 small or 2 large electrodes. Vary the placement to find the optimum location

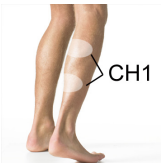


Feel free to combine training with active movements

Body Zone	**LOWERLEG**
Muscle	anterior tibial, posterior tibial, peroneal, gastrocnemial
Placement of the electrodes	Use 4 small or 2 large electrodes. Vary the placement to find the optimum location

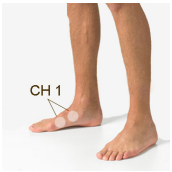






Feel free to combine training with active movements

Body Zone	**FOOT**
Muscle	abductor hallucis
Placement of the electrodes	Use 2 extra small electrodes. Vary the placement to find the optimum location



Intensity			
Visible muscle contractions without pain			
Treatment Time			
24:50 minutes			
ATROPY	**Sequence 1**	**Sequence 2**	**Sequence 3**
Time (min)	5:00	19:50	
Pulse duration (µs)	250	250	
Frequency (Hz)	5	25 – 40	
Ramp up time (sec)		2	
Hold time (sec)		4	
Ramp down time (sec)		1	
Rest Time (sec)		10	

15.1.2 FORCE

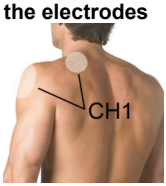
The training focuses on aerobic metabolism, training mainly type II fibres to improve stamina in the muscle. Each program consists of three sequences. To ensure balanced training, the program always starts with a warm-up and ends with a recovery sequence. The middle sequence is the actual strength training sequence, and it is crucial that the amplitude is set on a strong level, but not a painful one. When the sequence changes, the amplitude sinks to half the previous level to allow a comfortable transition. This means that the amplitude must be increased when a new sequence starts.

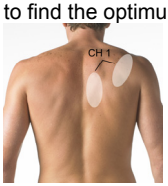
Active rest
During some of the NMES programs you can also chose to stimulate the muscle during the rest time. The aim is to keep the muscle prepared for the next contraction, and to decrease training aches afterwards. The active rest should cause muscle vibrations, but not contractions. When the amplitude drops to 0.0 mA after the stimulation time increase the amplitude for the active rest until visible muscle vibrations is seen.

FORCE

Indication
Post-operative, muscles that have been immobilized for some time or are weakened.

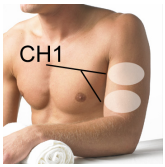
Body Zone	**SHOULDER**
Muscle	deltoid, infraspinal, supraspinal, teres minor
Placement of the electrodes	Use 4 small or 2 large electrodes. Vary the placement to find the optimum location

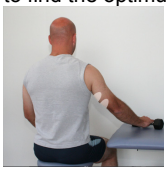
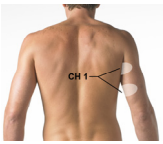




Feel free to combine training with active movements

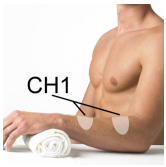
Body Zone	**UPPERARM**
Muscle	brachial, brachial biceps, brachial triceps
Placement of the electrodes	Use 4 small or 2 large electrodes. Vary the placement to find the optimum location

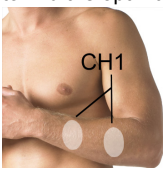


Feel free to combine training with active movements

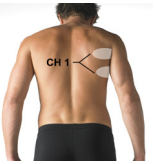
Body Zone	**LOWER ARM**
Muscle	carpal flexors, carpal extensors, brachioradial muscle
Placement of the electrodes	Use 4 small or 2 large electrodes. Vary the placement to find the optimum location

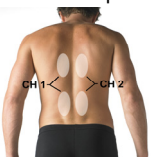


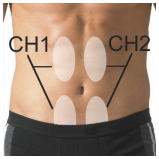


Feel free to combine training with active movements

Body Zone	**BACK – TRUNK**
Muscle	latissimus dorsi, pectorals, abdominals, spinal erectors
Placement of the electrodes	Use 4 small or 2 large electrodes. Vary the placement to find the optimum location

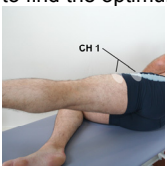






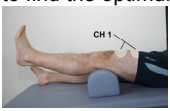
Feel free to combine training with active movements

Body Zone	**HIP**
Muscle	gluteus medius, gluteus maximus, tensor fascia latae
Placement of the electrodes	Use 4 small or 2 large electrodes. Vary the placement to find the optimum location



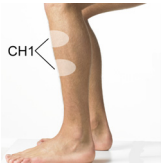
Feel free to combine training with active movements

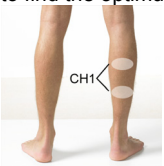
Body Zone	**THIGH – KNEE**
Muscle	Quadriceps (rectus femoris)
Placement of the electrodes	Use 4 small or 2 large electrodes. Vary the placement to find the optimum location

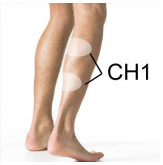


Feel free to combine training with active movements

Body Zone	**LOWERLEG**
Muscle	anterior tibial, posterior tibial, peroneal, gastrocnemial
Placement of the electrodes	Use 4 small or 2 large electrodes. Vary the placement to find the optimum location

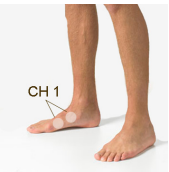






Feel free to combine training with active movements

Body Zone	**FOOT**
Muscle	abductor hallucis
Placement of the electrodes	Use 2 extra small electrodes. Vary the placement to find the optimum location



Intensity

Medium-intensity muscle contractions without pain.

Treatment Time

29:49 minutes

FORCE	**Sequence 1**	**Sequence 2**	**Sequence 3**
Time (min)	5	19:49	5
Pulse duration (µs)	250	250	250
Frequency (Hz)	5	35-60	2-8
Modulation time (sec)			10
Rest Frequency (Hz)		5	
Ramp up time (sec)		3	
Hold time (sec)		8	
Ramp down time (sec)		1	
Active rest (sec)*		17	

*Active rest is 5 Hz, ramp-up 1 sec, hold time 15 sec, ramp-down 1 sec

15.1.3 MOBILISATION 1 + 2

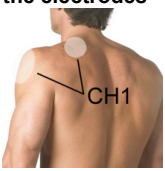
The training focuses on neuromuscular facilitation, which primarily improves mobility. Each program consists of one sequence for training mobility with alternating stimulation. Stimulation alternates between training agonist and antagonist muscles. The channels work in pairs during alternating stimulation. Channel 1 together with channel 2 and channel 3 together with channel 4. At least two channels must be active. When using only two channels use one channel from each pair, for example channel 1 and channel 3. The amplitude must be set so that visible muscle contractions occur resulting in movement.

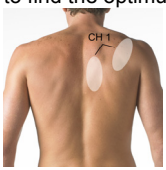
MOBILISATION

Indication

Post-operative, muscles that have been immobilized for some time or are weakened.

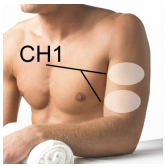
Body Zone	**SHOULDER**
Muscle	deltoid, infraspinal, supraspinal, teres minor
Placement of the electrodes	Use 4 small or 2 large electrodes. Vary the placement to find the optimum location

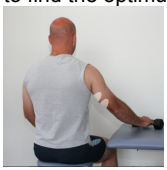
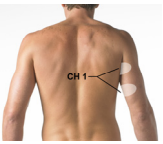




Feel free to combine training with active movements

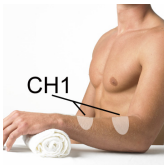
Body Zone	**UPPERARM**
Muscle	brachial, brachial biceps, brachial triceps
Placement of the electrodes	Use 4 small or 2 large electrodes. Vary the placement to find the optimum location

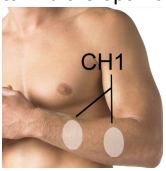


Feel free to combine training with active movements

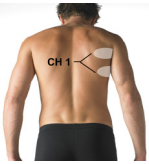
Body Zone	**LOWER ARM**
Muscle	carpal flexors, carpal extensors, brachioradial muscle
Placement of the electrodes	Use 4 small or 2 large electrodes. Vary the placement to find the optimum location

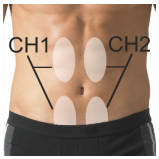




Feel free to combine training with active movements

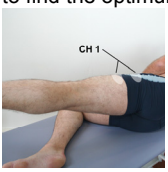
Body Zone	**BACK – TRUNK**
Muscle	latissimus dorsi, pectorals, abdominals, spinal erectors
Placement of the electrodes	Use 4 small or 2 large electrodes. Vary the placement to find the optimum location





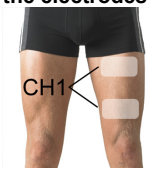
Feel free to combine training with active movements

Body Zone	**HIP**
Muscle	gluteus medius, gluteus maximus, tensor fascia latae
Placement of the electrodes	Use 4 small or 2 large electrodes. Vary the placement to find the optimum location



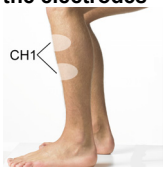
Feel free to combine training with active movements

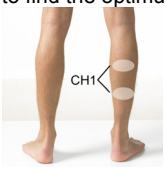
Body Zone	**THIGH – KNEE**
Muscle	Quadriceps (rectus femoris)
Placement of the electrodes	Use 4 small or 2 large electrodes. Vary the placement to find the optimum location



Feel free to combine training with active movements

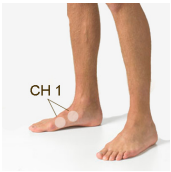
Body Zone	**LOWERLEG**
Muscle	anterior tibial, posterior tibial, peroneal, gastrocnemial
Placement of the electrodes	Use 4 small or 2 large electrodes. Vary the placement to find the optimum location





Feel free to combine training with active movements

Body Zone	**FOOT**
Muscle	abductor hallucis
Placement of the electrodes	Use 2 extra small electrodes. Vary the placement to find the optimum location



Intensity			
Visible muscle contractions resulting in movement, without pain.			
Treatment Time			
15 minutes			
MOBILISATION 1	**Sequence 1**	**Sequence 2**	**Sequence 3**
Time (min)	15		
Pulse duration (µs)	200		
Frequency (Hz)	40		
Ramp up time (sec)	2		
Hold time (sec)	4		
Ramp down time (sec)	2		
Rest (sec)	14		

MOBILISATION 2	**Sequence 1**	**Sequence 2**	**Sequence 3**
Time (min)	15:12		
Pulse duration (µs)	200		
Frequency (Hz)	40		
Ramp up time (sec)	2		
Hold time (sec)	6		
Ramp down time (sec)	2		
Rest (sec)	18		

15.1.4 FACILITATION

FACILITATION	**Sequence 1**	**Sequence 2**	**Sequence 3**
Time (min)	14:56		
Pulse duration (µs)	300		
Frequency (Hz)	40		
Ramp up time (sec)	2		
Hold time (sec)	4		
Ramp down time (sec)	2		
Rest (sec)	6		

15.2 SPORT

Each program consists of 1–3 sequences with different aims. The three-sequence programs always start with a warm-up and end with a recovery sequence to ensure balanced training. The warm-up and recovery sequences generate muscle vibrations to increase circulation in the muscle. When the sequences changes, the amplitude sinks to half the previous level to allow a comfortable transition. This means that the amplitude must be increased when a new sequence starts.

Program with active rest
In some of the programs, the muscles are also stimulated between contractions – this is called active rest. Active rest should generate muscle vibrations, but not contractions. This is to prepare the muscle for the next contraction and therefore prevent aching muscles afterwards.
The Sport programs are designed for the following body parts:

- Upper body
- Back/Trunk
- Lower body

The following programs are available for each body part.

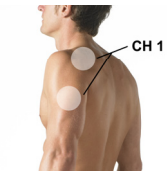
15.2.1 MAXIMUM FORCE

MAXIMUM FORCE

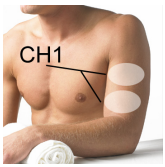
Indication

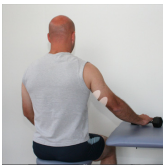
Increases the capacity for maximum strength development, and increases muscle mass. Recommended for people whose sports require maximum strength.

Body Zone **SHOULDER**
Muscle deltoid

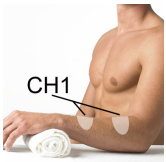


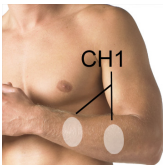
Body Zone **UPPERARM**
Muscle brachial, brachial biceps, brachial triceps



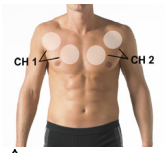


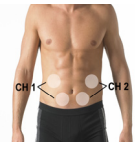
Body Zone **LOWER ARM**
Muscle carpal flexors, carpal extensors, brachioradial muscle





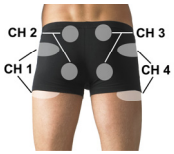
Body Zone **BACK – TRUNK**
Muscle latissimus dorsi, pectorals, abdominals, spinal erectors





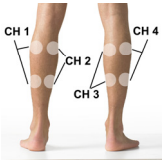
⚠ Current International standards require that a warning be given concerning the application of electrodes to the thorax (increased risk of cardiac fibrillation).

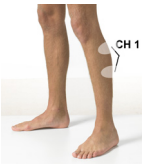
Body Zone **HIP**
Muscle gluteus medius, gluteus maximus, tensor fascia latae



Body Zone **THIGH – KNEE**
Muscle femoral biceps, quadriceps

Body Zone **LOWERLEG**
Muscle anterior tibial, posterior tibial, peroneal, gastrocnemial





Intensity

Maximum muscle contractions without pain. Active rest should generate muscle vibrations.

Treatment Time

30:45 minutes

MAXIMUM FORCE	Sequence 1	Sequence 2	Sequence 3
Time (min)	5	15:45	10
Pulse duration (µs)	220	220	220
Frequency (Hz)	3 – 10	50 – 70	2 – 8
Modulation time (sec)			
Rest Frequency (Hz)		4	
Ramp up time (sec)	6	1,75	2
Hold time (sec)	0	6	9:56
Ramp down time (sec)	6	1,25	2
Active rest time (sec)		18	

15.2.2 RESISTANCE FORCE

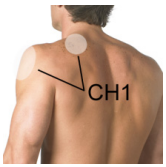
RESISTANCE FORCE

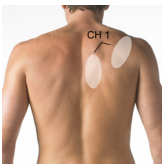
Indication

Improves the capacity to develop a high level of force over a long time, delays muscle fatigue. Recommended for sports that require intense muscle work over a long time.

Body Zone **SHOULDER**

Muscle deltoid, infraspinal, supraspinal, teres minor

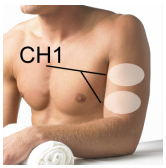


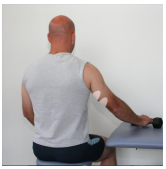


Feel free to combine training with active movements.

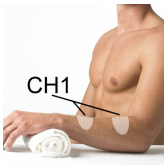
Body Zone **UPPERARM**

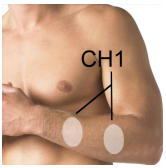
Muscle brachial, brachial biceps, brachial triceps



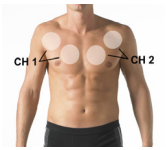


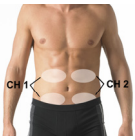
Body Zone	**LOWER ARM**
Muscle	carpal flexors, carpal extensors, brachioradial muscle

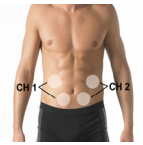




Body Zone	**BACK – TRUNK**
Muscle	latissimus dorsi, pectorals, abdominals

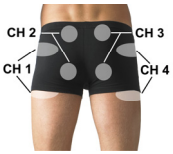






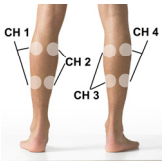
⚠ Current International standards require that a warning be given concerning the application of electrodes to the thorax (increased risk of cardiac fibrillation).

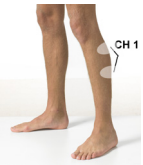
Body Zone	**HIP**
Muscle	gluteus medius, gluteus maximus, tensor fascia latae



Body Zone	**THIGH – KNEE**
Muscle	femoral biceps, quadriceps

Body Zone	**LOWERLEG**
Muscle	anterior tibial, posterior tibial, peroneal, gastrocnemial





Intensity

Medium to strong muscle contractions. Active rest should generate muscle vibrations.

Treatment Time

33 minutes

RESISTANCE	**Sequence 1**	**Sequence 2**	**Sequence 3**
Time (min)	4	14	15
Pulse duration (µs)	220	220	220
Frequency (Hz)	3 – 10	50 – 70	3
Modulation time (sec)			
Rest Frequency (Hz)		5	
Ramp up time (sec)	6	1,75	2
Hold time (sec)	0	8	14:56
Ramp down time (sec)	6	1.25	2
Active rest time (sec)		10	

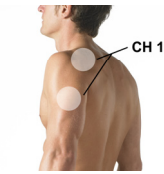
15.2.3 RECOVERY

RECOVERY

Indication

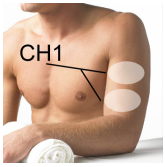
Increases the ability to recover maximum muscle capacity after training or competition, through improved circulation and elimination of lactic acid.

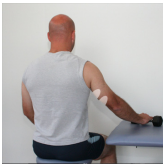
Body Zone	**SHOULDER**
Muscle	deltoid



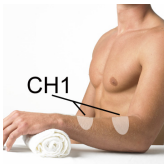
Feel free to combine training with active movements.

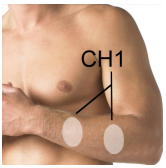
Body Zone **UPPERARM**
Muscle brachial, brachial biceps, brachial triceps



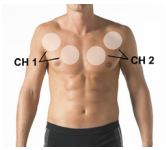


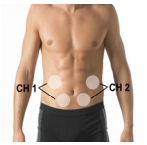
Body Zone **LOWER ARM**
Muscle carpal flexors, carpal extensors, brachioradial muscle





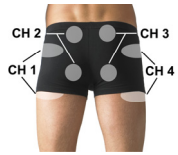
Body Zone **BACK – TRUNK**
Muscle latissimus dorsi, pectorals, abdominals





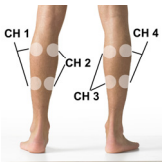
⚠ Current International standards require that a warning be given concerning the application of electrodes to the thorax (increased risk of cardiac fibrillation).

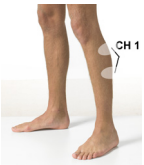
Body Zone **HIP**
Muscle gluteus medius, gluteus maximus, tensor fascia latae



Body Zone	**THIGH – KNEE**
Muscle	femoral biceps, quadriceps

Body Zone	**LOWERLEG**
Muscle	anterior tibial, posterior tibial, peroneal, gastrocnemial





Intensity

Visible muscle vibrations.

Treatment Time

10 minutes

RESISTANCE	**Sequence 1**	**Sequence 2**	**Sequence 3**
Time (min)	10		
Pulse duration (µs)	220		
Frequency (Hz)	3		

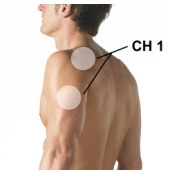
15.2.4 TONING

TONING

Indication

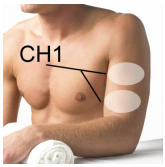
Helps maintain the muscles' tone and is an effective complement to other training.

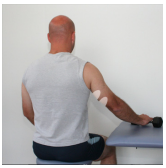
Body Zone	**SHOULDER**
Muscle	deltoid



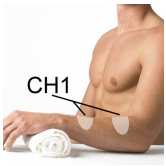
Feel free to combine training with active movements.

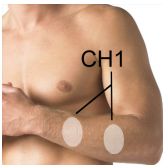
Body Zone **UPPERARM**
Muscle brachial, brachial biceps, brachial triceps



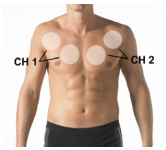


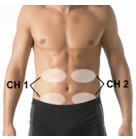
Body Zone **LOWER ARM**
Muscle carpal flexors, carpal extensors, brachioradial muscle

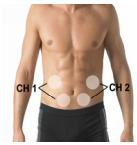




Body Zone **BACK – TRUNK**
Muscle latissimus dorsi, pectorals, abdominals

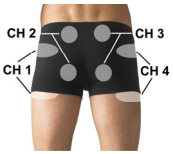




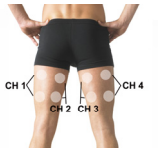


⚠ Current International standards require that a warning be given concerning the application of electrodes to the thorax (increased risk of cardiac fibrillation).

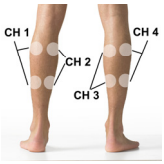
Body Zone **HIP**
Muscle gluteus medius, gluteus maximus, tensor fascia latae

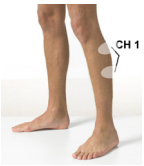


Body Zone	**THIGH – KNEE**
Muscle	femoral biceps, quadriceps



Body Zone	**LOWERLEG**
Muscle	anterior tibial, posterior tibial, peroneal, gastrocnemial





Intensity

Medium-intensity muscle vibrations.

Treatment Time

25 minutes

TONING	**Sequence 1**	**Sequence 2**	**Sequence 3**
Time (min)	5	15	5
Pulse duration (µs)	220	220	220
Frequency (Hz)	5	25 – 40	3
Modulation time (sec)			
Ramp up time (sec)	2	2	2
Hold time (sec)	04:56	6	04:56
Ramp down time (sec)	2	1	2
Rest time (sec)		8	

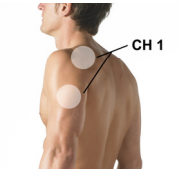
15.2.5 DRAINAGE

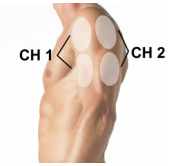
DRAINAGE

Indication

Activates the circulation through a pumping effect of the muscles. Gives effective elimination of waste products. The drainage programs are serial contraction programs, which means that the muscles are stimulated one after each other in a series.

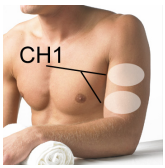
Body Zone **SHOULDER**
Muscle deltoid, infraspinal, supraspinal, teres minor

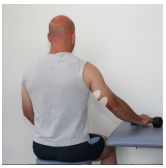




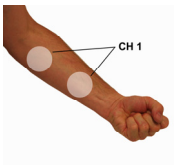
Feel free to combine training with active movements.

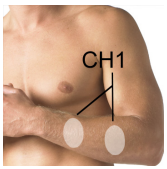
Body Zone **UPPERARM**
Muscle brachial, brachial biceps, brachial triceps



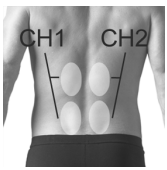


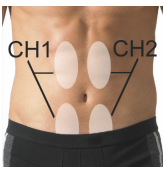
Body Zone **LOWER ARM**
Muscle carpal flexors, carpal extensors, brachioradial muscle



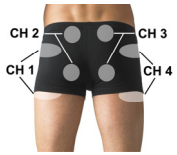


Body Zone **BACK – TRUNK**
Muscle abdominals, spinal erectors

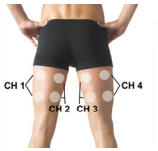




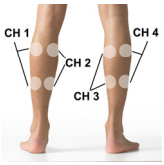
Body Zone **HIP**
Muscle gluteus medius, gluteus maximus, tensor fascia latae

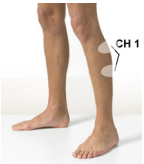


Body Zone **THIGH – KNEE**
Muscle femoral biceps, quadriceps



Body Zone **LOWERLEG**
Muscle anterior tibial, posterior tibial, peroneal, gastrocnemial





Intensity
Visible muscle vibrations.
Note:
There are 42 loops. Sequence 1 is on channel 1+2 only, Sequence 2 is on channel 1+2+3+4
Treatment Time
20:39 minutes

DRAINAGE	Sequence 1	Sequence 2	Sequence 3
Pulse duration (µs)	400	400	400
Frequency (Hz)	50	50	0
Ramp up time (sec)	1.5	1.5	0
Hold time (sec)	3	3	19
Ramp down time (sec)	0	1.5	0

15.2.6 UROLOGY

Urinary incontinence is a major problem for many people. We can define two main types of urinary incontinence.

15.2.6.1 Urge incontinence

Urge incontinence means a sudden, intense, uncontrollable urge. Sometimes major urine leakage cannot be prevented due to an involuntary contraction of the bladder. Both men and women can be affected, particularly older adults. One reason can be a disruption in the part of the nervous system that controls the bladder.
The problems of urinary incontinence can be complex for individual patients, and mixed forms of stress and urge incontinence are common.
The bladder should maintain a low pressure between evacuations, but in certain kinds of urge incontinence, the bladder is unstable and has sudden pressure increases during the "resting phase". Urge incontinence is treated with low-frequency constant stimulation between 5 and 10 Hz. This type of stimulation has a relaxing effect on the bladder, which is often hyperactive. The stimulation should be as strong as possible without being painful.
Treatment time: about 15 minutes, 2–3 times a week.

URGE INCONTINENCE

In case of urge incontinence, the stimulation aims to relax the overactive bladder by stimulating the perineal nerves to reflexively
Treatment Time:
15 minutes

	Sequence 1	Sequence 2	Sequence 3
Time (min)	15		
Pulse duration (µs)	180		
Frequency (Hz)	10		

15.2.6.2 Treating Mixed incontinence

Mixed incontinence is treated with intermittent stimulation on a frequency of 20 Hz. The stimulation should be as strong as possible without being painful. Treatment time: about 15 minutes, 1–5 times a week. It is helpful if the patient participates actively in the muscle contractions.

MIXED INCONTINENCE 1

In cases of mixed incontinence, the stimulation treats both urge and stress incontinence.
Treatment Time:
14:57 minutes

	Sequence 1	Sequence 2	Sequence 3
Time (min)	14:57		
Pulse duration (µs)	180		
Frequency (Hz)	20		
Stimulation time (sec)	7		
Rest time (sec)	6		

MIXED INCONTINENCE 2			
In cases of mixed incontinence, the stimulation treats both urge and stress incontinence. **Treatment Time:** 14:56 minutes			
	Sequence 1	**Sequence 2**	**Sequence 3**
Time (min)	14:56		
Pulse duration (µs)	180		
Frequency (Hz)	20		
Stimulation time (sec)	6		
Rest time (sec)	8		

15.2.6.3 Stress incontinence

Stress incontinence means that the urine leak is caused by increased abdominal pressure during physical activity. The pressure on the urethra is too great to resist. This problem primarily affects women, usually due to a weakening of the perineal muscles.
One cause of stress incontinence can be poorly functioning perineal muscles. To help identify the muscles, and to strengthen the perineal muscles, an intermittent stimulation of about 50 Hz is ideal. The stimulation must be as strong as possible without being painful, and it's helpful if the patient participates actively in the muscle contractions. Treatment time: about 15 minutes, 3–5 times a week. We suggest that this training is combined with the patient's own kegel exercises

STRESS INCONTINENCE 1			
Treatment Time: 14:56 minutes			
	Sequence 1	**Sequence 2**	**Sequence 3**
Time (min)	14:56		
Pulse duration (µs)	180		
Frequency (Hz)	50		
Stimulation time (sec)	6		
Rest time (sec)	8		

STRESS INCONTINENCE 2			
Treatment Time: 15 minutes			
	Sequence 1	**Sequence 2**	**Sequence 3**
Time (min)	15		
Pulse duration (µs)	180		
Frequency (Hz)	50		
Stimulation time (sec)	8		
Rest time (sec)	12		

PELVIC FLOOR PAIN

Treatment Time:
15 minutes

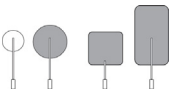
	Sequence 1	Sequence 2	Sequence 3
Time (min)	15		
Pulse duration (µs)	180		
Frequency (Hz)	100		

15.2.7 HEMIPLEGIA

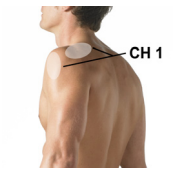
NMES is an excellent complement to traditional physiotherapy after a stroke. It can be used to aid facilitation and relearning of motor skills, and also to reduce spasticity. When used to treat spasticity, the electrodes can be placed on the agonist or the antagonist.
The antagonist is a more common placement. NMES also has an analgesic effect, which can be used for indications like shoulder pain. If the patient has a disrupted perceptive ability with reduced attention (called hemi-inattention or neglect), training of this function can also be integrated into the treatment. NMES treatment should not be solely passive, but used actively in the training situation

HEMIPLEGIA - SHOULDER

Intensity:
Visible muscle contractions without pain, ideally resulting in movement.
Treatment Time:
20:16 minutes
Placement of electrodes
Use 4 small or 2 large electrodes.
Vary the placement to find the optimum location



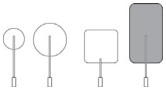
Muscles: deltoid, supraspinal



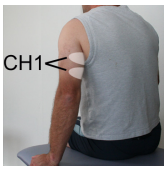
	Sequence 1	Sequence 2	Sequence 3
Time (min)	20:16		
Pulse duration (µs)	250		
Frequency (Hz)	40		
Ramp up time (sec)	4		
Stimulation time (sec)	10		
Ramp down time (sec)	2		
Rest time (sec)	22		

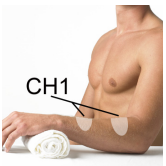
HEMIPLEGIA - ARM

Intensity:
Visible muscle contractions without pain, ideally resulting in movement.
Treatment Time:
20:18 minutes
Placement of electrodes
2 large electrodes. Vary the placement to find the optimum location



Muscles: brachial triceps, carpal extensors

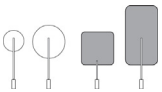




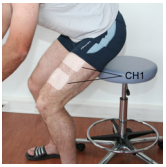
	Sequence 1	Sequence 2	Sequence 3
Time (min)	20:18		
Pulse duration (µs)	200		
Frequency (Hz)	40		
Ramp down time (sec)	2		
Stimulation time (sec)	14		
Ramp up time (sec)	4		
Rest time (sec)	22		

HEMIPLEGIA - HIP and THIGH

Intensity:
Visible muscle contractions without pain, ideally resulting in movement.
Treatment Time:
19:49 minutes
Placement of electrodes
Combine 2 small and 2 large electrodes. Vary the placement to find the optimum location



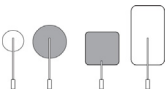
Muscles: gluteus medius, gluteus maximus, tensor fascia latae, quadriceps



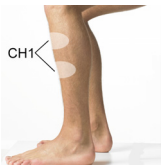
	Sequence 1	Sequence 2	Sequence 3
Time (min)	19:49		
Pulse duration (µs)	400		
Frequency (Hz)	40		
Ramp up time (sec)	4		
Stimulation time (sec)	18		
Ramp down time (sec)	2		
Rest time (sec)	18		

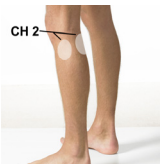
HEMIPLEGIA - LOWER LEG

Intensity:
Visible muscle contractions without pain, ideally resulting in movement.
Treatment Time:
19:49 minutes
Placement of electrodes
2 or 4 medium electrodes. Vary the placement to find the optimum location



Muscles: antererior tibial **Nerve:** peroneal

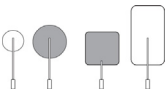


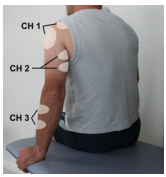


	Sequence 1	Sequence 2	Sequence 3
Time (min)	19:49		
Pulse duration (µs)	250		
Frequency (Hz)	40		
Ramp up time (sec)	4		
Stimulation time (sec)	18		
Ramp down time (sec)	2		
Rest time (sec)	18		

HEMIPLEGIA - SPASTICITY

Intensity:
Visible muscle contractions without pain.
Treatment Time:
30 minutes
Placement of electrodes
Place the electrodes on the muscle, agonist or antagonist.





	Sequence 1	Sequence 2	Sequence 3
Time (min)	29:58		
Pulse duration (µs)	250		
Frequency (Hz)	40		
Ramp up time (sec)	4		
Stimulation time (sec)	8		
Ramp down time (sec)	2		
Rest time (sec)	17		

TENS is used for both acute and long-term pain conditions, particularly when the pain originates in joints, skeleton, muscles, skin, viscera or the nervous system – both nociceptive and neurogenic pain. TENS may be sufficient as the only treatment form, but it is also a valuable complement to other pharmacological and/or physical treatments. TENS has also proven to relieve pain and improve the healing of wounds in patients with peripheral circulation disorders, and is effective in treating nausea.

TENS uses the nervous system's own analgesic mechanisms in two ways:

High-frequency TENS (also called Conventional TENS) is based on the gate control theory, where inward-leading nerve fibres inhibit the transfer of impulses in the pain pathways on the spinal level. High-frequency TENS uses a frequency of 50–120 Hz.

Low-frequency, acupuncture-like TENS (also called Burst TENS) stimulates motor efferents to create muscle contractions. This releases the body's own morphine-like substances – endorphins. Low-frequency TENS uses a frequency of 2–10 Hz.

Mixed frequency stimulation means that high and low-frequency TENS are integrated in the same program. The stimulation switches between 2 Hz and 80 Hz every three seconds. This provides a combination of high-frequency and low-frequency stimulation, which can lead to more efficient treatment.

16.1 Placement of electrodes

High-frequency TENS: the electrodes are preferably placed over or near the painful region. You can also place the electrodes in the same dermatome as the pain (see the dermatome chart on page 68), paravertebrally (on both sides of the spine) or on the opposite side of the body. Place the negative electrode – the cathode (black pin) – over the most painful area. Select the electrode size according to the area to be treated.
Low-frequency TENS: place the electrodes over the muscle or muscle group you want to treat. Place the negative electrode over the motor point (where the nerve is closest to the surface). You can also place the electrodes in the related myotome (see the myotome chart on page 69) or on acupuncture points. Select the electrode size according to the muscle group to be treated. Never place the electrodes closer than 3 cm from each other or father apart than 30 cm.

16.1.1 Stimulation

High-frequency TENS: Adjust the current so that the stimulation gives strong, but pleasant paraesthesia – tingling. The patient often adapts to the amplitude, so that it needs to be adjusted after 5 to 10 minutes. Treatment time: Usually a session of 30–60 minutes. You can repeat the treatment many times a day according to how strong the pain is. *Low-frequency TENS:* Adjust the current so that the stimulation gives visible muscle contractions without pain. Treatment time: 20–45 minutes. Don't repeat the treatment more than three times a day, to assure that you avoid muscle fatigue.

16.1.2 Nociceptive and neurogenic pain

The difference between nociceptive and neurogenic pain is that with nociceptive pain, the nervous system is intact, while neurogenic pain means that the nervous system is damaged in some way. Always remember to test sensitivity before treating with TENS, and be careful with the intensity in the beginning when treating neurogenic pain. Sometimes patients with neurogenic pain feel increased pain from the TENS treatment, in which case the treatment must be altered or stopped. One alternative is to treat the patient on the contralateral side.

16.2 TENS GENERAL

Indications: nociceptive and neurogenic pain.
Intensity: Clear feeling of current without pain

Conventional TENS	
Frequency	80 Hz
Pulse duration	180 µs
Treatment Time	30 minutes

Modulated Phase Duration	
Frequency	80 Hz
Pulse duration	75 - 180 µs
Modulation time	2 seconds
Treatment Time	30 minutes

BURST TENS 2 HZ	
Frequency	2 Hz
Pulse duration	180 µs
Treatment Time	30 minutes

BURST TENS 4 Hz	
Frequency	4 Hz
Pulse duration	180 µs
Treatment Time	30 minutes

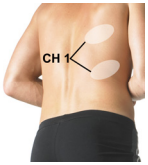
Mixed Frequency	
Frequency 1	80 Hz
Frequency 2	2 Hz
Pulse duration	180 µs
Modulation Time	3,5 seconds
Treatment Time	30 minutes

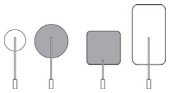
**One amplitude for each frequency is being set. First set the amplitude for high-frequency stimulation and when the stimulator after 3 seconds switches over to low-frequency stimulation, set the amplitude for this frequency.*

16.3 Nociceptive Pain

RIB FRACTURE

Intensity:
Clear feeling of current without pain.
Treatment Time:
30 minutes

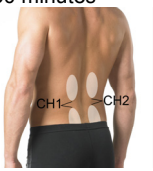


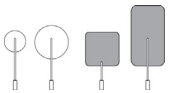


Time (min)	30
Pulse duration (µs)	170
Frequency (Hz)	70

SPINE COMPRESSION

Intensity:
Clear feeling of current without pain.
Treatment Time:
30 minutes

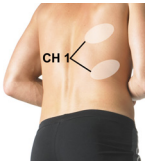


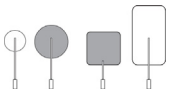


Time (min)	30
Pulse duration (µs)	180
Frequency (Hz)	70

FRACTURE PAIN

Intensity:
Clear feeling of current without pain.
Treatment Time:
30 minutes

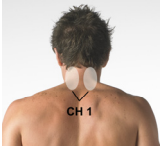


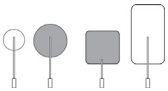


Time (min)	30
Pulse duration (µs)	180
Frequency (Hz)	80

NECK PAIN

Intensity:
Clear feeling of current without pain.
Treatment Time:
30 minutes



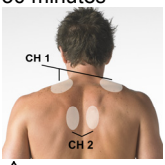


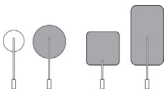
⚠ Current International standards require that a warning be given concerning the application of electrodes to the thorax (increased risk of cardiac fibrillation).

Time (min)	30
Pulse duration (µs)	70 – 140
Frequency (Hz)	80
Modulation time (sec)	3

M. TRAPEZIUS PAIN

Intensity:
Clear feeling of current without pain.
Treatment Time:
30 minutes



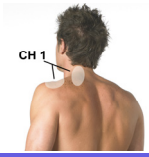


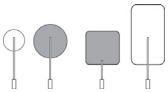
⚠ Current International standards require that a warning be given concerning the application of electrodes to the thorax (increased risk of cardiac fibrillation).

Time (min)	30
Pulse duration (µs)	80 – 200
Frequency (Hz)	60
Modulation time (sec)	3

CERVICAL SPASM

Intensity:
Clear feeling of current without pain.
Treatment Time:
30 minutes

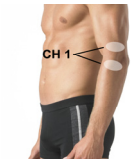


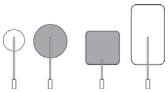


Time (min)	30
Pulse duration (µs)	60 – 160
Frequency (Hz)	80
Modulation time (sec)	2

EPICONDYLITIS

Intensity:
Clear feeling of current without pain.
Treatment Time:
30 minutes

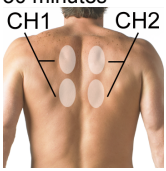


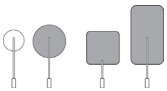


Time (min)	30
Pulse duration (µs)	150
Frequency (Hz)	80

THORACAL BACK PAIN

Intensity:
Clear feeling of current without pain.
Treatment Time:
30 minutes



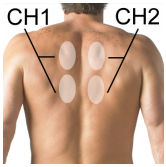


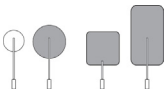
⚠ Current International standards require that a warning be given concerning the application of electrodes to the thorax (increased risk of cardiac fibrillation).

Time (min)	30
Pulse duration (µs)	180
Frequency (Hz)	20 – 60
Modulation time (sec)	3

LOW BACK PAIN

Intensity:
Clear feeling of current without pain.
Treatment Time:
30 minutes

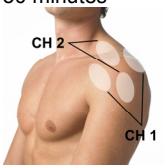


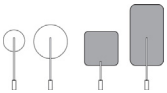


Time (min)	30
Pulse duration (µs)	250
Frequency (Hz)	40 – 100
Modulation time (sec)	3

SHOULDER PAIN

Intensity:
Clear feeling of current without pain.
Treatment Time:
30 minutes

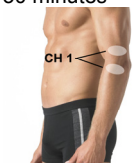


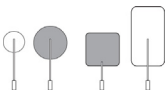


Time (min)	30
Pulse duration (µs)	75 – 180
Frequency (Hz)	80
Modulation time (sec)	3

ELBOW PAIN

Intensity:
Clear feeling of current without pain.
Treatment Time:
30 minutes

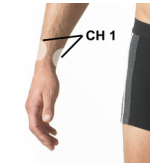


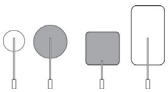


Time (min)	30
Pulse duration (µs)	75 – 180
Frequency (Hz)	60
Modulation time (sec)	2

WRIST PAIN

Intensity:
Clear feeling of current without pain.
Treatment Time:
30 minutes

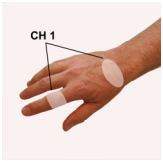


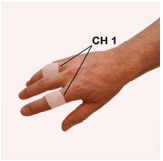


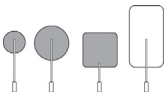
Time (min)	30
Pulse duration (µs)	60 – 150
Frequency (Hz)	60
Modulation time (sec)	2

FINGER PAIN

Intensity:
Clear feeling of current without pain.
Treatment Time:
30 minutes



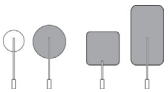




Time (min)	30
Pulse duration (µs)	100
Frequency (Hz)	70

HIP PAIN

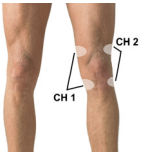
Intensity:
Clear feeling of current without pain.
Treatment Time:
30 minutes

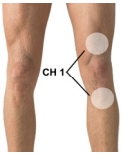


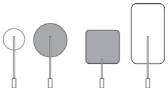
Time (min)	30
Pulse duration (µs)	80 – 200
Frequency (Hz)	80
Modulation time (sec)	3

KNEE PAIN

Intensity:
Clear feeling of current without pain.
Treatment Time:
30 minutes



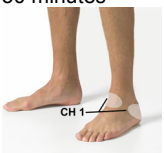


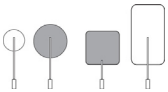


Time (min)	30
Pulse duration (µs)	75 – 180
Frequency (Hz)	80
Modulation time (sec)	2

ANKLE PAIN

Intensity:
Clear feeling of current without pain.
Treatment Time:
30 minutes





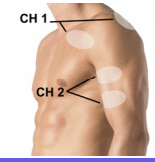
Time (min)	30
Pulse duration (µs)	75 – 180
Frequency (Hz)	70

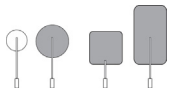
16.4 TENS NEUROGENIC

Always remember to test sensitivity before treating with TENS, and be careful with the intensity in the beginning when treating neurogenic pain. Sometimes patients with neurogenic pain feel increased pain from the TENS treatment, in which case the treatment must be altered or stopped. One alternative is to treat the patient on the contralateral side.

CERVICAL RHIZOPATHY

Intensity:
Visible muscle vibrations without pain.
Treatment Time:
30 minutes

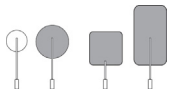




Time (min)	30
Pulse duration (µs)	180
Burst Frequency (Hz)	2

LOW BACK + SCIATICA

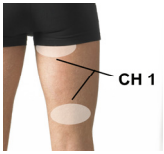
Intensity:
Clear feeling of current and visible muscle contractions without pain.
Treatment Time:
30 minutes

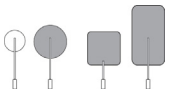


	Sequence 1	Sequence 2
Pulse duration (µs)	180	180
Frequency (Hz)	80	2
Time (sec)	3,5	3,5
Repetitions	Ca. 257	

SCIATICA

Intensity:
Visible muscle contractions without pain.
Treatment Time:
30 minutes

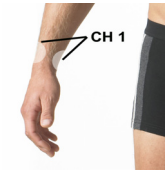


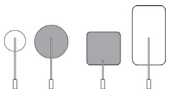


Time (min)	30
Pulse duration (µs)	250
Burst Frequency (Hz)	2

CARPAL TUNNEL

Intensity:
Clear feeling of current and visible muscle contractions without pain.
Treatment Time:
30 minutes

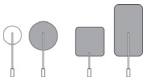




Time (min)	30
Pulse duration (µs)	60 – 150
Frequency (Hz)	80
Modulation time (sec)	2

PHANTOM LIMB

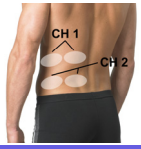
Intensity:
Clear feeling of current and visible muscle contractions without pain.
Treatment Time:
30 minutes

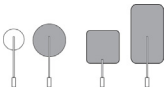


Time (min)	30
Pulse duration (µs)	90 – 200
Frequency (Hz)	80
Modulation time (sec)	2

POST HERP NEURALGIA

Intensity:
Clear feeling of current and visible muscle contractions without pain.
Treatment Time:
20 minutes

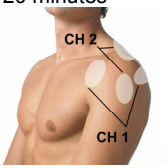


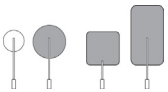


Time (min)	20
Pulse duration (µs)	180
Frequency (Hz)	70

HEMI SHOULDER PAIN

Intensity:
Clear feeling of current without pain.
Note: If the patient has reduced sensitivity, test what amplitude the patient prefers on the undamaged side.
Treatment Time:
20 minutes

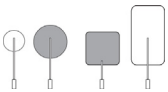




Time (min)	20
Pulse duration (µs)	200
Frequency (Hz)	100

SPASTICITY

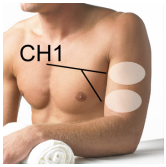
Intensity:
Clear feeling of current without pain.
Note: If the patient has reduced sensitivity, test what amplitude the patient prefers on the undamaged side.
Treatment Time:
30 minutes

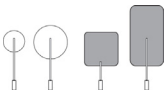


Time (min)	30
Pulse duration (µs)	200
Frequency (Hz)	100

POST STROKE PAIN 1

Intensity:
Clear feeling of current without pain.
Treatment Time:
25 minutes

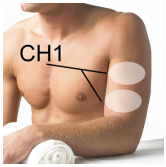


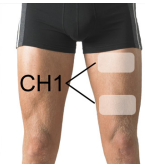


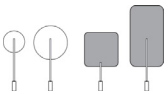
Time (min)	25
Pulse duration (µs)	180
Frequency (Hz)	70

POST STROKE PAIN 2

Intensity:
Visible muscle contractions without pain.
Treatment Time:
25 minutes



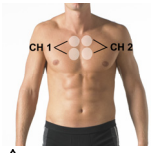


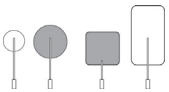


Time (min)	25
Pulse duration (µs)	180
Burst Frequency (Hz)	2

MONONEUROPATHY

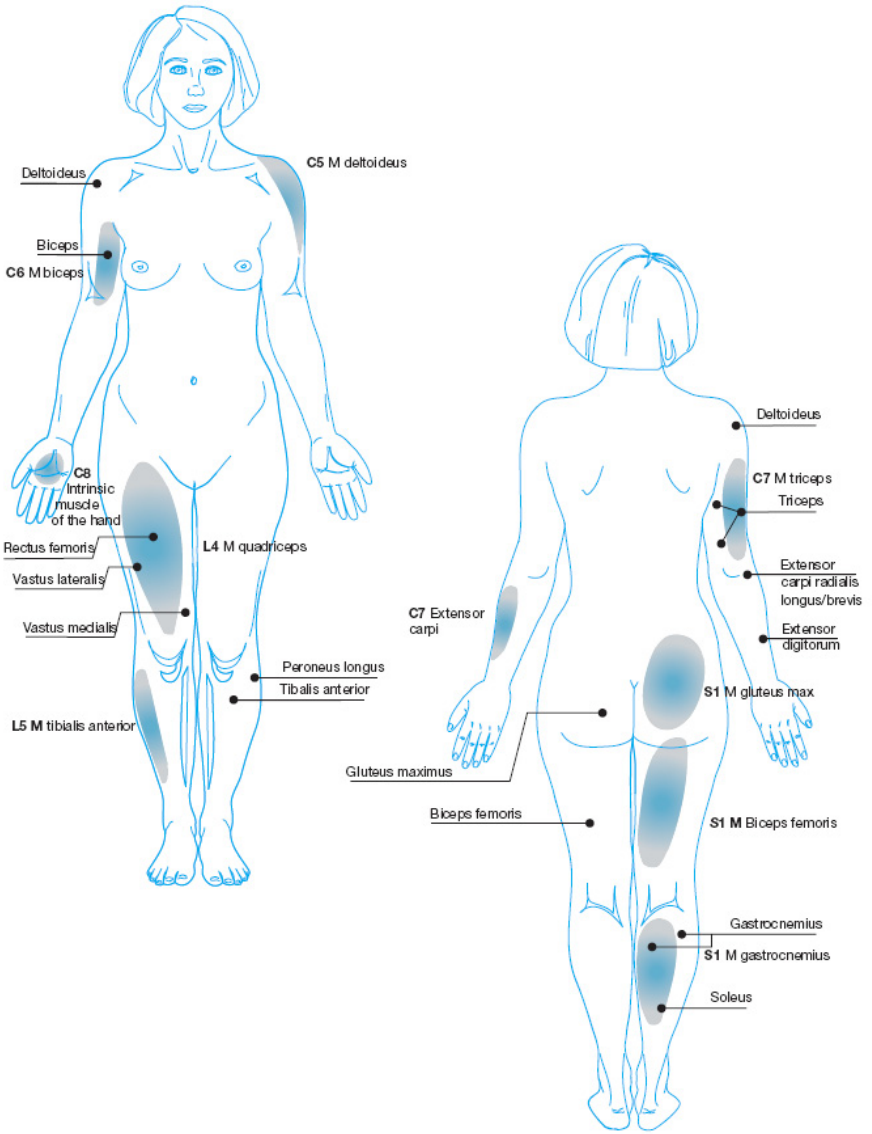
Intensity:
Clear feeling of current without pain.
Treatment Time:
30 minutes

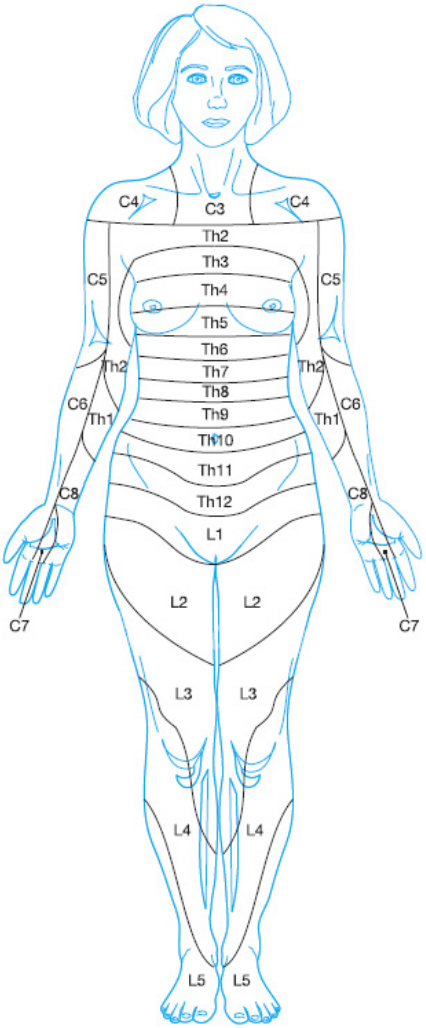


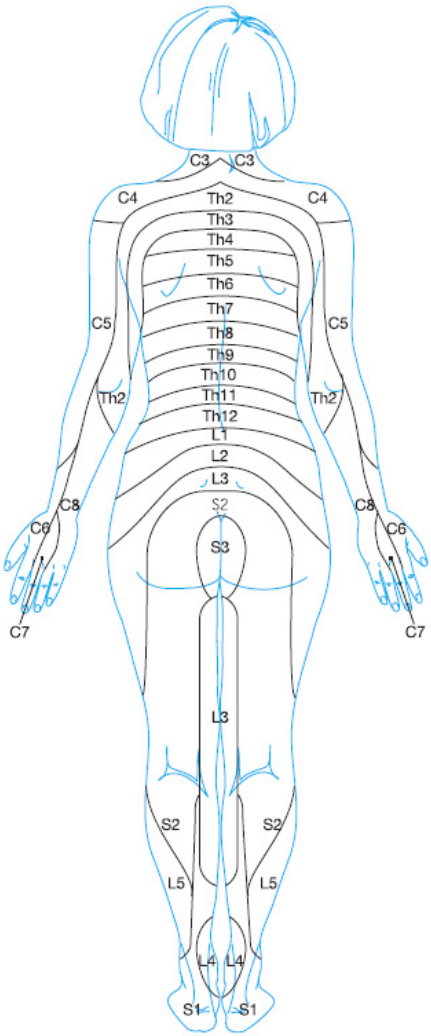


⚠ Current International standards require that a warning be given concerning the application of electrodes to the thorax (increased risk of cardiac fibrillation).

Time (min)	30
Pulse duration (µs)	75 – 170
Frequency (Hz)	70
Modulation time (sec)	3


Deltoideus
C5 M deltoideus
Biceps
C6 M biceps
C8
Intrinsic
muscle
of the hand
Rectus femoris
L4 M quadriceps
Vastus lateralis
Vastus medialis
Peroneus longus
Tibalis anterior
L5 M tibialis anterior
Deltoideus
C7 M triceps
Triceps
Extensor
carpi radialis
longus/brevis
C7 Extensor
carpi
Extensor
digitorum
S1 M gluteus max
Gluteus maximus
Biceps femoris
S1 M Biceps femoris
Gastrocnemius
S1 M gastrocnemius
Soleus


C4
C3
C4
Th2
Th3
C5
Th4
C5
Th5
Th6
Th2
Th7
Th2
Th8
C6
Th1
Th9
Th1
C6
Th10
Th11
C8
Th12
C8
L1
L2
L2
C7
C7
L3
L3
L4
L4
L5
L5


C3
C3
C4
Th2
C4
Th3
Th4
Th5
Th6
Th7
C5
C5
Th8
Th9
Th10
Th2
Th11
Th2
Th12
L1
L2
L3
S2
C8
C8
C6
S3
C6
C7
C7
L3
S2
S2
L5
L5
L4
L4
S1
S1

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