

# INSTRUCTION MANUAL

FOR THE

**EM**  **500**



# INDEX

Chapter Contents	Page
Index .....	1
1. Introduction .....	2
2. Cautions .....	3
3. Warnings .....	3
4. Contraindication .....	4
5. Adverse Reactions .....	4
6. General Description .....	4
7. Construction .....	5
8. Technical Specifications .....	6
9. Replaceable Parts .....	7
10. Accessories .....	7
11. Graphic Symbols .....	8
12. Attachment of Electrodes Lead Wires .....	8
13. Lead Wire Maintenance .....	9
14. Electrode Options .....	9
15. Electrode Placement .....	9
16. Tips For Skin Care .....	10
17. Application of Re-usable Self Adhesive Electrodes .....	11
18. Adjusting the Controls .....	12
19. Battery Information .....	17
20. Maintenance, Transportation and Storage Of Digital Ems Device .....	18
21. Safety - Technical Controls .....	19
22. Malfunctions .....	19
23. Conformity to Safety Standards .....	20
24. Warranty .....	20

## Chapter 1 : INTRODUCTION

### EXPLANATION OF DIGITAL EMS

Electrical Muscle Stimulation is an internationally accepted and proven way of treating muscular injuries. It works by sending electronic pulses to the muscle needing treatment; this causes the muscle to exercise passively.

It is a product derived from the square waveform, originally invented by John Faraday in 1831. Through the square wave pattern it is able to work directly on muscle motor neurons. DIGITAL EMS has low frequency and this in conjunction with the square wave pattern allows direct work on muscle groupings. This is being widely used in hospitals and sports clinics for the treatment of muscular injuries and for the re-education of paralyzed muscles, to prevent atrophy in affected muscles and improving muscle tone and blood circulation.

### HOW DIGITAL EMS WORKS

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

The EMS units send comfortable impulses through the skin that stimulate the nerves in the treatment area. When the muscle receives this signal it contracts as if the brain has sent the signal itself. As the signal strength increases, the muscle flexes as in physical exercise. Then when the pulse ceases, the muscle relaxes and the cycle starts over again. (Stimulation, Contraction and Relaxation.) Powered muscle stimulators should only be used under medical supervision for adjunctive therapy for the treatment of medical diseases and conditions.

## **Chapter 2 : CAUTIONS**

1. Safety of powered muscle stimulators for use during pregnancy has not been established.
2. Caution should be used for patients with suspected or diagnosed heart problems.
3. Caution should be used for patients with suspected or diagnosed epilepsy.
4. Caution should be used in the presence of the following:
  - a. When there is a tendency to hemorrhage following acute trauma or fracture;
  - b. Following recent surgical procedures when muscle contraction may disrupt the healing process;
  - c. Over the menstruating or pregnant uterus; and
  - d. Over areas of the skin which lack normal sensation.
5. Some patients may experience skin irritation or hypersensitivity due to the electrical stimulation or electrical conductive medium. The irritation can usually be reduced by using an alternate conductive medium, or alternate electrode placement.
6. Electrode placement and stimulation settings should be based on the guidance of the prescribing practitioner.
7. Powered muscle stimulators should be kept out of the reach of children.
8. Powered muscle stimulators should be used only with the leads and electrodes recommended for use by the manufacturer.
9. Portable powered muscle stimulators should not be used while driving, operating machinery, or during any activity in which involuntary muscle contractions may put the user at undue risk of injury.

## **Chapter 3 : WARNINGS**

1. The long-term effects of chronic electrical stimulation are unknown.
2. Stimulation should not be applied over the carotid sinus nerves, particularly in patients with a known sensitivity to the carotid sinus reflex.

3. Stimulation should not be applied over the neck or mouth. Severe spasm of the laryngeal and pharyngeal muscles may occur and the contractions may be strong enough to close the airway or cause difficulty in breathing.
4. Stimulation should not be applied transthoracically in that the introduction of electrical current into the heart may cause cardiac arrhythmias.
5. Stimulation should not be applied transcerebrally.
6. Stimulation should not be applied over swollen, infected, or inflamed areas or skin eruptions, e.g., phlebitis, thrombophlebitis, varicose veins, etc.
7. Stimulation should not be applied over, or in proximity to, cancerous lesions.

#### **Chapter 4: CONTRAINDICATION**

Powered muscle stimulators should not be used on patients with cardiac demand pacemakers.

#### **Chapter 5: ADVERSE REACTIONS**

Skin irritation and burns beneath the electrodes have been reported with the use of powered muscle stimulators.

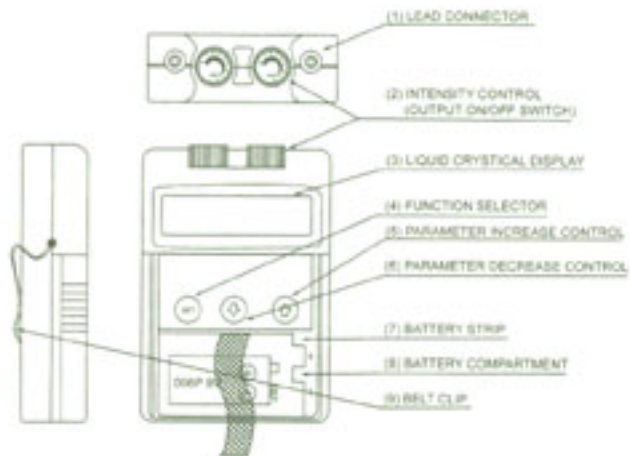
#### **Chapter 6 : GENERAL DESCRIPTION**

The EMS 500 is a battery operated pulse generator that sends electrical impulses through electrodes to the body and reaches the underlying nerves or muscle group. The device is provided with two controllable output channels, each independent of each other. An electrode pair can be connected to each output channel.

The electronics of the EMS 500 create electrical impulses whose

Intensity, Pulse Width, Pulse Rate, Contraction, Relaxation and Ramp may be altered with the switches. Press buttons are very easy to use and the slide cover prevents accidental changes in the setting.

## Chapter 7 : CONSTRUCTION



## Chapter 8 : TECHNICAL SPECIFICATION

The technical specification details of EMS 500 are as follows.

	MECHANISM	TECHNICAL DESCRIPTION
01.	Channel	Dual, isolated between channels.
02.	Intensity Control	Adjustable, 0-90 mA Max output 90mA (peak to peak) into 500 ohm load each channel
03.	Wave Form	Asymmetrical Bi-Phase Square Pulse
04.	Voltage	Adjustable, 0-45V Max output 45V (Peak to Peak) into 500 ohm load each channel.
05.	Power Supply	One 9V battery.
06.	Size	10cm (L) x 6 cm(W) x 2.1cm(H)
07.	Weight	120 grams with battery
08.	Pulse Rate	Adjustable, from 1 Hz to 150 Hz, 1 Hz/Step
09.	Pulse Width	Adjustable, from 30 $\mu$ S to 260 $\mu$ S, 10 $\mu$ S/Step
10.	Contraction Time	Adjustable from 1 - 30 seconds , 1 Sec./Step
11.	Relaxation Time	Adjustable from 1 - 30 seconds , 1 Sec./Step
12.	Ramp Time	Adjustable from 1 - 6 seconds , 1 Sec./Step
13.	Timer	Adjustable : 1 - 60 minutes, 1 Sec./Step
14.	Max. Charge per pulse	20 micro - coulombs
15.	Remark	There may be up to a +/- 5% tolerance of all parameters and +/-20% tolerance of amplitude & voltage.

## Chapter 9 : REPLACABLE PARTS

The replaceable parts and accessories of DIGITAL EMS devices are as given below –Except leads, electrodes and battery, battery case cover, please do not try to replace the other parts of a device.

	PARTS
01	ELECTRODES LEADS
02	ELECTRODES
03	9V BATTERY ,TYPE 6F22
04	BELT CLIP
05	BATTERY CASE COVER
06	LEAD CONNECTOR
07	MAIN PCB
08	INTENSITY KNOB

## Chapter 10 : ACCESSORIES

Each set EMS 500 are completed with standard accessories and standard label as given below

### I. Accessories

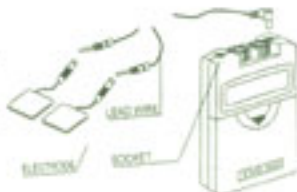
REF. NO.	PRODUCT	Q'TY
1. KF4040	40 X 4 0 MM Adhesive Electrodes	4 pieces
2. KE-24	Electrodes Leads	2 pieces
3.	9 V Battery	1 piece
4.	Instruction Manual	1 piece
5.	Carrying Case	1 piece

## Chapter 11 : GRAPHIC SYMBOLS

1.  Note Operating Instructions
2.  Degree of Electrical Protection BF
3.  Do not insert the plug into AC power supply socket
4.  Direct Current (DC power source)
5.  Pulse Rate
6.  Pulse Width
7.  Timer
8.  Parameter Increase
9.  Parameter Decrease

## Chapter 12 : ATTACHMENT OF ELECTRODE LEAD WIRES

The wires provided with the system insert into the jack sockets located on top of the device. Holding the insulated portion of the connector, push the plug end of the wire into one of the jacks (see drawing); one or two sets of wires may be used (connecting the wires to the stimulator, attach each wire to an electrode. Use care when you plug and unplug the wires. Jerking the wire instead of holding the insulated connector body may cause wire breakage.



## **CAUTION**

Do not insert the plug of the patient lead wire into the AC power supply socket.

## **Chapter 13: LEAD WIRE MAINTENANCE**

Clean the wires by wiping with a damp cloth. Coating them lightly with talcum powder will reduce tangling and prolong life.

## **Chapter 14 : ELECTRODE OPTIONS**

You should use the same size and type of electrodes that was supplied with your EMS device, unless your clinician instructs you to use a different electrode. Follow application procedures outlined in electrode packing, to maintain stimulation and prevent skin irritation. Use the legally marketed EMS electrode is recommended. The device is completed with standard carbon film adhesive electrodes in size 4x4cm.

## **Chapter 15 : ELECTRODE PLACEMENT**

The placement of electrodes can be one of the most important parameters in achieving success with DIGITAL EMS therapy. Of utmost importance is the willingness of the clinician to try the various styles of electrode placement to find which method best fits the needs of the individual patient.

Every patient responds to electrical stimulation differently and their needs may vary from the conventional settings suggested here. If the initial results are not positive, feel free to experiment. Once an acceptable placement has been achieved, mark down the electrodes sites and the settings on the patient's Reference sheet of this manual, so the patient can easily continue treatment at home.

## Chapter 16 : TIPS FOR SKIN CARE

To avoid skin irritation, especially if you have sensitive skin, follow these suggestions:

1. Wash the area of skin where you will be placing the electrodes, using mild soap and water before applying electrodes, and after taking them off. Be sure to rinse soap off thoroughly and dry skin well.
2. Excess hair may be clipped with scissors; do not shave stimulation area.
3. Wipe the area with the skin preparation your clinician has recommended. Let this dry. Apply electrodes as directed.
4. Many skin problems EMS arise from the "pulling stress" from adhesive patches that are excessively stretched across the skin during application. To prevent this, apply electrodes from centre outward; avoid stretching over the skin.
5. To minimize "pulling stress", tape extra lengths of lead wires to the skin in a loop to prevent tugging on electrodes.
6. When removing electrodes, always remove by pulling in the direction of hair growth.
7. It may be helpful to rub skin lotion on electrode placement area when not wearing electrodes.
8. Never apply electrodes over irritated or broken skin.

## Chapter 17 APPLICATION OF RE-USABLE SELF ADHESIVE ELECTRODES

### **Application**

1. Clean and dry the skin at the prescribed area thoroughly with soap and water prior to application of electrodes.
2. Insert the lead wire into the pin connector on the pre-wired electrodes.
3. Remove the electrodes from the protective liner and apply the electrodes firmly to the treatment site.

### **Removal**

1. Lift at the edge of electrodes and peel; do not pull on the lead wires because it may damage the electrodes.



2. Place the electrodes on the liner and remove the lead wire by twisting and pulling at the same time.

### **Care and Storage**

1. Between uses, store the electrodes in the resealed bag in a cool dry place.
2. It may be helpful to improve repeated application by spreading a few drops of cold water over the adhesive and turn the surface up to air dry. Over Saturation with water will reduce the adhesive properties.

## Important

1. Do not apply to broken skin.
2. The electrodes should be discarded when they are no longer adhering.
3. The electrodes are intended for single patient use only.
4. If irritation occurs, discontinue use and consult your clinician.
5. Read the instruction for use of self-adhesive electrodes before application.

## Chapter 18 : ADJUSTING THE CONTROLS

### 1. Slide Cover:

A slide-on panel covers the controls for Contraction Time, Relaxation Time, Ramp Time, Pulse Width, and Pulse Rate. Your medical professional may wish to set these controls for you and request that you leave the cover in place.

### 2. Power On/Off Switch and Intensity Controls:

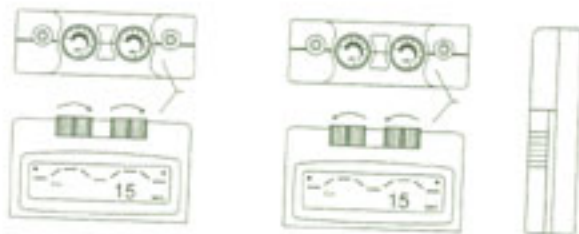
If both controls are in the off-position, the device is switched off.

By turning the controls clockwise, the appropriate channel is switched on and the indicator of power (a dot) will reveal on the LCD.

The current strength of the impulses transmitted to the electrodes increases further when the control is turned clockwise.

To reduce the current strength or switch the device off, turn the control counter clockwise to the required setting or off-position, respectively.





### 3. Lead Connector

Connection of the electrodes is made with two-lead connector. The device must be switched off before connecting the cables. Both intensity controls must be at the Off position. Electrodes must be pressed firmly on the skin.



### 4. Function Selector

Expose the controls by sliding front cover down from top of unit. This button Controlling the menu on the LCD. When the button is pressed, it can change menu from contraction time, relaxation time, ramp time, pulse rate, pulse width to timer. The parameter of each function can be adjusted when it is revealed on the menu.



### 5. Parameter Increase Control

This button controlling the increase of parameter. When pressing this button, the parameter will increase. Press the button until the value desired is reached.



### 6. Parameter Decrease Control

This button controlling the decrease of parameter. When pressing this button, the parameter will decrease. Press the button until the value desired is reached.



### 7. Function Indicator

The drawing on the top of LCD showing the function that is working. Each part of the drawing represents one function of the course.



The defined area will flash when the device is working on that function.

## 8. Step to Set Parameter

The parameter of a treatment course can be adjusted according to the following steps.

Press "set" button to select the function you wish to set a value.

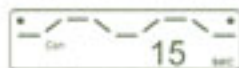
### a. Turn on the Intensity

After the electrodes are placed firmly on skin and the lead wires are plugged in the socket of device, turn the on/off control clockwise. The menu will reveal on LCD. Notice the indication of power and function on the LCD.



### b. Set Contraction Time

The contraction time controls the time of stimulation. By pressing parameter controls, the contraction time can be pre-set. The range is adjustable from 1 second to 30 seconds.



### c. Set Relaxation Time

The relaxation time determines the time of relaxation. The stimulation ceases at setting relaxation time and then re-start in a cycle pattern. The relaxation time of both channels is changed by pressing the parameter controls. The range of it is adjustable from 1 second to 45 seconds.



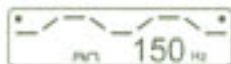
d. Set Ramp Time

This ramp time controlling the time of output current that increase from 0 to the setting level, and from the setting value to 0. When the ramp time is set, each contraction may be ramped in order that signals come on and come off gradually and smoothly. The ramp time is adjustable from 1 to 8 seconds by pressing the parameter controls.



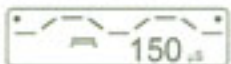
e. Set Pulse Rate

The pulse rate determines how many electrical impulses are applied through the skin each second. By pressing the parameter controls, the number of current impulses per second (Hz) for both channels can be continually adjusted. The pulse rate is adjustable from 1 Hz to 150 Hz. Unless otherwise instructed, turn the pulse rate control to the 70-120 Hz range.



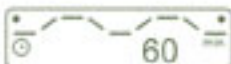
f. Set Pulse Width

The pulse width determines the length of time. Each electrical signal is applied through the skin, which controls the strength and sensation of the stimulation. The pulse width is adjustable from 2 to 250  $\mu$ S. Press the buttons until the desired value is reached.



g. Set Timer

The treatment time is adjustable from 1 to 60 minutes.



#### 10. Check/Replace the Battery:

Over time, in order to ensure the functional safety of DIGITAL EMS, changing the battery is necessary.

1. Make sure that both intensity controls are switched to off- position.
2. Slide the battery compartment cover and remove.
3. Remove the battery from the compartment.
4. Insert the battery into the compartment.  
Note the polarity indicated on the battery and in the compartment.
5. Replace the battery compartment cover and slide to close



## **Chapter 19 : BATTERY INFORMATION**

EMS 500 can be used with 6F22 rechargeable battery when necessary. If you use rechargeable batteries, please follow the instructions.

### **RECHARGEABLE BATTERIES:**

Prior to the use of a new unit, the rechargeable battery should be charged according to the battery manufacturer's instructions. Before using the battery charger, read all instructions and cautionary markings on the battery and in this instruction manual.

After being stored for 60 days or more, the batteries may lose their charge. After long periods of storage, batteries should be charged prior to use.

### **BATTERY CHARGING**

- (1) Plug the charger into any working 110 or 220/240v mains electrical outlet. The use of any attachment not supplied with the charger

may result in the risk of fire, electric shock, or injury to persons.

- (2) Follow the battery manufacturer's instructions for charging time.
- (3) After the battery manufacturer's recommended charging time has been completed, unplug the charger and remove the battery.
- (4) Batteries should always be stored in a fully charged state.

To ensure optimum battery performance, follow these guidelines:

- (a) Although overcharging the batteries for up to 24 hours will not damage them, repeated overcharging may decrease useful battery life.
- (b) Always store batteries in their charged condition. After a battery has been discharged, recharge it as soon as possible. If the battery is stored more than 60 days, it may need to be recharged.
- (c) Do not short the terminals of the battery. This will cause the battery to get hot and can cause permanent damage. Avoid storing the batteries in your pocket or purse where the terminals may accidentally come into contact with coins, keys or any metal objects.
- (d) **WARNINGS:**
  1. Do not attempt to charge any other types of batteries in your charger, other than the nickel-cadmium rechargeable batteries. Other types of batteries may leak or burst.
  2. Do not incinerate the rechargeable battery as it may explode!

## **Chapter 20: MAINTENANCE, TRANSPORTATION AND STORAGE OF DIGITAL EMS DEVICE**

1. Non-flammable cleaning solution is suitable for cleaning the device.  
Note: Do not smoke or work with open lights (for example, candles, etc.) when working with flammable liquids.
2. Stains and spots can be removed with a cleaning agent.
3. Do not submerge the device in liquids or expose it to large amounts of water.
4. Return the device to the carrying box with sponge foam to ensure that the unit is well-protected before transportation.

5. If the device is not to be used for a long period of time, remove the batteries from the battery compartment (acid may leak from used batteries and damage the device). Put the device and accessories in carrying box and keep it in cool dry place.
6. The packed DIGITAL EMS device should be stored and transported under the temperature range of  $-20^{\circ}\text{C}$  –  $+60^{\circ}\text{C}$ , relative humidity 20% – 95%, Atmosphere pressure 500hPa – 1060hPa.

## **Chapter 21: SAFETY-TECHNICAL CONTROLS**

For safety reasons, check your EMS 500 each week based on the following checklist.

1. Check the device for external damage.
  - deformation of the housing.
  - damaged or defective output sockets.
2. Check the device for defective operating elements.
  - legibility of inscriptions and labels.
  - make sure the inscriptions and labels are not distorted.
3. Check LCD
  - Parameters must be visible on the CLD.
4. Check the usability of accessories.
  - patient cable undamaged.
  - electrodes undamaged.

Please consult your distributor if there are any problems EMS with device and accessories.

## **Chapter 22 MALFUNCTIONS**

Should any malfunctions occur while using the DIGITAL EMS, check

- whether the controls or parameters are set to the appropriate form

- of therapy. Adjust the control correctly.
- whether the cable is correctly connected to the device. The cables should be inserted completely into the sockets.
  - whether the LCD reveal the menu. If necessary, insert a new battery.
  - for possible damage to the cable. Change the cable if any damage is detected.
- \* if there is any other problem, please return the device to your distributor. Do not try to repair a defective device.

## Chapter 23 Conformity to Safety Standards

The EMS 500 devices are in compliance with  
EN60 601-1: 1990+A1:1993+A2:1995.

## Chapter 24 : WARRANTY

All EMS 500 models carry a warranty of one year from the date of delivery. The warranty applies to the stimulator only and covers both parts and labour relating thereto.

The warranty does not apply to damage resulting from failure to follow the operating instructions, accidents, abuse, alteration or disassembly by unauthorized personnel.

**Distributed by:**

