Instruction Manual

TENS 210 (T)

METTLER ELECTRONICS® corp.

IR9-42

1333 South Claudina Street
Anaheim, CA 92805
(800) 854-9305 • 1 (714) 533-2221
Fax: 1 (714) 635-7539
www.mettlerelectronics.com
Email: *mail@mettlerelectronics.com*

TABLE OF CONTENTS

1-INTRODUCTION TO TENS

WHAT IS PAIN?
Pain is a warning system. It is essentially the body's method of telling us that something is wrong. Pain is important: without it, abnormal conditions may continue undetected, causing irreversible damage to vital parts of our bodies. The pain we feel is actually transmitted to specific parts of our bodies from our brains. When we touch something hot, for example, a pain message is transmitted along small nerves and to our spinal cord where it is passed in to our brain. Our brain decodes the message and sends back a response. This response could be the pulling our hand away from the hot object.
Even though pain is a much needed warning signal, there are certain instances where pain serves little necessary purpose. This type of pain, often referred to as "chronic pain", instead becomes a burden on the individual. For many individuals, chronic pain is untreatable and is often associated with diseases, such as arthritis, or simple wear and tear on the body. Chronic pain is not necessarily the result of injury and may even be present after successful surgery. Unlike pain described in the first paragraph, this type of pain is not necessary for the well being of the human body.

WHAT IS TENS?
Transcutaneous Electrical Nerve Stimulation(TENS) is a non-invasive, drug-free method of masking chronic pain. A TENS device, like the **TENS 210(T)** unit you have

just purchased, sends tiny electrical impulses through the skin to small nerves. These tiny impulses help trigger a different message than the original pain message being sent to the brain, eliminating the feeling of pain.
Your **TENS 210(T)** device is equipped to send a wide range of pulse widths and durations. Each setting designed to have a varied effect on the small nerves near or around the pain producing area. These electrical pulses can result in a soft tapping sensation or in large muscle contractions. Naturally, different settings will have different results for different users.

HOW DOES TENS WORK?
The TENS device sends comfortable impulses through the skin that stimulate the nerve (or nerves) in the treatment area. In many cases, this stimulation will greatly reduce or eliminate the pain sensation you feel by masking the original pain message sent to the brain.
It is also believed that TENS stimulation helps release 8 endorphins into the blood stream thereby further reducing pain, sometimes for hours after use of the TENS device.
It must be noted that TENS devices do not cure physiological problems that result in pain. Nor do they truly eliminate the pain that one feels from associated problems. TENS devices merely mask the pain messages being transmitted to the brain, fooling the brain into believing there is no pain.

Having said this, TENS devices are clinically proven useful in the fight against chronic and unnecessary pain. TENS devices have proven effective in most cases, and although they may not work for everyone, they have allowed thousands of people to once again enjoy pain-free everyday activities.

2-CAUTIONS AND WARNINGS

BEFORE YOU BEGIN
1.Read the operation manual before using this TENS device.
Contraindications
1. Do not place electrodes on the front of the throat. This may result in spasms of the laryngeal and pharyngeal muscles. Do not place the electrodes over the carotid nerve, particularly with patients who experience sinus reflex sensitivity.
2. Do not use TENS on patients who have a demand-type pacemaker or any other implanted electronic device.
3. Do not apply electrodes so that current flows transcerebrally (through the head).
4. Do not use TENS whenever pain syndromes are undiagnosed, until etiology is established.
Warnings
1. The safety of TENS devices for use during pregnancy or birth has not been established.

2. Keep this device out of the reach of children.
3. Electrodes should not be placed over the eyes, in the mouth or internally.
4. Avoid adjusting controls while operating machinery or vehicles.
5. Care should be taken so the stimulator controls cannot be changed while operating potentially dangerous machinery or driving a vehicle.
6. Always turn the TENS device off before applying or removing electrodes.
7. Caution should be used when applying TENS to patients suspected of having heart disease. Further clinical data is needed to show there are no adverse effects on those with heart disease.
8. Electronic monitoring equipment (such as ECG monitors and ECG alarms may not operated properly when TENS stimulation is in use.
9. TENS devices do not have AP/APG protection. Do not use in the presence of explosives or flammables.
10. If TENS treatment becomes ineffective or unpleasant, stimulation should be discontinued until reevaluation by a physician.
11. TENS is not effective for pain of central origin. (This includes headache.)
12. TENS devices should be used only under the continued supervision of a physician.
13. TENS devices have no curative value.
14. TENS is a symptomatic treatment and as such suppresses the sensation of pain which would otherwise serve as a protective mechanism.

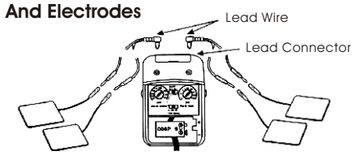
Precautions
1. Isolated cases of skin irritation may occur at the site of electrode placement following long-term application.
2. Effectiveness is highly dependent upon patient selection by a person qualified in the management of pain patients.

Adverse reactions:
1. Skin irritation and electrode burns are potential adverse reactions.

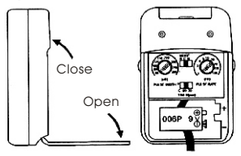
3-ABOUT THIS DEVICE

YOUR **TENS 210(T)** DEVICE
Thank you for purchasing a **TENS 210(T)** brand Transcutaneous Electrical Nerve Stimulation Device. We hope that the **TENS 210(T)** device will bring you relief from your pain.
In order to familiarize yourself with the important functions and features of this device, we ask you to study the following diagrams carefully and be sure to read the entire operation manual before using the device.
The **TENS 210(T)** is a battery operated device that includes two controllable output channels. This TENS device creates electrical impulses whose intensity, duration, number per second and modulation can be altered with the controls or switches.
The **TENS 210(T)** dial controls are very easy to use and the slide cover prevents accidental changes in settings. We recommend that you consult a physician before using **TENS 210(T)** device.

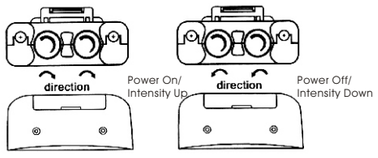
TENS 210(T) Leads And Electrodes



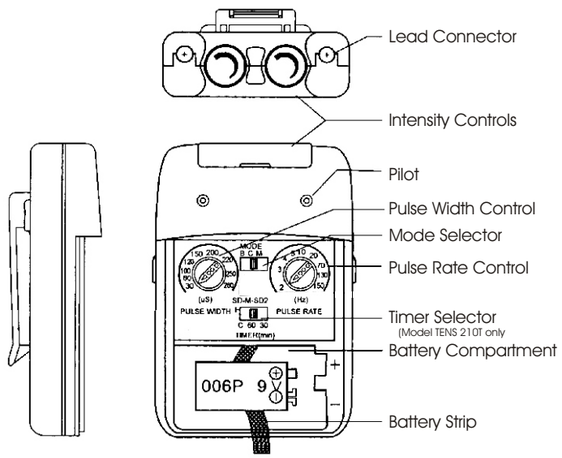
TENS 210(T) Battery Compartment



Of/Off Intensity Controls

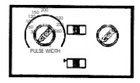


The TENS 210(T) Device

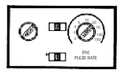


4-USING THE CONTROLS

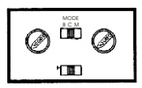
You should have familiarized yourself with the different functions and features of the **TENS 210(T)** in the previous chapter. This chapter will introduce each of the individual controls and explain their purpose and function.



PULSE WIDTH
The Pulse Width dial is used to control the width of the electrical pulse, altering the length of the electrical pulse. A wider pulse width setting will deliver stronger stimulation for each given intensity. It is widely believed that by using a combination of intensity and pulse width settings, electrical pulses are capable of stimulating different groups of nerve fibres.
A wider pulse width is effective on recruiting motor fibres, whereas the narrow pulse width is more effective on more sensory fibres.
The choice of which pulse width to use is partially dependent upon the Treatment Mode (B.M.P) and protocol settings.



PULSE RATE
The Pulse Rate, displayed in units of Hz, affects the rate at which pulses are applied to the electrodes and therefore the skin. Pulse rate settings should be determined in relation to the type of electrode placement chosen for the user. When using contiguous and dermatome electrode placements (i.e., stimulating directly through the area of pain or localized innervation), a quick pulse rate (setting greater than 80Hz on the Pulse Rate Control) is desired. The patient should not perceive individual pulses but rather have the sensation of steady continuous stimulation. When using point treatments, it has been suggested that slow pulses be utilized (less than 10Hz). With this setting the patient should be able to slightly perceive individual pulses. When using multiple electrode placement strategies, such as combinations of point and contiguous electrode placements, quicker pulse rates are suggested. Despite the above recommendations, individual patients may require variations to the above settings, determined through their physician or experimentation.



TREATMENT MODE
Treatment mode consists of three potential settings:
Continuous (C), Burst (B) or Modulated (M). Treatment Mode settings control the program of potential pulses in stimulation cycle.

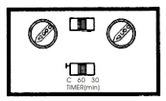
The first setting, continuous (C), offers users direct control over the control knobs of the device.
The second mode, Burst Mode (B), releases individual "bursts" of 7-10 individual pulses in a fixed pattern. It is thus a combination of Continuous TENS and Low Rate TENS. In Burst Mode, the treatment frequency is fixed by the instrument and is not adjustable with the Frequency Rate control.
The third setting is the Modulated Mode (M). This mode attemps to prevent accommodation by continously changing the intensity and the pulse width in a set pattern. If you adjust the intensity during a low intensity portion of the cycle, turn the contro desired intensity.

INTENSITY
Each patient responds differently to different levels of intensity, due to varying degrees of tissue resistance, innervation, skin thickness, etc. Intensity instructions are therefore limited to the following settings:

Perception-The intensity is increased so that the patient can feel the stimulation but there is not any muscular contraction.

Slight contraction- Intensity is increased to a barely visible muscular contraction that is not strong enough to move a joint. When using low pulse rate settings, this

will show as individual twitches. At higher pulse rates there will simply be increased muscle tension. Strong muscular contraction is typically not used in TENS therapy. However, muscular contraction may be useful if the pain involves a cramped or spastic muscle. The TENS can be used as a traditional muscle stimulator in these circumstances to quickly break the spasm. Use a quick pulse rate, wide pulse duration and set the intensity to visible contraction (still within patient tolerance). Twenty or thirty minutes of such a tetanized muscular contraction will generally break the spasm. In all cases, if the patient complains that the stimulation is uncomfortable, reduce intensity and/or cease stimulation.



TIME DURATION (MODEL **TENS 210T** ONLY)
The onset of pain relief should occur shortly after the intensity setting has been determined. However, in some cases, pain relief may take as long as 30 minutes to achieve, especially when using point electrode placements and slow pulse rates.
TENS units are typically operated for long periods of time, with a minimum of 20 to 30 Minutes and in some postoperation protocols, as long as 36 hours. In general, pain relief will diminish within 30 minutes of the cessation of stimulation. Pain relief

obtained through point electrode placements may last longer (perhaps because of the presence of endorphins).

5-ATTACHING THE LEAD WIRES TO THE DEVICE

The wires provided with the TENS device 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. After 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.

6-LEAD WIRE MAINTENANCE

It is important that you take good care of the lead wires. Failure to do so will result in reducing the device's overall effectiveness.
Clean the wires by wiping with a damp cloth. Coating them lightly with talcum powder will reduce tangling and prolong life.

7-ELECTRODE OPTIONS

Use V Trode™ self-adhesive electrodes from Mettler Electronics Corp. The following part numbers should be used to reorder electrodes from your Mettler distributor:

2702 V Trode 2" diameter round electrodes with lead wires, case of ten packages (four electrodes/pkg.)
2703 V Trode 2.75" diameter round electrodes with lead wires, case of 10 packages (four electrodes/pkg.)
2704 V Trode 2" x 4" oval electrodes with lead wires, case of 10 packages (four electrodes/pkg.)
2705 V Trode 2" square electrodes with lead wires, case of 10 packages (four electrodes/pkg.)

8-ELECTRODE PLACEMENT

WHERE TO PLACE THE ELECTRODES
The placement of electrodes can be one of the most important factors in achieving success with TENS therapy. Of utmost importance is the willingness of the physician and patient to try the various positions of electrode placement in order to find the best method for the individual. Be prepared to invest some time and energy into experimenting with electrode placement. This will increase the

likelihood of success with the device. Individuals respond differently to electrical stimulation and their needs may vary from the continuous settings. If the initial results are not positive, be sure to experiment. Once an acceptable placement has been achieved, mark down the electrode sites and the settings.
The following sections introduce different types of placement techniques. Be sure to experiment with each one or consult your physician to find out which placement techniques may be more effective for you.

CONTIGUOUS PLACEMENT
This is the most common placement technique. It involves placing the electrodes near or around the area of localized pain, in such a way as to direct the flow of current through or around the area of pain.
This is achieved by placing one pad on either side of the pain area. This works well if the pain is localized on an extremity and deep within the tissue. Pad placement on the front and back of he affected limb will allow the current to flow completely through the limb and thus through the pain area.

DERMATOMES, MYOTOMES AND SCLEROTOMES
These are the regions of the body enervated by one spinal nerve. The technique of electrode placement involves stimulating across the enervated area. This is achieved by placing one electrode on the pain site and another electrode at

the point where the nerve root joins the spinal cord.

MOTOR, TRIGGER AND ACUPUNCTURE POINT
While these points of high tissue conductivity can differ in location, and in theory of use, their use as electrode placement site is identical to the techniques described above. The easiest technique involves placing one pad directly over the point and completing the circuit by placing the second pad on some area on the affected side. This second electrode sites can be within a nerve zone, or it can be the master point located between the thumb and the forefinger on the dorsal web area of the hand, between the two metacarpal bones.

MULTIPLE PLACEMENT STRAEGIES
Because this TENS device has two independently operated channels, you may take advantage of alternative, concurrent pad placement strategies.
For example, it is possible to use two different electrode placement strategies at the same time. One channel can be used to directly stimulate the pain site in a contiguous manner, while the other channel can be utilized for point therapy.

9-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. You may choose to use a skin treatment or preparation. This should be recommended by your physician. Apply, let dry, and apply electrodes as directed.
4. Many skin problems arise from the "Pulling stress" from adhesive patches that are excessively stretched across the skin during application. To prevent this, apply electrodes with the centers outward. Avoid stretching over the skin.
5. To minimize "pulling stress", tape the 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.

10-SELF-ADHESIVE ELECTRODES

HOW TO APPLY SELF- ADHESIVE ELECTRODES
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 prewired electrodes.
3. Remove the electrodes from the protective liner and apply the electrodes firmly to the treatment area.

HOW TO REMOVE SELF - ADHESIVE ELECTRODES
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 OF SELF - ADHESIVE ELECTRODES
1. Between uses, store the electrodes in the resealed bag in a cool dry place.
2. Improve repeated application by spreading a few drops of cold water over the adhesive and turn the surface up to air dry. Note, however, that over saturation with water will reduce the adhesive properties.

CAUTION
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 physician.
5. Read all instructions for use of self - adhesive electrodes before application.

MODE CONTROL (MODEL TENS 210(T) ONLY)
Expose the controls by opening front cover of the unit. This switch has 3 positions: B for burst stimulation, C for continuous stimulation, and M for modulation stimulation. Adjust the Mode Selector until the desired setting has been achieved.

PULSE RATE CONTROL
This dial determines how many electrical impulses are applied through the skin each second. By turning these controls, the number of current impulses per second (Hz) for both channels can be continually adjusted. Unless otherwise instructed, turn the pulse rate control to the 70-120Hz range.

PULSE WIDTH CONTROL
The dial adjusts the length of time each electrical signal is applied through the skin, which controls the strength and sensation of the stimulation. If no instructions regarding the pulse width are given in therapy, set the control to the suggested 70-120 μS setting.
TIMER CONTROL
Treatment time of TENS can be preset with timer control.
This switch has 3 positions: 30minutes, 60 minutes and C for a continuous treatment. Push the Mode Selector until engaged in position desired.

11-ADJUSTING THE CONTROLS

PANEL COVER
A cover conceals the controls for pulse width, Pulse Rate, Mode Selector and Modulation Selector. Your medical professional may wish to set these controls for you and request that you leave the cover in place. Press the top side of the cover and pull down in order to open the cover.

DISPLAY LED
The TENS device's LED illuminates each time the device releases an electrical pulse. Note, the LED illuminates for frequencies up to 30Hz. At higher frequencies, the LED will appear to be illuminated constantly.

ON/OFF SWITCH AND INTENSITY CONTROL
If both intensity controls are in the off-position the device is switched off. Turning the controls clockwise turns the device on.
To reduce the strength of electrical pulses or turn the device off, turn the control counter clockwise to the required setting or off-position.

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

CHECK/REPLACE THE BATTERY
Over time, in order to ensure the functional safety of TENS, changing the battery is necessary.
1. Make sure that both intensity controls are switched to off position.
2. Slide the battery compartment cover and open it.
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 press to close.

12 - BATTERY INFORMATION

If you use rechargeable batteries, please be sure to follow these 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 recharged prior to use.

BATTERY CHARGING
1. Plug the charger into any working 110 or 220/240 V electrical outlet. The use of any attachment not supplied with the charger may result in the risk of fire, electric shock, or injury.
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:
1. Although charging the batteries for up to 24 hours will not damage them. repeated overcharging may decrease useful battery life.
2. 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.
3. Do not short the terminals of the battery. This will cause the battery to get hot and can cause permanent dam age. Avoid storing the batteries in your pocket or purse as the terminals may accidentally come into contact with coins, keys or other metal objects.
4. Warnings:
   1. **Do not attempt to charge any 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!**

- deformation of the housing
- damaged or defective output sockets

Check the device for defective operating elements:
- legibility of inscriptions and labels
- make sure the inscriptions and labels are not distorted

Check the LED:
- LED must be illuminated when switched on

Check the usability of accessories:
- electrode cable undamaged
- electrodes undamaged

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

15 - MALFUNCTIONS

Should any malfunctions occur while using the TENS, check:
- whether the switch/control is 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 impulse display LED is illuminated. If necessary, insert a new battery.

13 - CARING FOR YOUR TENS DEVICE

MAINTENANCE, TRANSPORTATION AND STORAGE OF YOUR TENS DEVICE
1. Alcohol 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 mild cleaning detergent or agent.
3. Do not submerge the device in liquids or expose it to large amounts of water.
4. Always return the device to the carrying box in order 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 TENS device should be stored and transported under the temperature range of - 20 to + 60℃, relative humidity 20%-95%, atmosphere pressure 500hPa - 1060hPa.

14 - SAFETY MEASURES

SAFETY - TECHNICAL CONTROLS
For safety reasons, check your TENS each week based on the following checklist:
Check the device for external damage:

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

16 - CONTENTS

Your **TENS 210(T)** includes the following items:
1. One TENS(T) unit.
2. Two electrode leads (2101)
3. One package V Trode self-adhesive electrodes (2705)
4. One Alkaline 9V battery
5. One Instruction Manual
6. One carrying case

17 - WARRANTY

The **TENS 210(T)** unit is warranted against defects in materials and workmanship for a period of one year from date of purchase. The lead wires are warranted for 90 days. During the applicable warranty period Mettler Electronics Corp. will, at its discretion, either repair or replace the Product without charge for these types of defects.

For service under this warranty, the Product must be returned by the buyer within the applicable warranty period to Mettler Electronics Corp. Shipping charges to Mettler Electronics Corp. under this warranty must be paid by the buyer. The buyer must also include a copy of the sales receipt or other proof of the date of purchase. If the Product is returned without proof of the date of purchase, it will be serviced as an out-of-warranty product at Mettler Electronics Corp.'s prevailing service rates.

Alteration, misuse, or neglect of the Product voids this warranty. Except as specific ally set forth above, Mettler Electronics Corp. makes no warranties, express or implied, including without limitation any implied warranty of merchantability or fitness for a particular purpose, with respect to the Product. If any implied warranties apply as a matter of law, they are limited in duration to one year.

Mettler Electronics Corp. shall not be liable for any indirect, special, consequential or incidental damages resulting from any defect in or use of the Product.

Any legal action brought by the buyer relating to this warranty must be commenced within one year from the date any claim arises and must be brought only in the state or federal courts located in Orange County, California.

Some states do not allow limitations on how long an implied warranty lasts, or the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to the buyer. This warranty gives the buyer specific legal rights, and the buyer may also have other rights which vary from state to state.

18 - TECHNICAL SPECIFICATIONS

FOR **TENS 210(T)**

Channel: Dual, isolated between channels.

Pulse amplitude: Adjustable 0- 80mA peak into 500Ω load each channel, constant current.

Pulse Rate: 2Hz - 150Hz(adjustable).

Pulse Width: 30 μs-260 μs (adjustable).

Timer: C -60 - 30 min TENS 210T ONLY

Modulation Mode: Pulse width of successive output pulse is automatically varied in cycle pattern over an interval of nominally 6.5 seconds.

1. Pulse width decreases linearly over a period of 0.5 seconds from the control setting value to a value which is 60% less.
2. This narrower pulse width is maintained for 2 seconds and then increased linearly over a 0.5 second period to its original value.

3. Pulse width is maintained for 3.5 sec. at the control setting value. The cycle is then repeated.

Burst Mode: Bursts consist of Pulse Width (adjustable), frequency=100Hz. Bursts occur twice every second.

Wave Form: Asymmetrical Bi-Phasic square pulse.

Voltage: 0-100 Volt (open circuit)

Power Source: 9-Volt battery (alkaline or nickel-cadmium rechargeable)

Battery Life: Approximately 70 hours at nominal settings.

Dimensions: 3.7 in. (H) x 2.6 in. (W) x 0.9 in.(T)

Weight: 4OZ (battery included).

All electrical specifications are ±20% 500Ω load.