Grafco®

A Graham-Field® Family Brand

TENS / EMS
Dual Channel Electrical Stimulator
Model GF-DF5

Operation Manual

Read this manual before operating your GF-DF5 Dual Channel Electrical Stimulator.

Save this manual for future use.

The most current version of this manual can be found online at www.grahamfield.com.

GF-DF5-INS-LAB-RevA16

CONTENTS

1 INTRODUCTION

Thank you for purchasing the GF-DF5 Dual Channel Electrical Stimulator.

Important safety, operating, and maintenance instructions that warrant your attention are included in this operation manual. Read the entire manual carefully before using your Dual Channel Electrical Stimulator, and refer to it whenever necessary during use.

⚠ **WARNING: Federal Law (USA) restricts this device to sale by or on the order of a physician. This product should not be used unless the operator has been instructed by a qualified healthcare professional.**

DECLARATION OF CONFORMITY

The GF-DF5 Dual Channel Electrical Stimulator conforms to the following standards:

IEC 60601-1, IEC 60601-1-2, IEC 60601-2-10, IEC 60601-1-11, IEC 60601-1-4, IEC 60601-1-6, IEC 62304, IEC 62366, ISO14971, ISO 10993-1, ISO 10993-5, ISO 10993-10

The GF-DF5 Dual Channel Electrical Stimulator is a battery-operated electrical stimulation system with the following two basic functions, which can be used either alone or in combination.

1. TENS, Transcutaneous Electrical Nerve Stimulation
2. EMS, Electrical Muscular Stimulation

The operation principle of electrical stimulation equipment is based on the simulation of the body's own pulses, transmitted transcutaneously to nerve or muscle fibers, with electrodes. The electrodes can be attached to many parts of the body, where the electrical stimuli are practically painless; you feel only a gentle prickling or vibration in some applications. The electrical pulses transmitted to the tissue affect the transmission of stimulation in nerve conductions as well as neuron and muscle tissue.

TENS DESCRIPTION

TENS, Transcutaneous Electrical Nerve Stimulation, is a treatment whereby electrical impulses are applied to nerves through electrode pads placed on the skin. TENS is non-invasive and does not use pharmaceuticals. TENS uses tiny battery-operated electrical impulses sent through the skin to nerves to modify your pain perception. TENS does not cure any physiological problem; it only helps control the pain. TENS does not work for everyone; however, in most patients it is effective in reducing or eliminating pain.

TENS Intended Use (Indications)

TENS is clinically tested and approved with the following applications:

- Symptomatic relief of chronic intractable pain
- Post traumatic pain
- Post surgical pain

EMS DESCRIPTION

EMS, Electrical Muscle Stimulation, is a battery-operated pulse generator that sends electrical impulses to electrodes attached to the body to stimulate motor nerves and cause contraction and relaxation of muscles. It has proven valuable as a method of pain therapy and is of assistance to the experienced healthcare professional.

With some indications, healthcare professionals can prescribe EMS units to patients for use at home. This method has long been used in sports and rehabilitation medicine. In the sports and fitness field, one of the uses of EMS is as a supplement to conventional muscle training, in order to increase the efficiency of muscle groups and adapt physical proportions to the desired aesthetic results. EMS application takes two directions — in one, a targeted strengthening of musculature can be produced (activating application) and in the other a relaxing, resting effect can also be achieved (relaxing application).

EMS Intended Use (Indications)

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

TENS AND EMS CONTRAINDICATIONS

⚠ **WARNING: Federal Law (USA) restricts this device to sale by or on the order of a physician. This product should not be used unless the operator has been instructed by a qualified healthcare professional.**

⚠ **WARNING: Do not use this device if you have a cardiac pacemaker, implanted defibrillator, or other implanted metallic or electronic device. Such use could cause electric shock, burns, electrical interference, or death.**

⚠ **WARNING: Do not use this device in an oxygen-rich environment.**

⚠ **WARNING: Do not use this device in the presence of or in proximity to cancerous or other lesions.**

⚠ **WARNING: Do not apply stimulation over swollen, infected, inflamed areas or skin eruptions (e.g. phlebitis, thrombophlebitis, varicose veins, etc.).**

⚠ **WARNING: Avoid electrode placements that apply current to the carotid sinus region (anterior neck) or transcerebrally (through the head).**

⚠ **WARNING: Do not use this device over poorly enervated areas.**

⚠ **WARNING: Do not use this device over an inguinal hernia.**

⚠ **WARNING: Do not use this device on scarred areas following surgery for at least ten months after the operation.**

⚠ **WARNING: Do not use this device with serious arterial circulatory problems in the lower limbs.**

2 SAFETY

Always follow basic safety precautions.

Please note the following special statements, used throughout this manual, and their significance:

⚠ **WARNING: Indicates a potential hazard situation or unsafe practice that, if not avoided, could result in death or serious personal injury.**

⚠ **CAUTION: Indicates a potential hazard or unsafe practice that, if not avoided, could result in minor or moderate personal injury.**

▲ **NOTICE: Indicates a potential hazard or unsafe practice that, if not avoided, could result in product or property damage.**

NOTE: Provides application recommendations or other useful information to ensure that you get the most from your product.

WARNING Statements

⚠ **WARNING: Keep this device out of reach of children.**

⚠ **WARNING: Do not use this device with patients who are noncompliant or noncommunicative.**

⚠ **WARNING: If you have had medical or physical treatment for your pain, consult with your healthcare professional before using this device.**

⚠ **WARNING: If your pain does not improve, becomes more than mild, or continues for more than five days, stop using this device and consult with your healthcare professional.**

⚠ **WARNING: Do not apply stimulation over your neck; this could cause severe muscle spasms resulting in closure of your airway, difficulty in breathing, or adverse effects on heart rhythm or blood pressure.**

⚠ **WARNING: Do not apply stimulation to the chest area or near the heart. Do not apply electrodes on the front of the thorax (marked by ribs and breastbone), nor on the two large pectoral muscles. The introduction of electrical current into the chest could cause rhythm disturbances to the heart, which could cause death.**

⚠ **WARNING: Do not apply stimulation in the presence of electronic monitoring equipment (e.g., cardiac monitors, ECG alarms), which may not operate properly when electrical stimulation device is in use.**

⚠ **WARNING: Do not apply stimulation when in the bath or shower.**

⚠ **WARNING: Do not apply stimulation while sleeping.**

⚠ **WARNING: Do not apply stimulation while driving, operating machinery, or during any activity in which electrical stimulation can put you at risk of injury.**

⚠ **WARNING: Apply stimulation only to normal, intact, clean, healthy skin.**

⚠ **WARNING: Stimulation should not take place while the user is connected to high-frequency surgical equipment, which may cause burn injuries on the skin under the electrodes, as well as problems with the stimulator.**

⚠ **WARNING: Do not use this device at the same time as other equipment which sends electrical pulses to your body.**

⚠ **WARNING: Do not use this device in the vicinity of shortwave or microwave therapy equipment, since this may affect the output power of the stimulator.**

⚠ **WARNING: Do not use this device in the eye area.**

⚠ **WARNING: Do not use this device in the genital area.**

⚠ WARNING: Do not use this device on areas of the skin which lack normal sensation.

⚠ WARNING: Keep electrodes separate during treatment; electrodes in contact with each other could result in improper stimulation or skin burns.

⚠ WARNING: Consult your healthcare professional if you have any questions about the use of this device.

⚠ WARNING: Discontinue use of this device and do not increase the intensity level if you feel discomfort during use.

⚠ WARNING: The long-term effects of electrical stimulation are unknown.

⚠ WARNING: Electrical stimulation devices have no curative value.

⚠ WARNING: Notice for California Customers- California Proposition 65
WARNING: This product contains a chemical known to the State of California to cause cancer and reproductive or developmental harm.

⚠ WARNING: GF Health Products, Inc. specifically disclaims responsibility for any personal injury or property damage which may occur during any use which does not comply with federal, state, or local laws or ordinances.

CAUTION Statements / Possible Adverse Reactions

⚠ CAUTION: TENS is not effective for pain of central origin including headache.

⚠ CAUTION: TENS is not a substitute for pain medications and other pain management therapies.

⚠ **CAUTION: TENS is a symptomatic treatment and, as such, suppresses the sensation of pain that would otherwise serve as a protective mechanism.**

⚠ **CAUTION: Effectiveness is highly dependent upon the patient's selection of a healthcare professional qualified in the management of pain.**

⚠ **CAUTION: The safety of electrical stimulation during pregnancy has not been established.**

⚠ **CAUTION: Use caution if stimulation is applied over the menstruating or pregnant uterus.**

⚠ **CAUTION: You may experience skin irritation or hypersensitivity due to the electrical stimulation or electrical conductive medium (silica gel).**

⚠ **CAUTION: Use caution for patients with suspected or diagnosed heart problems; if you have suspected or diagnosed heart disease, you should follow precautions recommended by your healthcare professional.**

⚠ **CAUTION: If you have suspected or diagnosed epilepsy, you should follow precautions recommended by your healthcare professional.**

⚠ **CAUTION: Use caution if you have a tendency to bleed internally, such as following an injury or fracture.**

⚠ **CAUTION: Consult with your healthcare professional before using the device after surgery; stimulation may disrupt the healing process.**

⚠ **CAUTION: Use caution if stimulation is applied over areas of skin that lack normal sensation.**

⚠ **CAUTION: The electrodes are intended for single patient use only.**

⚠ **CAUTION: Keep yourself informed of the contraindications.**

⚠ **CAUTION: The indications for use were listed; any other use may be dangerous.**

⚠ **CAUTION: Isolated cases of skin irritation may occur at the site of the electrode placement following long-term application.**

⚠ **CAUTION: Skin irritation from the electrode gel and electrode burns are potential adverse reactions. If skin irritation occurs, discontinue use and consult your healthcare professional.**

⚠ **CAUTION: If the stimulation levels are uncomfortable, reduce the stimulation Intensity to a comfortable level and contact your healthcare professional if problems persist.**

NOTICE Statements

▲ **NOTICE: Do not sterilize this device.**

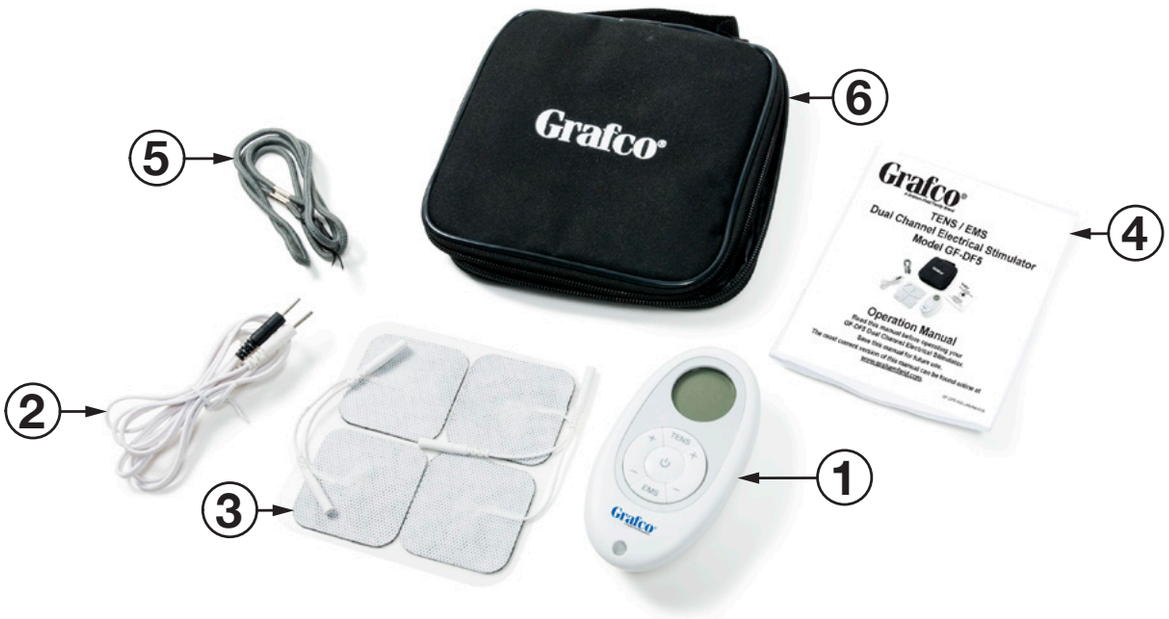
▲ **NOTICE: Do not use sharp objects such as pencil point or ballpoint pen to operate the buttons on the control panel.**

▲ **NOTICE: Check the electrode connections before each use to ensure they are in good working order.**

▲ **NOTICE: Electrical stimulators should be used only with the electrodes recommended for use by the manufacturer.**

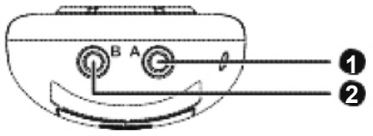
3 FEATURES

Components

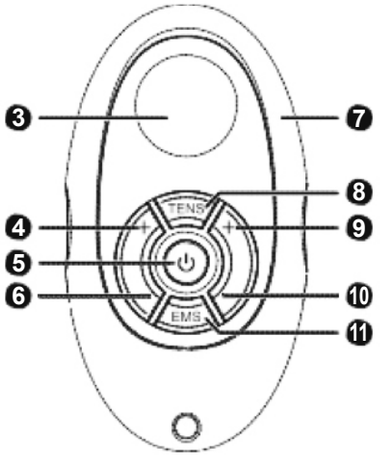


ITEM	DESCRIPTION	QTY
Included with Device		
1	GF-DF5 Dual Channel Electrical Stimulator Device	1
2	Electrode Lead Wire	2
3	2" x 2" (50 mm x 50 mm) Adhesive Electrode Pad	4
4	Operation Manual	1
5	Lanyard (can be used to hang device from lanyard hole)	1
6	Case	1
Also Required for Operation, but Not Included with Device		
	1.5 V AAA Battery (not shown)	3

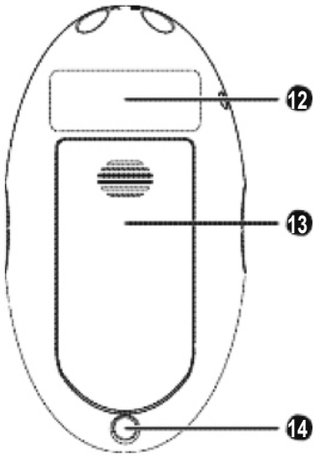
Top / Front and Back Panels



Top



Front Panel

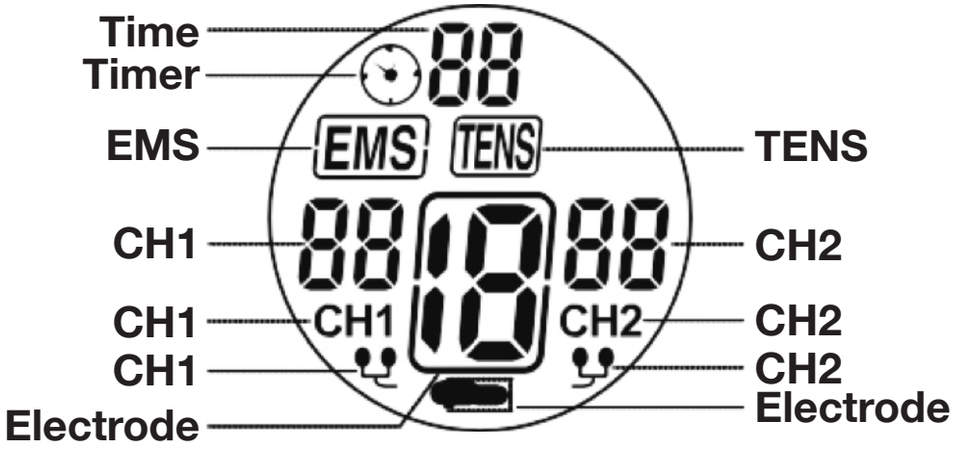


Back Panel

1	CH1 output socket: CH1 (Channel 1) output after electrode connection
2	CH2 output socket: CH2 (Channel 2) output after electrode connection
3	LCD (Liquid Crystal Display) Panel: Shows user parameters and information
4	CH1 increase button (press to increase CH1 output intensity)
5	Power button (ON / OFF) (⏻)
6	CH1 decrease button (press to decrease CH1 output intensity)
7	Plastic shell

8	TENS button (press to select TENS function)
9	CH2 increase button (press to increase CH2 output intensity)
10	CH2 decrease button (press to decrease CH2 output intensity)
11	EMS button (press to select EMS function)
12	Label
13	Battery cover
14	Lanyard hole (to hang by lanyard)

LCD Panel


Time
Timer
EMS
CH1
CH1
CH1
Electrode
EMS
TENS
CH1
CH2
TENS
CH2
CH2
CH2
Electrode

4 SETUP

Skin Preparation and Care

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

⚠ **WARNING: Never apply electrodes to irritated or broken skin.**

1. Wash the skin where you will be placing the electrodes with mild soap and water, rinse soap off thoroughly, and dry skin well.
2. Clip excess hair with scissors; do not shave stimulation area.
3. Wipe the area with the skin preparation your healthcare professional has recommended and let it dry before applying electrodes.
4. It may be helpful to apply skin lotion to electrode placement area after therapy when electrodes have been removed.

Check / Replace the Batteries

▲ **NOTICE: Replace all three batteries with new (or freshly recharged) AAA 1.5 V batteries.**

If using the device for the first time, install three new (or freshly recharged) AAA 1.5 V batteries as described below (batteries are not included with the device).

To ensure the function of the device, you must occasionally replace the batteries as described below.

1. Slide open the battery compartment cover (see picture on page 14).
2. Pull up the belt under the battery compartment gently to remove batteries.
3. Insert three new (or freshly recharged) AAA 1.5 V batteries into the battery compartment.
4. Ensure you are installing the batteries with correct polarity — match the positive and negative ends of the battery to the symbols in the battery compartment.
5. After replacing the batteries and ensuring correct polarity, close the battery compartment cover. Ensure the cover is tightly closed.

Battery Safety

Dispose of batteries in accordance with local guidelines and regulations.

⚠ **WARNING: If a battery is swallowed, seek medical attention immediately.**

⚠ **WARNING: If battery leakage occurs, avoid contact with skin, eyes and mucous membranes. Rinse the affected spots with lots of clear water immediately and contact a healthcare professional immediately.**

⚠ **WARNING: Do not disassemble or short-circuit batteries.**

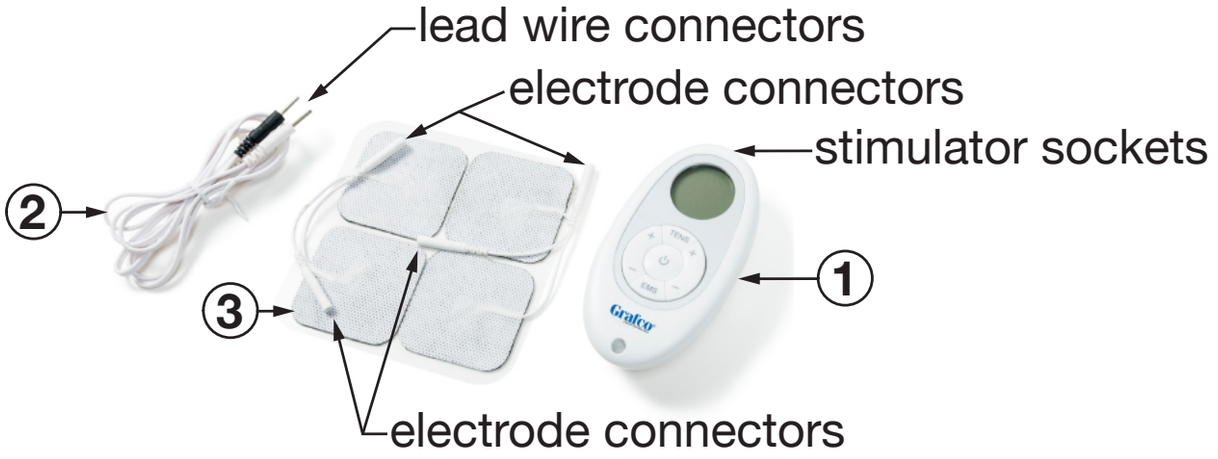
⚠ **WARNING: Do not place batteries in or near fire; explosion may occur.**

⚠ **WARNING: Protect batteries from excess heat.**

▲ **NOTICE: Remove spent batteries from device to prevent damage caused by leaking batteries.**

▲ **NOTICE: Remove batteries from device if you no longer use it to prevent damage caused by leaking batteries.**

Connecting Electrodes to Lead Wires



⚠ **WARNING: Ensure the device is powered OFF.**

See picture above. Insert item 2 lead wire connectors into item 3 electrode connectors. Ensure they are properly connected to ensure performance.

Connecting Lead Wires to Stimulator

1. See picture on previous page. Insert lead wire connectors into the sockets on top of item 1 stimulator. Holding the insulated portion of the connector, push the plug end of the wire into one of the sockets. One or two sets of wires may be used.
2. The device has two output circuits at the top of the unit controlled by Channel 1 and Channel 2. You may choose to use one channel with one pair of lead wires or both channels with two pairs of lead wires. Using both channels provides the advantage of stimulating two different areas at the same time.

Electrodes

Electrodes are disposable. Replace them when they start to lose their adhesive. If you question your electrode adhesive properties, order new replacement electrodes. Re-order replacement electrodes through or on the advice of your healthcare professional or your GF authorized distributor.

We recommend a minimum size of 1.5" x 1.5" (38 mm x 38 mm) self-adhering square electrodes. Follow application procedures below or on electrode packaging to maintain optimal stimulation.

Electrode Placement

⚠ **WARNING: Never apply electrodes to irritated or broken skin.**

⚠ **WARNING: Do not power on the device until after electrodes have been applied.**

Electrode placement can be very important to achieving success with therapy. Consult your healthcare professional for electrode placement suggestions. Apply electrodes to the exact site indicated by your healthcare professional. Before application, thoroughly clean and dry the target skin surface. To ensure good contact between the skin and the electrodes, attach the electrodes firmly and evenly to the skin.

Every patient responds differently to electrical stimulation, and your needs may vary from the conventional settings suggested here. If the initial results are not positive, speak to your healthcare professional about alternative stimulation settings and / or electrode placements. Once an acceptable placement has been achieved, record it for later use.

1. Remove the protective backing from the electrode adhesive surface. Do not throw away the protective backing because it is reused after the treatment session has been completed.
2. Skin problems may arise from the stress of adhesive patches that are excessively stretched across the skin during application. To prevent this, apply electrodes from the center outward; avoid stretching over the skin. To minimize this stress, tape excess lengths of lead wire to the skin in a loop to prevent tugging on electrodes.
3. Place the tacky surface to the prescribed skin area by pressing the electrode firmly and evenly against the skin.

Electrode Removal

⚠ **WARNING: Before removing or moving the electrodes, power off the device or appropriate channel in order to avoid irritation.**

⚠ **WARNING: Remove the electrodes from the skin with a moderate pulling motion in order to avoid injury to sensitive skin.**

⚠ **WARNING: If irritation occurs, discontinue use and consult your healthcare professional.**

⚠ **CAUTION: The electrodes are intended for single patient use only.**

▲ **NOTICE: Do not pull on the electrode wire. Doing so may damage the wire and electrode.**

▲ **NOTICE: Replace the electrodes when they are no longer adhering.**

1. When removing electrodes, remove by pulling in the direction of hair growth. Lift the corner of the electrode and gently remove it from the skin.
2. Apply the protective backing to the tacky side of the electrode.
3. 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. Oversaturation with water will reduce the adhesive properties.
4. Between uses, store the electrodes in the resealable bag in a cool dry place.

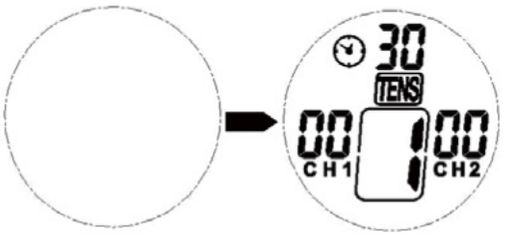
5 OPERATION

Refer to pictures at right of text.

Turn the Device ON

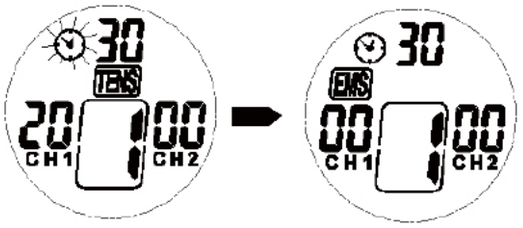
Before using the device for the first time, take careful note of the contraindications in Section 1, INTRODUCTION, and the safety measures detailed in Section 2, SAFETY.

Press the **POWER** button to turn on the device; the LCD will show.



Select the Treatment Mode

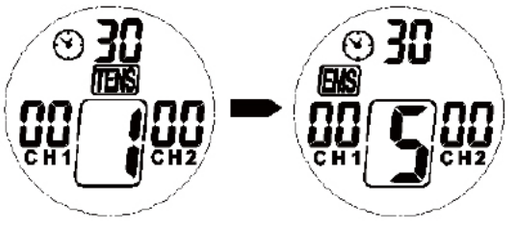
While in the standby mode, press either the **TENS** button to select the TENS treatment mode or the **EMS** button to select the EMS treatment mode.



Select the Treatment Program

After pressing the **TENS** button to select TENS treatment mode, press the **TENS** button again to select the treatment program. The stimulator has five TENS programs.

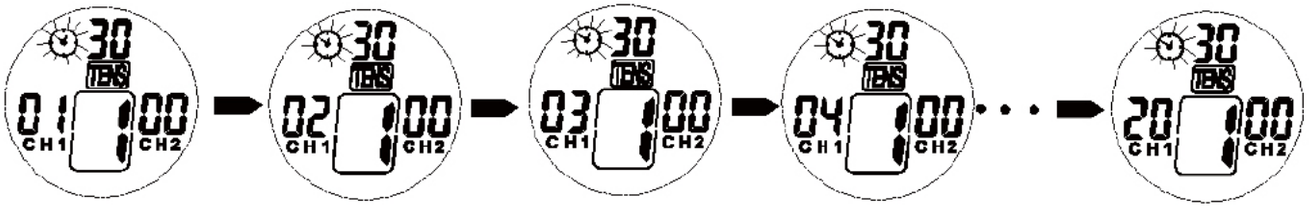
After pressing the **EMS** button to select EMS treatment mode, press the **EMS** button again to select the treatment program. The stimulator has five EMS programs.



Adjust the Treatment Intensity

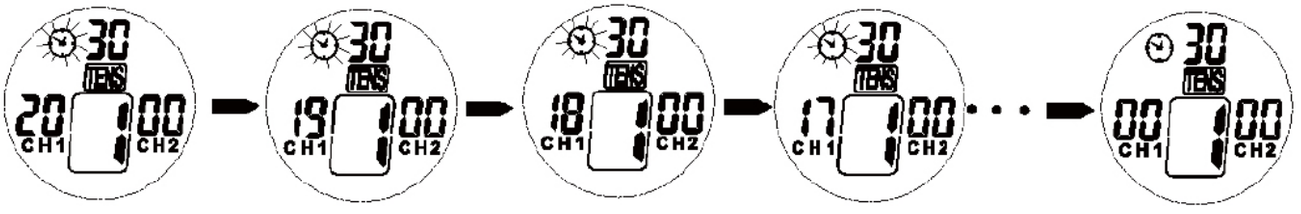
Press the **Intensity Control** button ([+] or [-]) to control the intensity output. The left [+] and [-] button control the CH1 channel intensity, and the right [+] and [-] button control the CH2 channel intensity.

When increasing the intensity, each click of the [+] button increases the output intensity of the selected channel by one level, which will show on the LCD. The stimulator has twenty levels of intensity.



Adjusting the intensity may cause a tingling sensation; adjust the intensity to a level that is comfortable to you.

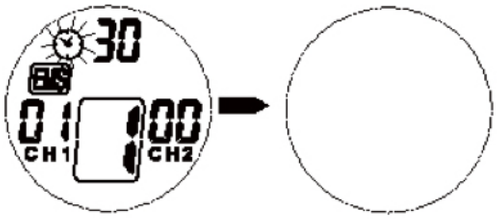
When decreasing the intensity, each click of the [-] button decreases the output intensity of the selected channel by one level, which will show on the LCD.



⚠ **WARNING: If the stimulation levels are uncomfortable or become uncomfortable, reduce the intensity to a comfortable level. If problems persist, contact your healthcare professional.**

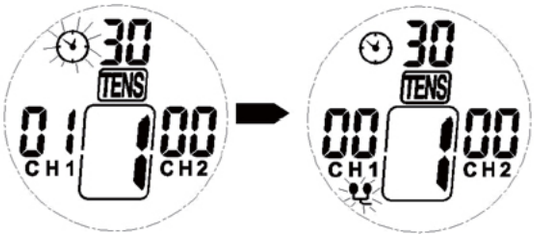
Stop Treatment

To stop treatment, press the POWER button (⏻) to turn the device off.



Load Detect Function

When the device hasn’t detected load (i.e., an electrode is loose or off, resulting in no current), it will be assumed there is no load, the intensity will automatically return to zero, and the device will return to standby mode.



6 MAINTENANCE — CLEANING AND CARE

Maintenance and Cleaning

⚠ **WARNING: Remove the batteries from the device whenever you clean it.**

▲ **NOTICE: There are no serviceable components inside the stimulator case. Contact your authorized GF distributor for repair.**

▲ **NOTICE: Ensure that no water or other liquid penetrates the device.**

▲ **NOTICE: Do not use any chemical cleaners or abrasive agents on any part of this device.**

Check the unit before each use for signs of wear and / or damage. Replace worn items as required. Clean the device after use with a soft, clean, slightly moistened cloth. In case of more extreme soiling you can also moisten the cloth with mild soapy water.

Electrode Care

1. Use this device only with the leads and electrodes provided by GF Health Products, Inc., or suggested by your healthcare professional. Use only the electrode placements and stimulation settings prescribed by your healthcare professional.
2. We recommend a minimum size of 1.5" x 1.5" (38 mm x 38 mm) self-adhering square electrodes.
3. Inspect the electrodes before each use. Replace electrodes as needed. Overuse of electrodes may cause skin irritation, loss of adhesion and decreased stimulation.
4. Clean the electrode wires by wiping them with a clean, soft, damp cloth. Coating them lightly with talcum powder will reduce tangles and may prolong their life.

7 TROUBLESHOOTING

If the device does not seem to be operating correctly, refer to the chart below to determine what may be wrong. Should none of these measures correct the problem, the device should be serviced.

Problem	Cause	Remedial Action
Power cannot be turned on	Batteries are inserted in wrong direction (wrong polarity)	Insert batteries in correct direction (correct polarity)
Output intensity turns off	Pads are not attached to skin or are removed from skin	When pads are not attached to skin or are removed from skin, output intensity turns off automatically
	Batteries are worn out	Replace batteries
	Electrode lead wire is broken	Replace electrode lead wires
Pad does not attach to skin	Adhesive surface of pad is dirty	Replace pad
Skin turns red or feels irritated.	Treatment time is too long	Limit treatment time to 20-30 min.
	Pad is not attached well	Re-attach pad
	Adhesive surface of pad is damaged	Replace pad
Cannot feel stimulation	Power is off	Turn power on
	Pad is not attached well	Re-attach pad
	Pads overlap each other	Re-attach pads without overlapping
	Electrode lead wires are not connected or are badly connected	Connect electrode lead wires
	Intensity is adjusted too weak	Re-adjust Intensity Dial
	Batteries are worn out	Replace batteries
	Adhesive surface of pad is damaged	Replace pad

8 STORAGE

▲ **Remove the batteries from the unit if it will not be used for an extended period of time. Leaking batteries can damage the unit.**

▲ **Do not place heavy objects on the device.**

1. Detach the connecting cable from the electrodes.
2. Store the device in a cool, dry, well-ventilated room and do not expose it to heat, sunlight or moisture.

Do not dispose of spent batteries in household waste. Dispose of batteries in accordance with local guidelines and regulations.

Electric devices are recyclable material and should not be disposed of in household waste. Dispose of this device in accordance with local guidelines and regulations.

9 SYMBOLS

LOT	Lot code
SN	Serial number
	Attention: Read the operating instructions!
	Electric devices are recyclable material and should not be disposed of with household waste after their useful lives. Dispose of this device in accordance with local guidelines and regulations.
	Type BF applied part
IP22	Device IP code: grade of ingress against solid foreign objects: ≥12.5mm diameter; waterproof grade is dripping (15° tilted)
	Manufacturer

10 SPECIFICATIONS

DEVICE SPECIFICATIONS

⚠ **WARNING: Do not use this device in an oxygen-rich environment.**

▲ **NOTICE: Do not sterilize this device.**

Device name	Dual Channel Electrical Stimulator
Model	GF-DF5
Power supply	DC 4.5 V, three 1.5 (AAA) batteries (not included)
Output channel	Dual, isolated between output channels
Wave sharp	Bi-directional square-wave pulse
Output voltage	Maximum 40 Vpp (at 500 Ω load)
Output current	Maximum 80 mA (at 500 Ω load)
DC capacity of output	0
Treatment time	20-30 min.
Output intensity	0 to 20 levels, adjustable
Treatment mode	TENS, EMS
Number of treatment programs	TENS: five programs
	EMS: five programs
Operating conditions	41°F - 104°F (5°C - 40°C), 30% — 75% RH, 700 hPa - 1060 hPa atmospheric pressure
Transportation and storage environment:	14°F - 122°F (-10°C - 50°C), 10% - 90% RH, 700 hPa - 1060 hPa atmospheric pressure
Dimensions (L x W x H)	4.33 in. x 2.34 in. x 1.18 in. (110 mm x 59.5 mm x 30 mm)

Device Specifications continued	
Weight (without batteries)	0.1 lb (45 g)
Automatic shutoff	3 min.
Electrode detection function	When amplitude level ≥1 and an open circuit at either channel is detected, amplitude level will be reset to 0 V.
Output precision	All output parameters allow ±20% error for the specification
Grade of waterproof	IP22
Electric shock	Internally powered ME equipment
Applied part, entire unit	Type BF applied part
Mode of operation	Continuous operation
Device service life	Two years (Normally)

TENS MODE SPECIFICATIONS

Waveform	Bi-directional square-wave pulse
Pulse Width (PW)	From 120 - 250 µs depending on program
Output frequency	From 1 - 150 Hz depending on program
Burst	TENS 3: There is one pulse wave including 10 pulses which is 100 Hz per 2 Hz output
Continuous	TENS 1: Pulse rate / pulse width output 80 Hz / 200 µs; TENS 2: Pulse rate / pulse width output 2 Hz / 250 µs
Pulse Width Modulation	TENS 4: Pulse width is automatically varied in a cycle. Pulse width output is 100 Hz / 150 µs in the first 3 s and 250 µs / 2 Hz in another 3 s, thus run in cycles.
Pulse Rate Modulation	TENS 5: The output pulse is automatically varied in a cycle time. The output pulse is increased from 1Hz / 200 µs to 150 Hz / 120 µs in setting cycle time 6 s, and then decreased from 150 Hz / 120 µs to 1 Hz / 200 µs in next setting cycle time 6 s

EMS MODE SPECIFICATIONS

Pulse Width	150 - 300 µs
Output frequency	20 -100 Hz
Ramp up time	1 - 5 s
On time	4 - 10 s
Ramp down time	1 - 5 s
Off time	5 - 20 s

PROCESS CHART AND FUNCTION

TENS Program Table

Program	Working time (min.)	Frequency (Hz)	Pulse width (μs)	Waveform property
P1	30	80	200	Continuous
P2	30	2	250	Continuous
P3	30	100	250	Burst
P4	30	100 / 2	150 / 250	Modulation
P5	30	1-150	120-200	Modulation

EMS Program Table

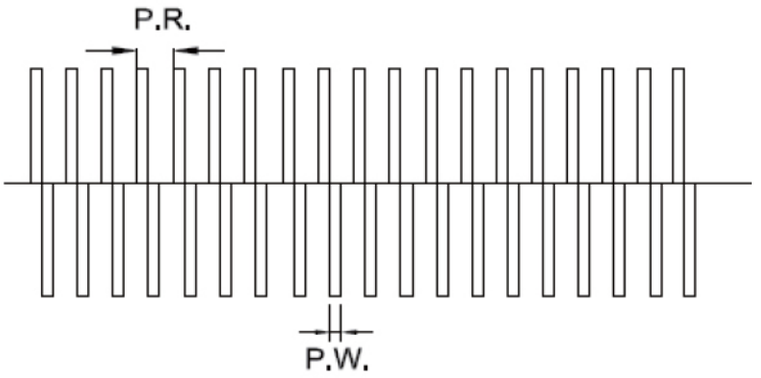
Program	Treatment time (min.)	Frequency (Hz)	Pulse width (μs)	Waveform property
P01	30	80	150	EMS
P02	30	50	300	EMS
P03	20	20	300	EMS
P04	25	75	300	EMS
P05	25	100	200	EMS

TENS Stimulation Mode Waveform

Refer to pictures at right of text.

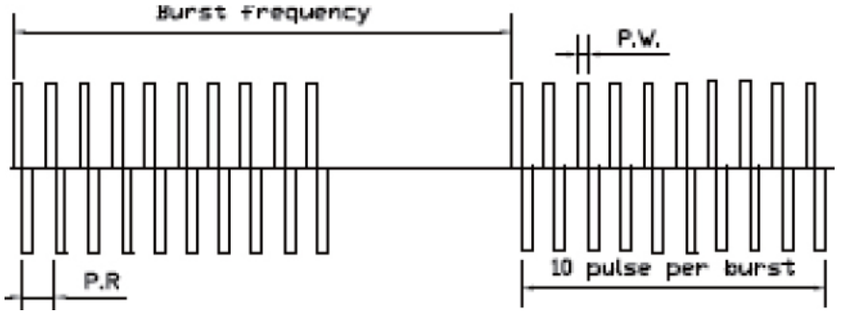
1) Continuous (P01, P02)

Waveform:	Biphasic square wave
PR (Pulse Rate)	P01-80 Hz; P02-2 Hz
PW (Pulse Width)	P01-200 µs P02-250 µs
Output Current	0 - 80 mA (500 Ω load), adjustable
Output Voltage	0 - 40 V (500 Ω load), adjustable



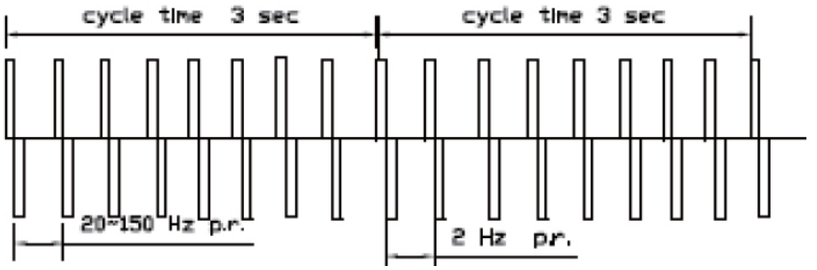
2) Burst (P03)

Waveform	Biphasic square wave
PR (Pulse Rate)	100 Hz (fixed)
Burst Frequency	2 Hz
PW (Pulse Width)	250 µs
Output Current	0 - 80 mA (500 Ω load), adjustable
Output Voltage	0 - 40 V (500 Ω load), adjustable



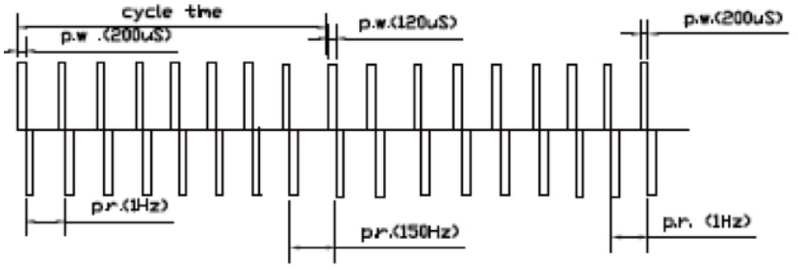
3) Modulation (P04)

Waveform	Biphasic square wave
PR (Pulse Rate)	100 / 2 Hz
PW (Pulse Width)	150 / 250 µs
Output Order	100 Hz / 150 µs first output 3 s then 2 Hz / 250 µs output 3 s
Output Current	0 - 80 mA (500 Ω load), adjustable
Output Voltage	0 - 40V (500 Ω load), adjustable

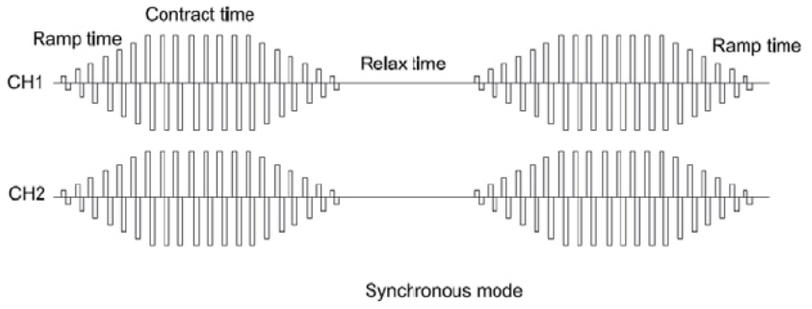


4) FM and PM Modulations (P05)

Waveform	Biphasic square wave
PR. (Pulse Rate)	1 to 150 Hz. First pulse rate increases from 1 - 150 Hz in 6 s, then pulse rate decreases from 150 - 1 Hz in 6 s
PW (Pulse Width)	120 - 200 µs. First pulse width decreases from 200 - 120 µs in 6 s, then pulse width increases from 120 - 200 µs in 6 s
Output Current	0 - 80 mA (500 Ω load), adjustable
Output Voltage	0 - 40 V (500 Ω load), adjustable
Cycle time	12 s



EMS stimulation mode wave characteristic (see picture below).



Waveform	Biphasic square wave
Wave characteristic	All programs of EMS mode output wave characteristic are same
PR (Pulse Rate)	P01 - P05- output pulse rate is default
PW (Pulse Width)	P01 - P05- output pulse width is default
Ramp up time	P01 – 1 s; P02 – 2 s; P03 – 3 s; P04 – 3 s; P05 – 5 s
Ramp down time	P01 – 1 s; P02 – 2 s; P03 – 3 s; P04 – 3 s; P05 – 5 s
Contract time (on time)	P01 – 5 s; P02 – 4 s; P03 – 6 s; P04 – 6 s; P05 – 10 s
Relax time (off time)	P01 – 5 s; P02 – 10 s; P03 – 6 s; P04 – 10 s; P05 – 20 s
Output Current	0 - 80 mA (500 Ω load), adjustable
Output Voltage	0 - 40 V (500 Ω load), adjustable

11 LIMITED WARRANTY

SCOPE OF WARRANTY

GF Health Products, Inc. (“GF”) warrants to the original purchaser only that it will replace or repair components, at GF’s sole discretion, that are defective in material or workmanship under normal use and service. All warranties are conditioned upon the proper use of the products strictly in accordance with good commercial practice and applicable GF instructions and manuals, including proper use and maintenance. To the extent that a component is warranted by a third party, GF conveys all of its rights under that warranty to the original purchaser, to the extent permitted. This limited warranty shall only apply to defects that are reported to GF’s customer service team within the applicable warranty period and which, upon examination by GF or its authorized representative, prove to be a warranty item. This limited warranty is not transferable. Within the guidelines set forth in this document, this product is warranted for one (1) year. The applicable warranty period shall commence from date of shipment to the original customer, unless there is an expiration date on the component in which case the warranty shall expire on the earlier of warranty period or the expiration date.

OBTAINING WARRANTY SERVICE

This limited warranty shall only apply to defects that are reported to the Distributor from whom the Customer purchased the product within the applicable warranty period. If there is not a Distributor, you must contact GF directly by calling 1-770-368-4700, sending a fax request to 1-770-368-2386, or by e-mailing a request to cs@grahamfield.com. Specific directions will be provided by the Customer Service Representative. Failure to abide by the specific directions will result in denial of the warranty claim.

EXCLUSIONS

The warranty does not cover and GF shall not be liable for the following:

1) Defects, damage, or other conditions caused, in whole or in part, by misuse, abuse, negligence, alteration, accident, freight damage, tampering or failure to seek and obtain repair or replacement in a timely manner;
2) Products which are not installed, used, or properly cleaned and maintained as required in the official manual for the applicable product;
3) Products considered to be of a non-durable nature including, but not limited to: adhesive electrode pads, casters, filters, fuses, gaskets, lubricants, and charts;
4) Accessories or parts not provided by GF;
5) Charges by anyone for adjustments, repairs, replacement parts, installation or other work performed upon or in connection with such products which are not expressly authorized in writing, in advance, by GF;

6) Any labor or shipping charges incurred in the replacement part installation or repair;
7) Costs and expenses of regular maintenance and cleaning; and
8) Representations and warranties made by any person or entity other than GF.

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The warranties contained herein contain all the representations and warranties with respect to the subject matter of this document, and supersede all prior negotiations, agreements and understandings with respect thereto. The recipient of this document hereby acknowledges and represents that it has not relied on any representation, assertion, guarantee, warranty, collateral contract or other assurance, except those set out in this document.

For additional information on this product or this warranty, please contact a GF Customer Service Representative.

NOTES:

1) Additional terms and conditions may apply.
2) Freight claims must be notated on the appropriate shipping documents and must be made with immediacy. International, federal and state regulations govern specific requirements for freight claims. Failure to abide by those regulations may result in a denial of the freight claim. GF will assist you in filing the freight claim.
3) Claims for any short shipment must be made within three (3) days of the invoice date.

12 ELECTROMAGNETIC COMPATIBILITY (EMC) TABLES

Guidance and manufacturer's declaration - electromagnetic emissions		
The device is intended for use in the electromagnetic environment specified below. The customer or the user assures that it is used in such an environment.		
Emissions test	Compliance	Electromagnetic environment - guidance
RF emissions CISPR 11	Group 1	The device uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR11	Class B	
Harmonic emissions IEC 61000-3-2	Not applicable	
Voltage fluctuations / flicker emissions IEC 61000-3-3	Not applicable	

Guidance and manufacturer's declaration — electromagnetic immunity			
The device is intended for use in the electromagnetic environment specified below. The customer or the user of the device 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%. If ESD interfere with the operation of equipment, countermeasurements such as wrist strap or grounding shall be considered.

Electrical fast transient / burst IEC 61000-4-4	±2 kV for power supply lines	Not applicable	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1 kV differential mode ±2kV common mode	Not applicable	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	< 5% UT (> 95% dip in UT) for 0.5 cycle 40% UT (60% dip in UT) for 5 cycles 70% UT (30% dip in UT) for 25 cycles < 5% UT (> 95% dip in UT) for 5 sec	Not applicable	Mains power quality should be that of a typical commercial or hospital environment. If the user of the device requires continued operation during power mains interruptions, it is recommended that the devices be powered from an uninterruptible power supply or a battery.
Power frequency (50 / 60 Hz) magnetic field IEC 61000-4-8	3 A / m	3 A / m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

Guidance and- manufacturer’s declaration. Electromagnetic immunity			
The device is intended for use in the electromagnetic environment specified below. The customer or the user should assure that it is used in such an environment.			
Immunity test	IEC 60501 test level	Compliance level	Electromagnetic environment - guidance
Conducted RF IEC 61000-4-6 Radiated RF IEC 61000-4-3	3 Vrms 150 kHz - 80 MHz 3 V / m 80 MHz - 2.5 GHz	Not applicable 3 V / m	Portable and mobile RF communications equipment should be used no closer to any part of the device, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance $d = 1.2\sqrt{P}$ $d = 1.2\sqrt{P}$ 80 MHz to 800 MHz $d = 2.3\sqrt{P}$ 800 MHz to 2,5 MHz 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, should be less than the compliance level in each frequency range. 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.			

Recommended separation distances between portable and mobile RF communications equipment and the device			
The device is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the device can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the 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 $d = 1.2\sqrt{P}$	80 MHz to 800 MHz $d = 1.2\sqrt{P}$	800 MHz to 2,5 GHz $d = 2.3\sqrt{P}$
0,01	0.12	0.12	0.23
0,1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23
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) accordable to the transmitter manufacturer.			
NOTE I: 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.			

1.770.368.4700

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The most current and complete product information can be found on our website.
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