WAVEFORMS

For additional information on Waveforms and output energy, refer to APPENDIX 3 on page 86.

CC: Constant Current
CV: Constant Voltage

IFC (Interferential) Traditional (4 Pole)

Interferential Current is a medium frequency waveform. Current is distributed through two channels (four electrodes). The currents cross each other in the body at the area requiring treatment. The two currents interfere with each other at this crossing point, resulting in a modulation of the intensity (the current intensity increases and decreases at a regular frequency).

Output Mode	Electrodes
Carrier Frequency	2000-10,000 Hz
Beat Frequency	1-200 Hz
Sweep Time	15 sec
Sweep Low Beat Frequency	1-200 Hz
Sweep High Beat Frequency	1-200 Hz
Scan Percentage	Static, 40%, 100%, Manual
Amplitude	0-100 mA (CC with carrier freq ≤ 5000 kHz)
	0-90 mA (CC with carrier freq > 5000 kHz)
	0-64 V (CV with carrier freq ≤ 5000 kHz)
	0-45 V (CV with carrier freq > 5000 kHz)
Treatment Time	1-60 Minutes
Available on Channel	1&2, 3&4 Option
Mode Selection	CC or CV
IRMS [mA]	0-100 mA

TENS- Symmetrical Biphasic

The Symmetrical Biphasic waveform has a short pulse duration and is capable of strong stimulation of nerve fibers in the skin and in muscle. This waveform is often used in portable muscle stimulation units, and some TENS devices.

Output Mode	Electrodes
Output Intensity	0-80 mA (CC) 0-80 V (CV)
Phase Duration	20-1,000 µsec
Frequency	1-250 Hz
Mode Selection	CC or CV
Burst Frequency	0-31 bps
Frequency Modulation	0-250 Hz
Amplitude Modulation	Off, 40%, 60%, 80%, and 100%
Treatment Time	1-60 min
Ramp	0-5 sec
IRMS [mA]	0-49.32 mA

TENS- Asymmetrical Biphasic

The Asymmetrical Biphasic waveform has a short pulse duration. It is capable of strong stimulation of the nerve fibers in the skin as well as of muscle tissue. This waveform is often used in TENS devices.Because of its short pulse, the patient typically tolerates the current well, even at relatively high intensities.

Output Mode	Electrodes
Output Intensity	0-110 mA (CC) 0-110 V (CV)
Phase Duration	20-1,000 µsec
Frequency	1-250 Hz
Mode Selection	CC or CV
Burst Frequency	0-31 Hz
Frequency Modulation	0-250 Hz
Amplitude Modulation	Off, 40%, 60%, 80%, and 100%
Treatment Time	1-60 minutes
Ramp	0-5 sec
IRMS [mA]	0-53.61 mA

TENS- Alternating Rectangular

The Alternating Rectangular waveform is an interrupted biphasic current with a rectangular pulse shape. This waveform is commonly used as a pain management application.

Output Mode	Electrodes
Output Intensity	0-100 mA (CC) 0-100 V (CV)
Phase Duration	20-1,000 µsec
Frequency	1-250 Hz
Mode Selection	CC or CV
Burst Frequency	0-31 bps
Frequency Modulation	0-250 Hz
Amplitude Modulation	Off, 40%, 60%, 80%, and 100%
Treatment Time	1-60 min
Ramp	0-5 sec
IRMS [mA]	0-61.64 mA

DANGER

- **Stimulus delivered by the TENS waveforms of this device, in certain configurations, will deliver a charge of 25 microcoulombs (µC) or greater per pulse and may be sufficient to cause electrocution. Electrical current of this magnitude must not flow through the thorax because it may cause a cardiac arrhythmia.**

WAVEFORMS (CONTINUED)

TENS- Monophasic Rectangular

The Monophasic Rectangular waveform is an interrupted unidirectional current with a rectangular pulse shape. This waveform is commonly used with electrodiagnostic testing and clinically to stimulate denervated muscle.

Output Mode ..... Electrodes
Output Intensity..... 0-110 mA (CC) 0-110 V (CV)
Phase Duration..... Adjustable 20-1,000 µsec
Frequency ..... 1-250 Hz
Mode Selection ..... CC or CV
Burst Frequency..... 0-31 bps
Frequency Modulation ..... 0-250 Hz
Amplitude Modulation ..... Off, 40%, 60%, 80%.and 100%
Treatment Time ..... 1-60 minutes
Ramp..... 0-5 sec
IRMS [mA]..... 0-47.95 mA

TENS - HAN

The HAN Waveform provides optimal parameters with a precisely controlled sequence of Dense-and-Disperse (DD) modes of stimulation where 2 Hz is alternating with 15 or 70 Hz, each lasting for 3 seconds. Under these parameters all 3 kinds of opioid peptides are released simultaneously. This produces a synergistic analgesic effect for faster, greater and more long-lasting results.

Output Mode ..... Electrodes
Output Intensity..... 0-100 mA (CC)
Phase Duration ..... 180 µsec
Mode Selection CC
Burst Frequency..... 0-2 Hz
Frequency Modulation ..... 80 Hz
Cycle Time . . Burst of 8 pulses at 80 Hz(at a frequency of 2 Hz) for 3 seconds to 80 Hz continuous (no burst) for 3 seconds, repeated
Treatment Time ..... 1-60 min
Available on Channels..... 1, 2, 3, or 4
IRMS [mA]..... 0-20.36 mA

VMS™

VMS is a symmetrical biphasic waveform with a 100 µsec interphase interval. Because the pulse is relatively short, the waveform has a low skin load, making it suitable for applications requiring high intensities, such as in muscle strengthening protocols.

Output Mode ..... Electrodes
Output Intensity..... 0-200 mA (CC) 0-200 V (CV)
Channel Mode .....Single, Reciprocal, Co-Contract
Phase Duration.....20-1,000 µsec
Mode Selection ..... CC or CV
Anti-Fatigue ..... Off or On
Set Intensity .....Individual Channel Intensity Setting in ..... Reciprocal and Co-Contract modes
Cycle Time ..... Continuous or User Defined
Frequency ..... 1-200 pps
Ramp..... 0-5 sec
Treatment Time ..... 1-60 min
Available on Channels..... 1, 2, 3, or 4
IRMS [mA]..... 0-80 mA

Microcurrent

Microcurrent is a monophasic waveform of very low intensity. The literature reports beneficial effects of this waveform in the treatment of wounds. The physiological working mechanism of this effect is as yet not clearly understood. It is thought to stimulate tissue healing by stimulating the 'current of injury', a current which naturally occurs in healing tissue.

Output Mode ..... Electrodes
Output Intensity..... 0-1,000 µA
Polarity .....Positive, Negative, or Alternating
Treatment Time ..... 1-60 Min
Available on channels ..... 1, 2, 3, or 4
Duty Cycle 50%
Frequency .....0.1-1,000 Hz
Mode Selection CC
IRMS [mA]..... 0-0.71 mA

WAVEFORMS (CONTINUED)

Diadynamic Waveforms

The Diadynamic waveforms are rectified alternating currents. The alternating current is modified (rectified) to allow the current to flow in one direction only.

Output Mode ..... Electrodes
Output Intensity.....0-80 mA
Treatment Time ..... 1-60 min
Available on channels 1, 2, 3, 4
Mode Selection ..... CC or CV

MF: (Monophasé Fixe) - Frequency of 50 Hz: phase duration of 10 ms followed by a pause of 10 ms.
IRMS [mA].....0-40 mA

DF: (Diphasé Fixe) - Frequency of 100 Hz: phase duration of 10 ms followed immediately by another identical phase of 10 ms.
CP: (Modulé en Courtes Périodes) - 1 second of MF followed abruptly by 1 second of DF.
LP: (Modulé en Longues Périodes) - Rhythmical fluctuation between 2 MF currents.
CP-iso: (Courtes Periodes Isodynamic) - A combination of MF and DF waveforms.
CP-id: Same as CP-iso.
MF+CP: A period of MF followed by a period of CP.
MF+CP-id: A period of MF followed by a period of CP-ID.
DF+LP: A period of DF followed by a period of LP.
DF+CP: A period of DF followed by a period of CP.

IRMS [mA].....0-56.57 mA

IFC Premodulated (Traditional 2 Pole)

Premodulated Current is a medium frequency waveform. Current comes out of one channel (two electrodes). The current intensity is modulated: it increases and decreases at a regular frequency (the Amplitude Modulation Frequency).

Output Mode ..... Electrodes
Output Intensity.....
.....0-100 mA (CC) 0-96 V (CV) (with Carrier Frequency ≤ 5,000 kHz)
.....0-100 mA (CC) 0-68 V (CV) (with Carrier Frequency > 5,000 kHz)
Carrier Frequency.....2,000-10,000 Hz
Beat Fixed (Sweep Off) ..... 1-200 Hz
Sweep Low Beat Frequency ..... 1-200 Hz
Sweep High Beat Frequency..... 2-200 Hz
Cycle Time ..... Continuous or User Defined
Mode Selection ..... CC or CV
Treatment Time ..... 1-60 Min
Available on Channel..... 1, 2, 3, or 4

Russian

Russian Current is a sinusoidal waveform, delivered in bursts or series of pulses. This method was claimed by its author (Kots) to produce maximal muscle strengthening effects without significant discomfort to the patient.

Output Mode ..... Electrodes
Output Intensity..... 0-100 mA (CC) 0-90 V (CV)
Channel Mode .....Single, Reciprocal, Co-Contract
Duty Cycle 10%, 20%, 30%, 40%, 50%
Mode Selection ..... CC or CV
Anti-Fatigue ..... Off or On
Cycle Time ..... Continuous or User Defined
Carrier Frequency.....2,500 Hz
Burst Frequency (Anti-Fatigue Off) ..... 20-100 bps
Ramp.....0-5 sec
Treatment Time ..... 1-60 min
Available on Channels ..... 1, 2, 3, or 4
IRMS [mA].....0-50 mA

VMS™ Burst

VMS Burst is a symmetrical biphasic waveform delivered in a burst format. Because the pulse is relatively short, the waveform has a low skin load, making it suitable for applications requiring high intensities, such as muscle strengthening protocols.

Output Mode ..... Electrodes
Output Intensity..... 0-200 mA (CC) 0-200 V (CV)
Channel Mode .....Single, Reciprocal, Co-Contract
Phase Duration.....20-700 µsec
Mode Selection ..... CC or CV
Anti-Fatigue ..... Off or On
Set Intensity .....Individual Channel Intensity Setting in
..... Reciprocal and Co-Contract modes
Cycle Time ..... Continuous or User Defined
Frequency ..... 1-200 bps
Ramp.....0-5 sec
Treatment Time ..... 1-60 min
Available on Channels..... 1, 2, 3, or 4
IRMS [mA].....0-138.56 mA

WAVEFORMS (CONTINUED)

MONOPHASIC: Monophasic Rectangular Pulsed

The Monophasic Rectangular Pulsed waveform is an interrupted unidirectional current with a rectangular pulse shape.

Output Mode ..... Electrodes
Output Intensity.....0-80 mA
Phase Duration..... 0.1-500.0 ms
Phase Interval..... 5-5,000 ms
Treatment Time ..... 1-60 min
Available on Channels..... 1, 2, 3, or 4
Mode Selection CC
IRMS [mA].....0-79.60 mA

MONOPHASIC: Monophasic Triangular Pulsed

The Monophasic Triangular Pulsed waveform is an interrupted unidirectional current with a triangular pulse shape.

Output Mode ..... Electrodes
Output Intensity..... 0-80 mA
Phase Duration..... 0.1-500.0 ms
Phase Interval..... 5-5,000 ms
Treatment Time ..... 1-60 min
Available on Channels..... 1, 2, 3, or 4
Mode Selection CC
IRMS [mA].....0-45.96 mA

GALVANIC: Continuous

Galvanic Current is a direct current flowing in one direction only. The current can be continuous or interrupted.

Output Mode ..... Electrodes
Output Intensity.....0-72 mA
Polarity Reversal..... On or Off
..... With Polarity Reversal On, Polarity will change every five minutes.
Cycle Time .....Continuous, 5/5, 4/12, 10/10, 10/20, 10/30, 10/50
Treatment Time ..... 1-60 min
Available on Channels..... 1, 2, 3, or 4
Mode Selection CC
IRMS [mA].....0-80 mA

GALVANIC: Interrupted

Galvanic Current is a direct current flowing in one direction only. The current can be continuous or interrupted.

Pulse Duration .....135.5 µsec
Output Mode ..... Electrodes
Output Intensity.....0-79 mA
Polarity Reversal..... On or Off
..... With Polarity Reversal On, Polarity will change every five minutes.
Cycle Time .....Continuous, 5/5, 4/12, 10/10, 10/20, 10/30, 10/50
Treatment Time ..... 1-60 min
Available on Channels..... 1, 2, 3, or 4
Ramp.....0-5 sec
Mode Selection CC
IRMS [mA].....0-73.40 mA

Träbert (Ultrareiz)

The Träbert Current is a monophasic waveform with a phase duration of 2 ms and a pause of 5 ms resulting in a frequency of approximately 143Hz.

Output Mode ..... Electrodes
Output Intensity.....0-80 mA
Polarity Reversal..... On or Off
..... With Polarity Reversal On, Polarity will change every 7.5 minutes.
Treatment Time ..... 1-60 min
Available on Channels..... 1, 2, 3, or 4
Frequency..... 142.86 Hz
Phase Duration.....2 ms
Mode Selection CC
IRMS [mA].....0-42.76 mA

WAVEFORMS (CONTINUED)

SURGED: Monophasic Rectangular

The SURGED: Monophasic Rectangular Current is a series of rectangular, monophasic pulses. The pulses surge to maximum power, hold and then decrease before the pause. This waveform is well suited for muscle strengthening.

Output Mode	Electrodes
Output Intensity	0-80 mA
Phase Duration	0.2-5.0 ms
Frequency	5-60 Hz
Surges per minute	1-20
Pause	0-57 sec
Treatment Time	1-60 min
Available on Channels	1, 2, 3, or 4
Mode Selection	CC
IRMS [mA]	0-43.82 mA

SURGED: Monophasic Triangular

The SURGED: Monophasic Triangular Current is a series of triangular, monophasic pulses. The pulses surge to maximum power, hold and then decrease before the pause. This waveform is well suited for muscle strengthening.

Output Mode	Electrodes
Output Intensity	0-80 mA
Phase Duration	0.2-5.0 ms
Frequency	5-60 Hz
Surges per minute	1-20
Pause	0-57 sec
Treatment Time	1-60 min
Available on Channels	1, 2, 3, or 4
Mode Selection	CC
IRMS [mA[	0-25.30 mA

VMS™ FR

The VMS-FR version of the VMS waveform is a physiologically based channel interaction in which one channel stimulates the agonist and the other the antagonist of the muscle group that is being exercised. The agonistic channel initiates the movement with a brief burst of power, followed by a period of sustained activity to complete the movement. The antagonistic channel has a brief burst of power to slow down the initial acceleration of the agonist, followed by a low output to regulate the movement of the agonist. The movement is completed by a final burst of activity in both channels. VMS is a symmetrical biphasic waveform with a 100 µsec interphase interval. Because the pulse is relatively short, the waveform has a low skin load, making it suitable for applications requiring high intensities, such as in muscle strengthening protocols.

Output Mode	Electrodes
Output Intensity	0-150 mA (CC) 0-150 V (CV)
Burst Duration	200 - 5000 ms
Phase Duration	20-400 µsec
Mode Selection	CC or CV
Channel Intensity	Setting in Reciprocal and Co-Contract modes
Cycle Time	Continuous, 5/5, 4/12,10/10, 10/20, 10/30, 10/50
Frequency	20-80 pps
Treatment Time	1-60 min
Available on Channels	1&2, 3&4
IRMS [mA]	0-20.57 mA

High Voltage Pulsed Current (HVPC)

The High Voltage Pulsed Current (HVPC) has a very brief pulse duration characterized by two distinct peaks delivered at high voltage. The waveform is monophasic (current flows in one direction only). The high voltage causes a decreased skin resistance making the current comfortable and easy to tolerate.

Output Mode	Electrodes
Output Intensity	0-500 V
Polarity	Positive or Negative
Ramp	0.5-5 sec
Display	Peak Current or Volts
Sweep High Frequency	20-120 pps
Sweep Low Frequency	10-110 pps
Frequency	10-120 pps
Cycle Time	Continuous or User Defined
Treatment Time	1-60 Min
Available on Channels	1, 2, 3, or 4
Mode Selection	CV