

FNS-4 Neuromuscular Stimulator

Programmable 4-channel constant-current stimulation

The FNS-4 Stimulator is a full-featured 4-channel stimulator for neuromuscular stimulation. It features fully programmable bi-phasic, constant-current waveforms, with user control of all timing, polarity, and current amplitude parameters. All outputs are electrically isolated for low noise and to prevent interference with adjacent recordings.

Each channel is independently programmable from the host PC using a standard RS232 serial interface (or optional USB adapter). In addition, groups of channels can be simultaneously programmed, stopped, or started for truly synchronous multi-channel stimulation. Programming is accomplished using command-byte strings generated by a Labview® or other control program (Labview core vi provided), or by custom-developed software. Programming a channel or group of channels, or starting/stopping a stimulus program takes just a few milliseconds. This allows real-time, closed-loop stimulus control in response to recorded neural or muscular activity.

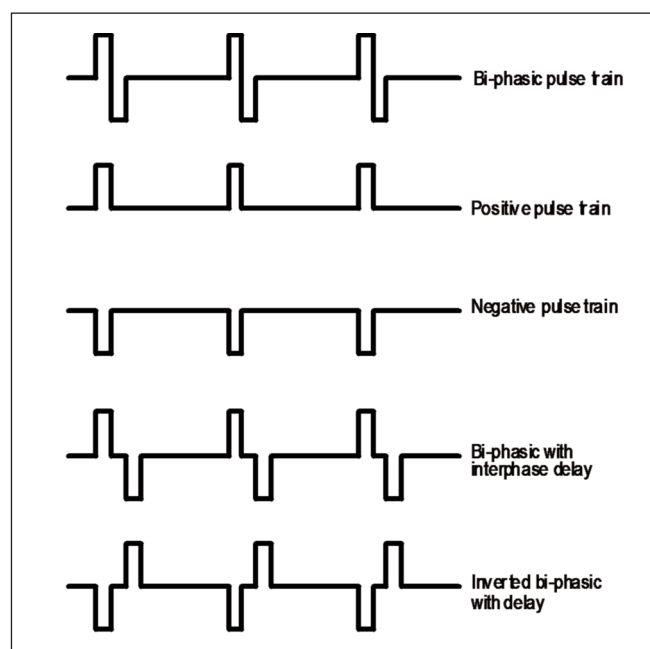
The FNS-4 uses a master crystal clock common to all channels, so groups of channels continue to run synchronously.

A wide variety of waveforms is possible, including single pulses, pulse trains of n pulses, or continuous pulsing. The polarity of bi-phasic pulses is adjustable, and interphase delays between first and second phase are user programmable.

A **MONITOR** port gives access to all timing and amplitude information for each of the four channels. Separate logic and analog monitor signals are provided. These provide an exact representation of the stimulus being delivered, but are galvanically isolated from the actual stimulus outputs. Stimulus outputs are provided using a single shielded connector box with four BNC jacks. Comes complete with serial cable and CD containing Labview software.



FNS-4 front panel



Examples of FNS-4 stimulus waveforms

Standard Features:

- USB interface
- Full constant-current waveform control
- Fast programming and channel control

Applications:

- Complex stimulation protocols
- Gait studies
- Closed-loop record/stimulation

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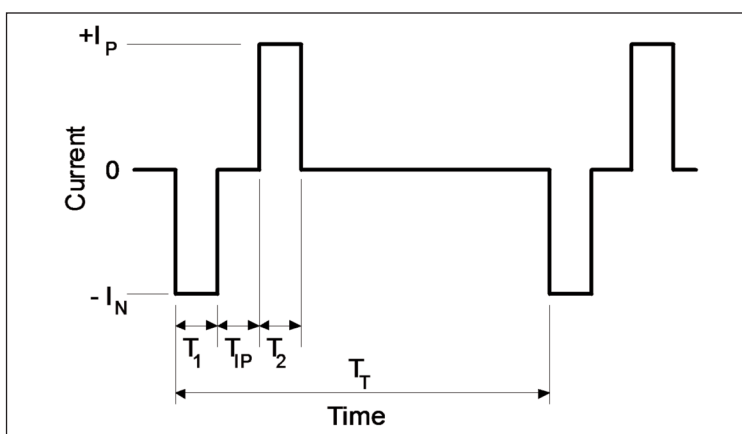
FNS-4a 10/09

FNS-4 Functional Neural Stimulator

Specifications: (Note 1)

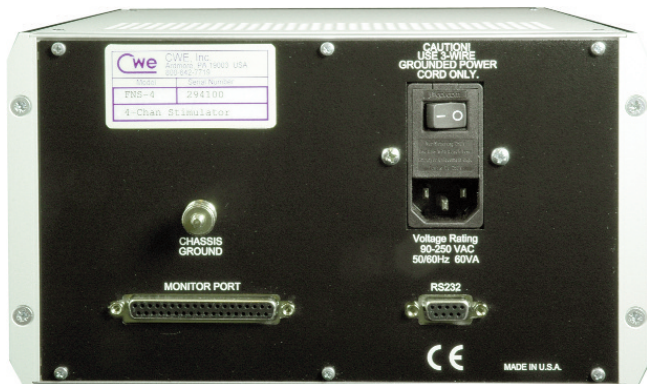
Stimulus type	constant current, programmable
Current range	0 - $\pm 20,000\mu\text{A}$
Current resolution	1 μA (16-bit accuracy)
Pulse frequency	0 - $>250\text{Hz}$
Timing range (all waveform parameters)	0 - 0.65s (10 μs resolution)
Isolation voltage	1500V continuous, 2000V 10 sec
Leakage current	$<15\mu\text{A}$, any output
Stimulus compliance voltage	$\pm 45\text{V}$
Monitor output (analog)	0 - 5V (4000 $\mu\text{A/V}$)
Monitor output (logic)	0 - 5V, TTL
Output connector box	4 x BNC, 6' cable
Power requirements	115/230V @ 50VA
Dimensions	9.5W x 3.5H x 12D in. (48x9x30cm)
Weight	5 lbs. (2.3kg)

Note 1: This instrument is intended for non-human use only.



Programmable waveform parameters:

- I_P = positive current
- I_N = negative current
- T_1 = phase one pulse time
- T_2 = phase two pulse time
- T_{IP} = interphase delay time
- T_T = pulse repetition time (1/F)



FNS-4 Rear panel

Rear-panel view of the FNS-4 shows the mains universal power inlet / power switch, the RS232 serial port connection and the monitor output connection. A USB-serial adapter is available for use with computers lacking a serial port.

Ordering Information

16-10001	FNS-4	Four-channel version with Labview software, output connector box, cables
16-10000	FNS-16	Sixteen-channel stimulator with output connector box, all cables, and software
16-11000	FNS-1	Replacement channel plug-in board for FNS-4 or FNS-16

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