

# LabSmith HVS448

## High Voltage Sequencer

- ▶ Eight channels supplying and sensing voltages up to  $\pm 3$  kV, fully regulated
- ▶ 16-bit voltage and current sensing and control
- ▶ Complete microsystem automation



▶ MEMS and microfluidics require precise and coordinated control over multiple high voltage channels. Sophisticated microsystems need more than open-loop voltage or current control — drivers must be able to sense and react in real time.

The LabSmith HVS448 High Voltage Sequencer drives eight high voltage channels, with agile programmable sequencing for an entirely new level of electrical manipulation. The HVS448 provides complete experiment control for microfluidics, MEMS, piezo-electronic actuators, and more. With innovative voltage supply/sensing and a ground-breaking sequence programming environment, the HVS448 integrates the entire experiment, simply and safely.

### Innovative Voltage Control

The HVS448 includes eight high-voltage channels, each of which can switch in a millisecond between several functions:

- Voltage regulator (up to  $\pm 3$  kV)
- Current regulator (up to  $\pm 100$  mA)
- High impedance input (100 M $\Omega$ )
- All while monitoring and controlling actual voltage and current with 16-bit resolution (0.0015%).

Four digital inputs and four trigger outputs integrate the system with the rest of your lab, allowing real-time coordination, synchronization, and control of other apparatus.

### Unique Sequencing Environment

The key innovation of the HVS448 is its ability to switch its channels rapidly through different modes and settings based on real-time calculations, measurements, or programmed sequences. Sequence™ software provides both flexibility and simplicity for

creating sophisticated, adaptable, and fault-tolerant active controls.

The Sequence architecture simplifies control-system programming:

- A top-level “Sequence” program controls the flow between steps, including the conditions for changing steps and handling exceptions.
- Individual “Step” programs define channel functions. Each step can respond to timers, triggers, current or voltage levels, or real-time calculations. It can then switch regulation modes, alter voltage or current settings, and/or send digital output signals for any/all channels.

### Complete Experiment Control

An example experiment in microfluidic cytometry helps explain the power of the HVS448. To control this experiment, one HVS448 can automatically perform all of the following duties:

- Detect a current dip as a cell passes through an orifice
- Convey that cell to a preparation chamber, then trap it
- Flow labeling dyes into the chamber and lyse the cell
- Inject the labeled lysate into a column
- Fractionate it into bands
- Power a photo-multiplier tube to detect fluorescence
- Electrospray into a mass spectrometer and trigger data recording
- Flush the chamber, then await more cells.

From outputs to interlocks, the HVS448 commands every aspect of the experiment, replacing an entire rack of uncoordinated high-voltage supplies, multimeters, cables and controls. Add the ability to switch between programs and reconfigure in seconds, and the HVS448 becomes an essential tool for cutting edge research.

### Applications

- Electrophoresis
- Conventional and Pulsed-Field Dielectrophoresis
- Program Gradient Chromatography
- Electrochromatography
- Chip-Based Electric Manipulation
- Array Assays
- Multi-channel Separations



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# LabSmith HVS448: Specifications

## SUPPLY

Model	Output Voltage <sup>1</sup>	Output Current <sup>2</sup>	Output Current Per Channel
3000	±3000 V	±6 mA	±4.8 mA
1500	±1500 V	±12 mA	±10 mA
800	±800 V	±25 mA	±20 mA
400	±400 V	±50 mA	±40 mA
200	±200 V	±100 mA	±80 mA

<sup>1</sup>relative to case ground  
<sup>2</sup>total source or sink current

## MONITOR

Property	Min	Max	Typ	Notes
Monitor time resolution	-	100 µs	-	
Current monitor resolution	-	-	100 nA	
Voltage monitor resolution	-	-	50 mV	
Voltage settling time	-	500 µs	-	step load change or step voltage change
Current settling time	-	10 µm	-	step load change or step current change

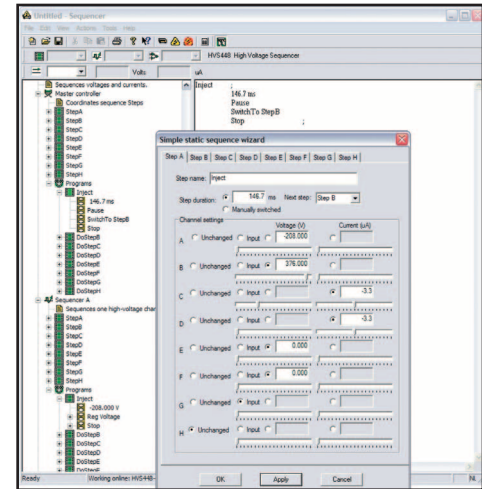
## SEQUENCE PROGRAMMING

Property	Min	Max	Typ	Notes
Number of step programs per sequence	-	8	-	
Total number of instructions in the step programs	-	1500/channel	-	

Trigger programming: Arbitrary logical comparison of 4 digital inputs and 8 channel outputs. Individual program for each step.

## POWER REQUIREMENTS

Property	Min	Max	Notes
Voltage	-	100–250 VAC 50–60 Hz	external male AC connector with fuse, internal cooling fan
Current	1 A	-	internally fused DC supply



Sequence's intuitive interface and wizards make quick work of controlling your microsystem.

## PHYSICAL DIMENSIONS

Property	Typ	Notes
Width	208 mm (8.2")	black enamel-coated anti-RFI steel enclosure
Length	242 mm (9.5")	electrostatically shielded
Height	60 mm (2.4")	

## PROGRAMMING REQUIREMENTS

- Standard RS-232 interface, (e.g., external IBM PC-compatible COM port), USB optional
- 115200 baud, 1 stop bit, no parity
- Unit is supplied with serial cable

## SOFTWARE REQUIREMENTS

- PC-compatible computer
- Sequence software for Windows 95, NT, Me, 2000, XP or later, included
- National Instruments LabView™ drivers available



Visit our website at [www.labsmith.com](http://www.labsmith.com) for information on the HVS448 and other LabSmith products. Try our Sequence software at [www.labsmith.com/downloads](http://www.labsmith.com/downloads)