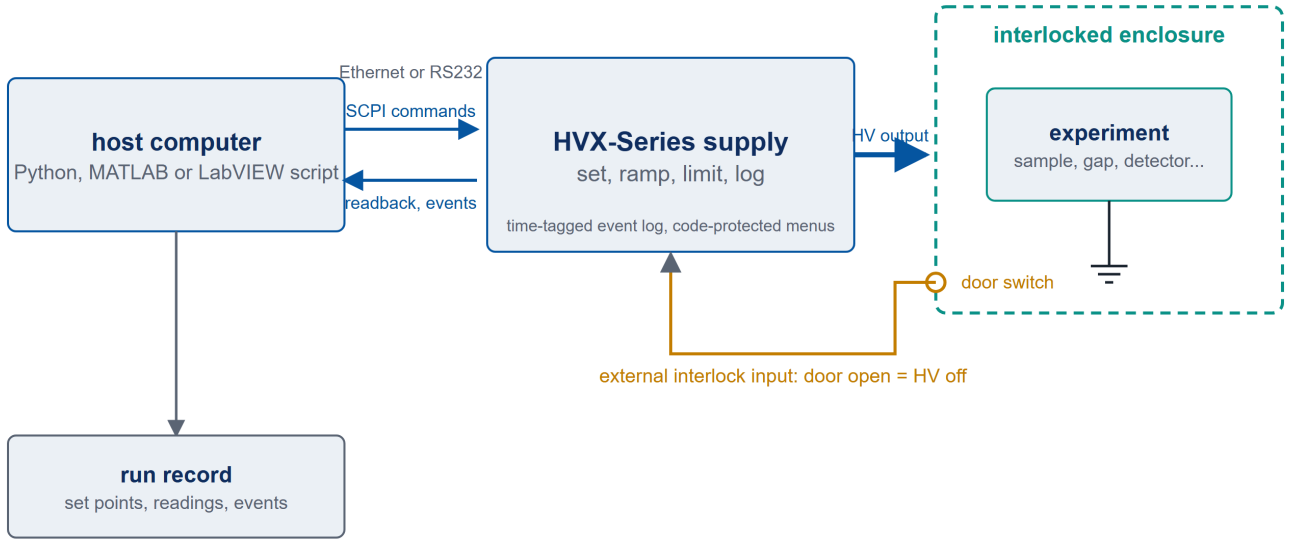
R&D & University HV Lab

A flexible bench or rack supply with full digital control, SCPI over Ethernet, reversible and floating output, and a 1.5 to 30 kV range that spans teaching demonstrations through funded research.

APPLICATION BRIEF · HVX-SERIES HIGH VOLTAGE POWER SUPPLIES · dc-62022201

Schematic

A scripted high-voltage experiment: host, supply, interlocked enclosure, record



The script sets each point, waits for the readback, logs it, and moves on; the interlock and the supply's own arc detection stay in hardware

Schematic: a scripted high-voltage experiment. The host scripts the supply over SCPI, the supply drives an experiment inside an interlocked enclosure, the door switch feeds the external interlock input, and set points, readings and events go to a run record.

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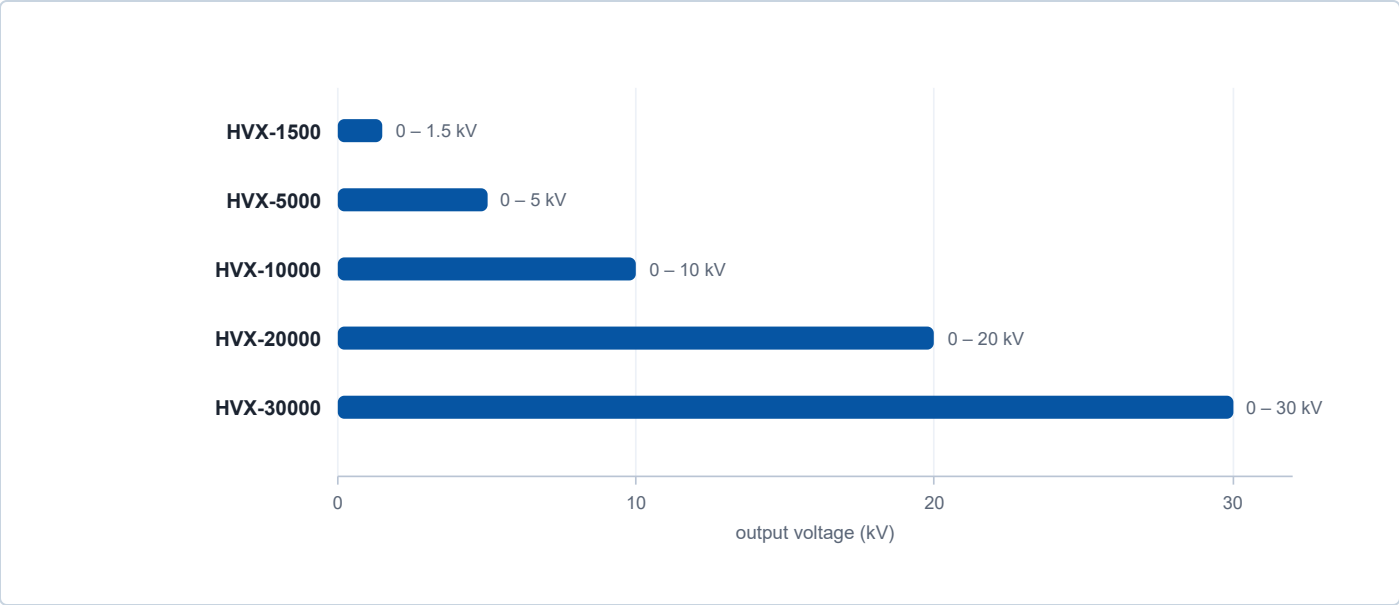
A university or industrial research lab rarely runs a single experiment. The same bench supports a power-electronics study one week, a materials breakdown test the next, and a teaching session after that. A high-voltage supply purchased for one project quickly becomes the supply everyone reaches for. A supply built for one job, with one polarity and one range, covers only part of that breadth.



Research also runs on automation. A graduate student does not want to sit at a front panel turning a dial for a 12-hour sweep. The experiment needs to be scripted, stepped, and logged from a host computer, then re-run identically

months later when a reviewer asks for the data again. A supply that cannot be driven from code limits what the lab can automate.

Then there is the matter of grounding and polarity. Different experiments reference the load to ground in different ways. Some need a clean earth-referenced output that can be flipped positive or negative. Others, where neither terminal can sit at ground, need a floating, potential-free output. A lab that has to buy a separate instrument for each case wastes both budget and bench space.



DERIVED **Figure 1.** From the datasheet: the HVX voltage classes from 1.5 kV to 30 kV across 500 W to 3 kW power classes, all with the same digital control, so the bench that teaches in September can run funded research in January.

How the BNC HVX-Series line solves it

The Berkeley Nucleonics HVX-Series is a fully digitally regulated DC high-voltage supply that covers this range of use. The voltage range spans the catalog from 1.5 kV up to 30 kV, so one product family covers low-voltage device work and high-field experiments alike. Power classes of 500 W, 2 kW, and 3 kW let a lab match the supply to the experiment rather than over-buying.

Control is where the line earns its place in research. Every unit carries on-board Ethernet and RS232 with a SCPI command set, so a student can drive it from Python, MATLAB, or LabVIEW and script a full voltage or current sweep without touching the front panel. For hands-on sessions the 3.5-inch color display with two soft keys and a turn-and-press knob gives direct manual control, and the time-tagged error and event log captures what happened during a run. Configurable code protection lets a lab manager lock a safe operating envelope before students take the bench.

Flexibility extends to the output itself. Reversible-polarity models switch between positive and negative, earth-referenced operation in a single chassis, while floating models provide a potential-free output for experiments where neither terminal can be grounded. The supply takes single-phase 230 V mains (230 V plus or minus 10 percent on the 3 kW models, 187 V to 253 V on the 2 kW models) through an IEC C20 inlet with active power-factor correction, so the bench needs a 230 V circuit rather than a 120 V outlet, and the 19-inch rack or benchtop form factor fits whether the lab works from a rack or a tabletop.

Which HVX-Series models and options fit

Because research needs vary so widely, the model choice depends on the voltage and power the lab expects to use most. The table below maps common lab profiles to a sensible starting model.

Table 1.

Lab profile	Recommended HVX-Series model	Output
General teaching and device work	HVX-1500-1400	1.5 kV, 1400 mA, reversible
Floating-output experiments	HVX-1500-2000 FLO	1.5 kV, 2000 mA, floating
Mid-range materials and breakdown	HVX-5000-600	5 kV, 600 mA, reversible
High-field and plasma research	HVX-10000-300	10 kV, 300 mA, reversible
Extended high-voltage studies	HVX-20000-25 or HVX-30000-17	20 kV, 25 mA or 30 kV, 17 mA, positive or negative

The 1.5 kV to 10 kV models are available in positive, negative or reversible-polarity versions, so a reversible HVX-5000-600 covers both polarities in one chassis; the 20 kV and 30 kV models are positive or negative. The retrofittable options matter for research as well. Ramp Control sets a defined rate of rise from 1 V/s up to ten times nominal volts per second, which protects sensitive samples and makes soft turn-on repeatable. Arc Detection reports flashover events and can shut the output off, a useful safeguard when students run unfamiliar loads.

> **Stored energy**
>
> Every HVX-Series model sources at least 500 W, and the 1.5 kV models source up to 3 kW; none is a current-limited low-energy supply. A teaching bench needs an interlocked enclosure wired to the supply's external interlock input, a defined discharge path, and a supervisor who confirms zero potential with an HV probe before anyone touches the load.

Recommended configuration

For a flexible teaching and research bench, a strong default is the reversible **HVX-5000-600**. At 5 kV and 3 kW with both polarities in one chassis, it covers device, materials and demonstration work to 5 kV, and it speaks SCPI over Ethernet so it slots straight into scripted experiments. Add the Ramp Control option for controlled turn-on of sensitive samples and Arc Detection to shut the output off on a flashover.

Labs that also need a potential-free output should add a floating model such as the **HVX-1500-2000 FLO** for experiments where neither terminal sits at ground. Where the research program reaches into higher fields, a **HVX-10000-300** or a 20 to 30 kV unit extends the same digital control and interfaces to the top of the range. Every model shares the same command set, so a script written for one transfers to the others with little change.

> **Equipping a research or teaching lab?**
>
> Berkeley Nucleonics applications engineers can match HVX-Series models, polarity, and options to your experiments and automation. Call 800-234-7858 or write info@berkeleynucleonics.com to scope a configuration for your bench.

For a quick question, chat with an engineer at berkeleynucleonics.com.

Berkeley Nucleonics Corp.
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Application Brief
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