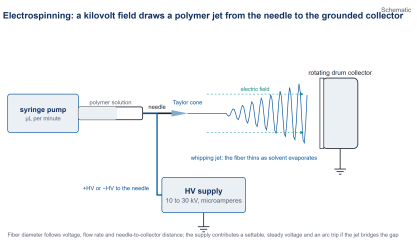
Electrostatic & Coating Processes

Drive electrospinning, sputter bias, electrostatic chucks and laboratory corona and precipitation electrodes with a settable high-voltage field up to 30 kV that ramps at a defined rate and shuts off on an arc.

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



Schematic: electrospinning. A syringe pump feeds a polymer solution to a needle held at high voltage; a Taylor cone forms, the jet whips and thins, and the fiber lands on a grounded rotating drum collector.

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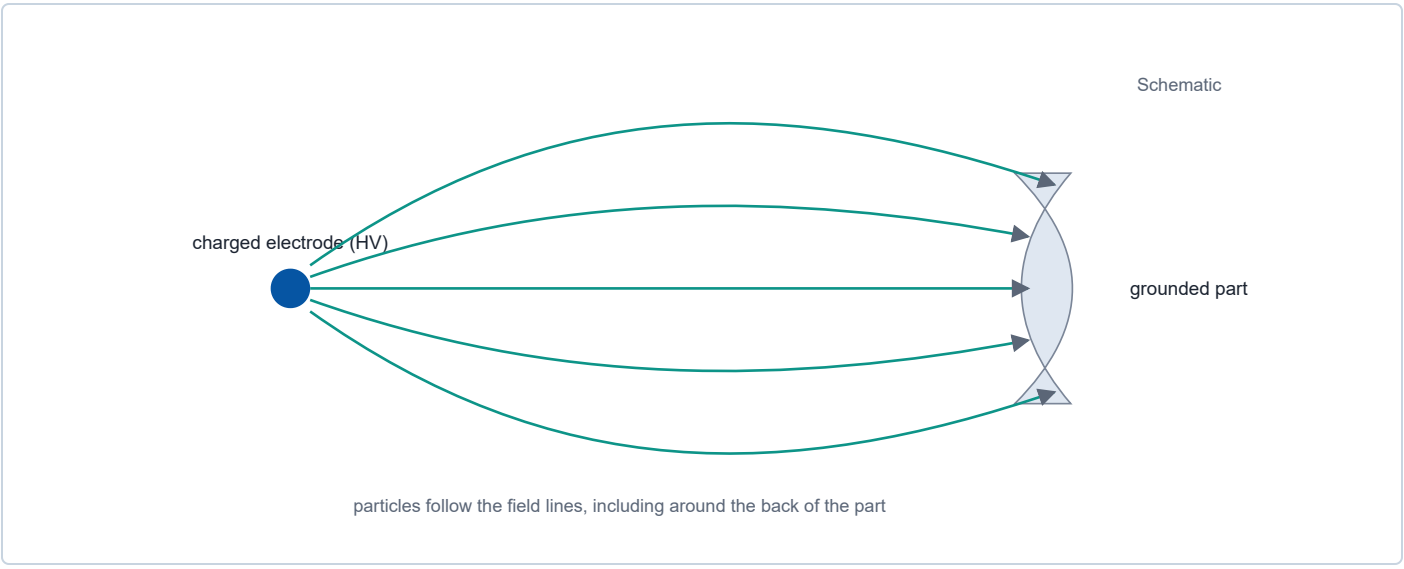
Electrostatic and coating processes turn a high-voltage DC field into useful work. The supply charges an electrode, and the field it creates is what does the job: it pulls charged particles out of an air stream, atomizes a paint or powder and steers it onto a grounded part, draws a polymer into a fiber, biases a sputtering target, or holds a wafer flat against a chuck. The field is the tool, so the quality of the result follows directly from the quality of the voltage behind it.

These processes span a wide range of voltage. Electrostatic chucks hold a substrate at a few hundred volts to a few kilovolts. DC sputter bias runs at hundreds of volts and amperes of current. Electrospinning draws nanofibers from a charged polymer solution at 10 kV to 30 kV and a few microamperes. Laboratory corona charging, electrostatic separation and small precipitation cells work between 5 kV and 30 kV. Production electrostatic spray and powder-coating guns and full-size industrial precipitators run above this range, at tens of kilovolts to about 100 kV, and take purpose-built supplies. Negative polarity is common across the processes in range, and development work often needs both polarities.

What they share is a need for a field that is stable, settable, and well-behaved at the edges. A drifting or rippling field changes the deposition pattern, the fiber diameter, or the collection efficiency from minute to minute. Bringing the voltage up too abruptly invites sudden corona or a flashover before the process has stabilized. And coating environments spark often, because grounded parts move through the field and conductive overspray builds up, so the supply has to recognize an arc and react rather than keep driving into the fault.

Why controllable high voltage matters

The practical requirement is fourfold: set the field precisely, hold it steady, raise it gently, and protect the process when it arcs. A precise setting lets an operator dial in the exact field a coating recipe calls for and return to it part after part. Tight regulation keeps that field constant as the load changes, which is what keeps transfer efficiency and film uniformity repeatable. A controlled ramp brings the field up along a defined gradient so the process stabilizes before reaching full strength, avoiding the abrupt onset of corona or an early arc. And arc handling that can switch the output off limits the energy delivered into a flashover and keeps a routine spark from becoming a damaging event.



SCHEMATIC **Figure 1.** Charged particles ride the field lines from the electrode to the grounded part, including around its back. The wrap-around that makes electrostatic coating efficient exists only while the field is held stable.

How the HVX-Series solves it

The HVX-Series is a fully digitally regulated DC high-voltage supply built around a microcontroller and FPGA, which gives an electrostatic process the settable, steady field it needs. Voltage is set digitally with 16-bit resolution across roughly 0.01 to 100 percent of nominal, so the field can be placed precisely and recalled to within the 0.1 percent reproducibility. Once set, it stays put: line regulation is tighter than plus or minus 0.01 percent of nominal across a 10 percent mains swing, load regulation is within 0.05 percent of nominal over a 10 to 90 percent load step, and stability holds within 0.01 percent of nominal over an eight-hour run. Ripple is specified at 0.01 percent of nominal plus 100 mV peak to peak. A quiet, steady field is what makes a result repeatable.

Ramp Control is the option that suits these processes best. It brings the output up along an adjustable gradient, from 1 V/s up to ten times nominal per second, so the field builds gently and the process settles before it reaches working strength rather than snapping on and triggering corona or an arc. **Arc Detection** is the companion option. It detects a flashover, reports it, and can shut the output off, so a spark at an electrode or in a precipitation cell does not become sustained current into the fault. On the 1.5 kV to 10 kV classes polarity is electrically reversible, which covers the negative-polarity processes common in this area and supports development work that needs both; the 20 kV and 30 kV models are ordered as positive or negative. On board, Ethernet and RS232 with a standard SCPI command set let the supply take field commands from a line controller or recipe sequencer, while the time-tagged event log records every set point and arc event for the process record.

Which HVX-Series models and options fit

Voltage sets the model and current follows the process. Chucks and sputter bias need the 1.5 kV and 5 kV classes, where the current ratings reach amperes; electrospinning, corona and laboratory precipitation cells draw microamperes to milliamperes and need the 10 kV to 30 kV classes.

Table 1.

Need	Recommended HVX-Series model	Rating
DC sputter bias, electrostatic chucks	HVX-1500-2000	1.5 kV, 2000 mA, reversible
Chuck and bias development to 5 kV	HVX-5000-400	5 kV, 400 mA, reversible

Need	Recommended HVX-Series model	Rating
Laboratory corona and precipitation cells	HVX-10000-200	10 kV, 200 mA, reversible
Electrospinning, electrostatic separation	HVX-20000-25 or HVX-30000-17	20 kV, 25 mA or 30 kV, 17 mA, positive or negative

Two options carry these applications. **Ramp Control** gives the gradient-based field build-up that keeps the onset of corona and early arcs under control. **Arc Detection**, which detects a flashover, reports it and can shut the output off, is the protection to specify wherever a grounded part moves through the field or conductive deposit builds up on an electrode. Choose negative polarity where the process calls for it, or the reversible variant on the 1.5 kV, 5 kV and 10 kV classes where process development needs both polarities.

Recommended configuration

For an electrospinning station, a **HVX-30000-17** in the polarity the process uses (negative is the common choice with a grounded collector) covers the 10 kV to 30 kV working range with the 16-bit setting, about 0.46 V per step, that fiber-diameter studies need; the process draws microamperes, so the 17 mA rating is not a constraint. Add **Ramp Control** so the field builds at a defined rate and the Taylor cone forms before full voltage, and **Arc Detection** to shut the output off if the jet bridges to the collector.

For sputter bias and electrostatic chucks, the **HVX-1500-2000** sources up to 2 A at 1.5 kV with the same regulation and options, and the reversible configuration supports process development in both polarities. Laboratory corona and precipitation cells use the **HVX-10000-200**. In every case, specify **Arc Detection**, add **Ramp Control** for a controlled field, and drive the supply over Ethernet with SCPI from the process controller so set points and arc events land in the process record. Rack the 2U enclosure into the control cabinet beside the rest of the equipment.

> **Flammable atmospheres**
>
> The HVX-Series carries CE and cMETus marks and no hazardous-location rating, and arc detection does not make it an ignition-safe source. Where solvent vapor, a powder cloud or another flammable atmosphere can be present, as in a spray booth, the installation has to meet the area classification, and the supply itself stays outside the classified zone.

Talk to an application engineer

Berkeley Nucleonics can help you match a HVX-Series model and option set to your electrostatic or coating process. Call **800-234-7858** or email info@berkeleynucleonics.com.

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

Ask now → Chat with our assistant and get an answer in seconds.

Berkeley Nucleonics Corp.
Test, Measurement and Nuclear Instrumentation since 1963
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Application Brief
HVX-Series High Voltage Power Supplies | dc-62022201