

# Pinnacle™ Plus+ Pulsed DC Power Supply: New Horizons in Reactive Sputtering Performance

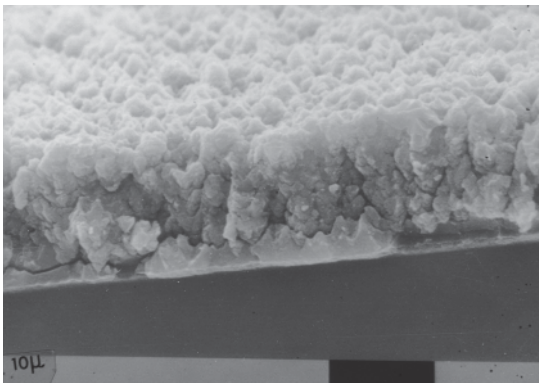
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AE's new Pinnacle Plus+ pulsed dc power supply opens up new performance horizons for your reactive processes. Traditionally, RF has been used to create high quality films by sputtering insulating targets directly. With its advanced pulsed dc capabilities, AE's new Pinnacle Plus+ product line offers a cost-effective, technologically advanced alternative—and it's available in single- and dual-output 5 kW models as well as single-output 10 kW models.

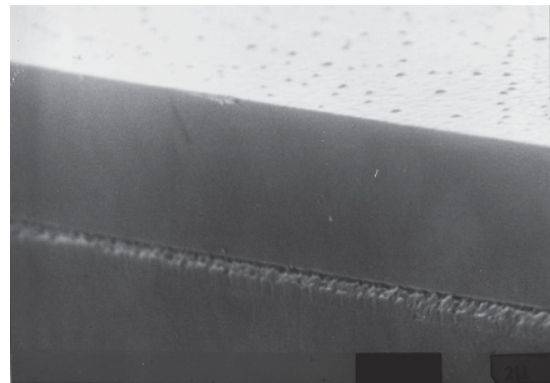
Using RF technology is expensive and complex compared with using pulsed dc technology available in the Pinnacle Plus+ product line. This new product line delivers high-quality films and allows increased throughput. It is ideal for extending the performance of existing processes as well as for expanding the possibilities for developing new, previously unachievable dc processes.

The Pinnacle Plus+ product line is an effective combination of standard dc technology and process-proven pulsed dc technology first invented by AE in the early 1990s. AE's application and engineering expertise ensures a robust, flexible, reliable design that delivers the high output accuracy and process repeatability that is critical in reactive processes.

## Performance Results You Can See



Al<sub>2</sub>O<sub>3</sub> sputtered without pulsed dc.



Al<sub>2</sub>O<sub>3</sub> sputtered with pulsed dc.

Photo Source: Centre for Advanced Materials and Surface Engineering, University of Salford, UK

## Innovative Features and Performance Benefits You Can Bank On

- Individually controllable dual-output pulsed dc power from a single unit
  - Provides a cost-effective solution for multi-chamber production
- Increased process flexibility
  - Incorporates an extended frequency range of 5 kHz to 350 kHz
  - Full power over a wide impedance range with high current at low voltage
  - 50% duty cycle—the highest available—enables bi-polar pulsed dc operation
- More repeatable process performance
  - Integrated microprocessor
- Active front panel
  - Provides easy access to critical parameters
- Meets CE requirements

## Easy to Operate

Ease-of-use is a top design consideration with the Pinnacle Plus+ product line which offers a wide selection of well established User and Host port protocols. In addition, we've designed the "form and fit" to allow easy transition from earlier generations of AE supplies.

## Electrical Specifications

### Output

<b>Power Options</b>	<b>10 kW:</b> Single output <b>5 kW:</b> Single output; dual output, independently controlled
<b>Voltage Range</b>	325 Vdc to 650 Vdc
<b>Maximum Current</b>	<b>10 kW:</b> 30.8 A (below 325 V) <b>5 kW:</b> 15.4 A (below 325 V)
<b>Frequency</b>	5 kHz to 350 kHz (variable)
<b>Reverse Time</b>	400 nsec to 5 $\mu$ sec (variable)
<b>Duty Cycle</b>	Up to 50%
<b>Reverse Voltage</b>	10% of the operating voltage
<b>Ignition Voltage</b>	1700 V
<b>Regulation Modes</b>	Power, voltage, or current
<b>Repeatability</b>	Output power repeatability from run to run at a constant setpoint is 0.1% from 10% to 100% of rated power
<b>Output Readback Accuracy</b>	Accuracy of actual output value (V, kW, or A) to setpoint at 25°C is $\pm 1\%$ of the actual value or $\pm 0.2\%$ of the full rated output (whichever is greater) for the full input voltage range and output impedance range

### Input

<b>Voltage Range</b>	360 Vac to 440 Vac, 3 $\phi$ , 50/60 Hz, no neutral required
<b>Current</b>	<b>Dual 5 kW &amp; Single 10 kW:</b> 17 A nominal <b>Single 5 kW:</b> 9 A nominal

## Communications Specifications

<b>Front Panel</b>	Active front panel or passive display front panel
<b>Remote Panel</b>	Accessory available
<b>Host (Serial)</b>	RS-232/422/485 or Profibus (12 Mbit)
<b>User (Analog)</b>	24-V isolated or 15-V non-isolated

## Physical Specifications

**Size** 133 mm (H) x 483 mm (W) x 639 mm (D), including connectors  
5.22" (H) x 19" (W) x 25.18" (D)

**Weight** **Dual 5 kW & Single 10 kW:** 30 kg (66 lb)  
**Single 5 kW:** 25 kg (55.25 lb)

**Input Power Connector** Five terminal, DIN compression terminal block

**Input Cable** Supports up to 8 AWG wire per terminal

**Output Connector** Shielded strain relief with a 3-terminal, multi-contact, pluggable connector; other options are available

**Output Cable** Triax or twinax (shielded) cable recommended

**Host and User Port Cable** Shielded cable recommended

## Compliance Specifications

### Electro-Magnetic Compatibility

Tested for and complies with Directive 89/336/EEC: Standards EN 55011 (CISPR 11 Group 2, Class A) and EN 50082-2

**Safety Standards** Tested for and complies with Directive 73/23/EEC: Standard EN 50178

**Installation Requirements** Standards listed and also EN 60204 (IEC 204), VDE 0113, and other applicable requirements

## Environmental Specifications During Operation

**Air Temperature** 0°C to +40°C (+32°F to +104°F)

**Relative Humidity** 5% to 85% (+1 g/m<sup>3</sup> to +25 g/m<sup>3</sup>), no condensing or icing

**Air Pressure** 80 kPa to 106 kPa (800 mbar to 1060 mbar)

## Ordering Information

### Description

5 kW /5 kW

10 kW

5 kW

xxx Please contact your local AE sales representative for information on available options and pricing.

### AE Part Number

3152430-xxx

3152432-xxx

3152434-xxx

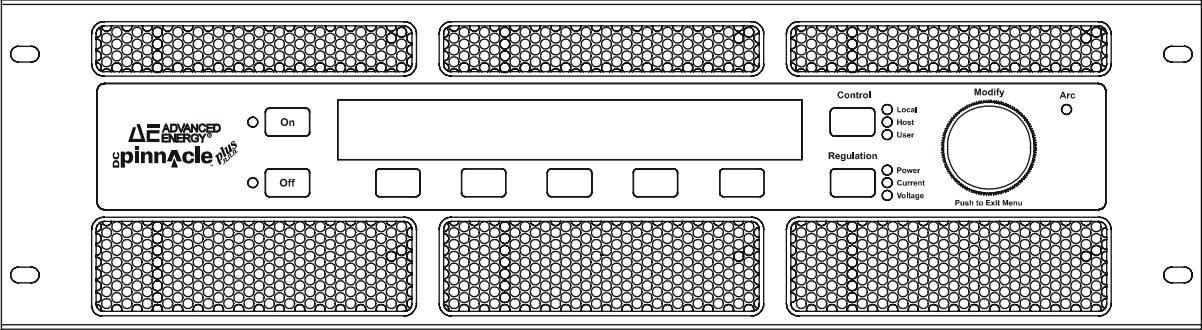
### Configuration

5 kW, dual output

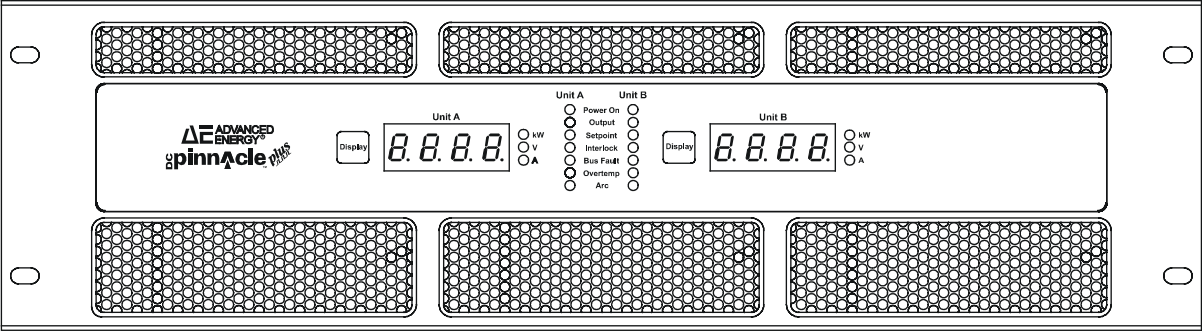
10 kW, single output

5 kW, single output

Pinnacle Plus+ Active Front Panel



Pinnacle Plus+ Passive Display Front Panel (Dual)



Pinnacle Plus+ Rear Panel (Dual)

