PINNACLE SERIES
DC MAGNETRON POWER SUPPLIES

LOWEST STORED ENERGY, FASTEST ARC RESPONSE, AND WIDEST FULL-POWER OPERATIONAL IMPEDANCE RANGE AVAILABLE

Input Voltage

200/208, 400, or 480 VAC (all ±10%)

Output Voltage

Low-Z and Standard-Z

Efficiency

>87%

Power Factor

>0.90 for loads > 2 kW

Pinnacle Series DC Magnetron Power Supplies

The field-proven Pinnacle® platform of DC power supplies delivers remarkable process consistency and control for significantly reduced variation and higher yields. This compact, versatile package offers the lowest stored energy, fastest arc response, and widest full-power operational impedance range in the industry. These unprecedented capabilities, combined with superior efficiency and the highest power factor available, deliver process benefits you can bank on.

Product Highlights

- Lowest operating and installed cost
- Fastest arc response in industry — least arc damage
- Configurable arc response
- Maximum process efficiency
- Precise process control
- Compact, versatile package
- Numerous display/control options
- Safety/emissions compliant
- Lowest stored energy — less than 1 mJ per 1 kW of output
- No tap changes
- 6.25:1 impedance range
- Target conditioning cycle (TCC) — minimizes conditioning time for new targets
- Output repeatability of ±0.1%
- Joule mode — optimized energy delivery
- Programmable limits for output level, strike voltage, and process voltage
- Non-volatile memory storage of settings
- Compact, 3U (128 mm, 5.25") chassis
- 200 kW of output in a 30U (1280 mm, 50") rack
- CE and CSA marked

Fastest Arc Response in Industry — Least Arc Damage

Pinnacle series DC power supplies store less than 1 mJ per 1 kW of output for the shortest arc recovery time in the industry. With a hard-arc detection time of 0.5 to 3 µs, they are approximately ten times faster than competing units. Process interruption is negligible. Hard arc shutdown from full power results in power interruption of less than 10 µs.

Configurable Arc Response

Sophisticated arc-handling capabilities enable you to easily program voltage trip level, delay to shutdown, and shutdown time to match your process. For additional ease, Pinnacle series units automatically implement pre-set process values when you select your target type (metal or nonmetal).

Maximum Process Efficiency

With the highest efficiency and power factor in the industry, the Pinnacle platform offers both the lowest operating and installed cost.

No Tap Changes, Wide, Full-Power Tap

Pinnacle units deliver a full-power tap over a 6.25:1 impedance range — without tap changes. Competitive supplies have a gap in coverage with little overlap, and may only cover a 2.87:1 range by changing among three manual taps.

The standard-Z version of the Pinnacle platform delivers full output into loads requiring 400 to 1000 VDC. If you don't need full output, the range of available load impedances is even wider. Further, several low-Z options are available for full power below 400 VDC.

Minimized Conditioning Time for New Targets

Target conditioning cycle (TCC) mode ensures the shortest conditioning time by limiting output power based on arc rate and average power delivered.

Low-Ripple Technology

The elimination of high-voltage switches and current-diversion circuits results in superior reliability, as well as superior process performance in the form of high output-voltage consistency and a highly accurate, fast ramp response.

Precise Process Control

A variety of innovative features maximize process control:

Joule mode enables you to set delivered energy during each process run and adjusts for ramp time and lost energy during arc events.

User-selectable and programmable parameters put process control at your fingertips:

- Selectable operation as a power, current, or voltage source
- Programmable ramp/run recipes
- Programmable process limits for output level as well as strike and process voltage

16-bit control circuitry enables the fastest, most accurate ramp-to-set point response in the industry.

Non-volatile memory stores and preserves recent settings in case of an unexpected shutdown.

Compact, Versatile Package

Pinnacle supplies require only 3U for either a single 20 kW unit or two 10 kW power supplies. Single-output 3 kW, and 12 kW units, as well as dual-output 6 kW and 10 kW units, are also available. Flexible master/slaving allows up to 200 kW of output in only 30U. Six kW and 12 kW units can be configured together in a master/slave arrangement, as well as can 10 kW and 20 kW units. Any unit is easily designated as either master or slave, making units of the same configuration interchangeable.

Display/Control Options

The Pinnacle platform offers the following options:

- Active front panel or remote panel. Either option offers complete unit control, with adjustable settings for joule mode, output limits, ramp/run recipes, and arc response.
- Passive front panel. Allows visual monitoring by an operator.
- Multiple I/O protocols. Allow you to adjust settings as with an active remote panel. Analog selections are available in isolated and non-isolated 15- and 24- VDC configurations. Digital selections include AE Bus (RS-232, RS-422, RS-485), Profibus, and DeviceNet™.

Regulatory Compliance

Pinnacle units are CE marked and conform to Low Voltage Directive and Electromagnetic Compatibility Directive. Units comply with IEC/EN 61326-1 (EMC) and IEC/EN/CSA/UL 61010-1(Safety) and carry a NRTL certification.

Product Specifications

Electrical	
Input Voltage	200/208, 400, or 480 VAC (all ±10%)
	3, 4 wire, 50 to 60 Hz, no neutral required
Efficiency	>87%
Power Factor	>0.90 for loads > 2 kW
Output Voltage	Low-Z and standard-Z options (please refer to individual specification information)
Output Polarities	Floating default with positive and negative capability
Output Ripple Voltage	The component of output ripple voltage related to input line frequency is <2% RMS
Output Power Repeatability	0.1% from 10% to 100% of rated power (from run to run at a constant set point)
Remote Panel or Host Port	±1% of full-rated output
User Port	1% or ±0.2% of full-rated output, whichever is greater
Line Regulation	No accuracy derating for line voltages within the specified input voltage range
Load Regulation	No accuracy derating for impedances within the specified output impedance range
Temperature Coefficient	<0.005%/°C variation in the regulated output parameter over 20° to 40°C (68° to 104°F) ambient temperature range
Product Line (Overall)	Specification accuracy is Cpk <1.5

I/O Control	
Analog Interface Options	37-pin isolated (to 500 VRMS), 0 to 10 VDC analog, 0/24 VDC digital
	37-pin, 0 to 10 VDC analog, 0/15 VDC digital
	37-pin, 0 to 5 VDC analog, 0/15 VDC digital
Serial Communication Options	RS-232, RS-422, RS-485 (selectable baud rates up to 115.2 k): · AE Bus protocol · ASCII protocol (MDX and emulation)
	Profibus (selectable baud rates of 1.5 or 12 MB); AE Bus protocol
	DeviceNet™ option available

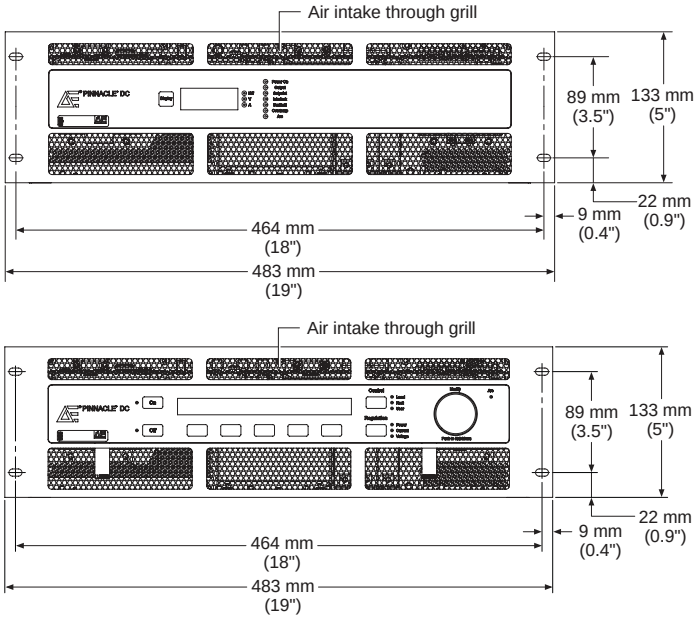
Mechanical Specifications

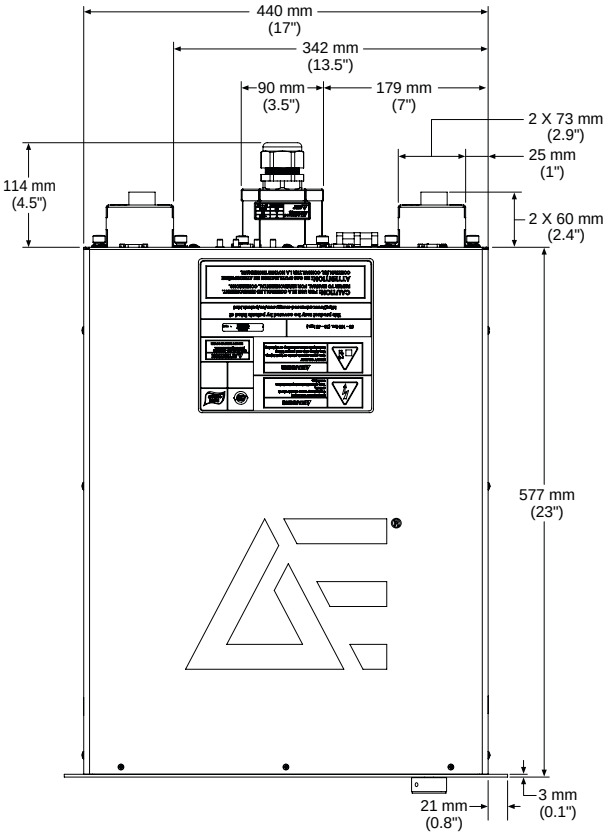
Construction	
Size*	3U: 128 mm (H) x 483 mm (W) x 574 mm (D) (5.25″ (H) x 19″ (W) x 25.18″ (D))
	4U: 177 mm (H) x 483 mm (W) x 574 mm (D) (7″ (H) x 19″ (W) x 22.6″ (D))
Weight	21.3 kg (47 lb) to 32.2 kg (71 lb)
Output Power Connector	Three-terminal, multi-contact, pluggable connector (with shielded or plastic strain relief), UHF, military, or ring lug
Input Power Connector	The input connector varies from unit to unit. Input connector options include: · 208 VAC units: four-terminal, strip, compression connector · 400 VAC to 480 VAC units:, five-terminal, strip, compression connector

*Dimensions do not include front panel mounting extensions, the power connection cover, or other connectors.

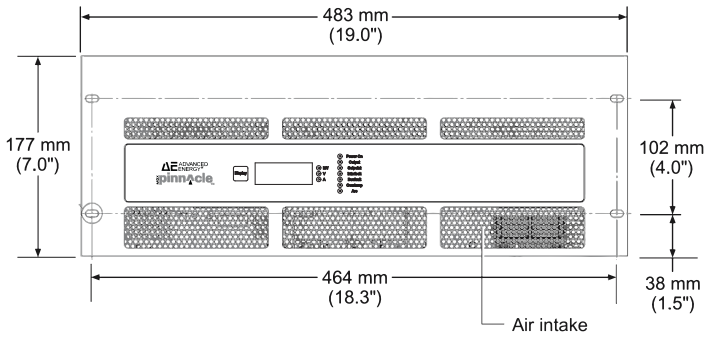
Basic Pinnacle Dimensions (Millimeters/Inches)

3U:





4U:



ABOUT ADVANCED ENERGY

Advanced Energy (AE) has devoted more than three decades to perfecting power for its global customers. AE designs and manufactures highly engineered, precision power conversion, measurement and control solutions for mission-critical applications and processes.

AE's power solutions enable customer innovation in complex semiconductor and industrial thin film plasma manufacturing processes, demanding high and low voltage applications, and temperature-critical thermal processes.

With deep applications know-how and responsive service and support across the globe, AE builds collaborative partnerships to meet rapid technological developments, propel growth for its customers and power the future of technology.

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