



Better technology. Better results.



Pinnacle® Series DC Magnetron Power Supplies™

Lowest stored energy, fastest arc response, and widest full-power operational impedance range available

Benefits

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

Features

Lowest stored energy—less than 1 mJ per 1 kW of output

No tap changes

4:1 impedance range

Target conditioning cycle (TCC)
—minimizes conditioning time for new targets

Output repeatability of $\pm 0.1\%$

Joule mode—optimized energy delivery

Programmable limits for output level, strike voltage, and process voltage

Non-volatile memory storage of settings

Compact, 3 U (133 mm, 5.25") chassis

200 kW of output in a 30 U (1330 mm, 52.5") rack

CE marked

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.

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 1 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 4:1 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 800 VDC. If you don't need full output, the range of available load impedances is even wider. Further, several low-Z and high-Z options are available for full power below 400 or above 800 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 (<3 ms)—with run-to-run repeatability of $\pm 0.1\%$.

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

Compact, Versatile Package

Pinnacle supplies require only 3 U for either a single 20-kW unit or two 10-kW power supplies. Single-output 6-kW and 12-kW units, as well as a dual-output 6-kW unit, are also available. Flexible master/slaving allows up to 200 kW of output in

only 30 U. 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, DeviceNet™, and more.*

Regulatory Compliance

Pinnacle units are CE marked and conform to Low Voltage Directive 73/23/EEC and Electromagnetic Compatibility Directive 89/366/EEC—meeting EN55011 (emissions), EN61000-6-2 (immunity), and EN50178 (safety). Select units also carry NRTL certification.



Racks of Pinnacle power supplies used in master/slave configurations (photo copyright 2002 Southwall Inc., used here with permission)

Physical Specifications

Size (including connectors)	133 mm (H) x 483 mm (W) x 639 mm (D) 5.25" (H) x 19" (W) x 25.18" (D)
Weight	29.5 kg (65 lb)
Output Power Connector	Three-terminal, multi-contact, pluggable connector (with shielded or plastic strain relief), UHF, military, or ring lug
Input Power Connector	Five-terminal, DIN compression connector

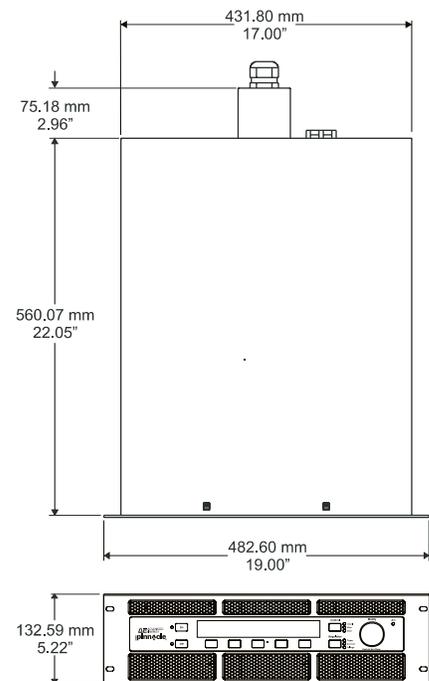
Electrical Specifications

Input Voltage	200/208, 400, or 480 VAC (all $\pm 10\%$) 3 ϕ , 4 wire, 50 to 60 Hz, no neutral required
Efficiency	> 90%
Power Factor	0.90 for loads > 1.2 kW
Output Voltage	Low Z, standard Z, or high Z (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 < 5% 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	$\pm 1\%$ of full-rated output
User Port	1% or $\pm 0.2\%$ of full-rated output, whichever is greater
Line Regulation	1% for 10% line voltage change or $\pm 2\%$ frequency change
Load Regulation	$\pm 1\%$ for 4:1 load change within V-1 limits of tap 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

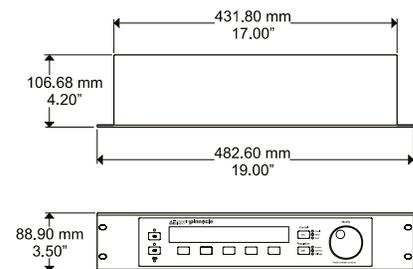
I/O Control Specifications

Analog Interface Options	37-pin isolated (to 500 V _{RMS}), 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 57.6 k): <ul style="list-style-type: none"> ◦ AE Bus protocol ◦ ASCII protocol (MDX and emulation) Profibus (selectable baud rates of 1.5 or 12 MB); AE Bus protocol DeviceNet option available

Basic Pinnacle Dimensions (Millimeters/Inches)



Optional Remote Control Panel Dimensions (Millimeters/Inches)



Advanced Energy Industries, Inc. • 1625 Sharp Point Drive • Fort Collins, Colorado 80525
 T: 800.446.9167 or 970.221.4670 • F: 970.221.5583 • support@aei.com • www.advanced-energy.com

© Advanced Energy Industries, Inc. 2006
 All rights reserved. Printed in U.S.A.
 SL-PNCL-210-04 0M 2/06

United Kingdom
 T: 44.1869.320022
 F: 44.1869.325004

Germany
 T: 49.711.779270
 F: 49.711.7778700

Korea
 T: 82.31.777.9191
 F: 82.31.777.9195

Japan
 T: 81.3.32351511
 F: 81.3.32353580

Taiwan
 T: 886.2.82215599
 F: 886.2.82215050

China
 T: 86.21.58579011
 F: 86.21.58579003