

# PEII SERIES



**LOW FREQUENCY**

*enhanced arc control with*

**POWER SUPPLIES**

*internal load matching for*

**5 KW TO 60 KW**

*40 kHz reactive sputtering*

*applications.*



## LOW-FREQUENCY POWER SUPPLIES, 5 KW TO 60 KW

The low-frequency PEII series provides 40 kHz resonant switch-mode power supplies featuring enhanced arc control and internal load matching with outputs of up to 60 kW—with no external combining hardware such as transformers.

**The compact PEII series offers 40 kHz with up to 60 kW and two distinct arc-handling circuits.**

The PEII series has dual floating outputs that can be grounded on either side. It has a water-cooled design and offers tight output regulation on power, voltage, or current with a measurement accuracy of 1% and with low harmonics, which ensure equal performance across all power levels. All PEII units are programmable logic controller (PLC) compatible and comply with CE specifications.

To achieve 20 kW to 60 kW of output power, simply combine up to six 10 kW PEII units by synchronizing them through CEX/drive connectors. In such multiple unit systems, you can match your load impedance electronically using one of seven tap positions through the User I/O port.

### BENEFITS

- **High power density**
- **Wide tap range**
- **Regulation on power, voltage, or current**
- **Enhanced arc control**
- **Automatic process safeguard**
- **Flexible modularity**

### HIGH POWER DENSITY

PEII units offer remarkable power density—with a power factor of  $> 0.9$ . Their efficient, compact design offers internal load matching so you can take advantage of the PEII series' wide tap range without additional hardware and at significant space savings over other types of power supplies.

### WIDE TAP RANGE

The PEII series' comprehensive voltage range (307  $V_{RMS}$  to 953  $V_{RMS}$ ) allows you to operate continuously through nearly a 10:1 impedance range. This wide tap range lets you buy only the power output your application needs.

### CONSTANT REGULATION ON POWER, VOLTAGE, OR CURRENT

You can select to control your process not only by constant load power, but also by voltage or current. Thus, you can optimize your processes using whichever control regulation mode best fits the running process.

### ENHANCED ARC CONTROL

PEII power supplies offer two distinct arc-handling circuits. Current-arc circuitry handles major process arcs. In addition, voltage-arc circuitry detects and reacts to micro-arcs—substantially reducing the occurrence of major process arcs by pulsing the PEII unit off for a short period. The voltage-arc circuitry detects changes in the output waveform created by a micro-arc within one half-cycle of the output. You can select how sensitive the voltage-arc circuit is to the changes in the output waveform, and you can select the duration of the “off” pulse. Thus, the PEII power supply provides the fastest possible response with the best possible signal-to-noise ratio.

### AUTOMATIC PROCESS SAFEGUARD

If a fault occurs, such as a water flow restriction causing thermal shutdown to a slave unit, the PEII system automatically recognizes the fault occurrence and redistributes the power output to the working units. This ensures maximum power output to the process and enables you to work through a fault condition to complete the runs you have in process.

### FLEXIBLE MODULARITY

With its high power density and wide tap range, the PEII power supply offers designed-in flexibility. Because of their high power density, PEII units are a compact 178 mm (7") high—which translates into valuable space savings. For comparable power configurations, the PEII unit is up to two-and-a-half times smaller than competing power systems.

### BUILT-IN PROTECTION

All PEII power supplies have complete internal protection for overvoltage, overcurrent, overpower, and open and short circuits. User connections let you add inputs such as vacuum, water, and system interlocks.

## CE COMPLIANCE

All PEII power supplies comply with CE specifications for EN55011 (emissions), EN50082-2 (immunity), and EN50178 (safety).

## RELIABILITY AND SERVICEABILITY

Designed to be among the most reliable and highest-quality power supplies available, all PEII units carry our standard one-year warranty for parts and labor.

## APPLICATIONS

The PEII power supply is an integral part of your plasma-based industrial coating system. It contributes to improved efficiency and cost-effectiveness by helping to reduce arcing and to increase throughput and film quality as well as to maximize target utilization. The PEII supply is valuable in such applications as:

- Dual-cathode and other reactive sputtering applications such as  $Al_2O_3$ ,  $SiO_2$ , and diamond-like carbon (DLC) used to create energy-efficient optical and glass coatings.
- Dual-cathode plasma-enhanced chemical vapor deposition (PECVD) of  $SiO/SiO_2$  that produce film and plastic coatings for decorative films, food packaging, capacitor films, and other films.
- PECVD, DLC, metal oxides, and carbon coatings that provide tool and tribological coatings for cutting tools, surface hardened gears, and other rotating and wear surfaces as well as for hip joint replacements and lubricating surface treatments.

## ACCESSORIES

AE offers the following optional accessories to enhance the performance of your PEII power supply.

### RAS Split Inductor

AE's Redundant Anode Sputtering (RAS) split inductor eliminates the disappearing anode problem from single-target reactive sputtering processes, thus enabling such systems to approximate DC sputtering rates. The RAS inductor's novel design incorporates two anodes and a single cathode, which facilitates easy retrofitting onto existing systems.

### Solenoid Controller

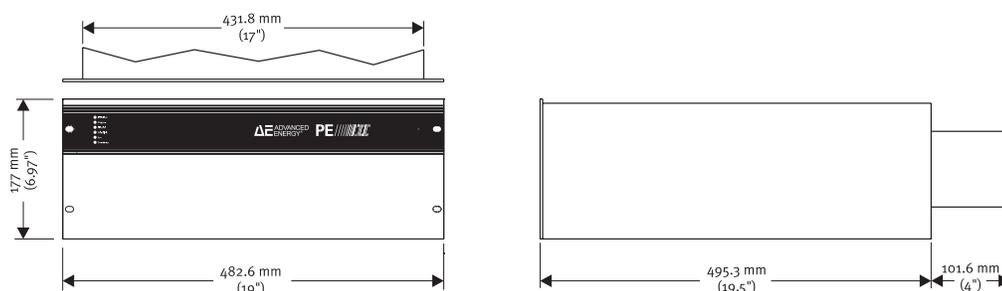
Strongly recommended in high-humidity environments, this accessory interrupts coolant flow when the unit is not producing power. This reduces the likelihood of condensation, which can interfere with the power supply's electronics. User-configurable switches allow you to adjust the delay time from power-off to a water interruption from 30 seconds to 30 minutes.

### Extender Hoses for Stacking Units

Extender hoses, connected before you stack your PEII power supplies, ease installation by extending hard-to-reach water connections behind the units. This makes these connections readily accessible, thus simplifying set-up and maintenance.

**The PEII series' automatic process safeguard ensures maximum power output to the process and enables you to work through a fault condition.**

## DIMENSIONS





## SPECIFICATIONS

ELECTRICAL	
Source Voltage	180 VAC to 230 VAC (208 VAC nominal); 3Ø with ground (no neutral)
Efficiency	85% at full rated output
Power Factor	0.90 at full rated output
Output Frequency	40 kHz $\pm$ 0.01%
Output Power	5 kW and 10 kW models
Output Voltage	547 V <sub>RMS</sub> nominal in tap 4; 953 V <sub>RMS</sub> maximum in tap 7
Output Current	5 kW: 9 A <sub>RMS</sub> nominal in tap 4; 16 A <sub>RMS</sub> maximum in tap 1 10 kW: 18 A <sub>RMS</sub> nominal in tap 4; 32 A <sub>RMS</sub> maximum in tap 1
Output Load	5 kW: 42 $\Omega$ dual floating outputs nominal in tap 4 10 kW: 84 $\Omega$ dual floating outputs nominal in tap 4
Load Match	7 taps, 2:1 impedance range per tap
Arc Circuitry	
Voltage Arc	The minimum output voltage level required for this circuit to become activated is user-selectable at 15%, 29%, 44%, or 58% of full-scale voltage for a given tap. When the half-cycle average drops below a user-selectable trigger level, the circuit pulses power off for a user-selectable time. You can also choose to completely disable this circuit.
Current Arc	Removes output power for 10 ms when current exceeds 20% above maximum current allowed in a given tap position. Re-application of output power goes through a programmed ramp sequence.
Regulation Modes	Power, voltage, and current
Measurement Accuracy	$\pm$ 1%

PHYSICAL	
Size	177 mm (H) x 482.6 mm (W) x 495.3 mm (D); 6.97" (H) x 19" (W) x 19.5" (D) 102 mm (4") required for rear panel connections
Weight	40.8 kg (90 lb) maximum
RF Output Connectors	Dual output, terminal block with approved safety cover
RF Voltage & Current Monitors	BNC female
User Port	25-pin, subminiature-D, female, with 4-40 jack post
AC Power Input	Site wired, 4-wire DIN rail (terminal block) with cover
Input CEX/Drive Connector	50-pin, SCSI 2, female, with 2-56 jack post
Output CEX/Drive Connector	50-pin, SCSI 2, female, with spring clips
Coolant Connectors	3/8 in female NPT

ENVIRONMENTAL	
Ambient Temperature & Humidity	0°C to 40°C (32°F to 104°F), 15% to 85% relative humidity; noncondensing
Cooling	Water cooled; 5°C to 30°C (41°F to 86°F) to inlet temperature; 7.57 liters (2 gal) per minute minimum; 6.9 bars (100 psi) maximum inlet pressure



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. 2002  
All rights reserved. Printed in U.S.A.  
SL-PEII-230-02 2M 05/02

California T: 408.263.8784 F: 408.263.8992	New Jersey T: 856.627.6100 F: 856.627.6159	Texas T: 512.339.7100 F: 512.339.8889	United Kingdom T: 44.1869.320022 F: 44.1869.325004	Germany T: 49.711.779270 F: 49.711.7778700	Korea T: 82.3.1.705.2100 F: 82.31.705.2766	Japan T: 81.3.32351511 F: 81.3.32353580	Taiwan T: 886.2.82215599 F: 886.2.82215050	China T: 86.755.3867986 F: 86.755.3867984
--------------------------------------------------	--------------------------------------------------	---------------------------------------------	----------------------------------------------------------	--------------------------------------------------	--------------------------------------------------	-----------------------------------------------	--------------------------------------------------	-------------------------------------------------