

HFV[®] Variable-Frequency (~2 MHz) Generators

Benefits

- Improves run-to-run accuracy
- Delivers versatility
- Increases reliability
- Enhances process flexibility
- Reduces CoO

Features

- Customizable frequency tuning parameters
- Output frequency range of 1.765 to 2.165 MHz
- 5 and 8 kW output power levels
- Digitally synthesized frequency output
- Microprocessor control

Used primarily as a plasma generator for 200 and 300 mm wafer processing, flat panel display (FPD), and DVD equipment, the flexible HFV[®] generator offers process consistency for ionized physical vapor deposition (IPVD), CVD, and etch. This versatile power generator's features include digitally synthesized variable-frequency output and microprocessor control, with output power levels of 5 and 8 kW. In addition, it delivers an output frequency range of 1.765 to 2.165 MHz. Frequency tuning parameters that reside in firmware may be customized to ensure repeatable operation with a wide variety of chamber configurations and process recipes.

Run-to-Run Plasma Accuracy

Advanced Energy[®]'s sense-and-control technology ensures process consistency. In forward regulation mode, the power dissipated into the plasma is accurate to within 3% of set point and is consistent from run to run.

In addition, the HFV generator's flexibility and efficiency significantly reduce cost of ownership (CoO):

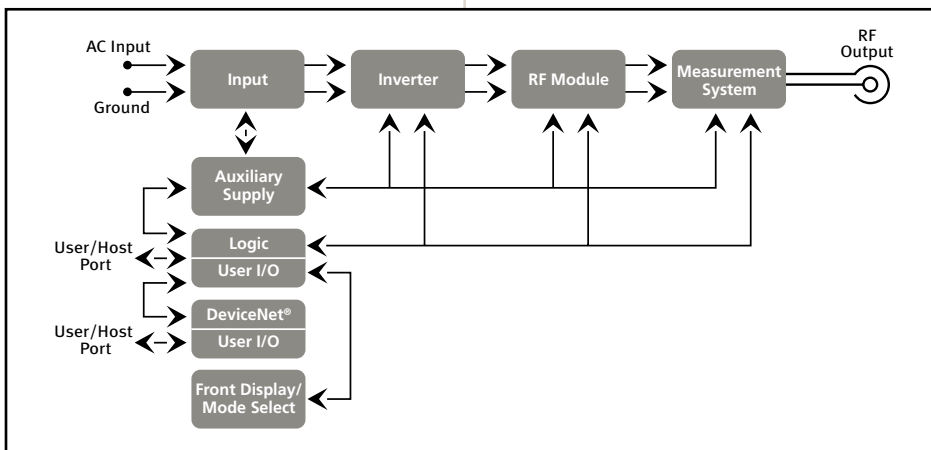
- *Exceptional reliability reduces repairs and downtime.*
- *Internal diagnostics eliminate the need for supplementary testing equipment.*
- *Compact design increases rack-space efficiency.*

- *Digital synthesis makes the need for a variable tuner obsolete.*
- *Variable-frequency output increases product versatility for use in a wide variety of applications and processes:*
 - *FPD, DVD, and semiconductor applications*
 - *IPVD, DVD, and etch processes*

Versatility

Designed for maximum versatility, the HFV generator supplies the following capabilities in a single, compact, rack-mountable package:

- *2 MHz, digitally synthesized variable frequency*
- *Load power or forward power regulation modes*
- *5 and 8 kW output levels*
- *208 VAC or 400 to 480 VAC line inputs*
- *Flexible communication protocols, including:*
 - *Analog and serial interfaces*
 - *Compatibility with DeviceNet[®] and PowerView[®] software*



Reliability

The following features not only minimize downtime and repairs, but also directly lower your overall CoO:

- *Integrated self-diagnostics*
- *Water coolant system*

The HFV generator's self-diagnostic applications provide an operating history and test for 14 different types of internal supply parameters. This significantly facilitates system troubleshooting. Further, the output cover, rather than added-on test fixtures, is used to verify operation with an open load. In addition to ensuring dependable operation, the compact design allows more efficient and economical use of rack space. The HFV generator is water cooled for consistent operation, eliminating the need for a dual air-and-water system.

Process Flexibility

In ionized metal plasma (IMP) applications, the HFV generator is proven to deliver higher yields and aspect ratios. The HFV generator's PowerView software turns your computer into a miniature control panel, making additional equipment obsolete. Designed specifically for AE's power-delivery products, PowerView software provides intuitive, broad-ranging functionality in system monitoring and control. The combination of an HFV generator and PowerView software creates a sophisticated partnership, enabling superior communication and response.

Specifications

Physical	
Size	13.3 cm (H) x 43.2 cm (W) x 51.4 cm (D) 5.25" (H) x 17.0" (W) x 20.25" (D)
Weight	35.87 kg (79 lb)
Connector/Cable Specifications	
RF Output Connector	Type SQS female (Tru-Connector #TRU-7776) or 7/16 (on some options)
RF Output Cable (Recommended)	RG-393 or equivalent
Generator User Connector	15-pin, sub-miniature D, shielded, female
Host Port Connector	9-pin, sub-miniature, shielded, female
Coolant Connectors	3/8" stainless steel female NPT

Electrical	
Input Power Specifications	
Line Voltage	178 to 229 VAC (nominal 208 V, 3 Φ) or 360 to 528 VAC (nominal 400/480 V, 3 Φ)
Line Frequency	50/60 Hz
Configuration	3 Φ with ground; no neutral connection required
Line Current	Maximum current per Φ at 8000 W output power 208 V line: 34.5 A at 176 VAC, 29.5 A at 208 VAC 400/480 V line: 17.5 A at 360 VAC, 13 A at 480 VAC
RF Output Specifications	
Output Power	Up to 5 kW or 8 kW, depending on product option
Regulation	Across full frequency range into 50 Ω load: <ul style="list-style-type: none"> • Forward power regulation mode: $\pm 3.0\%$ of set point or ± 24 W (whichever is greater) • Load power regulation mode: $\pm 4.0\%$ of set point or ± 32 W (whichever is greater) Display accuracy is $\pm 2\%$ of set point (regulated) or ± 16 W (whichever is greater)
Transient Regulation	$\leq 0.1\%$ change for a 10% distribution in the AC line voltage
Frequency	1.765 to 2.165 MHz, fixed or auto-selectable (via 9-pin host port)
Response Time	≤ 100 msec rise at full scale set point and fall time from RF-ON or RF-OFF
Load Impedance	50 Ω , ± 2 Ω center impedance

Environmental	
Ambient Operating Temperature	+5 to +40°C (+41 to +104°F)
Relative Operating Humidity	15 to 85% humidity, non-condensing
Atmospheric Pressure	86 to 106 kPa (860 to 1060 mbar)
Coolant Requirements	
Water Coolant Specifications	+15 to +30°C (+59 to +86°F) inlet temperature, 11.4 lpm (3 gpm) min, 75 psi max inlet pressure

Specifications are subject to change without notice.



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ENG-HFV-250-02 0M 8/07