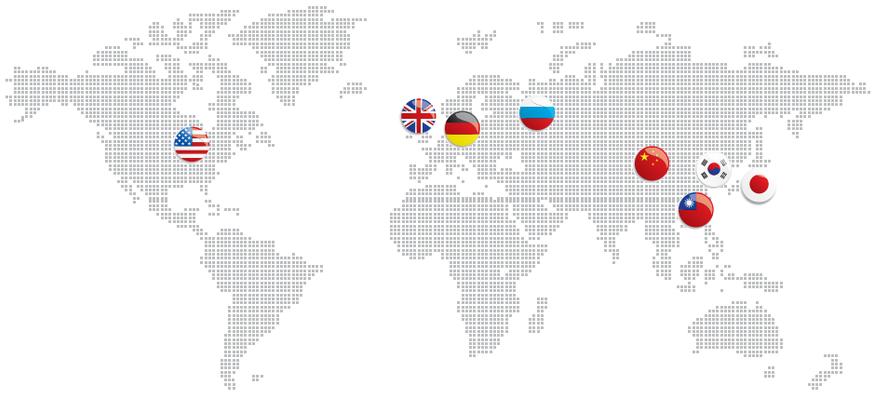
全球销售网络及售后服务



EN Creative Energy to the World TECHNOLOGIES

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应用于等离子工艺领域的直流及脉冲电源

- 直流 & 脉冲磁控溅射
- 大气压等离子体
- 电弧离子镀
- 清洗 & 偏压
- 离子束
- OLED 加热

EN Creative Energy to the World TECHNOLOGIES

EN Creative Energy to the World TECHNOLOGIES

EN TECHNOLOGIES 是首家向大面积平板显示器制造商提供等离子体电源装置的韩国企业。

EN TECHNOLOGIES提供行业领先的技术解决方案。EN电源具有信赖性高、控制精确、抑弧能力强的特点，这使得生产工艺的稳定性得到进一步提升。目前，我公司拥有素质高且经验丰富的专业技术团队，竭诚为客户提供专业、优质、合理、快速的技术服务。

2015 - 向Hanwha Q-Cell太阳能电池量产线提供双极脉冲直流电源
- 向三星手机金属外壳生产提供直流电源

2014 - 被选定为世界一流产品

2012 - 在上海设立了维修中心

2011 - 取得 ISO 14001 认证

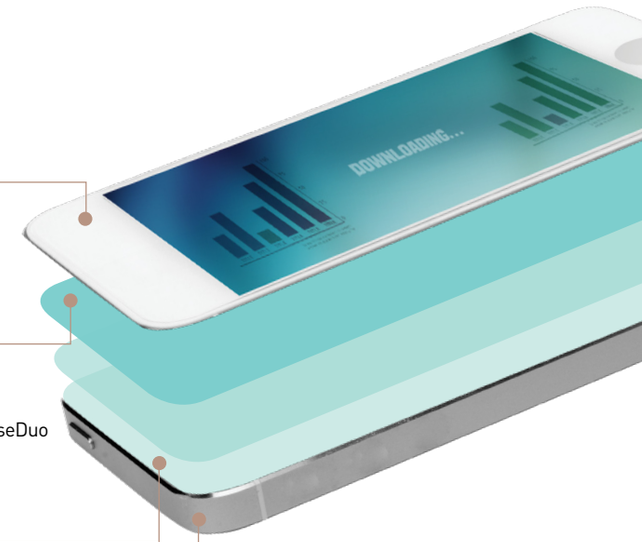
2010 - 在创业大典上荣获总统奖
- 向大面积平板显示器制造商提供直流电源
(三星显示器、LG 显示器、日本显示器、夏普等)

2009 - 取得 Single PPM 认证

2005 - 取得 ISO 9001 认证

2003 - 公司成立

Applications



TOP GLASS(玻璃镀膜)

抗反射
防指纹

- DC : EnerStream
- Pulsed DC : EnerPulse

TOUCH PANEL(触摸屏)

ITO & 金属溅射
反应溅射

- Pulsed DC : EnerPulse
- DC : EnerStream
- Bipolar Pulsed DC : EnerPulseDuo

OLED, TFT-LCD, Oxide TFT

ITO & 金属溅射
有机物 & 金属加热

- Pulsed DC : EnerPulse
- DC : EnerStream
- DC for OLED Heating : Neos

CASE(外壳)

电磁屏蔽膜
多层颜色膜

- Pulsed DC : EnerPulse
- DC : EnerStream
- Bipolar Pulsed DC : EnerPulseDuo

OLED、柔性触摸屏、光学镜片镀膜、Low-E玻璃镀膜、TCO镀膜、太阳能电池制造、平板显示器制造、卷绕镀、车轮及灯头、类金刚石镀膜、PECVD应用、装饰镀膜、工具镀膜及其它特殊应用等

特点

优秀的电弧控制系统

电弧能量小于 0.2mJ/kW

为了实现电弧影响的最小化，ENtechnologies通过施加200ns的逆电压和2.5μs内使电流达到零点的方法，向客户提供高品质的薄膜和很好的收率

高性能

采用了基于下垂特性的稳定的拓扑结构

形成稳定的等离子体，发生电弧时可快速检测电弧，确保稳定输出。
可实现恒功率、恒电压、恒电流工作状态

宽的输出范围

可连接多种不同负载，输出范围宽

(可输出大电流和大电压)

接口

提供了多种用户接口

有模拟与数字，RS-232与485通讯，Fieldbus，Ethernet等。

并联运行

实现大容量输出

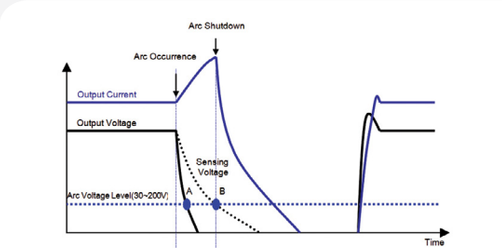
最多可并联12台电源(1个Master+11个Slave)

全球销售网络及售后服务

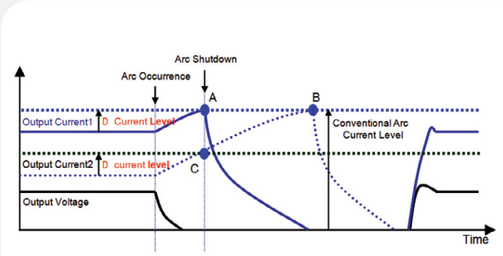
24小时在线服务

通过365天24小时紧急技术援助服务，向客户提供量产所需的最优解决方案。

抑制电弧



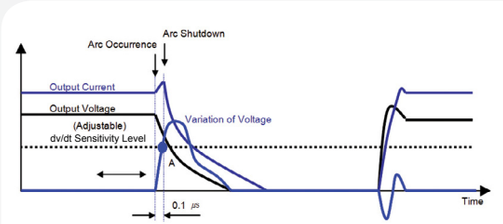
| Voltage Arc Suppression |



| Current Arc Suppression |

通过以下方法实现了电弧能量为0.2mJ/kW，从而在溅射镀膜时，尽可能达到电弧影响最小化的目的。

- 电源内部采用了最小化的储能元件拓扑结构
- 电弧发生后，采用了施加200ns的逆电压程序
- 2.5μs内电流达到零点
- 输出线的电感影响最小化

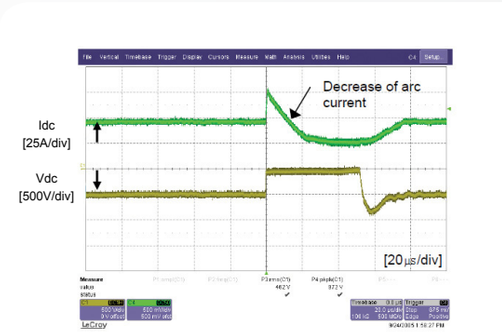


| dv/dt Arc Suppression |

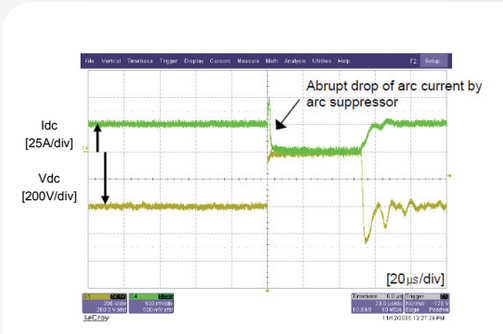
抑制电弧的波形

Test conditions : Al Target (5"×20")
Power supply : EnerStream20 (20kW DC)

Process pressure : 3.5×10^{-2} ~ 1.0×10^{-4} Torr
Gas : Ar

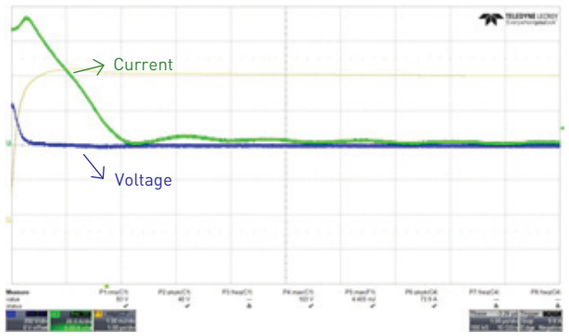


| Arc Energy without Arc Suppressor |

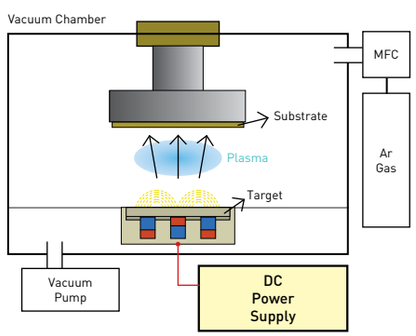


| Arc Energy with Arc Suppressor |

DC Power Supplies for Magnetron Sputter



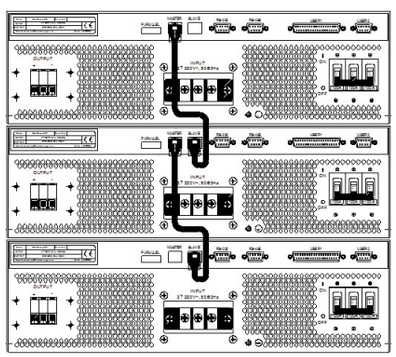
| EnerStream 60 generates Arc energy less than 0.2mJ/kW |



| Magnetron Sputter |

应用

- 半导体晶圆溅射
- TFT LCD & Color filter
- OLED LTPS sputter metal & TCO 镀膜
- 薄膜型 Solar cell
- 手机外壳
- 触摸面板用ITO镀膜
- 汽车轮毂,汽车灯头镀膜
- 离子氮化用
- BIPV, Data storage, FCCL. Etc.

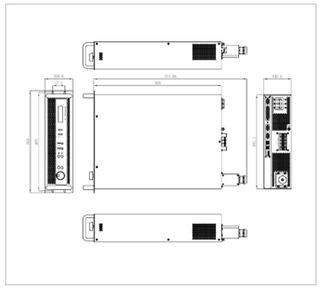


并联运行

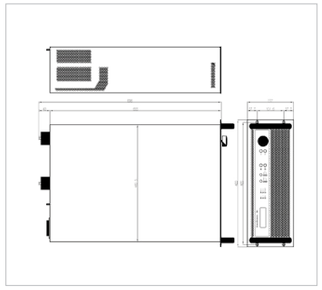
- 最多可并联12台电源
  (1个Master+11个Slave)
- 最大输出 480kW
  (EnerStream 60 8台并联时)

产品规格

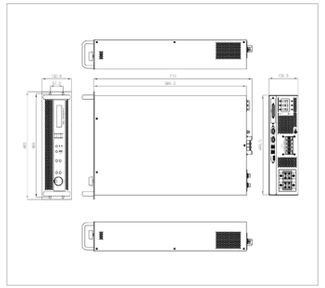
EnerStream®



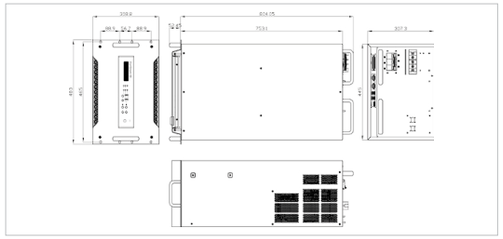
| EnerStream 5/10/20 |



| EnerStream 30 |



| EnerStream 5/10D |



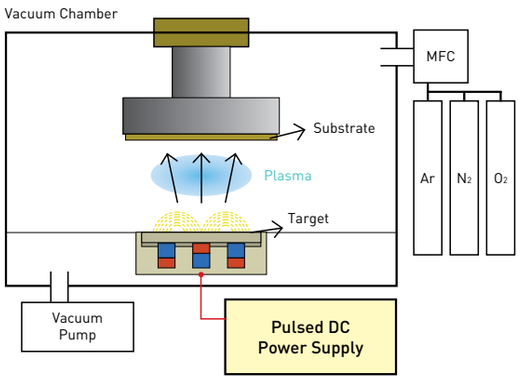
| EnerStream 60 |

Items	Specifications							
	DC (1Ch)						DC (2Ch)	
	EnerStream 5	EnerStream 10	EnerStream 20	EnerStream 30	EnerStream 30H	EnerStream 60	EnerStream 5D	EnerStream 10D
Input	3Ø 208V/ 220V/380V	3Ø 208V/ 220V/380V	3Ø 220V/380V	3Ø 380V/440V	3Ø 440V	3Ø 440V	3Ø 380V	3Ø 380V
Output voltage (Ignition)	800V(1500V)				1200V(1500V)	900V(1300V)	800V(1500V)/Ch.	
Max output current	12.5A	25A	50A	75A	55A	150A	12.5A/Ch.	25A/Ch.
Output power	DC 5kW	DC 10kW	DC 20kW	DC 30kW	DC 30kW	DC 60kW	DC 5kW+5kW	DC 10kW+10kW
Arc energy	Less than 0.5mJ/kW					Less than 0.2mJ/kW	Less than 0.5mJ/kW	
Interface	RS-232 / RS-485 (options : DeviceNet, ProfiBus)							
Size[mm]	133(H)x483(W) x605(D)	133(H)x483(W) x605(D)	133(H)x483(W) x605(D)	177(H)x483(W) x655(D)	177(H)x483(W) x655(D)	309(H)x483(W) x782(D)	133(H)x483(W) x655(D)	133(H)x483(W) x655(D)
Weight[kg]	24.5	24.5	30.5	38.8	38.8	80	32	32
Cooling	Forced Air							

※ Cable Duct + 129mm

※ Specifications subject to change without notice

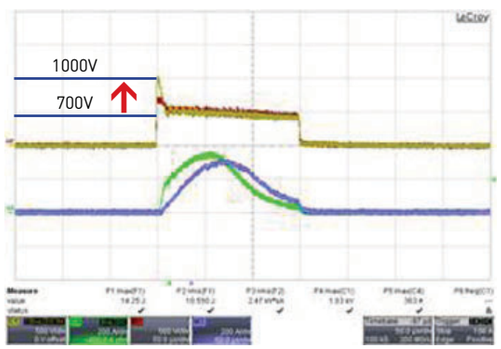
Pulsed DC Power Supplies
for Single Magnetron Sputtering

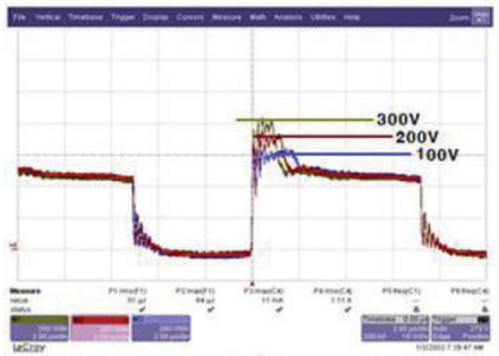


应用

- 半导体晶圆溅射
- TFT LCD & Color filter
- OLED LTPS sputter metal & TCO 镀膜
- 太阳能面板
- 手机外壳
- 触摸面板用ITO镀膜
- 硬镀膜
- 离子氮化用
- 建筑用玻璃, Data storage, FCCL. Etc.

实现电离最大化的脉冲波形



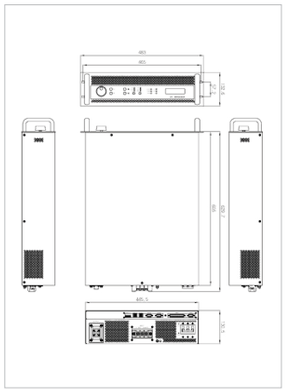


优点

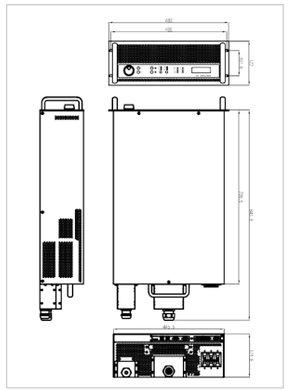
- 再点燃电压的变化引起电流的迅速增加 : 700V >1000V
- 再点燃电压的可调范围 : 50 - 300V

产品规格

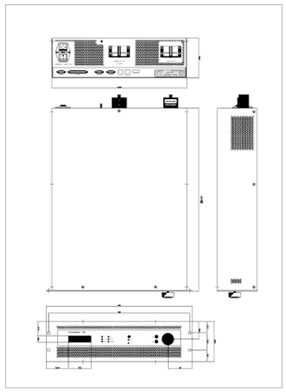
EnerPulse®



| EnerPulse 5/10/10LV/10M |



| EnerPulse 20 |



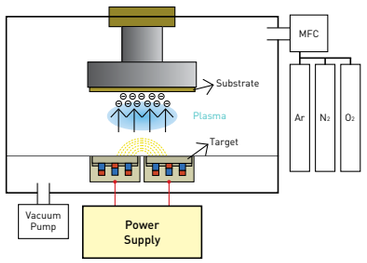
| PulseGen 20/30/40 |

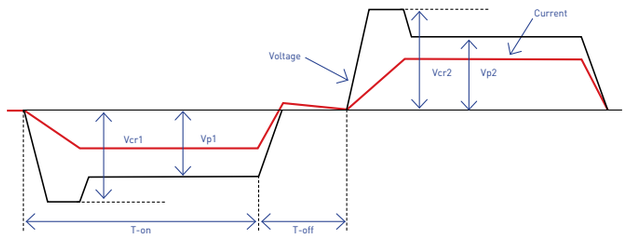
Items	Specifications							
	EnerPulse 5	EnerPulse 10	EnerPulse 10LV	EnerPulse 10M	EnerPulse 20	Pulse 20 (ES20+PG20)	Pulse 30 (ES30+PG30)	Pulse 40 (2xES20+PG40)
Input	3Ø 208V/220V/380V	3Ø 208V/220V/380V	3Ø 380V	3Ø 380V	3Ø 220V/380V/440V	3Ø 220V/380V	3Ø 380V/440V	3Ø 220V/380V
Ignition Voltage	1500V	1500V	1500V	1500V	1200V	1500V	1500V	1500V
Output	800V, 6.25A / 400V, 12.5A	800V, 12.5A / 400V, 25A	650V, 15.4A / 300V, 33.3A	800V, 12.5A / 400V, 25A	650V, 30A / 400V, 50A	800V, 25A / 400V, 50A	800V, 37.5A / 400V, 75A	800V, 50A / 400V, 100A
Output Power	Unipolar Pulse 5kW	Pulsed DC 10kW	Unipolar Pulse 10kW	Unipolar Pulse 10kW	Unipolar Pulse 20kW	Unipolar Pulse 20kW	Unipolar Pulse 30kW	Unipolar Pulse 40kW
Output Frequency	20 ~ 150 kHz			5~350kHz	40 ~ 100 kHz			40 ~ 80 kHz
Reverse Time	DC mode, 1.0μs~10μs				DC mode, 1.0μs~5μs			
Arc Energy	Less than 1mJ/kW							
Interface	RS-232 / RS-485 (Option : DeviceNet, ProfiBus)							
Size[mm]	133(H)x483(W) x605(D)	133(H)x483(W) x605(D)	133(H)x483(W) x605(D)	133(H)x483(W) x605(D)	177(H)x483(W) x700(D)	133(H)x483(W) x605(D)_PG	133(H)x483(W) x605(D)_PG	133(H)x483(W) x605(D)_PG
Weight[kg]	29.5	29.5	29.5	29.5	40	30.5+28	38.8+32	2*(30.5)+32
Cooling	Forced Air							

※ Cable Duct + 129mm

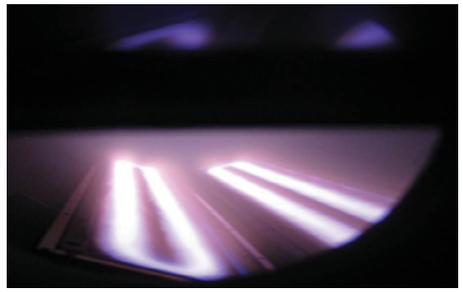
※ Specifications subject to change without notice

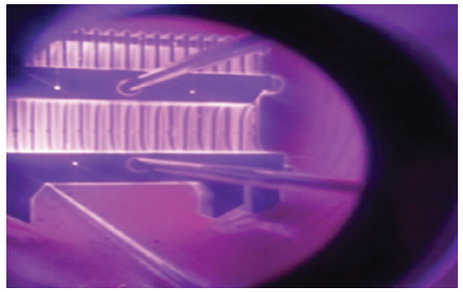
Bipolar Pulsed DC Power Supplies
for Dual Magnetron Sputtering & PECVD

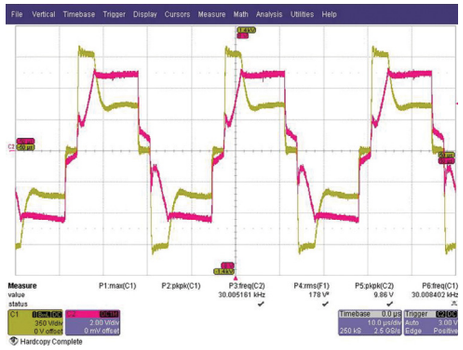




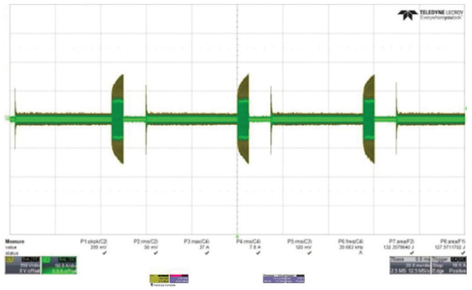
* Vp : 脉冲输出电压
* Vcr : 脉冲堆存的 peak 电压 (max.1200V)
  - 增大电离率及改善 Ignition 效果
  - Vp1 + dV (dV = 100~300V, 初始值为 100V)
  - Clamping Voltage的宽度根据Chamber条件变动







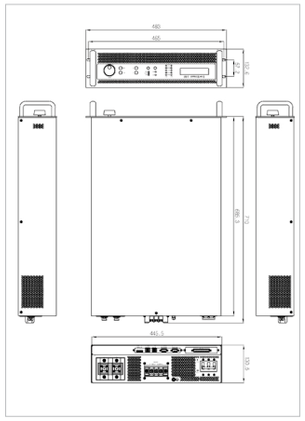
| Dual Magnetron Sputter |



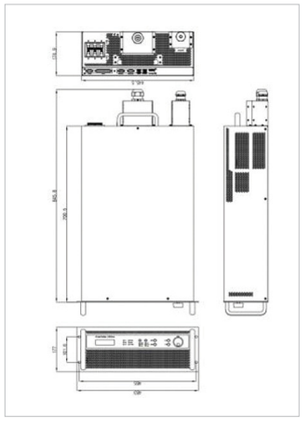
| PECVD |

产品规格

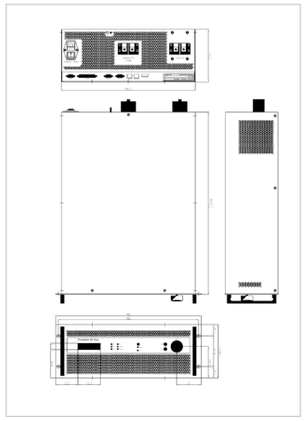
EnerPulse Duo™



| EnerPulse 5 /10 Duo |



| EnerPulse 20 Duo |



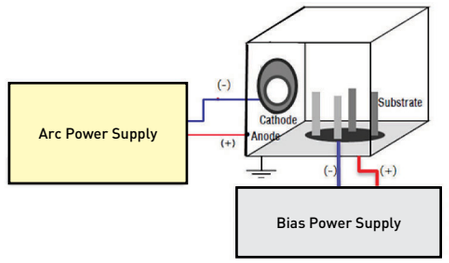
| PulseGen 20/30 Duo |

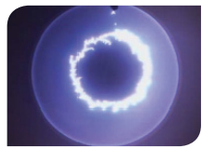
Items	Specifications				
	EnerPulse 5 Duo	EnerPulse 10 Duo	EnerPulse 20 Duo	DMS 20	DMS 30
Input	3Ø 380V	3Ø 380V	3Ø 440V	3Ø 220V/380V	3Ø 380V/440V
Output	800V, 6.25A / 400V, 12.5A	800V, 12.5A / 400V, 25A	600V, 33.3A / 400V, 50A	800V, 25A / 400V, 50A	800V, 37.5A / 400V, 75A
Output Power	Bipolar Pulsed DC 5kW	Bipolar Pulsed DC 10kW	Bipolar Pulsed DC 20kW	Bipolar Pulsed DC 20kW	Bipolar Pulsed DC 30kW
Output Frequency	20 ~ 50 kHz		20 ~ 40kHz		
Reverse Time	DC mode, 0.5μs~10μs		DC mode, 0.5μs~2μs	DC mode, 0.5μs~3μs	
Arc Energy	Less than 1mJ/kW			Less than 3mJ/kW	
Interface	RS-232 / RS-485 (Option : DeviceNet, ProfiBus)				
Size[mm]	133(H)x483(W) x605(D)	133(H)x483(W) x605(D)	177(H)x483(W) x700(D)	177(H)x483(W) x605(D)_PGD	177(H)x483(W) x605(D)_PGD
Weight[kg]	29.5	29.5	40	30.5+32	38.8+32
Cooling	Forced Air				
*Wave	On : 1ms ~ 72ms (Full-time output without "Wave" function when this parameter set "OFF".) / Period : 10ms ~ 80ms / Extra Wave : 0ms(OFF) ~ 75ms				

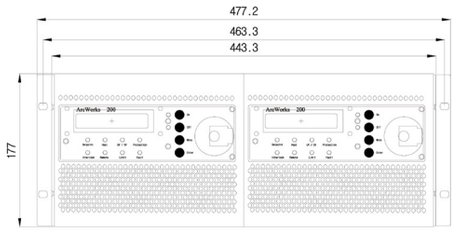
※ Cable Duct + 129mm

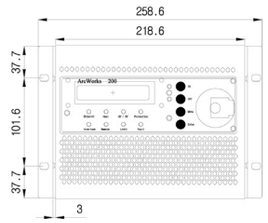
※ Specifications subject to change without notice

DC Power Supply for Arc Ion Plating









优点

定制功能

- 采用 DSP,实现了快速电流控制
- 通过 Auto Trigger,实现系统最优化
- 通过防止异常放电,实现靶材损伤最小化
- 通过粉尘影响最少化设计,确保了耐久性
- 通过轻量化设计,确保了安装便利性
- 采用易于控制的用户接口

应用

- 工具及金属框镀膜
- DLC 镀膜
- 汽车及装饰镀膜
- 金属手机外壳彩色镀膜

信赖性

- 通过EMI Filter,减少干扰。
- 自我诊断功能(保护,限制动作)

Items	Specifications
	Arc Works 200
Input	3Ø 220V/380V
Output Power	10kW
Output Voltage	50V / Trigger 130V
Output Current	200A
Interface	RS-232/485
Size[mm]	177(H)x218.6(W)x608.5(D)
Weight[kg]	17
Cooling	Forced Air

※ Specifications subject to change without notice

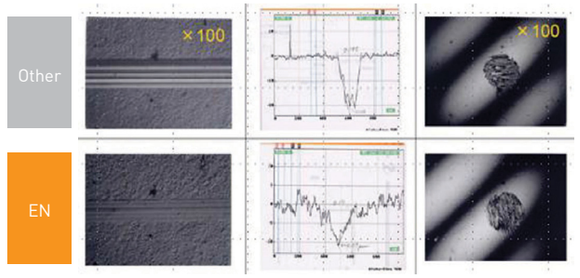
DC & Pulse Power Supplies for Ion Cleaning & Bias

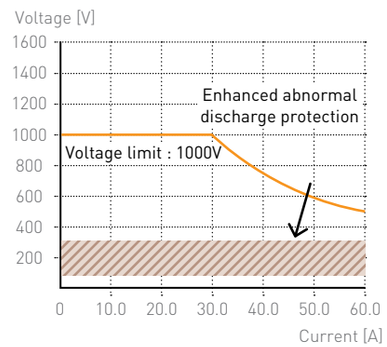
应用

- 清洗与偏压用途
- 表面处理用途

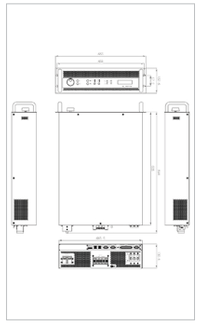
强化工艺控制

- 宽的运行范围
- 强化了低电压下的电弧控制能力

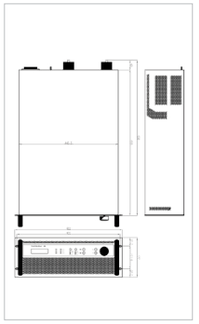




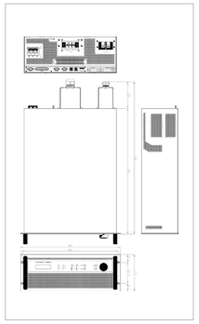
| EnerStream 30B |



| Hercules 10(BLV)/20(S) EnerPulse 5/10BHV|



| EnerStream 30B |



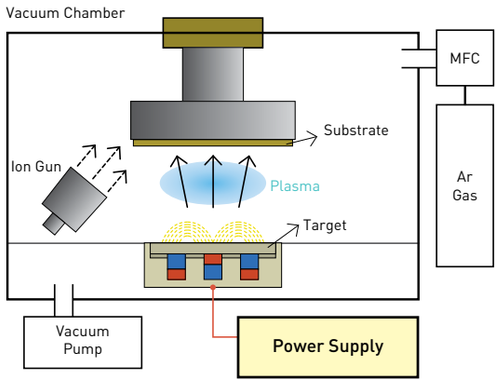
| EnerPulse 16BHV |

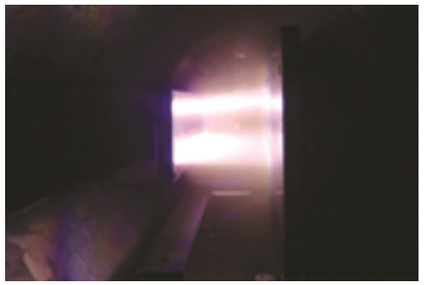
Items	Specifications							
	DC					Pulsed DC		
	Hercules 10BLV	Hercules 10	Hercules 20	Hercules 20S	EnerStream 30B	EnerPulse 5BHV	EnerPulse 10BHV	EnerPulse 16BHV
Input	3Ø 380V	3Ø 208V/380V	3Ø 208V/220V/380V	3Ø 208V/380V	3Ø 380V	3Ø 220V/380V		3Ø 380V
Ignition				1500V	1500V	1500V	1500V	1400V
Output	100V, 100A	1200V, 8.3A / 300V, 33.3A	1200V, 16.7A / 250V, 80A	800V, 25A / 400V, 50A	1000V, 30A / 500V, 60A	1400V, 5A / 1000V, 6.5A	1400V, 10A / 1000V, 13A	1150V, 17.7A / 530V, 35A
Output Power	DC 10kW		DC 20kW		DC 30kW	Pulsed DC 5kW	Pulsed DC 10kW	Pulsed DC 16kW
Output Frequency						20 ~ 120 kHz		
Reverse Time						1.5μs~40μs		
Arc Energy	Less than 1mJ/kW	Less than 0.5mJ/kW				Less than 1mJ/kW		
Interface	RS-232 / RS-485 (Option : ProfiBus, DeviceNet)					RS-232 / RS-485		
Size[mm]	133(H)x483(W)x605(D)		133(H)x483(W) x605(D)	133(H)x483(W) x605(D)	133(H)x483(W) x605(D)	133(H)x483(W) x605(D)	133(H)x483(W) x605(D)	177(H)x483(W) x605(D)
Weight[kg]	23.5		30.5	30.5	30.5	29	29	35
Cooling	Forced Air							

※ Cable Duct + 129mm

※ Specifications subject to change without notice

DC Power Supply for Ion Beam



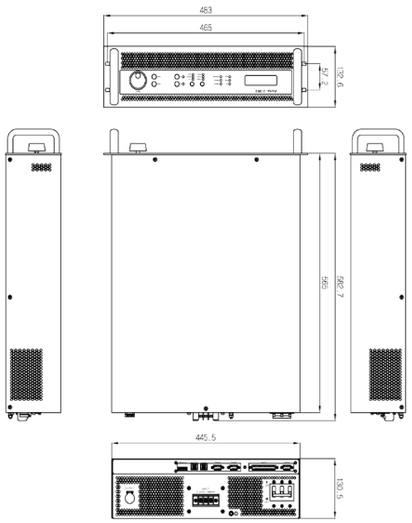


应用

- 利用闭合漂移离子源进行表面处理

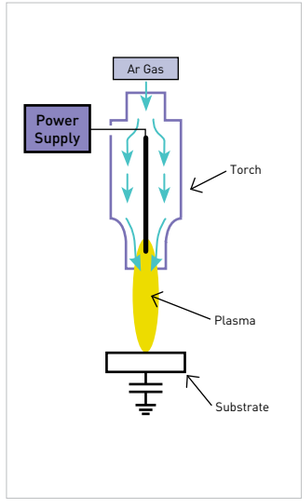
Items	Specifications
	Forte I-302
Input	3Ø 220V, 380V
Output power	6kW
Output voltage	3000V
Output current	2A
Arc energy	Less than 0.5mJ/kW
Interface	RS-232/485 (Option : ProfiBus, DeviceNet)
Size[mm]	133(H)x483(W)x605(D)
Weight[kg]	24.5
Cooling	Forced Air

※ Cable Duct + 129mm

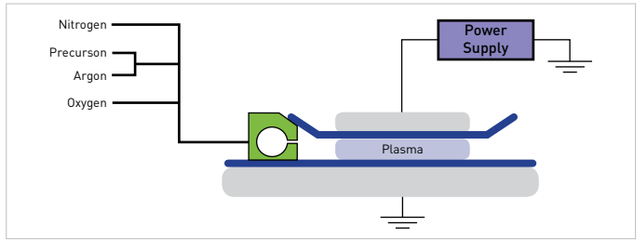


※ Specifications subject to change without notice

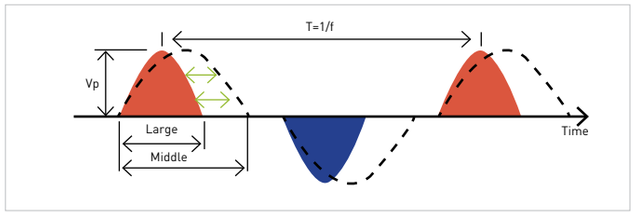
Quasi Pulse Power Supplies for Atmospheric Pressure Plasma



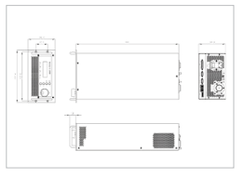
| Torch Type |



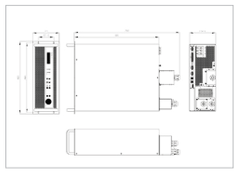
| DBD Type |



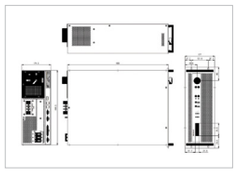
| Controlable Power Density Waveform |



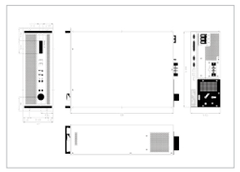
| Genius J-1000 |



| Genius 2 |



| Genius 6 |



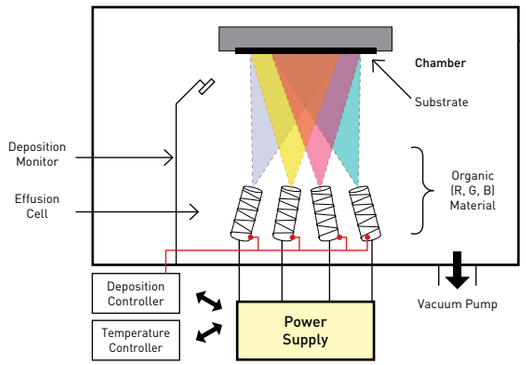
| Genius 10 |

Items	Specifications			
	Torch	DBD		
	Genius J-1000	Genius 2	Genius 6	Genius 10
Input	1Ø 220V	3Ø 220V		
Output Voltage	10kVpeak	10kVpeak / 15kVpeak		
Output Power	Quasi Pulsed DC 1kW	Quasi Pulsed DC 2kW	Quasi Pulsed DC 6kW	Quasi Pulsed DC 10kW
Output Frequency	40 ~ 60kHz	20 ~ 60 kHz		
Interface	RS-232 / RS-485			
Size[mm]	132(H)x257(W)x531(D)	177(H)x483(W)x590(D)	177(H)x483(W)x627(D)	177(H)x483(W)x627(D)
Weight[kg]	8.5	28	37.5	37.5
Cooling	Forced Air			

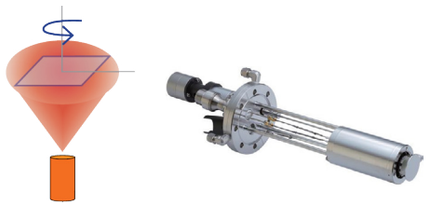
※ Cable Duct + 138mm

※ Specifications subject to change without notice

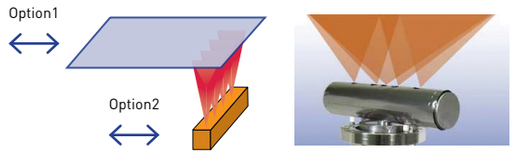
DC Power Supplies for OLED Heating Process



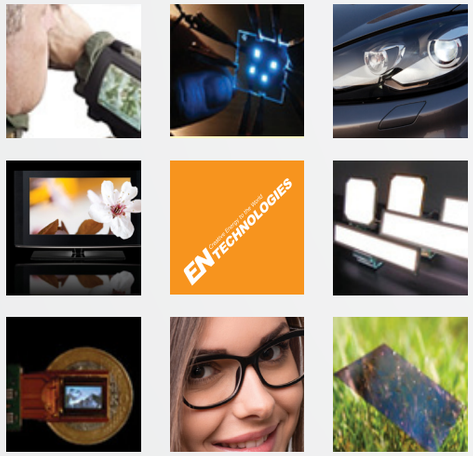
Evaporation of Point & Linear Source Application



| Point Source |



| Linear Source |



应用

- AMOLED, W-OLED 沉积用途
- 电池充放电用
- 半导体工艺用
- OLED lighting, Micro OLED & Solar Cell
- 产业用,军工用

特点

- 恒电压,恒电流功能
- 最大为50kW的大容量电源装置
- 干扰低且输出波纹小
- RS-232 & RS-485

Product Line-Up

NEOS Series

NEOS-200/400 (Input : 1Ø / 100~265V)

NEOS-750/1500 (Input : 1Ø / 100~265V)

NEOS-2000/3000 (Input : 1Ø, 3Ø / 220V)

NEOS-5000/10K (Input : 3Ø / 220V, 380V)

Model	Maximum Voltage(V)														Power(W)	Type	
	10	20	30	36	40	50	60	80	100	150	200	300	500	600			
NEOS-200		●		●											200	3¹/₆U	Module
NEOS-400		●		●											400		
NEOS-800		●		●											800		
NEOS-750					●		●	●		●					750	1U	19" Standard Rack
NEOS-1500					●		●	●		●					1,500	1U	
NEOS-2000			●			●	●	●	●		●				2,000	2U	
NEOS-3000			●			●	●	●	●		●	●			3,000	2U	
NEOS-5000	●	●	●			●	●	●	●	●	●	●			5,000	3U	
NEOS-10K	●	●				●	●		●	●	●	●	●	●	10,000	3U	

在等离子应用领域
已得到验证的电源装置

In-line Sputter System
for Touch panel