

IONICS has designed, developed and supplied regulated power supplies for Electron Beam Welding equipment using the high frequency resonant / PWM-controlled switch mode topology.

The entire power source consists of the following:

- Acceleration Voltage Supply
- Filament Heating Supply floating on high voltage
- Bias Supply floating on high voltage
- Focusing Supply
- Beam Oscillation supplies ( X and Y ) 2 sets
- Beam Deflection supplies ( X and Y ) 2 sets

The unit is divided into two parts:

- The HT Tank
- The Control Cubicle

The *HT tank* houses the high voltage section of the Acceleration Supply and also the Filament Heating Supply and the Bias supply, each floating at  $-100\text{ kV}$ .

The *Control Cubicle* houses the Beam Oscillation and the Beam Deflection Supplies, electronic controllers for the Acceleration Supply, Filament Supply and Bias Supply.



### TECHNICAL SPECIFICATIONS

PARAMETER	SPECIFICATION
Input Voltage	415V $\pm$ 10% AC, 50Hz, three phase
Duty	Continuous operation
Protections	HRC fuses at mains input Single phasing preventer Line filter at mains input Thermal overload relays Various interlocks
Controls & Signals on Control Panel for all the power supplies	Key switch to enable/disable the whole system Emergency OFF push button Selector switch for local/remote selection ON/OFF push buttons 10 turn potentiometers for voltage & current control LED indications for ON/OFF status LED indications for fault status
Remote Controls & Signals for all the power supplies	From remote control console through PLC/Microcontroller 0 to 10V signals for voltage/current control and monitoring PFC(relay contacts) for controls & interlocks
ACCELERATION VOLTAGE SUPPLY	
Output Voltage Range*	Upto $-100\text{ kV}$ DC
Output Current Range*	Upto 200mA

Output Voltage Control	0 to rated voltage
Output Current Control	0 to rated current
Line Regulation	$\leq 0.1\%$ for $\pm 10\%$ variation in input voltage
Load Regulation	$\leq 1\%$ for 0 to 100% load variation
Stability	$< 0.1\%$
Ripple	$\leq 1\%$ rms of rated voltage
Resolution	100V for voltage and 0.1mA for current
Repeatability in Settings	$< 1\%$
Protections	Against over current, over voltage, over temperature, short-circuit
<b>FILAMENT HEATING SUPPLY</b>	
Output Voltage Range	Upto 10V DC
Output Current Range	Upto 70A
Output Voltage Control	0 to rated voltage
Output Current Control	0 to rated current
Insulation Level	Floating on -100kV DC
Protections	Against over current, filament open
<b>BIAS (GRID ELECTRODE) SUPPLY</b>	
Output Voltage Range	Upto -3500V DC
Output Current Range	Upto 10mA
Output Voltage Control	0 to rated voltage
Insulation Level	Floating on -100kV DC
Regulation	$\pm 1\%$
Ripple in Voltage	$\leq 1\%$ peak to peak
Stability	$< 1\%$
Protections	Against short circuit
Control Loop	Control loop senses the beam current and required ramp-up timing
<b>FOCUSING SUPPLY</b>	
Output Voltage	Upto 150V DC
Output Current	Upto 15A
Output Voltage Control	0 to rated voltage
Output Current Control	0 to rated current
Ripple	$\leq 0.1\%$ rms
Mode of Regulation	Constant current-constant voltage
Protections	Against over current, short circuit
<b>BEAM OSCILLATION SUPPLIES (X &amp; Y) 2 SETS</b>	
Output Voltage	Upto 10V AC sinusoidal
Output Current	Upto 2A

Voltage Control	0 to rated voltage
Frequency	Variable from 50Hz to 1kHz
Phase Shift	Adjustable phase shift of 0 to 180° between the two sets of outputs
Line Regulation	$\leq 0.1\%$ for $\pm 10\%$ variation in input voltage
Load Regulation	$\pm 1\%$
Protections	Against over current
<b>BEAM DEFLECTION SUPPLIES (X &amp; Y) 2 SETS</b>	
Output Voltage	Upto 30V DC
Output Current	Upto 5A
Output Voltage Control	0 to rated voltage
Output Current Control	0 to rated current
Polarity	Positive / negative (selectable through switch)
Line regulation	$\leq 0.1\%$ for $\pm 10\%$ variation in input voltage
Load regulation	$\leq 0.1\%$
Ripple	$\leq 0.1\%$ rms
Mode of Regulation	Constant current-constant voltage
Protections	Against over current, short circuit

\*Optional. To be specified by the user.

For any queries or customization requests contact us at [info@ionics.co.in](mailto:info@ionics.co.in)

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IONICS has designed, developed and supplied regulated power supplies for Electron Beam Melting equipment using the transformer-rectifier topology.

The entire power source consists of the following:

- Acceleration Voltage Supply
- Filament Heating Supply floating on High Voltage
- Focusing Supply
- Beam Oscillation Supplies ( X and Y )
- Beam Deflection Supplies ( X and Y )



### TECHNICAL SPECIFICATIONS

PARAMETER	SPECIFICATION
Input Voltage	415V $\pm$ 10% AC, 50Hz, three phase
Ambient temperature	40°C
Method of cooling	Air-cooled
Type of Transformer	Epoxy cast dry type rectifier transformer
Duty	Continuous operation
Installation	Indoor
Protections	Input HRC fuses Single phasing preventer Harmonic filter at the mains input Thermal overload relays Linear reactor for limiting short circuit current
Digital Monitoring	Acceleration voltage - 0 to -15kV DC average Beam current - 0 to 1A DC mean
Controls & Signals on Control Panel	Push buttons for ON/OFF 10 turn potentiometer for voltage, current control LED indications for ON/OFF, fault status
Construction	The unit is to be divided into three parts viz., the transformer cubicle, control cubicle and control console

### ACCELERATION VOLTAGE SUPPLY

Output Voltage Range	-0.5kV DC to -15kV DC average
Output Current Range	0 to 1A mean
Line Regulation	Upto 4% for $\pm$ 10% variation in input voltage
Load Regulation	Upto 4% for 0 to 100% load variation
Stability	< 10%
Ripple at frequencies $\leq$ 1 kHz	Upto 4% rms of set value – within working range
Resolution	0.5kV for voltage and 10mA for current

Protections*	Against over load, over current, over voltage, over watts and short-circuit During short circuit power supply trips.
<b>FILAMENT HEATING SUPPLY (EHT INSULATED)</b>	
Output Voltage Range	0 to 7V AC rms
Output Current Range	0 to 40A
Insulation Level	This supply will be floating at -15kV DC
Protections	The power supply will incorporate trip circuit for over current fault.
Topology	Thyristorised primary controller followed by single phase step down transformer, independent close loop control
<b>FOCUSING SUPPLY</b>	
Output Voltage Range	0 to 70V DC
Output Current Range	0 to 1A
Ripple	0.1 %
Resolution	1mA
<b>BEAM OSCILLATION SUPPLIES (X &amp; Y) 2 SETS</b>	
Output Voltage Range	0 to 10V AC sinusoidal
Output Current Range	0 to 1A (max) continuously variable by multi-turn potentiometer.
Frequency	Variable from 3Hz to 50Hz, sinusoidal and saw tooth with selector switch
Phase Shift*	Adjustable phase shift of 0 – 180° between the two sets of output
Line Regulation	Upto 0.1% for ±10% variation in input voltage
Load Regulation	Upto 0.1%
<b>BEAM DEFLECTION SUPPLIES (X &amp; Y) 2 SETS</b>	
Voltage	0 to 5V DC
Current	0 to 0.5A (max) continuously variable by multi turn potentiometer.
Polarity	Positive / negative (selectable through switch)
Line regulation	Upto 0.1% for all changes in line voltage of ± 10%
Load regulation	Upto 0.1%
Ripple	< 1mV rms

\*Optional. To be specified by the user.

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