

## 1 keV to 50 keV Uniform Density Flood Beam

### FOR USE IN:

- ▶ Spacecraft Charge-up Studies
- ▶ Surface charging Studies
- ▶ Beta Decay Simulation
- ▶ Surface Physics Studies
- ▶ Vacuum Physics Experiments

### FEATURES / OPTIONS:

- ▶ Energy Range: 1 keV to 50 keV
- ▶ Beam Currents to 200  $\mu$ A
- ▶ High Current Option up to 1 mA
- ▶ Wide Angle Uniform Beam
- ▶ Divergence Control
- ▶ Rotatable 2 $\frac{3}{4}$  inch CFF Mounting
- ▶ Flange Multiplexer Flexibility
- ▶ User Replaceable Firing units
- ▶ Computer / Remote Control



*EGF-6104 Electron Flood Gun*

The Kimball Physics EGF-6104 Electron Gun, with its matching EGPS-6104 Power Supply, is intended for use in a variety of UHV charging, space physics, vacuum physics, surface physics, and nuclear simulation applications. Maximum flexibility is achieved in a minimum of space; the entire unit mounts through a single standard 2 $\frac{3}{4}$  inch CF port. It is a complete subsystem ready to attach and turn on.

Electrons are generated at negative high potential, thus the user's target is set at ground potential. Both beam energy and beam current are adjustable over wide ranges. The gun uses a space-charge-limited refractory-metal cathode to generate a uniform flood beam and the design allows generation of the beam down to low energies, and very low currents. Beam divergence is partially controllable electronically, and can be mechanically limited with optional apertures. Standard model beam current is 200  $\mu$ A. With a high current option, beam currents up to 1 mA can be obtained. The EGF-6104 utilizes optional 4-pole magnetic deflection to position and improve in beam current uniformity.

UHV technology is used throughout. The gun may be completely disassembled for cleaning and repair. The cathode firing unit assembly (which includes the cathode, cathode mount, apertures, and Wehnelt) is user-replaceable; and the firing unit assemblies may be sent back to Kimball Physics for rebuilding. Cathodes are not damaged by repeated exposure to atmospheric gases or water vapor when cold; the gun can be run in vacuums from 10<sup>-11</sup> torr to 10<sup>-5</sup> torr. The gun may be baked up to 350°C with cables removed. Non-standard mountings are available. Various stand-alone Faraday cup designs are available.

The EGPS-6104 Power Supply contains all power supplies necessary to generate the required voltages to run an EGF-6104 Electron Flood Gun, including the Energy, Focus, Source, Grid, Anode supplies and optional Magnetic Deflection Quadrupole. All power supplies are electronically regulated. A computer control option allows for control of all potentials from an interface at ground potential, via 0 to 10 V analog inputs.

The FlexPanel provides a digital display screen and a keypad for programming control on the front panel. Rear panel connectors allow remote /computer control and metering of all gun power supplies. An RS-232 serial port and an analog input/output connector are included on standard power supply units. All common computer interface bus types can be accommodated, by use of appropriate digital to analog converters. RS-422/485 conversion is possible.

An optional LabVIEW™ computer program designed for the EGF-6104 is available for remote computer control and metering. Software is available in two types: Using a simple serial connector interface or via National Instrument DAQ boards and SCSI connectors on the EGPS-6104. The program provides a virtual panel of controls and real-time metering on the user's computer screen.



*EGPS-6104 Electron Gun Power Supply with FlexPanel controller*

### EGF-6104 ELECTRON GUN SPECIFICATIONS

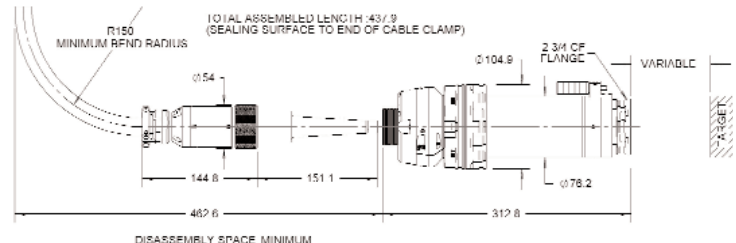
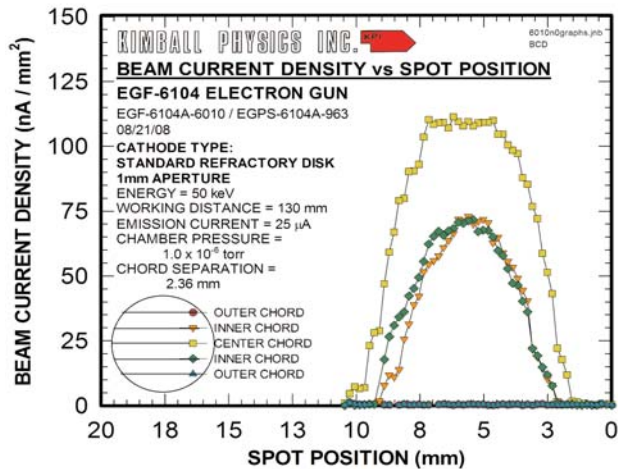
BEAM ENERGY	1 keV to 50 keV (Independently adjustable)
BEAM CURRENT	Standard: 1 nA to 200 $\mu$ A (Independently adjustable) High Current Option: up to 1 mA
ENERGY SPREAD	Approx. cathode thermal spread, calculated: Ta - 0.5eV
BEAM DEFLECTION	Optional: Magnetostatic (Quadrupole) Optional: Magnetostatic beam shaping
BEAM DIVERGENCE	Variable. Adjustable optics to adapt to different divergences and different working distances
SPOT SIZE	15 mm to 100 mm
WORKING DISTANCE	100 mm to 1000 mm
PULSE CAPABILITY	Optional Dual Grid Power Supply: pulse width 2 $\mu$ s to DC, rise/ fall 500 ns, rep rates to 5 kHz with optional LabVIEW™ program pulse generator or user's TTL pulser
BEAM UNIFORMITY	Depends on mask aperture, $\pm$ 25% with 8mm dia. mask (which yields $\sim$ 40 mm spot at 100 mm WD)
FIRING UNIT	Customer-replaceable Firing Unit Cartridge includes precision-aligned cathode, Wehnelt (G-1) assembly, focus and anode
CATHODE TYPES	Standard: Tantalum disc Refractory metal not harmed by repeated exposure to atmospheric gases while cold
MOUNTING	Standard: 2 $\frac{3}{4}$ inch CF flange
BEAM ALIGNMENT	Optional mechanical alignment with $\pm$ 2° Port Aligner
INSERTION LENGTH	0 mm
GUN DIMENSIONS (outside vacuum)	438 mm minimum from sealing surface to end of cable. Gun Diameter: 76 mm sealing surface end, 105 mm cable end.
FEEDTHROUGHS	Multi-pin brazed ceramic, threaded stainless steel shell
CABLES / CONNECTORS	Multi-conductor high voltage fully ground-shielded, with mating aluminum connector to connect gun and power supply. Standard lengths: 3 m. Optional: 5 m
MAXIMUM BAKEOUT	350°C with cables removed. 200°C with optional magnetic deflection or beam shaping

### EGPS-6104 ELECTRON GUN POWER SUPPLY SPECIFICATIONS

OUTPUT	All necessary voltages to drive the EGF-6104 Electron Gun
ENERGY STABILITY	$\pm$ 0.01% per hour; $\pm$ 0.02% per 8 hours at full output
BEAM STABILITY	$\pm$ 0.1% per hour with Emission Current Control or $\pm$ 10% per hour after warm up without ECC
CONTROLS	Energy, Focus, Anode, Grid, Source Voltage, Emission Current Control, X and Y deflection
METERING	FlexPanel digital meters: Energy, Emission, Focus, Anode, Grid, Source Volts, Source Current, X and Y Deflection
COMPUTER/REMOTE CONTROL	Power supplies: 0 to +10 V (-10 V to +10 V, deflection) Metering: 0 to +2 V (-2 V to +2 V, deflection) Standard 50-pin connector for analog input/output and RS-232 serial port (RS-422 or RS-485 available, if specified at time of order) Optional: SCSI metering and programming connectors
SOFTWARE	Standard configuration designed for RS-232 connections. Optional: National Instruments LabVIEW™ file, designed to run with computer DAQ boards NI PCI-6733 and PCIe-6341. SCSI interface
INPUT	115 or 230 VAC, 47 to 63 Hz, 100 W
ENVIRONMENT	Temperature: 0 to 40°C, Relative humidity: 0 to 75% RH non condensing. Classified as a pollution degree 2, installation category (overvoltage category) II environment unit
DIMENSIONS (width x height x depth)	17 in. x 7 in. x 22 in. (432 mm x 178 mm x 560 mm); with rack mount kit, overall width is 19.5 in. (495 mm)

### OPTIONAL HARDWARE RASTERING / BEAM WASHING

RASTER GENERATOR	Frequency in X and Y directions can be independently set. X freq. is up to 500 Hz, Y freq. 100Hz. When X freq. exceeds 100Hz the raster angle is reduced by 25%. All parameters controllable via RS-232, RS-422, RS-485, analog input, or computer control with LabVIEW™ software option.
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EGF-6104 ELECTRON GUN  
(Dimensions in mm)

