

### 200 eV to 20 keV Medium-Energy, Uniform Flood Electron Beam

#### FOR USE IN:

SPACECRAFT CHARGE-UP STUDIES  
SURFACE CHARGING STUDIES  
BETA DECAY SIMULATION  
SURFACE PHYSICS STUDIES  
VACUUM PHYSICS EXPERIMENTS

#### FEATURES / OPTIONS:

ENERGY RANGE: 200 eV to 20 keV  
BEAM CURRENTS to 1 mA  
WIDE ANGLE UNIFORM BEAM  
DIVERGENCE CONTROL  
ROTATABLE 2¾ inch CFF MOUNTING  
USER-REPLACEABLE FIRING UNIT  
COMPUTER / REMOTE CONTROL  
CUSTOM APERTURES



*EGF-3104 Electron Flood Gun mounted on a 2¾ inch CFF is rotatable, and has two sets of six mounting bolt holes, one set tapped and one set clear, to allow a user choice when mounting. All high voltage is totally enclosed in the multiconductor triaxial 20 kV cable and metal to metal shell connector.*

The Kimball Physics EGF-3104 Electron Gun, with its matching EGPS-3104 Power Supply, is intended for use in a variety of UHV charging, space physics, vacuum physics, surface physics, and nuclear simulation applications. It is a complete subsystem ready to attach and turn on. Maximum flexibility is achieved in a minimum of space; the entire unit mounts through a single standard 2¾ inch CF port.

Electrons are generated at negative high potential, and the user's target is typically 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. A high current option provides beam currents up to 1 mA. Beam divergence is partially controllable electronically over the full range of the electron energy.

Optional cathodes include barium oxide discs (BaO, low light, low energy spread) or yttria-coated iridium discs (Y<sub>2</sub>O<sub>3</sub> - Ir, rugged, may survive brief loss of vacuum). The yttria cathode is not damaged by repeated exposure to atmospheric gases or water vapor when cold. Cathode lifetime is a function of vacuum conditions and beam current as related to cathode temperature. Cathode lifetime at low currents in good vacuum may be in the many hundreds of hours, or even over a thousand hours.

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. 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.

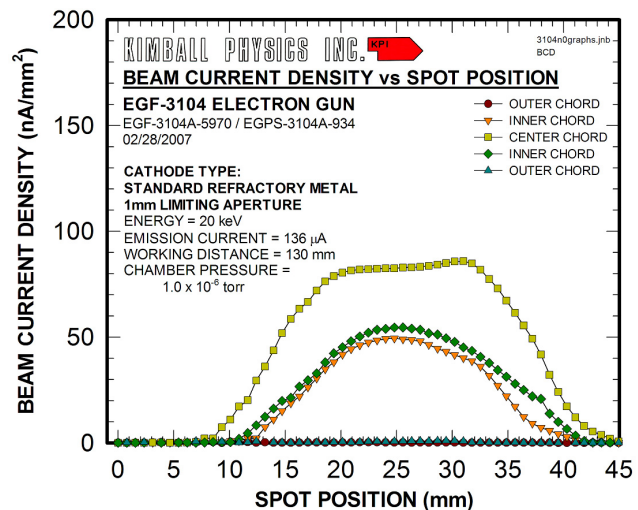
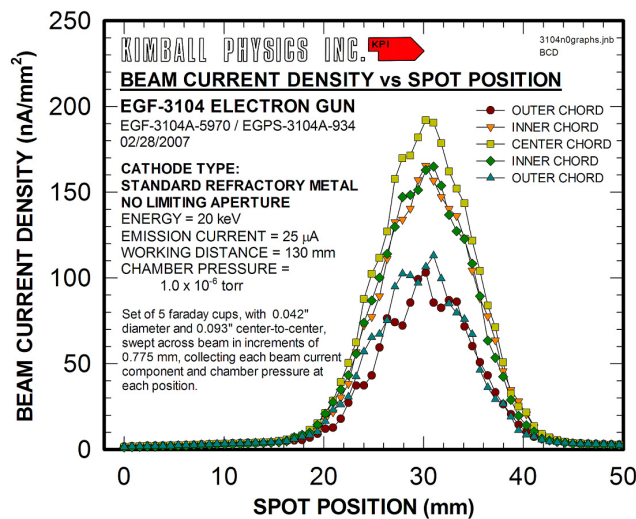
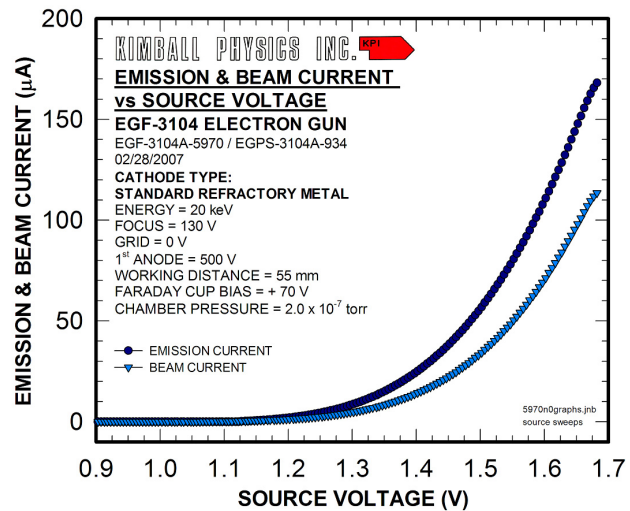
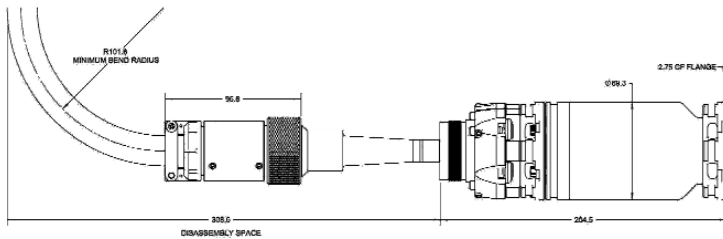
The EGPS-3104 Power Supply contains all power supplies necessary to generate the required voltages to run an EGF-3104 Electron Flood Gun, including the Energy, Focus, Source, Grid, and Anode supplies. All power supplies are electronically regulated. A computer control option allows for control of all potentials from an interface at ground potential, via 0 to 10 V analog inputs.

The new FlexPanel provides a digital display screen and a keypad controller 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-3104 is available for remote computer control and metering using National Instrument DAQ boards and SCSI connectors on the EGPS-3104. The program provides a virtual panel of controls and meters on the user's computer screen.

EGF-3104 ELECTRON GUN SPECIFICATIONS	
BEAM ENERGY	200 eV to 20 keV (Independently adjustable)
BEAM CURRENT	Standard: 1 nA to 100 $\mu$ A (Independently adjustable) High current option: 10 nA to 1 mA
ENERGY SPREAD	Approx. 0.4 eV cathode thermal spread, calculated
SPOT SIZE	15 - 50 mm at 100 mm working distance (Ind. adj.)
WORKING DISTANCE	Variable
BEAM DEFLECTION	Optional: Magnetic quadrupole (outside vacuum) for improved beam uniformity
PULSE CAPABILITY (using appropriate pulse generator, not included)	Dual Grid Power Supply: pulse width $\sim$ 2 $\mu$ s to DC rise/ fall $\sim$ 500 ns, rep rate to 5 kHz (TTL required)
BEAM UNIFORMITY	Depends on mask aperture
FIRING UNIT	User-replaceable Firing Unit Cartridge includes cathode and Wehnelt (G-1) assembly
CATHODE TYPE	Standard: Refractory Metal Cathode Optional: Low-light Barium Oxide Yttria-coated Iridium
MOUNTING	2 $\frac{3}{4}$ inch rotatable CF, including both tapped and clear mounting holes
BEAM ALIGNMENT	Mechanical alignment with internal firing unit alignment. Optional mechanical alignment with a $\pm$ 2° Port Aligner.
INSERTION LENGTH	0 mm
GUN DIMENSIONS	70 mm OD x 205 mm length
FEEDTHROUGHS	Multipin brazed ceramic, threaded stainless steel shell
CABLES / CONNECTORS	Multiconductor high voltage fully ground-shielded cable with mating aluminum shell connector, to connect gun and power supply. Standard length: 3 m, Optional: 5 m
MAXIMUM BAKEOUT	350°C with cables removed

EGPS-3104 ELECTRON GUN POWER SUPPLY SPECIFICATIONS	
OUTPUTS	All necessary voltages to drive the EGF-3104 Electron Gun (in combination with H.V. Power Supply)
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 (ECC) or $\pm$ 10% per hour without ECC
CONTROLS	FlexPanel controls: Energy, Source, Grid (G-1), 1 <sup>st</sup> Anode, Focus, Emission Current Control (ECC)
METERING	FlexPanel digital meters: Energy, Source Voltage, Source Current, Grid Voltage, Anode Voltage, Focus Voltage, Emission Current
COMPUTER/REMOTE CONTROL & METER	Power supplies: 0 to +10V (-10V to +10V, for deflection) Metering: 0 to +2V (-2V to +2V, for deflection) Toggle switches: 0 or +5V
INPUT	115 VAC switchable to 230 VAC, 50 to 60 Hz single phase, 250 VA
ENVIRONMENT	Temperature: 0 to 40°C, Relative humidity: 0 to 75% RH non condensing, Classified as a pollution degree 2, installation category
DIMENSIONS (width x height x depth)	EGPS-3104: 17 in. x 7 in. x 22 in. excluding handles (432 mm x 178 mm x 560 mm); 19 in.(495 mm) rack mountable.
WEIGHT	Appx. 35 lbs. (12 kg)



Typical performance; data for guidance only.