

### 1 keV to 100 keV

### High Energy, High Current, Flood Electron Beam

#### FOR USE IN:

GENERAL VACUUM PHYSICS  
 RADIATION STUDIES  
 SURFACE BOMBARDMENT  
 SEMICONDUCTOR RESEARCH  
 BIOLOGICAL SPECIMEN IRRADIATION  
 X-RAY GENERATION  
 PLASMA EXCITATION  
 FLUORESCENCE STUDIES  
 SURFACE PHYSICS STUDIES

#### FEATURES / OPTIONS:

BEAM CURRENTS, UP TO 1 mA (20mA pulsed)  
 PULSE CAPABILITY  
 INTERNAL ALIGNMENT WHILE OPERATING  
 USER-REPLACEABLE FIRING UNITS  
 COMPUTER CONTROL AVAILABLE



EGH-8100 Electron Gun

The Kimball Physics EGH-8100 Electron Gun with its matching EGPS-8100 Power Supply is a complete subsystem ready to attach to the user's vacuum system and turn on. It can deliver electrons over a very broad range of energies, currents and power. The EGH-8100 has applications in space materials testing, radiation studies, semiconductor research x-ray generation and plasma excitation.

The gun uses a refractory metal or lanthanum hexaboride ( $\text{LaB}_6$ ) cathode to generate a high energy, high current electron beam. Both beam energy and beam current are independently adjustable over wide ranges, the energy from 1 keV to 100 keV, and current from 10 nA to 1 mA. (20 mA pulsed). The electron beam can be pulsed by an input signal to the control grid.

The gun features an adjustable cathode feedthrough assembly that allows the mechanical alignment of the firing unit with respect to the anode. This alignment can be done in real time while the gun is operating with beam on.

UHV technology is used throughout. The gun can be run in vacuums from  $10^{-11}$  torr to  $10^{-6}$  torr for the refractory metal cathodes. The electron gun is bakeable to  $350^\circ\text{C}$  with cables removed.

Several cathode types and sizes are available: tantalum disc cathodes (Ta), single-crystal lanthanum hexaboride ( $\text{LaB}_6$ , high brightness, min. vacuum  $1 \times 10^{-7}$  torr) and Ytria coated iridium discs ( $\text{Y}_2\text{O}_3$  - Ir, rugged, may survive brief loss of vacuum). The cathodes are not damaged by repeated exposure to atmospheric gases or water vapor when cold.

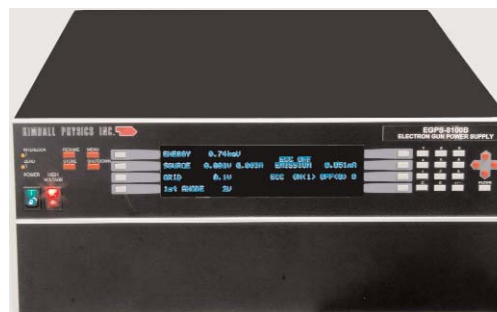
The gun design provides for differential pumping of the Source region with a  $4\frac{1}{2}$  CF flange on the source chamber for attachment for a Turbo pump and three  $2\frac{3}{4}$  CF flanges for an ionization gauge or other equipment. The gun is usually mounted on a 6 inch CF flange and has zero insertion length, i.e. does not extend into the vacuum chamber. Due to the high power beam produced by the EGH-8100, X-ray shielding is essential.

Firing units are user-replaceable without removing the entire gun from the vacuum chamber; spare firing units can be purchased new, and used firing units may be returned to the factory for rebuild. Alternatively, the entire electron gun can be sent back to the factory for complete cleaning, rebuild, cathode replacement, and optional in-vacuum testing. Various stand-alone designs of Faraday cups are available.

The Power Supply System for the EGH-8100 is composed of two separate units: the EGPS-8100 Electron Gun Power Supply and a separate H.V. Power Supply controlled by the EGPS-8100. The EGPS-8100 features a modular design with miniaturized power supply clusters, optically isolated signals, and the new FlexPanel digital interface controller. The included power supplies are Beam Energy, as well as the floating Source/ ECC, Grid, and First Anode supplies.

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 or RS-422/485 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.

An optional LabVIEW™ computer program designed for the EGH-8100 is available for remote computer control and metering. Software is available in two types: Using National Instrument DAQ boards and SCSI connectors on the EGPS-8100, or via a simple serial connector interface. The program provides a virtual panel of controls and real-time metering on the user's computer screen.



EGPS-8100 Power Supply

EGH-8100 ELECTRON GUN SPECIFICATIONS	
BEAM ENERGY	1 keV to 100 keV (Independently adjustable)
BEAM CURRENT	Standard: 10 nA to 100 $\mu$ A (Independently adjustable) Optional: 10 nA to 1 mA (20mA pulsed)
ENERGY SPREAD	Approx. cathode thermal spread, calculated Ta - 0.5eV $Y_2O_3$ - 0.4eV LaB <sub>6</sub> - 0.4eV
BEAM FOCUSING	Magnetostatic
BEAM DIVERGENCE	Variable. Adjustable optics to adapt to different divergences and different working distances
SPOT SIZE	Standard: 3 mm to 100 mm.
WORKING DISTANCE	50 mm to 1000 mm
BEAM DEFLECTION	None
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	Gaussian
FIRING UNIT	Customer-replaceable Firing Unit Cartridge includes precision-aligned cathode, and Wehnelt (G-1) assembly
CATHODE TYPES	Standard: Tantalum disc (Ta). Optional: Lanthanum hexaboride (LaB <sub>6</sub> ) Yttrium oxide ( $Y_2O_3$ ) Cathodes not harmed by repeated exposure to atmospheric gases while cold
INTERNAL GUN ALIGNMENT	Adjustable Feedthrough for mechanical alignment of firing unit while gun is operating
MOUNTING	Standard: 6 inch CF flange
DIFFERENTIAL PUMPING	Source chamber with one 4½ CF port and three 2¼ CF ports for small pump and ionization gauge Optional pump: Varian Turbo-V70 LP with controller Optional gauge: Granville-Phillips 354 Micro-Ion Module
INSERTION LENGTH	Zero mm
GUN DIMENSIONS (outside vacuum)	Gun length: 403 mm sealing surface to end of cable connector 285 mm max across flange cluster on source chamber (no pumps), 203 mm dia source chamber
FEEDTHROUGHS	Multi-pin brazed ceramic, threaded aluminum-plated shell for main cable and stainless steel shell for others
CABLES / CONNECTORS	All high voltage fully ground-shielded cables with mating metal to metal connectors, to connect gun and power supply. Standard lengths: 3 m. Optional: 5m
MAXIMUM BAKEOUT	350°C for Source chamber with cables removed

EGPS-8100 ELECTRON GUN POWER SUPPLY SPECIFICATIONS	
OUTPUT	All necessary voltages to drive the EGH-8100 Electron Gun (in combination with H.V. Power Supply)
ENERGY SUPPLY STABILITY	<0.01% per hour with 0.05% rms ripple at full output
BEAM STABILITY	$\pm$ 0.1% per hour with optional Emission Current Control or $\pm$ 10% per hour after warm up without ECC
CONTROLS	FlexPanel controls: Energy, Source, Grid, First Anode, Emission Current Control (ECC).
METERING	FlexPanel digital meters: Energy, Source Voltage, Source Current, Emission Current, Grid, First Anode Voltage.
COMPUTER/REMOTE CONTROL & METER	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-232, RS-422 or RS-485 available, if specified at time of order) Optional: SCSI metering and programming connectors
INPUT	115 VAC or 230 VAC, (specify on order) 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 (overvoltage category) II environment unit
SOFTWARE	Standard configuration designed for RS-232 connections. Optional: National Instruments LabVIEW™ file, designed to run with computer DAQ boards NI PCI-6713 / PCIe-63416. SCSI interface
DIMENSIONS (width x height x depth)	Two units, total approx: 17 in. x 20.3 in. x 22 in. excluding handles (425 mm x 515 mm x 560 mm); 19 in. rack mountable

