



EGH-6002 / EGPS-6002 ELECTRON GUN / POWER SUPPLY

1 keV to 50 keV

FOCUSABLE SMALL SPOT HIGH-ENERGY ELECTRON BEAMS

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:

MEDIUM BEAM CURRENTS
 SMALL SPOTS
 MAGNETOSTATIC FOCUSING
 MAGNETOSTATIC DEFLECTION
 PULSE CAPABILITY
 INTERNAL ALIGNMENT WHILE OPERATING
 USER-REPLACEABLE FIRING UNITS
 4½ OR 6 INCH CFF MOUNTING
 UHV TECHNOLOGY / BAKEABLE
 COMPUTER / REMOTE CONTROL



EGH-6002 Electron Gun mounted on 6 inch CFF

The Kimball Physics EGH-6002 Electron Gun with its matching EGPS-6002 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-6002 can be used in many different applications from semiconductor research to secondary electron emission studies.

The gun can generate a high energy, focusable, small spot electron beam. Both beam energy and beam current are independently adjustable over wide ranges; energies from 1 keV to 50 keV and currents from picoamps to tens of milliamps can be achieved. The electron beam can be pulsed by an input signal to the control grid.

The adjustable optics of the gun can adapt to different divergences and different working distances. The spot size can be varied from ½ mm to 10 cm. A magnetic focusing lens and magnetic centering deflection provide beam control with low aberration. In addition, the cathode to anode spacing is internally adjustable to change permeance.

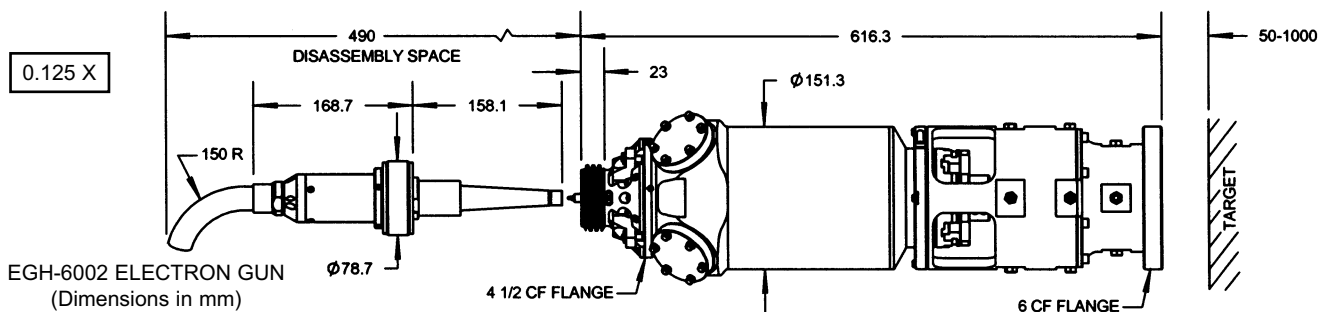
The gun features an adjustable cathode feedthrough assembly that allows the mechanical alignment of the firing unit with respect to the anode and the column. This alignment can be done in real time while the gun is operating at full voltage with beam on. The firing unit cartridge (including the cathode, cathode-mount, and Wehnelt aperture) is user-replaceable without even removing the gun from the vacuum chamber. Used firing units may be returned to the factory for rebuild.

Several cathode types and sizes are available: tantalum disc cathodes, yttria-coated (Y_2O_3) iridium cathodes, or single-crystal lanthanum hexaboride (LaB_6) cathodes. These cathodes are not damaged by repeated exposure to atmospheric gases or water vapor when cold.

UHV technology is used throughout. The gun can be run in vacuums from 10^{-11} torr to 10^{-6} torr for the metal cathodes, or to 10^{-7} torr for LaB_6 cathodes. The yttria-coated iridium cathode can survive a total vacuum dump. The electron gun is bakeable to 200°C with cables and electronics box removed; bakeout is limited by the magnetic focus and deflection coils. The Source region separately is bakeable to 350°C. The gun can be mounted on a 4½ inch or 6 inch CF flange, and has zero insertion distance into the vacuum chamber.

The EGPS-6002 Power Supply System contains all necessary power supplies to run the EGH-6002 Electron Gun. The power supply design includes a unique optically-controlled floating electronics box that is mounted close to the gun. Among other advantages, this design reduces the possibility of arc damage due to excess stored energy in the high voltage cable

An optional LabVIEW™ computer program designed for the EGH-6002 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-6002, 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.



EGH-6002 ELECTRON GUN
(Dimensions in mm)

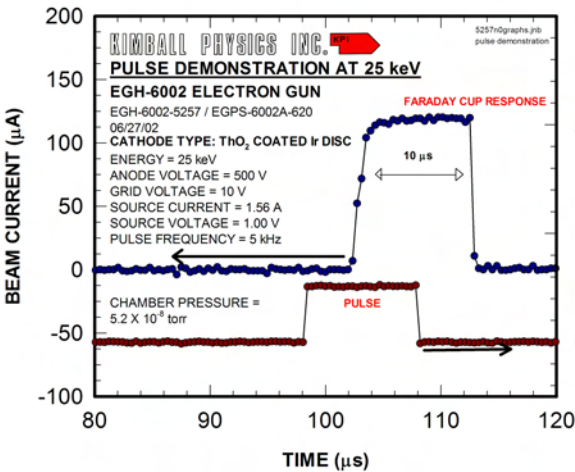
EGH-6002 ELECTRON GUN SPECIFICATIONS	
BEAM ENERGY	1 keV to 50 keV (Independently adjustable)
BEAM CURRENT	10 nA to 100 μ A (Independently adjustable) High Current option: 10 nA to 15 mA Low Current option: 100 pA to 100 nA
ENERGY SPREAD	Approx. 0.4 eV cathode thermal spread, calculated
BEAM FOCUSING	Magnetostatic
BEAM DIVERGENCE	Variable. Adjustable optics to adapt to different divergences and working distances
SPOT SIZE	0.5 mm to 100 mm
WORKING DISTANCE	50 mm to 1000 mm; Typical: 100 mm
BEAM DEFLECTION	Magnetostatic $\pm 0.5^\circ$
PULSE CAPABILITY	Optional Dual Grid Power Supply: pulse width 2 μ s to DC, rep rates to 1 kHz, 500 ns rise/fall, using appropriate pulse generator, not furnished
BEAM UNIFORMITY	Gaussian
FIRING UNIT	Customer-replaceable Firing Unit Cartridge includes precision-aligned cathode, and Wehnelt (G-1) assembly. Entire firing unit also includes first anode
CATHODE TYPES	Tantalum disc, Yttrium oxide (Y_2O_3), or Lanthanum hexaboride (LaB_6) 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	4 1/2 inch or 6 inch CFF
GUN DIMENSIONS, (OUTSIDE VACUUM)	Gun length: 636 mm, sealing surface to end of cable connector, Gun diameter: 151 mm for most of length Gun with electronics box & H.V. cable: approx. 745 mm x 415 mm x 220 mm overall (30 in x 16 in x 9 in)
INSERTION LENGTH	Zero mm
FEEDTHROUGHS	Multi-pin brazed ceramic, threaded stainless steel shell
CABLES / CONNECTORS	Multiconductor high voltage fully ground-shielded, with mating aluminum connector to connect gun and power supply. Standard lengths: 3m Optional: 5 m
MAXIMUM BAKEOUT	200°C with cables and floating electronics box removed (200°C for magnetic Lens and Deflection coils, 350°C for Source chamber region)

EGPS-6002 ELECTRON GUN POWER SUPPLY SPECIFICATIONS	
OUTPUTS	All necessary voltages to drive the EGH-6002 Electron Gun.
ENERGY STABILITY	<0.01% per hour with 0.05% rms ripple at full output
BEAM STABILITY	$\pm 1.0\%$ per hour with Emission Current Control or $\pm 10\%$ per hour after warm up without ECC
CONTROLS	Energy, Lens, Anode, Grid, Source, Emission Current Control, X and Y Deflection
METERING	Digital: Energy, Lens, Anode, Emission, Grid, Source Volts, Source Amps, optional X and Y Deflection
COMPUTER/REMOTE CONTROL & METER	All power supplies: 0 to +10 volts or -10 to +10 volts All meters: 0 to +2 volts
SOFTWARE	Optional: National Instruments LabVIEW™ file, designed to run with computer DAQ boards NI 6034E/6036 and NI 6703/6713. The DAQ boards appropriate for a given system (determined by options & custom features) will be determined by the Kimball Physics engineering department.
INPUT	115 VAC switchable to 230 VAC, 50 to 60 Hz, 100 W
DIMENSIONS (width x height x depth)	Two units, total approx: 17 in. x 7 in. x 22 in. (432 mm x 180 mm x 560 mm); with rack mount kits, overall width is 19.5 in. (495 mm)

Standard specifications listed; Enhanced and custom specifications available.



A typical lab set-up of a complete Kimball Physics high energy system with a focusable electron gun, power supplies and optional computer control system (details vary with gun model)



Typical performance; data for guidance only.

