



EGH-8105 / EGPS-8105 ELECTRON GUN / POWER SUPPLY

1 keV to 100 keV FOCUSABLE FLOOD HIGH-ENERGY ELECTRON BEAMS

FOR USE IN:

GENERAL VACUUM PHYSICS
SPACECRAFT MATERIALS TESTING
UHV CHARGING
SURFACE PHYSICS

FEATURES / OPTIONS:

UNIFORM FLOOD BEAM
BEAM WASHING FOR UNIFORM SPOT
ELECTROSTATIC FOCUSING
TWO X 1.33" INSTRUMENTATION PORTS
INTERNAL ALIGNMENT WHILE OPERATING
USER-REPLACEABLE FIRING UNITS
6 INCH CFF MOUNTING
UHV TECHNOLOGY / BAKEABLE
COMPUTER / REMOTE CONTROL
LABVIEW™ COMPUTER / PROGRAMMING



EGH-8105 Electron Gun System components

The Kimball Physics EGH-8105 Electron Gun with its matching EGPS-8105 Power Supply is a complete subsystem ready to attach to the user's vacuum system and turn on. It can deliver electrons over a broad range of energies, currents and power. The EGH-8105 is a high-power, focusable flood gun for use in spacecraft materials testing and other surface physics and general vacuum physics applications.

This is a high energy, focusable, flood electron beam system where both beam energy and beam current are independently adjustable over wide ranges. Energies from 1 keV to 100 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. A magnetic beam washing ("wobbling") option is available which provides significant improvement in beam uniformity. An electrostatic focusing lens provides control of the spot size, which is typically in the tens of centimeters. However as a flood-style gun, the spot size is also partially dependent on the grid, anode and working distance.

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 the beam on. The firing unit cartridge (including the cathode, cathode-mount, and Wehnelt aperture) is user-replaceable without the need to remove the gun from the vacuum chamber. Used firing units may be returned to the factory for rebuild.

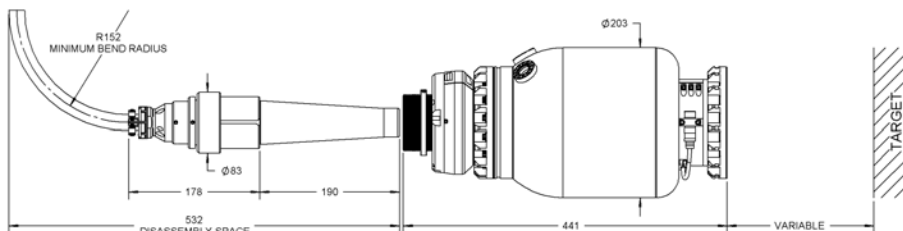
Several cathode types and sizes are available: tantalum (Ta) disc cathodes, yttria-coated (Y_2O_3) iridium cathodes, or Barium Oxide (BaO) cathodes. These cathodes (with the exception of BaO) are not damaged by repeated exposure to atmospheric gases or water vapor when cold.

UHV technology is used throughout. The gun can be run in vacuums from 10^{-11} torr to 10^{-6} torr for the Ta and Y_2O_3 cathodes, or to 10^{-7} torr for BaO cathode. The yttria-coated iridium cathode can survive a total vacuum dump. The electron gun is bakeable to $200^\circ C$ with cables removed. The gun is usually mounted on a 6 inch CF flange, and it has zero insertion distance into the vacuum chamber.

The EGPS-8105 Power Supply contains all necessary power supplies to run the EGH-8105 Electron Gun. The Power Supply System design includes a separate H.V. Supply.

An optional LabVIEW™ computer program designed for the EGH-8105 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-8105, 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.

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



EGH-8105 ELECTRON GUN
(Dimensions in mm)

EGH-8105 ELECTRON GUN SPECIFICATIONS	
BEAM ENERGY	1 keV to 100 keV (Independently adjustable)
BEAM CURRENT	50 nA to 100 μ A (Independently adjustable) High Current option: 10nA to 5 mA Low Current option: 100pA to 100nA
ENERGY SPREAD	Approx. 0.4 eV cathode thermal spread, calculated
BEAM FOCUSING	Magnetostatic (Quadrupole) Optional: Magnetostatic beam shaping
BEAM DIVERGENCE	Variable. Adjustable optics to adapt to different divergences and different working distances
SPOT SIZE	Variable
WORKING DISTANCE	Variable
BEAM DEFLECTION	Magnetostatic: $\pm 20^\circ$ at 100 keV
BEAM WASHING	Magnetic: Improves beam uniformity (optional)
PULSE CAPABILITY	Pulsing with grid remote control Optional Dual Grid Power Supply: pulse width 2 μ s to DC, rise/ fall 500 ns, rep rates to 5 kHz with optional LabVIEW™ program pulse generator
BEAM UNIFORMITY	Gaussian
FIRING UNIT	Customer-replaceable Firing Unit Cartridge includes precision-aligned cathode, and Wehnelt (G-1) assembly Firing unit also includes first anode
CATHODE TYPES	Standard: Refractory metal cathode - Ta Low-light barium oxide coated (BaO) Yttria coated iridium (Y2O3)
BEAM ALIGNMENT	Mechanical alignment with internal firing unit adjustment
MOUNTING	Standard: 6 inch CF flange
INSERTION LENGTH	Zero mm
GUN DIMENSIONS (outside vacuum)	Gun length: 537 mm sealing surface to end of cable connector, Gun diameter: 203 mm
FEEDTHROUGHS	Multi-pin brazed ceramic with threaded stainless steel shell
CABLES	Multiconductor high voltage fully ground-shielded Source cable, low voltage deflection cable
MAXIMUM BAKEOUT	200°C with cables removed

EGPS-8105 ELECTRON GUN POWER SUPPLY SPECIFICATIONS	
OUTPUT	All necessary voltages to drive the EGH-8105 Electron Gun.
ENERGY SUPPLY 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, Focus, Anode, Grid, Source, Emission Current Control, optional Raster X and Y Size and Frequency
METERING	Digital: Energy, Focus Anode, Emission, Grid, Source Volts, Source Amps, optional Raster X Size and Y Size
COMPUTER/REMOTE CONTROL & METER	All power supplies: 0 to +10 volts or -10 to +10 volts All meters: 0 to +2 volts
INPUT	115 VAC or 230 VAC, 50 to 60 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
SOFTWARE	Optional: National Instruments LabVIEW™ file, designed to run with computer DAQ boards NI 6713 / 6036. Standard configuration designed for RS-232 connections. SCSI optional
DIMENSIONS (width x height x depth)	Two units, (EGPS control unit and HV unit) total approx: 17 in. x 12 in. x 22 in. excluding handles (432 mm x 305 mm x 560 mm); 19 in. rack mountable

OPTIONAL RASTERING / BEAM WASHING SPECIFICATIONS	
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.
DIMENSIONS	Included in dimensions for standard EGPS (above)

Typical performance; data for guidance only.

