EGA-1108 / EGPS-1108
ELECTRON GUN / POWER SUPPLY

50 eV to 1000 eV
Uniform Focusable Low-Energy Electron Beam

FOR USE IN:

ELECTRON-IMPACT STUDIES
IONIZATION EXPERIMENTS
SURFACE PHYSICS STUDIES
VACUUM PHYSICS EXPERIMENTS
CHARGE NEUTRALIZATION
ELECTRON DESORPTION
SURFACE SCRUBBING
PHOSPHOR TESTING
SEMICONDUCTOR PROCESSING

FEATURES / OPTIONS:

FEEDBACK STABILIZED EMISSION CURRENT
WIDELY-CONTROLLABLE PARAMETERS
FLOOD BEAMS OR
NARROW ANGLE BEAMS
ELECTROSTATIC FOCUSING
USER-REPLACEABLE FIRING UNITS
UHV COMPATIBLE / BAKEABLE
COMPUTER / REMOTE CONTROL

EGA-1108 Electron Gun

The Kimball Physics EGA-1108 Electron Gun, with its matching EGPS-1108 Power Supply, is intended for use in a variety of UHV, surface physics, and processing applications. It is a complete subsystem ready to attach and turn on. Beam energy, beam current and beam divergence are all independently adjustable. The EGA-1108 Electron Gun uses a space charge limited refractory metal cathode to generate a focusable beam. This design allows for generation of the beam down to medium low energies and very low currents.

UHV technology is used throughout. The electron gun is bakeable up to 350°C with cables removed. The cathodes are not damaged by repeated exposure to atmospheric gases or water vapor when cold. The gun can be run in vacuums from 10^{-11} torr to 10^{-5} torr. 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. Firing units (containing cathode, control grid, and anode, with ceramic insulators and electrical connections—the complete triode structure) are user-replaceable; used firing units may be returned to the factory for rebuild. The electron gun itself may also be sent back to the factory for complete disassembly, cleaning, and rebuild of the firing unit assembly (including installation of a new cathode).

EGPS-1108 Electron Gun Power Supply with FlexPanel controller

The EGA-1108 Electron Gun is available in two different mounting configurations: as a standard mounted gun with a 2¾ CF Flange Multiplexer or as a demountable gun. The Demountable EGA-1108 can be used as mounted gun, or it can be removed by the user from its mounting and used as an unmounted gun with the Flange Multiplexer as a separate vacuum feed through.

A fast pulse option, using a pulse junction box on one of the 1⅓ inch CF ports of a MCF275-FM105R Flange Multiplexer, permits fast beam pulsing down to 20 nanoseconds with 20% maximum duty cycle. Pulse speed and shape are dependent upon the type of pulse generator chosen (not provided).

Phosphor screens (for locating / experimenting with electron beams) are available in UHV and Ruggedized versions.

The EGPS-1108 Power Supply 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 and X,Y Deflection, as well as floating Source/ECC, Grid, and Focus supplies.

The new 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 EGA-1108 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-1108, 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.

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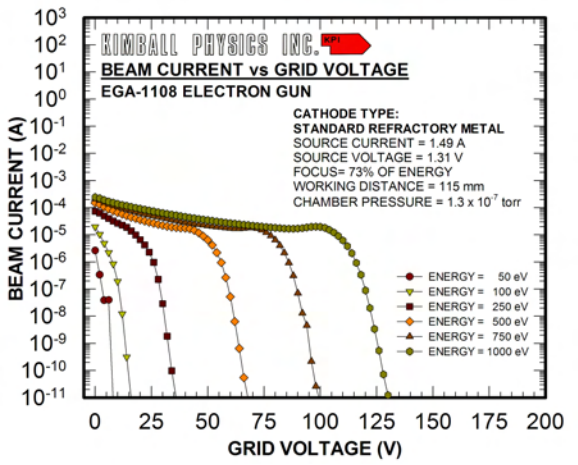
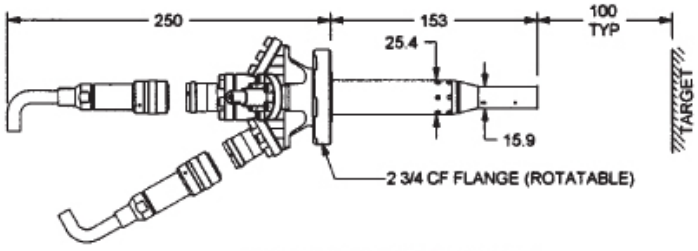
EGA-1108 ELECTRON GUN SPECIFICATIONS	
BEAM ENERGY	50 eV to 1000 eV (Independently adjustable)
BEAM CURRENT	1 nA to 100 µA (Independently adjustable)
ENERGY SPREAD	Approx. 0.4 eV cathode thermal spread, calculated
SPOT SIZE	1 mm to 12 mm at a 50 mm working distance
WORKING DISTANCE	25 mm to 200 mm
BEAM DEFLECTION	Optional: ± 5º max deflection angle at 1000 eV
ENERGY SPREAD	Approx. 0.4 eV cathode thermal spread, calculated
PULSE CAPABILITY (using appropriate pulse generator, not included)	Optional Capacitive: pulse width 20 ns to 100 µs, rep rates up to 20% of duty cycle Optional Dual Grid Power Supply: pulse width 1 µs to DC, rep rates to 1 kHz
BEAM UNIFORMITY	Gaussian
FIRING UNIT	Customer-replaceable Firing Unit includes precision-aligned cathode, Wehnelt (G-1) assembly and anode
CATHODE TYPES	Standard: Refractory metal Optional: Barium oxide, Yttrium oxide With the exception of Barium oxide, cathodes not harmed by repeated exposure to atmospheric gases while cold
MOUNTING	Flange Multiplexer with a 2¾ inch rotatable CF Optional: Demountable (Unmounted / Mounted) with Flange Multiplexer with a 2¾ inch rotatable CF3
FARADAY CUP	Optional: Mounted on gun, manual or pneumatic control
INSERTION LENGTH	Standard: 150 mm. Range: 110 mm to 170 mm. Custom lengths available. Gun manufactured at standard length unless otherwise specified at time of order. Optional Unmounted: 9.7 cm (excluding electrical leads)
GUN DIAMETER	Mounted: 1.6 cm at gun end, 2.54 cm at flange edge Unmounted: 1.6 cm at gun end, 2.3 cm at feedthrough
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: 3 m Optional: 5 m
MAXIMUM BAKEOUT	350°C with cables removed (Removable Faraday cup pneumatic actuator 65°C)

EGPS-1108 ELECTRON GUN POWER SUPPLY SPECIFICATIONS	
OUTPUTS	All necessary voltages to drive the EGA-1108 Electron Gun
ENERGY STABILITY	±0.01% per hour; ±0.02% per 8 hours at full output
BEAM STABILITY	±0.1% per hour with Emission Current Control or ±10% per hour after warm up without ECC
CONTROLS	FlexPanel controls: Energy, Source, Grid, Focus, X and Y Deflection, Emission Current Control
METERING	FlexPanel digital meters: Energy, Source Voltage, Source Current, Emission Current, Grid, Focus, X and Y Deflection
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-422 or RS-485 available, if specified at time of order) Optional: SCSI metering and programming connectors
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 single phase, 250 VA
ENVIRONMENT	Temperature: 0 to 40ºC, 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 3.5 in. x 22 in. excluding handles (425 mm x 90 mm x 560 mm); 19 in. rack mountable

OPTIONAL RGDU-4A RASTER GENERATOR SPECIFICATIONS	
RASTER GENERATOR	Continuous control of X & Y Raster Amplitude, variable offset (Centering) and Frequency, with 0-10 kHz (X) and 0-100 Hz (Y) standard. All parameters controllable via RS-232, RS-422, RS-485, analog input, or computer control with LabVIEW™ software option.
DIMENSIONS (width x height x depth)	17 in. x 3.5 in. x 22 in.excluding handles (425 mm x 90 mm x 560 mm); 19 in. rack mountable





EGA-1108 ELECTRON GUN
(Dimensions in mm)

Typical performance; data for guidance only.