

**5 eV to 1000 eV**  
**High Current, Medium-Diameter, Low-Energy Electron Beam**

**FOR USE IN:**

- Surface Physics Studies
- Vacuum Physics Experiments
- Charge Neutralization
- Electron Desorption
- Surface Scrubbing
- Phosphor Testing
- Ionization Experiments
- Semiconductor Processing

**FEATURES / OPTIONS:**

- Beam Current up to 2mA
- Feedback Stabilized Emission Current
- User-replaceable Firing Units
- UHV Compatible / Bakeable
- Computer / Remote Control
- Beam Pulsing Option



*EGA-1012 Electron Gun on 2.75" Inch CF Flange*

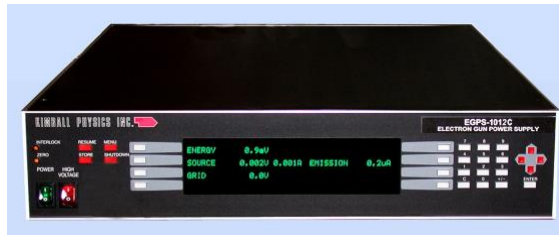
Kimball Physics EGA-1012 Electron Gun, with its matching EGPS-1012 Power Supply, is intended for use in a variety of UHV, surface physics, and processing applications where high beam currents are needed at low energy. It is a complete subsystem ready to attach and turn on. Beam energy, beam current and beam divergence are all independently adjustable. The EGA-1012 Electron Gun uses a space-charge-limited oxide-coated cathode to generate a uniform flood beam. This design allows for generation of the beam down to low energies and very low currents.

UHV technology is used throughout. The electron gun is bakeable up to 350°C with cables removed. With Faraday cup, maximum is 65°C unless removed.

The standard cathode is a high current, rugged yttria-coated disc (Y<sub>2</sub>O<sub>3</sub>). 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<sup>-11</sup> torr to 10<sup>-5</sup> 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-1012C Power supply with FlexPanel controller**

The EGPS-1012 Power Supply Unit contains all the power supplies necessary to generate the required voltages to run an EGA-1012 Electron

Gun. An external connector allows computer/remote control of all gun power supplies, including the floating supplies, via 0 to 10 V analog inputs at ground potential.

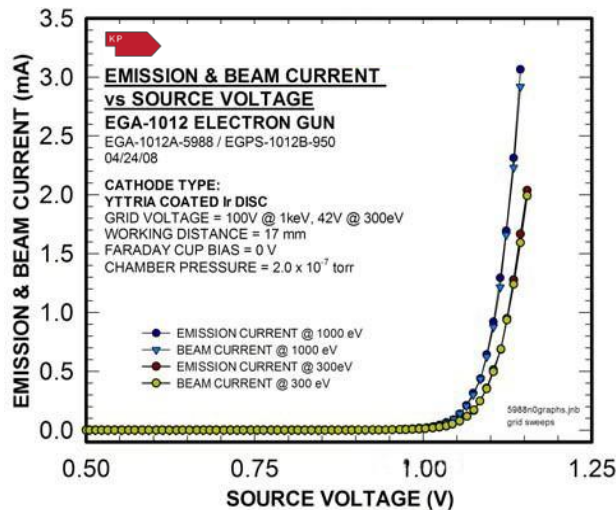
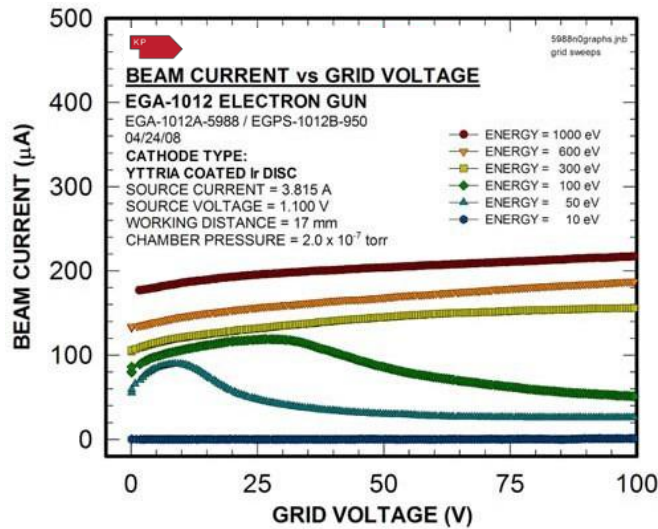
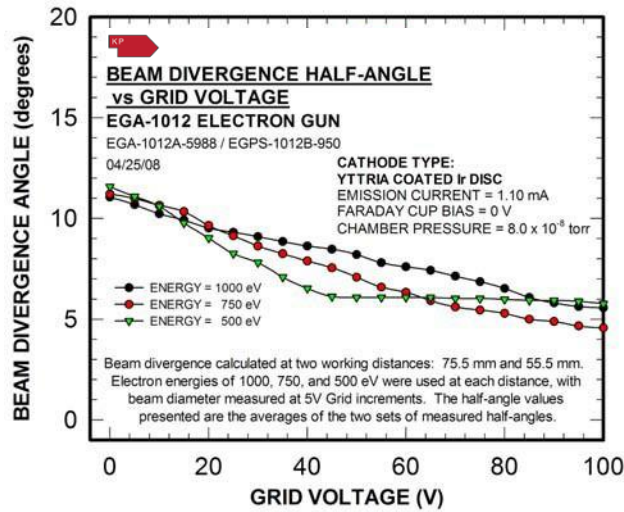
The FlexPanel provides a digital display screen and a keypad for programming control on the front panel. Rear panel connectors allow remote /computer control and metering of all gun power supplies. A RS-232 and mini-USB serial port and an analog input/output connector are included on standard power supply units. All common computer interface bus types can be

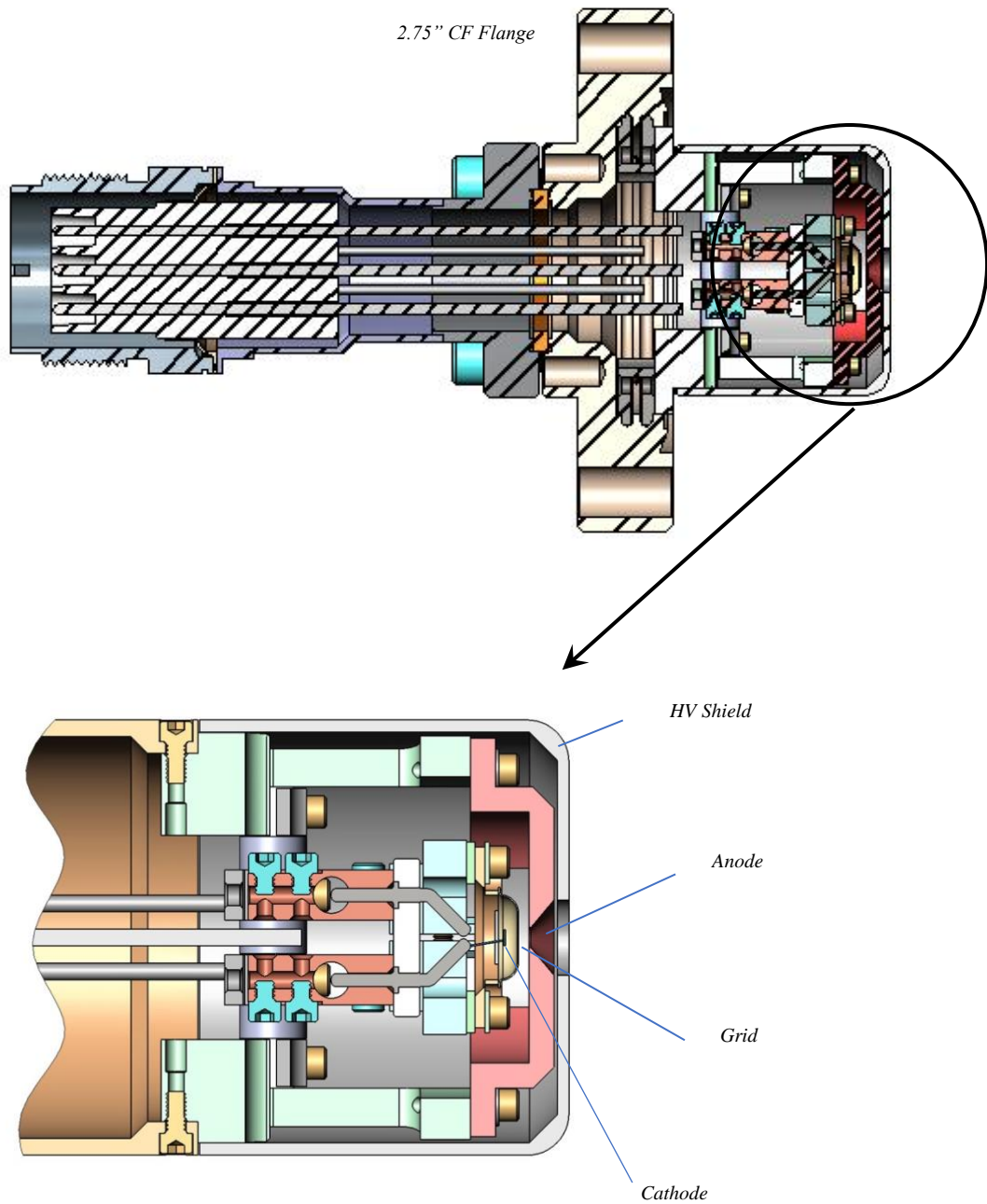
accommodated, by use of appropriate digital to analog converters. RS-422/485 conversion is possible.

An optional LabVIEW™ computer program designed for the EGA-1012 is available for remote computer control and metering. Software is available in two options: 1) using National Instrument DAQ modules and the 50-pin connector on the EGPS-1012, or 2) via a mini-USB or simple serial connector interface. The program provides a virtual panel of controls and real-time metering on the user's computer screen.

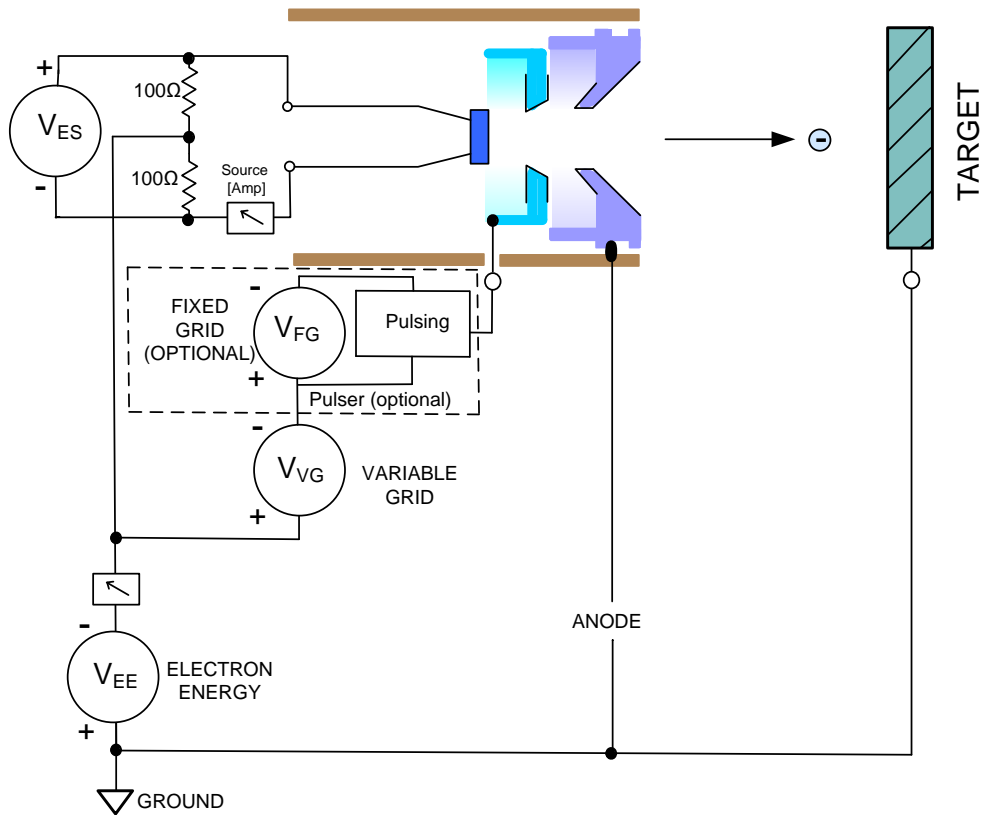
EGA-1012 ELECTRON GUN SPECIFICATIONS	
BEAM ENERGY	5 eV to 1000 eV (Independently adjustable)
BEAM CURRENT	1 $\mu$ A to 2 mA (Independently adjustable)
ENERGY SPREAD	Approx. cathode thermal spread, calculated: $Y_2O_3 - 0.4eV$
SPOT SIZE	10 mm to 25 mm at 55 mm working distance
WORKING DISTANCE	10 mm to 200 mm
BEAM DEFLECTION	None
PULSE CAPABILITY (using appropriate pulse generator, not included)	Optional Dual grid power supply: pulse width 2 $\mu$ s to DC, rise / fall 5—ns, rep rates to 5 kHz (TTL required).
FIRING UNIT	Customer-replaceable Firing Unit Cartridge includes precision-aligned cathode, Wehnelt (G-1) assembly and anode
CATHODE TYPE	Standard: Yttrium Oxide
FARADAY CUP	Various stand-alone designs available
BEAM ALIGNMENT	Optional mechanical alignment with $\pm 2^\circ$ Port Aligner
MOUNTING	Standard: 2 $\frac{3}{4}$ inch CF flange Optional: Unmounted
INSERTION LENGTH	29 mm
GUN DIMENSIONS	Diameter- 33.5 mm at gun end
FEEDTHROUGHS	Multi-pin brazed ceramic, threaded stainless steel shell
CABLES / CONNECTORS	Multi-conductor 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 65°C max with Faraday cup (unless removed).

EGPS-1012 POWER SUPPLY SPECIFICATIONS	
OUTPUT	All necessary voltages to drive the EGA-1012 Electron Gun
ENERGY SUPPLY STABILITY	$\pm 0.01\%$ per hour $\pm 0.02\%$ per 8 hours 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, Source, Grid, Emission Current Control (ECC)
METERING	FlexPanel digital meters: Energy, Source Voltage, Source Current, Emission Current, Grid Voltage
COMPUTER/REMOTE CONTROL & METER	Power supplies: 0 to +10 V Metering: 0 to +2 V Standard 50-pin connector for analog input/output and RS-232 and mini-USB serial port (RS-422 or RS-485 available, if specified at time of order)
SOFTWARE	Standard configuration designed for RS-232 and USB serial connections. Optional: National Instruments LabVIEW™ file, designed to run with NI DAQ modules
INPUT	115 VAC or 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 (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

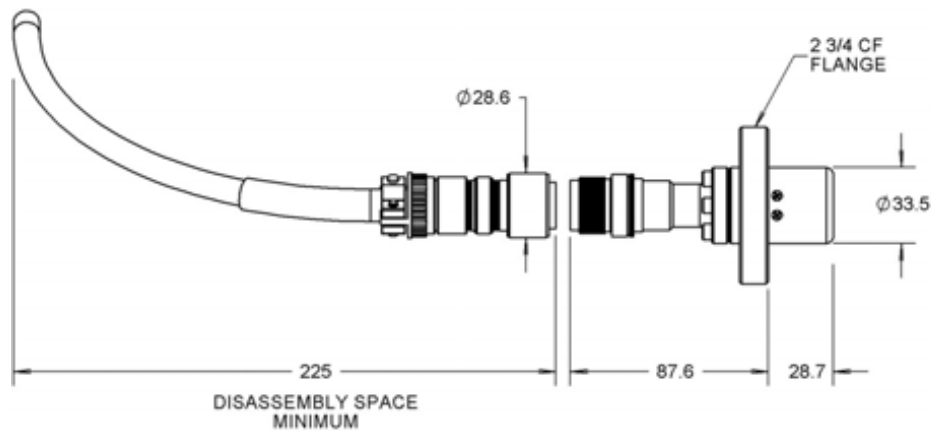




Solid Model Cross-section of the EGA-1012 electron gun showing the major components



EGA-1012 electron gun block diagram.



## References

For more information on electron sources / gun operations (and the technical bulletins and additional documents listed below), please visit the Resources and Documents section of our website.

General Operating Hints

Operating Instructions, Typical LabVIEW™ Electron Gun Systems

Beam Pulsing Options

*Note: A comprehensive custom manual is supplied with each system.*

### Notes:

1. Charts /graphs show typical performance, data is for guidance only
2. It is not necessarily possible to achieve all maximum specifications simultaneously.
3. Specifications Subject to Change Without Notice.
4. DE Altobelli, DT Taylor 11/11/2022

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