

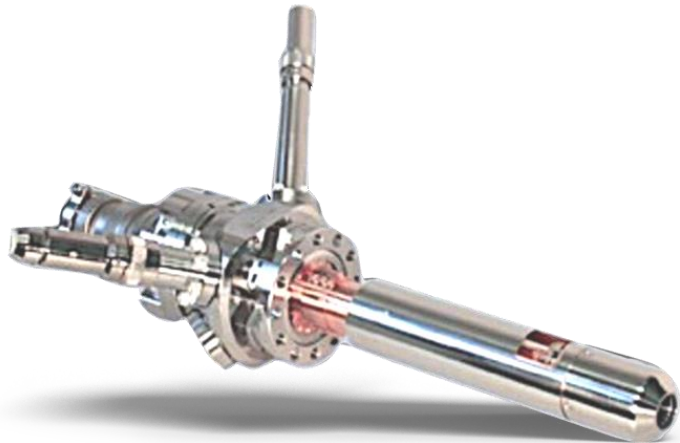
100 eV to 10 keV
Focusable Electron Beams, High Current Option up to 50 mA

FOR USE IN:

- Neutral Beam Excitation
- Space Physics Studies
- Surface Heating
- Surface Excitation
- Fluorescence Experiments
- Spacecraft Testing
- Vacuum Physics Experiments

FEATURES / OPTIONS:

- Beam Currents to 50 mA
- Focusing, Deflection and Rastering
- 2.75" inch CF Mounting
- Computer / Remote Control



EGG-3103 Electron Gun Mounted on 2.75" inch CF Flange Multiplexer

The Kimball Physics EGG-3103 Electron Gun, with its matching EGPS-3103 Power Supply is a medium energy, high current electron gun with applications in general vacuum physics, surface heating, excitation, ionization, fluorescence experiments, and spacecraft testing. It is a complete subsystem ready to attach and turn on.

The gun generally uses an Yttria (Y_2O_3) cathode to generate a high current, focusable electron beam. The gun has a Pierce style geometry with a shaped grid element and a shaped first anode element to control the beam. Both beam energy and beam current are independently adjustable over wide ranges. The energy is variable from 100 eV to 10 keV, and current from 200 μA to 10 mA. A high current option provides beam currents up to 50 mA.

UHV technology is used throughout. The gun can be run in vacuums from 10^{-11} torr up to 10^{-5} torr. The electron gun is bakable to $350^\circ C$ with cables removed. Stand-alone Faraday cup designs are available.

The standard cathode is a high current, rugged yttria-coated disc (Y_2O_3). The cathode is not damaged by repeated exposure to atmospheric

gases or water vapor when cold. 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 are user replaceable. 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.

Pulsing is not usually available with the EGG-3103 due to the gun geometry, which is optimized for high beam currents. The grid controls the electron beam and can completely suppress emission at lower energies.

A rastering option can be provided by an on-board power supply module or as an additional feature in a LabVIEW™ software package.

The EGPS-3103 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, Focus, and X, Y Deflection, as well as the floating Source/ECC and Grid supplies. The system includes a separate High Voltage Power Supply connected to and controlled by the EGPS-3103

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 mini-USB and 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 EGG-3103 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-3103, or 2) via a simple serial connector interface. The program provides a virtual panel of controls and real-time metering on the user's computer screen.

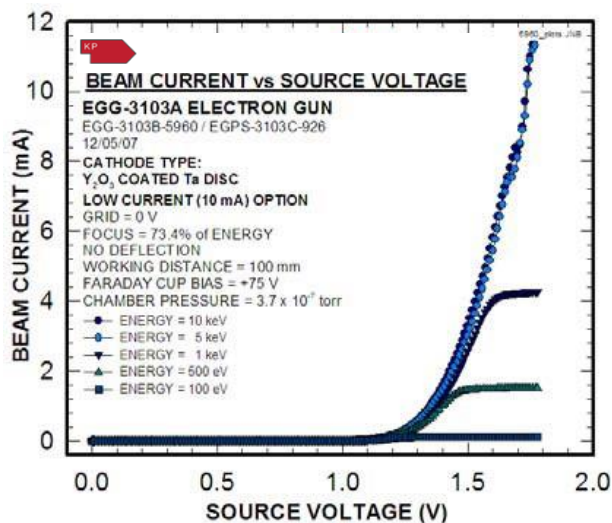
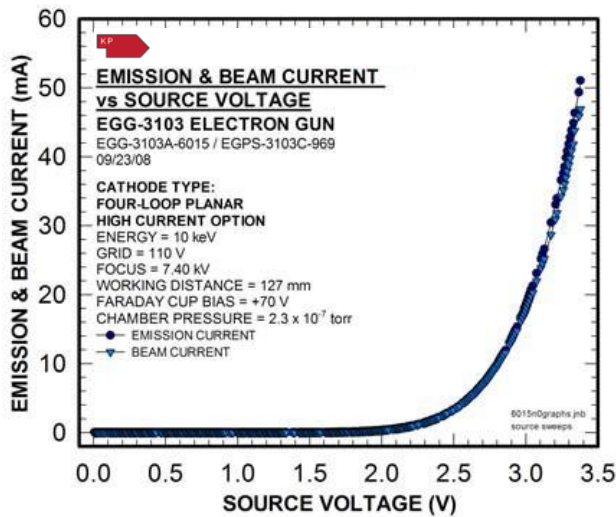
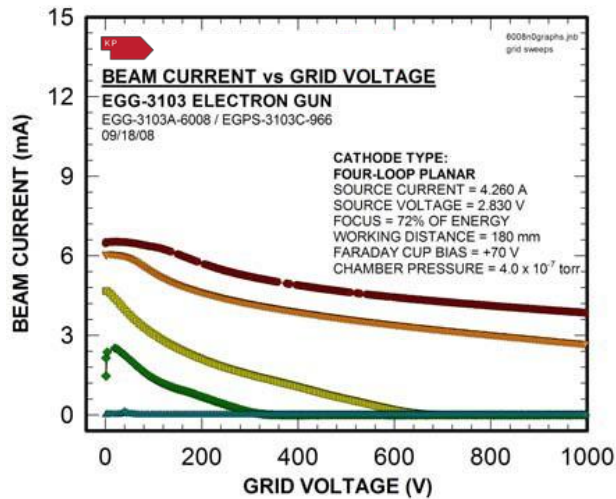


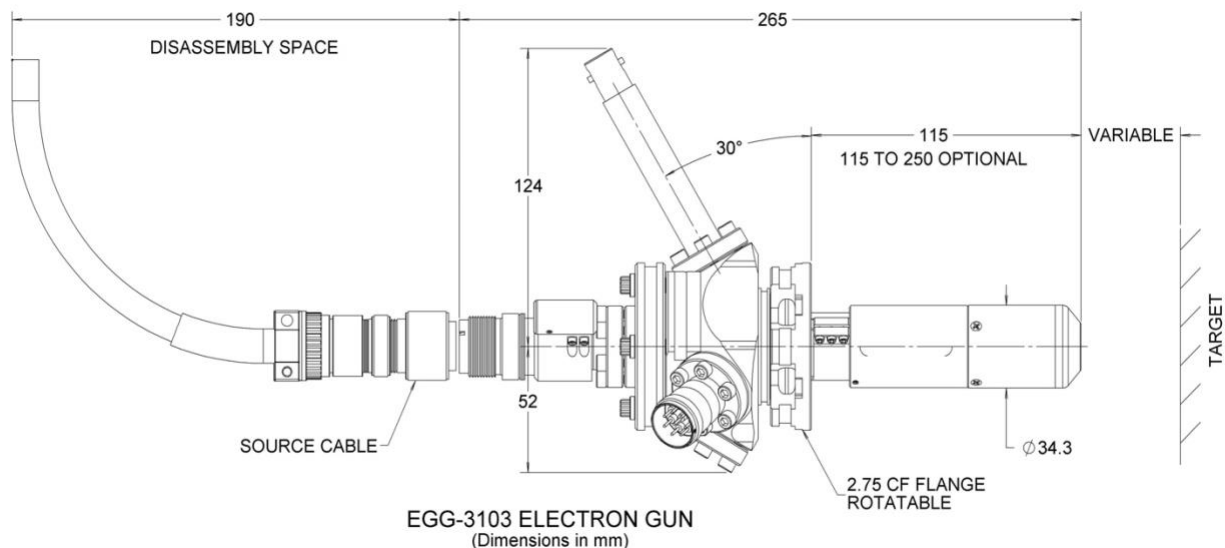
EGPS-3103 Electron Gun Power Supply with FlexPanel controller.

EGG-3103 ELECTRON GUN SPECIFICATIONS	
BEAM ENERGY	100 eV to 10 keV (Independently adjustable)
BEAM CURRENT	Standard: 200 μ A to 10 mA (Independently adjustable) High Current option: 5 mA to 50 mA
ENERGY SPREAD	Approx. cathode thermal spread, calculated: $Y_2O_3 - 0.4eV$
SPOT SIZE	Standard: 1.5 mm to 20 mm (Independently adjustable) High Current option: 5 mm to 25 mm
WORKING DISTANCE	Variable: 100 mm to 1000 mm
BEAM DEFLECTION	Standard: None Optional: 4 pole electrostatic: $\pm 1^\circ$ at 10 keV; $\pm 10^\circ$ at 1 keV
PULSE CAPABILITY	Optional; consult Kimball Physics Engineering
BEAM UNIFORMITY	Gaussian
FIRING UNIT	Customer-replaceable Firing Unit includes precision-aligned cathode and Wehnelt/Grid (G-1) assembly
CATHODE TYPE	High current yttria-coated (Y_2O_3) disc Cathodes are not harmed by repeated exposure to atmospheric gases while cold
BEAM ALIGNMENT	Optional: Mechanical alignment with $\pm 2^\circ$ Port Aligner
MOUNTING	Flange Multiplexer with a 2 $\frac{3}{4}$ inch rotatable CF, including both tapped and clear mounting holes
INSERTION LENGTH	Standard: 115 mm (with deflection), Range with deflection: 115 mm to 250 mm. Range without deflection: 100 mm to 250 mm. Custom lengths available. Gun manufactured at standard length unless otherwise specified at time of order
GUN DIMENSIONS	Gun Diameter- 34 mm, gun tube in vacuum
FEEDTHROUGHS	Multi-pin brazed ceramic, threaded stainless steel shell
CABLES / CONNECTORS	Multi-conductor high voltage fully ground-shielded cable, coaxial grid cable, low voltage deflection cable, with mating aluminum shell connectors, to connect gun and power supply. Standard lengths: 3 m Optional: 5 m
MAXIMUM BAKEOUT	350°C with cables removed

EGGS-3103 POWER SUPPLY SPECIFICATIONS	
OUTPUT	All necessary voltages to drive the EGG-3103 Electron Gun (in combination with H.V. Power Supply)
ENERGY SUPPLY STABILITY	$\pm 0.01\%$ per hour; $\pm 0.02\%$ per 8 hours at full output
BEAM STABILITY	$\pm 0.1\%$ per hour with Emission Current Control (ECC) or $\pm 10\%$ per hour after warm-up without ECC
CONTROLS	FlexPanel controls: Energy, Source, Grid, Focus, Emission Current Control, Optional X and Y Deflection
METERING	FlexPanel digital meters: Energy, Source Voltage, Source Current, Emission Current, Grid, Focus, Optional 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 a mini-USB and RS-232 serial port (RS-422 or RS-485 available, if specified at time of order) Optional: SCSI metering and programming connectors
SOFTWARE	Standard configuration designed for RS-232 and mini-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)	Two units, total approx.: 17 in. x 10.5 in. x 22 in. excluding handles (425 mm x 260 mm x 560 mm); 19 in. rack mountable

OPTIONAL HARDWARE RASTER 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 serial, analog input, or computer control with LabVIEW™ software option.





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 11/21/2022, 4/18/2025

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