



IMG-4212 / IGPS-3212 ION GUN / POWER SUPPLY

1 keV to 20 keV

Cs, Li, Na, K, Rb ALKALI METAL ION BEAMS

Small Spot Collimated Beam, Alignment during Operation

FOR USE IN:

Secondary Ion Mass Spectrometry
Ion Accelerators
Surface Physics
Vacuum Physics

FEATURES / OPTIONS:

Modular design
Internal alignment while operating
Collimated beam
Electrostatic focusing & deflection
User-replaceable firing units
UHV compatible / bakeable
Computer / Remote control
Beam pulsing & blanking options



IMG-4212 Ion Gun with 4 1/2 CF mounting flange

The Kimball Physics IMG-4212 Ion Gun, with its matching IGPS-3212 Power Supply, is a multi-purpose modular Ion Gun with applications in many areas. The IMG-4212/ IGPS-3212 is a complete subsystem ready to attach to a user's vacuum system and turn on. The gun has the capability of producing a collimated, small spot or flood ion beam.

Beam current, beam divergence, and beam energy are all adjustable over wide ranges. The energy can be varied from 1 keV to 20 keV. Beam blanking and rastering are also available as options.

The modular design of the IMG-4212 allows either the firing unit assembly or the lens assembly to be replaced. The firing unit cartridge is user-replaceable without removing the entire gun from the vacuum chamber. The anode is also replaceable. The cartridge to anode spacing is internally adjustable to vary permeance.

By use of different source firing units, the alkali ion beams of Cs, Li, Na, K, and Rb can be generated. The alkali metal is generated as needed by a solid-solid chemical reaction, and is then surface ionized and evaporated with low energy spread. The resulting ion beams can be generated down to relatively low energies, and very low currents. Beam divergence and beam alignment are both controllable using a built-in electrostatic condenser lens and electrostatic centering deflection plates. The ion gun with its power supply is a complete subsystem ready to attach and turn on.

The gun features an adjustable source 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.

UHV technology is used throughout. The gun can be run in vacuums from 10^{-11} up to 10^{-5} torr. Various stand alone Faraday cup designs are available.

Ion Source cartridges are user-replaceable, and used cartridges may be returned to the factory for rebuild. The Ion gun itself may also be sent back to the factory for complete disassembly, cleaning, and rebuild (including installation of a new ion source).

The IGPS-3212 Power Supply features a modular design with miniaturized power supply clusters, optically isolated signals, and the FlexPanel digital interface controller. The included power supplies are Beam Energy, Focus, X,Y Deflection and optional Beam Blanker, as well as the floating Source/ECC and Grid supplies.

A rastering option can be provided by an additional unit within the power supply, or by LabVIEW™ software.

The FlexPanel provides a digital display screen and 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, along with a USB port, 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 IMG-4212, is available for remote computer control and metering. Software is available in two types: Using National Instrument DAQ boards and SCSI connectors on the IGPS-3212, 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.

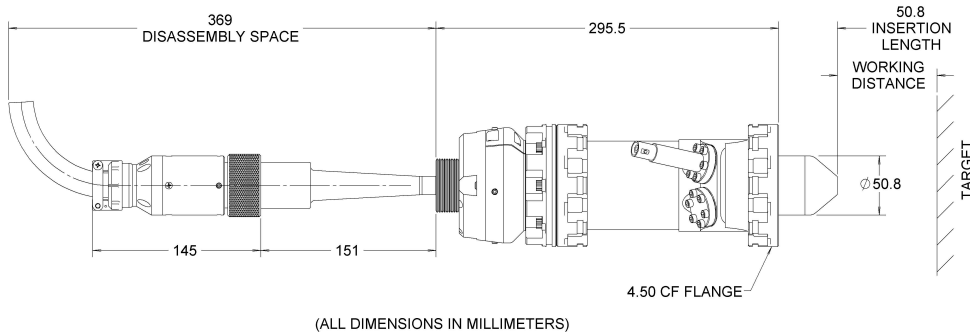


3212 Power Supply with FlexPanel controller

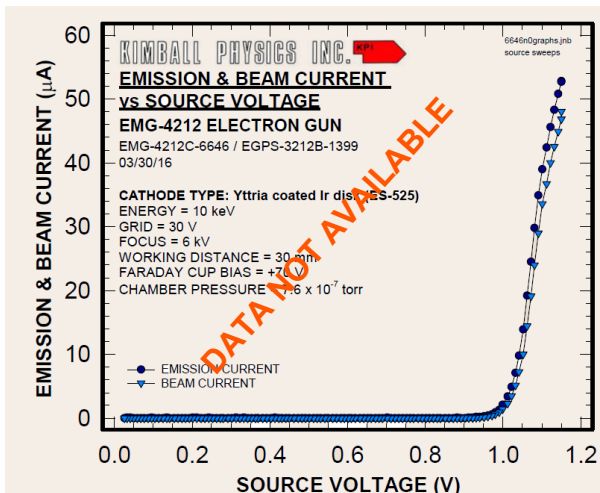
IMG-4212 ION GUN SPECIFICATIONS	
BEAM ENERGY	1 keV to 20 keV (Independently adjustable)
BEAM CURRENT	1 nA to 2 μ A (Independently adjustable) Ion Species Dependant
ENERGY SPREAD	Approx. 0.4 eV (max) thermal spread, calculated
BEAM DIVERGENCE	Collimated beam or Flood beam, depending on operating parameters
SPOT SIZE	Standard: 500 μ m to 25 mm
WORKING DISTANCE	Typical: 150 mm. Range: 100 mm to 1000 mm
BEAM DEFLECTION	4 Pole Electrostatic: $\pm 3^\circ$ at 20 keV; scales larger at lower energies
PULSE CAPABILITY (using appropriate pulse generator, not included)	DC, rise/ fall 500 ns, rep rates to 5 kHz (TTL required) Optional Capacitive Pulse Junction Box: pulse width 20 ns to 100 μ s, rise/ fall 10 ns, 50 Ω impedance, 1 W
BEAM BLANKING	Optional Blanker with TTL input: Pulse width 1 μ s to DC, rep rate to 5 kHz.
BEAM UNIFORMITY	Gaussian
FIRING UNIT	Customer-replaceable Firing Unit Cartridge includes precision-aligned ion source and Wehnelt (G-1)
ION SPECIES	Cs ⁺ , Li ⁺ , Na ⁺ , K ⁺ , or Rb ⁺
INTERNAL GUN ALIGNMENT	Adjustable Feedthrough for mechanical alignment of firing unit while gun is operating
MOUNTING	Flange Multiplexer with a 4 1/2 inch CFF, including both tapped and clear mounting holes
INSERTION LENGTH	Standard: 51 mm
GUN DIMENSIONS	Gun length in vacuum: 51 mm sealing surface to end, 51 mm dia. Outside vacuum: 258 mm sealing surface to end of cable (313 mm with blanker)
FEEDTHROUGHS	Multi-pin brazed ceramic, threaded stainless steel shell
CABLES / CONNECTORS	Multi-conductor 20 kV high voltage fully ground-shielded cable, 20 kV focus cable, and low voltage deflection cable, with mating aluminum connectors, to connect gun and power supply. Standard lengths: 3 m, Optional: 5 m
MAXIMUM BAKEOUT	350°C with cables removed

IGPS-3212 ION GUN POWER SUPPLY SPECIFICATIONS	
OUTPUT	All necessary voltages to drive the IMG-4212 Electron Gun (in combination with H.V. Power Supply)
ENERGY SUPPLY STABILITY	<0.01% per hour with 0.05% rms ripple at full output
BEAM STABILITY	$\pm 0.1\%$ per hour with Emission Current Control or $\pm 10\%$ per hour after warm up without ECC
CONTROLS	FlexPanel controls: Energy, Source, Grid, Focus, X and Y Deflection, Emission Current Control, Optional Blanker
METERING	FlexPanel digital meters: Energy, Source Voltage, Source Current, Emission Current, Grid, Focus, X and Y Deflection, Optional Blanker Voltage, Optional Beam Dump Current
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	Standard configuration designed for RS-232 connections. Optional: National Instruments LabVIEW™ file, designed to run with computer DAQ boards NI PCI-6733 and PCI-6341. SCSI interface
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)	Approx: 17 in. x 7 in. x 22 in. excluding handles (425 mm x 172 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 RS-232, RS-422, RS-485, analog input, or computer control with LabVIEW™ software option.



A typical lab set-up of a complete Kimball Physics system with power supplies, ion gun, and optional computer control system



Typical performance; data for guidance only.

