

Residual Gas Analyzers

RGA120 Series — 120 amu, 220 amu and 320 amu systems



Residual Gas Analyzers

- 120, 220 and 320 amu systems
- Built-in I/O ports, relay & GPIO
- Easy peak tuning
- 5×10^{-14} Torr detection limit
- New RGASoft Windows software
- Hybrid electrometer for improved baseline sensitivity
- USB, RS-232 and Ethernet interfaces std.

- RGA120 ... \$5450 (U.S. list)
- RGA220 ... \$6900 (U.S. list)
- RGA320 ... \$8450 (U.S. list)

The new 120, 220 and 320 amu residual gas analyzers from SRS offer increased mass range, better performance and new capabilities like built-in analog I/O. Building on the previous RGA100 series, SRS continues to offer unmatched value with the RGA120 series. Each RGA system comes complete with a quadrupole probe, electronics control unit (ECU), and a real-time Windows software package that is used for data acquisition and analysis, as well as probe control.

Rugged Probe Design

The probe consists of an ionizer, quadrupole mass filter, and a detector. The simple design has a small number of parts which minimizes outgassing and reduces the chances of introducing impurities into your vacuum system. The probe assembly is rugged and mounts onto a standard 2.75" Conflat® flange. It is enclosed within a stainless steel tube, with the exception of the ionizer which requires just 2.5" of clearance in your vacuum system — about that of a standard ion gauge. The probe is designed using self-aligning parts so it can easily be reassembled after cleaning.

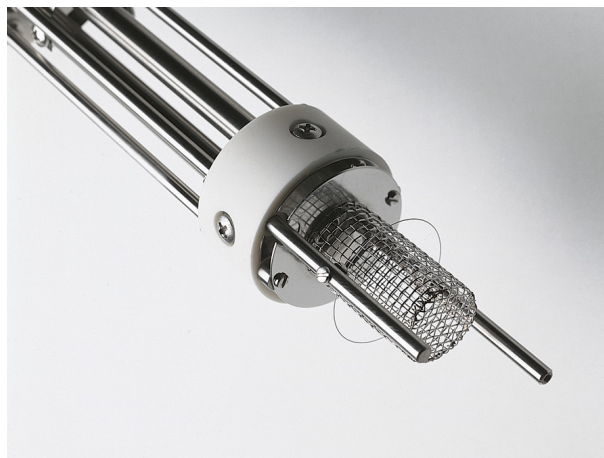
Compact Electronics Control Unit

The densely packed ECU contains all the necessary electronics for controlling the RGA head. It is powered by either an external +24 VDC (2.5 A) power supply or an optional, built-in power module which plugs into an AC outlet. LED indicators provide instant feedback on the status of the

electron multiplier, filament, electronics system and the probe. The ECU can easily be removed from the probe for high-temperature bakeouts.

Unique Filament Design

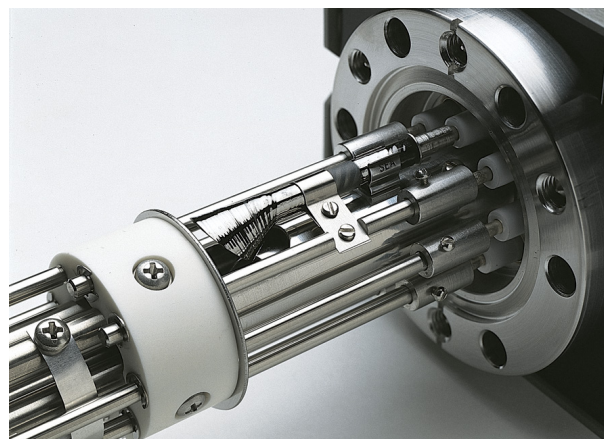
A long-life, dual thoriated-iridium (ThO_2/Ir) filament is used for electron emission. Dual ThO_2/Ir filaments last much



Dual ThO_2/Ir filament

longer than single filaments, maximizing the time between filament replacement. Unlike other designs, SRS filaments can be replaced by the user in a matter of minutes. Improved filament protection checks process pressure before turning on the filament.

Continuous Dynode Electron Multiplier



Continuous dynode electron multiplier

A Faraday cup detector is standard with all SRS RGAs, allowing partial pressure measurements from 10^{-5} Torr to

5×10^{-11} Torr. For increased sensitivity and faster scan rates, an optional electron multiplier is offered that detects partial pressures down to 5×10^{-14} Torr. This state-of-the-art, multi-channel, continuous-dynode electron multiplier (EM) offers increased longevity and stability, and can also be replaced by the user.

Automatic Peak Tuning

Efficient RF generation with dynamic RF resonance frequency tracking is used to provide increased mass range. It also enables automatic peak tuning using independent RF/DC control, while increasing scan speeds up to 130 AMU/s (260 AMU/s with 10 points per AMU).

New Hybrid Electrometer

A wider dynamic range hybrid electrometer works as a linear amplifier with low current ($< 1 \text{ nA}$) and as a log amplifier with higher current (up to 2 uA). At low or negative current values, the linear mode leads to improved baseline sensitivity.

This temperature-compensated, hybrid log electrometer detects ion current from 10^{-7} to 10^{-15} amps in a single scan, with better than 2 % precision. This huge dynamic range means you can make measurements of small and large gas concentrations simultaneously.

Built-in I/O

A rich set of input/output connections provide monitoring and control of the RGA, and also enable external process control. An external scan trigger, a configurable event based relay, GPIO, and an RTD input for temperature monitoring during scanning are included. An analog output provides a signal proportional to any scanned variable, including partial pressure.

Complete Programmability

Communication with computers is made via USB, Ethernet or RS-232 interfaces. Analog and histogram (bar) scans, leak detection, and probe parameters are all controlled and monitored through an extensive SCPI command set. This allows easy integration into existing programs.

RGASoft Windows Software

A brand new RGASoft Windows application is included. With a rich feature set and modern UI design, scan data is captured and displayed in real-time or scheduled for acquisition at a given time interval for long-term data logging. Multiple spectral data and individual measurements can be collected together in one sequence. Versatile docking windows and widgets give the user various ways to organize the display. Data can be scaled manually or automatically, in linear or log format on plots. Units are selectable among Torr, Bar, Pascal and Amp. Features include common gas labels, programmable audio and visual alarms, expandable library, composition analysis, and comprehensive on-line help.

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The software also allows complete RGA control with easy mass scale tuning, sensitivity calibration, ionizer setup, and electron multiplier gain adjustment. For further analysis, data files can be saved in CSV text format for easy transfer into spreadsheets. Graphic images can be saved in common formats (PNG, BMP, TIFF, JPG, SVG, PDF) or copied to the clipboard for importing directly into other programs.

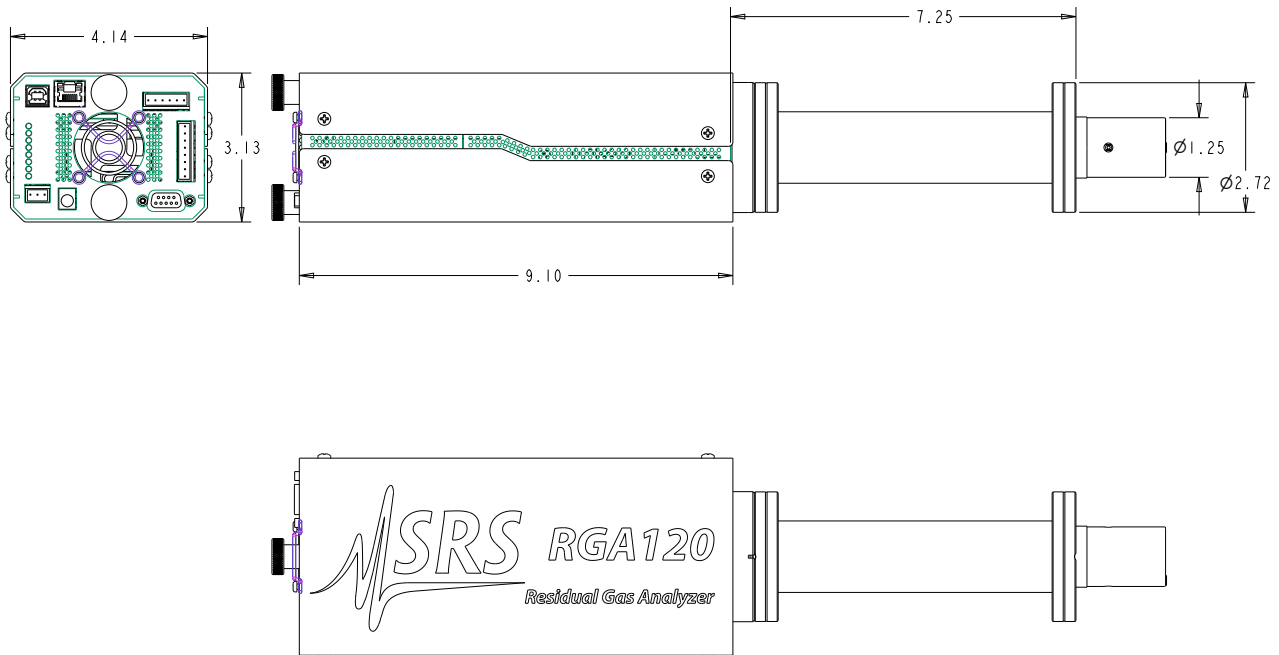
The software supports multiple head operation when more than one RGA is needed. Multiple RGAs can be controlled and run concurrently with multiple software instances. The number of RGAs is only limited by the system resources.

Performance and Value

The new RGA120 series is ideal for applications involving gas analysis, leak detection, and vacuum processing. We offer 120, 220 and 320 amu systems with supporting Windows software, and options that include an electron multiplier and a built-in power module for AC line operation. The RGA Windows software is downloadable from SRS website.



*RGA120 rear panel
(with optional AC power module)*



RGA120 series dimensional drawing (inches)

RGA120 Series Specifications

Operational

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|--|---|
| Mass range | |
| RGA120 | 1 to 120 amu |
| RGA220 | 1 to 220 amu |
| RGA320 | 1 to 320 amu |
| Mass filter type | Quadrupole |
| Detector type | Faraday cup (FC), standard Electron multiplier (EM), optional |
| Resolution (per AVS std. 2.3) | Better than 0.5 amu @ 10% peak height. Adjustable to constant peak width throughout the mass range. |
| Sensitivity (A/Torr) | 2×10^{-4} (FC), <200 (EM). User adjustable throughout high voltage range. Measured with N ₂ @ 28 amu with 1 amu full peak width, 10% height, 70 eV electron energy, 12 eV ion energy, and 1 mA electron emission current. |
| Minimum detectable partial pressure | 5×10^{-11} Torr (FC), 5×10^{-14} Torr (EM) Measured with N ₂ @ 28 amu with 1 amu full peak width, 10% height, 70 eV electron energy, 12 eV ion energy, and 1 mA electron emission current. |
| Operating range | 10 ⁻⁴ Torr to UHV (FC) 10 ⁻⁶ Torr to UHV (EM) |
| Operating temperature | 70 °C (max.) |
| Bakeout temperature | 300 °C (without ECU) |

Ionizer

| | |
|---------------------------|--|
| Design | Open ion source, cylindrical symmetry, electron impact ionization |
| Material | SS304 construction |
| Filament | Thoriated iridium (dual) with firmware protection. Built-in 1 to 8 W degas ramp-up. (Field replaceable) |
| Electron energy | 25 to 110 V, programmable |
| Ion energy | 4 to 16 V, programmable |
| Focus voltage | 0 to 110 V, programmable |
| Electron emission current | 0 to 4 mA, programmable |

Input/Output

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|---------------|--|
| Analog Output | Emission Current, RTD Temperature, Flange Temperature, Total Pressure, Mass Ion Current, Analog Scan Ion Current, or User Value |
| Range | Voltage 0 to 20 V Current 4 to 20 mA |
| Analog Input | User Value or Overpressure Indicator |
| Range | Voltage 0 to 10 V, Current 4 to 20 mA, 4 to 20 mA with Loop Power |

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|---------------|---|
| Event Relay | DPDT relay, For analog nput current or voltage limits, mass ion current limit, or communications idle timer. |
| GPIO | Digital I/O. For analog nput current or voltage limits, mass ion current limit, or communications idle timer. |
| RTD Input | Nominal Pt RTD 100 Ω |
| Trigger Input | 0 to 3.3 V |

General

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|-----------------------|---|
| Probe dimension | 8.75" from flange face to top of ionizer |
| Probe insertion | 2.0" |
| Probe mounting flange | 2.75" CF |
| Minimum tube I.D. | 1.375" |
| ECU dimensions | 3.1" × 4.1" × 9.1" (WHD). Easily separated for bakeout. |
| LED indicators | Power (ON/OFF), Fil. (ON/OFF), CEM (ON/OFF), Degas (ON/OFF), Comm. (Busy signal), Comm. Error, Pressure Error, and System Error. Overpressure, Burnt Filament |
| Warm-up time | Mass stability ±0.1 amu after 30 min. |
| Computer interface | USB, Ethernet, RS-232C |
| Software | Windows based application |
| Power requirement | 24 VDC @ 2.5 amps, Standard barrel connector, 5.5mm OD, 2 mm ID. Optional built-in AC power module 6 lbs. |
| Weight | 6 lbs. |
| Warranty | One year parts and labor on defects in materials and workmanship |

Ordering Information

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| RGA120 | 120 amu RGA | \$5450 |
| RGA220 | 220 amu RGA | \$6900 |
| RGA320 | 320 amu RGA | \$8450 |
| Option 01 | Electron multiplier | \$1895 |
| Option 02 | AC power module | \$350 |
| Option 03 | Ion counting output | \$250 |
| O100HJRW | Heater jacket | \$1500 |
| O100MAX | Max. insertion nipple (4.5" CF) | \$1200 |