



Residual Gas Analyzer

Quadrupole Mass Analyzer + Ion Gauge + Pirani Gauge



XT Series

The only gauge your vacuum system may need

The Latest Residual Gas Analyzer for Your Vacuum System RGA, Ion Gauge, and Pirani Gauge All On a Single Probe



Extorr has created the ultimate vacuum measurement probe. A single device, mounted on a 2 3/4 inch flange, contains a Pirani gauge, an ion gauge, and a quadrupole mass analyzer. As the vacuum system is rough pumped, the Pirani gauge starts to make measurements. When ready, the ion gauge turns on and finally when the pressure is low enough, the quadrupole is activated for partial pressure measurements. Extorr has done all of this employing a single, smart RS-232 controlled package. All Extorr models start at 1 amu. The XT100 goes to 100 amu.

The XT200 goes to 200 amu and the XT300 goes to 300 amu.

Compact Communications and Control Unit

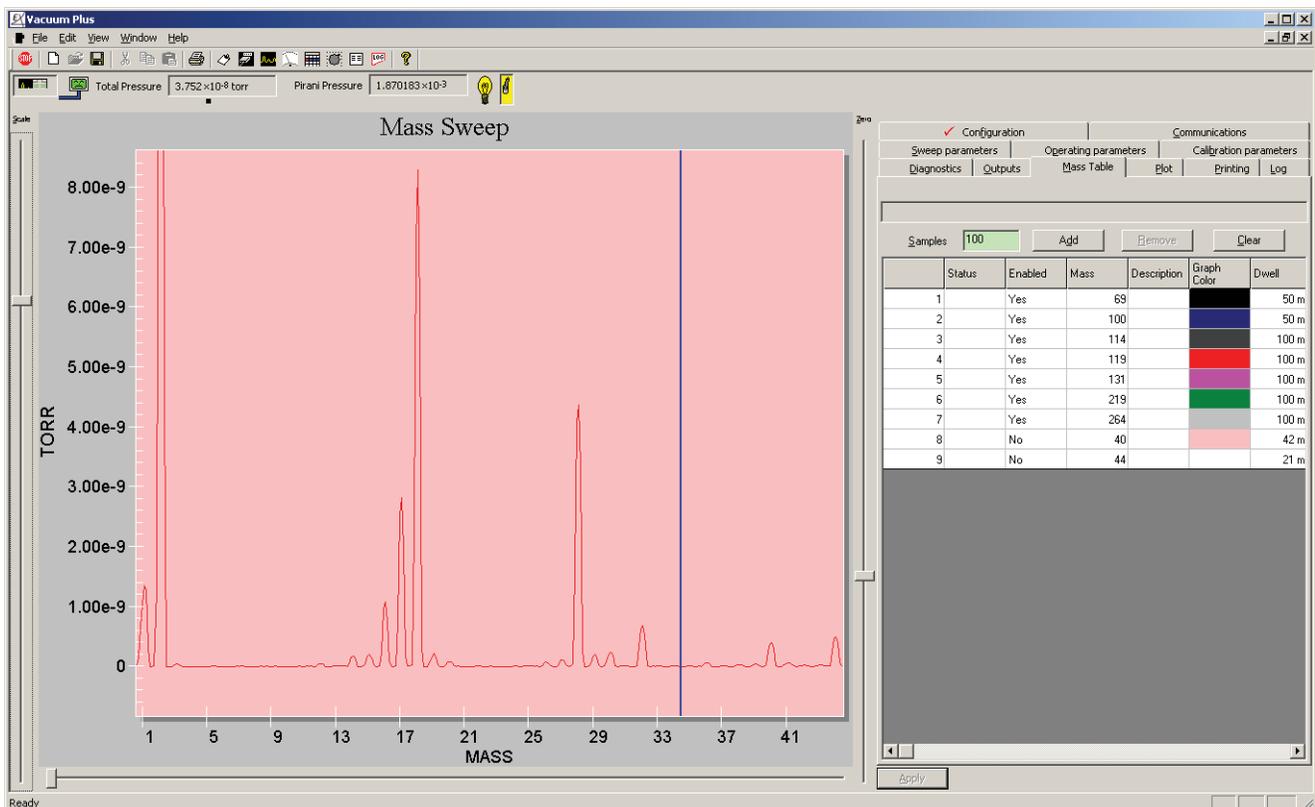
The densely packed CCU contains all the necessary electronics for probe control, measurement acquisition and computer communication in a volume of less than 100 cubic inches (1.6 l). The CCU is easily removed for high temperature bake-out.

Long-Life Dual Filaments and the Ion Source Kits

Dual thoria coated filaments are used for electron emission for both the quadrupole and ion gauge operation. The filaments are protected against stress from vacuum excursions by both the ion and the Pirani functions. Extorr will therefore outlast filaments in conventional RGA units. When a filament eventually does burn out, the second filament will allow for normal operation until filaments are replaced. Extorr offers an inexpensive dual filament assembly as well as ion gauge/ionizer. Both of these assemblies can be replaced in the field in minutes.

Ultra-Sensitive Detection

The XT units come standard with a Faraday cup detection system. When the multiplier option is chosen (XT(M) systems) both Faraday cup and multiplier detection is available. With the Faraday cup alone, the



partial pressure measurements from 10^{-4} and 10^{-11} torr may be made. With the multiplier option, this sensitivity is extended down to 5×10^{-14} torr. Extorr's novel ion current amplifier detects ion currents from 10^{-6} to 10^{-15} amps in a single scan. This huge dynamic range allows for very large and very small peaks to coexist on one scan.

Complete Programmability

Communications with a host computer is made via a fast (up to 115,200 baud) RS-232 interface. Operational modes offer analog scans, multiple and single ion (trend line) scans, Degas, and Calibration. Operational Parameters may be monitored and edited at all times. Any number of configurations may be saved for use as defaults or for special applications. All files, configuration and data, are saved in XML format for easy use in all modern programs and the World Wide Web.

Extorr VacuumPlus Windows Software

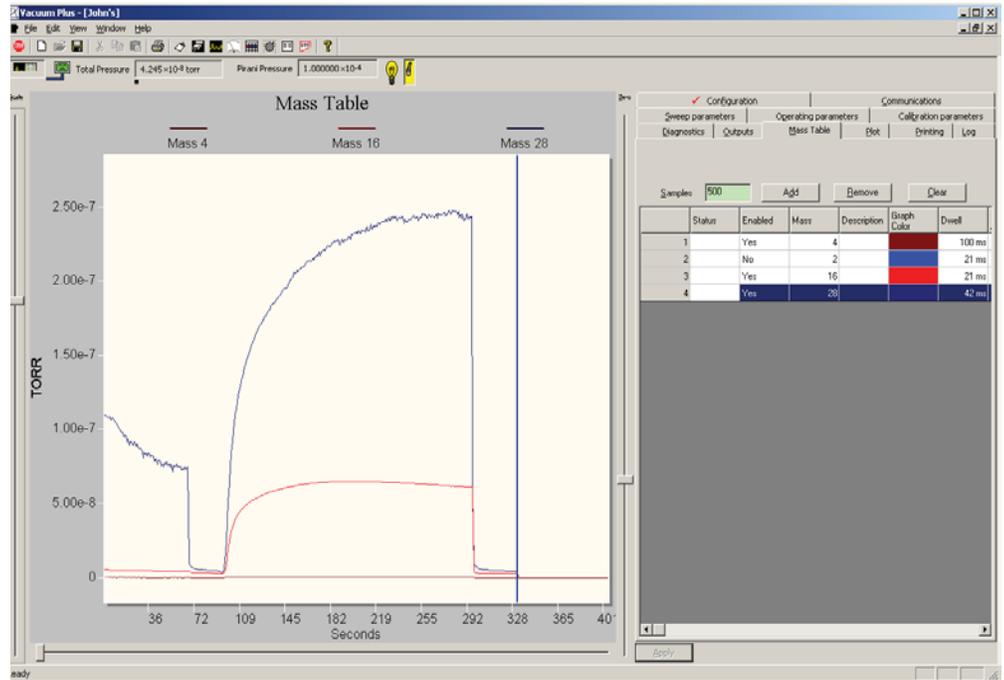
All Extorr systems come standard with the VacuumPlus real-time Windows® software package. An intuitive graphical user interface makes the total functionality of the Extorr system available to the user. Complete pump down may be monitored quickly and easily. The pressure may be expressed in a choice of units. The software also allows for complete RGA head control with easy mass scale tuning, sensitivity calibration, and ionizer setup. For further analysis, XML data files (text format) can be saved for easy transfer into spread- sheets or even word processors. Graphic images can be saved or copied into other Windows® programs. As new software packages are generated and new functionality is added, software updates will be made available on the Extorr web site at www.extorr.com.

Multiple Head Operation

The software supports multiple head operation. The software will run as many probes as there are com ports available on the host computer.

Performance and Value

The Extorr XT systems are ideal for Applications involving gas analysis, leak detection and vacuum processing. The Extorr is not only a great RGA it is also the only vacuum gauge that you will ever need for your system. This combination of flexibility and



competitive price makes the Extorr an outstanding vacuum measurement value.

Software

The Extorr XT series RGA systems are controlled by the VacuumPlus real-time software which operates in on a Windows 2000, or above operating system. The VacuumPlus Software is powerful, up-to-date, and intuitive to operate. VacuumPlus takes advantage of the extraordinary XT probe and electronics to give the user extraordinary power in a research, production or trouble-shooting environment.

User Control

VacuumPlus gives the user complete control over the many routine, as well as unique, features of the Extorr system. The graphical display may be individualized to suit the user's needs. Scales can be set to linear or log format, and data can be scaled using set points or slider bars. Color schemes, borders, labels and grid lines may be set to taste. Resolution, electron energy, ion energy, data point acquisition time may be easily set or returned to factory default. All settings may be saved in a configuration file so that any individualized software configuration may be re-established by merely selecting it from a menu.

Data I/O

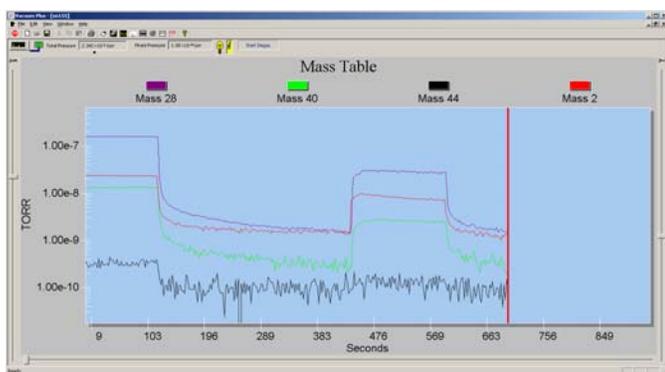
Data may be saved and transported out of the VacuumPlus program in a large number of ways, either as graphic files and/or text files. Graphic files may be exported as bmp, .jpg, .png or meta files. They may be taken to the windows clipboard, a program name of the user's choice, or the printer. Text data files may be placed into a .dat file under a name of the user's choosing. Data may be exported with the precision of choice, up to a 5 decimal point mantissa.

VacuumPlus also supports XML data structure exports both in a manual and streaming, real-time, mode.

Powerful Operational Modes

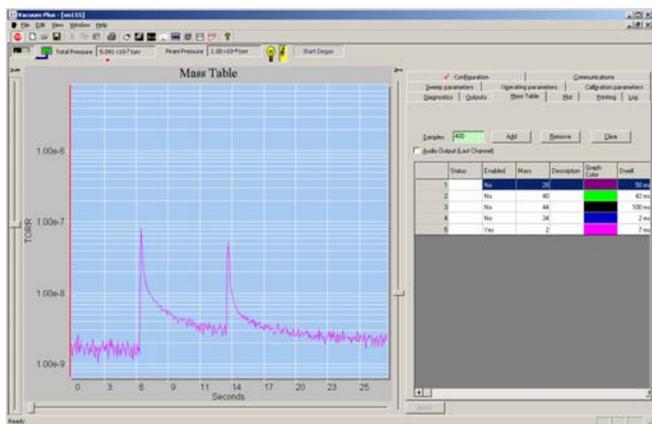
The fundamental mode of any RGA is the analog sweep mode. The system may be set to take mass spectral intensities from any start mass to any end mass within the mass range of the unit purchased. The user has complete control over the number of data points per amu and the integration time per data point. Choices of analog or log intensity outputs allow the user to zero in on the exactly what he wants to see. Scale slider-bars further increase the ability of the user to zoom in on his area of interest. Grid line options allow for more exacting numerical determinations of peak heights on graphs. Intensity outputs may be set to torr, pascal, or ion current.

Trend Mode



In the trend mode the peak intensities of the up to 10 ions of interest may be followed as a function of time. Peaks to be monitored are set in a Mass Table where amu, description, dwell time for acquisition, color of trace, high and low alarms may be set. The graph then displays the intensities of the activated mass table point intensities as a function of time. Again, the user has full control over how the data is displayed and exported.

Leak detect mode



In the leak detect mode, the last active entry into the mass table is considered to the leak detect gas. Helium is the most common gas to be used but any other gas may be used. It is just a matter of placing the

gas of choice into the table. The intensity trace of the leak detection peak is then shown on the graph. Leak detection may also be done by sound. An audio signal may be selected which changes the pitch on the computer speakers in proportion to the trace intensity.

Degas Mode

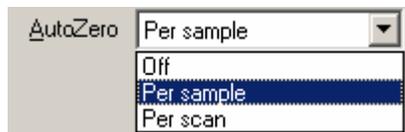


Depending on system use, there may be a time when ionizer performance is degraded by ionizer contamination. Performance will often be restored by heating the ionizer by means of electron bombardment. In this case, the electrons are emitted from filament at an increased voltage, thereby heating the surfaces of the ionizer. The VacuumPlus software has a timer to limit this degassing to 10 minutes per application.

Logical Graphical User Interface (GUI)

The Graphical User Interface (GUI) is designed for ease of use. Getting to where the user wishes to go is simplified by operational redundancy to suit the user's preferences. A graph is always available and the interactive operational and output dialog pages may be accessed by icons, drop down menus, tab selections or keystrokes. A vast graphic options package is made available by a right click on the graph area.

Auto Zero



For the smallest peaks detectable, the electrometer zero may not be exactly zero and may experience thermal drift during long measurement periods. The auto zero may be applied in these cases. The zeroing measurement is taken when the quadrupole is told to reject all ions. This measurement is then subtracted from the properly filtered ion current. This may be set to happen once per sweep, once per measurement, or not at all, depending on user selection.

Filament Indicator



Near the top center part of the GUI is an icon, in shape of a light bulb and switch, representing the filament used in the ion source and B/A gauge. The filament may be turned off manually with the switch and, when off, the bulb will be colored gray. In the default mode, the bulb follows the filament start-up sequence. This sequence first looks at the Pirani gauge output and if it reads pressures above 10^{-2} torr, the bulb will have a red color. When the Pirani reads below 10^{-2} torr, the bulb turns orange and the filament turns on at reduced emission. When the ion gauge reads below 10^{-4} torr,

the bulb turns yellow, the emission is turned on to its set value and quadrupole is activated.

Total Pressure Indicator

Total Pressure	4.624 × 10 ⁻⁷ torr	Pirani Pressure	1.00 × 10 ⁻⁴ torr
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The Extorr XT series of instruments are not only very good quadrupole systems but are also true vacuum probes since they include both Pirani gauge and a B/A type ion gauge. These readings are found near the top of the GUI just below the task bar.

Diagnostic Outputs

Configuration	Communications	Sweep parameters	Operating parameters
Plot	Printing	Log	
Calibration parameters	Diagnostics	Outputs	Mass Table
Degas current	2.4 ma	Filament Voltage	1.91 volts
Electronics Temperature	43.4 °C	Filament Resistance	1.03 Ohm
Power supply	24.12 volts	Sensor Temperature	36.7 °C
Source1 current	0.999895 ma	Reference (2.45 to 2.55)	2.470361 volts
Source2 current	0.999895 ma	Ground ref (+/- .02)	-0.011625 volts
RF Amp (0 to 20.0)	3.502290 volts	Focus1 FB (Focus1)	-29.69 volts
Pirani Temp (-.1 to -1.0)	-0.143893 volts	Repeller (2.0 - Elec_En)	-67.69 volts
Pirani Corr (-.1 to -1.0)	-0.144388 volts	Filament Power	51.6 %
Pirani Press (-.3 to -2.5)	-0.322577 volts	Filament DAC Coarse	3025
+FB (2.25 to 2.5)	2.400229 volts	Filament DAC Fine	2838
-FB (2.25 to 2.5)	2.400527 volts		

Although the Extorr is designed for reliable operation, it is always comforting to know that useful diagnostic information on system operation is available at the click of the mouse. The Outputs page is very extensive giving real-time measurements of filament voltage, emission current, electronics temperature and much more. This information will quickly tell you of a filament problem or a shorted probe.

Specifications

Mass range XT100(M) 1 to 100 amu
XT200(M) 1 to 200 amu
XT300(M) 1 to 300 amu

Mass filter type Quadrupole

Detector type Faraday cup

Resolution

Greater than 0.5 amu @ 10% peak height. Adjustable to Constant peak width throughout the mass range.

Sensitivity (A/Torr)

5x10⁻⁴ into Faraday cup. Measured with N2 @ 28 amu with 1 amu full peak width, 10% height, 70 eV electron energy, 6 eV ion energy and 2 mA electron emission

current. Multiplier operation adds a factor of about 1000.

Minimum detectable partial pressure

10⁻¹¹ torr Measured with N2 @ 28 amu with 1 amu full peak Width, 10% height, 70 eV electron energy, 6 eV ion energy, and 2 mA electron emission current. With multiplier this detection is to 5x10⁻¹⁴ torr.

Operating pressure

Atmosphere to UHV (ion gauge operation below 10⁻² torr and RGA operation below 10⁻⁴ torr)

Maximum operating temperature 50°C

Bakeout temperature 300°C (without CCU)

Total pressure measurement.

Available in Pirani, BA and RGA modes

Ionizer Design

Open ion source, electron impact ionization

Probe Materials

SS304, Kovar, Tungsten, Alumina, Iridium, Copper, Nickel

Filament

Dual thoria coated iridium with firmware protection. Built-in 1 to 30 W degas ramp-up. Field replaceable.

Electron energy 40 to 150 V, programmable

Ion energy 3 to 10 V, programmable

Electron emission current 0.2 to 5 mA, programmable

Probe dimension 6.7" from flange face to top of ionizer

CCU Extension 5.5" from flange face

Minimum tube I.D. 1.375"

Probe mounting flange 2.75" CF

CCU dimensions 3.3" x 4.8"x 7.5". Easily separated from the probe for bakeout.

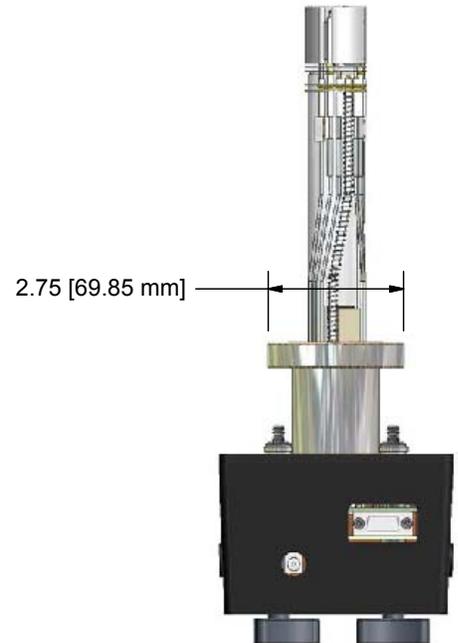
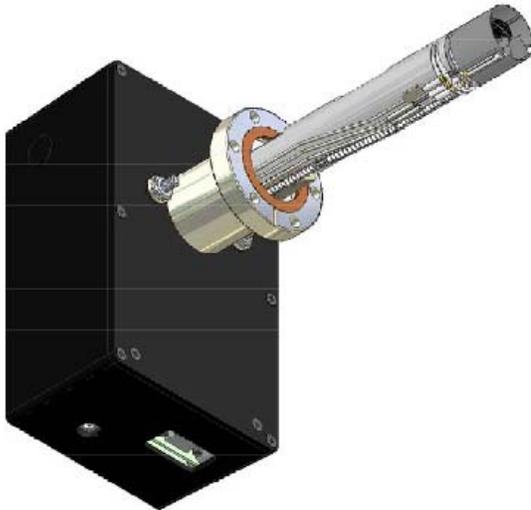
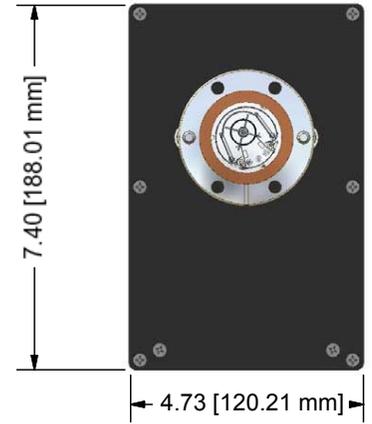
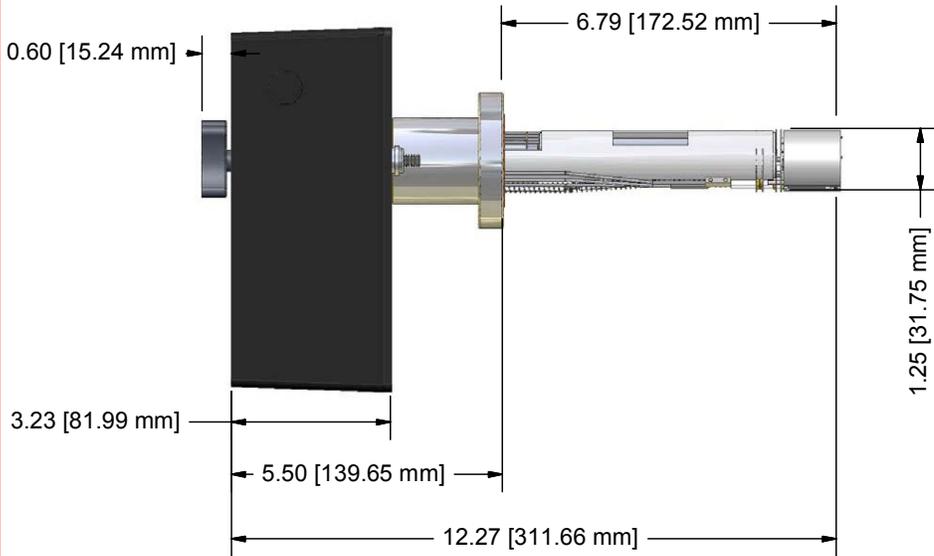
Warm-up time Mass stability ±0.1 amu after 30 minutes.

Computer interface RS-232C, up to 115,200 Baud
Software Windows® NT, 2000, XP based application. Requires Pentium or better.

Power requirement

24 VDC @ 2.5 Amps. Standard 120 VAC adapter supplied.

Weight 5 lbs.



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