InstruTech®, Inc.

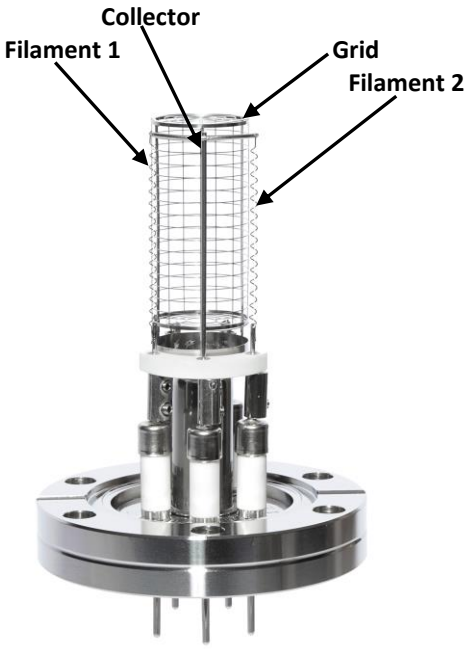
Series 600 Hot Cathode Bayard-Alpert Ionization Vacuum Gauges

- **BA601 UHV Nude: Electron Bombardment (EB) degas design 2 x 10^{-11} to 1 x 10^{-3} Torr Measurement Range**
- **BA602/BA603: Resistive degas (I^2R) design 4 x 10^{-10} to 1 x 10^{-3} Torr Measurement Range**
- **Wide range of emission currents (100 µA to 10 mA)**
- **All 3 models can be degassed using electron bombardment, BA602/BA603 can also be degassed using resistive degas (I^2R)**
- **Available with single/dual yttria coated iridium and dual tungsten filament cathode assemblies**

BA601 BA602 BA603

Description

The hot cathode Bayard-Alpert ionization vacuum gauge (IG) operates by ionizing the gas inside the gauge and then measuring the number of ions generated. The ions are then collected giving a measurement of the density or pressure of the gas inside the transducer.



The various electrodes used in the transducer design are a collector surrounded by a circular grid with one or two filaments outside the grid. An electric current is passed through the filament to cause the filament temperature to increase. As the filament temperature is increased, electrons are emitted from the filament surface. The bias voltage between the filament and the grid will accelerate the electrons toward the grid. Most electrons will pass through the grid volume and exit the other side of the grid and then be drawn back into the grid for another traversal through the grid volume. Eventually, most electrons will impact the grid surface generating a current between the filament and the grid which is referred to as the emission current.

The electronic controller is designed to maintain a constant, selectable emission current which is independent of pressure. While an electron is traversing inside the grid volume, it may collide with a gas molecule and ionize it which removes an electron. The ionized gas molecule, which now has a positive charge because it is missing an electron, will be attracted to the collector which is at ground potential. A current will be generated by the flow of ions to the collector which is known as the ion or collector current. The Controller's electrometer will measure the small ion current generated and a pressure, which is proportional to the ion current is calculated.

The InstruTech series 600 Bayard-Alpert ionization vacuum gauges are offered in three different configurations:
BA601 is a EB-degas UHV nude ionization vacuum gauge capable of pressure measurements as low as 2 x 10^{-11} Torr.
BA602 is a Resistive degas (I^2R) nude ionization vacuum gauge capable of pressure measurements as low as 4 x 10^{-10} Torr.
BA603 is a Resistive degas (I^2R) glass enclosed ionization vacuum gauge capable of pressure measurements as low as 4 x 10^{-10} Torr.

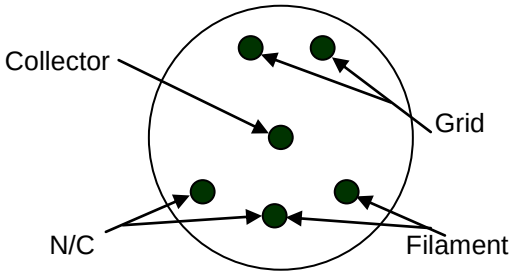
For general vacuum applications, yttria coated iridium filaments are offered for use with air and inert gases such as N_2, argon, etc. Tungsten filaments are available for use with gases that are not compatible with yttria coated iridium filaments. The BA600 series vacuum gauges can be operated using InstruTech's *FlexRax® 4000* multi-gauge vacuum gauge controller. They may also be operated using compatible vacuum gauge controllers from other manufacturers capable of operating such B-A gauges.

Specifications

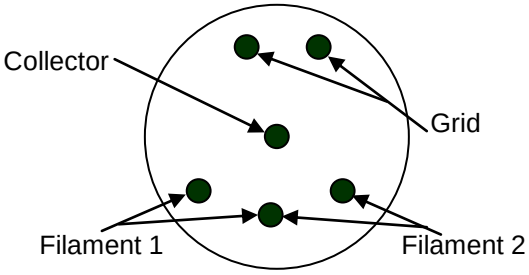
Data	**BA601**	**BA602**	**BA603**
			
measurement range	2 x 10^{-11} to 1 x 10^{-3} Torr 2.7 x 10^{-11} to 1.3 x 10^{-3} mbar 2.7 x 10^{-9} to 1.3 x 10^{-1} Pa	4 x 10^{-10} to 1 x 10^{-3} Torr 5.3 x 10^{-10} to 1.3 x 10^{-3} mbar 5.3 x 10^{-8} to 1.3 x 10^{-1} Pa	4 x 10^{-10} to 1 x 10^{-3} Torr 5.3 x 10^{-10} to 1.3 x 10^{-3} mbar 5.3 x 10^{-8} to 1.3 x 10^{-1} Pa
accuracy - N_2 (typical)	± 20%	± 20%	± 20%
X-ray limit	2 x 10^{-11} Torr	4 x 10^{-10} Torr	4 x 10^{-10} Torr
sensitivity - N_2	25 Torr $^{-1}$	10 Torr $^{-1}$	10 Torr $^{-1}$
degas - electron bombardment	40 W max	70 W nominal, 100 W max	100 W max
degas - resistance heated I^2R	N/A	6.3 to 7.5 Vac at 10 A	6.3 to 7.5 Vac at 10 A
filament current	2.5 to 3.5 A	4 to 6 A	4 to 6 A
filament voltage	3 to 5 Vdc	3 to 5 Vdc	3 to 5 Vdc
filament potential	+30 Vdc	+30 Vdc	+30 Vdc
grid potential	+180 Vdc	+180 Vdc	+180 Vdc
collector potential	0 V	0 V	0 V
bakeout temperature	450 °C	450 °C	450 °C
collector	tungsten, 0.005 in. diameter	tungsten, 0.010 in. diameter	tungsten, 0.010 in. diameter
filament material	dual yttria coated iridium or dual tungsten	single/dual hairpin type yttria coated iridium or dual tungsten	single hairpin type yttria coated iridium or dual tungsten
grid	photo etched closed end stainless steel cage grid	non-sag double helical, 0.025 in. tungsten grid	non-sag double helical, 0.025 in. tungsten grid
insulator	ceramic	ceramic	glass to metal
mounting orientation	any	any	any
glass envelope	N/A	N/A	2 1/4 in. dia x 5 in. long
length	4 1/8 in. overall, 3 in. insertion	4 1/8 in. overall, 3 in. insertion	6 in. overall
fitting	2 3/4 in. CF / NW35CF Conflat®	2 3/4 in. CF / NW35CF Conflat®	3/4 in. Kovar metal port, 1 in. Kovar metal port, 3/4 in. glass port, 1 in. glass port, NW25KF, NW40KF, 1 1/3 in. / NW16CF Mini-Conflat® 2 3/4 in. CF / NW35CF Conflat®

Controls & Connections

Nude B-A Gauge
Pin Pattern

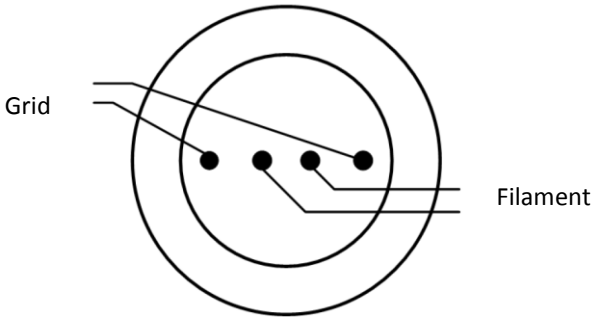


Base View
BA602
I^2R - single filament



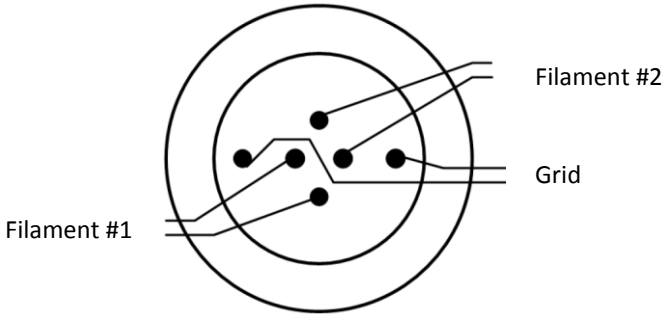
Base View
BA601/BA602
EB degas - dual filament
I^2R degas - dual filament

Glass B-A Gauge
Pin Pattern



Base View
BA603
single filament

Glass B-A Gauge
Pin Pattern



Base View
BA603
dual filament

Nude Gauge Filament Assemblies

BA601 dual yttria coated
Iridium filament

BA601 dual
tungsten filament

BA602 single hairpin
yttria coated iridium filament

BA602 dual hairpin
yttria coated iridium filament

BA602 dual tungsten filament

Ordering Information	*Part Number*

BA601 UHV Nude IG - Electron bombardment degas

Nude IG - UHV EB-degas, dual yttria coated iridium filament, 2 3/4 in. Conflat®	BA601DY
Nude IG - UHV EB-degas, dual tungsten filament, 2 3/4 in. Conflat®	BA601DT
Dual yttria coated Iridium replacement filament assembly	BA1DY
Dual tungsten replacement filament assembly	BA2DT

BA602 Nude IG - Resistive degas (I^2R)

Nude IG - I^2R, single hairpin yttria coated iridium filament, 2 3/4 in. Conflat®	BA602SY
Nude IG - I^2R, dual hairpin yttria coated iridium filament, 2 3/4 in. Conflat®	BA602DY
Nude IG - I^2R, dual tungsten filament, 2 3/4 in. Conflat®	BA602DT
Single yttria coated Iridium replacement filament assembly	BA2SY
Dual yttria coated Iridium replacement filament assembly	BA2DY
Dual tungsten replacement filament assembly	BA2DT

BA603 Glass IG - Resistive degas (I^2R) with single hairpin yttria coated iridium filament

Glass IG - I^2R, single hairpin yttria coated iridium filament, 3/4 in. Kovar metal inlet port	BA603SYA
Glass IG - I^2R, single hairpin yttria coated iridium filament, 1 in. Kovar metal inlet port	BA603SYT
Glass IG - I^2R, single hairpin yttria coated iridium filament, 3/4 in. glass inlet port	BA603SYG
Glass IG - I^2R, single hairpin yttria coated iridium filament, 1 in. glass inlet port	BA603SYH
Glass IG - I^2R, single hairpin yttria coated iridium filament, NW25KF	BA603SYC
Glass IG - I^2R, single hairpin yttria coated iridium filament, NW40KF	BA603SYD
Glass IG - I^2R, single hairpin yttria coated iridium filament, 1 1/3 in. Mini-CF/NW16CF Mini-Conflat®	BA603SYE
Glass IG - I^2R, single hairpin yttria coated iridium filament, 2 3/4 in. CF / NW35CF Conflat®	BA603SYF

BA603 Glass IG - Resistive degas (I^2R) with dual tungsten filaments

Glass IG - I^2R, dual tungsten filaments, 3/4 in. Kovar metal inlet port	BA603DTA
Glass IG - I^2R, dual tungsten filaments, 1 in. Kovar metal inlet port	BA603DTT
Glass IG - I^2R, dual tungsten filaments, 3/4 in. glass inlet port	BA603DTG
Glass IG - I^2R, dual tungsten filaments, 1 in. glass inlet port	BA603DTH
Glass IG - I^2R, dual tungsten filaments, NW25KF	BA603DTC
Glass IG - I^2R, dual tungsten filaments, NW40KF	BA603DTD
Glass IG - I^2R, dual tungsten filaments, 1 1/3 in. Mini-CF/NW16CF Mini-Conflat®	BA603DTE
Glass IG - I^2R, dual tungsten filaments, 2 3/4 in. CF / NW35CF Conflat®	BA603DTF

InstruTech®, Inc.
1475 S. Fordham Street
Longmont, CO 80503
USA

Phone +1-303-651-0551
Fax: +1-303-678-1754
E-mail info@instrutechinc.com
Web www.instrutechinc.com