



**Series 600 Hot Cathode Bayard-Alpert Ionization Vacuum Gauges**

- ◆ **BA600 Mini IG: Electron Bombardment (EB) degas design**  
1 x 10<sup>-9</sup> to 5 x 10<sup>-2</sup> Torr Measurement Range
- ◆ **BA601 UHV Nude: Electron Bombardment (EB) degas design**  
2 x 10<sup>-11</sup> to 1 x 10<sup>-3</sup> Torr Measurement Range
- ◆ **BA602/BA603: Resistive degas (I<sup>2</sup>R) design**  
4 x 10<sup>-10</sup> to 1 x 10<sup>-3</sup> Torr Measurement Range
- ◆ **Wide range of emission currents (100 µA to 10 mA)**
- ◆ **All 4 models can be degassed using electron bombardment, BA602/BA603 can also be degassed using resistive degas (I<sup>2</sup>R)**



**Description**

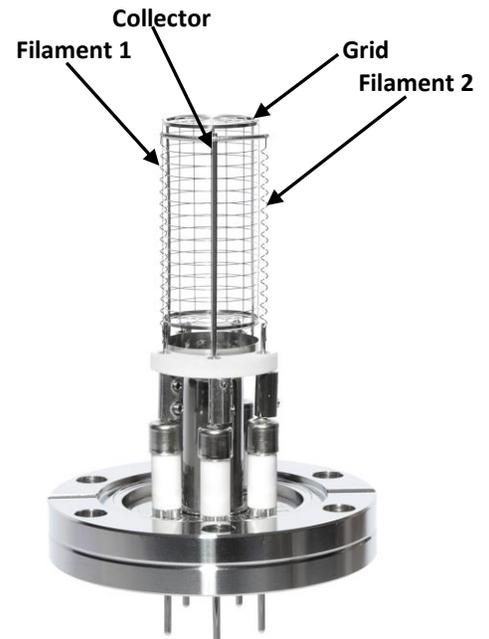
The hot cathode Bayard-Alpert ionization vacuum gauge (IG) operates by ionizing the gas inside the gauge and then measuring the number of ions generated. The ions are then collected giving a measurement of the density or pressure of the gas inside the transducer.

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 four different configurations: BA600 is a EB-degas metal enclosed miniature ionization vacuum gauge capable of pressure measurements as low as 1 x 10<sup>-9</sup> Torr. BA601 is a EB-degas UHV nude ionization vacuum gauge capable of pressure measurements as low as 2 x 10<sup>-11</sup> Torr. BA602 is a Resistive degas (I<sup>2</sup>R) nude ionization vacuum gauge capable of pressure measurements as low as 4 x 10<sup>-10</sup> Torr. BA603 is a Resistive degas (I<sup>2</sup>R) glass enclosed ionization vacuum gauge capable of pressure measurements as low as 4 x 10<sup>-10</sup> Torr.

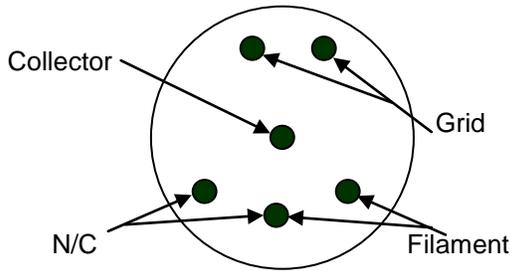
For general vacuum applications, yttria coated iridium filaments are offered for use with air and inert gases such as N<sub>2</sub>, argon, etc. Tungsten filaments are available for use with gases not compatible with yttria coated iridium filaments. The BA601/602/603 vacuum gauges can be operated using InstruTech's controllers or other manufacturer brands capable of operating such B-A gauges.



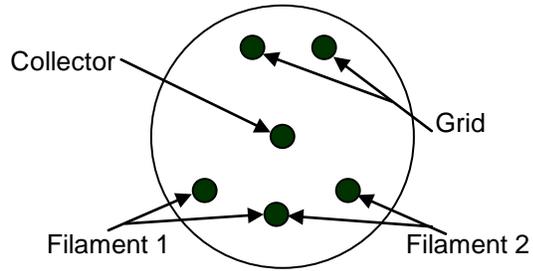
## Specifications

Data	BA600	BA601	BA602	BA603
				
measurement range	Torr mbar Pa			
	$1 \times 10^{-9}$ to $5 \times 10^{-2}$ $1.3 \times 10^{-9}$ to $6.7 \times 10^{-2}$ $1.3 \times 10^{-7}$ to 6.7	$2 \times 10^{-11}$ to $1 \times 10^{-3}$ $2.7 \times 10^{-11}$ to $1.3 \times 10^{-3}$ $2.7 \times 10^{-9}$ to $1.3 \times 10^{-1}$	$4 \times 10^{-10}$ to $1 \times 10^{-3}$ $5.3 \times 10^{-10}$ to $1.3 \times 10^{-3}$ $5.3 \times 10^{-8}$ to $1.3 \times 10^{-1}$	$4 \times 10^{-10}$ to $1 \times 10^{-3}$ $5.3 \times 10^{-10}$ to $1.3 \times 10^{-3}$ $5.3 \times 10^{-8}$ to $1.3 \times 10^{-1}$
accuracy - N <sub>2</sub> (typical)	± 15% over the range of $1 \times 10^{-8}$ to $5 \times 10^{-2}$ Torr	± 20%	± 20%	± 20%
repeatability - N <sub>2</sub> (typical)	± 5% in the range of $1 \times 10^{-8}$ to $5 \times 10^{-2}$ Torr	± 5%	± 5%	± 5%
X-ray limit	$5 \times 10^{-10}$ Torr	$2 \times 10^{-11}$ Torr	$4 \times 10^{-10}$ Torr	$4 \times 10^{-10}$ Torr
sensitivity - N <sub>2</sub>	10 Torr <sup>-1</sup> nominal	25 Torr <sup>-1</sup>	10 Torr <sup>-1</sup>	10 Torr <sup>-1</sup>
degas - electron bombardment	3 W max	40 W max	70 W nominal, 100 W max	100 W max
degas - resistance heated I <sup>2</sup> R	N/A	N/A	6.3 to 7.5 Vac at 10 A	6.3 to 7.5 Vac at 10 A
filament current	2.0 to 2.5 A	2.5 to 3.5 A	4 to 6 A	4 to 6 A
filament voltage	1.5 to 2 Vdc	3 to 5 Vdc	3 to 5 Vdc	3 to 5 Vdc
filament potential	+30 Vdc	+30 Vdc	+30 Vdc	+30 Vdc
grid potential	+180 Vdc	+180 Vdc	+180 Vdc	+180 Vdc
collector potential	0 V	0 V	0 V	0 V
bakeout temperature	200 °C	450 °C	450 °C	450 °C
collector	tungsten, 0.010 in. diameter	tungsten, 0.005 in. diameter	tungsten, 0.010 in. diameter	tungsten, 0.010 in. diameter
filament material	dual yttria coated iridium	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	etched Stainless Steel	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	glass	ceramic	ceramic	glass to metal
mounting orientation	any	any	any	any
glass envelope	N/A	N/A	N/A	2 1/4 in. dia x 5 in. long
length	2.70 in. to 3.80 in. overall depending on fitting	4 1/8 in. overall, 3 in. insertion	4 1/8 in. overall, 3 in. insertion	6 in. overall
fitting	NW16KF NW25KF NW40KF 1 1/3 in. (16CF) Mini-CF 2 3/4 in. (35CF) Conflat® 3/4 in. Tubular 1/2 in. Cajon® 8VCR®	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. (16CF) Mini-CF 2 3/4 in. (35CF) Conflat®
Compatible InstruTech Controller	B-RAX 3400	B-RAX 3400 FlexRax 4000	B-RAX 3300 FlexRax 4000	B-RAX 3300 FlexRax 4000

**Nude B-A Gauge  
Pin Pattern**

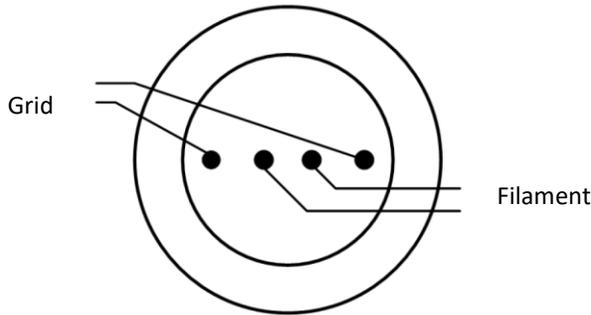


**Base View**  
BA602  
I<sup>2</sup>R - single filament



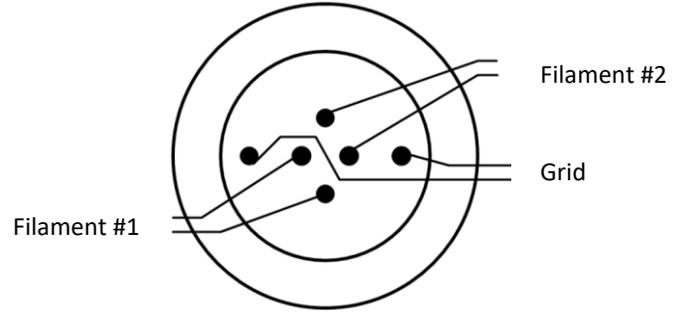
**Base View**  
BA601/BA602  
EB degas - dual filament  
I<sup>2</sup>R degas - dual filament

**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

**BA600 Mini IG - Electron bombardment degas**

3/4 in. Tube (3/4 in. O.D. O-ring compression)	BA600DYA
NW16KF	BA600DYB
NW25KF	BA600DYC
NW40KF	BA600DYD
1 1/3 in. Mini-CF/NW 16CF Mini- Conflat®	BA600DYE
2 3/4 in. CF / NW35CF Conflat®	BA600DYF
1/2 in. Cajon® 8VCR® female	BA600DYH

**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<sup>2</sup>R)**

Nude IG - I <sup>2</sup> R, single hairpin yttria coated iridium filament, 2 3/4 in. Conflat®	BA602SY
Nude IG - I <sup>2</sup> R, dual hairpin yttria coated iridium filament, 2 3/4 in. Conflat®	BA602DY
Nude IG - I <sup>2</sup> R, 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<sup>2</sup>R) with single hairpin yttria coated iridium filament**

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

**BA603 Glass IG - Resistive degas (I<sup>2</sup>R) with dual tungsten filaments**

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

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