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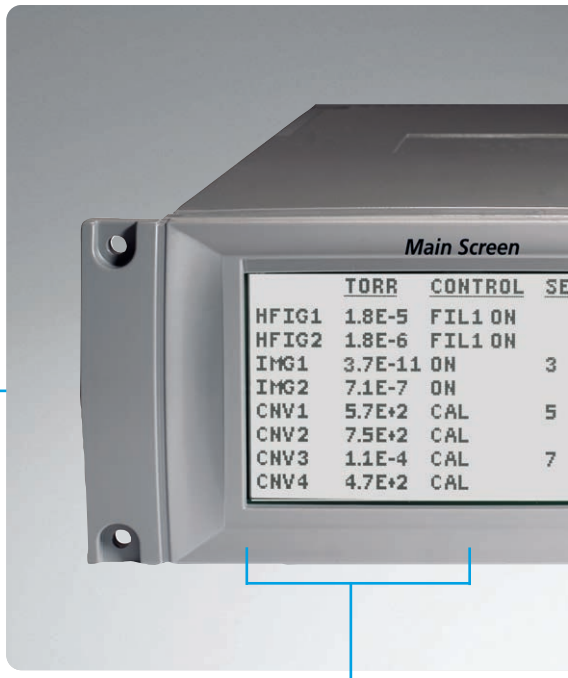
Visit our website - *Click HERE*

Vacuum Measurement for Science and Industry

Agilent vacuum gauges and controllers are reliable, accurate, and cost-effective tools for measuring and controlling
vacuum pressure in a wide range of applications.

- Agilent features pressure measurement technology designed for challenging industrial environments: simplicity, rugged design, plus ease of service to insure maximum productivity and uptime in your vacuum system or vacuum process.
- With over 50 years experience in science research, our superior accuracy and stability meets the most demanding scientific requirements, and Agilent can provide the ultimate in measurement precision through our STARRS calibration and support program.

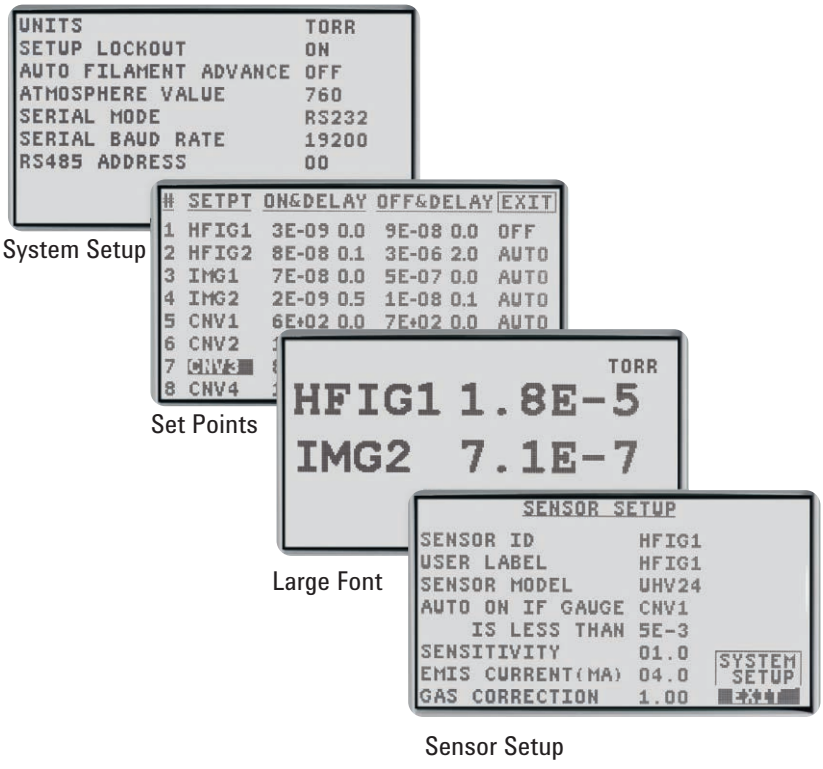
XGS-600 Gauge Controller



Intuitive screen functions

- Displays up to 8 gauges on one screen
- Customizable gauge labels

User Friendly Interface



System Setup

Set Points

Large Font

Sensor Setup

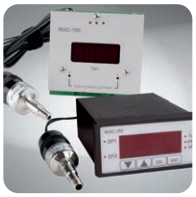
Intelligent Design & Functionality

- Simultaneous operation of all gauges – up to 12
- < 20 millisecond signal-to-set- point response time
- Displays up to 8 gauges at one time

- Standard features include:
  - 8 gauge set points
  - fully programmable RS-232/485 serial communications
  - E-beam degas for hot filament gauges
  - pressure unit selection: Torr, mbar, Pascal
  - universal voltage compatability
  - analog output



Easy key pad navigation



Rough Gauge Controllers

Reliable, cost-effective solutions for pressure measurement from 1 x 10^{-3} Torr to 760 Torr, these controllers come with the Agilent TC tube and cable and are pre-calibrated.

- Ready to install and operate.
- Two easily configured set points to facilitate critical operations.
- Large, bright LED display is easily read across a room or in dimly lit locations.



Active Gauge Controllers

These single channel controllers operate the FRG-, PVG-, PCG-, and CDG-series of Active Gauges. Both provide user selectable measurement units and adjustable set point control.

- Easy to set up.
- Automatically identify the gauge type when connected.
- Adjustable set point control enable critical process steps or operations.

Capacity, Flexibility & Expandability

Only 3 gauge cards operate all Agilent gauges:

- Add a gauge card when needed, simply and quickly
- Save the cost of additional controllers

Simultaneous operation of:

- Up to 4 hot filament gauges plus 4 convection gauges
- Up to 5 inverted magnetron gauges
- Up to 12 convection gauges



Agilent Gauge Selection Chart

Vacuum Range

ROUGH
atm
to 10^{-3}

HIGH
10^{-3}
to 10^{-9}

ULTRA HIGH
10^{-9}
to 10^{-12}

Transducers
Controller Required

ConvecTorr
Best overall accuracy and repeatability. Secure bayonet connector. p 12

536 ConvecTorr quality accuracy and repeatability
p 13

531 Most economical rough gauge
p 13

convection board

572 Glass; most popular general purpose HV gauge (hot filament). Dual filament. p 15

571 Glass; same as 563 without platinum coating
p 16

hot filament board

563 Best general purpose HV gauge (hot filament) for overall performance and reliability. p 17

MBA-100 One filament.
MBA-200 Two filament.
Break resistant HV gauge (hot filament) p 18

cold cathode board

IMG-100 Most durable HV gauge (cold cathode); fastest response
p 19

UHV-24 Most popular UHV gauge (hot filament)
UHV-24p UHV gauge – highest vacuum reading
p 21

IMG-300 Most durable, UHV gauge (cold cathode); fastest response
p 20

Vacuum Measurement

Rough Gauge Packages

RGC-100/RGC-150: Pre-calibrated rough gauges and controller packages

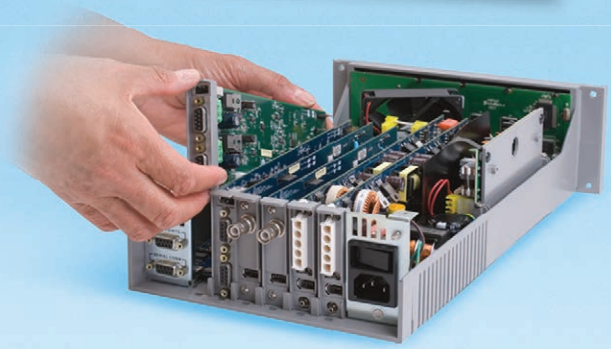






XGS-600
Multi-gauge Controller





Active Gauge Controllers

AGC-100/AGD-100: Low cost active gauge controllers automatically identify the connected gauge.



Active Gauges
No Controller Required

Vacuum Range

ROUGH atm to 10^{-3}

HIGH 10^{-3} to 10^{-9}

ULTRA HIGH 10^{-9} to 10^{-12}



CT-100 Robust, reliable; general rough vacuum use p 22



PVG-500 Compact, rugged; stainless steel sensor p 24



CDG-500 Full scale range options; push-button zeroing and setpoints p 26



PCG-750 Combo Pirani and CDG for accuracy and gas-type independence p 28





FRG-700 Combo Pirani and IMG – accuracy from ATM through HV p 30

FRG-720/730 Combo Pirani and B/A - widest vacuum measurement range p 32

Physics R&D, Accelerators

- **Synchrotron Light Sources and Beam Lines**
- **Particle Accelerator Rings**

Vacuum gauges are widely used in High Energy Physics, Fusion Technology and general UHV research. Synchrotron Light Sources, Particle Accelerator Rings, UHV Laboratory research, and Fusion reactors need extremely accurate, reliable and cost effective HV and UHV gauges. Agilent offers a full range of vacuum transducers that can be equipped with high function controllers to monitor and control HV and UVH environments. If desired, Agilent also offers "Active Gauges" equipped with on-board controllers that combine highly accurate and compact vacuum measurement and control in the smallest footprint.

Industrial Processes

- **Thin Film Deposition**
  - glass coating equipment (architectural glass, automotive glass, flat panel display substrates)
  - thin film solar cells production (photo-voltaic)
  - optical data media (Compact Discs, Digital Versatile Discs, Magneto Optical Discs)
- **Magnetic storage media (hard discs, read heads)**
- **Surface treatments (functional, decorative)**
- **Optical coating (ophthalmic, precision opto-electronics)**
- **Roll/web coating on films or foils**

In order to assure that a thin film process (PVD/sputtering) is reproducible it is necessary to measure parameters that relate to total gas pressure, which is a function of gas density and temperature, and the partial pressure of the individual gas species. These vacuum parameters should be measured precisely both during pump down to base pressure and during processing as processing often releases gas into the deposition environment.

In crowded chambers at higher pressures (>1mTorr), significant pressure differential can exist in the processing chamber. These pressure differentials can affect film properties such as residual stress, composition, electrical resistivity, etc. In sputter deposition systems, when establishing a plasma, such pressure differences can change the plasma density and thus the sputtering rate, thereby affecting the film composition deposition. In such circumstances several gauges may be used at different locations in the processing chamber to monitor the pressure differences.





Plasma vapour deposition (PVD). Worker adjusting the controls of a PVD machine which is being used to coat components (trays at lower centre and lower left) with a thin film metal alloy to provide a wear-resistant coating.

- **Device Processing**
  - TV and monitor picture tube manufacture
  - Evacuation and coating of lamps (motorway lighting, beamers)
  - X-Ray tubes & electron devices (CPI, etc)
  - Medical accelerator tubes (medical devices)
  - Lasers, night vision systems
  - Cryogenic processes and instrumentation
  - Infrared detectors (DRS)
- **General Industrial Processes**
  - Vacuum furnaces – Metallurgy

Vacuum Furnaces for Metal Treatment

Brazing, sintering or annealing metals requires an atmosphere free of oxygen. Therefore, such processes are carried out under partial vacuum using inert gas. The vacuum level must be monitored and kept constantly low during the process in order to avoid oxidation of the products. As a result, it is necessary to measure the pressure in the high vacuum furnace near the gas inlet as well as at the vacuum port with high accuracy. Agilent active convection gauges with wide measuring range can detect the pressure at the furnace gas inlet and vacuum port with excellent precision. They are then linked to the system PLC by their serial port with either RS-232 or 485 communication. Based on this, all system pressure levels can be monitored at the main control system. This allows easy monitoring of the system gradient inside the furnace.



Scanning electron microscopes, like the one shown here, can "see" details as small as one nanometre – one millionth of a metre!



An NRC researcher uses a liquid chromatography-mass spectrometry system to quantify toxins in shellfish samples.

Nanotechnologies & Semiconductor Manufacturing

- **Electron Microscopy (SEM, TEM)**
- **Focused Ion-beam Systems (FIB) and Surface Analysis**
- **Semiconductor manufacturing**

Modern focused-beam systems such as SEMs, TEMs and FIB's utilize columns that project electrons or ions onto microscopic samples for detailed analysis. End users analyze all types of substances from organic compounds to semiconductor wafers. A key requirement is high sample throughput in order to lower the cost of ownership of these instruments. Agilent offers a full range of high and ultra-high vacuum gauges designed especially for the demanding requirements of SEMs, TEMs and surface analysis systems. Vacuum gauges are also a key component in modern focused-beam systems because the process gas flow can cause significant fluctuations in chamber pressures demanding a wide range of control. Agilent offers a full range of application specific SEM vacuum gauges for easy system integration and flexibility, or gauge controllers for systems that do not have integrated control systems or require dedicated remote read-out.

For the majority of semiconductor manufacturing processes, vacuum system operation usually can be enhanced through good vacuum control to improve reliability, throughput, uptime, contamination control, and process control. For example, a vacuum pump-down or purge cycle often can be shortened without degrading the product, and the time saved can significantly increase throughput. Agilent's complete line of on-board, direct measurement gauges can be easily integrated into existing OEM system controllers through digital or analog control, assuring the ability to meet demanding rapid cycle applications, such as vacuum load locks, in which high gas-load cycling and high tolerable foreline pressures are critical to the success of the process.

Analytical Instrumentation

- **Mass Spectrometry**

Mass Spectrometry has become an important analytical tool in many industries including pharmaceuticals and life sciences. Thanks to advances in electronics, instrument designers can implement cost-effective, high-performance analytical power in a cost-effective, easy-to-use system. These developments require advanced vacuum systems that are characterized by multi-chamber, high throughput designs on the high quality instruments.

Mass Spectrometers must operate with high accuracy and reliability. Periodic offset adjustment under fine vacuum conditions guarantees that even slightest hints of contamination can be detected. The precise Pirani vacuum transducer controls whether the required vacuum level for zero adjustment is achieved. With its elastic helix filament and the rugged metal housing the transducer is especially durable.

Agilent XGS-600



The XGS-600 Vacuum Gauge Controller provides unprecedented capacity, performance and flexibility in a cost effective, standard half-rack package. A single controller can simultaneously operate up to four hot filament (or four cold cathode) gauges and four convection gauges, up to five cold cathode gauges, or up to twelve convection gauges. Expansion or re-configuration in the field is easy to do. Serial communications (RS-232 or RS-485), eight set points, and universal voltage compatibility are standard in all units. A programmable dot matrix LCD provides display flexibility, and simple screen organization and navigation makes the unit extremely easy to use. Drop down gauge selection automatically sets the emission current, sensitivity and overpressure. The screen displays up to eight gauges and pressures simultaneously, and permits the user to label each gauge. A large-font feature provides visibility from up to 20 feet.

Features	Benefits
• Powerful	• A single unit can simultaneously operate up to: – 4 BA and 4 convection gauges (or 4 IMG and 4 convection gauges) – 5 ion gauges (5 IMG gauges or 4 hot filament and 1 IMG) – 12 Convection gauges – 12 Agilent Active gauges • 8 set points • Standard Features in every unit: – Serial communication (RS-232 and RS-485), universal voltage, Degas
• Flexible	• Operates hot filament, inverted magnetron (cold cathode), convection gauges and all Agilent Active gauges • Can mix and match any gauges in a single unit • Can expand or reconfigure easily in the field • Optional card supports Profibus DP communications protocol
• Easy to Use	• Simple screen organization and navigation • Drop down gauge selection automatically sets the emission current, sensitivity and overpressure. • Displays up to 8 gauges simultaneously on one screen • Large font feature allows display of 2 gauges visible from 15-20 feet • Capability of programming your own 5 character gauge label • Set Point Screen: displays and adjusts set points for up to 8 gauges
• Fast	• < 20 milliseconds from signal to set point response
• Compact	• All in the impressively small half-rack package

XGS-600 Controller operates all Agilent gauges with only 3 gauge cards... convection, hot filament and cold cathode (inverted magnetron)



Laboratory

- Easy to use – can be operated without a manual; screens and menus are easy to follow
- Easy to order – only 3 different controller gauge cards/modules to choose from, everything else is standard
- Easy to adapt – only one gauge card is needed to operate any Agilent gauge of a given type
- Practical – the XGS-600 can be easily reconfigured – it just takes a few minutes to add or remove a gauge card – any Agilent gauge can be operated in one unit
- Convenient – view up to 8 gauges at one time or change the font to view 2 from 15 feet away – all programming is stored in flash memory so no battery backups are needed

Possible Configurations

Below are examples of ways to configure the XGS-600, but remember, you are not limited to these configurations. The flexibility of this unit allows you to setup the controller with the gauges that suit your needs.

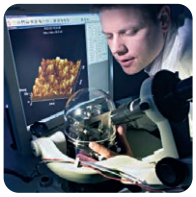




Accelerators, Synchrotrons and Other Large Facilities

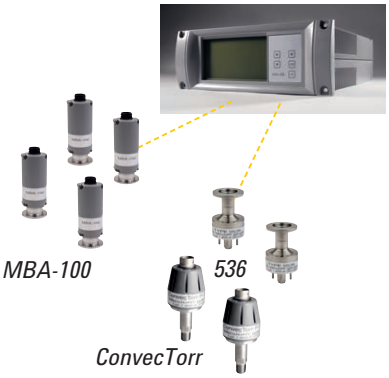
- Signal response – <20 milliseconds from signal to set point response – ideal for fast acting valves
- Capacity – operates up to 5 IMG gauges in one controller
- Compact – half-rack size saves up to 50-75% of rack space from other controller options
- Operability – fully programmable serial communications with individual gauge labeling; choice of RS-232/485
- Flexibility – combine UHV/HV metrology and IMG interlocking in one unit – ideal in beamline applications



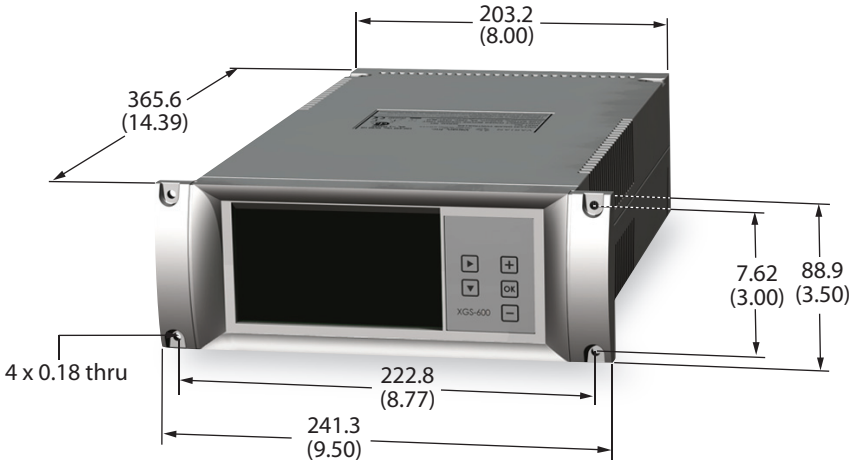


OEM Equipment

- Reliable – The XGS-600 controller has been qualified under demanding test standards; thermal management reduces component stress and provides consistency and durability in performance.
- Compact – half-rack size for up to 4 ion gauges and 4 convection gauges in one unit
- Flexibility – operates any Agilent gauge in one controller
- Performance – fully programmable serial communication is standard. Serial response time <2 milliseconds. Displays up to 8 gauges in one screen, gauge labeling. All programming stored in flash memory – no batteries needed.



Agilent XGS-600



Dimensions: millimeters (inches)

Technical Specifications

User interface	LCD monochrome dot matrix, 240 x 128, white LED backlight; 5 button keypad
Display capability	Up to eight simultaneous channels of pressure measurement, up to a 5 character user label for each; up to two channels in a large font; readable from 15 feet; display updates every 200 msec
Gauge capability	Up to 4 Hot Filament BA gauges including metal, glass, and nude UHV types using the HFIG** cards; up to 5 IMGs* using the IMG* cards; up to 12 rough gauges using the Dual Convection Gauge Cards; up to 12 Active Gauges using Dual Analog Input Cards
Measurement range	1 x 10^{-11} Torr to Atm dependent upon card and gauge type selected
Setpoints	Eight normally open setpoints (open collector), with independently programmable ON and OFF delays, manual override (see detail specs for ratings)
Fast setpoint response	20 msec max (with delay set to 0.0 secs)
Serial communications	RS232 and RS485 (fully programmable), Profibus DP (optional)
Analog outputs	1v/dec LOG, 0 – 10 V FS, on each card with 200 msec update rate
I/O control	HFIG** card: Remote gauge ON/OFF, Fil select, DeGAS ON/OFF Inputs, Status Output IMG* card: Remote gauge ON/OFF Input, Status Output Dual Convection Card: Remote CAL inputs, Status Outputs Dual Analog Input Card: Remote CAL Inputs, Status Output
Other	Auto-ON capability for installed ion gauges when at least one convection card is installed Sensitivity, gas correction, emission current (BA gauges only) inputs for ion gauges E-BEAM degas, with auto turn off for BA gauges Selectable air or argon calibration for rough gauges Adjustable atmosphere value for rough gauges Text error messages All data stored in FLASH non-volatile memory requiring no batteries
Power input / Temperature	Worldwide universal power input, 100-240 VAC, 2 A, 50/60 Hz, IEC inlet; 5-40 °C ambient
Regulatory approvals	CE certified and RoHS compliant, BV certified for USA and Canada

Ordering Information

Description	Part Number
XGS-600 Vacuum Controller, without cards	XGS600H0M0C0

Configure your XGS-600 Controller with cards – constructing your part number: XGS600HXMXCX

1 Refer to the Gauge Selection Chart to help determine the gauge you need

2 Choose the number of HFIG** cards you want; place after the "H"; will be 0 to 4

3 Choose the number of IMG* (cold cathode) cards you want; place after the "M"; will be 0 to 5

4 Choose the number of Dual Convection Gauge Cards; place after the "C"; each card runs two convection type gauges, will be 0 to 6

5. If ordering Active Gauge (Analog Input) Cards, add "Ax" to the end of the part number, with the number of cards desired (1 to 6). Each card operates two Active Gauges. XGS600HXMXCXAX

6. If ordering Profibus DP Option, add "P" XGS600HXMXCXAXP

Note:

- The XGS-600 has 6 gauge card slots permitting a total of 6 cards.
- Up to four slots can be used for HFIG** cards. If four of these are chosen, one IMG* card or up to two Dual Convection Gauge Cards may be selected also.
- Up to five slots can be used for IMG* cards. If five of these are chosen, no additional gauge cards may be selected.
- All six slots may be used for Dual Convection Gauge Cards or Analog Input Cards.
- HFIG, IMG, and Dual Convection Cards can be used with Dual Analog Input Cards.

Cables***		Part Number						
Cable Description	**Length**	**3** ft	**10** ft	**25** ft	**50** ft	**65** ft	**75** ft	**90** ft	**100** ft
XGS-600 I/O, with flying leads			R32493010	R32493025	R32493050	Special Order (SO)			
ConvecTorr Gauge, non-bakeable			L91223010	L91223025	L91223050	Special Order (SO)			L91223100
Thermocouple Gauge (531, 536)			L91313010	L91313025	L91313050	SO	L91313075	SO	L91313100
MBA-100 Gauge			R32483010	R32483025	R32483050	Special Order (SO)			
Glass BA Gauge standard, non-bakeable			R32443010	R32443025	R32443050	Not available over 50 feet – with 10 ft. standard cable, it is possible to order extension up to 250 ft.			
UHV-24/UHV-24p standard, non-bakeable			R32453010	R32453025	R32453050				
UHV-24/UHV-24p Teflon UHV, bakeable to 250 °C			R32463010	R32463025	R32463050				
Ion Gauge extension – all hot filament			N/A	N/A	N/A	R32473065	SO	R32473090	SO
IMG-100 Gauge, non-bakeable – may be used with IMG-300			R03113010	R03113025	R03113050	SO	R03113075	SO	R03113100
IMG-300 Gauge, bakeable			R03413010	R03413025	SO	R03413065	SO	SO	R03413100
CT-100 Analog Input Board		R35883003	R35883010	R35883025	R35883050				
FRG-700/PVG/PCG Analog Input Board		R35893003	R35893010	R35893025	R35893050				
CDG Analog Input Board		R35903003	R35903010	R35903025	R35903050				
FRG720/730 Analog Input Board		R35913003	R35913010	R35913025	R35913050				

**** Custom and longer lengths are available on request.*

Accessories

Description	Part Number
Hot Filament Ion Gauge (HFIG) card, field Install	R3075301
Inverted Magnetron Ion Gauge (IMG) Card, field install	R3080301
Dual Convection Gauge Card, field install	R3084301
Dual Analog Input Card, field install	R3487301
Profibus DP Interface Card, field install	R3494301
Tilt stand accessory	R3124301
Center rack mount kit	L6423301
Off-Center rack mount kit	L6422301
Dual Mount rack mount kit	L6426301

**IMG – Inverted Magnetron Gauge*
***HFIG – Hot Filament Ion Gauge*

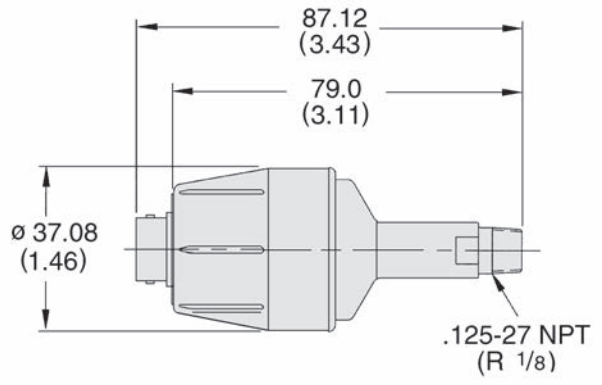
Power Cord Selection

One power cord included with each unit

Description	Part Number
Europe, 10 A / 220-230 VAC, 2.5 meter	656494220
Denmark, 10 A / 220-230 VAC, 2.5 meter	656494225
Switzerland, 10 A / 230 VAC, 2.5 meter	656494235
UK/Ireland, 13 A / 230 VAC, 2.5 meter	656494250
India, 10 A / 220-250 VAC, 2.5 meter	656494245
Israel, 10 A / 230 VAC, 2.5 meter	656494230
Japan, 12 A / 100 VAC, 2.3 meter	656494240
North America, 13 A / 125 VAC, 2.0 meter	656458203

Agilent ConvecTorr Gauge





Dimensions: millimeters (inches)

Agilent's unique ConvecTorr gauge is a stainless steel, convection-enhanced thermal gauge, which maintains the sensing element at a constant temperature for superior performance from 10^{-4} Torr to atmospheric pressure. The ConvecTorr features accurate pressure indication over the entire rough vacuum range with extremely fast response time (0.2 seconds) and superior readings at higher vacuum pressures due to enhanced thermal stability. ConvecTorr is ideally suited for a wide range of demanding vacuum applications where accurate pressure monitoring and rapid, repetitive pump downs from atmosphere are required, such as load lock applications or control of a two-stage pump down. And, with excellent sensitivity near atmospheric pressure, ConvecTorr can often save many hours of pumping time when monitoring initial pumping of large vacuum systems.

The ConvecTorr, unlike other convection-type gauges, is not affected by system vibration and features a locking bayonet connector. The ConvecTorr offers continuous and repeatable pressure indications between 0 °C and 50 °C. The ConvecTorr is offered with a variety of mounting options and is easily interfaced with Agilent's XGS-600 gauge controller for integration in a complex vacuum system, or for use as a stand-alone pressure measurement tool.

Technical Specifications

Measurement range
1 x 10^{-4} Torr to atmosphere, 1 x 10^{-1} to 133 Pascal

Measurement precision
+ 30 % within a pressure decade

Temperature limits
Operating: 0 °C to 50 °C; storage: –15 to 80 °C; bake out: 80 °C with cable disconnected

Pressure response time
Less than 0.2 seconds

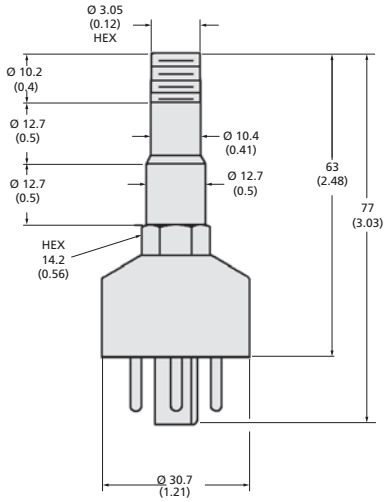
Materials
304 stainless steel with platinel filament and ABS housing

Ordering Information

Description	Part Number	Fitting	Shipping Weight kg (lbs.)
ConvecTorr Gauge Tube, platinel filament	L9090301	⅛ in. NPT	0.5 (1.0)
	L9090302	Mini-ConFlat	0.5 (1.0)
	L9090303	Cajon 4 VCR (female)	0.5 (1.0)
	L9090305	NW16 KF	0.5 (1.0)
	L9090306	NW25 KF	0.5 (1.0)

Agilent 531 Thermocouple and 536 Baffled Thermocouple





Dimensions: millimeters (inches))

The 531 Thermocouple Gauge Tube is the time-proven, low-cost solution for continuous aand accurate indication of rough vacuum pressure from 1 x 10^{-3} to 2.0 Torr (1 x 10^{-3} mbar to 2.7 mbar). Featuring rugged dependability and consistent operation unaffected by mounting orientation.

The 536 Thermocouple Gauge Tube is a welded 304 stainless steel version of the 531 with an additional baffle that greatly extends the sensor life when exposed to condensable gases in demanding applications. It provides a continuous and repeatable indication of pressures from 1 x 10^{-3} Torr to 2 Torr (1 x 10^{-3} mbar to 2.7 mbar). The thermocouple and heater are noble metal to minimize any possible affect of contaminants on gauge performance.

Both gauges are offered in a variety of mounting options and are easily interfaced with Agilent's XGS-600 gauge controller.

Technical Specifications

Measurement range

1 x 10^{-3} Torr to atmosphere, 1 x 10^{-1} to 133 Pascal

Temperature limits

Operating: 0 °C to 50 °C; Storage: –15 to 80 °C; bake out: 150 °C with cable disconnected

Pressure response time

Less than 3 seconds

Ordering Information

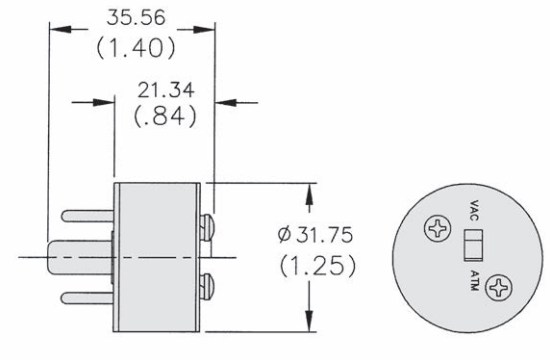
Description	Part Number	Fitting	Weight kg (lbs.)
531 Thermocouple Gauge Tube	F0472301	⅛ in. NPT	0.5 (1.0)
536 Thermocouple Gauge Tube			
Baffled TC tube type 304 stainless steel	L6141303	⅛ in. NPT	0.5 (1.0)
Platinel filament	L6141304	Mini-ConFlat	0.5 (1.0)
	L6141305	Cajon 4 VCR (female)	0.5 (1.0)
	L6141307	NW10 KF	0.5 (1.0)
	L6141308	NW16 KF	0.5 (1.0)
	L6141309	NW25 KF	0.5 (1.0)

Agilent Thermocouple and ConvecTorr Gauge Simulators – Rough Vacuum

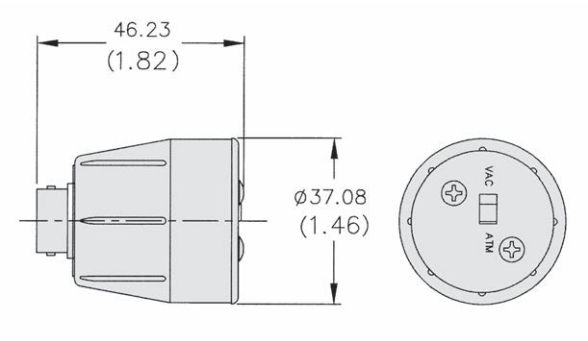


ConvecTorr and TC Gauge Simulators are designed to be convenient tools for verifying proper operation of the control unit. For those cases when the target gauge tube cannot be brought to proper pressure levels for true in-situ calibration, the simulator is used to ensure the control unit is calibrated to the average tube. The selectable "Vac" or "Atm" setting facilitates troubleshooting.

TC Gauge Simulator



ConvecTorr Simulator



Dimensions: millimeters (inches)

Technical Specifications

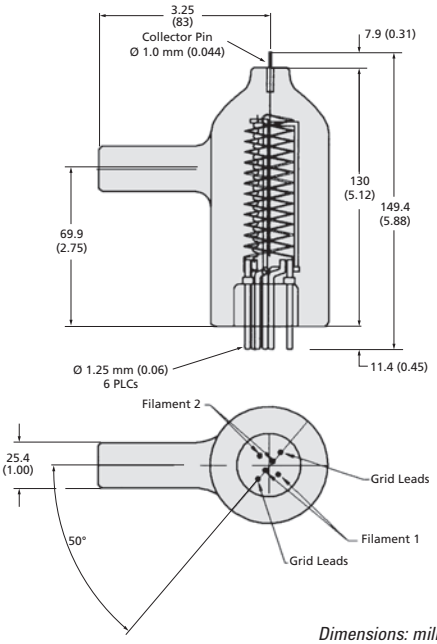
Reference pressure
Simulates high vacuum <10^{-4} Torr and atmosphere 760 Torr

Ordering Information

Description	**Part Number**	**Shipping Weight** kg (lbs.)
ConvecTorr Simulator	L7382301	0.5 (1.0)
TC Simulator	L7383301	0.5 (1.0)

Agilent 572 Dual Tungsten Filament Bayard-Alpert Type Standard Range Ionization Gauge Tube





Dimensions: millimeters (inches))

The 572 is a high-performance gauge with a wide range of linear response: from 2 x 10^{-10} to 10^{-3} Torr. It is designed to withstand long periods of outgassing, and to facilitate simple external switching of filaments without disturbing the vacuum system. The 572 is compatible with virtually all modern hot filament ionization gauge controllers.

Technical Specifications

Sensitivity

10 $(Torr)^{-1}$ $(mbar)^{-1}$ (typical)

Operating ratings

- 0 VDC to ground (collector)
- + 180 VDC to ground (grid)
- + 30 VDC to ground (filament)

X-Ray limit

2 x 10^{-10} Torr, (2.6 x 10^{-10} mbar)

Operating pressure

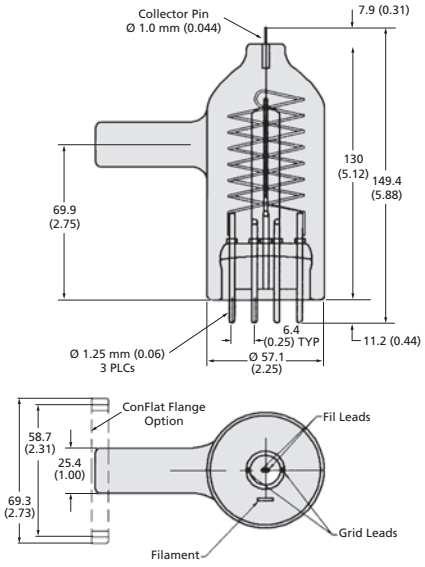
2 x 10^{-10} Torr to 1 x 10^{-3} Torr
(2.7 x 10^{-10} mbar to 1 x 10^{-3} mbar)

Ordering Information

Description	Part Number	Fitting	Shipping Weight kg (lbs.)
572 Dual-tungsten-filament ionization gauge tube	K7360301	1 in. Glass tubulation	0.5 (1.0)
	K7360302	1 in. Kovar tubulation	0.5 (1.0)
	K7360303	¾ in. Glass tubulation	0.5 (1.0)
	K7360304	¾ in. Kovar tubulation	0.5 (1.0)
	K7360305	NW25 KF	0.5 (1.0)
	K7360306	NW40 KF	0.5 (1.0)
	K7360307	2.75 in. CFF	0.5 (1.0)

Agilent 571 Series Bayard-Alpert Type Standard Range





Dimensions: millimeters (inches)

The 571 offers high performance and wide range (2 x 10^{-10} to 1 x 10^{-3} Torr). The gauge is rugged; it can withstand long periods of degassing or accidental exposure to atmosphere at operating temperature and still recover its original characteristics.

Technical Specifications

Sensitivity

6 $(Torr)^{-1}$ $(mbar)^{-1}$ (typical)

Operating ratings

- 0 VDC to ground (collector)
- 0 VDC (shield)
- + 180 VDC to ground (grid)
- + 30 VDC to ground
- 4.0 VAC nominal (filament)

X-Ray limit

4 x 10^{-10} Torr, (5.2 x 10^{-10} mbar)

Operating pressure

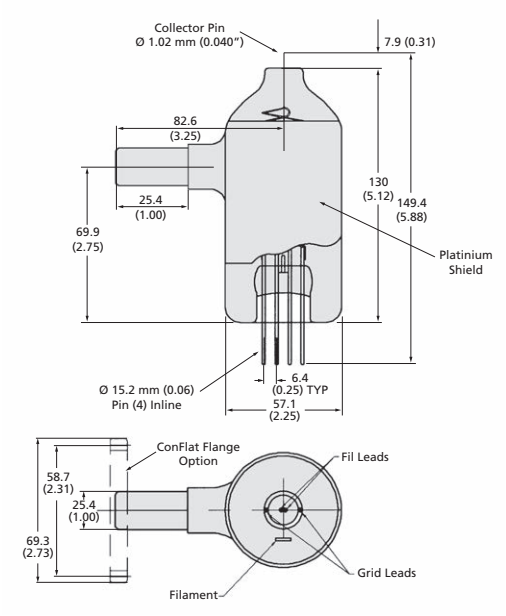
- 4 x 10^{-10} Torr to 5 x 10^{-2} Torr
  (5 x 10^{-10} mbar to 6.7 x 10^{-2} mbar) (Air)
- 4 x 10^{-10} Torr to 1 x 10^{-1} Torr
  (5 x 10^{-10} mbar to 1 x 10^{-1} mbar) (Argon)

Ordering Information

Description	Part Number	Fitting	Shipping Weight kg (lbs.)
571 Ionization tube with thoria-coated iridium filament	K2471301	1 in. Glass tubulation	0.5 (1.0)
	K2471302	1 in. Kovar tubulation	0.5 (1.0)
	K2471304	¾ in. Glass tubulation	0.5 (1.0)
	K2471305	¾ in. Kovar tubulation	0.5 (1.0)
	K2471306	NW25 KF	0.5 (1.0)
	K2471311	NW40 KF	1.0 (2.0)
	K2471303	2.75 in. CFF	1.0 (2.0)
571 reference ionization tube with thoria-coated iridium filament (sealed off at ≤5 x 10^{-6} Torr)	K2471307	–	0.5 (1.0)

Agilent 563 Series Bayard-Alpert Type Standard Range Ionization Gauge Tube





Dimensions: millimeters (inches))

The 563 is a rugged gauge with wide range of linear response: 2 x 10^{-10} to 1 x 10^{-3} Torr. The platinum coating inside the bulb shields the gauge elements from electrostatic charges at low pressures and drains off the static charges which can build up at high pressures. The 563 is available in a variety of tubulations.

Technical Specifications

Sensitivity

10 $(Torr)^{-1}$ $(mbar)^{-1}$ (typical)
Exact measurement available through Agilent STARRS program. Contact Agilent for details

Operating ratings

- 0 VDC (collector)
- + 180 VDC to ground (grid)
- + 30 VDC to ground
- 5 VAC nominal (filament)

X-Ray limit

2 x 10^{-10} Torr, (2.6 x 10^{-10} mbar)

Operating pressure

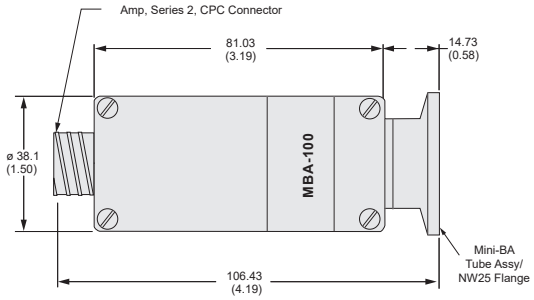
2 x 10^{-10} Torr to 1 x 10^{-3} Torr
(2.7 x 10^{-10} mbar to 1 x 10^{-3} mbar)

Ordering Information

Description	Part Number	Fitting	Shipping Weight kg (lbs.)
563 Ionization tube with thoria-coated iridium filament	K2466301	1 in. Glass tubulation	0.5 (1.0)
	K2466302	1 in. Kovar tubulation	0.5 (1.0)
	K2466304	¾ in. Glass tubulation	0.5 (1.0)
	K2466305	¾ in. Kovar tubulation	0.5 (1.0)
	K2466306	NW25 KF	0.5 (1.0)
	K2466311	NW40 KF	1.0 (2.0)
	K2466303	2.75 in. CFF	1.0 (2.0)
563 reference ionization tube with thoria-coated iridium filament (sealed off at ≤5 x 10^{-6} Torr)	K2466307	–	0.5 (1.0)

Agilent MBA-100/200 Bayard-Alpert Ion Gauges





Dimensions: millimeters (inches)

The MBA-100 is a compact, all-metal high-vacuum gauge for use where measurement precision and repeatability are equally important, for example laboratory vacuum systems, mass spectrometers, electron microscopes and scientific instruments. A heated filament provides a constant source of electrons for gas ionization, creating superior accuracy and stability, and a wide measurement range from 1 x 10^{-2} to 1 x 10^{-9} Torr. Agilent's unique etched-grid technology provides excellent gauge-to-gauge repeatability, and the small internal surface yields minimal outgassing to ensure accuracy and to protect your experimental process.

The MBA-100 is small and rugged to permit easy installation in a closely packed system. The locking electrical connector ensures safe, positive contact, while the plastic housing protects people and nearby equipment from heat. A metal housing provides excellent shielding from electromagnetic interference (EMI) for superior gauge stability. The thoria-coated iridium filament resists burn out, even in the event of an accidental exposure to air. A dual filament model is available for the most critical applications; the spare filament will permit continued pressure measurement until the next scheduled maintenance period. The MBA-100 is easily interfaced with Agilent's XGS-600 controller for use as a stand-alone pressure measurement tool, or for integration into an experimental or process system.

Technical Specifications

Pressure range
1 x 10^{-2} to 1 x 10^{-9} Torr, 1.3 Pa to 1.3 x 10^{-7} Pa

Sensitivity
15/Torr

Measurement precision
+ 25% within a pressure decade
+ 10 % with STARRS Calibration

Emission current
1 milliamp max

Temperature limits
Operation: 0 °C to 850 °C; Storage: –15 to 80 °C

Bake out temperature
100 °C maximum with cable disconnected

Filament power
~3 watts, varies with pressure

Degas
E-Beam, 600 VDC @ 10 ma maximum

Materials
304 SST housing, flange & grid, thoria- iridium filament, tungsten collector

Connector
Series 2 Circular Plastic Connector, size 11-9 (glass filled nylon)

NOTE *For vacuum pressure applications < 10^{-8} Torr, a Conflat flange (CFF) is recommended.*

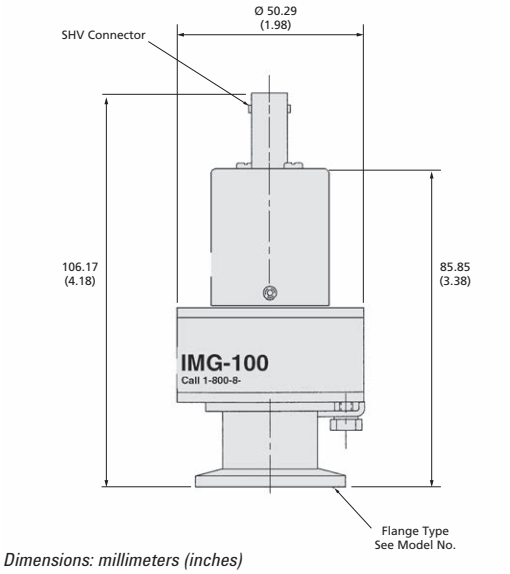
Ordering Information

NOTE *For information on a gauge controller and cables, please refer to the XGS-600 Controller section.*

Description	Part Number	Fitting	Shipping Weight kg (lbs.)
MBA-100 Ionization Gauge, Single Iridium Filament	R1170301	NW25 KF	1.0 (2.0)
MBA-100 Ionization Gauge, Single Iridium Filament	R1170302	NW40 KF	1.0 (2.0)
MBA-100 Ionization Gauge, Single Iridium Filament	R1170303	2.75 CFF	1.0 (2.0)
MBA-200T Ionization Gauge, Dual Tungsten Filaments	R1170121	NW25 KF	1.0 (2.0)
MBA-200T Ionization Gauge, Dual Tungsten Filaments	R1170122	NW40 KF	1.0 (2.0)
MBA-200T Ionization Gauge, Dual Tungsten Filaments	R1170123	2.75 CFF	1.0 (2.0)
MBA-200T Ionization Gauge, Dual Tungsten Filaments	R1170321	NW25 KF	1.0 (2.0)
MBA-200T Ionization Gauge, Dual Tungsten Filaments	R1170322	NW40 KF	1.0 (2.0)
MBA-200T Ionization Gauge, Dual Tungsten Filaments	R1170323	2.75 CFF	1.0 (2.0)

Agilent IMG-100 Inverted Magnetron Gauge





Dimensions: millimeters (inches)

The IMG-100 is a rugged and accurate high vacuum gauge featuring a wide measurement range, fast starting time, good accuracy and superior repeatability in challenging environments. The IMG-100 is ideal for use in industrial applications such as metal deposition, glass coaters, vacuum furnaces, degassing ovens, and electron-beam welders.

The simple design requires no heated filament, so the IMG-100 has an excellent lifetime, is easily serviced, and is tolerant of sudden or frequent exposure to atmosphere. Further, there is less risk of heat from the gauge interfering with a critical experiment or process. The compact size allows flexible installation in any orientation, while the locking SHV high-voltage connector ensures safety and positive electrical contact. A precisely designed magnetic field constrains ionized gas molecules for accurate pressure measurement, so emission of stray electrons and photons is minimized.

The IMG-100 is easily interfaced with Agilent's XGS-600 gauge controller for integration into a variety of vacuum systems, or for use as a stand-alone pressure measurement tool.

Technical Specifications

Measurement range

1 x 10^{-3} Torr to 5 x 10^{-9} Torr, 1 x 10^{-1} Torr to 7 x 10^{-7} Pascal

Measurement precision

+ xx % within a pressure decade standard, + xx % with STARRS Calibration

Temperature limits

Operating: 0 °C to 80 °C; storage: –15 to 80 °C

Bake out temperature with Conflat flange

150 °C maximum with Cable Disconnected

Ignition response (starting time)

T < 5 seconds at pressures < 1 x 10^{-6} Torr

Materials exposed to vacuum

300 series stainless steel, nickel, glass (feedthrough)

Operating voltage

3 kilovolts

Sensitivity

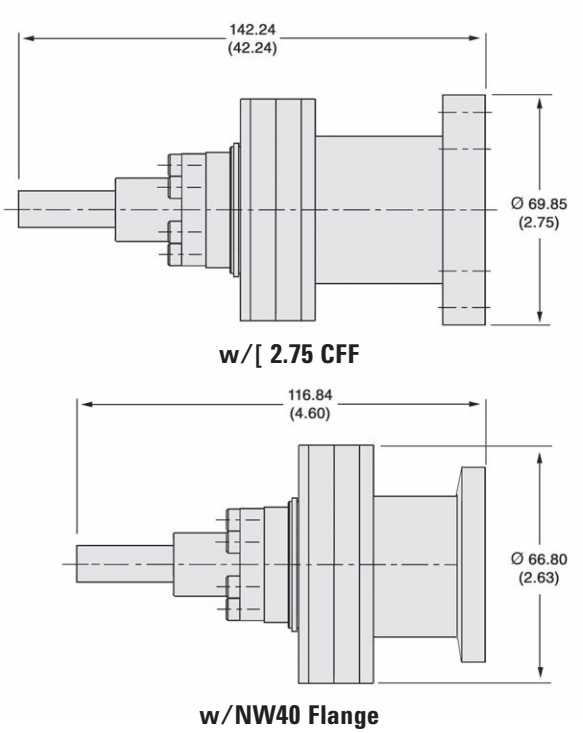
2.7 A / Torr + 20% at 5 x 10^{-6} Torr

Ordering Information

Description	Part Number	Shipping Weight kg (lbs.)
IMG-100 NW25 KF	R0310301	1.0 (2.0)
IMG-100 NW40 KF	R0310302	1.0 (2.0)
IMG-100 2.75 in. CFF	R0310303	1.0 (2.0)
IMG-100 Maintenance Kit	R0339301	0.5 (1.0)

Agilent IMG-300 UHV Inverted Magretron Gauge





Dimensions: millimeters (inches)

The IMG-300 inverted magnetron gauge combines excellent ultra-high vacuum measurement capability with fast pressure response. This sensor is optimized for UHV applications such as particle accelerators, synchrotron light beam lines and energy research applications, where stable UHV pressure measurement and fast pressure response are equally critical. Inverted magnetron gauges have no x-ray limit, so the ability to read extremely low pressure is limited only by the number of gas molecules present.

The magnetic design provides superior sensitivity at UHV pressures and ensures starting within 30 seconds at 1 x 10^{-10} Torr (millibar). With no hot filament, there is minimal outgassing from within the gauge that would degrade absolute accuracy of pressure response, and there is no electron or photon emission to disrupt an experimental process.

The all-metal gauge design is radiation-resistant and bakeable to 250 °C during operation, while the locking SHV high-voltage connector ensures safety and positive electrical contact. Radiation-resistant, bakeable cables are also available.

The IMG-300 is easily interfaced with Agilent's XGS-600 gauge controller for integration into a variety of vacuum systems, or for use as a stand-alone pressure measurement tool.

Technical Specifications

Measurement range
1 x 10^{-3} Torr to 1 x 10^{-11} Torr, 1 x 10^{-1} Torr to 1 x 10^{-9} Pascal
Measurement precision
+ 50 % within a pressure decade standard, + 20 % with STARRS Calibration
Temperature limits
Operating: 0 °C to 250 °C; storage: –15 to 80 °C
Bake out temperature
250 °C maximum with cable and magnet attached

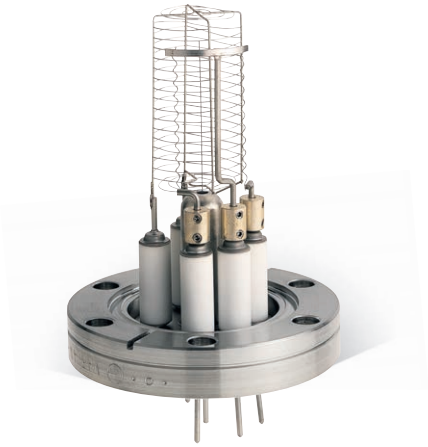
Pressure response time
< 50 milliseconds @ UHV pressures
Ignition response (starting time)
< 30 seconds @ 1 x 10^{-10} Torr
Operating voltage
3 kilovolts
Materials exposed to eacuum
Stainless steel, nickel, glass, nickel alloy 52
Sensitivity
2 A / Torr + 20% at 5 x 10^{-6} Torr

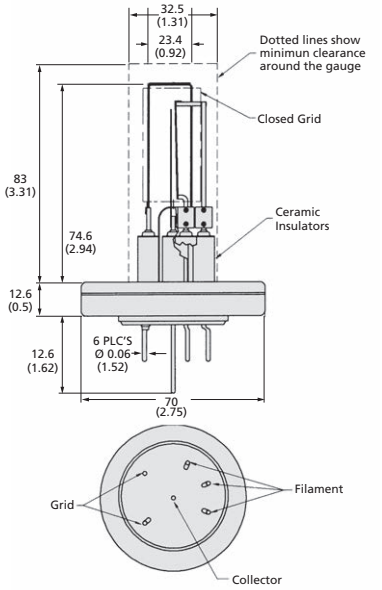
Ordering Information

NOTE *For information on compatible gauge controllers and cabling, please refer to Multi-Gauge sections of catalog.*

Description	**Part Number**	**Fitting**	**Shipping Weight** kg (lbs.)
IMG-300	R0343301	2.75 inch CFF	1.0 (2.0)
IMG-300 Maintenance Kit	R0040301		

Agilent UHV-24 and UHV-24p Bayard-Alpert Ion Gauge





Dimensions: millimeters (inches)

The UHV-24 is a Bayard-Alpert ion gauge using Agilent's etched-grid structure to provide a broad operating pressure range with ionization effectiveness (sensitivity) at least 2 times that of other ionization gauges. The UHV-24 gauges excel in applications where superior measurement accuracy and repeatability of measurement are equally critical. The heated filament provides a constant source of electrons for ionization of gas molecules resulting in accurate and stable results. The precision collector limits X-ray current to a pressure equivalent of approximately 5 x 10^{-12} Torr (6.7 x 10^{-12} mbar).

The UHV-24P, an extended range version of the UHV-24, measures pressure from 5 x 10^{-12} Torr to 1 x 10^{-3} Torr (6.7 x 10^{-12} mbar to 1 x 10^{-3} mbar). The UHV-24 and 24P feature a 2-3/4-inch ConFlat flange with long-life thoria-coated iridium or tungsten filaments that are easily replaceable in the field.

The UHV-24 and 24P are easily interfaced with Agilent's XGS-600 gauge controller for integration into a variety of vacuum systems, or for use as a stand-alone pressure measurement tool.

Technical Specifications

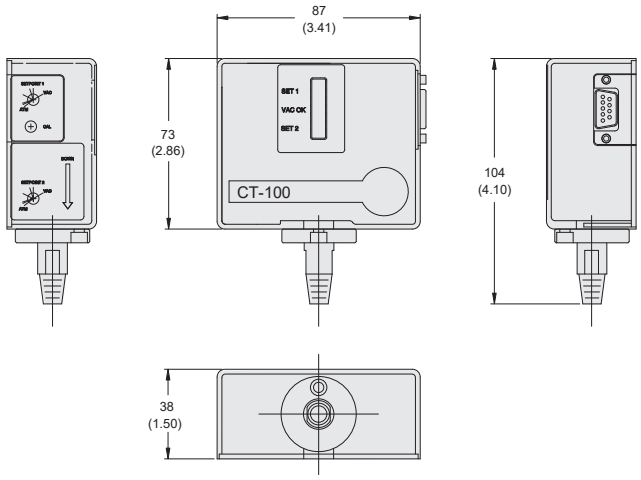
	UHV-24	UHV-24p
Pressure range	2 x 10^{-11} to 1 x 10^{-3} Torr	5 x 10^{-12} to 1 x 10^{-3} Torr
	2 x 10^{-11} to 1 x 10^{-3} mbar	6.7 x 10^{-12} to 1 x 10^{-3} mbar
Sensitivity	25 $Torr^{-1}$	20 $Torr^{-1}$
X-Ray limit	2 x10^{-11} Torr	5 x 10^{-12} Torr (6.7 x 10^{-12})
Measurement precision	+ 20% of full scale within a pressure decade	
Emission current	4 milliamps default (10 A to 9.99 mA)	
Bake temperature	450 °C with cable connected	
Temperature limits	Operation 0 °C to 250 °C; storage –15 to 80 °C	
Degas	Electron bombardment 400 volts @ 65 mA	
Materials	304 ST, ceramic, Kovar, iridium or tungsten	

Ordering Information

Description	Part Number	Fitting	Shipping Weight kg (lbs.)
UHV-24, dual tungsten filaments	9715008	2.75 in. CFF	2.0 (4.0)
UHV-24, dual thoria-iridium filaments	9715007	2.75 in. CFF	2.0 (4.0)
UHV-24P Extended Range,dual tungsten filaments	9715014	2.75 in. CFF	2.0 (4.0)
UHV-24P Extended Range, dual thoria-iridium filaments	9715015	2.75 in. CFF	2.0 (4.0)
Filament replacement kit (thoria-iridium)	9710028		0.5 (1.0)
Filament replacement kit (tungsten filament)	9710018		0.5 (1.0)

Agilent CT-100 Active Rough Vacuum Gauge





Dimensions: millimeters (inches)

The Agilent CT-100 active rough vacuum gauge delivers Pirani gauge performance, at lower cost, in a simple, durable design. Rapid Response Pirani-like response time of 0.2 seconds makes the CT-100 ideal for high productivity applications where process steps are critically time-dependent. Rapid response time enables fast-acting valves to protect turbo pumps from sudden inrush of gas.

Two user-defined set points per gauge allow the triggering of multiple process steps, alarms, or other pressure-related conditions. Selectable pressure range offers accurate and repeatable readings precisely where it is most critical to the user.

CT-100 operates over the full rough pressure spectrum (1×10^{-4} Torr up to 100 Torr; 1.33×10^{-4} to 133 mbar; 1.33×10^{-2} Pa to 1.33×10^{-4} Pa), up to sensitivity to Atmosphere.

The long-life sensing element is designed three times thicker than a typical gauge, which minimizes sensitivity to process vibration, shock, and all condensables found in vacuum.

The robust sensing element results in longer life and higher repeatability making the CT-100 a more economical choice than traditional Pirani gauges. Single point calibration feature maintains gauge accuracy over time, unlike other gauges where more frequent replacement is required.

Features

- Selectable pressure range
- 0.2 second response time
- Two setpoints per gauge
- Thick sensing element
- Single point calibration offset
- Status LEDs

Benefits

- Provides accurate and repeatable readings
- Improves productivity and performance
- Enables cost and space savings
- Durable and reliable design
- Maintains gauge accuracy over time
- Quick visual indicator of vacuum status

Technical Specifications

Pressure range N_2/Air	Factory setting (1.000 V @ ≤ 1 x 10^{-5} Torr): 1 x 10^{-4} to 100 Torr, sensitive to ATM (1.33 x 10^{-4} to 133 mbar, sensitive to ATM) (1.33 x 10^{-2} to 1.33 x 10^{-4} Pa, sensitive to ATM) Optional User Setting (8.255 V @ ATM): 20 mTorr to ATM (2.6 x 10^{-2} to 1000 mbar) (2.6 to 10^{-5} Pa)
Response time	0.2 second
Relay response time	<1 msec
Setpoint adjustment range	Greater than gauge pressure range
Operating temperature	15 °C to 50 °C, 90% relative humidity non-condensing
Storage temperature	–15 °C to 85 °C
Mounting orientation	Vacuum port pointing down for best results above 1 Torr (1.33 mbar, 133 Pa)
Weight with NPT Fitting	113 grams (¼ lb)

Interface	
Two setpoints	Two user defined pressure setpoints for process steps, alarms, high vacuum gauge trigger, or other pressure-induced events
Setpoint	Dual, non-isolated, open collector output
"Contact" Rating	0.3 VDC @100 mA (on), 30 VDC Max (off)
Adjustment	Trim pot, panel calibration, fixed hysteresis Analog voltage proportional to threshold available at connector (0 VDC – 12 VDC referred to analog output), output impedance 100 kohms

Input voltage/power	13 to 30 VDC @ 0.125 AMP, protected against reversals
Output signal (analog)	Non-linear, 1 to 9 VDC, nominal
Fault	<0.5 VDC or >9 VDC (for N_2)
Output impedance	100 ohms

Displays	
Setpoint indicators	Red LEDs – Verify an operation is underway and the appropriate vacuum has been achieved
Vacuum indicator	Green LED – Indicates <100 mTorr vacuum is achieved

Materials of construction	
Materials exposed to vacuum	Nickel-plated mild steel, glass, nickel alloy (⅛" NPT) 304 SSt, glass, nickel alloy (NW16)
Casing	Flame retardant ABS (Acrylonitrile-butadiene-styrene)
Sensor element	Platinel
Sensor internal volume	5.4 mL

Connections	
Electrical	9-pin D-Sub
Hardware	⅛" NPT or NW16 KF
Certification	UL Recognized, cUL Recognized
CE	EMC: EU 89/336, EN55011, EN61326 Safety: 73/23/EEC, Low Voltage Directive EN61010

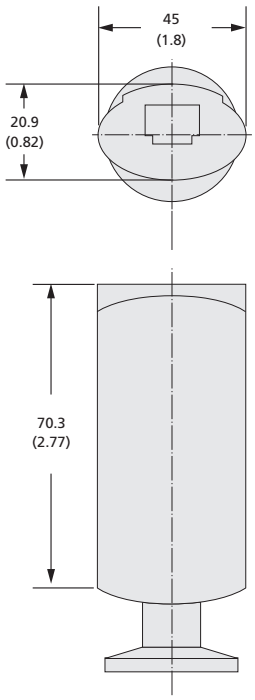
Ordering Information

Description			**Part Number**	**Shipping Weight** kg (lbs.)
CT-100 Active Rough Gauge*				
CT-100, ⅛" NPT			L7426301	0.9 (2.0)
CT-100, NW16 KF			L7426302	0.9 (2.0)
Replacement tube, CT-100, ⅛" NPT			L7426601	0.5 (1.0)
Replacement tube, CT-100, NW16 KF			L7426602	0.5 (1.0)
Accessories				
Vacuum Connections				
CT-100 to KF	Stainless Steel	KF16	KAFP160125S	
		KF25	KAFP250125S	
	Aluminum	KF16	KAFP160125A	
		KF25	KAFP250125A	
Interface Cable See page 29				
Mating Connector				
9-Pin D-sub connector kit with metal backshell			L7440301	
Adapter Kit				
RJ45 Adapter for Edwards ATC/APG			L7439301	
Power Supply/Breakout Box* (provides 24 VDC power and test points for signal access)			R2180302	
Calibration Service				
Factory calibration			CALEYECT-1	

**Not UL, cUL, CE certified*

Agilent PVG-500/PVG-500S/PVG-502S





Dimensions: millimeters (inches)

The Agilent PVG-500 series of Pirani gauges provides the ultimate combination of state-of-art technology and ruggedness within a compact design. The PVG-500 series utilizes the most advanced digital Pirani technology combined with a stainless steel sensor design to meet the various needs of the market today.

Applications

- Fore pressure vacuum pressure monitoring
- Controlling high vacuum ionization gauges
- Safety monitoring in vacuum systems
- General vacuum measurement and control in the medium and rough vacuum range

Features

- Compact, rugged aluminum housing that mounts in any orientation with a logarithmic signal output
- Stainless steel sensor cell with metal-sealed feedthrough
- Easy push button ATM and High Vacuum (HV) adjustment
- Nickel filament option
- Optional set points

Benefits

- Ease of integration
- Rugged design for a wide range of applications
- Ease of set-up
- Solution for corrosive applications
- Utilize pressure readings to perform critical operations

Technical Specifications

Measurement range (Air, 0_2, CO, N_2)		5 x 10^{-4} to 1000 mbar (3.75 x 10^{-4} to 750 Torr)	
Accuracy (N_2)	**% of reading**	**Units**	
	±15%	1 x 10^{-3} to 100 mbar (1 x 10^{-3} to 75 Torr)	
	±50%	5 x 10^{-4} to 1 x 10^{-3} mbar (3.75 x 10^{-4} to 1 x 10^{-3} Torr)	
	±50%	100 to 1000 mbar (75 to 750 Torr)	
Repeatability (Air)		1 x 10^{-3} to 100 mbar (1 x 10^{-3} to 75 Torr) – % of reading 62%	
Output signal	**Voltage range**	**Measurement range**	
(measurement signal)	0 to 10.3 V	1.9 to 10.0 V	
Voltage vs. pressure		1.286 V/decade, logarithmic	
Error signal		0 to 0.5 V (filament rupture)	
Minimum loaded impedance		10 kΩ, short-circuit proof	
Response time		80 ms	
Adjustment		One tactile switch for both ATM and HV adjustment	
Identification gauge		27 kΩ, referenced to supply common	
	PVG-500	**PVG-500S, PVG-502S**	
Setpoint	None	2	
Setting range	None	2 x 10^{-3} to 500 mbar (1.5 x 10^{-3} to 375 Torr)	
Hysteresis	None	10% above lower threshold % of reading	
Relay contact	None	30 VDC / 0.5 ADC floating	
Switching time	None	<20 ms	
Supply voltage	**At gauge**	**Ripple**	**Power consumption**
	14 to 30 VDC	≤1 Vpp	≤1 W
Electrical connection		FCC 68/RJ45 appliance connector, 8 poles, male	
Sensor cable		8 poles plus shielding	
Cable length		≤100 meter (330 ft)	
Materials exposed to vacuum		Glass, Ni, NiFe, tungsten (tungsten version)	
Admissible temperature	**Operation**	**Storage**	**Vacuum Connection**[1]
	5 to 60 °C	–20 to +65 °C	80 °C
Mounting orientation		Any	
Weight		80 g	

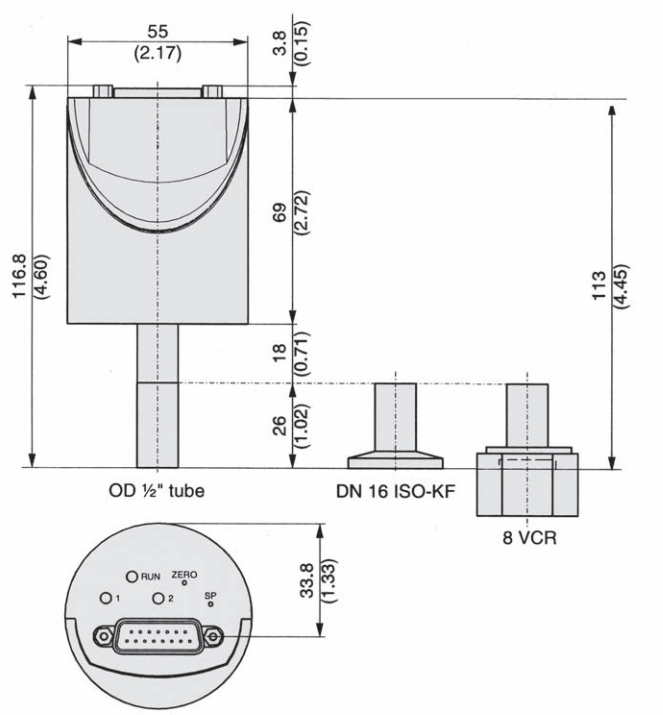
[1] *In horizontal mounting position*

Ordering Information

Description	**Part Number**
PVG-500 Pirani, KF16	PVG500KF16
PVG-500 Pirani tungsten filament with setpoints, KF16	PVG500KF16S
PVG-502 Pirani nickel filament with setpoints, KF16 – *for corrosive applications*	PVG502KF16S
Accessories	
PVG-500 Replacement sensor (tungsten) – *recommended for most applications*	PVG500KF16RS
PVG-502 Replacement sensor (nickel) – *recommended for corrosive applications*	PVG502KF16RS

Agilent CDG-500





Dimensions: millimeters (inches)

The Agilent CDG-500 series of temperature compensated Capacitance Diaphragm gauges provides a high level of accuracy in the high pressure region. Full scale measurement ranges are available from 1000 Torr to 1 Torr. The CDG-500 series uses a corrosion resistant ultra pure alumina ceramic diaphragm providing exceptional signal stability, fast recovery from atmosphere, short warm-up times and unparalleled robustness.

Applications

- General thin film and vacuum processes
- Industrial vacuum processes
- Data storage and display manufacturing
- Etch, CVD, PVD and other semiconductor production processes
- Reference sensor for monitoring of test instruments
- Transfer standard for traceability measurements

Features	Benefits
• Full scale ranges from 1 to 1000 Torr with push button zeroing and optional set point control	• Ease of integration
• Excellent long term signal stability and repeatability	• Long term performance – comparable to competitor's heated versions
• Fast recovery from atmospheric pressures and rapid stabilization after start-up	• Reduces process cycle times
• Corrosion resistant ceramic sensor with sensor shielding protection	• Application robustness

Technical Specifications

Measurement range (full scale)	Torr	1000	100	10	1
	Pa	133,322	13,332	1,333	133
	mbar	1333	133	13.3	1.3
Accuracy[1]	% of reading	0.2	0.2	0.2	0.2
Temperature effect					
on zero	% F.S./°C	0.005	0.005	0.005	0.015
on span	% of reading/°C	0.01	0.01	0.01	0.01
Resolution	% F.S.	0.003	0.003	0.003	0.003
Pressure, maximum	kPa (absolute)	400	260	260	260
Lowest reading	% F.S.	0.01			
Lowest suggested reading	% F.S.	0.05			
Lowest suggested control pressure	% F.S.	0.05			
Temperature		**Operation** (ambient)	**Bakeout** (at flange)[2]		**Storage**
		5 to 50 °C	≤ 110 °C		–40 to 65 °C
Supply voltage			14 to 30 VDC		
Power consumption			≤ 1 W		
Output signal (analog)			0 to 10 VDC		
Response time			30 ms		
Degree of protection			IP30		
Electrical connection			D-sub, 15 pole, male		
Setpoints[3] – Two (2) setpoints, SP 1 and SP 2		**Relay Contact**		**Hysteresis**	
		30 VDC; ≤ 0.5 ADC		1% of F.S	
Materials exposed to vacuum		Aluminum oxide ceramic (Al_2O_3), Vacon 70[4], stainless steel (AISI 316L[5]) AgCuTi hard solder, sealing glass			

[1] *Non-linearity, hysteresis, repeatability at 25 °C ambient operating temperature without temperature effects after 2 hours operation*

[2] *Non operating*

[3] *CDG-500 setpoint versions only*

[4] *28% Ni, 23% Co, 49% Fe*

[5] *18% Cr, 10% Ni, 3% Mo, 69% Fe*

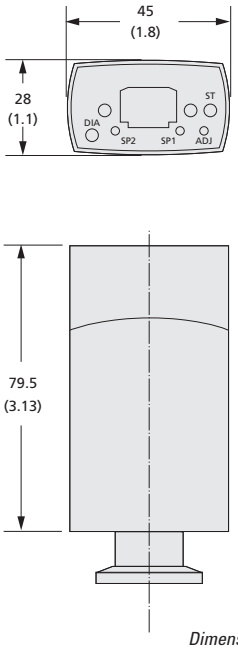
Ordering Information

Description	**Part Number**	
	KF16	**VCR8**
CDG-500 Capacitance Diaphragm Gauge (1000 Torr)	CDG500T1000KF16	CDG500T1000VCR8
CDG-500 Capacitance Diaphragm Gauge (100 Torr)	CDG500T0100KF16	CDG500T0100VCR8
CDG-500 Capacitance Diaphragm Gauge (10 Torr)	CDG500T0010KF16	CDG500T0010VCR8
CDG-500 Capacitance Diaphragm Gauge (1 Torr)	CDG500T0001KF16	CDG500T0001VCR8
CDG-500 Capacitance Diaphragm Gauge (1000 Torr) with setpoints	CDG500T1000KF16S	CDG500T1000VCR8S
CDG-500 Capacitance Diaphragm Gauge (100 Torr) with setpoints	CDG500T0100KF16S	CDG500T0100VCR8S
CDG-500 Capacitance Diaphragm Gauge (10 Torr) with setpoints	CDG500T0010KF16S	CDG500T0010VCR8S
CDG-500 Capacitance Diaphragm Gauge (1 Torr) with setpoints	CDG500T0001KF16S	CDG500T0001VCR8S

Agilent PCG-750/PCG-752



Profibus Version



Dimensions: millimeters (inches)

The Agilent PCG-750 series of Pirani Capacitance Diaphragm gauges combines Agilent's Pirani and ceramic capacitance diaphragm sensors into a single design that provides gas-type independence with increased accuracy from Atm to 5 x 10^{-5} mbar (3.8 x 10^{-5} Torr).

Applications

- Fore pressure vacuum monitoring
- Safety monitoring in vacuum systems
- General vacuum measurement and control in the medium and rough vacuum range
- Load lock control

Features

- High accuracy and reproducibility at atmosphere
- Fast atmospheric detection
- Gas-type independent above 10 mbar
- Compact, rugged housing that mounts in any orientation with a logarithmic signal output
- Set point control
- Exchangeable plug and play sensor
- Nickel filament option
- Bright color LCD display option

Benefits

- Reliable atmospheric pressure monitoring
- Shortens process cycle times
- Allows safe venting with any gas mixture
- Ease of integration
- Utilize pressure readings to perform critical operations
- Easy to repair with low cost of ownership
- Solution for corrosive applications
- Monitor pressure readings easily

Technical Specifications

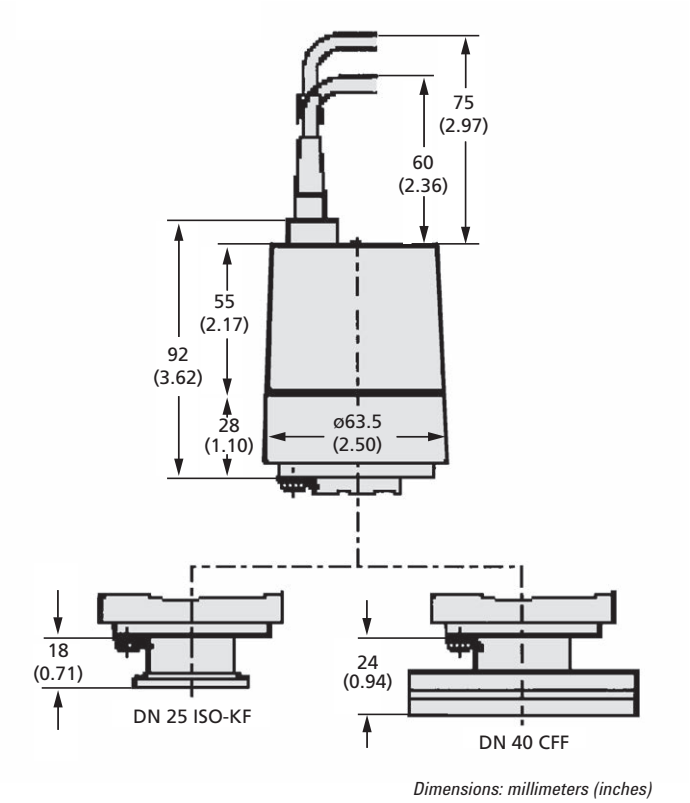
Measurement range (Air, 0_2, CO, N_2)			5×10^{-5} to 1500 mbar (3.8×10^{-5} to 1125 Torr)			
Accuracy	**% of reading**		**Units**			
	±50%		5×10^{-5} to 1×10^{-3} mbar (3.75 Torr to 1×10^{-3} Torr)			
	±15%		1×10^{-3} to 100 mbar (1×10^{-3} to 75 Torr)			
	±5%		100 to 950 mbar (75 to 712.5 Torr)			
	±2.5%		950 to 1050 mbar (712.5 to 787.5 Torr)			
Repeatability (N_2)	**% of reading**		**Units**			
	±2.5%		1×10^{-3} to 1100 mbar (1×10^{-3} to 825 Torr)			
Admissible pressure			≤ 5 bar absolute			
Burst pressure			≤ 10 bar absolute			
Admissible temperature	**Operation** (ambient)		**Storage**		**Bakeout flange**	
	10 to 50 °C		–20 to +65 °C		≤ 80 °C	
Supply voltage			15 to 30 VDC @ < 0.8 A			
Output signal			0 to 10.23 V			
Measurement range			0.61 to 10.23 V			
Voltage vs. pressure			1.286 V/decade			
Load impedance			> 10 kΩ			
Setpoint relay (2)	**Range (N_2)**	**Relay Contact**	**Hysteresis**	**Contact Rating Solid state relays**	**Contact Rating Mechanical relays**	**Switching time**
	5×10^{-5} to 1500 mbar	n.o., potential free	10 % of threshold	≤30VDC/ ≤0.3ADC	≤30VDC/ ≤1ADC	≤30 ms
Interface (digital)				RS232C		
Power connection				FCC, 8 pin		
Materials exposed to vacuum	PCG-750: W, Ni, NiFe, Al_2O_3, SnAg, SS, glass PCG752: Ni, NiFe, Al_2O_3, SnAg, SS, glass					

Ordering Information

Description	**Part Number**
PCG-750 Pirani/CDG combination gauge (tungsten), KF16	PCG750KF16
PCG-750 Pirani/CDG combination gauge (tungsten) with setpoints and display, KF16 (mbar)	PCG750KF16SD1
PCG-750 Pirani/CDG combination gauge (tungsten) with setpoints and display, KF16 (Torr)	PCG750KF16SD2
PCG-750 Pirani/CDG combination gauge (tungsten) with setpoints and display, KF16 (pascal)	PCG750KF16SD3
PCG-750 Pirani/CDG combination gauge (tungsten) with setpoints and Profibus. KF16 (mbar)	PCG750KF16SP
PCG-752 Pirani/CDG combination gauge (nickel), KF16	PCG752KF16
PCG-752 Pirani/CDG combination gauge (nickel) with setpoints and display, KF16 (mbar)	PCG752KF16SD1
PCG-752 Pirani/CDG combination gauge (nickel) with setpoints and display, KF16 (Torr)	PCG752KF16SD2
PCG-752 Pirani/CDG combination gauge (nickel) with setpoints and display, KF16 (pascal)	PCG752KF16SD3
PCG-752 Pirani/CDG combination gauge (nickel) with setpoints and Profibus, KF16 (mbar)	PCG752KF16SP
Accessories	
PCG-750 (tungsten) Replacement sensor –recommended for most applications	PCG750KF16RS
PCG-752 (nickel) Replacement sensor –recommended for corrosive applications	PCG752KF16RS

Agilent FRG-700/FRG-702





Dimensions: millimeters (inches)

The Agilent FRG-700 and FRG-702 (all metal version) are full range gauges that provide two measuring technologies in a single, compact and economical package to measure process and base pressure from 5 x 10^{-9} mbar to atmosphere (3.8 x 10^{-9} Torr to atmosphere). The single, compact unit with one logarithmic analog output signal significantly reduces the complexity of installation, setup and integration. The benefit is reduced cost and reduction in valuable space requirements

Applications

- High vacuum pressure monitoring
- Base pressure for evaporation and sputtering systems
- General vacuum measurement and control in the medium and high vacuum range

Features

- Combination gauge – inverted magnetron and Pirani, with wide measurement range from 5 x 10^{-9} mbar to atmosphere
- No filament to burn out; easy to clean
- Excellent ignition properties
- Can be operated by a Agilent V-81 or V-301 rack controller and used with the TPS Compact and MiniTask
- LED indicator for high voltage on

Benefits

- Measures 9 decades using 1 compact gauge, 1 connection, 1 sensor cable and 1 A/D converter; reduces complexity and cost
- Low maintenance and reduced cost
- Rapid start-up
- Greatly reduces cost and space requirements
- Provides quick visual indication of status

Technical Specifications

Measurement range	5 x 10^{-9} to 1000 mbar (3.8 x 10^{-9} to 760 Torr)			
Accuracy	±30% of reading, typical			
Repeatability	±5% of reading, typical			
Mounting orientation	Any			
Admissible temperature	**Operation** (ambient)	**Storage**	**Bake-out** * (w/o electronics)	**Filament temperature** (Pirani)
	5 to 55 °C	–40 to +65 °C	150 °C	120 °C
Supply voltage	**At gauge**	**Ripple**	**Power consumption**	
	15 to 30 VDC	≤1 Vpp	≤2 W	
Output signal (measurement signal)	**Voltage range** 0 to 10.5 V	**Measurement range** 1.82 to 8.6 V		
Voltage vs. pressure	0.6 V/decade, logarithmic			
Error signal	<0.5 V (no supply), >9.5 V (Pirani sensor, filament rupture)			
Minimum loaded impedance	10 kΩ, short-circuit proof			
Response time	<10 ms (@ p> 10^{-6} mbar), ≈1000 ms (@ p= 10^{-8} mbar)			
Identification gauge	85 kΩ, referenced to supply common			
Status	**Pirani-only mode** 0 V (low)	**Combined Pirani/cold cathode mode** 15 V to 30 (high)	**LED** LED green high voltage on	
Electrical connection	FCC 68 appliance connector, 8 poles, female			
Sensor cable	8 poles plus shielding			
Maximum cable length	≤50 m			
Operating voltage/current	≤3.3 kV/≤500 A			
Materials exposed to vacuum	**FRG-700** - SS, Al_2O_3, FPM75, Mo, Ni, Au, W	**FRG-702** - SS, Al_2O_3, FPM75, Mo, Ni, Au, W		
Internal volume	≈ 20 cm^3			
Weight	**FRG-700** - DN 25 ISO-KF ≈700g, DN 40 CF ≈980 g **FRG-702** - DN 25 ISO-KF ≈730g, DN 40 CF ≈1010 g			
Standards	EN 61000-6-2, EN 61000-6-3, EN 61010-1			

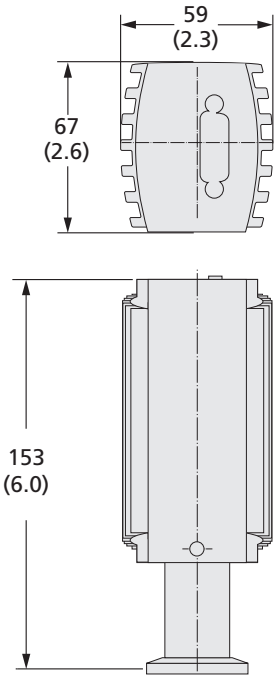
**Without electronics and magnetic shielding.*

Ordering Information

Description	Part Number
FRG-700 Pirani/IMG Combination Gauge, KF 25	FRG700KF25
FRG-700 Pirani/IMG Combination Gauge, DN40 CF	FRG700CF35
FRG-702 Pirani/IMG Combination Gauge, KF25, All Metal – bakeable	FRG702KF25
FRG-702 Pirani/IMG Combination Gauge, DN40 CF, All Metal – bakeable	FRG702CF35
Accessories	
FRG-700 Gauge Maintenance Kit	FRG700MAINT
FRG-700 Gauge Repair Kit	FRG700REPR
FRG-702 Gauge Maintenance Kit	FRG702MAINT
FRG-702 Gauge Repair Kit	FRG702REPR
FRG-700/702 Magnetic Shielding	FRG700MSHD
FRG-700 Cable, Gauge to AG Turbo Controller, 3M	9699960
FRG-700 Cable, Gauge to AG Turbo Controller, 5M	9699961

Agilent FRG-720/FRG-730





Dimensions: millimeters (inches)

The Agilent FRG-720 and FRG-730 combine Agilent's Pirani and Bayard-Alpert sensor into a single compact design that provides measuring capability from 5 x 10^{-10} mbar to atmosphere (3.8 x 10^{-10} Torr to atmosphere). Combining these two technologies into a single unit reduces complexity and integration challenges while protecting the Bayard-Alpert sensor from premature burnout.

Applications

- Wide range from industrial coating and semiconductor processing to research and laboratory environments
- General vacuum measurement and control in the low to ultra-high vacuum range

Features

- Combination gauge – Bayard-Alpert and Pirani
- Pirani interlock
- Long-life yttrium oxide coated iridium filament
- Set point control
- LCD display option
- Profibus communication option

Benefits

- Wide measurement range from 5 x 10^{-10} mbar to atmosphere
- Protects Bayard-Alpert sensor from premature burnout and contamination effects from high pressure operation
- Rugged design for a wide range of applications
- Utilize pressure readings to perform critical operations
- Monitor pressure readings easily
- Ease of network integration

Technical Specifications

Measurement range (Air, O2, CO, N2)	5 x 10^{-10} to 1000 mbar (3.8 x 10^{-10} to 760 Torr)				
Accuracy	10^{-8} to 10^{-2} mbar/Torr – ±15% of reading				
Repeatability	10^{-8} to 10^{-2} mbar/Torr – ±5% of reading				
Degas	p < 7.2 x 10^{-6} mbar – electron bombardment, max. 3 min				
Pressure, maximum	2 bar absolute				
Temperature	**Operation** (ambient)	**Storage**	**Bakeout at flange** w/extension	**Bakeout at flange** wo/extension	**Bakeout w/electroncs** removed
	0 to 50 °C	–20 to +70 °C	150 °C	80 °C	150 °C
Supply voltage	20 to 28 VDC, 1.4 A on startup for 200 msec, 0.8 A operating				
Output signal analog	0 to 10 V				
Measurement range	0.774 to 10.0 V				
Voltage vs. pressure	0.75 V/decade				
Error signal	0.3/0.5 V				
Minimum loaded impedance	10 kΩ				
Communications interface	RS-232C				
Electrical connection	D-sub, 15 pin, male				
Maximum cable length	100 m (330 ft)				
Materials exposed to vacuum	Yt_2O_3, Ir, Pt, Mo, Cu, W, NiFe, NiCr, stainless steel, glass				
Internal volume KF/CF	24 cm^3 (1.46 in^3)/34 cm^3 (2.1 in^3)				
Weight KF/CF	285 g/550 g				
Protection type	IP30				
Setpoint relays (1) **for FRG-730**	**Range**	**Relay Contact**	**Hysteresis**	**Contact rating**	
	1 x 10^{-9} to 100 mbar	n.o., potential free	10 % of reading	30 V/0.5 A DC	
Profibus option					
Baud rates	9.6/19.2/93.75/187.5/500 kBaud; 1.5/12 mBaud				
Address	2 switches (address 00 – 127) or network programmable				
Digital functions	Read pressure, select units (Torr, mbar, Pa); degas function, Pirani full scale adjust; monitor gauge status; safe state allows definition of behavior in case of error; detailed alarm and warning information				
Analog functions	0 to 10 V analog output pressure indication; two setpoint relays A + B				
Setpoint relays (2)	**Range**	**Relay Contact**	**Hysteresis**	**Contact rating**	
	1 x 10^{-9} to 100 mbar	n.o., potential free	10 % of reading	60 V/0.5 A DC	
Connector for Profibus DP	D-sub, 9 pin, female				

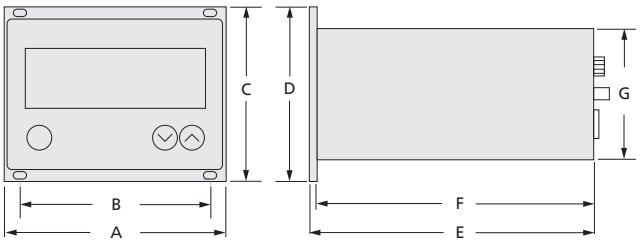
Ordering Information

Description	**Part Number**	
	KF25	**CF35**
FRG-720 Pirani/Bayard Alpert combination gauge – single filament	FRG720KF25	FRG720CF35
with display	FRG720KF25D	FRG720CF35D
with setpoints and Profibus	FRG720KF25SP	FRG720CF35SP
FRG-730 Pirani/Bayard Alpert combination gauge – dual filaments w/set pts	FRG730KF25S	FRG730CF35S
FRG-730 Pirani/Bayard Alpert combination gauge – dual filaments w/set pts. and display	FRG730KF25SD	FRG730CF35SD
FRG-730 Pirani/Bayard Alpert combination gauge – dual filaments w/set pts and Profibus	FRG730KF25SP	FRG730CF35SP

Accessories	
FRG-720 Replacement sensor–KF25	FRG720KF25RS
FRG-720 Replacement sensor–CF35	FRG720CF35RS
FRG-730 (dual filaments)–KF25 Replacement sensor	FRG730KF25RS
FRG-730 (dual filaments)–CF35 Replacement sensor	FRG730CF35RS
FRG-720/730 Baffle	FRG720BFL
FRG-720/730 Power Supply 24 V DC/RS232C	FRG720PWR
FRG-720/730 Bakeout extension, 100mm	FRG720BKE

Agilent AGC-100/AGD-100





	A	B	C	D	E	F	G
AGC-100	106 (4.2)	91 (3.6)	78 3.1	84 3.3	210 8.3	207 8.2	67 (2.6)
AGD-100	106 (4.2)	91 (3.6)	78 (3.1)	84 (3.3)	136 (5.3)	132 5.2	62 (2.4)

Dimensions: millimeters (inches)

AGC-100 is single channel controller compatible with the FRG 7xx, PVG-5xx, PCG-75x and CDG-500 series of active gauges and automatically identifies the active gauge connected.

AGD-100 is a low cost single channel display option for the FRG-700/702, PVG-5xx and PCG-75x series of active gauges. Both units have user selectable measurement unit (mbar, Torr, Pascal), and adjustable setpoint control.

Features

- Automatic identification of Agilent active gauges
- User selectable pressure units (mbar, Torr, Pascal)
- Adjustable setpoint control

Benefits

- Ease of setup
- Global compatibility
- Utilize pressure readings to perform critical operations

Technical Specifications

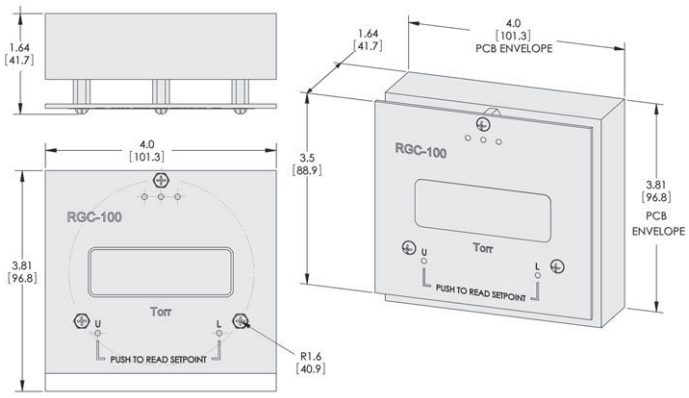
Measurement channels	One (1)
Measurement range	2 x 10^{-10} to 1500 mbar (1.5 x 10^{-10} to 1125 Torr)
Measurement unit (selectable)	mbar, Torr, Pascal
Rate	10/sec
A/D converter	16 bit
Setpoints	
Setpoint relays	One (1)
Channel assignment	One (1)
Relay contact	Potential free change over contact
Hysterisis	Adjustable
Contact rating	30 VAC/1A; 60 VDC/0.5A
Connector	D-Sub, 9 pin, male
Display	LED
Analog output	
Range	0-10.3 V, sensor analog output signal
Connector	D-Sub, 9 pin, male
Supply	90-250 V, 50/60 Hz
Consumption	#30W
Operation temperature (ambient)	5 to 50 °C
Digital interface (AGC-100 only)	RS-232C ; D-Sub, 9 pin, female

Ordering Information

Description	**Part Number**
Active Gauge Controller for FRG 7xx, PVG-5xx, PCG-75x and CDG-500 Series	AGC100
Gauge display for FRG-700/702 and PVG-5xx and PCG-75x Series	AGD100
Accessories	
Front adapter for controller, rack adaptor, 3u	AGC100ADPT
Cable (FRG700/702, PVG, PCG) – 3 m (9.9 ft)	AGCCBL103
Cable (FRG700/702, PVG, PCG) – 5 m (16.4 ft)	AGCCBL105
Cable (FRG700/702, PVG, PCG) – 10 m (33 ft)	AGCCBL110
Cable (FRG720/730) – 3 m (9.9 ft)	AGCCBL203
Cable (FRG720/730) – 5 m (16.4 ft)	AGCCBL205
Cable (FRG720/730) – 10 m (33 ft)	AGCCBL210
Cable (CDG500) – 3 m (9.9 ft)	AGCCBL303
Cable (CDG500) – 5 m (16.4 ft)	AGCCBL305
Cable (CDG500) – 10 m (33 ft)	AGCCBL310
Power Cord Selection One power cord included with each unit	
Europe, 10 A/220-230 VAC, 2.5 meter	656494220
Denmark, 10 A/220-230 VAC, 2.5 meter	656494225
Switzerland, 10 A/230 VAC, 2.5 meter	656494235
UK/Ireland, 13 A/230 VAC, 2.5 meter	656494250
India, 10 A/220-250 VAC, 2.5 meter	656494245
Israel, 10 A/230 VAC, 2.5 meter	656494230
Japan, 12 A/100 VAC, 2.3 meter	656494240
North America, 13 A/125 VAC, 2.0 meter	656458203

Agilent RGC-100





Dimensions: millimeters (inches)

The Agilent RGC-100 Rough Gauge Controller is a cost effective solution for pressure measurements in the 1 x 10^{-3} Torr to 760 Torr region.

The RGC-100 package includes the TC tube and cables to provide a pre-calibrated turnkey rough vacuum solution.

Applications

- General vacuum measurement and control in the rough vacuum range
- Monitor forelines, chamber evacuation and crossover to high vacuum pumps

Features

- Thermocouple gauge – Agilent 531 – and controller are pre-calibrated as a set at the factory using a NIST standard
- Runs on 100-230 VAC, 50/60 Hz and displays in Torr or mbar
- Large bright LED display
- No moving parts
- Optional set point control
- Economical vacuum gauge

Benefits

- No calibration required at initial setup
- Globally compatible
- Easily read from across a room, or in dimly lit locations
- Shock resistant and requires infrequent calibration
- Easily integrated
- Ideal choice for integrators

Technical Specifications

Measurement range		1 x 10^{-3} to 1000 mbar (1.5 x 10^{-3} to 760 Torr)
Accuracy	**% of reading**	**Units**
	±10%	1.3 x 10^{-3} to 1.3 mbar (1 milliTorr to 1 Torr)
	±15%	1.3 to 13.3 mbar (1 to 10 Torr)
	±50%	13.3 to 213 mbar (10 to 160 Torr)
	±25%	213 to 1000 mbar (160 Torr to 760 Torr)
Vacuum fitting		⅛ inch NPT-M
Interface cable length		10 ft.
Sensor		Agilent 531 TC gauge tube
Display		See below
Dimensions		Mounts in 2.66 inch panel hole with 3 screws on 1.60 inch radius
Analog output		0-5 VDC
Supply voltage		100-240 VAC, 50/60 Hz
Standards		CE, ROHS compliant
Optional setpoint controls		7 A, 250 V
Optional communication interface		RS-232

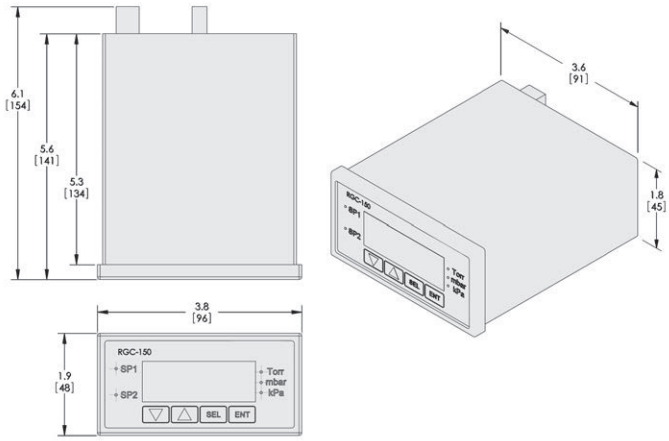
Ordering Information

Description	**Part Number**
RGC-100 Rough Gauge Controller (mbar)	RGC100M
RGC-100 Rough Gauge Controller (Torr)	RGC100T
RGC-100 Rough Gauge Controller with setpoints and RS232 (mbar)	RGC100MS
RGC-100 Rough Gauge Controller with setpoints and RS232 (Torr)	RGC100TS
RGC-100, 1.33" CFF TC, mbar, Controller	RGC100MCF
RGC-100, KF16 536 TC, mbar, Controller	RGC100MKF16
RGC-100, KF25 536 TC, mbar, Controller	RGC100MKF25
RGC-100, 1.33" CFF TC, mbar, SPs, Controller	RGC100MSCF
RGC-100, KF16 536 TC, mbar, SPs, Controller	RGC100MSKF16
RGC-100, KF25 536 TC, mbar, SPs, Controller	RGC100MSKF25
RGC-100, 1.33" CFF TC, Torr, Controller	RGC100TCF
RGC-100, KF16 536 TC, Torr, Controller	RGC100TKF16
RGC-100, KF25 536 TC, Torr, Controller	RGC100TKF25
RGC-100, 1.33" CFF TC, Torr, SPs, Controller	RGC100TSCF
RGC-100, KF16 536 TC, Torr, SPs, Controller	RGC100TSKF16
RGC-100, KF25 536 TC, Torr, SPs, Controller	RGC100TSKF25

Accessories	
Replacement sensors ⅛ inch NPT-M	F0472303
KF16	L6141308
KF25	L6141309
1.33 in CFF	L6141304

Agilent RGC-150





Dimensions: millimeters (inches)

The Agilent RGC-150 Rough Gauge Controller is a cost effective solution for pressure measurements in the 1 x 10^{-3} Torr to 760 Torr region.

The RGC-150 package includes the TC tube and cables to provide a pre-calibrated turnkey rough vacuum solution.

Applications

- General vacuum measurement and control in the rough vacuum range
- Monitor forelines, chamber evacuation and crossover to high vacuum pumps

Features

- Thermocouple gauge – Agilent 531 – and controller are pre-calibrated as a set at the factory using a NIST standard
- Two easily configured set points
- Runs on 100-230 VAC, 50/60 Hz and displays in Torr, mbar and kPa
- Large bright LED display
- Optional Ethernet connection and software that allows for remote monitoring through a web browser

Benefits

- No calibration required at initial setup
- Utilize pressure readings to perform critical operations
- Globally compatible
- Easily read from across a room or in dimly lit locations
- Monitor vacuum performance from a remote location

Technical Specifications

Measurement range		1 x 10^{-3} to 1013 mbar (1.5 x 10^{-3} to 760 Torr)
Accuracy	**% of reading**	**Units**
	±10%	1.3 x 10^{-3} to 1.3 mbar (1 milliTorr to 1 Torr)
	±15%	1.3 to 13.3 mbar (1 to 10 Torr)
	±50%	13.3 to 213 mbar (10 to 160 Torr)
	±25%	213 to 1000 mbar (160 Torr to 760 Torr)
Vacuum fitting		⅛ inch NPT-M
Interface cable length		10 ft.
Sensor		See below
Display		0.38 inch high 6 digit red LED
Dimensions		1.7 inch high, 3.52 inch wide, 5.35 inch deep
Analog output		0-5 VDC
Supply voltage		100-240 VAC, 50/60 Hz
Standards		CE, ROHS compliant
Optional setpoint controls		7 A, 250 V
Optional communication interface		RS-232
Mounting		⅛ DIN rack mount

Ordering Information

Description	**Part Number**
RGC-150 Rough Gauge Controller	RGC150
RGC-150 Rough Gauge Controller with Ethernet and Software	RGC150E
RGC-150, 1.33"CFF TC, Rough Vac Controller	RGC150CF
RGC-150, KF16 536TC, Rough Vac Controller	RGC150KF16
RGC-150, KF25 536TC, Rough Vac Controller	RGC150KF25
RGC-150, 1.33"CFF TC, Rough Vac Controller, Ethernet	RGC150ECF
RGC-150, KF16 536TC, Rough Vac Controller, Ethernet	RGC150EKF16
RGC-150, KF25 536TC, Rough Vac Controller, Ethernet	RGC150EKF25

Accessories	
Replacement sensors ⅛ inch NPT-M	F0472303
KF16	L6141308
KF25	L6141309
1.33 in CFF	L6141305

Gauge Cables

NOTE • *All cables are available in 5 foot increments.*

Ordering Information

Description	Length (in feet)	Part Number	Shipping Weight kg (lbs.)
XGS-600 I/O, with flying leads	10	R32493010	2.0 (1.0)
	25	R32493025	2.0 (1.0)
	50	R32493050	3.0 (1.5)
Other lengths available – 65, 75, 90, 100 feet		**R32493XXX**	
Lengths in feet			
Thermocouple Cables *(XGS-600 and senTorr only)*	10	L91313010	2.0 (1.0)
For use with one 531 or 536 gauge tubes	25	L91313025	2.0 (1.0)
	50	L91313050	3.0 (1.5)
	75	L91313075	
	100	L91313100	
Other lengths		**R91313XXX**	
Lengths in feet (maximum 100 ft.)			
ConvecTorr Cables *(XGS-600, Multi-Gauge,*	10	L91223010	2.0 (1.0)
senTorr and PanelVac ConvecTorr)	25	L91223025	2.0 (1.0)
Standard non-bakeable	50	L91223050	3.0 (1.5)
	100	L91223100	
Other lengths		**R91223XXX**	
Length in feet (maximum 100 ft.)			
Thermocouple Cables *(Multi-Gauge only)*			
Dual (for use with two gauges)	10	L64752010	2.0 (1.0)
Dual (for use with two gauges)	25	L64752025	2.0 (1.0)
Quad (for use with four gauges)	10	L64754010	2.0 (1.0)
Quad (for use with four gauges)	25	L64754025	2.0 (1.0)
		R6475XXXX	
Other lengths Single (1 gauge)			
Dual (2 gauges)			
Triple (3 gauges)			
Quad (4 gauges)			
Length in feet (maximum 100 ft.)			
Glass BA Gauge Cables	10	R32443010	2.0 (1.0)
Standard non-bakeable	25	R32443025	2.0 (1.0)
	100	R32443050	2.0 (1.0)
Other lengths – not available over 50 feet – with 10 ft. standard cable, it is possible to order extension up to 250 feet			
MBA-100/200 Gauge Cables	10	R32483010	2.0 (1.0)
	25	R32483025	2.0 (1.0)
	50	R32483050	3.0 (1.5)
Other lengths		**R3243XXX**	
Length in feet			

Ordering Information

Description	Length (in feet)	Part Number	Shipping Weight kg (lbs.)
UHV-24/UHV-24p Standard	10	R32453010	2.0 (1.0)
Standard non-bakeable	25	R32453025	2.0 (1.0)
	50	R32453050	3.0 (1.5)
Other lengths – not available over 50 feet – with 10 ft. standard cable, it is possible to order extension up to 250 ft.			
UHV-24/UHV-24p Teflon UHV	10	R32463010	2.0 (1.0)
bakeable to 250°C	25	R32463025	2.0 (1.0)
	50	R32463050	3.0 (1.5)
Other lengths – not available over 50 feet – with 10 ft. standard cable, it is possible to order extension up to 250 ft.			
Ion Gauge Extension Cables *(XGS-600)*	65	R3247065	
	90	R3247090	
Other lengths		**R3247XXX**	
Length in feet (maximum 350 feet)			
IMG-100 Cables *(XGS-600)*	10	R03113010	2.0 (1.0)
Standard non-bakeable	25	R03113025	2.0 (1.0)
may be used with IMG-300	50	R03113080	3.0 (1.5)
	75	R03113075	
	100	R03113100	
IMG-300 Cables Inverted Magnetron Gauge *(UHV)*	10	R03413010	2.0 (1.0)
Bakeable to 250 °C	25	R03413025	2.0 (1.0)
	65	R03413065	
	100	R03413100	
Other lengths		**R03413XXX**	
Length in feet (maximum 350 feet)			
CT-100 Interface Cable			2.0 (1.0)
9-Pin D-sub to flying leads, shielded		**R0907XXX**	
Length in feet up to 100			

FRG-700 Cables	Gauge to FRG Controller	3 m	FRG700CBL3
	Gauge to FRG Controller	5 m	FRG700CBL5
	Gauge to AG Turbo Controller	3 m	9699960
		5 m	9699961

XGS-600 Analog Board Cables	**Part Number**			
Cable Length	**3** ft	**10** ft	**25** ft	**50** ft
CT-100 Analog Input Board	R35883003	R35883010	R35883025	R35883050
FRG-700/PVG/PCG Analog Input Board	R35893003	R35893010	R35893025	R35893050
CDG Analog Input Board	R35903003	R35903010	R35903025	R35903050
FRG720/730 Analog Input Board	R35913003	R35913010	R35913025	R35913050

STARRS Calibration and Service Program

Agilent introduces the STARRS Calibration and Service Program. STARRS is a total calibration, service and warranty program to ensure the optimum performance of your Agilent vacuum measurement equipment. Vacuum gauges are often overlooked in many systems, however, their accurate and reliable operation is critical to any process. Proper calibration on Agilent's state-of-the-art equipment will ensure that your gauges are accurate and repeatable. Our extended warranty and advanced exchange programs will eliminate downtime due to equipment problems. All of our calibration service is NIST-traceable and fully documented to meet exacting ISO standards.

The STARRS program encompasses a large number of options for calibration. We will calibrate new gauging on order from Agilent or your existing Agilent equipment. You may choose to have the gauges calibrated with the controllers or separately. In addition, you may choose a simple, inexpensive calibration or a more in-depth service.

In many cases, a multi-million dollar process depends on a vacuum gauge and controller. For this reason, Agilent offers an advanced exchange program. This ensures that replacement equipment will be available to you right away should the need arise. Our extended warranty program offers peace of mind for all of your vacuum gauge instrumentation.

'The XGS line of gauge controllers has an advanced exchange program available. Due to the multiple configurations available, we encourage you to call Agilent to obtain the correct exchange part number for your product'



Sensitivity

Sensitivity is the most important parameter for an ion gauge. Also referred to as gauge factor, sensitivity is a measure of the ionization efficiency of a gauge. In order to understand the accuracy of an ion gauge, the sensitivity must be known. For a Bayard-Alpert gauge, the sensitivity may be calculated as follows:

$$S = \left(\frac{I^+}{I^-}\right)\left(\frac{1}{P}\right)$$

Where:

S = Sensitivity
I+ = Ion Current in Amperes (from collector)
I– = Emission Current in Amperes (from filament)
P = Pressure in Torr

Using the above equation, sensitivity is expressed in "per Torr" units. Simply put, the higher the sensitivity, the better the resolution of the ion gauge. In order to accurately translate the ion current signal from a gauge into a pressure value, the sensitivity must be known. Typically, sensitivity values for gauges shown in manuals or marketing literature are average or "typical" values. In particular, older controllers used to operate these ion gauges are designed for this typical value. The actual sensitivity for a particular gauge tube may be significantly different from the published value, which will mean that your achieved accuracy will be much worse than expected. However, if the sensitivity of a gauge is known, then control electronics or the output signal may be adjusted accordingly.

Traceability

The status quo for most manufacturing operations is ISO 9000 compliance, meaning all procedures and products must be completely and accurately documented. Therefore, vacuum gauge calibrations must be properly documented in order to satisfy this requirement. It is important to use equipment which has been checked and adjusted against a standard reference. Agilent can supply ion gauges, Capacitance Diaphragm Gauges, and thermal rough vacuum gauges calibrated against NIST standards. In addition, Agilent maintains calibration records both electronically and on paper.

Accuracy

Accuracy is an issue often misunderstood in the vacuum environment. Accuracy is defined as measurement compared to a reference standard. Depending on the type of vacuum gauge, this value is quantified as a percentage of reading or full scale. For many vacuum applications such as high-energy physics research, accuracy must be known in order to ensure publishable results. By providing gauges calibrated against NIST-traceable standards, accuracy is quantified providing consistent data to the vacuum user.

Repeatability

In the production environment, repeatability is often more important than accuracy. In this context, repeatability is the ability of a vacuum measurement system to obtain the same reading after several process cycles. Excellent repeatability means consistent, high-quality end product from your process. Poor repeatability means downtime and extra cost.

Reliability

All applications demand a reliable vacuum measurement equipment. In many cases, a multi-million dollar process is dependent on a several hundred dollar vacuum gauge. Unnecessary downtime leads to unnecessary costs.

All Agilent vacuum gauge controllers and electronics have at least a one-year guarantee – and we will exchange or replace the component at your request. In order to provide extra peace of mind, Agilent will also arrange an advanced exchange program with your facility. Your local Agilent Vacuum Technologies sales engineer can provide details on this program.

Statistical Process Control

Agilent Vacuum Technologies is constantly seeking to maintain our quality and improve performance. For our broad line of vacuum gauging products, we have implemented a rigorous statistical process control (SPC) program to ensure consistent, reliable gauges. We track key performance characteristics and manufacturing parameters to maintain a high quality product.

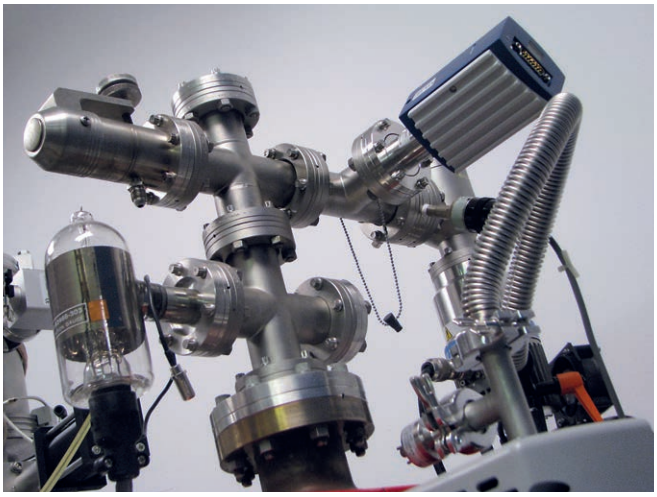
Agilent Calibration Services Available

NIST-Traceable Gauge Only Calibration Rough Gauges (1mTorr to Atmosphere)

The Unit-Under-Test (UUT) Gauge will be operated with a NIST-calibrated Agilent controller and referenced against a suitable NIST-calibrated transfer-standard capacitance manometer. The customer will be given a four-point calibration sheet indicating the performance of the gauge relative to the standard, type number and serial number for transfer standard, and conditions at the time of test. Agilent CeramiCel Capacitance Diaphragm Gauges will be internally adjusted for optimum calibration. A "four-point" calibration provides UUT readings referenced against an NIST-standard at 25%, 50%, 75%, and 100% of full scale.
A "ten-point" calibration means reference data at 10%, 20%,... 100% of full scale.

NIST-Traceable System Calibration Includes Controller, Cables(s), Gauge(s)

All calibrations include documentation indicating equipment performance, environmental conditions, and NIST reference information.



NIST-Traceable Gauge Only Calibration High Vacuum and Ultra-High Vacuum Gauges

Gauge will be operated with a NIST-calibrated Agilent Controller. Two types of calibration will be available: standard, using a NIST-calibrated tube to determine a mid-range gauge factor (10^{-6}), and premium, which includes an SRG calibration down to the 10^{-6} Torr range and a NIST-tube calibration below this pressure. Premium service will include three gauge factor measurements – 10^{-4} Torr, 10^{-5} T and 10^{-6} Torr. Cost is per filament for hot-cathode gauges.
All calibrations include documentation indicating equipment performance, environmental conditions, and NIST reference information.

Ordering Information

Description	Part Number*
Unheated capacitance diaphragm gauge, 4 points	CALCDG-1
Unheated capacitance diaphragm gauge, 10 points	CALCDG-2
Heated capacitance diaphragm gauge, 4 points	CALCDG-3
Heated capacitance diaphragm gauge, 10 points	CALCDG-4
Standard cold cathode gauge	SCCG-1
Standard Inverted magnetron gauge	SIMG-1
Standard Bayard-Alpert gauge	SBAG-1
Standard UHV nude gauge	SUHV-1
Premium cold cathode gauge	PCCG-1
Premium inverted magnetron gauge	PIMG-1
Premium Bayard-Alpert gauge	PBAG-1
Premium UHV nude gauge	PUHV-1

Description	Part Number*	Service Performed
Multi-Gauge Controller System Calibration	CALMG-1	Calibration of electronics using NIST-traceable equipment
For each thermocouple or ConvecTorr	CALCNTC-1	Calibration of gauges using electronics and cables provided. Includes sensitivity adjustment on Multi-Gauge to match ion gauge performance

Refer to ordering information above for Capacitance Diaphragm Gauge calibration part numbers.
Refer to ordering information above for Ion Gauge calibration part numbers.

senTorr Controller System Calibration	CALST-1	Calibration of electronics using NIST-traceable equipment
For each thermocouple or ConvecTorr	CALCNTC-1	Calibration of gauges using electronics and cables provided Includes sensitivity adjustment on senTorr to match ion gauge performance

Refer to ordering information above for Ion Gauge calibration part numbers.

CT-100 and Eyesys ConvecTorr Electronics and Gauge Calibration	CALEYECT-1	Calibration of transducer using NIST-traceable capacitance diaphragm gauge
Eyesys Mini-BA Electronics and Gauge Calibration		
(Standard Calibration)	CALYBAS-1	Calibration of transducer using NIST-traceable ion gauge. Includes sensitivity adjustment for optimum performance.
(Premium Calibration)	CALYBAP-1	Includes spinning rotor gauge reference
860 Cold Cathode Controller and Gauge Calibration	CAL860-1	Calibration of cold cathode gauge and controller using NIST-traceable ion gauge Documentation indicating results of testing and NIST reference data
ConvecTorr Analog Controller and Gauge Calibration	CALCVT-1	Calibration of ConvecTorr gauge and controller using NIST-traceable capacitance diaphragm gauge

*** Note regarding part numbers**

- *Part numbers listed above have been created specifically for new gauges purchased for calibration through this program.*
- *When returning gauges for calibration to Agilent, add a "SER" prefix. Example: SER-CALCDG-1.*

Vacuum Gauge Technical Notes

Historical Notes

Early interest in pressure measurement was stimulated in the 17th century by engineers who were concerned about the inability of suction pumps to remove water from mines. The pumps were limited to about 30 feet. For example, the Duke of Tuscany (Italy) commissioned Galileo to investigate the problem.

Galileo, among others, devised a number of experiments to investigate the properties of air. Among these experiments were pistons for measuring the "force of vacuum" and a water barometer that stood about 34 feet tall.

After Galileo's death in 1642, the work was carried on by his associate, Evangelista Torricelli. Torricelli invented the mercury barometer (Figure 1) and he concluded that atmospheric air forced water up to a height of 33.6 feet.

In 1644, the French mathematician, Blaise Pascal, sent a group of mountaineers up into the Alps with a barometer and proved that air pressure decreased with altitude. The average height of the mercury column at sea level is 760 mm, and this is defined as a standard atmosphere.

This also is 1.01 x 10^5 Pascals or 1.01 x 10^5 dynes cm^2. The 1/760 of this value is called a Torr in honor of Torricelli.

An extension of the mercury barometer was the mercury U-tube manometer (Figure 2). Varying atmospheric pressures causes the mercury level to rise and fall in the "Torricellian Void." Likewise, if the pressure at the other end of the tube is artificially reduced by a vacuum pump, the mercury in the tube falls drastically.

With both the barometer and the manometer, it is the difference in heights of the mercury levels that indicates the pressure, that is, the force (weight of Hg) per unit area that the air pressure will support. As the pressure on the system side is reduced, the height of the columns on either side of the U-tube approaches the same, and any difference becomes very difficult to measure (Figure 2).

Many schemes were tried to magnify the very small differences that occurred at very low pressures, but the only one that really extended the range of the manometer was invented by H. McLeod in 1872. This gauge is an application of Boyle's Law and is still in use today as a standard for calibrating secondary gauges (Figure 3).

ERROR: ioerror
OFFENDING COMMAND: imagemask

STACK:

-mark-
-savelevel-
-mark-
-savelevel-

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