

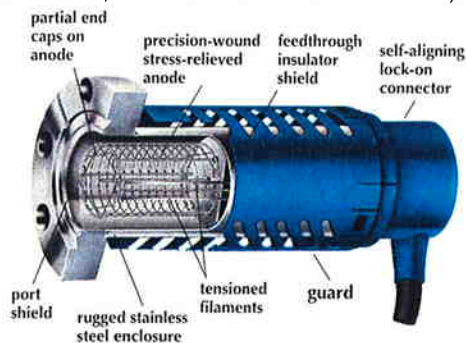
STABIL-ION[®] Vacuum Measurement System

Lowest Total Cost of Ownership—Guaranteed*

Buy a *STABIL-ION* System and put it to use. Then if you can find a commercially available ionization gauge system with better long-term accuracy of readout and, therefore, lower total cost of ownership any time within a year of your purchase of a *STABIL-ION* System, here is what we will do. We will refund all your money, plus transportation. We will even pay for the competitive replacement system. If we don't believe *STABIL-ION* technology is best for you once we understand your application, we will not try to sell it to you. If we believe it is right, then we will stand behind it with a better than risk-free guarantee. Either way you can't lose.

Improved Long-Term Accuracy

Long-term accuracy of pressure measurement is essential in vacuum processing to achieve maximum throughput. Conventional IG Systems will typically provide pressure indications that are uncertain by 30 to 40% at mid-range and by several hundred percent at higher pressures when new. Even accurate calibration does nothing to improve the accuracy of readout on non *STABIL-ION* Systems. With these older systems, you must use lookup tables to get accurate information and, with use, the calibration typically changes resulting in unavoidable errors. Only *STABIL-ION* Systems can automatically correct for the nonlinearity in sensitivity inherent in all Bayard-Alpert type gauges. Compare the 2, 3, or 6% uncertainty of readout at mid-range of *STABIL-ION* Systems (depending on the system ordered) with the approximately 10 times larger uncertainty of readout of older systems and you will choose *STABIL-ION* Systems.



Why can only *STABIL-ION* Systems provide such accurate readout? It is because only *STABIL-ION* Systems have a design that helps assure unequalled long-term stability of calibration. Obviously, it does no good to store calibration data in controller memory if it is going to change, so conventional systems have never stored calibration data. Only *STABIL-ION* Systems have sufficient stability to warrant storing calibration data in the controller, thus permitting accurate readout over the entire pressure range.



The *STABIL-ION* Vacuum Measurement System consists of: 1) a patented, breakthrough design Bayard-Alpert type Ionization Gauge, and 2) a Controller designed to take advantage of the unique design of the *STABIL-ION* Gauge to provide real time pressure indication with unparalleled long-term accuracy of readout from 2×10^{-2} Torr to UHV. Options include sequential operation of a second *STABIL-ION* Gauge and simultaneous operation of two *CONVECTRON* Gauges for pressure indication up to atmosphere.

Reliability is Designed In

With *STABIL-ION* Gauges, there is no glass breakage, glass decomposition, or helium permeation. Conventional nude ionization gauges also have no glass envelopes; however, the lack of a fixed metal envelope and shields around the electrodes means that any change in the position or potential of any surface in the vicinity of the nude gauge affects its accuracy.

GPC uses a proprietary filament coating process with greatly improved adhesion and uniformity of coating for longer cathode life. A number of pre-production *STABIL-ION* Gauges have been operating continuously for over 42 months. *STABIL-ION* filaments are burnout resistant even in air whereas tungsten filaments burn out instantly on exposure to air, even before they can be turned off.

A power limiter prevents excessive pressure during degas. There is automatic turn-off if the pressure gets too high, if the emission is insufficient, or if the anode potential is too low. A high voltage arc preventer rapidly interrupts degas if a discharge starts to form.

STABIL-ION Systems Help Avoid Process Replication Problems

A common complaint is that it is virtually impossible to transfer a nicely operating process to another system without extensive tweaking. Patented *STABIL-ION* Systems are the first to provide reproducible pressure indications from system to system which are essential for successful process replication. Even if *STABIL-ION* or *CONVECTRON* Gauges are replaced, processing results are much more likely to remain the same.

* See Guarantee on back page.



STABIL-ION Systems Offer Greatly Improved Convenience

All older hot cathode IG systems provide only a single value of sensitivity stored in the controller. This "one size fits all" results in large uncertainties of readout across the pressure range. Calibration can provide better accuracy, but inconvenient lookup tables are required with all older systems.

STABIL-ION Systems are the only systems to eliminate the need for lookup tables when accurate pressure data are required.

With gas specific Memory Modules, you can achieve accurate direct pressure readout for any compatible gas of your choosing (e.g., nitrogen or argon).

STABIL-ION Gauges are Safer*

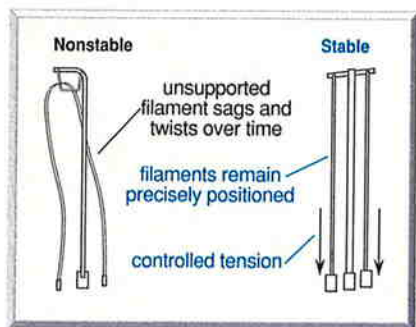
A metal enclosure eliminates the risk of glass breakage and the implosion hazard which is often present with glass ionization gauges. The all-metal enclosure extends beyond the electrical connections greatly reducing electrical shock hazards if your vacuum system is appropriately grounded. A guard helps protect you from being burned during degas and prevents cables and plastic utility lines from contacting hot surfaces.

UL LISTED STABIL-ION Systems are Listed by Underwriters Laboratories Inc. (UL). Samples of this product have been evaluated by UL and meet the applicable UL Standards for Safety. STABIL-ION Systems are the first in their product category to be listed by UL.

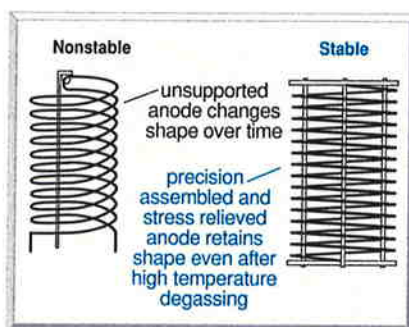
* For your free copy of an important report No. 505 on ionization gauges and vacuum safety, call us at (+1) 303-443-7660 (toll free 1-800-776-6543 in USA). Ask for ext. 665; or FAX us at (+1) 303-443-2546.

Long-term, accurate measurement is assured by the unique design and careful manufacturing of STABIL-ION Gauges.

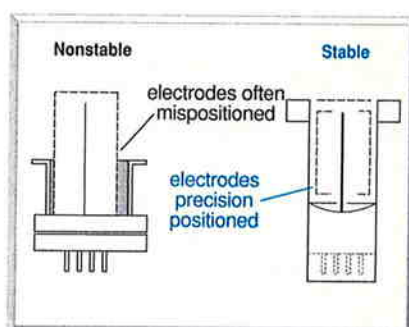
Here are the more important problems with older BA gauge designs that we removed in order to achieve accuracy over time and gauge-to-gauge. Sophisticated computer simulations of electron and ion trajectories helped greatly in identifying the causes of nonstable behavior.



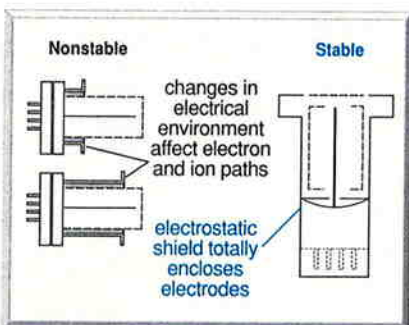
Filament must remain in position over time.



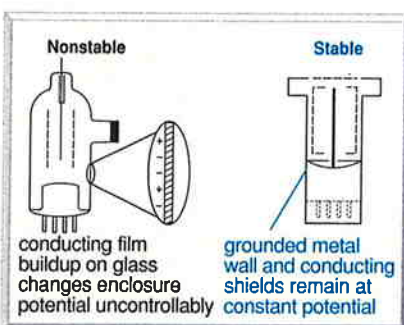
Anode must remain in position over time.



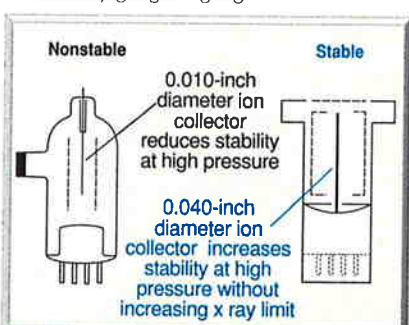
Electrode position relative to wall must not vary gauge to gauge.



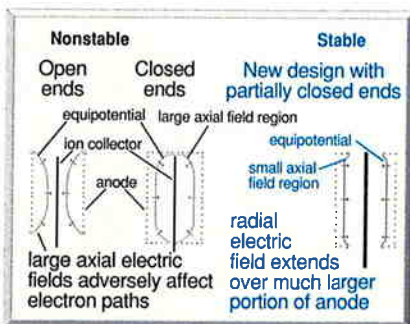
Electrical environment must not change.



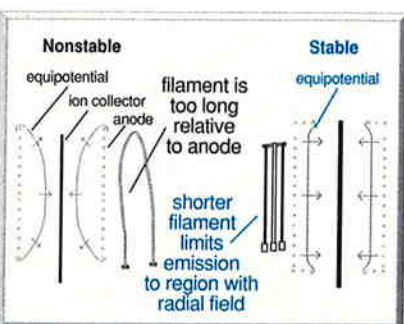
Electrical environment must not change.



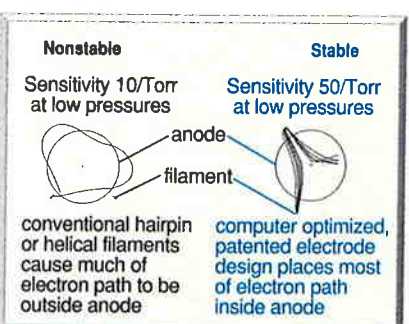
Ion space charge at high pressures must be minimized.



Axial electric fields must be minimized.



Electron emission must be limited to central region of anode.



Electron trajectories must be controlled.

Hardware Options

Factory-installed

Sequential *STABIL-ION* Operation

Operate either of two *STABIL-ION* Gauges. Use for measuring at a first or at a second location at a small fraction of the cost of another Controller.

STABIL-ION Remote Control

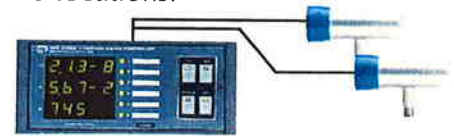
- Control *STABIL-ION* Gauges 1 and 2 on/off, and degas on/off.
- Select the optimum emission current for your application—for each gauge.
- Switch to alternate cathode on each gauge.
- Lock out front panel switches, except power on/off.
- Provides status relay contacts for *STABIL-ION* Gauges 1 and 2, plus fault detection.
- Optical isolation helps prevent malfunction or damage.

Field- or factory-installed

Dual *CONVECTRON* Operation

- Unique gauge design helps prevent calibration shifts with use.
- Fast response to pressure changes.
- Automatically turn a *STABIL-ION* Gauge on or off at pressures you select.
- NIST traceable calibration.
- Used worldwide since 1977.

Measure from 1000 to 10^{-4} Torr simultaneously at two locations.



Process Control

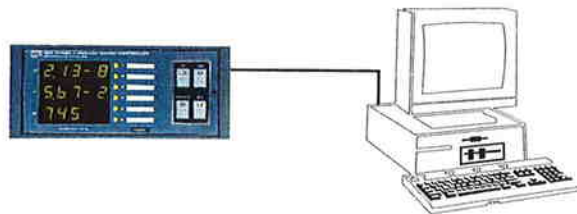
This capability provides convenient, dependable, automatic control of up to six pressure dependent operations by controlling system components such as valves, pumps, heaters, timers, and alarms.

- Manual override switches make setup and maintenance easy.
- Relay status displayed on front panel.
- Nonvolatile memory protects setpoints during power outage.
- Relays can be set to activate when pressure is either below or above the setpoint. Provides fail-safe relay status in case of power failure.
- Gold plated relay contacts help ensure stable, low current operation and provide dependable switching of up to 5 amperes.
- Digitally selectable setpoint values displayed on front panel on demand.

Computer Interfaces: RS-232

or IEEE 488

Pressure data and process control relay status are available to your computer.



STABIL-ION Controller on/off and degas functions can be computer controlled, as can emission current and cathode selection.

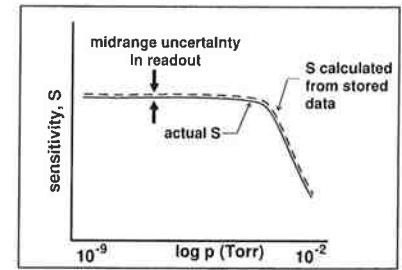
Calibration Options

STABIL-ION Systems are available with different accuracy specifications to suit a variety of applications

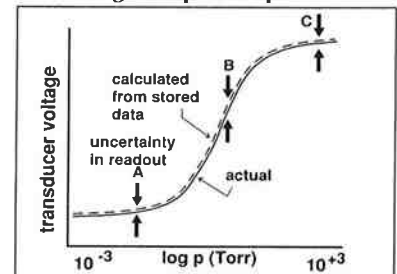
STABIL-ION Systems can be readily customized for many applications by combining basic Controllers, Gauges and Cables with standard hardware and calibration options.

Stored calibration data can be provided (1) from a standards laboratory with access to primary standards for highest accuracy, (2) from GPC using a secondary standard traceable to the National Institute of Standards and Technology (NIST) for high accuracy and ready availability, or (3) from GPC based on averaged data from a number of calibrations of nominally identical gauges using a secondary standard traceable to NIST for high accuracy at low cost. Averaged data are provided as standard. Order higher accuracy as an option. Estimates of uncertainty were obtained under controlled conditions using root-sum-square method of combining potential errors.

STABIL-ION Gauge sensitivity vs. pressure

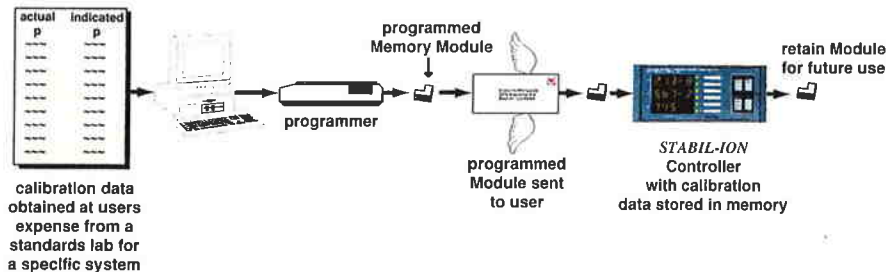


CONVECTRON Gauge voltage output vs. pressure



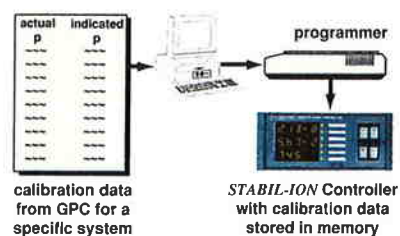
	STABIL-ION System typical uncertainty in readout at midrange	CONVECTRON Option typical uncertainty in readout at		
		A	B	C
Standards Laboratory Calibration	< 2 %	< 3 %	< 2 %	< 3 %
GPC Specific Calibration	< 3 %	— not available —		
GPC Averaged Calibration	< 6 %	< 4 %	< 3 %	< 4 %

Standards Lab Calibration STABIL-ION or CONVECTRON Gauge



STABIL-ION System calibration information from a standards lab is forwarded to GPC and transferred to a plug-in Memory Module. The programmed Memory Module is then sent to the user who simply plugs it into the port on the Controller for one minute. The Controller will then have a readout accuracy equal to that of the standards lab calibration—in other words, with as small an uncertainty as can be achieved by the best calibration procedure available. This process is used for both STABIL-ION and CONVECTRON Gauges.

GPC Specific Calibration STABIL-ION Gauge



Calibration data provided by GPC are programmed directly into Controller memory ready for use as received by the user. Alternatively, data can be furnished on memory modules for a nominal charge so that calibrations can be switched, e.g., for different gases, whenever desired. STABIL-ION Gauge calibration is for one filament at 0.1 mA and 4.0 mA emission. GPC Specific calibration of CONVECTRON Gauges is not available at this time.

Definitions:

Accuracy – is defined by the International Standards Organization as the closeness of agreement between the result of a measurement and the true value of the measurand.

Reproducibility – is defined in terms of the closeness of measurements taken with multiple gauges at the same true value of the measurand.

Stability/Repeatability – is defined in terms of the closeness of repeated measurements with the same gauge at the same true value of the measurand.

Specifications

Controller

Pressure range for N₂/air

emission range	
0.1 mA	2x10 ⁻² to 4x10 ⁻⁹ Torr 3 to 5x10 ⁻⁷ Pa
4.0 mA	5x10 ⁻⁴ to 1x10 ⁻¹⁰ Torr 7x10 ⁻² to 1x10 ⁻⁸ Pa

Display resolution
Display units
Display update rate
Degas power
Degas timer range
Maximum ionization gauge cable length
Operating temperature
Input voltage
Input frequency
Input power
Analog output
Accuracy at 25 °C ± 5 °C:
Electrometer

3 digits
Torr, mbar, or Pa
2/sec
electron bombardment, 40 W
1 to 30 minutes, adjustable
60 m (200 ft)
0 – 40 °C ambient, noncondensing
90 to 130 Vac, or 180 to 250 Vac
50 or 60 Hz
220 W maximum
1–10 V, 1 V/decade, logarithmic

Emission current
Anode and cathode bias

±1% of reading to 10 µA
±least significant digit ± 2 pA
±0.25% of setting
±0.3% of nominal values

STABIL-ION Gauge

X ray limit
Bakeout temperature, nonoperating
Operating temperature
STABIL-ION cable bakeout temperature
Materials exposed to vacuum

2x10⁻¹⁰ Torr maximum
450 °C maximum
0 – 50 °C ambient, noncondensing
150 °C maximum
vacuum fired, UHV compatible

STABIL-ION Remote Control

Inputs: External power required
for optical isolation
Input current (I_{IL})
Outputs: Relay configuration

5 V, 25 mA
2 mA per input
SPDT, Form C

Process Control

Relay configuration
Contact rating
Setpoint resolution
Channels

SPDT, Form C
5 A, 250 Vac, 30 Vdc, resistive load
2 significant digits plus exponent
6 maximum, 2 per operating gauge
maximum

Dual CONVECTRON Operation

Pressure range

999 to 1x10⁻⁴ Torr for N₂/air
1.33x10⁵ to 1x10⁻² Pa for N₂/air

Display units
Maximum cable length
Analog output

Torr, mbar, or Pa
150 m (500 ft)
0–7 V, 1 V/decade, logarithmic
adjustable offset of +1 to -7 V
3 digits, except for lowest two decades

Display resolution

CONVECTRON Gauge

Bakeout temperature, nonoperating
Operating temperature
Sensor material
Mounting orientation

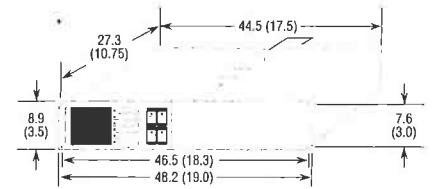
150 °C maximum
4 – 50 °C ambient, noncondensing
gold-plated tungsten
gauge axis must be horizontal to provide
accurate measurement above about 1 Torr.
105 °C maximum

Cable bakeout temperature

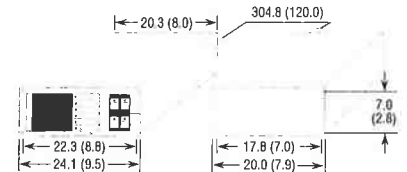
® Cajon, VCR, VCO are registered trademarks of Cajon Co; ConFlat of Varian Associates.
All dimensions are nominal. For tolerances, contact GPC.

dimensions are in cm (in.)

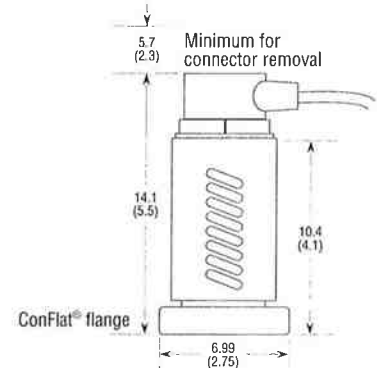
STABIL-ION Controllers



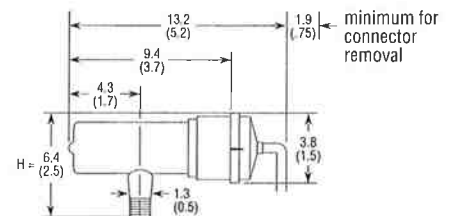
Allow 6.5 cm (2.5 in)
clearance for rear
connectors



STABIL-ION Gauge with connector








CONVECTRON Gauge with connector



1/8 NPT/ 1/2 in. quick
connect/weld fitting

Other fittings

	SS-4-VCR®-3, SS-4-VCR-1	8.1 (3.2)
	SS-6-VCO®-1	7.9 (3.1)
	welded NW16 KF	6.9 (2.7)
	welded NW25 KF	6.9 (2.7)
	2 3/4 in. rotatable ConFlat	6.4 (2.5)

Series 360 Stabil-Ion® Gauge Controller

Description	Catalog Number
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Controller, for a Stabil-Ion Gauge, with 3-line display, electron bombardment degas, sequential operation of a second ion gauge, and remote input/output interface (CE-Marked)

Choose one of the basic controllers and add the options below to create your catalog number. See the example below.

Left mount, side-by-side with power supply for 19-inch rack	360501 - # # # - # #
Half-rack mount, remote power supply	360502 - # # # - # #
Interface Options (Slot X):	
None	0
RS-232	A
RS-485	B
IEEE-488	C
Gauge Options (Slot Y):	
None	0
Dual Convectron	1
Setpoint Options (Slot Z):	
None	0
2 setpoint relays for Stabil-Ion Gauge	A
6 setpoint relays, 2 per channel	B
Display Options - Measurement units:	
Torr	T
mbar	M
Pa	P
Power Cord Options:	
North America 115 V	1
North America 240 V	2
Universal Europe 220 V	3
United Kingdom 240 V	4

Example: To order a Series 360 Stabil-Ion Gauge Controller and power supply mounted side-by-side for 19-inch rack, IEEE-485 interface, dual Convectron Gauge operation, 6 setpoint relays, display in Torr, and North America 115 V power cord, select catalog number: 360501-C1B-T1

Stabil-Ion Gauge with dual yttria-coated iridium filaments

Extended Range Gauge	360120
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Convectron Gauges

Gold-plated Tungsten Filament

1/8 NPT / 1/2 inch tubulation	275071
1/4 inch VCR®-type female fittings	275185
3/8 inch VCO®-type male fitting	275233
NW16KF flange (welded)	275203
NW25KF flange (welded)	275196
2.75 inch (NW35CF) rotatable ConFlat-type flange	275238

Series 360 Stabil-Ion Gauge Controller (Continued)

Description	Catalog Number
Option Cards (for field installation)	
RS-232 computer interface	360110
IEEE-488 computer interface	360111
Dual Convector Gauge	360106
Process control with 2 setpoint relays for ionization gauge	360108
Process control with 6 setpoint relays, 2 per channel	360107
Optional Installation Hardware (for field installation)	
– Rack-mount kits	
Control unit on the left or right side for 19-inch rack	307010
Control unit in the center for 19-inch rack	307011
2 control units side-by-side for 19-inch rack	307021
1 or 2 power supplies for 19-inch rack	307008
Cables for:	
– Stabil-Ion Gauge, side-by-side mounting	
10 feet (3 meters)	360116-10
25 feet (7.6 meters)	360116-25
50 feet (15.2 meters)	360116-50
100 feet (30.5 meters)	360116-100
200 feet (61 meters)	360116-200
– Stabil-Ion Gauge, remote mounting of power supply	
10 feet (3 meters)	360117-10
25 feet (7.6 meters)	360117-25
– Dual Convector Gauges	
10 feet (3 meters)	303040-10
25 feet (7.6 meters)	303040-25
50 feet (15.2 meters)	303040-50
100 feet (30.5 meters)	303040-100
200 feet (61 meters)	303040-200

Guarantee

Guarantee is valid only for those applications where total cost of ownership of an ionization gauge system is significantly influenced by long-term accuracy. If purchaser, within 12 months after purchase of a *STABIL-ION* System, finds a competitive ionization gauge system with better long-term accuracy of readout as shown by actual tests by the manufacturer for equivalent installation and conditions of use, GPC will refund the full purchase price of the *STABIL-ION* System, including shipping costs, plus pay for the competitive replacement system. Offer limited to refund on one *STABIL-ION* System per organization and is subject to withdrawal, but not retroactively.

Request for quotation

We suggest a statement equivalent to the following: Vacuum measuring system. 1000 to _____ Torr, calibration memory, three displays, three-digit resolution, high precision electronics, and detachable power supply. Operates and displays two ionization gauges sequentially. Operates and displays output from two thermal conductivity gauges simultaneously, etc.

Terms and policy

F.O.B. plant, Boulder, Colorado, USA. Other terms will be quoted on request. Granville-Phillips reserves the right to change prices and specifications without notice.

Application assistance

Granville-Phillips has specialized in high quality vacuum instrumentation since 1954. We are independent and have no corporate ties to your competition. If you do research or process products in vacuum, we can most likely help improve your productivity.

Limited Warranty

Granville-Phillips Company (GPC) warrants Series 360 Controllers for five years and Series 275 and 360 Gauges for one year from date of shipment against defects in materials and workmanship, provided that the installation, operating and preventive maintenance procedures specified in their instruction manuals have been followed. GPC warrants that the software and hardware designated by GPC for use with these products will execute their programming instructions, but does not warrant that the operation of the product, software, or hardware will be uninterrupted or error free. GPC will, at its option, repair, replace or refund the selling price of a product if it proves to be defective in materials or workmanship during the warranty period, provided the item is returned to GPC together with a written statement of the problem.

The foregoing warranties shall not apply to defects resulting from improper or inadequate maintenance by Buyer, Buyer-supplied software or hardware or interfacing, unauthorized modification, misuse, mechanical damage, operation outside of the environmental specifications for the product, or improper site preparation or maintenance. In addition, the foregoing one-year warranty shall not apply to transducers that are visibly contaminated.

THE WARRANTY SET FORTH ABOVE IS EXCLUSIVE. GPC EXPRESSLY DISCLAIMS ANY OTHER WARRANTIES, WHETHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. UNDER NO CIRCUMSTANCES SHALL GRANVILLE-PHILLIPS COMPANY BE LIABLE FOR CONSEQUENTIAL OR OTHER DAMAGES RESULTING FROM A BREACH OF THIS LIMITED WARRANTY OR OTHERWISE.

For warranty service or repair, this product must be returned to a service facility designated by GPC. Buyer shall prepay shipping charges to the designated service facility and the service facility shall pay shipping charges to return the product to Buyer. However, Buyer shall pay all shipping charges, duties, and taxes incoming and outgoing for products returned to GPC from another country.

Some states or provinces do not allow limitations on how long an implied warranty lasts, so such limitation or exclusion may not apply. However, any implied warranty of merchantability or fitness is limited to the duration of this written warranty.

Brooks Automation, Inc.
Granville-Phillips® Products
6450 Dry Creek Parkway, Longmont, CO 80503-9501
1-303-652-4400 or 1-800-776-6543
1-303-652-2844 (Fax) www.brooks.com

