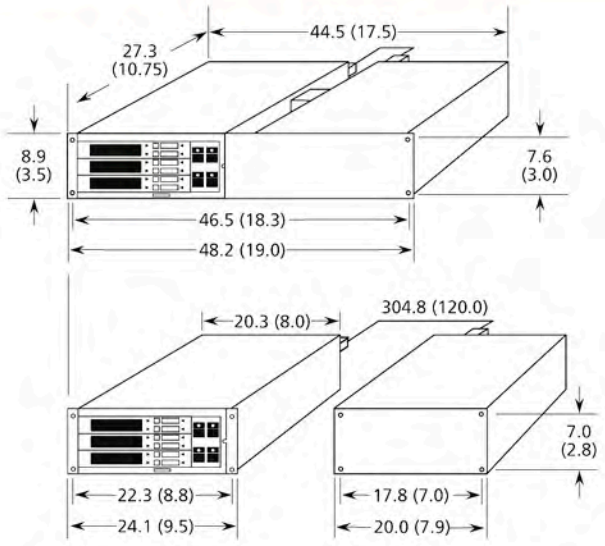
Ideal vacuum products

# Granville-Phillips® Series 370 Stabil-Ion® Vacuum Gauge and Controller

## Advanced Vacuum Measurement Solutions

VACUUM PRODUCTS

## Dimensions




Dimensions are shown in millimeters (inches)

Brooks CRITICAL COMPONENTS GROUP

WWW.BROOKS.COM

Brooks
CRITICAL COMPONENTS GROUP

# Granville-Phillips® Series 370 Stabil-Ion® Vacuum Gauge and Controller

## Advanced Vacuum Measurement Solutions

VACUUM PRODUCTS

**Benefits**

- All-metal, rack-mount controller for Stabil-Ion and Convectron® vacuum gauges is noise-immune and CE compliant
- The latest ionization gauge technology provides accurate vacuum pressure measurement from the $10^{-11}$ Torr range ($10^{-11}$ mbar, $10^{-9}$ Pa)
- Convectron Gauge option extends pressure measurement to atmosphere
- Flexible design allows for optional setpoint relays and digital interfaces
- Three-digit display of pressure measurements
- Stabil-Ion Gauge with memory module of calibration data
- Ultra-clean gauge construction allows rapid response during pumpdown
- Dual filaments increase equipment uptime

The stability, accuracy, and reliability of the Stabil-Ion® Gauge are the results of many years of testing and design. Stabil-Ion Gauges are the only high vacuum process control gauges that are designed to maintain calibration over time. Due to the design and technology of older style ionization gauges, the physical relationship between the grid and the filament is always changing. As a result, pressure readings are often inaccurate by 30% to 40% - sometimes even more. A patented precise design and advanced manufacturing techniques ensure that the Stabil Ion Gauge's components do not shift, so you can count on accurate pressure measurements for the life of the gauge.

If the Stabil-Ion Gauge and memory module are replaced, processing results are much more likely to remain the same. If you need vacuum measurements that are accurate and repeatable over time, the Stabil-Ion Gauge and Controller is your answer. Every Stabil-Ion Gauge is individually calibrated at 15 pressure values and supplied with a memory module matched to its own calibration data. This provides gauge-to-gauge reproducibility which is essential for process replication.

## Stabil-Ion Vacuum Gauge Controller

The Granville-Phillips Stabil-Ion Vacuum Gauge and Controller combine the latest technology in ionization gauges and control electronics, giving you the most reliable and accurate vacuum pressure measurements for your systems and research. Bright LEDs display the pressures read by the Stabil-Ion and Convectron Gauges. The flexible, modular design offers a range of computer interfaces, setpoint control relays, dual Convectron Gauge operation, and digital display in Torr, Millibar, or Pascal to meet your specific requirements. Other features include analog output, selectable emission current, degas timer, and selectable $N_2$/Ar gas for Convectron.


Granville-Phillips® Series 370 Stabil-Ion® Vacuum Gauge and Controller

## Stabil-Ion Controller Features and Benefits

**Wide Measurement Range:** Designed specifically for the Stabil-Ion and Convectron Gauges, the Stabil-Ion Controller monitors vacuum system performance continuously from $2x10^{-11}$ Torr to 999 Torr.

**Simple Modular Design:** Allows you to add just the functions you want to control your vacuum measurement system. Field replaceable option boards allow for easy upgrading as your needs change.

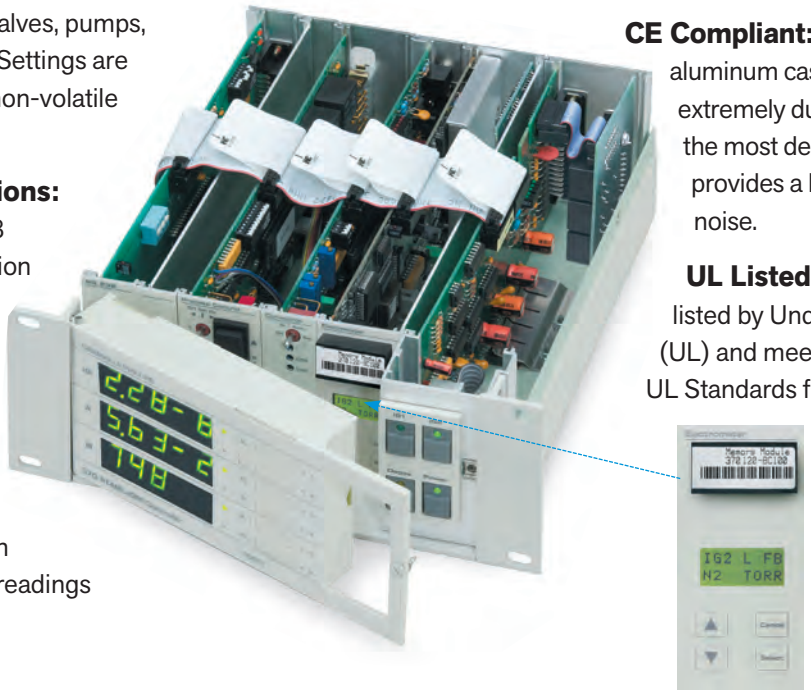
**Process Control Options:** Up to six process control setpoint relays are available to control other vacuum equipment such as valves, pumps, timers, and safety interlocks. Settings are adjustable and are stored in non-volatile memory.

**Computer Interface Options:** RS-232, RS-485 or IEEE-488 interface allows easy integration with computer-controlled systems.

**3-Line Digital Display:** Bright, easy-to-read, flicker-free, green LED displays allow the user to monitor the Stabil-Ion Gauge and both Convectron Gauge pressure readings at a single glance.

**Memory Module for the Stabil-Ion Gauge:** Each Stabil-Ion Gauge is individually calibrated and supplied with a memory module matched to its own calibration data. If you replace a Stabil-Ion Gauge on your system, you also replace the memory module supplied with the new gauge to achieve immediate system callibration.

**Digital Electrometer with Liquid Crystal Display for Setup:** Permits easy programming of operating parameters and calibration data, and displays the parameter value readouts.

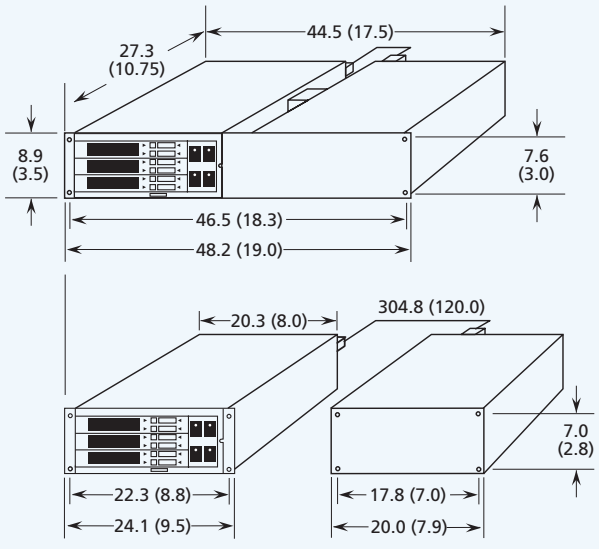


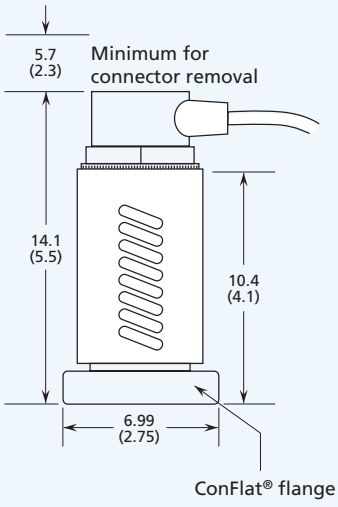
**CE Compliant:** The rugged extruded aluminum case makes the controller extremely durable for a long lifetime in the most demanding environments and provides a high level of immunity to RF noise.

**UL Listed:** Stabil-Ion Systems are listed by Underwriters Laboratories Inc. (UL) and meet the applicable UL Standards for Safety.




## Dimensions




Dimensions are shown in millimeters (inches)

## Stabil-Ion Gauge Features and Benefits

**Precision-Wound, Stress-Relieved Anode:** Retains its original shape even after high-temperature degassing, thus reduces measurement errors. No movement of any of the internal components means no variations of actual pressure indication.

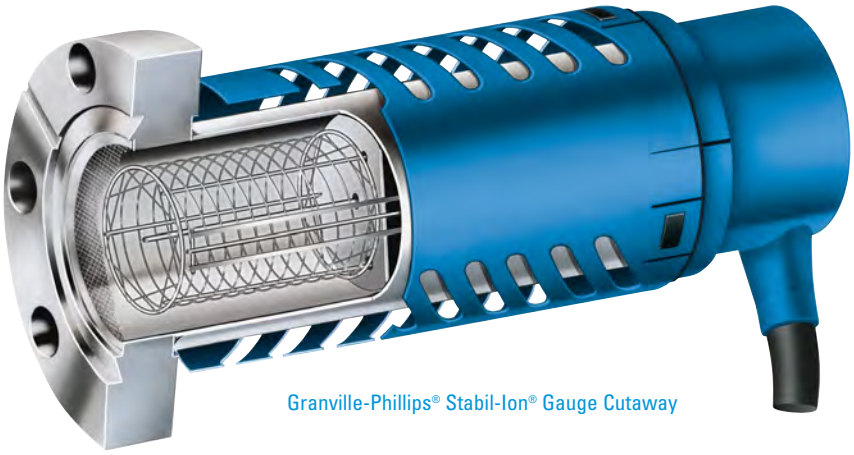
**Rugged Stainless Steel Construction:** Prevents grid and filament damage during mounting, and eliminates the risk of glass breakage.

**Tensioned Dual Filaments:** Stay precisely positioned to maintain stability and calibration.

**Vacuum-Fired Components:** Are never touched by bare hands during assembly. All manufacturing, assembly and testing are performed in a cleanroom environment, thereby preventing contamination and speeding vacuum system pumpdown.

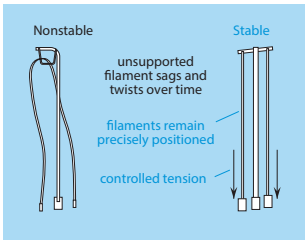
**Calibration Memory:** The Stabil-Ion Gauge is the first ionization gauge with sufficient long-term stability to justify storing calibration data in memory. Each Stabil-Ion Gauge is provided with a memory module containing the calibration data based on 15 individually calibrated pressure values.

**Choice of Measuring Range:** The Stabil-Ion Gauge is available for use in high vacuum or ultra-high vacuum ranges. See the Technical Specifications for measurement ranges.

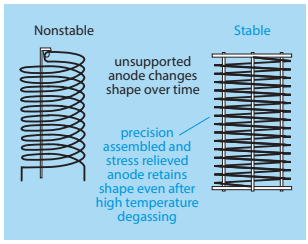


Granville-Phillips® Stabil-Ion® Gauge Cutaway

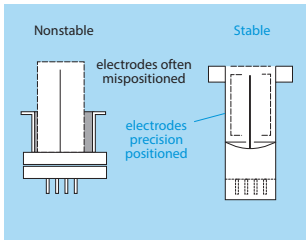
**Long-term, accurate measurement is assured by the unique design and careful manufacturing of the Stabil-Ion Gauges.**
Here are the more important problems with older BA gauge designs that we removed in order to achieve accuracy over time and gauge-to-gauge. Sophisticated computer simulations of electron and ion trajectories helped greatly in identifying the causes of nonstable behavior.



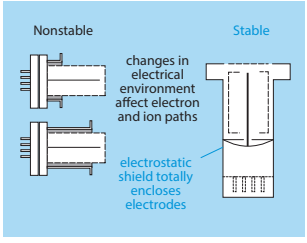

Filament must remain in position over time.



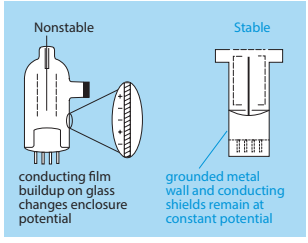

Anode must remain in position over time.



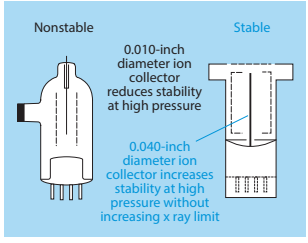

Electrode position relative to wall must not vary gauge to gauge.



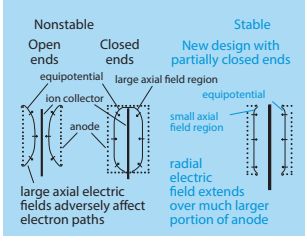

Electrical environment must not change.



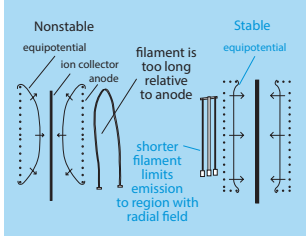

Electrical environment must not change.



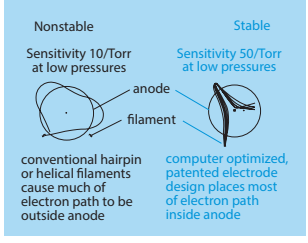

Ion space charge at high pressure must be minimized.




Axial electric fields must be minimized.




Electron emission must be limited to central region of anode.




Electron trajectories must be controlled.

# Technical Specifications

| | |
|---|---|
| Controller measuring range for $N_2$ or air (see Notes 1, 2 and 3, below) | |
| UHV Stabil-Ion Gauge (with Convectron) | |
| Torr | $2 \times 10^{-11}$ to 999 Torr |
| mbar | $3 \times 10^{-11}$ to $1.33 \times 10^{3}$ mbar |
| Pa | $3 \times 10^{-9}$ to $1.33 \times 10^{5}$ Pa |
| Extended Range Stabil-Ion Gauge (with Convectron) | |
| Torr | $2 \times 10^{-10}$ to 999 Torr |
| mbar | $3 \times 10^{-10}$ to $1.3 \times 10^{3}$ mbar |
| Pa | $3 \times 10^{-8}$ to $1.3 \times 10^{5}$ Pa |
| Accuracy for $N_2$ | $\pm$ 4% of reading from $1 \times 10^{-8}$ Torr to $1 \times 10^{-4}$ Torr (see Note 4) |
| Repeatability | $\pm$ 3% of reading from $1 \times 10^{-8}$ Torr to $1 \times 10^{-4}$ Torr (see Note 5) |
| Emission current | 0.1 mA and 4.0 mA |
| Stabil-Ion analog output | 1 volt/decade, logarithmic, 0 to 10 Vdc |
| Degas | Electron bombardment, 40 W, 1 to 30 minutes (adjustable) |
| Power required | 90 to 130 Vac, or 180 to 250 Vac, 50 to 60 Hz, 220 W max |
| Operating temperature | 0 °C to 40 °C ambient, non-condensing |
| Non-operating temperature | -40 °C to 70 °C |
| Case materials | Aluminum extrusion, steel, plastic |
| CE compliance | |
| EMC directive | 89/336/EEC; EN 50081-2, EN 50082-2 |
| Low voltage directive | 73/23/EEC; EN 61010 (UL 6Z30) |
| Display | 3 digits, plus exponent, green LED: Torr, mbar, or Pa |
| Digital interface options | RS-232, RS-485 or IEEE-488 |
| Convectron gauge option | Operates 2 gauges |
| Analog output | 1 volt/decade, logarithmic, 0 to 7 Vdc |
| Setpoint options | 2 relays for Stabil-Ion gauge or 6 relays (2 per channel) |
| Configuration | Single pole, double throw (SPDT) |
| Contact rating | 5 A at 250 Vac, 5 A at 30 Vac, resistive load |
| Stabil-Ion gauge | |
| Measuring range for $N_2$ or air | |
| 0.1 mA emission | $4 \times 10^{-9}$ to $2 \times 10^{-2}$ Torr; 5 to 3 $\times 10^{-7}$ Pa; $5 \times 10^{-9}$ to $3 \times 10^{-2}$ mbar |
| 4.0 mA emission (UHV) | $2 \times 10^{-11}$ to $5 \times 10^{-4}$ Torr; $3 \times 10^{-9}$ to $7 \times 10^{-2}$ Pa; $3 \times 10^{-11}$ to $7 \times 10^{-4}$ mbar |
| 4.0 mA emission (extended) | $2 \times 10^{-10}$ to $5 \times 10^{-4}$ Torr; $3 \times 10^{-8}$ to $7 \times 10^{-2}$ Pa; $3 \times 10^{-10}$ to $7 \times 10^{-4}$ mbar |
| X-ray limit (UHV) | $2 \times 10^{-11}$ Torr; 3 $\times 10^{-9}$ Pa; $3 \times 10^{-11}$ mbar (see Note 6 below) |
| Materials exposed to gas | All vacuum fired, UHV compatible |
| Gauge operating temperature | 0 °C to 50 °C ambient, non-condensing |
| Internal volume | 73.0 $cm^3$, (4.45 $inch^3$) to the port screen |
| Gauge bakeout temperature | 450 °C maximum (non-operating, cable removed) |
| Maximum gauge cable length | 61 meters (200 feet) |
| Convectron gauge | |
| Measuring range for $N_2$ or air | $1 \times 10^{-4}$ to 999 Torr; $1 \times 10^{-2}$ to $1.33 \times 10^{5}$ Pa; $1 \times 10^{-4}$ to $1.33 \times 10^{3}$ mbar |
| Mounting position | Horizontal preferred, with port down |
| Sensor material | Gold-plated tungsten |
| Other materials exposed to gas | 304 stainless steel, nickel iron alloy, borosilicate glass, polyimide |
| Internal volume | 33 $cm^3$ (2.14 $inch^3$) |
| Gauge operating temperature | 0 °C to 50 °C ambient, non-condensing |
| Gauge bakeout temperature | 150 °C maximum, non-operating, cable disconnected |
| Cable bakeout temperature | 105 °C maximum |
| Maximum gauge cable length | 152 meters (500 feet) |

1. Measurements will change with different gases and mixtures.
2. Stabil-Ion and Convectron Gauges are not intended for use with flammable or explosive gases.
3. Atmospheric value is based on calibration at time of use.
4. Accuracy for extended range gauge (the difference between the gauge reading and a calibrated reference standard) is determined statistically and includes the combined performance of the gauge and electronics.
5. Repeatability for extended range gauge refers to the ability of the same module to read the same pressure at different times.
6. The x-ray limit is the absolute lowest indication from the gauge. It is not practical to make repeatable measurements near the x-ray limit.

# Ordering Information

To specify a Series 370 Stabil-Ion Vacuum Measurement System, select:

- A Stabil-Ion Controller
- Rack-mount configuration
- Up to three option cards
- Measurement units display option
- Power cord option
- Stabil-Ion Gauges
- Stabil-Ion Gauge cables
- Convectron Gauges
- Convectron Gauge cable

## Stabil-Ion Vacuum Gauge Controller

Select the desired configurations and options to create your catalog number.

**Series 370 Stabil-Ion Controller** — 370 ### - # # # - # #

**Configuration options**

| | |
|---|---|
| controller and power supply, 19-inch rack | 501 |
| half-rack mount with remote power supply | 502 |

**Interface options (Slot X) ***

| | |
|---|---|
| None | 0 |
| RS-232 | A |
| RS-485 | B |
| IEEE-488 | C |

**Gauge options (Slot Y) ***

| | |
|---|---|
| None | 0 |
| Dual Convectron Gauge | 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 Vac & Japan 100 Vac | 1 |
| North America 240 Vac | 2 |
| Universal Europe 220 Vac | 3 |
| United Kingdom 240 Vac | 4 |

* Option cards: Select up to three option cards - one for each slot. The controller will be assembled with the option cards installed. Option cards can also be ordered separately for field installation. Contact Customer Support for more details.

### Ordering Example

To order a Series 370 Stabil-Ion Gauge Controller and power supply mounted side by side for 19-rack, IEEE-488 interface, dual Convectron Gauge operation, 6 setpoint relays, display in Torr, and North America 115 Vac power cord, select Catalog number: 370501-C1B-T1.

# Granville-Phillips® Series 370 Stabil-Ion® Vacuum Gauge and Controller

## Stabil-Ion® Gauges and Cables

**Stabil-Ion Vacuum Gauges with dual yttria-coated iridium filaments and Memory Module**

| | |
|---|---|
| Extended range gauge, 2.75 conflat flange | 370120 |
| UHV range gauge, 2.75 conflat flange | 370121 |

**Cables for Stabil-Ion Gauge, side-by-side mounting of controller and power supply**

| | |
|---|---|
| 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 |

**Cables for Stabil-Ion Gauge, remote mounting of power supply**

| | |
|---|---|
| 10 feet (3 meters) | 360117-10 |
| 25 feet (7.6 meters) | 360117-25 |

## Convectron® Gauges and Cables

**Convectron Vacuum Gauges**

Select the desired vacuum connection.

| | |
|---|---|
| 1/8 NPT / 1/2 inch tubulation | 275071 |
| 1/4 inch 4VCR-type female | 275185 |
| 1/2 inch 8VCR-type female | 275282 |
| NW16KF | 275203 |
| NW25KF | 275196 |
| NW40KF | 275316 |
| 1.33 inch (NW16CF) ConFlat-type | 275256 |
| 2.75 inch (NW35CF) ConFlat-type | 275238 |
| 3/8 inch VCO-type male | 275233 |

**Dual Convectron Gauge Cables**

Select the desired length. One cable assembly connects two gauges. A cable assembly has a single connection to the controller and two equal lengths of cable to the Convectron 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 |

## Backed by GUTS®

All Granville-Phillips products are backed by the GUTS (Guaranteed Uptime Support) rapid response network, our comprehensive customer support program. When you call the GUTS service center, you are guaranteed immediate, competent response and action by a vacuum expert from our worldwide technical support staff. We're at work for you 24 hours a day, 365 days a year. In the U.S., dial 1 before the phone number 1-800-FOR-GUTS (800-367-4887).

For more information, please contact your local Brooks Automation sales representative or visit www.brooks.com.

Brooks

6450 Dry Creek Parkway • Longmont, CO 80503 U.S.A. • Tel: (303) 652-4400 • Fax: (303) 652-2844 • www.brooks.com

© 2008 Brooks Automation, Inc. All Rights Reserved. Granville-Phillips, Stabil-Ion, Convectron and GUTS are registered trademarks of Brooks Automation, Inc. VCR is a registered trademark of Cajon Co; ConFlat of Varian Associates.

141607-04 03/12