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

All-metal, rack-mount controller for Stabil-Ion and Convectron® vacuum gauges is noise-immune and CE compliant

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

Stabil-Ion Gauge Technology

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, thereby always indicating a pressure reading that is often inaccurate by 30% to 40% - sometimes even worse. Patented precise design and advanced manufacturing techniques assure that the components of the Stabil-Ion Gauge do not shift, thus providing accurate pressure indications for the life of the gauge.

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. Even 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.

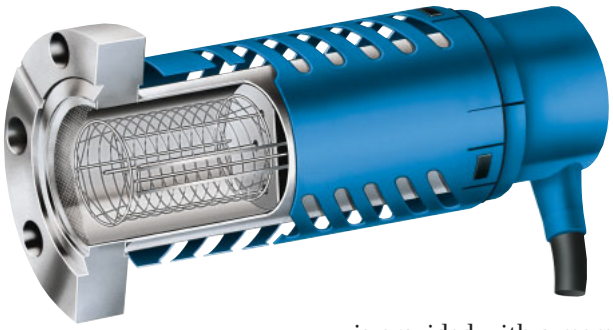
Stabil-Ion Vacuum Gauge Controller

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. Modular design provides many possibilities to meet your requirements, including a range of computer interfaces, setpoint control relays, dual Convectron Gauge operation, and digital display in torr, millibar, or pascal. Other features include analog output, selectable emission current, degas timer, and non-volatile memory to save setpoints during a power outage.

HELIX

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.

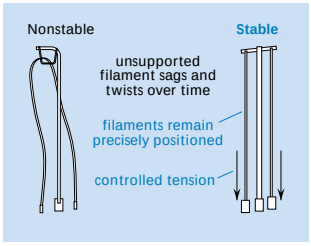
Vacuum Fired Components – Are never touched by bare hands during assembly. All manufacturing, assembly and testing is performed in a cleanroom environment, preventing contamination and speeding vacuum system pumpdown.

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.

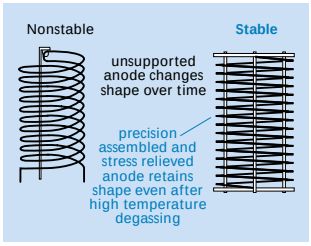
Choice of Measuring Range – The Stabil-Ion Gauge is available for use in high vacuum or ultra-high vacuum ranges. See the Technical Specifications for measurement ranges.

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

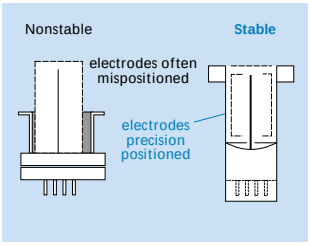
Here are the more important problems with older BA gauge designs that we removed in order to achieve accuracy over time and gauge-to-gauge. Sophisticated computer simulations of electron and ion trajectories helped greatly in identifying the causes of nonstable behavior.



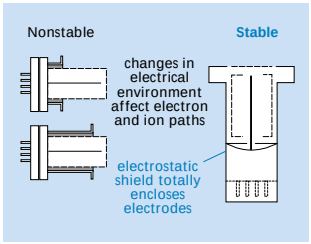
Filament must remain in position over time.



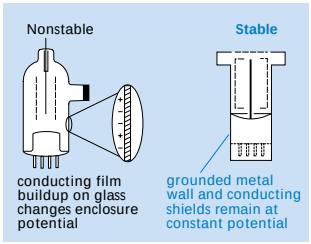
Anode must remain in position over time



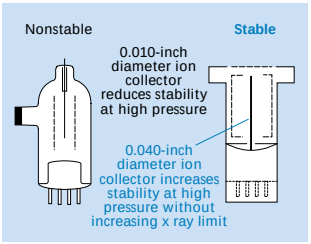
Electrode position relative to wall must not vary gauge to gauge.



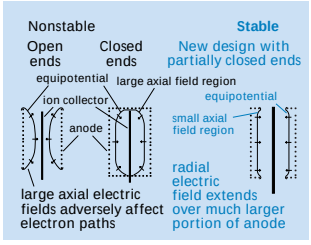
Electrical environment must not change.



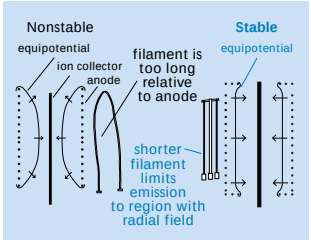
Electrical environment must not change.



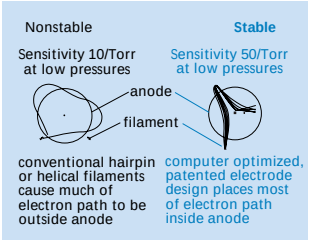
Ion space charge at high pressure must be minimized.



Axial electric fields must be minimized.



Electron emission must be limited to central region of anode.



Electron trajectories must be controlled.

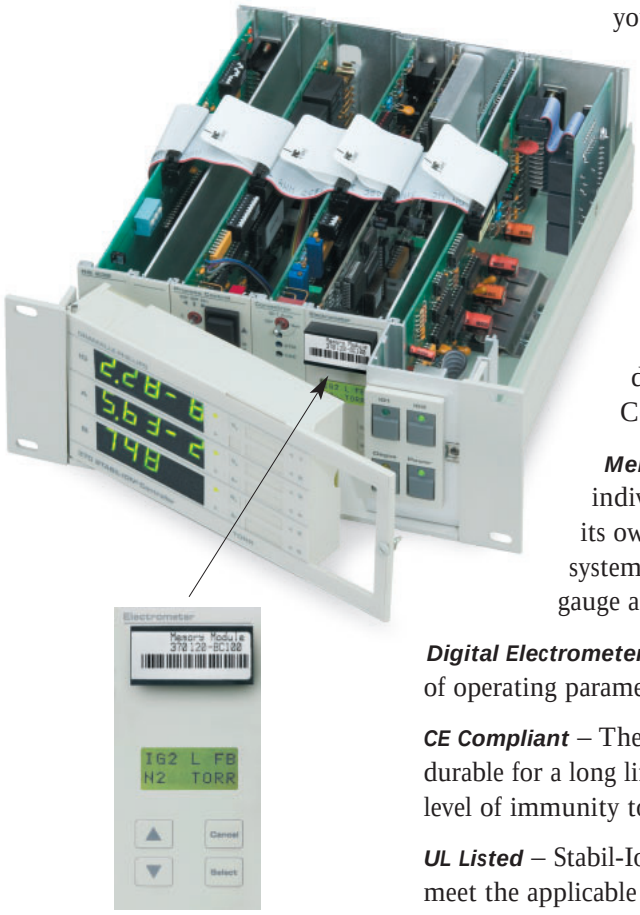
Technical Specifications

Controller measuring range for N_2 or air (see Notes 1, 2 and 3, below)	
UHV Stabil-Ion Gauge (with Convectron)	
Torr	2 x 10^{-11} to 999 Torr
mbar	3 x 10^{-11} to 1.33 x 10^{3} mbar
Pa	3 x 10^{-9} to 1.33 x 10^{5} Pa
Extended Range Stabil-Ion Gauge (with Convectron)	
Torr	2 x 10^{-10} to 999 Torr
mbar	3 x 10^{-10} to 1.3 x 10^{3} mbar
Pa	3 x 10^{-8} to 1.3 x 10^{5} Pa
Accuracy for N_2	± 4% of reading from 1 x 10^{-8} Torr to 1 x 10^{-4} Torr (see note 4)
Repeatability	± 3% of reading from 1 x 10^{-8} Torr to 1 x 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 3101)
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 60 Vdc, 5 A at 30 Vac, resistive load
Stabil-Ion gauge	
Measuring range for N_2 or air	
0.1 mA emission	4 x 10^{-9} to 2 x 10^{-2} Torr; 5 to 3 x10^{-7} Pa; 5 x 10^{-9} to 3 x 10^{-2} mbar
4.0 mA emission (UHV)	2 x 10^{-11} to 5 x 10^{-4} Torr; 3 x 10^{-9} to 7 x 10^{-2} Pa; 3 x 10^{-11} to 7 x 10^{-4} mbar
4.0 mA emission (extended)	2 x 10^{-10} to 5 x 10^{-4} Torr; 3 x 10^{-8} to 7 x 10^{-2} Pa; 3 x 10^{-10} to 7 x 10^{-4} mbar
X-ray limit (UHV)	2 x 10^{-11} Torr; 3 x10^{-9} Pa; 3 x 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 x 10^{-4} to 999 Torr; 1 x 10^{-2} to 1.33 x 10^{5} Pa; 1 x 10^{-4} to 1.33 x 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)

Notes

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.

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 easy upgrading as 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 with one glance.

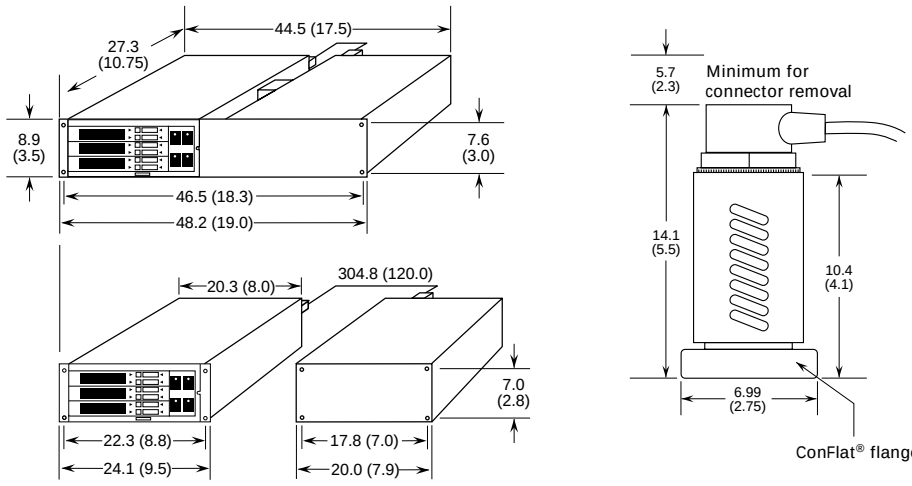
Memory Module for the Stabil-Ion Gauge – Each Stabil-Ion Gauge is individually calibrated and supplied with a memory module matched to its own calibration data. If you replace a Stabil-Ion Gauge on your system, you also replace the memory module supplied with the new gauge and you immediately have a calibrated system again.

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 in cm (inch)

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	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.

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

Vacuum gauges and cables are listed on the back of this brochure.

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

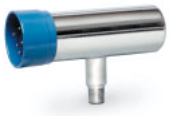
Cables for Stabil-Ion Gauge, side-by-side mounting of controller and power supply

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

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 world-wide technical support staff. We're at work for you 24 hours a day, 365 days a year. 1-800-FOR-GUTS (800-367-4887).

HELIX

Helix Technology Corporation
Colorado Operations
6450 Dry Creek Pkwy • Longmont, Colorado 80503-9501 USA
Telephone: (303) 652-4400 • Toll free in USA (800) 776-6543 • Fax: (303) 652-2844
email: salessupport@helixtechnology.com Visit us online at: www.helixtechnology.com