Series 370

Stabil-Ion® Vacuum Gauge and Controller

The 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, set point 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 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.

Product Features

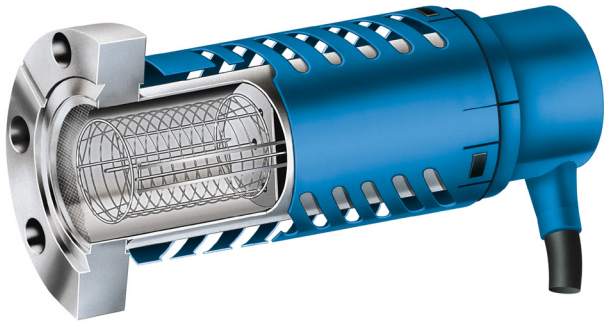
- All-metal, rack-mount controller for Stabil-Ion and Convectron vacuum gauges is noise-immune
- Flexible design allows for optional set point relays and digital interfaces
- Three-digit display of pressure measurements
- Stabil-Ion Gauge has memory module with calibration data
- Ultra-clean gauge construction allows rapid response during pumpdown

Key Benefits

- 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
- Dual filaments increase equipment uptime

Stabil-Ion® Vacuum Gauge

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.



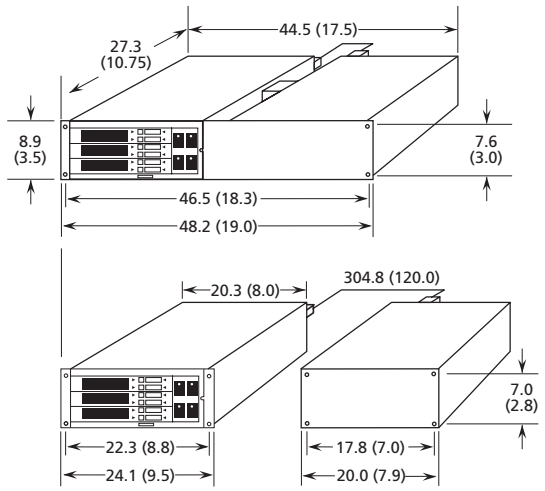
Stabil-Ion® Gauge Cutaway

- **Precision-Wound, Stress-Relieved Anode:** Retains its original shape even after high-temperature degassing, thus reduces measurement errors. No movement of any of theinternal 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.

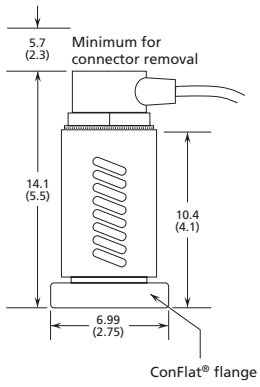
Stabil-Ion® Controller

- **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 set point 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 or RS-485 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 calibration.
- **Digital Electrometer with Liquid Crystal Display for Setup:** Permits easy programming of operating parameters and calibration data, and displays the parameter value readouts.
- **Dual Stabil-Ion Gauge Operation:** Sequentially operates two gauges.
- **Analog Output:** All Series 370 controller configurations provide a log linear analog output.

Vacuum Gauge Controller Cutaway

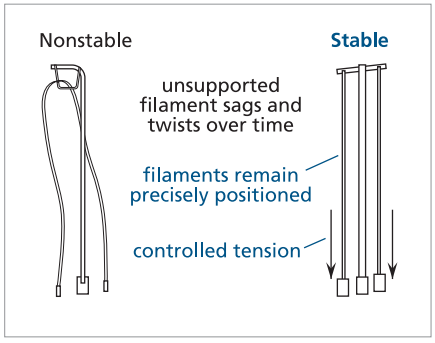


Dimensions are in cm (inch)

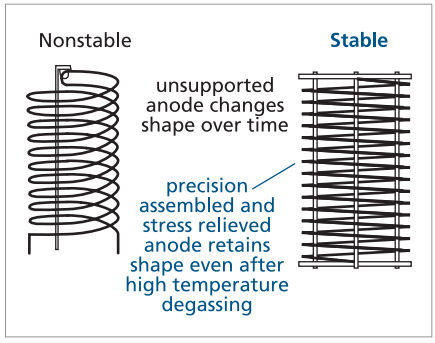


Dimensional Drawing
Note: Dimensions are nominal values in centimeters (inches referenced).

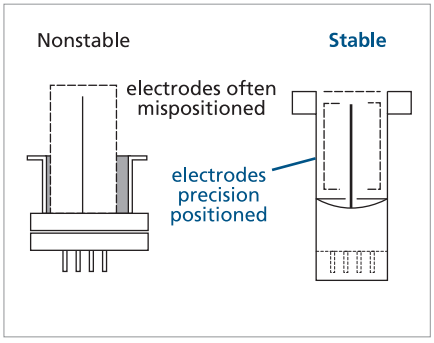
Behavior of Stabil-Ion® Gauges



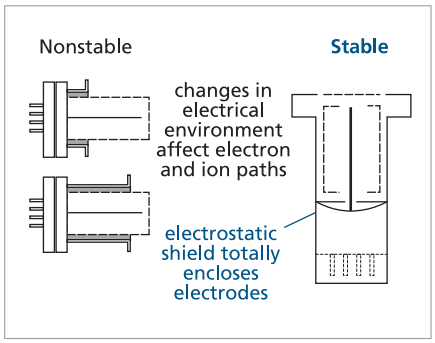
Filament must remain in position over time.



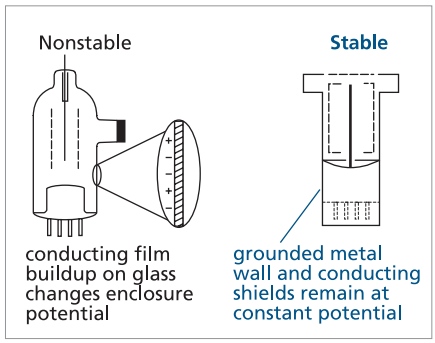
Anode must remain in position over time.



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



Electrical environment must not change.



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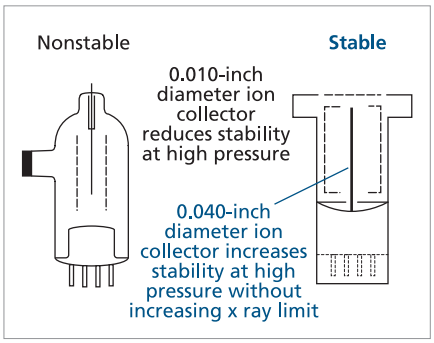
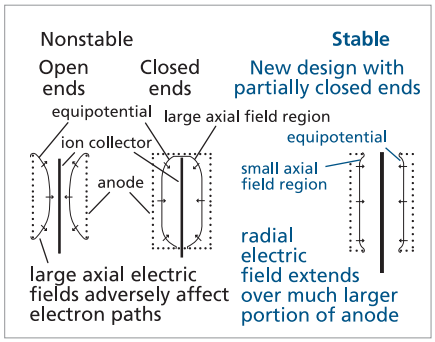
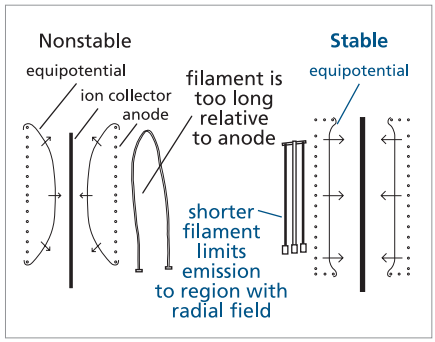


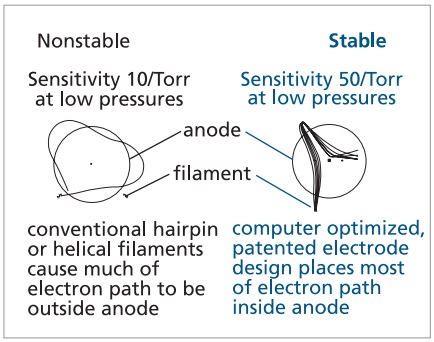
Ion space charge at high pressure must be minimized.



Axial electric fields must be minimized.



Electron emission must be limited to central region of anode.



Electron trajectories must be controlled.

Causes of Unstable Behavior of Typical B-A Gauges vs. Stable Behavior of Stabil-Ion® Gauges
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.

Specifications

UHV Stabil-Ion Gauge (with Convectron) Controller Measuring Range for N_2 or Air See Note (1), (2), (3)	
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
Display	3 digits, plus exponent, green LED: Torr, mbar, or Pa
Digital Interface Options	RS-232 or RS-485
Convectron Gauge Option	• Operates 2 gauges
Analog Output	• 1 volt/decade, logarithmic, 0 to 7 VDC
Set Point Options	• 2 relays for Stabil-Ion gauge or 6 relays
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 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)
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)
Stabil-Ion 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, Kovar®, alumina, borosilicate glass, polyimide
Internal Volume	• 35 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.*

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.

Ordering Code Example: 370501-B1B-T1	Code	Configuration
Model		
Series 370 Stabil-Ion Controller	370	370
Configuration Options		
Controller and power supply, 19-inch rack Half-rack mount with remote power supply	501 502	501
Interface Options (Slot X)*		
None RS-232 RS-485	0 A B	B
Gauge Options (Slot Y)*		
None Dual Convectron Gauge	0 1	1
Set Point Options (Slot Z)*		
None 2 set point relays for Stabil-Ion Gauge 6 set point relays, 2 per channel	0 A B	B
Display Options - Measurement Units		
Torr mbar Pa	T M P	T
Power Cord Options		
North America 115 VAC and Japan 100 VAC North America 240 VAC Universal Europe 220 VAC United Kingdom 240 VAC	1 2 3 4	1

** 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 Information

Gauge and Cable Ordering information	
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 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

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