

Series 355/358

Micro-Ion[®] Vacuum Gauge and Controller



The Series 358 Controller is designed specifically to obtain the highest performance from the Micro-Ion[®] Gauge. It is capable of measuring from a lower limit in the 10^{-10} Torr range (10^{-10} mbar, 10^{-8} Pa) to 5×10^{-2} Torr (7×10^{-2} mbar, 7 Pa). Pressure measurements can be extended to atmosphere with the Dual Convectron[®] Gauge Option.

This reliable controller is compact and easy to use. The extruded aluminum, half-rack design fits easily into your control rack. Infrequently used controls are located behind the front panel door to provide an uncluttered appearance. Large, bright green, flicker-free LED digital displays make measurements easy to read - even from a distance.

The Series 358 controller can be configured to meet your specific system requirements. Up to 6 set point relays can be used to control a variety of system functions such as switching valves, setting interlocks, and setting alarms. Integration into computer-controlled systems is

also possible through the use of RS-232 or RS-485/422 interface options.

The Micro-Ion Gauge is the world's smallest ionization gauge where pressure measurement is based on the amount of ion current that is generated when energized electrons collide with gas molecules in the gauge. High performance in a small volume is achieved through a number of enhancements including its patented dual ion collector design that optimizes electron motion and ion collection. Dual filaments provide extended lifetime by running both filaments simultaneously at a lower current, and avoid unscheduled downtime by using the second filament as a backup. Ultra-clean construction, including vacuum firing of all components and assembly in a Class 100 cleanroom environment ensures rapid, repeatable response during vacuum chamber pumpdown.

Product Features

- Vacuum pressure measurement from the 10^{-10} Torr range (10^{-10} mbar, 10^{-8} Pa)
- Flexible design allows for optional set point relays and digital interfaces
- Rugged metal enclosure is noise immune
- Dual filaments increase equipment uptime



Key Benefits

- Compact, reliable, rack-mount controller for optimum Micro-Ion[®] Gauge performance
- Convectron[®] Gauge option extends pressure measurement to atmosphere
- Ultra-clean gauge construction allows rapid response during pumpdown

Series 358 Micro-Ion® Controller

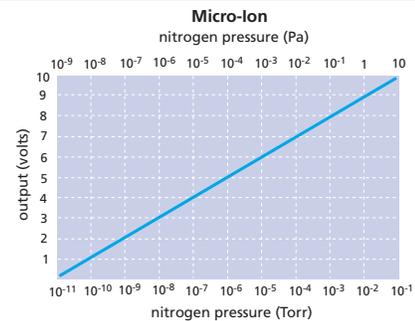
- **Optimized Micro-Ion Gauge Performance:** The controller is designed specifically to obtain optimum performance from a Micro-Ion Gauge. With the proper emission current settings, Micro-Ion Gauges can be operated from 5×10^{-10} to 5×10^{-2} Torr.
- **Convenient, Option-Rich, Half-Rack Controller:** Half-rack design saves space in your control rack. The controller can be configured to your requirements with numerous optional features, including dual Convector Gauge readout, process set point relays, and digital Interfaces. The extruded aluminum case provides a high level of immunity to electrical noise and is fully CE compliant.
- **3-Line Digital Display:** Bright, easy-to-read, flicker-free, green LED displays allow the user to monitor all three pressure readings at a single glance.
- **Dual Convector Option:** Provides accurate and reliable vacuum pressure measurements from 10^{-4} Torr (10^{-4} mbar, 10^{-2} Pa) to atmosphere at two locations on your vacuum system. The Convector Gauge reading can be used to automatically turn on the Micro-Ion Gauge.
- **Improved Economy:** The modular design enables users to purchase only the required capabilities without paying for features that they do not want or need. Field-replaceable option boards allow for easy upgrading as needs change.
- **Process Control Options:** Up to six process control set point relays are available to control other vacuum equipment and provide safety interlocking. These digitally controlled relays are stable and easy to adjust. A manual override capability helps with system set-up and maintenance.
- **Computer Interface Options:** A RS-232 or RS-485/422 interface allows easy integration with computer-controlled systems.
- **Universal Power Supply:** Works with any AC supply voltage between 90 and 240 Volts.

Analog Output

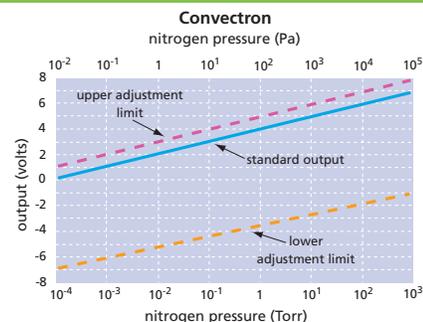
The Micro-Ion Gauge analog output is proportional to the logarithm of the pressure indication with the scale of one volt per decade. A >10 Volt signal indicates that the gauge is off. The Convector Gauge analog output is also proportional to the logarithm of the pressure indication with the scale of one volt per decade. The dc offset for this output can be adjusted from -7 to $+1$ Volts by an internal adjustment on the option card. The factory setting is an offset of 0 Volts.



Series 358 Vacuum Gauge Controller



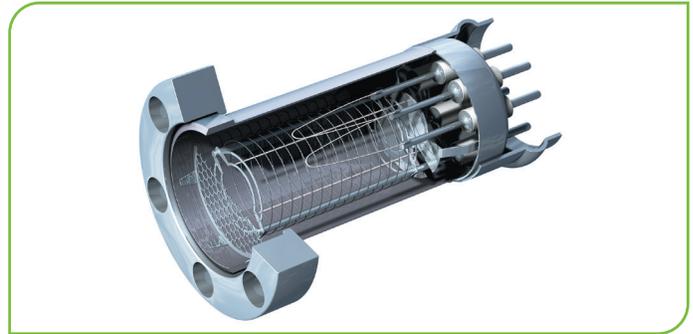
Micro-Ion® Analog Output



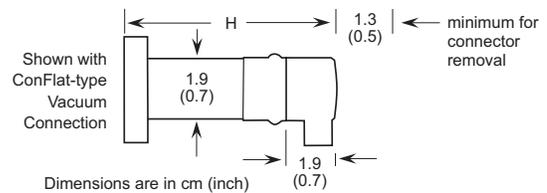
Convector® Analog Output

Series 355 Micro-Ion® Gauge

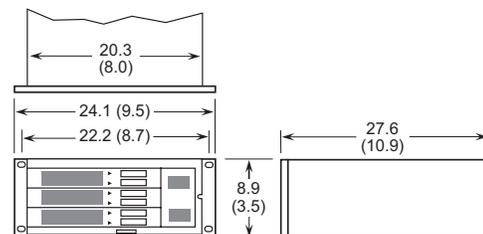
- World's Smallest Ionization Gauge:** Micro-Ion Gauges occupy less than 10% of the volume of conventional glass gauge or nude gauges, allowing easy installation in complex, tightly packed vacuum systems.
- High Performance:** Patented dual ion collector design increases electron path length and ion collection efficiency providing high performance in a small volume.
- Long-Term Stability:** The grid windings are attached to the grid posts every 180° for greater sensitivity and stability.
- Dual Filaments:** Dual, burn-out resistant yttria-coated iridium filaments provide long gauge life. Unscheduled downtime is avoided by using the second filament as a back-up until the gauge can be replaced during regular maintenance procedures.
- Cooler Operation:** At only 8% of the power consumption of a traditional glass or nude gauge, the Micro-Ion Gauge generates significantly less heat-related process or experiment disturbances.
- Port Shield:** Protects the electrode assembly from damage during assembly or vacuum chamber maintenance, and provides a stable electrical environment for improved measurement performance.
- All-Metal Enclosure:** Prevents grid and filament damage during mounting and eliminates the risk of glass breakage.
- Wide Selection of Vacuum Fittings:** Simplifies installation on your vacuum system.



Series 358 Micro-Ion® Gauge Cutaway



Vacuum Connection	Dimension H
0.75 inch port diameter	9.4 cm (3.7 in.)
1.0 inch port diameter	9.4 cm (3.7 in.)
15 mm port diameter	9.4 cm (3.7 in.)
18 mm port diameter	9.4 cm (3.7 in.)
1/2 inch VCR type	8.6 cm (3.4 in.)
NW16KF flange	7.3 cm (2.9 in.)
NW25KF flange	7.3 cm (2.9 in.)
NW40KF flange	7.3 cm (2.9 in.)
1.33 inch ConFlat®	7.3 cm (2.9 in.)
2.75 inch ConFlat	7.3 cm (2.9 in.)



All dimensions are shown in centimeters (inches)

Dimensional Drawing - Unless otherwise specified, dimensions are nominal values in centimeters (inches referenced).

Specifications

Measuring Range for Air and N₂ <small>See notes (1), (2)</small>	Torr mbar Pa	<ul style="list-style-type: none"> • 5×10^{-10} to 5×10^{-2} (to 1000 Torr with Convector option) • 6×10^{-10} to 7×10^{-2} (to 1300 mbar with Convector option) • 6×10^{-8} to 7 (to 130 kPa with Convector option)
Display	Update Rate	<ul style="list-style-type: none"> • 2 digits plus exponent, green LED • Every 0.5 sec
Emission Current		0.02, 1 or 4 mA, switch selectable
Filament Selections		Filament 1, filament 2 or both, switch selectable
Degas		Electron bombardment, 4 W with 2-minute timer
Overpressure Protection		Ion gauge turns off at factory set upper pressure limit
Micro-Ion Analog Output		1 Volt/decade, logarithmic, 0 to 10 V
Remote Input/Output Signals	Input Signals Output Signals Connector	<ul style="list-style-type: none"> • Gauge on/off and degas on/off, selected by momentary continuity to ground • Gauge status indicated by a single-pole, double-throw relay rated at 1 A @ 30 VDC resistive, AC non-inductive • 9-pin subminiature-D male
Maximum Micro-Ion Cable Length		50 ft (15 m) with standard cable
Power Required		100 to 240 VAC, 50 to 60 Hz, 50 W max
Operating Temperature		0°C to 40°C ambient, non-condensing
Non-Operating Temperature		-40°C to 70°C
Weight		1.8 kg (4 lbs)
Case Material		Aluminum extrusion
Convector Option	Analog Output Maximum Cable Length	<ul style="list-style-type: none"> • Operates 2 gauges • 1 Volt/decade, logarithmic, 0 to 7 V, -7 to 1 V adjustable offset • 500 ft (152.4 m)
Process Control Options	Configuration Contact Rating	<ul style="list-style-type: none"> • 6 channels max, 2 per gauge • Single-pole, double-throw (SPDT) relays • 5 A at 30 VDC, 5 A at 120 VAC, 4 A at 240 VAC, resistive load

Specifications	
Digital Interface Options	RS-232 or RS-485/422
Micro-Ion Gauge	
Sensitivity for N₂ or Air	• 20/Torr, 15/mbar, 0.15/Pa
X-ray Limit	• $<3 \times 10^{-10}$ Torr, $<4 \times 10^{-10}$ mbar, $<4 \times 10^{-8}$ Pa ^{See Note (3)}
Filament Materials	• Yttria-coated iridium or tungsten ^{See Note (4)}
Other Materials Exposed to Gas	• 304 stainless steel, alumina, tantalum, tungsten, CuAg eutectic, Kovar®
Internal Volume	• 10.8 cm ³ (0.66 inch ³) to port screen
Gauge Weight	• 113 gm (4 oz) with NW16KF fitting
Gauge Bakeout Temperature	• 200°C maximum, non-operating, cable disconnected
Cable Bakeout Temperature	• 150°C maximum
Convector Gauge	
Mounting Position	• Horizontal preferred
Sensor Material	• Gold-plated tungsten
Other Materials Exposed to Gas	• 304 stainless steel, borosilcate glass, Kovar, alumina, NiFe alloy, polyimide
Internal Volume	• 35 cm ³ (2.14 inch ³)
Gauge Weight	• 85 grams (3 ounces) plus vacuum connection fitting
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

Notes:

- (1) Measurements will change with different gases and mixtures. Correction curves for common gases are provided in the instruction manual. Micro-Ion Gauges and Convector Gauges are not intended for use with flammable or explosive gases.
- (2) For measurements below 1×10^{-7} Torr (1×10^{-7} mbar, 1×10^{-5} Pa), either a ConFlat®-type or VCR-type vacuum connection is recommended.
- (3) 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.
- (4) Tungsten filaments are for applications involving gases containing fluorine, chlorine or other gas species that poison yttria-coated iridium filaments. Tungsten filaments are not recommended for general vacuum applications because they may burn out when exposed to high pressures.

Ordering Information - Series 358

To specify a Series 358 Micro-Ion Vacuum Measurement System, select:

- A Micro-Ion Controller
- Up to three option cards *
- Measurement units display option
- Power cord option
- A Micro-Ion Gauge
- A Micro-Ion Gauge cable
- Convector Gauges
- Convector Gauge cable

Micro-Ion Vacuum Gauge Controller:

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

Ordering Code Example: 358501-B1B-T1	Code	Configuration
Model		
Series 358 Micro-Ion Controller	358	358
Configuration Options		
Controller, half-rack mount	501	501
Interface Options (Slot X)*		
None	0	
RS-232	A	B
RS-485/422	B	
Gauge Options (Slot Y)*		
None	0	
Dual Convector Gauge	1	1
Set Point Options (Slot Z)*		
None	0	
2 set point relays for Micro-Ion Gauge	A	B
6 set point relays, 2 per channel	B	
Display Options - Measurement Units		
Torr	T	
mbar	M	T
Pa	P	
Power Cord Options		
North America and Japan 115 VAC	1	
North America 240 VAC	2	
Universal Europe 220 VAC	3	1
United Kingdom 240 VAC	4	
Option Cards for Installation		
RS-232 Interface	358007	
RS-485/422 Interface	358006	
Dual Convector option	358002	
2 set point relays for Micro-Ion Gauge	358004	
6 set point relays, 2 per channel	358003	
Mounting Hardware for 19" Rack		
Two controllers side by side	370021	
One controller left or right mount	370010	
One controller center mount	370011	

*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 (see above).

Ordering Information - Series 355

Ordering Code Example: 355001-YD	Code	Configuration
Model		
Series 355 Micro-Ion Vacuum Gauge	355001	355001
Filament Type		
Dual yttria-coated iridium	Y	Y
Dual tungsten	T	
Vacuum Connection*		
3/4 inch port compression	A	D
1.0 inch port compression	J	
NW16KF	D	
NW25KF	E	
NW40KF	K	
1.33 inch (NW16CF) ConFlat-type	F	
2.75 inch (NW35CF) ConFlat-type	G	
1/2 inch VCR-type male	H	

*For measurements below 1×10^{-7} Torr (1×10^{-7} mbar, 1×10^{-5} Pa), either a ConFlat type or VCR-type vacuum connection is recommended.

Ordering Information - Cables

Micro-Ion® Gauge Cables	Code
Length	
10 feet (3 meters)	358011-10
25 feet (7.6 meters)	358011-25
50 feet (15.2 meters)	358011-50

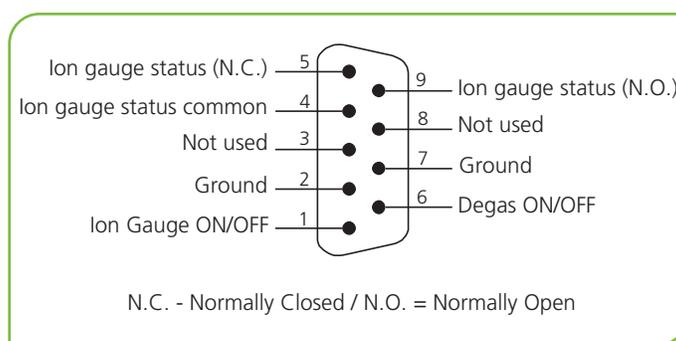
Select the desired length. One cable required.

Convectron® Vacuum Gauges	Code
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

Select the desired vacuum connection.

Dual Convectron® Gauge Cables	Code
Length	
10 ft (3 m)	303040-10
25 ft (7.6 m)	303040-25
50 ft (15.2 m)	303040-50
100 ft (30.48 m)	303040-100
200 ft (60.96 m)	303040-200

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.



Remote Input/Output Connector