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Pressure & Vacuum Measurement Solutions

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Series 355 & 358

MICRO-ION® VACUUM GAUGE AND CONTROLLER

Description

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 $5x10^{-2}$ Torr ($7x10^{-2}$ 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.

Features & Benefits

- Compact, reliable, rack-mount controller for optimum Micro-Ion® Gauge performance
- Vacuum pressure measurement from the 10^{-10} Torr range (10^{-10} mbar, 10^{-8} Pa)
- Convectron® Gauge option extends pressure measurement to atmosphere
- Flexible design allows for optional set point relays and digital interfaces
- Rugged metal enclosure is noise immune
- Dual filaments increase equipment uptime
- Ultra-clean gauge construction allows rapid response during pumpdown

Micro-Ion® Gauge Technology

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.

Series 358 Micro-Ion® Controller Description

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 $5x10^{-10}$ to $5x10^{-2}$ 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 Convectron 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 Convectron 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 Convectron 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.

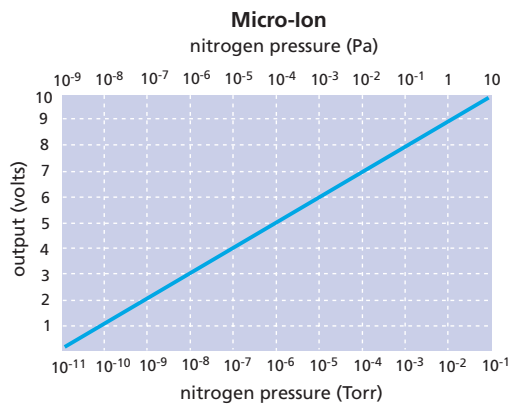
Computer Interface Options: A RS-232 or RS-485/422 interface allows easy integration with computer-controlled systems.

Universal Power Supply: Works with any AC supply voltage between 90 and 240 Volts.

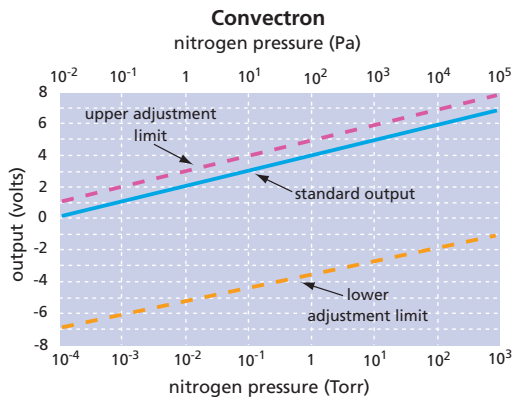
Analog Output

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 Convectron 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



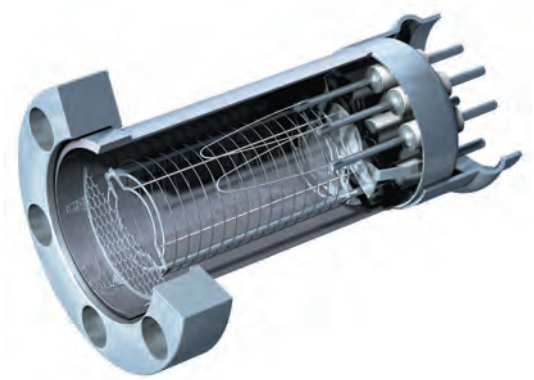
Micro-Ion® Analog Output



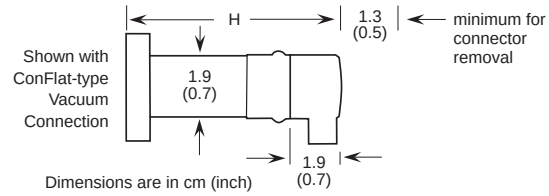
Convectron® Analog Output

Series 355 Micro-Ion® Gauge Description

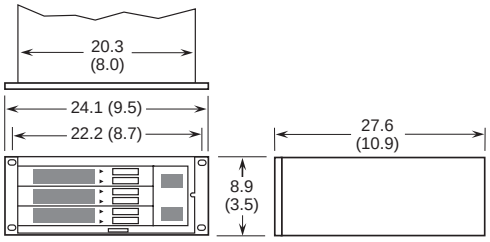
- **World's Smallest Ionization Gauge:** Micro-Ion Gauges occupy less than 10% of the volume of conventional glass gauge or nude gauges, allowing easy installation in complex, tightly packed vacuum systems.
- **High Performance:** Patented dual ion collector design increases electron path length and 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 355 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 —

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

Specifications

Measuring Range for Air and N_2 See Notes (1), (2)	
Torr	$5x10^{-10}$ to $5x10^{-2}$ (to 1000 Torr with Convectron option)
mbar	$6x10^{-10}$ to $7x10^{-2}$ (to 1300 mbar with Convectron option)
Pa	$6x10^{-8}$ to 7 (to 130 kPa with Convectron option)
Display	2 digits plus exponent, green LED
Update Rate	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	Gauge on/off and degas on/off, selected by momentary continuity to ground
Output Signals	Gauge status indicated by a single-pole, double-throw relay rated at 1 A @ 30 VDC resistive, AC non-inductive
Connector	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
Convectron Option	Operates 2 gauges
Analog Output	1 Volt/decade, logarithmic, 0 to 7 V, -7 to 1 V adjustable offset
Maximum Cable Length	500 ft (152.4 m)
Process Control Options	6 channels max, 2 per gauge
Configuration	Single-pole, double-throw (SPDT) relays
Contact Rating	5 A at 30 VDC, 5 A at 120 VAC, 4 A at 240 VAC, resistive load
Digital Interface Options	RS-232 or RS-485/422
Micro-Ion Gauge	
Sensitivity for N_2 or Air	20/Torr, 15/mbar, 0.15/Pa
X-ray Limit	< $3x10^{-10}$ Torr, < 4 $x10^{-10}$ mbar, < $4x10^{-8}$ 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 cc^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
Convectron 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 cc^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 Convectron Gauges are not intended for use with flammable or explosive gases.

(2) For measurements below $1x10^{-7}$ Torr ($1x10^{-7}$ mbar, $1x10^{-5}$ 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.

Model Number Matrix - Controller

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

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

Micro-Ion Vacuum Gauge Controller:

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

358### - # # # - # #

Series 358 Micro-Ion Controller	
Configuration options*:	
Controller, half-rack mount	501
Controller, left-mount for 19-inch rack	502
Controller, center-mount for 19-inch rack	503
Interface options (Slot X)**:	
None	0
RS-232	A
RS-485/422	B
Gauge options (Slot Y)**:	
None	0
Dual Convectron Gauge	1
1 Convectron Gauge/1 Capacitance Manometer	2
Set Point options (Slot Z)**:	
None	0
2 set point relays for Micro-Ion Gauge	A
6 set point relays, 2 per channel	B
Display options - Measurement units:	
Torr	T
mbar	M
Pa	P
Power Cord options:	
North America and Japan 115 VAC	1
North America 240 VAC	2
Universal Europe 220 VAC	3
United Kingdom 240 VAC	4

* Configuration options: To mount two units side by side in a 19 inch rack, order part number 370021. Rack mount kits can also be ordered separately for field installation.

** 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 below).

To order a Series 358 Micro-Ion Gauge Controller with half-rack mount, RS-485 interface, dual Convectron Gauge operation, 6 set point relays, display in Torr, and North America 115 V power cord, select catalog number 358501-B1B-T1.

Option cards for field installation	
RS-232 Interface	358007
RS-485/422 Interface	358006
Dual Convectron option	358002
2 set point relays for Micro-Ion Gauge	358004
6 set point relays, 2 per channel	358003

Ordering Information

Model Number Matrix - Gauge

Micro-Ion Vacuum Gauges:

Select a filament type and vacuum connection to create your catalog number.

355001 - # #

Filament type:	
Dual yttria-coated iridium	Y
Dual tungsten	T
Vacuum connection: *	
3/4 inch port compression	A
1.0 inch port compression	J
15 mm port compression	B
18 mm port compression	C
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 $1x10^{-7}$ Torr ($1x10^{-7}$ mbar, $1x10^{-5}$ Pa), either a ConFlat type or VCR-type vacuum connection is recommended.

Micro-Ion Gauge Cables

Select the desired length. One cable required.

10 ft (3 m)	358011-10
25 ft (7.6 m)	358011-25
50 ft (15.2 m)	358011-50

Convectron Vacuum Gauges

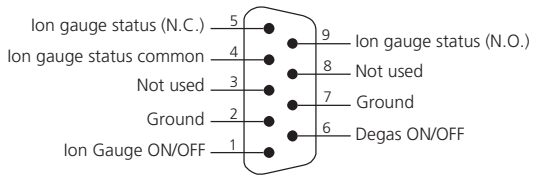
Select the desired vacuum connection.

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 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



N.C. - Normally Closed / N.O. = Normally Open

Remote Input/Output Connector

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