Pressure & Vacuum Measurement Solutions

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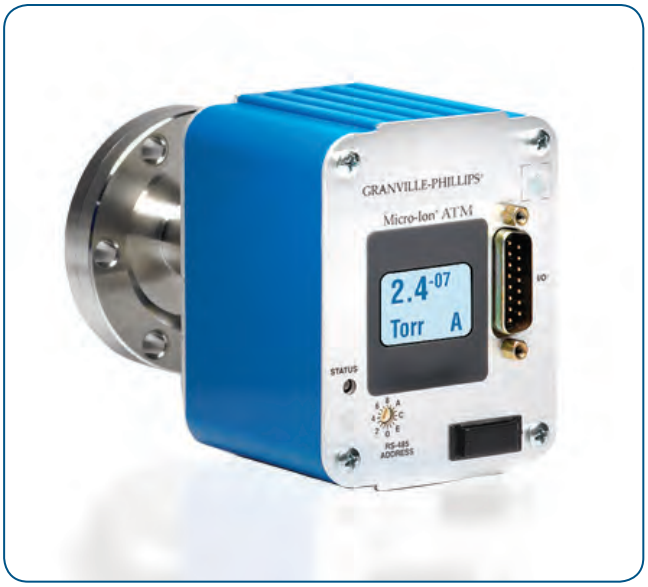


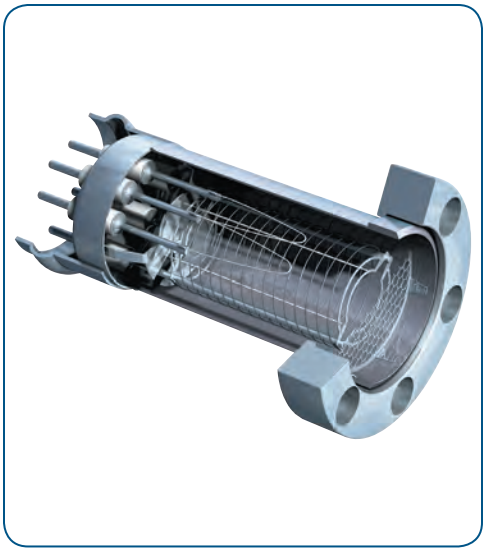
Series 390

MICRO-ION® ATM MODULE

The Micro-Ion ATM module combines proven Micro-Ion ionization gauge technology with a miniature Conductron® heat loss sensor and two Piezo resistive sensors to provide accurate, continuous pressure measurement from high vacuum to atmosphere. Using its diaphragm sensors, this product is capable of providing accurate absolute pressure up to atmosphere along with precise indication of vacuum chamber differential pressure from ambient. The unique sensor design eliminates thermal effects that can influence the performance of the heat loss sensor at higher pressures. This small module combines all four sensors and control electronics in a compact modular design, reducing the number of gauges required on a chamber and minimizing the required space. The full range pressure measurement is output as a single analog signal or available through optional serial RS-485 or DeviceNet™ digital interfaces. The RS-485 and DeviceNet versions have up to three optional set point relays that can be configured for process control, with the ability to assign the relays at any pressure across the vacuum pressure range or to a specific differential pressure value.

Features & Benefits

- Continuous pressure measurement from high vacuum to atmosphere
- Precision differential pressure measurement at atmosphere
- Eliminates need for discrete atmospheric switches
- Eliminates need for three separate sensors
- Dual ionization gauge filaments increase equipment uptime
- Automation of ionization gauge activation and deactivation
- Optional set point relays for process control
- Field-replaceable gauge assembly
- Analog, RS-485 or DeviceNet output available
- Optional graphics LCD display



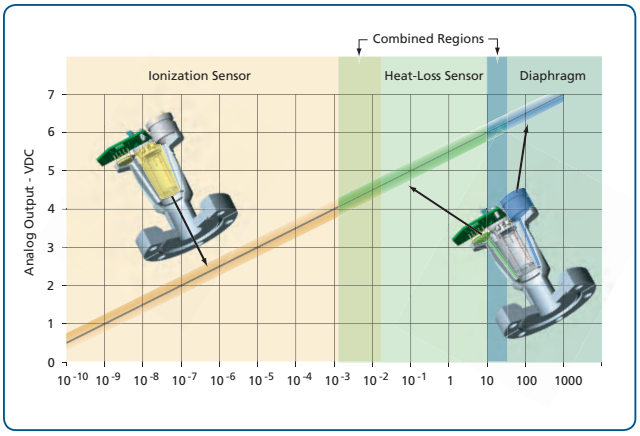
Cross Section of the Micro-Ion Gauge

Combination Gauge Technology

Traditionally, accurate measurement across a wide vacuum range required multiple sensors, multiple vacuum system ports, associated cables and electronics.

The Micro-Ion ATM module combines multiple sensors in one microprocessor-based design, reducing overall cost of ownership, while enhancing vacuum measurement performance.

Over 20 years of successful Granville-Phillips® vacuum gauge designs and field installations have been applied to produce a new standard in vacuum measurement; the Micro-Ion ATM module. The wide range, high performance, and compact design of the Micro-Ion ATM make it a wise choice for pressure measurement in high vacuum systems.



Sensor Switching Points

Description

- **Wide Measurement Range:** Provides continuous vacuum pressure measurement from 1 x 10^{-9} Torr to atmosphere.
- **High Performance:** Proven Micro-Ion ionization gauge technology with dual filaments, a patented heat-loss sensor, and a precision diaphragm eliminates thermal influences on the heat-loss sensor enhances performance at high pressures.
- **Automated Control:** Fully integrated sensors automatically control activation and deactivation of the ionization gauge, thereby simplifying gauge operation.
- **Compact Design:** One Micro-Ion gauge, a heat-loss sensor with a barometric diaphragm sensor, an absolute pressure diaphragm, and control electronics are all housed in a compact, modular package.
- **RS-485 Interface:** Allows for communications between the module and host controller, and module configuration using optional RS-485 communications.
- **DeviceNet Interface:** Provides high speed access to pressure measurement and easy configuration of gauge parameters.
- **Optional Process Control Relays:** Up to three set point control relays can be included to simplify process control functions. Settings are configurable through the RS-485 or DeviceNet interface.
- **Field-Replaceable Gauge Assembly:** Gauge assembly can be quickly and easily replaced in the field using only a screwdriver after removal from the vacuum system.

Specifications

Absolute Pressure Measurement Range (for Air or N_2) See notes (1), (2), (3)

Torr	1 x 10^{-9} to atmosphere
mbar	1.33 x 10^{-9} to atmosphere
Pascal	1.33 x 10^{-7} to atmosphere

X-ray Limit See Note (4)

Torr	<3 x 10^{-10}
mbar	<4 x 10^{-10}
Pascal	<4 x 10^{-8}

Differential Pressure Measurement Range (with respect to room atmosphere)

Torr	-750 to +250
mbar	-999 to +188
kPascal	-99.9 to 18.8

Accuracy (for Air or N_2 absolute pressure) See Note (5)

Torr	1 x 10^{-8} to 100 mTorr: ±15% of Reading; 100 mTorr to 150 Torr: ±10% of Reading; 150 to 1000 Torr: ±2.5% of Reading
mbar	1.33 x 10^{-8} to 0.133 mbar: ±15% of Reading; 0.133 to 200 mbar: ±10% of Reading; 200 to 1,333 mbar: ±2.5% of Reading
Pascal	1.33 x 10^{-6} to 13.3 Pa: ±15% of Reading; 13.3 to 2.00 x 10^{4} Pa: ±10% of Reading; 2.00 x 10^{4} to 1.33 x 10^{5} Pa: ±2.5% of Reading

Specifications

Repeatability (for Air or N_2 absolute pressure) See Note (6)	
Torr	1 x 10^{-8} to 100 mTorr: ±5% of Reading; 100 mTorr to 150 Torr: ±2.5% of Reading; 150 to 1000 Torr: ±1.0% of Reading
mbar	1.33 x 10^{-8} to 0.133 mbar: ±5% of Reading; 0.133 to 200 mbar: ±2.5% of Reading; 200 to 1,333 mbar: ±1.0% of Reading
Pascal	1.33 x 10^{-6} to 13.3 Pa: ±5% of Reading; 13.3 to 2.00 x 10^{4} Pa: ±2.5% of Reading; 2.00 x 10^{4} to 1.33 x 10^{5} Pa: ±1.0% of Reading
Accuracy (differential pressure)	±(2.5 Torr + 2.5% of Reading); ±(3.3 mbar + 2.5% of Reading); ±(0.33 kPa + 2.5% of Reading)
Response Time	< 25 mseconds
Analog Outputs	
Absolute Pressure	Logarithmic, 0.5 to 7.0 VDC, 0.5 V/decade
Differential Pressure	Linear 1-5 VDC, -750 to +250 Torr (-1000 to +333 mbar; -100 to +33 kPa)
RS-485 Serial Interface	
Digital Communications Interface	2-wire, half-duplex
Communications Format	ASCII: No parity, one stop bit
Baud Rates	1200, 2400, 4800, 9600, 19200 (default), 38400
Address	0-63, selected by using address switch and RS-485 command
DeviceNet Interface	
Messaging	Polled I/O and explicit
Data Rates	125, 250 or 500 kbaud, switch selectable
Address	0 - 63, selected by using the Low and High address switches
Operating Temperature	10° to 40°C (50° to 104°F), non-condensing
Storage Temperature	-40° to +70°C (-40° to +158°F)
Bakeout Temperature	105°C (221°F) maximum, with electronics removed
Ionization Gauge Emission Current	Autoranging
Automatic Ion Gauge Control Settings (default)	
Ionization Gauge On	2 x 10^{-2} Torr; 2.66 x 10^{-2} mbar; 2.66 Pa, with decreasing pressure
Ionization Gauge Off	3 x 10^{-2} Torr, 3.99 x 10^{-2} mbar; 3.99 Pa, with increasing pressure
Switch to High Emission	5 x 10^{-6} Torr; 6.66 x 10^{-6} mbar; 6.66 x 10^{-4} Pa, with decreasing pressure
Switch to Low Emission	1 x 10^{-5} Torr; 1.33 x 10^{-5} mbar; 1.33 x 10^{-3} Pa, with increasing pressure
Ionization Gauge Degas	Electron bombardment; 3 Watts for 1 minute/filament
Ionization Gauge Filaments	Tungsten or yttria-coated iridium
Filament Operation See Note (7)	Alternating (yttria default), automatic, manual (tungsten default)
Heat-Loss Sensor Wires	Gold-plated tungsten
Gauge Volume	10.8 cm^3 (0.65 in^3)
LED Indicator	Module status
I/O Connector	RS-485/Analog: 15-pin D-sub male; DeviceNet: 5-pin micro connector
Maximum Inrush Current	RS-485/Analog: 2 amps, 48W, for 0.5 seconds
Power Required	RS-485/Analog: 24 VDC +10% to -15%, 1 Amp, 22W nominal; DeviceNet: 24 VDC (11 to 26.4 VDC) at 0.2A nominal
Optional Display	Graphics LCD
Optional Set Point Relays	RS-485 or DeviceNet: 2 SPDT(NO/NC) or 3 SPST(NO), each can be independently assigned to absolute or differential pressure
Relay Contact Rating	
Maximum	1 A at 30 VDC, resistive load
Minimum	5 mA at 5 VDC, resistive load
Weight	728.5 gm (25.7 oz) (2.75 ConFlat® fitting)
Case Material	Aluminum extrusion with powder-coat
Materials Exposed to Vacuum	304 stainless steel, tantalum, tungsten, yttria-coated iridium, alumina, CuAg eutectic, Kovar®, gold or nickel plated Kovar, borosilicate glass
Compliance	CE

Notes:

(1) Measurements will change with different gases and mixtures.

(2) Micro-Ion ATM modules are not intended for use with flammable or explosive gases.

(3) Atmospheric value is based on calibration at time of use.

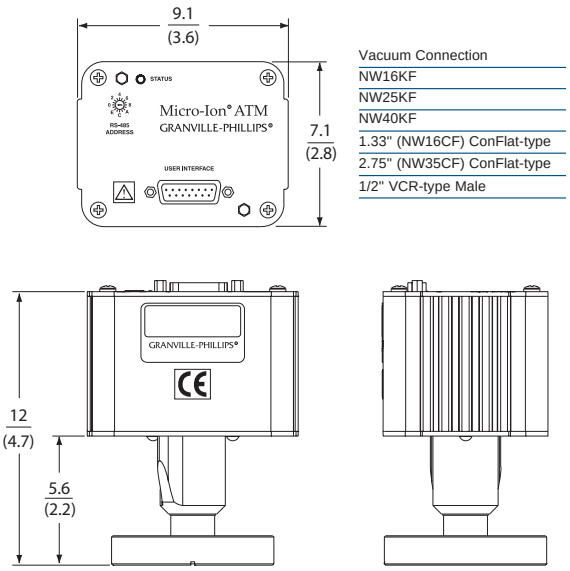
(4) X-ray limit is the absolute lowest indication from the gauge. It is not possible to make repeatable measurements near the x-ray limit.

(5) Accuracy (the difference between the gauge reading and a calibrated reference standard) is determined statistically and includes the combined performance of the gauge and electronics.

(6) Repeatability refers to the ability of the same module to read the same pressure at different times.

(7) In alternating mode the module will alternate between filaments with each activation of the ion gauge. In automatic mode filament 1 is used until it becomes inoperable, and the module will automatically switch to filament 2. In manual mode the module operates filaments as in automatic mode, with the exception that manual intervention is required to activate filament 2.

Ordering Information

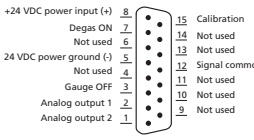


Vacuum Connection
NW16KF
NW25KF
NW40KF
1.33" (NW16CF) ConFlat-type
2.75" (NW35CF) ConFlat-type
1/2" VCR-type Male

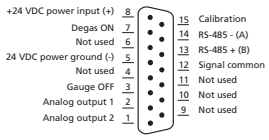
Dimensional Drawing —

Note: Unless otherwise specified, dimensions are nominal values in centimeters (inches referenced).

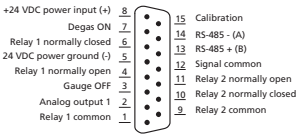
Analog
No Set Points Relays



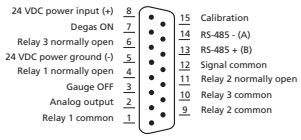
Analog/RS-485/DeviceNet
No Set Points Relays



Analog/RS-485/DeviceNet
Two Set Points Relays



Analog/RS-485/DeviceNet
Three Set Points Relays



I/O Pinouts —

15-pin subminiature-D male

Model Number Matrix

Choose a base model, number of set point relays, ionization gauge filament type, vacuum fitting, and measurement unit.

Base Micro-Ion ATM Module:

Analog only (no set points)	390410 - 0 - # # - #
Analog only with digital display (no set points available)	390411 - 0 - # # - #
RS-485/Analog	390510 - # - # # - #
RS-485/Analog with digital display	390511 - # - # # - #
DeviceNet	390610 - # - # # - #
DeviceNet with digital display	390611 - # - # # - #

Set Point Relays:	
None	0
Two	2
Three	3
Ionization Gauge Filament Types:	
Yttria-coated iridium	Y
Tungsten	T
Vacuum Connections:	
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
Measurement Units:	
Torr	T
mBar	M
Pascal	P

Replacement Gauges

Select ion gauge filament type and vacuum connection to create the catalog number.

Micro-Ion ATM replacement gauge	390100 - # #
Ion Gauge Filament Types:	
Yttria-coated iridium	Y
Tungsten	T
Vacuum Connections:	
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

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