



CRITICAL COMPONENTS  
GROUP

# Granville-Phillips® Series 390 Micro-Ion® ATM Module

Advanced Vacuum Measurement Solutions

VACUUM PRODUCTS

The Granville-Phillips 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.

## 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 setpoint relays for process control
- Field replaceable gauge assembly
- Analog, RS-485 or DeviceNet output available
- Optional graphics LCD display

Using its diaphragm sensors, this product is capable of providing accurate absolute pressure up to atmosphere along with precision 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 setpoint relays 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.

## *Combination Gauge Technology*

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



Granville-Phillips® Micro-Ion® ATM

## Features and Benefits

**Wide Measurement Range:** Provides continuous vacuum pressure measurement from  $1 \times 10^{-9}$  Torr to atmosphere.

**High Performance:** Proven Micro-Ion ionization gauge technology, with dual filaments, a patented heat-loss sensor, and a precision diaphragm are assembled to eliminate thermal influences on the heat-loss sensor, enhancing performance at high pressures.

**Automated Control:** Fully integrated sensors automatically control activation and deactivation of the ionization gauge, 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.

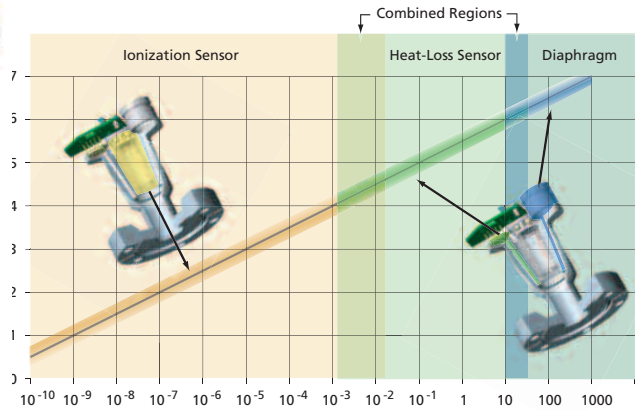


**RS-485 Interface:** Allows for communications between the module and host controller, and module configuration using optional RS-485 communications.

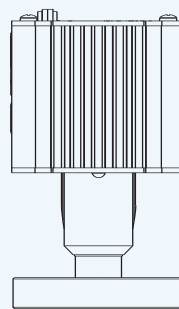
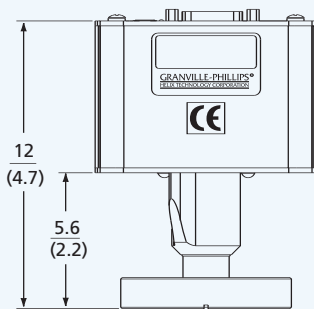
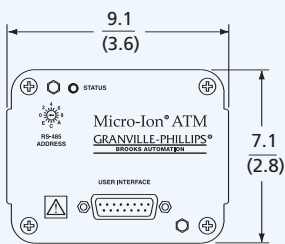
**DeviceNet Interface:** Provides high speed access to pressure measurement and easy configuration of gauge parameters.

**Optional Process Control Relays:** Up to three setpoint control relays can be included to simplify process control functions. Settings are configurable through the RS-485 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.



## Dimensions



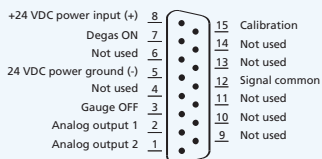
### Vacuum Connection

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

Dimensions are in cm (inch)

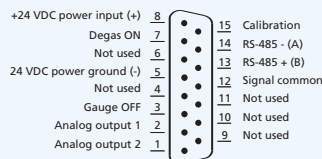
## I/O Pinouts

### No Setpoints Relays 15-pin subminiature-D male



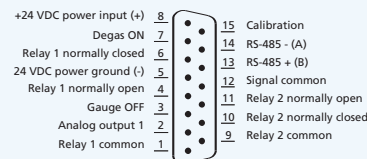
Analog

### No Setpoints Relays 15-pin subminiature-D male



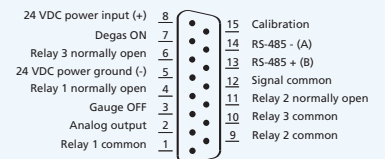
Analog + RS485

### Two Setpoints Relays 15-pin subminiature-D male



Analog + RS485 + 2SPs

### Three Setpoints Relays 15-pin subminiature-D male



Analog + RS485 + 3SPs

## Technical Specifications

Absolute pressure measurement range for air or N <sub>2</sub> (notes 1, 2 and 3)	
Torr	1 x 10 <sup>-9</sup> to atmosphere
mbar	1.33 x 10 <sup>-9</sup> to atmosphere
Pascal	1.33 x 10 <sup>-7</sup> to atmosphere
X-ray limit (note 4)	
Torr	<3 x 10 <sup>-10</sup>
mbar	<4 x 10 <sup>-10</sup>
Pascal	<4 x 10 <sup>-8</sup>
Differential pressure measurement range with respect to room atmosphere	
Torr	-750 to +250
mbar	-999 to 333
kPascal	-99.9 to 33.3
Accuracy (for air or N <sub>2</sub> absolute pressure) (note 5)	
Torr	1x10 <sup>-8</sup> 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 <sup>-8</sup> 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 <sup>-6</sup> to 13.3 Pa: ± 15% of reading; 13.3 to 2.00 x 10 <sup>4</sup> Pa: ± 10% of reading; 2.00 x 10 <sup>4</sup> to 1.33 x 10 <sup>5</sup> Pa: ± 2.5% of reading
Repeatability (for air or N <sub>2</sub> absolute pressure) (note 6)	
Torr	1x10 <sup>-8</sup> 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 <sup>-8</sup> 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 <sup>-6</sup> to 13.3 Pa: ± 5% of reading; 13.3 to 2.00 x 10 <sup>4</sup> Pa: ± 2.5% of reading; 2.00 x 10 <sup>4</sup> to 1.33 x 10 <sup>5</sup> 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 +333mbar; -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
Communications format	BOOL, BYTE, STRUCT, SSTRING, REAL, INT, UINT, USINT, EPATH and WORD data
Data rates	125, 250 or 500 kbaud, switch selectable
Address	0-63, selected by using data rate switch
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	2x10 <sup>-2</sup> Torr; 2.66x10 <sup>-2</sup> mbar; 2.66 Pa, with decreasing pressure
Ionization gauge off	3x10 <sup>-2</sup> Torr; 3.99x10 <sup>-2</sup> mbar; 3.99 Pa, with increasing pressure
Switch to high emission	5X10 <sup>-6</sup> Torr; 6.66X10 <sup>-6</sup> mbar; 6.66X10 <sup>-4</sup> Pa, with decreasing pressure
Switch to low emission	1x10 <sup>-5</sup> Torr; 1.33x10 <sup>-5</sup> mbar; 1.33X10 <sup>-3</sup> 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 (note 7)	Alternating (yttria default), automatic, manual (tungsten default)
Heat-loss sensor wires	Gold-plated tungsten
Gauge volume	10.8 cm <sup>3</sup> (0.65 in <sup>3</sup> )
LED indicator	Module status
I/O connector	RS-485/Analog: 15-pin subminiature-D male; DeviceNet: 5-pin micro connector
Maximum inrush current	RS-485/Analog: 2 amps, 48W, for 0.5 seconds; DeviceNet: 0.25A
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
CE Compliance (Pending)	
EMC directive	89/3361/EEC; EN50081-2, EN50082-2, EN 61326-1
Low voltage directive	73/23/EEC; EN 61010-1
Optional Display	Graphics LCD
Optional setpoint relays	RS-485 or DeviceNet only: 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

- Measurements will change with different gases and mixtures.
- Micro-Ion ATM modules are not intended for use with flammable or explosive gases.
- Atmospheric value is based on calibration at time of use.
- X-ray limit is the absolute lowest indication from the gauge. It is not possible to make repeatable measurements near the x-ray limit.
- 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.
- Repeatability refers to the ability of the same module to read the same pressure at different times.
- 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.

## Model Number Matrix

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

### Base Micro-Ion ATM Module:

Analog only (no setpoints available)	390410 - 0 - # - # - #
Analog only with local display (no setpoints available)	390411 - 0 - # - # - #
RS-485/Analog	390510 - # - # - # - #
RS-485/Analog with local display	390511 - # - # - # - #
DeviceNet™	390610 - # - # - # - #
DeviceNet™ with local display	390611 - # - # - # - #

### Setpoint Relays:

None	0
Two	2
Three	3

### Ionization Gauge Filament Types:

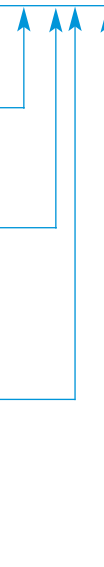
Yttria-coated iridium	Y
Tungsten	T

### 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



## 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).

*For more information, please contact your local Brooks Automation sales representative or visit [www.brooks.com](http://www.brooks.com).*

