

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 EtherCAT[®], RS-485 or DeviceNet[™] interfaces. The Series 390 is offered with versions having two or 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.

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.

Product Features

- Continuous pressure measurement from high vacuum to atmosphere
- Precision differential pressure measurement at atmosphere
- Eliminates need for discrete atmospheric switches and 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, EtherCAT, RS-485 or DeviceNet output available
- Optional graphics LCD display



Key Benefits

- Wide pressure measurement range
- Atmospheric switching
- Combination of three sensor technologies

Specifications

Absolute Pressure Measurement Range (for Air or N ₂) <small>See notes (1), (2), (3)</small>	Torr mbar Pascal	<ul style="list-style-type: none"> • 1 x 10⁻⁹ to atmosphere • 1.33 x 10⁻⁹ to atmosphere • 1.33 x 10⁻⁷ to atmosphere
X-ray Limit <small>See Note (4)</small>	Torr mbar Pascal	<ul style="list-style-type: none"> • <3 x 10⁻¹⁰ • <4 x 10⁻¹⁰ • <4 x 10⁻⁹
Differential Pressure Measurement Range (with respect to room atmosphere)	Torr mbar kPascal	<ul style="list-style-type: none"> • -750 to +250 • -999 to +188 • -99.9 to 18.8
Accuracy (for Air or N₂ absolute pressure) <small>See Note (5)</small>	Torr mbar Pascal	<ul style="list-style-type: none"> • 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 • 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 • 1.33 x 10⁻⁶ to 13.3 Pa: ±15% of Reading; 13.3 to 2.00 x 10⁴ Pa: ±10% of Reading; 2.00 x 10⁴ to 1.33 x 10⁵ Pa: ±2.5% of Reading
Repeatability (for Air or N₂ absolute pressure) <small>See Note (6)</small>	Torr mbar Pascal	<ul style="list-style-type: none"> • 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 • 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 • 1.33 x 10⁻⁶ to 13.3 Pa: ±5% of Reading; 13.3 to 2.00 x 10⁴ Pa: ±2.5% of Reading; 2.00 x 10⁴ to 1.33 x 10⁵ 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 Differential Pressure	Logarithmic, 0.5 to 7.0 VDC, 0.5 V/decade Linear 1-5 VDC, -750 to +250 Torr (-1000 to +333 mbar; -100 to +33 kPa)
Digital Communications		RS485, EtherCAT, DeviceNet
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 Ionization Gauge Off Switch to High Emission Switch to Low Emission		<ul style="list-style-type: none"> • 2 x 10⁻² Torr; 2.66 x 10⁻² mbar; 2.66 Pa, with decreasing pressure • 3 x 10⁻² Torr; 3.99 x 10⁻² mbar; 3.99 Pa, with increasing pressure • 5 x 10⁻⁶ Torr; 6.66 x 10⁻⁶ mbar; 6.66 x 10⁻⁴ Pa, with decreasing pressure • 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 <small>See Note (7)</small>		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, EtherCAT - Status, Run & Error
I/O Connector	RS-485/Analog DeviceNet EtherCAT	<ul style="list-style-type: none"> • 15-pin D-sub male • 5-pin micro connector • 15-pin HD-sub male, RJ45, IN/OUT

Maximum Inrush Current	RS-485/Analog DeviceNet/EtherCAT	<ul style="list-style-type: none"> • 2 amps, 48W, for 0.5 seconds • 2 amps, for 0.5 seconds
Power Required	RS-485/Analog DeviceNet EtherCAT	<ul style="list-style-type: none"> • 24 VDC +10% to -15%, 22W nominal • 24 VDC (11 to 26.4 VDC) at 0.2A nominal • +24VDC ±15%, max 22W
Optional Display		Graphics LCD
Optional Set Point Relays	RS-485/Analog/DeviceNet EtherCAT	<ul style="list-style-type: none"> • 2 SPDT(NO/NC) or 3 SPST(NO) • 2 SPDT (NO/NC), each can be independently assigned to absolute or differential pressure
Relay Contact Rating	Maximum Minimum	<ul style="list-style-type: none"> • 1 A at 30 VDC, resistive load • 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, ETG 5003.1, ETG 5003.2, ETG 5003.2080

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.

RS-485/Analog DIM B: 6.2 cm, (2.4 in)		
Fitting	Dimension A	
	Total Height (cm)	Total Height (in)
NW16KF	11.7	4.6
NW25KF	11.7	4.6
NW40KF	12.2	4.8
1.33" (NW16 CF)	11.8	4.6
2.75" (NW35 CF)	11.8	4.6
1/2" VCR male	13.5	5.3

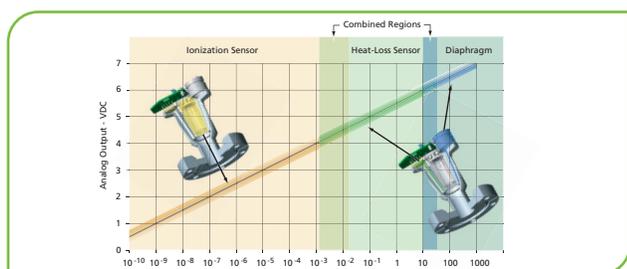
DeviceNet™/EtherCAT® DIM B: 7.9 cm, (3.1 in)		
Fitting	Dimension A	
	Total Height (cm)	Total Height (in)
NW16KF	13.4	5.3
NW25KF	13.4	5.3
NW40KF	13.9	5.5
1.33" (NW16 CF)	13.5	5.3
2.75" (NW35 CF)	13.5	5.3
1/2" VCR male	15.2	6.0

Dimensional Drawing - EtherCAT® shown

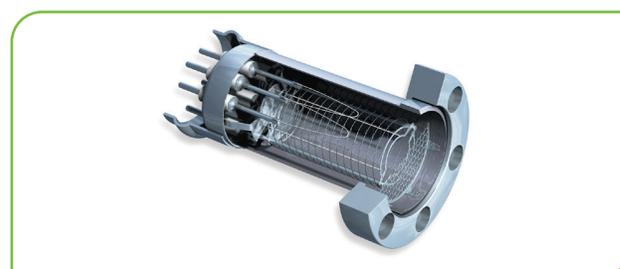
Note: Unless otherwise specified, dimensions are nominal values in inches (mm referenced).

Ordering Code Example: 390710-2-YG-T	Code	Configuration
Basic Micro-Ion ATM Module		
RS-485/Analog	390510	390710
RS-485/Analog with digital display	390511	
DeviceNet	390610	
DeviceNet with digital display	390611	
EtherCAT	390710	
Set Point Relays		
Two (EtherCAT only available with two set point relays)	2	2
Three	3	
Ionization Gauge Filament Types		
Yttria-coated iridium filaments (EtherCAT only available with Yttria coated)	Y	Y
Tungsten	T	
Vacuum Connections		
NW16KF	D	G
NW25KF	E	
NW40KF	K	
1.33" (NW16CF) ConFlat-type	F	
2.75" (NW35CF) ConFlat-type	G	
1/2" VCR-type Male	H	
Measurement Units		
Torr	T	T

Ordering Code Example: 390100-Y-E	Code	Configuration
Micro-Ion ATM Module		
Replacement gauge	390100	390100
Ionization Gauge Filament Types		
Yttria-coated iridium	Y	Y
Tungsten	T	
Vacuum Connections		
NW16KF	D	E
NW25KF	E	
NW40KF	K	
1.33" (NW16CF) ConFlat-type	F	
2.75" (NW35CF) ConFlat-type	G	
1/2" VCR-type Male	H	



Sensor Switching Points



Cross Section of the Micro-Ion Gauge