



CRITICAL COMPONENTS
GROUP

Granville-Phillips® Series 392 Micro-Ion® Plus Modules

Advanced Vacuum Measurement Solutions

VACUUM PRODUCTS

Benefits

- Continuous pressure measurement from high vacuum to atmosphere
- Compact multi sensor gauge design
- Eliminates need for two independent gauges
- Dual ionization gauge filaments increase equipment uptime
- Automation of ionization gauge activation and deactivation
- Optional analog, RS-485 or DeviceNet interfaces
- RS-485 and DeviceNet have optional setpoint relays for process control
- Optional flange configurations
- Field replaceable gauge assembly for low Cost-of-Ownership
- Electronic gauge-tube memory ensures accuracy and repeatability of replacement gauges
- Improved miniature Pirani Conductron accuracy
- Second generation product that leverages 30 years of Granville-Phillips vacuum gauge design experience
- Backed by Brooks' GUTS support program

The Granville-Phillips Series 392 Micro-Ion® Plus is a second-generation full range pressure measurement module that combines industry standard Micro-Ion® ionization gauge technology with a miniature Pirani Conductron® heat-loss sensor to provide accurate, continuous pressure measurement from high vacuum to atmosphere.

The Series 392 Micro-Ion Plus combines Granville-Phillips' industry standard and application tested Micro-Ion ionization sensor with an innovative miniature Pirani Conductron sensor in a single gauge assembly envelope that is attached to a compact electronics control module. This compact modular design reduces the number of separate gauges, vacuum interfaces, cabling and control electronics that are typically required for full range pressure measurement. The full range pressure measurement is output as a single analog signal or available through optional serial RS-485 or DeviceNet™ digital interfaces. Up to three optional setpoint relays are available that can be configured for process control, with the ability to assign the relays at any pressure across a broad vacuum spectrum. The Series 392 Micro-Ion Plus is available with or without display, and can be configured with a large variety of flanges.

This second generation Micro-Ion Plus has integrated gauge assembly electronic memory that contains factory-calibration information and is used by the control module to provide factory-level calibration accuracy for new and replacement gauges, and track gauge-tube usage information to enable the Brooks' GUTS team to quickly understand your application environment. The miniature Pirani Conductron accuracy is improved through better thermal management within the gauge envelope. Finally, the Series 392 and Series 390 Micro-Ion ATM now share a common platform for improved product quality through large volume manufacturing.

Combination Gauge Technology

Accurate measurement across a wide vacuum range often required multiple gauge components, additional vacuum ports, associated electrical interfaces and control systems. The Micro-Ion® Plus full-range vacuum module combines multiple sensors into a single gauge tube that connects to an advanced control electronics module to create a compact modular gauge design, simplifying interface requirements as well as reducing overall cost-of-ownership, while enhancing vacuum measurement performance.

Our knowledge gained through 30 years of vacuum gauge designs and field installations, and our work with Original Equipment Manufacturer (OEM) and End-User customers have been incorporated into this next generation Micro-Ion Plus product. For high performance, full range vacuum measurement in a compact single vacuum port design with a low cost of ownership, select the Series 392 Micro-Ion Plus or select from our full range of Granville-Phillips pressure measurement solutions.



Granville-Phillips® Series 392 Micro-Ion® Plus Modules

Features and Benefits

Wide Measurement Range: Provides continuous vacuum pressure measurement from 1×10^{-9} Torr to atmosphere. Pressure reading through a single Analog, RS-485 or DeviceNet output.

High Performance: Proven dual filament industry standard Micro-Ion ionization gauge technology and our patented miniature Pirani Conductron heat-loss sensor combine to provide an extended range of operation.

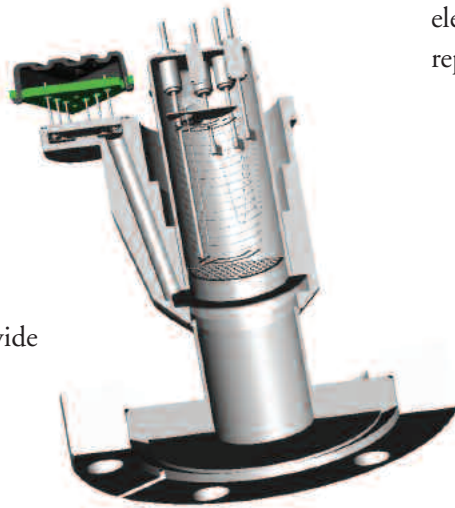
Automated Control: Fully integrated sensors automatically control activation and deactivation of the ionization gauge, simplifying gauge operation.

Compact Design:

Dual sensor design and control electronics integrated into a single compact, modular package.

Communication Interface:

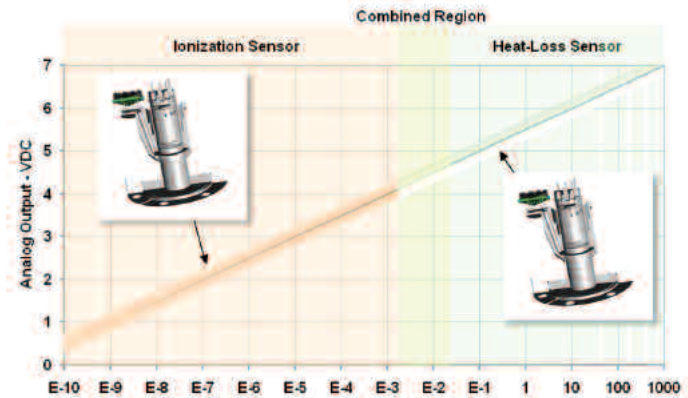
Available serial interfaces provide communication between the module and host controller with optional RS-485 or DeviceNet.



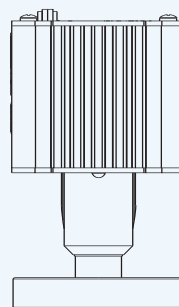
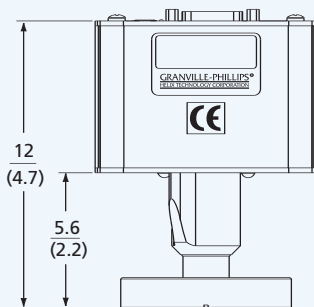
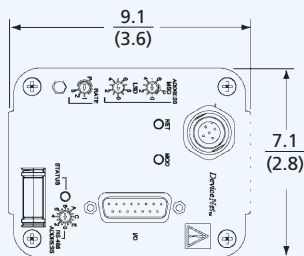
Optional Process Control Relays: Up to three setpoint control relays can be included to simplify process control functions. Settings are configurable through the serial interface.

Highly Configurable: Display and non-display versions, choice of Tungsten or Yttria-coated Iridium filaments, output measurement units (Torr, mbar, Pa) and a variety of common flange types.

Field Replaceable Gauge Assembly: Gauge assembly can quickly and easily be replaced in the field using only a screwdriver after removal from the vacuum system. Integrated electronic gauge assembly calibration information ensures replacement gauge accuracy and repeatability.



Dimensions



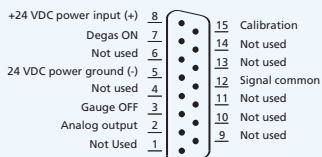
Vacuum Connection

- 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)

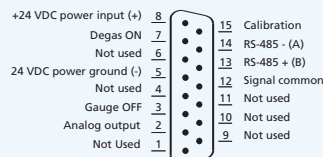
I/O Pinouts

No Setpoints Relays 15-pin subminiature-D male



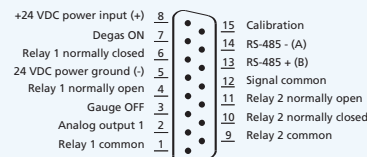
Analog

No Setpoints Relays 15-pin subminiature-D male



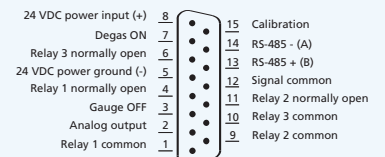
Analog + RS485

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 ₂ (notes 1, 2 and 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 (note 4)	
Torr	<3 x 10 ⁻¹⁰
mbar	<4 x 10 ⁻¹⁰
Pascal	<4 x 10 ⁻⁸
Accuracy (for air or N ₂ absolute pressure) (note 5)	
Torr	1x10 ⁻⁸ to 100 mTorr: ±15% of reading; 100 mTorr to 150 Torr: ± 10% of reading
mbar	1.33 x 10 ⁻⁸ to 0.133 mbar: ± 15% of reading; 0.133 to 200 mbar: ± 10% 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
Repeatability (for air or N ₂ absolute pressure) (note 6)	
Torr	1x10 ⁻⁸ to 100 mTorr: ±5% of reading; 100 mTorr to 150 Torr: ±2.5% of reading
mbar	1.33 x 10 ⁻⁸ to 0.133 mbar: ± 5% of reading; 0.133 to 200 mbar: ± 2.5% 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
Response time	< 25 mseconds
Analog outputs	
Absolute pressure	Logarithmic, 0.5 to 7.0 VDC, 0.5 V/decade
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 ⁻² Torr; 2.66x10 ⁻² mbar; 2.66 Pa, with decreasing pressure
Ionization gauge off	3x10 ⁻² Torr; 3.99x10 ⁻² mbar; 3.99 Pa, with increasing pressure
Switch to high emission	5x10 ⁻⁶ Torr; 6.66x10 ⁻⁶ mbar; 6.66x10 ⁻⁴ Pa, with decreasing pressure
Switch to low emission	1x10 ⁻⁵ Torr; 1.33x10 ⁻⁵ mbar; 1.33x10 ⁻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 (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 subminiature-D male; DeviceNet: 5-pin micro connector
Maximum inrush current	RS-485/Analog: 2 A, 48W, for 0.5 seconds; DeviceNet: 0.25A
Power required	RS-485/Analog: 24 VDC +10% to -15%, 1 A, 22W; DeviceNet: 24 VDC ± 15% (1.5A at 20.4 V), 3.0A at 30W Peak
CE Compliance	
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 set independently
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

Select base model, number of setpoints, ion gauge filament, vacuum fitting and measurement unit.

Base Micro-Ion Plus Modules:

Analog output, no display ¹	392401 - 0 - # - # - #
Analog output, with display ¹	392402 - 0 - # - # - #
RS-485 interface, no display	392501 - # - # - # - #
RS-485 interface, with display	392502 - # - # - # - #
DeviceNet™ interface, no display	392601 - # - # - # - #
DeviceNet™ interface, with display	392602 - # - # - # - #

Setpoints:

None	0
Two	2
Three	3

Ion Gauge Filaments:

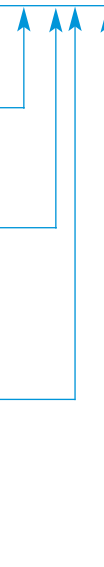
Yttria-coated iridium	Y
Tungsten	T

Vacuum Fitting:

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



Example: To order a Micro-Ion Plus Module with RS-485 output, no display, two setpoints, Tungsten filaments, NW25KF vacuum fitting, and units in Torr, select catalog number 392501-2-TE-T.

Note 1: . Setpoints not available in Analog only versions.

Replacement Gauges

Replacement Gauges for Micro-Ion Plus Modules

392100 - # - #

Ion Gauge Filaments:

Yttria-coated iridium	Y
Tungsten	T

Vacuum Fitting:

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.

