Granville-Phillips Micro-Ion® Plus Modules

Extended measurement range from high vacuum to atmosphere

Two sensors in one saves space

Dual ion gauge filaments increase equipment uptime

Auto turn-on and turn-off of ionization gauge

Push buttons for manual operation and adjustments

Two trip point relays for safety interlocking

Optional local display aids in setup and diagnostics

Available with RS-485 or DeviceNet™ digital interface

Vacuum Gauge Module

The Granville-Phillips Micro-Ion Plus Vacuum Gauge Module combines the new miniature Conductron® Heat-Loss Sensor with proven Micro-Ion Gauge technology in the same vacuum envelope to extend pressure measurements from high vacuum to atmosphere. The Micro-Ion Plus design combines the control electronics and the gauge in a compact module that provides convenient high vacuum measurement and is easy to interface to a control system.

The combination of two sensors in the same vacuum envelope saves space. Vacuum system control is simplified by using the heat-loss sensor to automatically turn-on and turn-off the ionization gauge. Convenient push button controls allow for module operation and adjustment of the two trip point relays without the need for electrical or computer interfacing. Two versions of the module are available – an RS-485 interface with analog output or a DeviceNet interface.

Combination Gauge Technology

The wide dynamic range of high vacuum systems require multiple sensor technologies to measure the entire pressure range. Traditionally this has been accomplished with multiple gauges, requiring multiple vacuum ports, cables and electronic controls. There is great benefit in combining multiple sensors in a miniature vacuum envelope, as long as the sensors do not interfere with each other and measurement performance is not compromised. This is achieved in the Micro-Ion Plus design. It maintains the high performance of the Granville-Phillips Micro-Ion Gauge design while incorporating a new miniature heat-loss sensor underneath the ionization volume. The new patented Conductron Heat Loss Sensor is based on the understanding and insights gained in over 20 years of experience in making the industry standard Convectron® Gauge.

The wide range, high performance and compact size make the Micro-Ion Plus Module a wise choice for pressure measurement on high vacuum systems.

HELIX

Micro-Ion Plus Module Features and Benefits

Wide Measurement Range – Allows vacuum system performance to be monitored continuously from $1x10^{-9}$ Torr ($1x10^{-9}$ mbar; $1x10^{-7}$ Pa) to atmosphere.

Simple Modular Design – Electronics and sensors are packaged together in one compact, easy to install module that eliminates the need for multiple gauges, cables, and electronics.

Control System Simplification – The integral heat loss sensor automatically controls activation and deactivation of the ion gauge, eliminating the need for external control of the ion gauge.

RS-485, Analog Output and Remote I/O – In addition to RS-485 communications and analog output, the module provides input control of gauge on/off, degas, atmospheric calibration, and keyboard lock along with outputs of gauge, filament, and degas status.

Process Trip Points – Relay contacts allow control of other vacuum equipment and provide safety interlocking. Settings are adjustable through the local interface, RS-485 or DeviceNet interface.

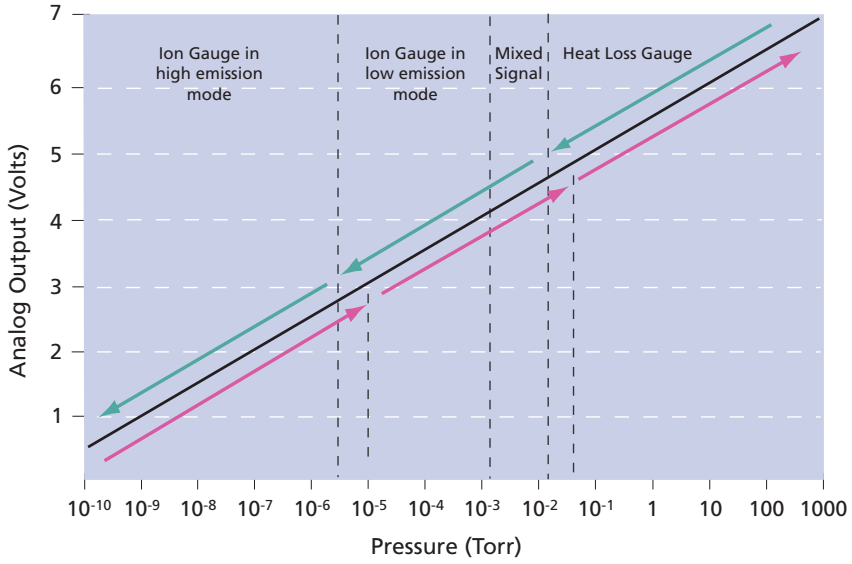
Local Display/Interface (Optional) – Setup time and diagnostics are improved with a green LED display and pushbutton interface that gives point-of-use pressure indication and local adjustment of process trip points.

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

DeviceNet Network Power Flexibility – Gauge power can be supplied either through the DeviceNet micro connector or through a separate connector.

CE Compliant – All metal packaging provides a high level of immunity to RF noise.

Auto Ranging Feature

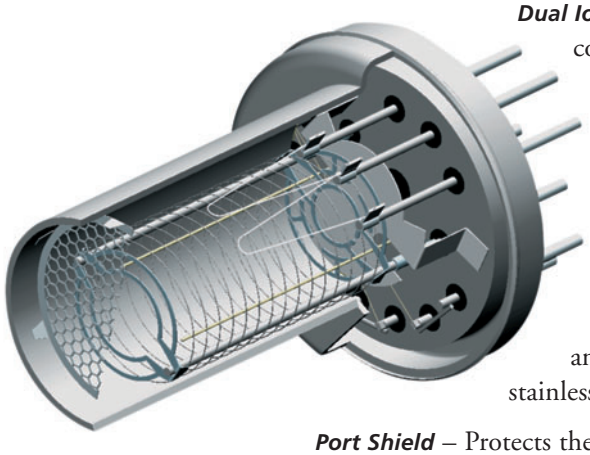


The auto ranging feature makes the Micro-Ion Plus simple and easy to use. As the vacuum system pumps down from atmosphere, the heat loss sensor measures pressure until a sufficiently low vacuum level is achieved, then it automatically turns on the ion gauge in the low emission mode. During the first decade that both sensors are operating, the control electronics mix the signals. As the pressure is reduced, the ion gauge automatically switches from low emission to high emission. As pressure increases, the opposite occurs at slightly higher pressures. This sequence is illustrated in the graph above.

Micro-Ion Plus Gauge Features and Benefits

World's Smallest Combination Gauge – Micro-Ion Plus combines the new miniature Conductron Heat-loss sensor with a Micro-Ion sensor in one gauge envelope, at less than 10% of the volume of a conventional ionization gauge.

High Performance – The complete Micro-Ion design has been retained with the patented dual ion collector that increases the electron path length and ion collection efficiency, providing high performance in a small volume.



Dual Ionization Sensor 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 sensor generates much less heat to disturb a process or experiment.

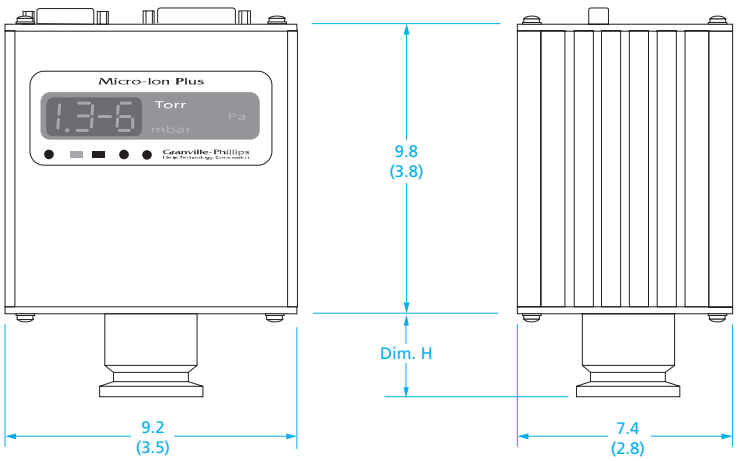
Robust All-Metal Design – Welded components, vacuum fired and assembled in a cleanroom environment, are enclosed in a stainless steel envelope to ensure sensor integrity.

Port Shield – Protects the electrode assembly from damage during assembly or vacuum chamber maintenance, and provides a stable electrical environment for improved measurement performance.

Wide Selection of Vacuum Fittings – Simplifies installation on your vacuum system.

Replaceable Gauge – Gauge can quickly and easily be replaced using only a screwdriver.

Dimensions



Vacuum Connections	Dim. H
1/2 inch 8VCR-type female	5.8 (2.3)
1.33 inch (NW16CF) ConFlat-type	4.3 (1.7)
2.75 inch (NW35CF) ConFlat-type	4.3 (1.7)
NW16KF	2.0 (0.8)
NW25KF	2.0 (0.8)
NW40KF	2.0 (0.8)

Dimensions are in cm (inch)

Technical Specifications

Measuring range for air and N_2 (see notes 1, 2 and 3, below)	
Torr	1 x 10^{-9} Torr to atmosphere
mbar	1 x 10^{-9} mbar to atmosphere
Pa	1 x 10^{-7} Pa to atmosphere
Accuracy for N_2	< 15% of reading from 1 x 10^{-8} Torr to 50 Torr (see note 4, below)
Repeatability	< 5% of reading from 1 x 10^{-8} Torr to 50 Torr (see note 5, below)
Ion gauge emission current	0.1 and 4 mA, autoranging
Autoranging (default values)	(see note 6, below)
Ion gauge auto on	2 x 10^{-2} Torr; 3 x 10^{-2} mbar; 3 Pa, on decreasing pressure
Switch to high emission (4.0 mA)	5 x 10^{-6} Torr; 7 x 10^{-6} mbar; 7 x 10^{-4} Pa, on decreasing pressure
Switch to low emission (0.1 mA)	1 x 10^{-5} Torr; 1 x 10^{-5} mbar; 1 x 10^{-3} Pa, on increasing pressure
Ion gauge auto off	3 x 10^{-2} Torr; 4 x 10^{-2} mbar; 4 Pa, on increasing pressure
Ion gauge degas	Electron bombardment, 3.75 W with 2-minute timer
Filament selection	Alternating (default) (see note 7, below)
Weight	567 gm (20 oz) with NW16KF flange
Power required	24 Vdc ± 15%, 26 W max
Operating temperature	10 °C to 40 °C ambient, non-condensing
Non-operating temperature	-40 °C to 70 °C
Case material	Aluminum extrusion
CE compliance	
EMC directive	89/336/EEC; EN 50081-2, EN 50082-2
Low voltage directive	73/23/EEC; EN 61010-1
Display (optional)	2 digits plus exponent, green LED
Trip point relays	Two single-pole, double-throw relays (SPDT)
Relay contact rating	1 A at 30 Vdc resistive, non-inductive
Range	1 x 10^{-9} to 50 Torr; 1 x 10^{-9} to 70 mbar; 1 x 10^{-7} Pa to 7 kPa
Micro-Ion Plus Gauge	
Ion gauge sensitivity	20 $Torr^{-1}$; 15 $mbar^{-1}$; 0.15 Pa^{-1} (± 15%) (see note 8, below)
X ray limit	< 3 x 10^{-10} Torr; < 4 x 10^{-10} mbar; < 4 x10^{-8} Pa (see note 9, below)
Ion gauge filament material	Yttria-coated iridium
Heat loss sensor material	Gold-plated tungsten
Other materials exposed to gas	304 stainless steel, tantalum, tungsten, nickel,
	nickel iron alloy, borosilicate glass
Internal volume	10.8 cm^3, (0.67 $inch^3$) to the port screen
Gauge bakeout temperature	150 °C (with electronics removed)

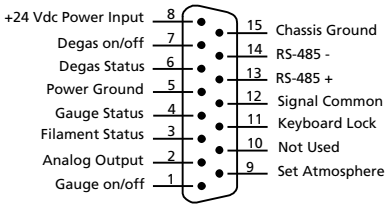
Notes

1. Measurements will change with different gases and mixtures.
2. Micro-Ion Plus Gauges are not intended for use with flammable or explosive gases.
3. Atmospheric value is based on calibration at time of use.
4. 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.
5. Repeatability refers to the ability of the same module to read the same pressure at different times.
6. The default switching points for the high and low emission modes can be adjusted through the digital interface.
7. The module will alternate between filaments with each turn-on of the ion gauge unless the AUTO mode is selected through the digital interface. In AUTO mode, filament 1 is used until failure. When either filament fails, the module automatically switches to the good filament.
8. Ion gauge sensitivity determined at 5x10^{-6} Torr.
9. 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.

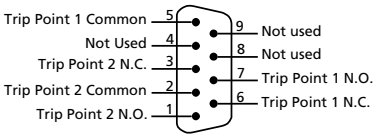
RS-485 Analog Version

Adjustable parameters	Atmospheric calibration, Data format (baud rate, data bits, parity), Trip points (value, direction and hysteresis), Gauge on/off, Degas on/off, Ion gauge emission switch point, Filament mode, Measurement units, Keyboard lock/unlock
Baud rate	1200, 2400, 4800, 9600, 19200 (default value), 38400
Data format	ASCII, 8 data bits, one stop-bit, no parity (default values)
Analog output	Logarithmic, 0.5 to 7.0 Vdc, 0.5 Volt/decade
Remote input signals	Gauge on/off, degas on/off, keyboard lock, and atmospheric calibration are set by continuity to ground
Remote output signals	Gauge, filament and degas status are output by an open collector transistor

User Interface Connector
15-pin subminiature-D male



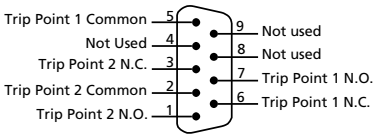
Trip Points Connector
9-pin subminiature-D male



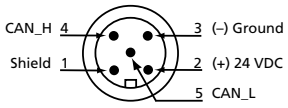
DeviceNet Version

Adjustable parameters	Atmospheric calibration, Trip points (value, direction, hysteresis), Gauge on/off, Degas on/off, Ion gauge emission switch point, Filament mode, Measurement units, Keyboard lock/unlock
Device type	Vacuum/pressure gauge device
Messaging	Polled I/O and explicit
Data rates	125K, 250K, or 500K switch selectable

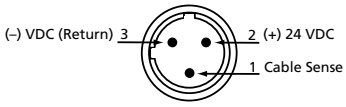
Trip Points Connector
9-pin subminiature-D male



DeviceNet Connector
5-pin micro



Auxiliary Power Connector
3-pin micro



Ordering Information

Micro-Ion Plus Modules

Choose a basic model, vacuum connection and measurement units to create your catalog number.

RS-485 and analog output, no display	356001 - Y # - #
RS-485 and analog output, digital display	356002 - Y # - #
DeviceNet, no display	356004 - Y # - #
DeviceNet, digital display	356005 - Y # - #

Vacuum Connection:

NW16KF	D
NW25KF	E
NW40KF	K
1.33 inch (NW16CF) ConFlat-type	F
2.75 inch (NW35CF) ConFlat-type	G
1/2 inch 8VCR-type male	H

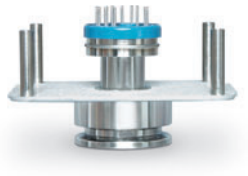
Measurement units:

Torr	T
mbar	M
Pa	P

Ordering Example

To order a Micro-Ion Plus Module with analog output, digital display, NW25KF fitting, and display in Torr, select catalog number 356002 - Y E - T

Replacement Gauges



Add a vacuum connection to create your catalog number. 356006 - Y #

Vacuum Connection:

NW16KF	D
NW25KF	E
NW40KF	K
1.33 inch (NW16CF) ConFlat-type	F
2.75 inch (NW35CF) ConFlat-type	G
1/2 inch 8VCR-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).

HELIX

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