**Series 401 Hornet™ Hot Cathode Bayard-Alpert Miniature-Ionization Vacuum Gauge**

**Wide measurement range**
- $1 \times 10^9$ to $5 \times 10^2$ Torr
- $1.3 \times 10^9$ to $6.7 \times 10^2$ mbar
- $1.3 \times 10^7$ to 6.7 Pa

Dual hot cathode design, rugged and compact metal construction

**Built-in digital display, set-point relay, log-linear analog output and RS485 serial communication, are all standard features of the Hornet™**

Bright digital OLED graphical display allows for wide angle, greater viewing distance

**Also a lower cost, direct drop-in plug-compatible replacement for the Granville-Phillips® Micro-Ion® module**

Significant cost savings for you - use your existing control hardware, cables and software when replacing Micro-Ion® without need to change your vacuum system control

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**IGM401 sensor**

The IGM401 Hornet ionization gauge sensor assembly is a compact, all metal design with either dual yttria coated iridium or tungsten filaments available.

For general vacuum applications, dual yttria coated filaments are offered for use with air and inert gases such as N₂, argon, etc. Dual tungsten filaments are available for use with gases that may not be compatible with yttria coated filaments.

The gauge sensor assembly can be easily replaced in the field.

**Lower cost without sacrificing quality or functionality**

InstruTech continuously strives to enhance the design, reduce cost and improve the performance and reliability of the Hornet IGM. The electrometer circuit auto zeroes to ensure that the readings are not subject to temperature drift, eliminating the need for unnecessary, expensive circuitry which further reduces the cost.

Filament voltage and current, emission current and ion current can be monitored in real time using the research mode display screen. Sensitivity and degas time maybe adjusted by the user.

Service screens allow monitoring of filament operation. Error messages are displayed for several common fault conditions.

**Also a direct drop-in plug-compatible replacement for the Micro-Ion®**

The IGM401 Hornet module will also directly replace various Granville-Phillips® 354 Micro-Ion® products. Measurement performance throughout the range of $1 \times 10^9$ to $5 \times 10^2$ Torr is equal to or better than similar vacuum gauge products in the marketplace.

An analog output voltage signal proportional to displayed pressure, one setpoint relay and RS485 serial communication are all included in the IGM401. All control functions are identical to corresponding 354 Micro-Ion® functions including software commands when using the RS485 serial interface.

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**IGM401 Built-in Controller & Display**

The IGM401 Hornet ionization vacuum gauge module (IGM) provides the basic signal conditioning required to turn the gauge into a complete measuring instrument. The built-in controller is offered with an easy to read, bright OLED display providing full programmability and a convenient user interface for setup and operation of the vacuum gauge.

Emission current can be set to automatically switch between 100 µA and 4 mA. This results in optimal and stable pressure readings over the entire measurement range from low to high vacuum.
Specifications

- **measurement range**: \(1 \times 10^{-9} \text{ to } 5 \times 10^{-2} \text{ Torr} / 1.3 \times 10^{-9} \text{ to } 6.7 \times 10^{-2} \text{ mbar} / 1.3 \times 10^{-7} \text{ to } 6.7 \text{ Pa}
- **accuracy**: \(N_2, \text{typical}\) \(1 \times 10^{-9} \text{ to } 5 \times 10^{-2} \text{ Torr}; \pm 15\% \text{ of reading}
- **repeatability**: \(\pm 5\% \text{ of reading}
- **display**: bright OLED display, 3 digits plus 1 digit exponent, user-selectable units of Torr, mbar, or Pa
- **materials exposed to gases**: dual filament: yttria coated iridium or tungsten filament; Tungsten: Grid: 304 Stainless Steel Others: 316/304 SS, glass, nickel
- **sensitivity**: factory pre-set; also user adjustable between 2 to 99
- **x-ray limit**: \(< 5 \times 10^{-10} \text{ Torr}, \ < 6.7 \times 10^{-10} \text{ mbar,} \ < 6.7 \times 10^{-8} \text{ Pa}
- **emission current**: 100 µA, 4 mA, or automatically switch between 100 µA and 4 mA (Auto-Ranging)
- **degas**: 3 W, electron bombardment
- **overpressure protection (IG)**: gauge turns off at factory default setting of 5 x 10^{-1} Torr; also user adjustable below 50 mTorr
- **internal gauge volume**: 1.0 in^3 (16.4 cm^3)
- **temperature**: 0 to + 40 °C operating; -40 to + 70 °C storage
- **bakeout temperature**: 200 °C (sensor only - electronics removed)
- **humidity**: 0 to 95% relative humidity, non-condensing
- **weight**: 0.6 lb. (0.27 kg) with NW25 KF flange
- **housing (electronics)**: aluminum extrusion
- **mounting orientation**: any
- **serial communications**: RS485 - ASCII protocol; minimum command interval: 50 ms
- **analog output**: log-linear 0 to 9 Vdc, 1 V/decade
- **setpoint relay**: one single-pole, double-throw (SPDT), 1 A at 30 Vdc resistive, or ac non-inductive
- **status outputs**: degas and filament on/off status are determined by either front panel displayed messages, via an open collector transistor output or RS485 serial communications
- **input signal**: degas, filament on/off and emission current are set by either continuous continuity to ground using digital inputs, RS485 serial communications or manually using front panel push buttons
- **filament selection**: filament 1 or 2 selectable via front panel push buttons or RS485 commands
- **input power**: 20 to 28 Vdc, 30 W protected against power reversal and transient over-voltages
- **connectors**: 9-pin D-sub male for analog and 9-pin D-sub female for RS485
- **CE compliance**: EMC Directive 2014/30/EU, EN55011, EN61000-6-2, EN61000-6-4, EN61326-1, EN61010-1
- **environmental**: RoHS compliant

<table>
<thead>
<tr>
<th>Fitting</th>
<th>dimension A</th>
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<tbody>
<tr>
<td>NW16KF</td>
<td>1.45 in. (37mm)</td>
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<tr>
<td>NW25KF</td>
<td>1.45 in. (37mm)</td>
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<tr>
<td>NW40KF</td>
<td>1.45 in. (37mm)</td>
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<tr>
<td>1 1/3 in. Mini-CF</td>
<td>1.85 in. (47 mm)</td>
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<tr>
<td>2 3/4 in. Conflat®</td>
<td>1.70 in. (43 mm)</td>
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<tr>
<td>3/4 in. Tube</td>
<td>2.16 in. (55 mm)</td>
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<tr>
<td>1/2 in. VCR®</td>
<td>2.58 in. (65 mm)</td>
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**IGM401 Fittings / Flanges**

<table>
<thead>
<tr>
<th></th>
<th>With Yttria Filaments</th>
<th>With Tungsten Filaments</th>
<th>Replacement / Spare Sensor - Yttria</th>
<th>Replacement / Spare Sensor - Tungsten</th>
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<tbody>
<tr>
<td>NW16KF</td>
<td>IGM401YBD</td>
<td>IGM401TBD</td>
<td>IG4YB</td>
<td>IG4TB</td>
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<td>NW25KF</td>
<td>IGM401YCD</td>
<td>IGM401TCD</td>
<td>IG4YC</td>
<td>IG4TC</td>
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<td>NW40KF</td>
<td>IGM401YDD</td>
<td>IGM401TDD</td>
<td>IG4YD</td>
<td>IG4TD</td>
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<tr>
<td>1 1/3 in. Mini-CF/NW 16CF Mini- Conflat®</td>
<td>IGM401YED</td>
<td>IGM401TED</td>
<td>IG4YE</td>
<td>IG4TE</td>
</tr>
<tr>
<td>2 3/4 in. CF / NW35CF Conflat®</td>
<td>IGM401YFD</td>
<td>IGM401TFD</td>
<td>IG4YF</td>
<td>IG4TF</td>
</tr>
<tr>
<td>3/4 in. Tube (3/4 in. O.D. O-ring compression)</td>
<td>IGM401YAD</td>
<td>IGM401TAD</td>
<td>IG4YA</td>
<td>IG4TA</td>
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<tr>
<td>1/2 in. Cajon® VCR® female</td>
<td>IGM401YHD</td>
<td>IGM401THD</td>
<td>IG4YH</td>
<td>IG4TH</td>
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**IntruTech®**

1475 S. Fordham Street
Longmont, CO 80503 USA

Phone +1-303-651-0551
Fax +1-303-678-1754
E-mail info@instrutechinc.com
Web www.instrutechinc.com

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