

# NGC2D Process Controller

## UHV Dual Bayard-Alpert Ion Gauge Controller

The NGC2D is a high-accuracy Ion Gauge controller that offers integrated pressure measurement and process control; with a large, clear display, an intuitive user interface and serial communications.



## Features

- Continuous measurement range: 1000 mBar to  $3 \times 10^{-11}$  mBar range.
- Controls 2 Ion gauges (sequentially), 2 Pirani gauges and 1 Capacitance Manometer.
- Bright green LED display shows bar-graph or numeric pressure, trend, diagnostics, etc.. Display in mBar, Torr or Pascal. Permanent bar-graph of Pirani pressures.
- Simple, guided setup is re-entrant and can be password protected.
- Reduced emission current. Instrument can advise optimum current or may be set manually. Variable Ion gauge sensitivity. Filament in use selectable from front panel
- Automatic start of Ion gauge in pump-down and can be interlocked by Pirani or external signal.
- Manual and automatic electron-bombardment degas programs.
- Integral, variable sensitivity leak detector with audio output on Pirani 1 or Ion gauge.
- 4 power relays for process control (5A, 240V) flexibly assignable to gauges.
- System bakeout program with control of temperature, time & over-pressure limit. Integral K-thermocouple amplifier.
- Automatic control of titanium sublimation pump controller with optional countdown / cancellation of imminent firing.
- RS-232C interface for data-logging and control
- Recorder output 1.0 volt/decade.
- 1U high full-width, steel cased instrument for easy rack-mounting.
- Operates from 100V to 240V, 50/60Hz supply.



SPECIFICATIONS:	
<b>Ionization Gauge</b>	
Gauge Type	AML AIG1xG are recommended. Bayard-Alpert gauges from many other manufacturers are suitable without adjustment other than sensitivity
Range	From $1 \times 10^{-3}$ to below $3 \times 10^{-11}$ mB with a UHV gaugehead with tungsten filaments. The low limit is dependent on gaugehead, cable construction and length and conditions of use. The upper limit is determined by the acceptable life of the filament and may be extended by the use of thoria or yttria-coated iridium filaments.
Accuracy and Repeatability	Determined principally by the gaugehead: controller errors are much smaller. Emission at 0.5mA is recommended. Electrometer logarithmic conformance <1% within any decade from 0.1 mA to 10 pA, <5% to 1 mA and <20% to 2 pA at 25°C incoming air temperature. Slope temperature compensation <0.02% per degree Celsius. Differential linearity of the 12-bit A to D converter is less than 0.1 LSB. Emission current initial accuracy <2%, stability <1%.
Gauge Supplies	Grid: +200 volts in emission, +500 volts at £60 mA in degas. Filament: +50 volt bias, ≤12 volts at ≤4.2 A (Tungsten) ≤2.6 A (Yttria) with filament power limited at > 30 watts.
<b>Pirani Gauge</b>	
Gauge Type	AML types PVU and PVB. A constant-voltage bridge circuit reduces contamination at high pressures. AML Pirani gaugeheads may be exchanged or extension leads may be connected without adjustments being necessary.
<b>Capacitance Manometer</b>	
Gauge Type	Capacitance Manometers of any manufacture having a +10 volt full-scale output at 1, 10, 100 or 1000 mBar or Torr and which are self-powered are suitable. Pressure indication can be in units different to the full-scale units defined for the Capacitance Manometer.
<b>General Specifications</b>	
Pressure Display	Scientific notation or bar-graph displays in mBar, Torr or Pascal
Operating Temperature	5° to 35° Celsius for specified performance. Incoming air temperature is measured and displayed and operation is inhibited at >40°C.
Supply Voltage	100 V to 240 V nominal at 48 to 65 Hz, without adjustment.
Power Consumption	<20 watts idling, <75watts in emission.
Dimensions	1U high, full width x 270mm Deep

Order Code	
NGC2D	Dual (Sequential) Ion Gauge Controller
Accessories	
AIG17G	UHV Ion Gauge. 2 x Tungsten filaments
AIG18G	UHV Ion Gauge. 2 x Thoria coated filaments
AIG19G	UHV Ion Gauge. 2 x Yttria coated filaments
AIGL3 (6) or (9)	3, 6 or 9 metre bakeable Ion gauge cable
PVU3	Pirani Gauge. Non-bakeable with 3m cable
PVB3	Pirani Gauge. Bakeable with 3m cable
PVX10	Pirani 10 metre extension cable, non-bakeable



# AIG Ionisation Gauge & Lead

UHV Bayard-Alpert Ion Gaugeheads, leads & filaments



The AML AIG nude ionization gauge is a high-sensitivity UHV Bayard-Alpert gauge covering the vacuum range of  $1 \times 10^{-3}$  to  $3 \times 10^{-11}$  mbar and is intended for electron-bombardment degas. It has an NW35CF flange with individual glass compression seals, closed-end grid and a choice of filament materials.

- Individual glass compression seal around each feedthrough pin are more economical and robust than ceramic, resulting in a less expensive and more rugged gaugehead, with the central collector pin inherently guarded against leakage currents by the grounded bulk of the flange.
- Replaceable twin Tungsten filaments are fitted as standard with Thoria or Ytria-coated Iridium as an option.
- The molybdenum grid has a closed-end, light, rigid structure, resulting in high sensitivity. The X-Ray-induced electron desorption current at the collector is minimised by geometry and screening.
- Connector pins are gold-plated, shrouded and polarized. Gold plating ensures that oxidation on the air-side cannot occur even after repeated bakeouts.
- Maximum bakeout temperature  $250^{\circ}\text{C}$ . Sensitivity 19 per millibar for nitrogen. X-Ray asymptote  $3 \times 10^{-11}$  millibar.

## Recommended Operating Conditions

	Emission	Degas
Collector	+0V	+0V
Grid	+200V	+500V
Filament bias	+50V	+0V
Max. emission	10mA	10mA W, 60mA Ir

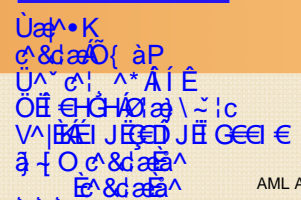
## Sensitivity, S mbar<sup>-1</sup>

H <sub>2</sub> O	19	N <sub>2</sub>	19
O <sub>2</sub>	21	CO	19
H <sub>2</sub>	6.2	CO <sub>2</sub>	27
He	2.4	Ne	5.4
Ar	21	CH <sub>4</sub>	27

Divide S by 100 for Pa<sup>-1</sup>. Multiply S by 1.33 for Torr<sup>-1</sup>



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**AIGL Gauge Lead.**

The AIGL is a 250°C-bakeable lead for use with AIG and similar ionisation gauges connected to AML controllers. They are available in 3, 6 and 9 metre versions or custom lengths to order. AML use gold-plated connectors exclusively: these are essential for reliable long-term measurement of the ion current after baking. The cable is rated for the worst-case operating conditions of 50 watt degas with a new tungsten filament during a 200°C bake. This product incorporates a fully screened and guarded collector with >1x10<sup>15</sup>Ω insulation. The connector housing is machined from PEEK and the cable clamp is anodized aluminium.

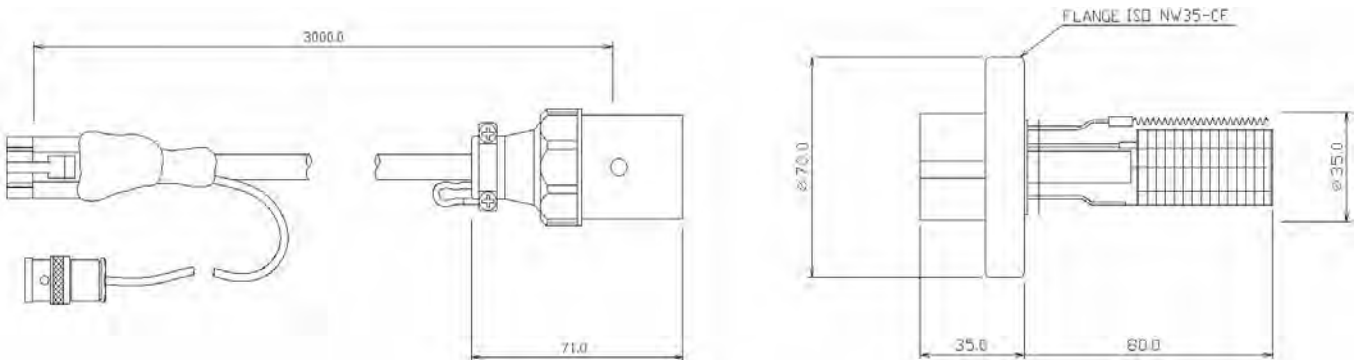
**Replacement Filaments**

Replacement filament assemblies are available in tungsten, thoria and Yttria-coated iridium. The assembly is held by Allen set screws in socket receptacles and a key and replacement screws are provided.

**Filament Types.**

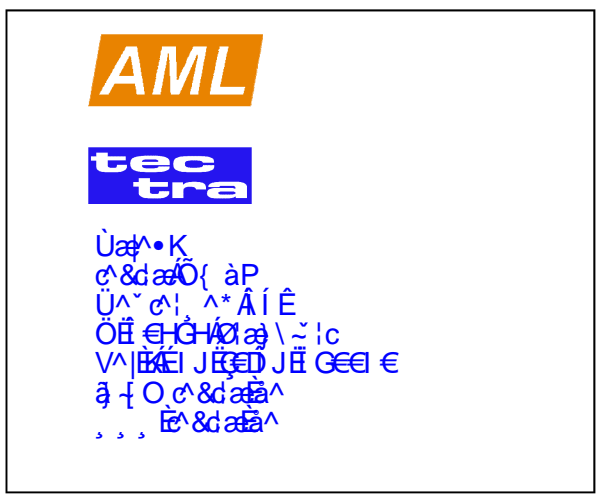
Filament power varies over the useful life of a filament, due to gradual erosion of bare tungsten or loss of the oxide coating. In general, Thoria-coated iridium filaments require about one quarter the power of tungsten at mid-life. Yttria has similar properties and runs less than 50°C hotter in normal emission. Yttria also has better adhesion and consequently longer life. Oxide-coated filaments absorb water in storage and may require more power initially to evaporate it.

The filament power supply must be capable of providing high currents to develop adequate power in the low resistance of a cold filament and sufficient voltage to compensate for drops in a long, hot cable. A power-limited supply of 40 watts capable of providing up to 12 volts and up to 4 amps will drive any AIG17G gauge operating under any conditions, (including degassing during bakeout at 250°C) with an AIGL9 lead. AML BA gauge controllers exceed these requirements and include comprehensive filament protection features.



**Ordering Information:**

<b>AIG17G</b>	UHV Bayard-Alpert gauge. Twin tungsten filaments
<b>AIG18G</b>	UHV Bayard-Alpert gauge. Twin thoria-coated iridium filaments
<b>AIG19G</b>	UHV Bayard-Alpert gauge. Twin yttria-coated iridium filaments
<b>AIGL3, (6), (9)</b>	3, (6), (9) metre, screened, bakeable Ion Gauge Cable.
<b>FIL17</b>	Replacement filament assembly. Twin tungsten
<b>FIL18</b>	Replacement filament assembly. Twin thoria-coated
<b>FIL19</b>	Replacement filament assembly. Twin yttria –coated



AML pursues a policy of continuous product improvement and reserves the right to make detail changes to specifications without consultation. Unless otherwise stated all specifications are typical and at 25° Celsius, after 1 hour operation. E and OE.



# PVU3 & PVB3 Pirani Gaugeheads

Pirani Gaugeheads for use with AML Ion Gauge Controllers



Pirani gauges detect the cooling effect of residual gas molecules on a heated filament. The rate of heat transfer to the gas is related to pressure and causes a change in the electrical resistance of the filament or the amount of power required to maintain it at constant temperature. The filament is normally connected in a bridge circuit.

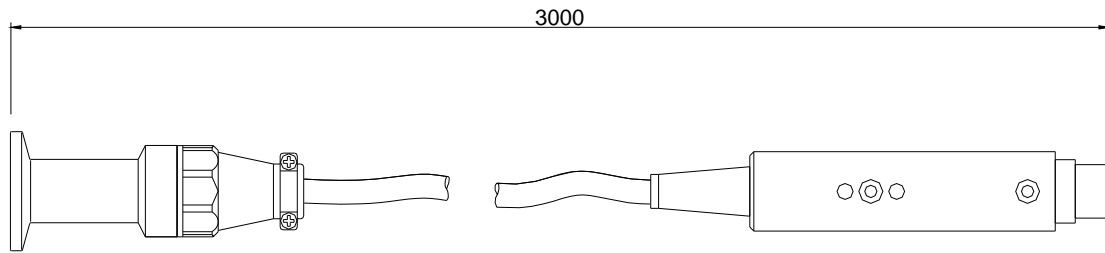
**PVU3** is a low-cost non-bakeable gaugehead with an integral 3-metre lead and connector. The feedthroughs use matched glass-to-metal seals which have better life and leak performance than the epoxy or compression seals used on other low-cost Pirani gaugeheads. The standard flange is NW16KF.

**PVB3** is a UHV-compatible stainless-steel Pirani gauge with an integral 3-metre lead and connector which can be baked at 200°C. The standard flange is NW16CF.

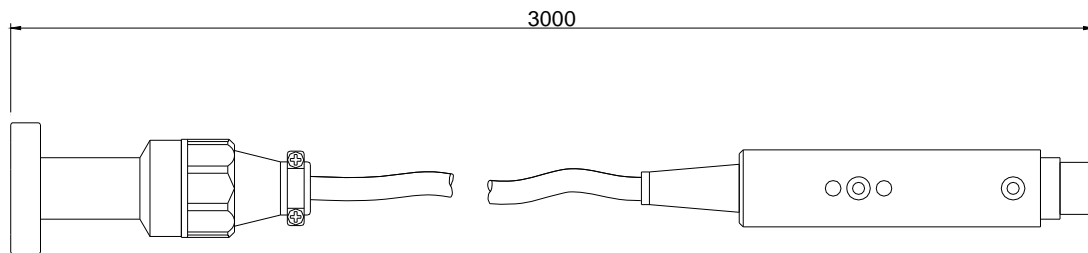
**PVX10** is a 10 metre extension cable for use with PVU or PVB. These cables extend the Kelvin sensing of AML controllers, so that the extension does not affect the calibration.

- AML Pirani gaugeheads are intended for use in constant-voltage bridge circuits, which reduces the filament temperature and the rate of filament corrosion or contamination at high pressures.
- Range: 1 bar to  $1 \times 10^{-3}$  millibars.
- May be interchanged between any AML NGC / PGC series or equivalent controllers without re-calibration. Extension cables do not affect the calibration.
- Supplied calibrated for vertical installation in dry nitrogen. Internal calibration adjustments enable them to be used with other orientations and gases.
- Materials exposed to the vacuum are stainless steel, nickel-cobalt-iron, glass and tungsten.





**PVU2**

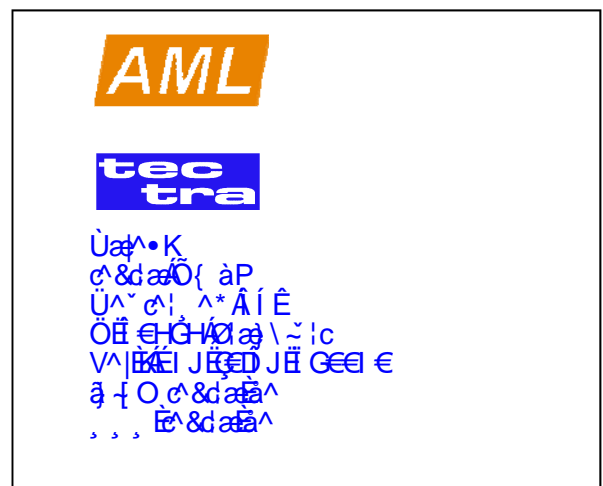


**PVB2**

Gauges are supplied calibrated for dry nitrogen. Calibration instructions are supplied with all gauges. AML Pirani gauges are intended for use with AML Pressure gauge controllers and 1U-high controllers manufactured by AML for other vendors. Such controllers may be identified by the AML copyright marks on the printed circuit boards.

**Ordering Information:**

- PVU3** Pirani Gauge, non-bakeable, 3m lead. NW16KF
- PVB3** Pirani Gauge, bakeable, 3m lead. NW16CF
- PVX10** Pirani extension lead, non bakeable, 10 metres



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