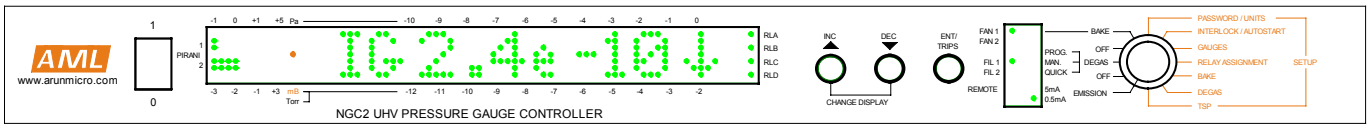
UHV BAYARD-ALPERT GAUGE CONTROLLER
MODEL NGC2

AML's NGC2 UHV BA controller is a powerful new-generation instrument, which has improved performance compared to PGC1 and PGC2, which it replaces. In 98% of cases it is a direct, plug-in replacement. Operation is even simpler, and more resistant to student-abuse. It has a longer, brighter LED display. All functions and setup are available from the front panel. Two fans are fitted, used alternately and monitored for performance.



NGC2 UHV PRESSURE GAUGE CONTROLLER

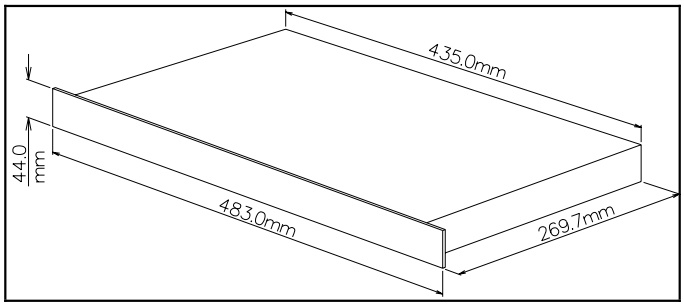
- ♦ 1U high full-width, steel-cased instrument for easy rack-mounting. Operates on 100 to 240v, 50/60Hz lines without adjustment.
- ♦ Controls 1 BA gauge plus 2 AML Pirani gauges plus a Capacitance Manometer simultaneously.
- ♦ Continuous measurement range: 1 Bar to 3×10^{-11} millibar.
- ♦ AML and approved equivalent gaugeheads may be exchanged or lead lengths altered without adjustment. Many other BA gauges are suitable.
- ♦ Filament current limit automatically set for filament material. Filament in use selected from the front panel. Ion gauge is grounded when not operating.
- ♦ Variable BA gauge sensitivity.
- ♦♦ Reduced emission current. Instrument advises optimum emission current at low pressure.
- ♦ Automatic start of BA gauge in pump-down.
- ♦ BA gauge interlock by Pirani or external signal (contact closure).
- ♦♦ Electron-bombardment degas program with independent adjustment of ramp, power and dwell time. Variable "quick" degas program with ramped start. Manual degas. Excessive or inappropriate degas is limited or inhibited.
- ♦♦ Pirani gauges may be switched on or off from the front panel.
- ♦♦ Comprehensive temperature management, with early indication of the need to replace a fan. Failure of a single fan does not inhibit use.
- ♦ Bright green LED display shows bargraph or numeric pressure, trend, diagnostics, etc.. Display in mBar, Torr or Pascal. Permanent bargraph of Pirani pressures.
- ♦ Simple, guided-setup is re-entrant and divided by function. Setup can be password-protected.
- ♦♦ Preset adjustable bakeout program with control of temperature, time and overpressure limit. Integral K-thermocouple amplifier.
- ♦♦ Automatic control of sublimation pump with countdown/cancellation of imminent firing.
- ♦ Integral, variable-sensitivity leak detector with audio output on Pirani1 or ion gauge.
- ♦♦ 4 internal power relays (5A, 240V) flexibly-assignable to gauges from the front panel. All external relay wiring is connected through a pluggable screw terminal block, which has a retaining safety shield.
- ♦♦ Non-volatile relay setpoints with manual override and inhibit facility. Simple setpoint adjustment and interrogation while measuring pressure.
- ♦♦ RS232-compatible interface for data-logging and control (cost - option).
- ♦ Recorder output 1.0 volt/decade on pluggable, 4-way screw terminal block with capacitance manometer and inhibit signals.
- ♦ Supplied with a mains lead, relay and auxiliary connectors, spare fuse and brief user manual.
- ♦♦ Cost-saving packages including gauges, leads and extended warranty are available.

AML

innovation in vacuum technology

SPECIFICATION

DIMENSIONS	
Nett Weight	**3.5 kg**
Shipping Weight	**5.0 kg**
Carton Dimensions	**60 x 40 x 13 cm**



BAYARD ALPERT GAUGE

Types: AML AIG17G is recommended. BA gauges from many other manufacturers are suitable, without adjustment other than sensitivity. A list of tested and approved gauges is available from AML. The use of non-approved gauges and leads may result in unstable emission or non-compliance with EU legal requirements and is not covered by AML's warranty.

Range: From 1 x 10^{-3} to below 3 x 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 25ºC 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.

CAPACITANCE MANOMETER (CM)

Capacitance Manometers of any manufacture having a +10 volt full-scale output at 1, 10, 100 or 1000 Torr or millibar and which are self-powered are suitable. Pressure indication can be in units different to the full-scale units defined for the Capacitance Manometer.

PIRANI GAUGES.

AML types PVU2 and PVB2. 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.

GENERAL

Pressure Display: Scientific notation with a 2-digit mantissa for all gauges. Bargraph displays may be selected.
Operating Temperature: 5º to 35º Celsius for specified performance. Incoming air temperature is measured and displayed and operation is inhibited at >40ºC.
Supply Voltage: 100 V to 240 V nominal at 48 to 65 Hz, without adjustment.
Power Consumption: <20 watts idling, <75watts in emission.
EMC Compliance: **Compliance with EU EMC Directive 89/336/EEC can only be guaranteed if AML BA gauge leads and screened Pirani gauges are used.**

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 25º Celsius, after 1 hour operation. E and OE.

Ordering information:	**NGC2**	Pressure Gauge Controller
Related products:	**AIG17G**	UHV Bayard-Alpert gauge, twin tungsten filaments
	AIGL3,(6),(9)	3, (6), (9) metre, screened, bakeable BA gauge lead
	PVU2	Pirani gauge, non-bakeable, with integral, screened 3 metre lead
	PVB2	Pirani gauge, bakeable, with integral, screened 3 metre lead
	AIG17P	UHV Bayard-Alpert gauge, twin tungsten filaments with integral Pirani gauge
	AIGL3P	Lead for AIG17P, screened, bakeable, 3metre
	PVX10	10 metre, non-bakeable, screened Pirani extension lead

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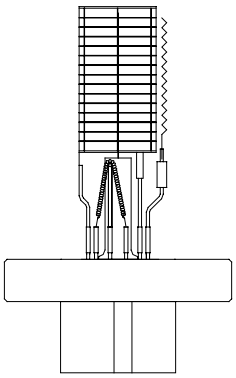
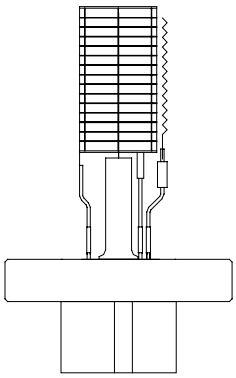
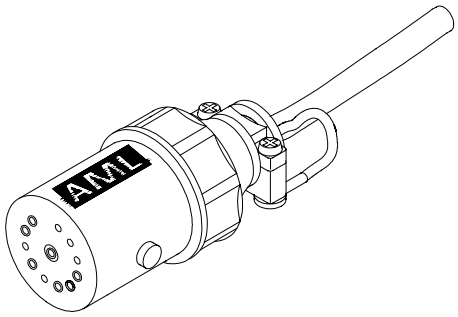
IMPROVED BAYARD-ALPERT GAUGEHEADS AND LEADS FOR UHV. MODELS AIG17P, AI17G AND AIGLx



AIG17P



AIG17G



AIGL3 and AIGL3P

Bayard-Alpert Gaugeheads and leads for Ultrahigh Vacuum.

AML BA gauges and leads are widely acknowledged as the best available in the industry. New-product introductions and enhancements confirm and extend this lead. The use of AML double-screened BA gauge leads is essential to ensure that AML Pressure Gauge Controller installations comply with EU EMC Directive.

- **AIG17G** is a nude UHV Bayard-Alpert gauge intended for electron-bombardment degas. It has an individual glass compression seal around each feedthrough pin. These glass seals 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. Twin tungsten filaments are standard. AML have improved the construction and method of attachment of the Molybdenum grid. The 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. The connector pins are **gold-plated**, shrouded and polarized. Sensitivity is 19 per millibar for nitrogen. Sensitivity for other gases is tabulated overleaf. X-Ray asymptote is 3 x 10^{-11} millibar. Maximum bakeout temperature is 250°C. Mounting flange is NW35CF.

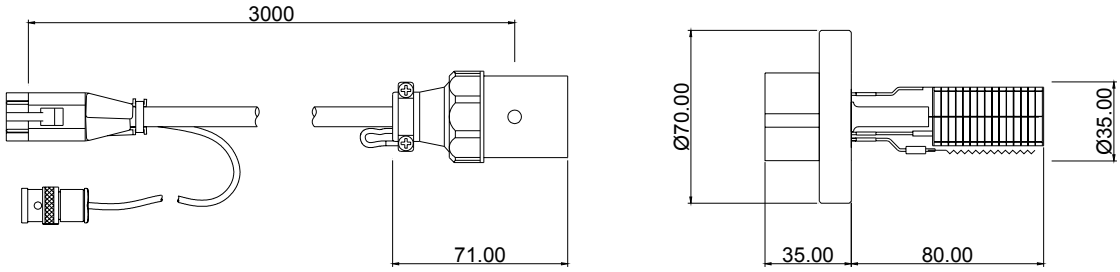
- **AIG17P** incorporates a Pirani gauge on the same flange as the BA gauge. To use the Pirani gauge it must be connected to the PGC with an AIGL3P lead. The use of this combination gauge leads to significant cost-saving and eliminates a port on the vacuum chamber.

- **FIL17** is a replacement twin-tungsten filament assembly. The assembly is held by Allen set screws in socket receptacles and a key and replacement screws are provided. **FIL19** is a twin yttria-coated iridium filament assembly. Yttria is a safe and equivalent alternative to the toxic and radioactive thoria formerly used.

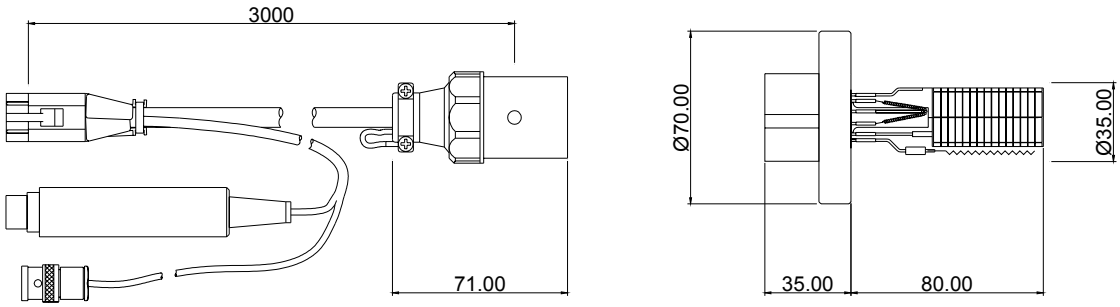
- **AIGL3** is a 250°C-bakeable 3-metre lead for use with AIG17G and similar ionisation gauges connected to AML controllers. **AIGL6** and **AIGL9** are 6 and 9 metre versions. AML use gold-plated connectors exclusively: these are essential for reliable long-term measurement of the ion current after 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 uses an entirely PTFE-insulated custom cable and incorporates an overall electrical screen and fully screened and guarded collector with >1x$10^{15}\Omega$ insulation. The connector housing is machined from PEEK and the cable clamp is a bright nickel-plated casting.

- **AIGL3P** has an additional connector incorporating calibration adjustments for the integral Pirani gauge on AIG17P.

AIGL3 and AIG17G



AIGL3P and AIG17P



Recommended Operating Conditions

	Emission	Degas
Collector	+0V	+0V
Grid	+200V	+500V
Filament bias	+50V	+0V
Max. Emission	10mA	100mA W, 60mA Ir

Sensitivity, S, mBar^{-1}

H_20	19	N_2	19
O_2	21	CO	19
H_2	6.2	CO_2	27
He	2.4	Ne	5.4
Ar	21	CH_4	27

These bias conditions produce sensitivity shown in the table on the right. Divide S by 100 for Pa^{-1}; multiply by 1.33 for Torr^{-1}.

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, yttria-coated iridium filaments require about one quarter the power of tungsten at mid-life. Thoria is radioactive, toxic and no longer recommended. 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 adsorb 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.

EU EMC Directive 89/336/EEC

AML Pressure gauge controllers were tested for compliance with AIGLx cables and AML screened Pirani gauges.
Installations using other cables without overall screens and controlled-grounding may not comply with legal requirements in the EU.

Ordering information:

AIG17G	UHV BA Gauge, twin tungsten filaments.
AIG17P	UHV BA Gauge, twin tungsten filaments with integral Pirani gauge.
AIGL3 or **AIGL6** or **AIGL9**	Lead for AIG17, bakeable , 3m / 6m / 9m
AIGL3P	Lead for AIG17P, bakeable , 3m
FIL17	Twin tungsten filament assembly
FIL19	Twin yttria-coated iridium filament assembly

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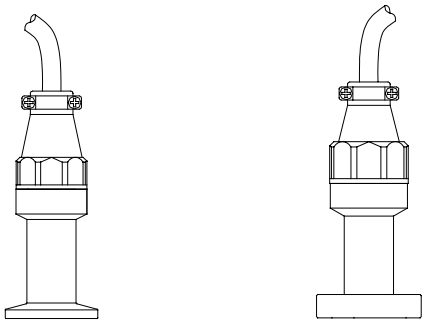
PIRANI GAUGEHEADS FOR ULTRAHIGH VACUUM
MODELS PVU PVB

Aml produce a range of Pirani gaugeheads to complement their Pressure Gauge Controllers.
All models include an integral lead for convenience and economy in installation.



PVU2 **PVB2**

PIRANI GAUGES

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.

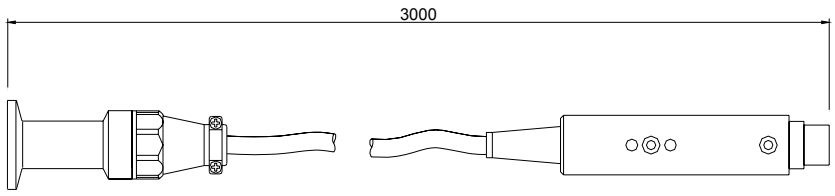
General Features of AML Pirani Gauges

- 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 x 10^{-3} millibars.
- May be interchanged between any AML 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.

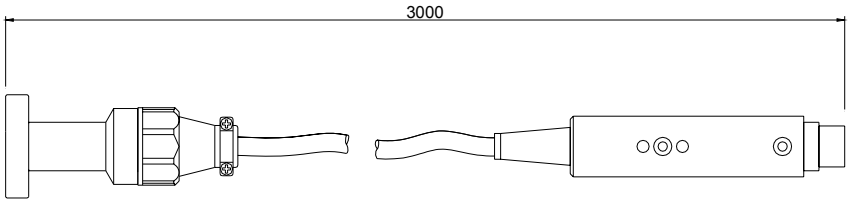
Features of specific AML Pirani Gauges

- **PVU2** 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.
- **PVB2** is a UHV-compatible stainless-steel Pirani gauge with an integral 3-metre lead and connector which can be baked at 250ºC. The standard flange is NW16CF.
- **PVX10** is a 10 metre extension cable for use with PVU2 or PVB2. These cables extend the Kelvin sensing of AML PGCs, so that the extension does not affect the calibration.

GAUGEHEAD DIMENSIONS / ORDERING INFORMATION



PVU2

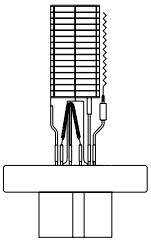


PVB2

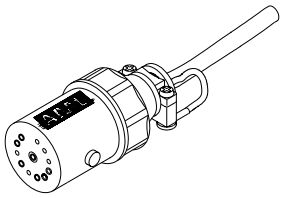
Gauges are supplied calibrated for dry nitrogen. Calibration instructions are supplied with all gauges. AML Pirani gauges are intended for use with AML Pressure gauge controllers and 1U-high controllers manufactured by AML for other vendors. Such controllers may be identified by the AML copyright marks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

Ordering information:	**PVU2**	Pirani Gauge, non-bakeable , 3m lead
	PVB2	Pirani Gauge, bakeable , 3m lead
	PVX10	Pirani Extension lead, non- bakeable, 10 metres
Related Products:	**AIG17P**	BA gauge with Integral Pirani Gauge
	AIGL3P	Lead for AIG17P, bakeable 3m

For new installations the use of combination gauges will save cost and reduce the number of ports required.



AIG17P



AIGL3P

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