For Ultra High Vacuum

# AGILENT 4UHV ION PUMP CONTROLLER


Agilent Technologies

FOR ULTRA HIGH VACUUM

# THE NEW AGILENT 4UHV ION PUMP CONTROLLER

The new state-of-the-art Agilent 4UHV Ion Pump Controller operates up to four pumps simultaneously and independently. The 4UHV starts and controls ion pumps of any type (Diode, Noble Diode, StarCell) and size (from 20 to 500 l/s). A large four-line LCD display allows simultaneous reading of individual pump voltage, current and pressure. The variable voltage feature ensures optimum pumping speed and pressure reading throughout the operating pressure range. Built-in set points, remote operation and RS232/485 computer interface are standard (Profibus and Ethernet optional).

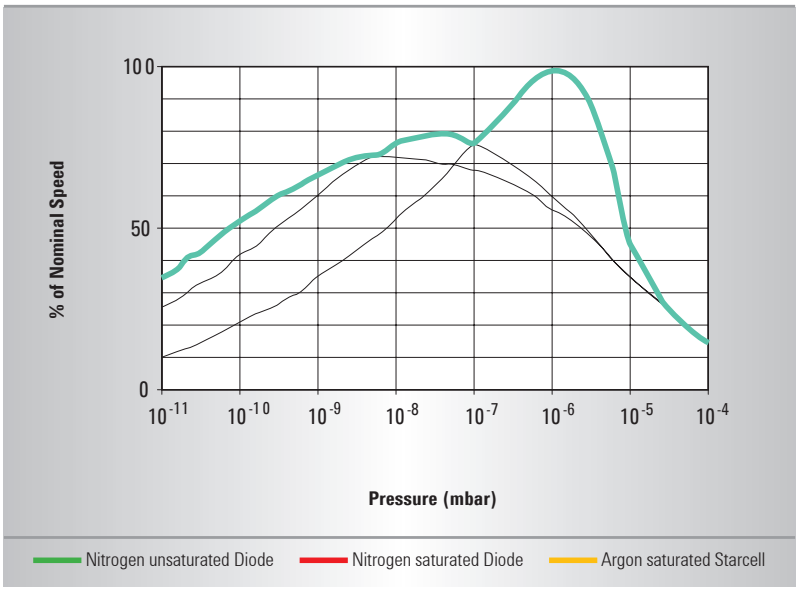
**Ion Pump Evolution**

Since the invention of the Vaclon Pump in 1957, all of the major innovations in UHV have come from Agilent Technologies (formerly Varian Vacuum).

## Optimized Pumping Speed

The 4UHV will select the right operating voltage to optimize the pumping speed of your ion pumps. By applying High Voltage in accordance with operating pressure, pumping speed performance is improved.
This is because the energy with which the ion bombards the cathode is the nominal applied HV, reduced by the space charge effect due to the electron cloud present in the ion pump cell. Since the space charge effect is pressure related, a variable HV is applied to maintain optimum bombardment energy, resulting in the best possible pumping performance at any pressure.

## Pumping Speed vs Pressure at Different Voltages



# Features and Benefits


## Versatility

The 4UHV is available in different configurations, in order to independently power, control and monitor any combination of multiple pumps of different sizes , from one to four pumps , from 20 to 500 l/s. For each number of pumps to be operated several options are available: 200W for a single pump, 2 x 80 W or 2 x 200 W for two pumps, 2 x 80 + 200 W for three pumps, 4 x 80 W for four pumps.

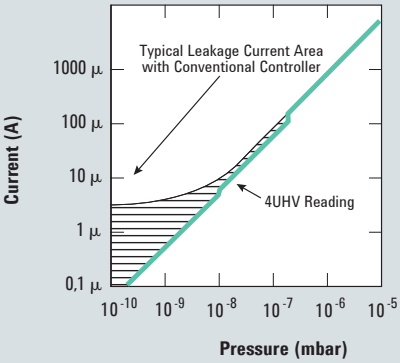
## Intelligence

To access the unit you can use analog or RS232/485 ports. The controller uses the same protocol as our other intelligent vacuum devices (Navigator turbo pump Controller and Inverter scroll & rotary vane pumps), giving you fast, convenient access to all elements of the vacuum system. Profibus and Ethernet communications available on request, please call Agilent for details.

## Pressure Reading

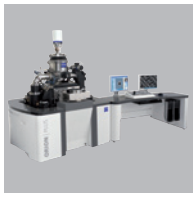
The 4UHV is preprogrammed to automatically convert current reading of any Vaclon Plus pump into pressure. Thanks to its ability to detect ion current as low as 10 nA, it allows pressure measurement in the $10^{-10}$ mbar range. To ensure reliable pressure reading down to the UHV region, the 4UHV optimizes the applied high voltage as a function of pressure. As a result, the leakage current of the ion pump is eliminated, thereby providing more accurate pressure readings.

## Typical Current vs Pressure Curve




## Safety

To protect you against high voltage the cable is equipped with an interlock system which immediately shuts down the high voltage when the plug is removed from the pump. The protect mode limits the current to protect the pump and the controller.



## Low noise

For SEM applications especially, the remaining AC component of the HV output was reduced to a minimum. It is much lower than in any other existing unit, eliminating the need for additional filters completely in many cases.

# Technical Specifications

| | |
|---|---|
| **Input Voltage** | 100 - 240 Vac (+/-10%) |
| **Input Frequency** | 50/60 Hz |
| **Dimensions** | 400.5 x 211.4 x 177.0 mm (l x w x h) |
| **Display** | 4 rows with 20 characters |
| **Available configurations** | 1 x 200 W, 2 x 80 W, |
| | 2 x 200 W, 4 x 80 W, 2 x 80 W +1 x 200 W |
| **Minimum Configuration** | One HV card with 200W or 2x80W |
| **Output Voltage** (Open Circuit) | 3, 5 and 7 kV |
| **Output Current** (Short Circuit) | 40 mA for 80 W channel, |
| | 100 mA for 200 W channel |
| **Modes of Operation** | Local / Serial / Remote |
| **Front Panel Readings** | Voltage, Pressure, Current, Status |
| **Safety Marks** | CE, C_CSA_US |
| **Current Measurement Range** | 10 nA to 100 mA |
| **Input Signals** | On/off; Protect; Step Mode; |
| **Output Signals** | Analog Out; NC Set-point; NO Set-point |
| **HV Connector** | Fischer Type 105 |
| **Output Power Maximum** | 400 W |
| **Communications** | RS232 / 485 standard |
| | Profibus or Ethernet optional |

# Ordering Information

| Description | Part Number |
|---|---|
| 200 W neg | 929-9010 |
| 200 W pos | 929-9011 |
| 2 x 80 W neg | 929-9200 |
| 2 x 80 W pos | 929-9201 |
| 2 x 200 W neg | 929-9020 |
| 2 x 200 W pos | 929-9021 |
| 1 x 200 W pos & 1 x 200 W neg | 929-9022 |
| 4 x 80 W neg | 929-9400 |
| 4 x 80 W pos | 929-9401 |
| 2 x 80 W pos & 2 x 80 W neg | 929-9402 |
| 2 x 80 W neg & 1 x 200 W neg | 929-9210 |
| 2 x 80 W pos & 1 x 200 W pos | 929-9211 |
| 2 x 80 W pos & 1 x 200 W neg | 929-9212 |
| 2 x 80 W neg & 1 x 200 W pos | 929-9213 |

Ethernet and Profibus communication available

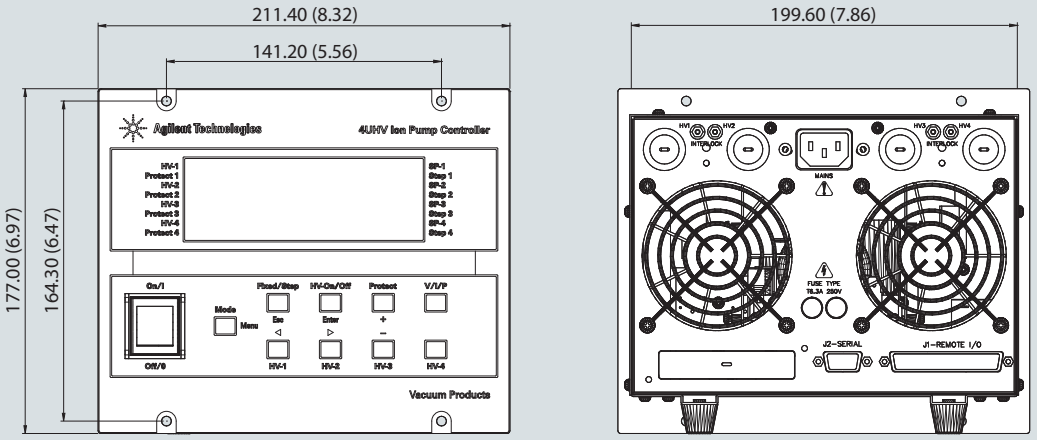
- Replace 929 with 729 in the PN for ETHERNET configurations (i.e. 729-9400 4x80W Neg with Ethernet)
- Replace 929 with 829 in the PN for PROFIBUS configurations (i.e. 829-9400 4UHV 4x80W Neg with Profibus)

**Accessories and Cables ***

| | |
|---|---|
| HV bakeable cable, radiation resistant, 4 m (13 ft.), with Interlock | 9290705 |
| HV bakeable cable, radiation resistant, 7 m (23 ft.), with Interlock | 9290707 |
| HV bakeable cable, radiation resistant, 10 m (33 ft.), with Interlock | 9290708 |
| HV bakeable cable, radiation resistant, 20 m (66 ft.), with Interlock | 9290709 |
| Rack adapter 19" | 9290064 |
| Mains cable NEMA Plug, 3 m (10 ft.) long * | 9699958 |
| Mains cable European Plug, 3 m (10 ft.) long * | 9699957 |

*(*) The unit does not include the power cable, please order the cable separately.*

# Outline Drawing

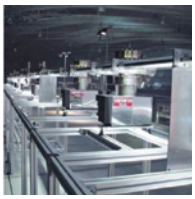



Dimensions: millimeters (inches)

Depth: mm 400.50 (15.77)


## How much power do I need for my ion pumps?

Power requirement depends on the pump size and starting pressure; the larger the pump and higher the starting pressure, the higher the power consumption. The largest standard Ion Pump configuration, 500 l/s, can be easily started with 200W up to $10^{-5}$ mbar, while a medium size pump (75 l/s) needs less than 80 W to be started at the same pressure, and 80 W are sufficient to operate a 500 l/s in the typical Ion Pump operating range (below 2 x $10^{-6}$ mbar).



## Why was the higher power rating necessary in the past?

In the past ion pumps were started with the aid of sorption pumps, able to reach $10^{-4}$ mbar only. As a consequence, much larger and more powerful Ion pumps controller were needed. The resulting life of Ion Pumps started at such high pressures was much shorter (1 minute of operation at $10^{-4}$ mbar is equivalent to 2 months at $10^{-9}$ mbar) Today's oil-free turbo pumps, backed by oil-free primary pumps, achieve lower pressures, thereby reducing the starting pressure of the ion pump. This reduces the maximum power requirement of the ion pump controller and extends the lifetime of the ion pump.

## Negative or positive?

The requirement of negative or positive potential depends on the pumping element installed in the ion pump. Diode style elements (Diode & Noble Diode) need positive voltages, while Triode style elements (old style Triode & StarCell) need negative voltages for operation.

# The New Agilent 4UHV Ion Pump Controller

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