Vacuum Technology

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HPS® Products

Series 901P

MICROPIRANI™ / PIEZO LOADLOCK TRANSDUCER

Designed specifically for the loadlock environment, the Series 901 Plus (901P) Loadlock Transducer (LLT) combines Piezo and MicroPirani™ sensor technologies. The combined output provides significantly higher accuracy, stability, repeatability and a faster response time than conventional thermal conductivity gauges.

Features and Benefits

- Functionality of three sensors in a single transducer for space savings and wide measurement range
- Ultra compact design
- Accurate absolute pressure measurement from 1,000 to 10^{-5} Torr
- Gas independent absolute pressure measurement from 50 to 1,000 Torr
- Accurate atmospheric pressure reading, independent of gas type and barometric pressure changes
- Fast, accurate and repeatable pressure measurements reduces process cycle time
- Mountable in any orientation for ease of installation; no loss of measurement accuracy
- MicroPirani™ solid state sensor is resistant to damage from air inrush or vibration
- Three setpoints with fast response time for reliable process control (optional)
- Ease of operation via analog output and digital communication
- Setup, diagnostic and operation software available
- Alternate analog output and electrical connectors available to match other vendors' gauges and facilitate an easy upgrade
- CE marked, compliant with EMC Directive 89/336/EEC

Applications

The 901P has been specifically designed for pressure measurement within a vacuum loadlock. It has the capability to replace multiple pressure measurement devices on a loadlock with its absolute pressure measurement from atmosphere to 10^{-5} Torr and atmospheric switching capabilities. Subsequently OEM's can reduce costs with a simplified loadlock design. The 901P can be used on loadlocks or any vacuum chamber requiring both absolute pressure measurement and atmospheric switching capabilities.

Compared to gauges used in traditional load-lock designs, the 901P accurate atmospheric pressure measurement can improve loadlock performance by faster cycle times and prevent contamination of loadlock with atmospheric air.

Description

The 901P combines both absolute and differential pressure measurement technologies to provide superior performance and functionality. The 901P provides patented, gas independent absolute pressure measurement from 50 -1000 Torr with increased accuracy over thermal conductivity sensors.

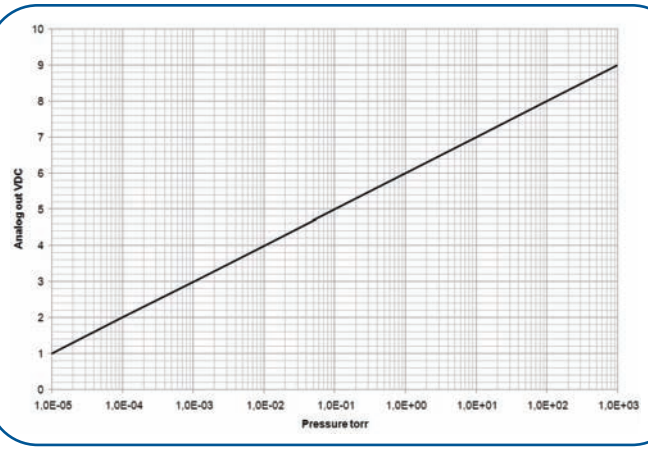
Unlike traditional Pirani gauges, the sensor element in the MicroPirani™ is made of a one millimeter square silicon chip, allowing the measurements to be made in a very small volume. As a result of the MicroPirani™ technology, the 901P can read pressures down to 10^{-5} Torr, two decades below a standard Pirani sensor. The sensor design minimizes the effects of convection, subsequently the 901P can be mounted in any orientation without compromising accuracy.

The Piezo is a differential pressure sensor, ensuring correct atmospheric pressure measurement under varying barometric pressure conditions. Piezo technology is a direct pressure reading, allowing the measurement to be gas independent. The Piezo sensor measures from -760 to +760 Torr relative to atmospheric pressure.

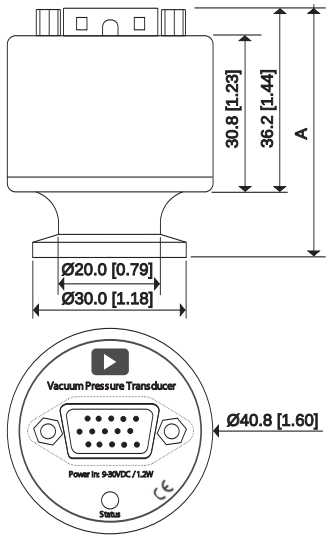
The 901P has RS232 or RS485 digital communication interface for setup of transducer parameters and to provide real time pressure measurement.

The 901P also has an analog pressure output of 1VDC/decade that can be interfaced to external analog equipment for pressure readout or control. Other analog outputs and curves can be selected via the digital user interface.

A secondary optional analog output is used to provide the differential pressure measurement.



The 901P has up to three mechanical relays which can be used for process control, for example interlocking isolation valves and vacuum pumps. Each set point can be assigned either to the differential piezo measurement or the combined absolute MicroPirani™/Piezo measurement. The 901P compact design significantly reduces the amount of space occupied by a vacuum gauge. This is particularly appealing to system designers and allows for a more compact vacuum system.

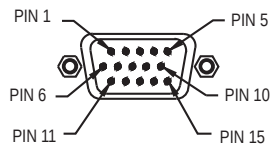


Flange	A
NW 16 KF	1.93 (49.1)
NW 25 KF	2.00 (50.9)
1/8" NPT-F	3.50 (89.0)
8 (½") VCR®-F [1]	3.24 (82.4)
4 (¼") VCR®-F [1]	3.20 (81.4)
CF 1.33"	2.30 (58.5)
NW 16 KF ext	2.58 (65.6)

Dimensions: inch (mm)

Dimensional Drawing -

Note: Unless otherwise specified, dimensions are nominal values in inches (millimeters referenced).



1 - RS485 (-)/RS232 transmit	9 - Relay #1 NC
2 - RS485 (+)/RS232 receive	10 - Relay #2 NC
3 - Power (+)	11 - Relay #2 Common
4 - Power (-)	12 - Relay #2 NO
5 - Analog Output (+) abs.	13 - Relay #3 NC
6 - Analog Output (-)	(or analog output + diff)
7 - Relay #1 NO	14 - Relay #3 Common
8 - Relay #1 Common	15 - Relay #3 NO

PinOuts -

Three (3) set point relays and dual Aout

Specifications

Sensor Type 1 **Sensor Type 2**	MicroPirani™ (MEMS Thermal Conductivity) Piezo differential (MEMS diaphragm)
Measuring Range Absolute **Measuring Range Differential**	1.0 X 10^{-5} Torr to 1500 Torr -760 to +760 Torr
Set Point Range Absolute **Set Point Range Differential**	5.0 X 10^{-4} Torr to 1000 Torr -760 to +100 Torr
Calibration Gas	Air, Argon, Helium, Nitrogen, H_2, H_2O vapor, CO_2, Xenon, Neon
Operating Temperature Range	0° to 40°C (32° to 104°F)
Maximum Bakeout Temperature	85°C (185°F), non-operating
Digital Communication	RS485 / RS232 (4800 to 230400 Baud)
Controls	Zero adjust, span adjust, analog output, pressure units, baud rate, address, factory default, set point functions: value, hysteresis, direction, enable, transducer status, switch, LED test
Status	Absolute and differential pressure reading, units, set point, operating time, transducer temperature, user tag, model, device type, serial number, firmware and hardware versions, part number, manufacturer
Analog Output (Absolute Pressure)	1 to 9 VDC, 1 VDC/decade, 100Ω maximum output impedance
Analog Output Resolution	16 bit
Optional Analog Output 2 (Piezo Differential)	5 VDC = 0 Torr, 1 VDC/decade
Analog Output 2 Resolution	12 bit
Relays (Optional) **Relay Contact Rating** **Relay Response**	901P - 3 relays SPDT 1 A @ 30VAC/DC, resistive 100 msec maximum
Power Requirements	9 to 30 VDC, < 1.2 watts max
MicroPirani **Accuracy(1)** **Repeatability(1)**	 5 X 10^{-4} to 1 X 10^{-3} Torr ±10% of reading 1 X 10^{-3} to 100 Torr ±5% of reading 100 Torr to Atm ±25% of reading 1 X 10^{-3} to 100 Torr ±2% of reading
Piezo Differential **Accuracy Piezo(1)** **Repeatability(1)** **Zero Stability(1)**	 -10 to +10 Torr ±10% of reading -100 to -10 Torr ±8% of reading -760 to -100 Torr ±1% of reading +10 to 100 Torr ±5% of reading -760 to +10 Torr ±1% of reading ±0.1% of Full Scale (F.S. = 760 Torr)
Overpressure Limit	1500 Torr (Absolute)
Installation Orientation	Any
Internal Volume (KF16)	2.8 cm^3
Materials Exposed to Vacuum	Silicon, SiO_2, Si_3N_4, gold, low outgassing epoxy resin, 304 stainless steel, Viton®
Electronic Casing and Flange	304 stainless steel
Weight (with KF 16 Flange)	170 g
CE Certification	EMC Directive 2004/108/EC

(1) Note: Accuracy and repeatability are typical values measured with Nitrogen gas at ambient temperature after zero adjustment.

Ordering Information

	Code
Transducer Model	
901P Loadlock	901P-
Flange	
KF16	1
KF25	2
1/8" npt	3
VCR4	4
VCR8	5
CF1.33	6
KF16 extended	8
Interface	
RS232 / Analog	1
RS485 / Analog	2
Analog Out	
Standard MKS	0
Connector Relays	
SUBD 15pinHD male / no relay	2
SUBD 15pinHD male / 3 relays	3
SUBD 15pinHD male/3 relays/ Dual Aout (piezo differential)	4
SUBD 15pinHD male / 3 relays / Dual Aout (Absolute)	5
Enclosure Sealing	
Standard / Viton sealing	0

Ordering Code Example: 901P-11030 = KF16, RS232, standard analog output, Sub D 15 pin HD male, 3 relays, Viton.

Analog Output
The 901P has a standard 15 pin HD SUBD connector and an analog output voltage pressure signal of 1VDC/decade. It can also emulate analog voltage outputs from a variety of other vacuum transducers. The emulation feature can be used to upgrade and replace other vendors' gauges in OEM applications without changing system software. Contact MKS technical support for details.

PDR900 Power Supply & Display

The PDR900 power supply and readout unit is a stand alone, single channel controller for use with the Series 900 digital vacuum transducers. It can be used as a stand-alone power supply readout unit or as a tool for configuration, calibration and diagnostics of system integrated transducers in OEM applications.

See more on: www.mksinst.com/pdr900

974 QuadMag Transducer

The 974 QuadMag transducer combines the features of the 901P with cold cathode inverted magnetron technology. In addition to the atmospheric switching capabilities of the 901P the 974 has a wider pressure measurement range and is capable of measuring pressures as low as $1x10^{-8}$ Torr.

See more on: www.mksinst.com/974

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Series 901P_11030 - 1/09