

Vacuum

Technology
WWW.MKSINST.COM



Series 970

COLD CATHODE TRANSDUCER FAMILY

The 970 Series is a family of compact, low cost, general-purpose transducers that utilize from one to four sensors- cold cathode, MicroPirani™, and Piezo technologies. Combining these sensing technologies enables a wide measurement range from atmosphere to 10^{-8} Torr. In addition to its small size, broad range and lower cost, the 970 Series can be operated via digital communication or as an autonomous analog unit.

Features & Benefits

- Small footprint design provides a compact transducer solution saving tool real estate
- Single transducer provides a wide measurement range of 10^{-8} Torr to atmosphere (972B and 974B models), eliminating the need for multiple gauges
- The MEMS based MicroPirani sensor in the 972B and 974B allows low auto cold cathode turn-on pressure (user programmable from 2×10^{-4} to 1×10^{-3} Torr) for enhanced reliability
- The cold cathode anode module design is user serviceable to decrease downtime and save external repair costs
- All transducers include both analog and digital communication for ease of operation
- MicroPirani is automatically zeroed during pump down cycle for improved accuracy (972B and 974B models)
- Mountable in any orientation for ease of use and flexibility of design
- Simplified interface via a single smoothed analog output that combines the individual sensor measurements
- Three user configurable relays for process control
- Alternate analog output and electrical connectors available to match other vendors' gauges and facilitate an easy upgrade
- Can be used with the PDR900 controller for easy set up
- RoHS and CE Compliant

Applications

The Series 970 Transducers are compact, low cost measurement solutions for vacuum users operating within the pressure range of atmosphere to 10^{-8} Torr. The small size of the Series 970 transducers makes them ideal for system integrators looking to reduce footprint and enable miniaturization. Applications include:

- Analytical equipment (mass spectrometer control)
- Scanning electron microscopes
- Coating systems
- Semiconductor loadlock pressure control
- General vacuum base pressure measurement



Description

The Series 970 family consists of 3 models, the 971B, 972B and the 974B.

971B UniMag

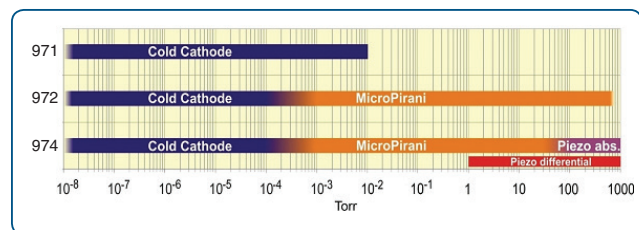
The 971B UniMag transducer offers a measurement range from 1×10^{-8} Torr to 5×10^{-3} Torr and is based on cold cathode inverted magnetron sensor technology. The 971B is a cost effective solution for base pressure measurement and control.

972B DualMag

The 972B DualMag transducer offers a measurement range from 1×10^{-8} Torr to atmospheric pressure and it combines cold cathode inverted magnetron and MicroPirani thermal conductivity MEMS sensor technologies. The MicroPirani automatically controls the cold cathode sensor to ensure optimal ignition pressure. The MicroPirani offers 1-2 decades lower measuring range than a traditional pirani gauge, subsequently by lowering the cold cathode activation pressure gauge, reliability is improved and the service interval extended.

974B QuadMag

The 974B QuadMag offers a measurement range from 1×10^{-8} to 1500 Torr and combines cold cathode inverted magnetron, MicroPirani and Piezo differential sensor technologies. The 974B 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^{-8} Torr and atmospheric switching capabilities. Subsequently, OEM's can reduce costs with a simplified loadlock design. The 974B can be used on loadlocks or any vacuum chamber requiring both absolute pressure measurement and atmospheric switching capabilities.



Sensor and transducer measurement ranges

Enclosure

The transducers are available with an optional IP54 (NEMA 3) rated enclosure.

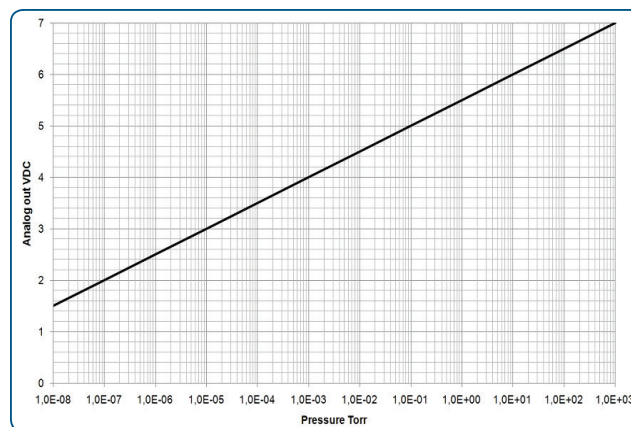
Interface

The Series 970 has RS232 or RS485 digital communication interface for setup of transducer parameters and to provide real time pressure measurement.

All Series 970 transducers have an analog pressure output of 0.5VDC/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.

The Series 970 has up to three mechanical relays which can be used for process control, examples are interlocking valves or pumps.

The Series 970 have standard 15 pin HD SUBD connector and an analog output voltage pressure signal of 0.5VDC/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.



Analog Output

Service

The user changeable cold cathode anode module and screen offers easy serviceability without disassembling of transducer electronics.



Specifications

	Series 971B	Series 972B	Series 974B
Sensor Type	Cold Cathode	Cold Cathode / MicroPirani (MEMS Thermal Conductivity)	Cold Cathode / MicroPirani (MEMS Thermal Conductivity) / Piezo Differential (MEMS Diaphragm)
Measuring Range Absolute	1 x 10 ⁻⁸ Torr to 5 x 10 ⁻³ Torr	1 x 10 ⁻⁸ Torr to Atmosphere	1 x 10 ⁻⁸ Torr to 1500 Torr
Measuring Range Differential	not available	not available	-760 to +760 Torr
Set Point Range Absolute	1 x 10 ⁻⁸ Torr to 5 x 10 ⁻³ Torr	1 x 10 ⁻⁸ Torr to Atmosphere	1 x 10 ⁻⁸ Torr to 1000 Torr
Set Point Range Differential	not available	not available	-760 to +100 Torr
Calibration Gas	Nitrogen	Nitrogen	Nitrogen
Operating Temperature Range	0° to 40°C (32° to 104°F)	0° to 40°C (32° to 104°F)	0° to 40°C (32° to 104°F)
Maximum Bakeout Temperature	85°C (185°F), non-operating	85°C (185°F), non-operating	85°C (185°F), non-operating
Digital Communications	RS485 or RS232	RS485 or RS232	RS485 or RS232
Controls	Pressure units, baud rate, address, factory default, user tag, RS485 test, gas correction; setpoint functions: value, hysteresis, direction, HV enable, protect, control setpoint, gas type	Pressure units, baud rate, address, factory default, user tag, RS485 test, gas correction; setpoint functions: value, hysteresis, direction, HV enable, protect, control setpoint, gas type	Pressure units, baud rate, address, factory default, user tag, RS485 test, gas correction; setpoint functions: value, hysteresis, direction, HV enable, protect, control setpoint, gas type
Status	Pressure reading and units, setpoint, transducer temperature, user tag, model, device type, serial number, firmware and hardware versions	Pressure reading and units, setpoint, transducer temperature, user tag, model, device type, serial number, firmware and hardware versions	Pressure reading and units, setpoint, transducer temperature, user tag, model, device type, serial number, firmware and hardware versions
Analog Output (Absolute Pressure)	0.5 VDC / decade	0.5 VDC / decade	0.5 VDC / decade
Relays	3 relays, SPST	3 relays, SPST	3 relays, SPST
Relay Contact Rating	1 A @ 30VAC/DC, resistive	1 A @ 30VAC/DC, resistive	1 A @ 30VAC/DC, resistive
Power Requirements	9-30 VDC, 2 W	9-30 VDC, 2 W	9-30 VDC, 2 W
Accuracy (Typical) Combined Absolute	5 x 10 ⁻⁸ Torr to 10 ⁻³ ± 30% of reading	5 x 10 ⁻⁸ Torr to 10 ⁻³ ± 30% of reading 10 ⁻³ to 100 ± 5% of reading	5 x 10 ⁻⁸ Torr to 10 ⁻³ ± 30% of reading 10 ⁻³ to 50 Torr ± 5% of reading 50 to 1000 Torr ± 1% of reading
Repeatability (Typical) Combined Absolute	5 x 10 ⁻⁸ Torr to 10 ⁻³ ± 30% of reading	5 x 10 ⁻⁸ Torr to 10 ⁻³ ± 30% of reading 10 ⁻³ to 100 ± 2% of reading	5 x 10 ⁻⁸ Torr to 10 ⁻³ ± 30% of reading 10 ⁻³ to 50 ± 2% of reading 50 to 1000 Torr ± 1% of reading
Accuracy (Typical) ¹ Differential	not available	not available	-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
Repeatability (Typical) ¹ Differential	not available	not available	-760 to +10 Torr ± 1% of reading
Zero Stability (Typical) ¹ Differential	not available	not available	± 0.1% of Full Scale (F.S. = 760 Torr)
Overpressure Limit	1500 Torr	1500 Torr	1500 Torr
Installation Orientation	Any	Any	Any
Internal Volume	21 cm ³	21 cm ³	21 cm ³
Materials Exposed to Vacuum	304 and 403 stainless steel, Viton®, epoxy resin, ceramic, titanium	304 and 403 stainless steel, silicon, SiO ₂ , SiN _x , gold, Viton®, epoxy resin, ceramic, titanium	304 and 403 stainless steel, silicon, SiO ₂ , SiN _x , gold, Viton®, epoxy resin, ceramic, titanium
Electronic Casing	304 stainless steel	304 stainless steel	304 stainless steel
Weight (with NW25 KF Flange)	12.7 oz (360 g)	12.7 oz (360 g)	12.7 oz (360 g)
CE Certification	EMC Directive 2004/108/EEC, EN-61326-1 Low Voltage Directive 73/23/EEC, EN-61010-1	EMC Directive 2004/108/EEC, EN-61326-1 Low Voltage Directive 73/23/EEC, EN-61010-1	EMC Directive 2004/108/EEC, EN-61326-1 Low Voltage Directive 73/23/EEC, EN-61010-1

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



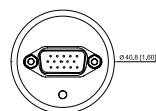
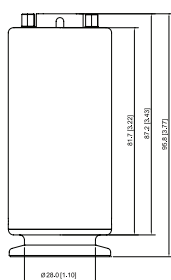
Ordering Information

Description	Code
Cold Cathode Transducer Model	
971B UniMag	971B-
972B DualMag	972B-
974B QuadMag	974B-
Flange	
NW25 KF	2
2 3/4" CF	7
NW40 KF	9
Interface	
RS232	1
RS485	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) - 974B only	4
SUBD 15pinHD male/3 relays/Dual Aout (Absolute) - 972B/974B only	5
Enclosure Sealing	
Standard/Viton® sealing	0
IP54/Viton	2
Standard/Viton sealing/display	4
Accessories	
PDR900 Single Channel Controller, RS232/485, US Power Cord	PDR900-12-US
Cable, PDR900 to 970, 10 ft (3M), RS232	100013620
Cable, PDR900 to 970, 10 ft (3M), RS485	100013671
Replacement Cold Cathode Anode Module	970B-Anode
Anode Screen and Front Screen	970B-CELLKIT
NW25KF Centering Ring with 4µm Filter and Viton O-ring*	100014515
NW40KF Centering Ring with 4µm Filter and Viton O-ring*	100014520

* Recommended on inlet flange of 972B/974B to protect sensors from particulates when used in harsh environments. Other filter sizes available upon request.

Ordering Code Example: 971B-21030 = NW25, RS232, standard analog output, Sub D 15 pin HD male, 3 relays, Viton.

Dimensions



Flange

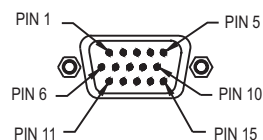
NW 25 KF
NW 40 KF
2 3/4" CF

A

3.78 (96)
3.86 (98)
4.49 (114)

Pin Outs

SubD 15 pin HD male/3 relays



- | | |
|--------------------------------|--|
| 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 (+) | 13 - Relay #3 NC (971B only - cold cathode enable) |
| 6 - Analog Output (-) | 14 - Relay #3 Common |
| 7 - Relay #1 NO | 15 - Relay #3 NO |
| 8 - Relay #1 Common | |



Global Headquarters

2 Tech Drive, Suite 201
Andover, MA 01810-2449
Tel: 978.645.5500
Tel: 800.227.8766 (in USA)
Web: www.mksinst.com

Vacuum Technology

HPS® Products
5330 Sterling Drive
Boulder, CO 80301
Tel: 303.449.9861
Tel: 800.345.1967 (in USA)

Denmark ApS

Ndr. Strandvej 119G
DK-3150 Hellebaek
Denmark
Tel: +45 4492 9299
Email: mksdenmark@mksinst.com