The 905 MicroPirani™ Sensor Kit is an ultra compact wide range vacuum transducer designed for OEM system integration. The transducer is based on well proven thermal conductivity MEMS (Micro-ElectronMechanical Systems) sensor technology and meets the equipment market demand for integrated vacuum measurement solutions.

The 905 MicroPirani Sensor Kit is a calibrated plug and play vacuum pressure transducer solution for OEM system integration. The kit consists of a MEMS-based pressure sensor and a measuring electronics and processor module.

The electronics module fits a standard 28 pin DIP socket and can easily be integrated on a printed circuit board together with other electronics. The sensor module can either be wired through the circuit board or connected by a special flat cable from the electronics module.

The MicroPirani sensor element consists of a silicon chip construction, where thermal conductivity is measured in a small cavity where gas is passed by diffusion instead of flow. The MicroPirani offers a wide measuring range of 1-2 decades lower than traditional wire based pirani and convection gauges. The sensor can be mounted in any orientation without compromise of measurement performance.

**Features & Benefits**

- Wide measurement range of atmosphere to $10^{-5}$ Torr
- Integration with equipment electronics
- Three open collector set points for advanced process control
- User-friendly digital control via host processor or computer
- Analog output 0.5 VDC / decade
- Analog / digital remote zero calibration provides ease of operation
- Ultra compact dimensional design simplifies installation
- Robust solid state sensor is resistant to vibrations and g-forces
- Standard DIP 28 pin footprint for easy integration

**Applications**

The 905 MicroPirani Sensor Kit can be used in a variety of applications and systems, including:

- Gas Analysis - Mass Spectrometry
- Scanning Electron Microscopes
- Vacuum Pumping Systems
- Gas Leak Detectors
- Semi Surface and Thin Film Analysis
- Space Flight Systems
- Vacuum Valves
- Freeze Drying
- UHV Vacuum Gauges
- Gyroscope
Applications (cont.)

The following are some of the more common applications for this product:

Mass Spectrometers
In a mass spectrometer, the mean distance between molecules must reach a certain distance before activating the analyzing cell. The Micro Pirani Sensor Kit can be used to measure pressure and thereby determine adequate mean free path of molecules. The size of mass spectrometers is constantly shrinking and the Sensor Kit significantly reduces space taken by traditional vacuum gauges, allowing more compact equipment design.

Pumping Systems
Traditional vacuum gauges occupy significant space in pumping systems. The compact size of the Sensor Kit allows pump manufacturers to integrate vacuum measurement solutions in pumping systems like multi-stage turbo molecular pumping systems.

Space Flight Systems
The low weight and highly robust MEMS sensor design allows use in demanding application and extreme environments like equipment for use in space flight. The electronics and sensor element is designed to withstand extreme g-forces and intense vibrations experienced during rocket launch.

Application and Custom Configuration
MKS offers individual solutions and configuration to OEM customer like customized cables, flanges and transducer setup.

Description
The advanced electronics module offers a wide selection of interface possibilities including an analog voltage output of 0.5 VDC / decade, digital communication via TTL UART interface and three independent open collector set points. The digital interface can transfer real time measuring data directly to a host processor or be used for configuration of set point parameters and user calibration.

Evaluation Board
The Micro Pirani Sensor Kit is designed for a high level of integration, but the evaluation board can get the Micro Pirani Sensor Kit up and running in minutes. The evaluation board is supplied with a sensor element mounted on a KF16 test flange for easy vacuum connection. The evaluation board offers both RS232 and RS485 digital communication and can be connected directly to a PC for real time pressure data logging and setup of digital parameters. For easy connectivity, all Sensor Kit I/O pins are available through screw terminals at the evaluation board. The evaluation board is also compatible with the PDR900 controller that can be used for pressure readout and setup of digital parameters.

Sensor Installation
The sensor module can easily be integrated into equipment vacuum systems or manifolds and occupies minimal space. The sensor is designed for o-ring sealing when connected to a 7.6 mm orifice.

Supply Voltage
The Sensor Kit electronics module is powered from a 5 VDC single supply. The low voltage and power consumption permits use with battery operated equipment.

Reset Function
The reset function allows remote resetting of the Sensor Kit microcontroller.

Set Point Output
The Sensor Kit has 3 independent set point values that can be used for process controlling, starting a turbo pump or other pressure related functions.

Serial Communication
The TTL level UART serial interface (universal asynchronous receiver/transmitter) enables digital communication with external UART serial devices. The interface can be used for real time pressure reading and for setup and configuration of digital parameters directly from external host microprocessor.

LED Output
The LED output can be connected to an external LED for visual indication of transducer status including fault situations.

Analog Output
The analog voltage output provides a log linear pressure signal of 0.5 VDC per decade and can easily be interfaced to analog measuring equipment and converted to pressure reading.

Remote Zero
The 905 Sensor Kit is factory calibrated and adjusted; however, the remote zero feature allows external zero adjustment of pressure reading when the system pressure is below 1×10^5 Torr. The remote zero function can be activated by an external switch or digitally from a host processor or computer.
MicroPirani™ Sensor Specifications

**Measurement Range**
- 1 x 10⁻⁵ to 760 Torr (1)
- 1 x 10⁻⁵ to 1000 mbar
- 1 x 10⁻³ to 1 x 10⁵ Pascal

**Measurement Accuracy**
5% (2)

**Pressure Units (User Selectable)**
Torr, mbar, Pascal

**Supply Voltage**
+5VDC (±2%)

**Digital User Interface**
Serial UART, TTL level

**Analog Output Range**
0.5 VDC - 4.5 VDC

**Analog Output Impedance**
100 Ohm

**Set Point Output**
3 (open collector)

**Set Point Sink Current**
50 mA

**Operating Temperature**
5° to 40°C (41° to 104°F)

**Storage Temperature**
-10° to 55°C (14° to 131°F)

**Sensor Bakeout Temperature**
130°C (266°F)

**Material Exposed to Vacuum**
Silicon, SiO₂, SiN₄, Epoxy, Gold

**Weight (Electronics Module)**
9 grams

**Mounting Electronics**
DIP 28 Pin socket

**Mounting Electronics Pins**
0.5 mm

**Electronics Dimensions**
47.8 x 20.8 mm (1.882 x .820 in)

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(1) Zero offset can impact measurement accuracy in the 10E-5 and low 10E-4 Torr/mbar decade and consequently zero adjustment may be required in some applications for repeatable measurement.

(2) Typical measuring accuracy from 1E-3 to 100 Torr Nitrogen pressure measured at 25°C.

(3) No set point load

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Evaluation Board Specifications

**Supply Voltage**
9-30 VDC

**Evaluation Board Power Consumption**
0.5 Watt

**Fuse (Thermal)**
200 mA

**Digital User Interface (jumper selectable)**
RS232 or RS485

**Sensor Flange**
KF16

**Electronics Dimensions**
48 x 82 mm (1.889 x 3.228 in.)

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Evaluation Board Pinout —
9 Pin Male D-sub

1. No use
2. No use
3. Power supply + (9-30 VDC)
4. Power supply - / RS232, RS485 ground
5. Analog output + (0.5 to 4.5 VDC)
6. No use
7. RS232 transmit or RS485-
8. Analog output -
9. RS232 receive or RS485+

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MicroPirani™ Sensor Dimensional Drawing —
Note: Unless otherwise specified, dimensions are nominal values in millimeters (inches referenced).

Electronics Module Dimensional Drawing —
Note: Unless otherwise specified, dimensions are nominal values in millimeters (inches referenced).
905 MicroPirani™ Sensor Kit

Part Number | Description
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905-0001 | 905 Evaluation Board, KF16 Flange (without Power Supply)
905-0002 | 905 Evaluation Board, KF16 Flange (with Power Supply)
905-0003 | 905 Electronics Module, Nude Sensor
905-0004 | 905 Electronics Module, Sensor PCB, 200 mm Cable

Sensor Cables

Part Number | Description
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100013955 | Sensor PCB Cable, 50 mm
100013956 | Sensor PCB Cable, 100 mm
100013811 | Sensor PCB Cable, 200 mm
100013957 | Sensor PCB Cable, 300 mm

Manual

Part Number | Description
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100013905 | Installation and Application Manual

Accessories

Part Number | Description
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PDR900-12-EU | PDR900 Single Channel Controller, RS232/RS485, EU
PDR900-12-UK | PDR900 Single Channel Controller, RS232/RS485, UK
100013613 | Cable, RS232, PDR900, 9 pin, 10 ft. (3m)
100013614 | Cable, RS232, PDR900, 9 pin, 16 ft. (5m)
100013515 | Cable, RS232, PDR900, 9 pin, 25 ft. (7.5m)
100013516 | Cable, RS232, PDR900, 9 pin, 30 ft. (10m)
100013604 | Series 900 Transducer Data Logger Software
100017240 | MicroPirani Sensor Viton O-Ring
100013951 | MicroPirani Sensor Protection Cap

Electronics Module Pinout—DIL 28 Pin

1. MP Sensor pin 1
2. AGND
3. MP Sensor pin 2
4. AGND
5. MP Sensor pin 3
6. Analog Out
7. AGND
8. Act LED
9. GND
10. GND
11. µP PSEN
12. Setp 1, open collector
13. Setp 2, open collector
14. Setp 3, open collector
15. GND
16. RS485 enable
17. +5V supply
18. +5V supply
19. Remote Zero switch
20. TXD (TTL)

(Res) Reserved for future use. Do not connect.

Functional Block Diagram

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