

# Series 905

## MicroPirani™ Sensor Kit

### Series 900 Vacuum Sensor Integration



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.

## Product Features

- 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
- Robust solid state sensor is resistant to vibrations and g-forces



## Key Benefits

- Ultra compact dimensional design simplifies installation
- Calibrated plug and play vacuum pressure transducer solution
- Standard DIP 28 pin footprint for easy integration

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 MicroPirani 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

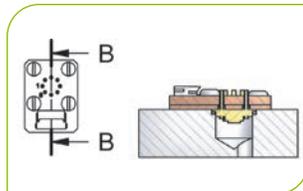
The low weight and highly robust MEMS sensor design allows use in demanding application and extreme environments like equipment for use in space flight. The electronics and sensor element is designed to withstand extreme g-forces and intense vibrations experienced during rocket launch.

### Interface Options

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.

### 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.

### Application and Custom Configuration

The 905 MicroPirani Sensor Kit can be also used in these applications and systems:

- Scanning Electron Microscopes
- Gas Leak Detectors
- Semi Surface and Thin Film Analysis
- Vacuum Valves
- Freeze Drying
- UHV Vacuum Gauges
- Gyroscope

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

### Serial Communication

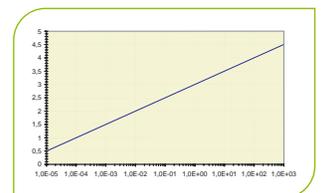
The TTL level UART serial interface (universal asynchronous receiver/transmitter) enables digital communication with external UART serial devices. The interface can be used for real time pressure reading and for setup and configuration of digital parameters directly from external host microprocessor.

### 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  $1 \times 10^{-5}$  Torr. The remote zero function can be activated by an external switch or digitally from a host processor or computer.

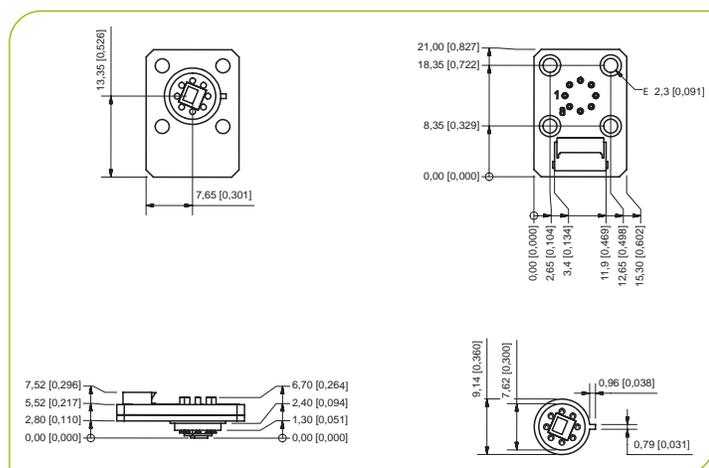
# Specifications

Measurement Range	1 x 10 <sup>-5</sup> to 760 Torr <sup>(1)</sup> 1 x 10 <sup>-5</sup> to 1000 mbar 1 x 10 <sup>-3</sup> to 1 x 10 <sup>+5</sup> Pascal
Measurement Accuracy	5% <sup>(2)</sup>
Pressure Units (User Selectable)	Torr, mbar, Pascal
Supply Voltage	+5VDC (±2%)
Supply Current	45 mA <sup>(3)</sup>
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, SiO <sub>2</sub> , SiN <sub>4</sub> , 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)

(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.

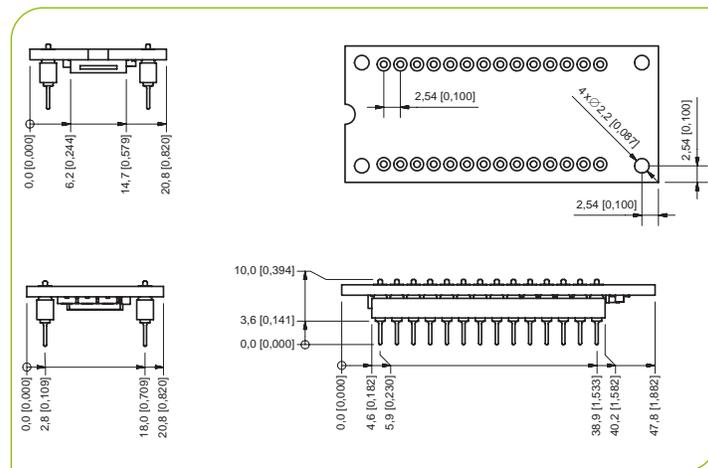
(2) Typical measuring accuracy from 1E-3 to 100 Torr Nitrogen pressure measured at 25°C.

(3) No set point load



**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).

# Ordering Information

## MicroPirani™ Sensor Kit

### Part Number

905-0003

905-0004

### Description

905 Electronics Module, Nude Sensor

905 Electronics Module, Sensor PCB, 200 mm Cable

## Sensor Cables

### Part Number

100013955

100013956

100013811

100013957

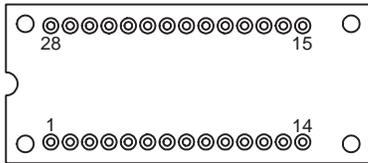
### Description

Sensor PCB Cable, 50 mm

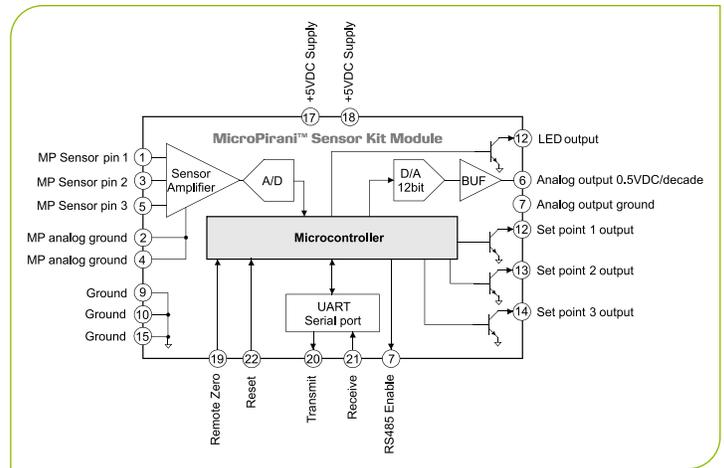
Sensor PCB Cable, 100 mm

Sensor PCB Cable, 200 mm

Sensor PCB Cable, 300 mm



- |                   |                             |                        |
|-------------------|-----------------------------|------------------------|
| 1. MP Sensor pin1 | 12. Setp. 1, open collector | 23. N/C <sup>(®)</sup> |
| 2. AGND           | 13. Setp. 2, open collector | 24. N/C <sup>(®)</sup> |
| 3. MP Sensor pin2 | 14. Setp. 3, open collector | 25. N/C <sup>(®)</sup> |
| 4. AGND           | 15. GND                     | 26. N/C <sup>(®)</sup> |
| 5. MP Sensor pin3 | 16. RS485 enable            | 27. N/C <sup>(®)</sup> |
| 6. Analog Out,    | 17. +5V supply              | 28. N/C <sup>(®)</sup> |
| 7. AGND           | 18. +5V supply              |                        |
| 8. Act LED        | 19. Remote Zero switch      |                        |
| 9. GND            | 20. TXD (TTL)               |                        |
| 10. GND           | 21. RXD (TTL)               |                        |
| 11. µP PSEN       | 22. µP Reset                |                        |



### Electronics Module Pinout

DIL 28 Pin

### Functional Block Diagram



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