

## Applications

This Panametrics aluminum oxide moisture sensor probe measures moisture concentration in gases and non-aqueous liquids from trace to ambient levels. It is designed to be used in conjunction with Panametrics Moisture Image Series 1 analyzer, Moisture Image Series 2 analyzer and PM880 portable hygrometer for industries including:

- Petrochemical
- Natural gas
- Industrial gas
- Semiconductor
- Furnace gas/heat treating
- Power generation
- Air dryer
- Pharmaceutical
- Aerospace

## Features

- Intrinsically safe
- Ambient to ppb moisture measurement; 16-bit resolution
- Three function capability with moisture sensor and optional built-in temperature and pressure sensors
- Nonvolatile calibration data storage
- Calibrations traceable to National Institute of Standards and Technology (NIST) or National Physical Lab U.K. (NPL)
- Requires only twisted pair cabling, allowing probe to be located up to 3000 ft (914 m) from analyzer
- Threaded and VCR mount configurations

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# Moisture Image® Series Panametrics Aluminum Oxide Moisture Probe

Moisture Image Series Probe is a Panametrics product. Panametrics has joined other GE high-technology sensing businesses under a new name—GE Industrial, Sensing.



# GE Sensing

## Panametrics Hygrometer Systems and Moisture Probes

Panametrics aluminum oxide moisture probes have set the standard of performance and value in industrial moisture measurement for more than 40 years.

In use, the Moisture Image Series probe is coupled to Panametrics hygrometer consoles by an interconnecting cable. Ease of use, wide measurement range and rigorous calibration standards make these systems the preferred choice for industrial moisture measurement worldwide.

## Built-In Pressure and Temperature Measurement

Accurate determination of many moisture measurement parameters requires knowledge of the process temperature and pressure. The inconvenience and limitations associated with installing and using separate temperature and pressure sensors have been eliminated, with both capabilities being built directly into the Moisture Image Series probe. A nonlinear NTC thermistor to measure temperature from  $-22^{\circ}\text{F}$  to  $158^{\circ}\text{F}$  ( $-30^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ ), and a choice of five solid-state piezoresistive transducers to measure pressures up to 5000 psig (345 bar), are available.

Temperature and pressure input data are used by Moisture Image Series 1 and 2 analyzers and the PM880 portable hygrometer to determine parameters such as ppm, lbs/mmSCF and relative humidity.

## MIS Electronics Module

The real power of the MIS probe comes from an electronics module that attaches to the moisture sensor probe. The built-in microprocessor provides 16 bit resolution, a real performance enhancement, allowing it to detect parts per billion (ppb) changes in moisture concentration. In addition, it continuously monitors and compensates the electronics to ensure long-term stability.

For convenience, moisture probe calibration data is stored in nonvolatile EEPROM, so data entry is automatic and safe from power outage.

The Moisture Image Series probe is intrinsically safe, saving the expense and installation problems associated with explosion-proof housings, purges, or external zener barriers. It is designed and certified to meet the requirements of IEC/Zone 0 areas.

## Rigorous Calibration Standards Traceable to the NIST/NPL

The aluminum oxide sensor of each MIS probe is individually calibrated in one of the world's most advanced moisture calibration facilities. Developed over several decades, this facility generates precisely known moisture concentrations, traceable to the NIST/NPL, to which each sensor is exposed during the calibration process.

All data is gathered and stored by a dedicated computer system. Calibrations are repeated over a period of many months to ensure the stability of each individual moisture probe. Only those probes that meet GE's demanding specifications for accuracy and stability are shipped to customers.

## Installation Flexibility

The Moisture Image Series probe is designed to be located at the process, exactly where the measurement is needed. The sensor can withstand process temperatures of  $-166^{\circ}\text{F}$  to  $158^{\circ}\text{F}$  ( $-110^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ ) and pressures from vacuum up to 5000 psig (345 bar). No minimum flow rate is required. For additional flexibility, the probe can be located up to 3000 feet (0.9 km) from the analyzer, connected by inexpensive, unshielded, twisted-pair cable (AWG 22). As a result, the probe can be placed in the ideal location, even in a large plant, without the cost, delays and installation problems associated with special cabling.

# MIS Probe Specifications

## Moisture Sensor

### Intrinsic Safety

Intrinsically safe when connected to a Panametrics Moisture Series analyzer, PM880 portable hygrometer or intrinsically safe barriers in accordance with the user's manual. Moisture Image Series probe:

BAS01ATEX1095

Ⓔ II 1 G EEx ia IIC T4 (-20°C to +80°C) and CSA C US Class I, Division 1, Groups A,B,C&D T4, LR44204-23

### European Compliance

Complies with EMC Directive 89/336/EEC and PED 97/23/EC for DN<25

### Type

Aluminum oxide moisture sensor probe

### Calibration

Each sensor is individually computer calibrated against known moisture concentrations, traceable to NIST or NPL.

### Dew/Frost Point Calibration Ranges

- Overall calibration range capability: 140°F to -166°F (60°C to -110°C)
- Standard: 68°F to -112°F (20°C to -80°C) with data to -166°F (-110°C)
- Ultralow: -58°F to -166°F (-50°C to -110°C)
- Extended high: 140°F to -112°F (60°C to -80°C) with data to -166°F (-110°C)

### Accuracy

- ±3.6°F (±2°C) from 140°F to -85°F (60°C to -65°C)
- ±5.4°F (±3°C) from -86°F to -166°F (-66°C to -110°C)

### Repeatability

- ±0.9°F (±0.5°C) from 140°F to -85°F (60°C to -65°C)
- ±1.8°F (±1.0°C) from -86°F to -166°F (-66°C to -110°C)

### Temperature

- Sensor operating temperature (process environment): -166°F to 158°F (-110°C to 70°C)
- Operating temperature for Moisture Image Series probe electronics module: 32°F to 140°F (0°C to 60°C)
- Storage temperature: 158°F (70°C) maximum

### Operating Pressure

5 μHg to 5000 psig (345 bar)

*Limited by optional pressure sensor—see pressure sensor ranges*

### Flow Range

- Gases: Static to 10,000 cm/s linear velocity at 1 atm
- Liquids: Static to 10 cm/s linear velocity at density of 1 g/cc

### Response Time

Less than five seconds for 63% step change in moisture content in either wet-up or dry-down cycle

### MIS Probe/Analyzer Separation

3000 ft (0.9 km) maximum recommended length (consult factory for longer distances)

### Moisture Image Series Probe/Analyzer Compatibility

- Moisture Image Series 1 analyzer
- Moisture Image Series 2 analyzer
- PM880 portable hygrometer

### MIS Probe/Analyzer Cable

Unshielded, twisted pair, AWG 22

### Limited Warranty

- Calibration: Six months from delivery
- Materials and workmanship: One year from delivery

## Built-In Temperature Sensor

### Type

Nonlinear NTC thermistor (resultant temperature linearized by microprocessor)

### Operating Range

-22°F to 158°F (-30°C to 70°C)

### Accuracy

±0.9°F (±0.5°C) overall

### Response Time (Maximum)

One second in well stirred oil or 10 seconds in still air for a 63% step change in increasing or decreasing temperature

# MIS Probe Specifications

## Built-In Pressure Sensor

### Type

Solid-state/piezoresistive

### Available Ranges

- 30 to 300 psig (3 to 21 bar)
- 50 to 500 psig (4 to 35 bar)
- 100 to 1000 psig (7 to 69 bar)
- 300 to 3000 psig (21 to 207 bar)
- 500 to 5000 psig (35 to 345 bar)

### Accuracy

±1% of full scale

### Pressure Rating

Three times the span of the available range to a maximum of 7500 psig (518 bar)



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