

# HygroPro

## Aluminum Oxide Moisture Transmitter



### Applications

This aluminum oxide moisture transmitter measures moisture concentration in gases and non-aqueous liquids from trace to ambient levels. It is suitable for a wide range of industries:

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

### Features

- Intrinsically safe
- Ambient to ppb moisture measurement; using aluminum oxide moisture sensor
- Built-in temperature and pressure sensors
- Non-volatile calibration data storage
- Calibrations traceable to National Institute of Standards and Technology (NIST)
- Requires only twisted pair cabling
- Complete program capability via six-button keypad
- Integrated display/user interface
- Analog and digital outputs



GE imagination at work

The HygroPro moisture transmitter is an intrinsically safe, compact, loop-powered moisture transmitter designed specifically to meet the demands of rugged industrial applications. With certified intrinsically safe electronics (when installed with proper protection) packaged in an IP67/Type 4X housing, the HygroPro is ideal for use in pipeline natural gas, petrochemical, power generation and other industrial gas or non-aqueous liquid applications.

The HygroPro features an integrated backlit display and six-button keypad to provide viewing of up to three parameters simultaneously and to allow easy navigation of the software for configuration of the display, analog and digital (RS485) outputs, and other user functions and diagnostics. Via the RS485 interface, the HygroPro built-in multidrop capability allow multiple units to be connected on a single network.

Using an industry-proven aluminum oxide moisture sensor, the HygroPro features a built-in temperature thermistor and pressure transducer to provide realtime measurement for calculation of parameters such as ppm<sub>v</sub> in gases, ppm<sub>w</sub> in liquids, pounds per million standard cubic feet in natural gas or percent relative humidity. Three sensors mounted on a single probe mount provide installation flexibility when space is limited. In addition, the HygroPro display can be oriented in four different orientations to allow installation of the moisture sensor in the top, bottom or side of a process pipe or sample cell.

The HygroPro consists of a display/keypad housing, and a replacement transducer element (RTE), which contains the aluminum oxide moisture sensor, temperature thermistor, and pressure transducer and associated electronics. The RTE is field replaceable by simply removing a small mounting plate and disconnecting a cable. Also, since the calibration data for the moisture and pressure sensors are stored in a non-volatile EEPROM in the RTE, a user does not need to enter any calibration data manually when changing an RTE.



## Advanced Moisture Sensor Technology

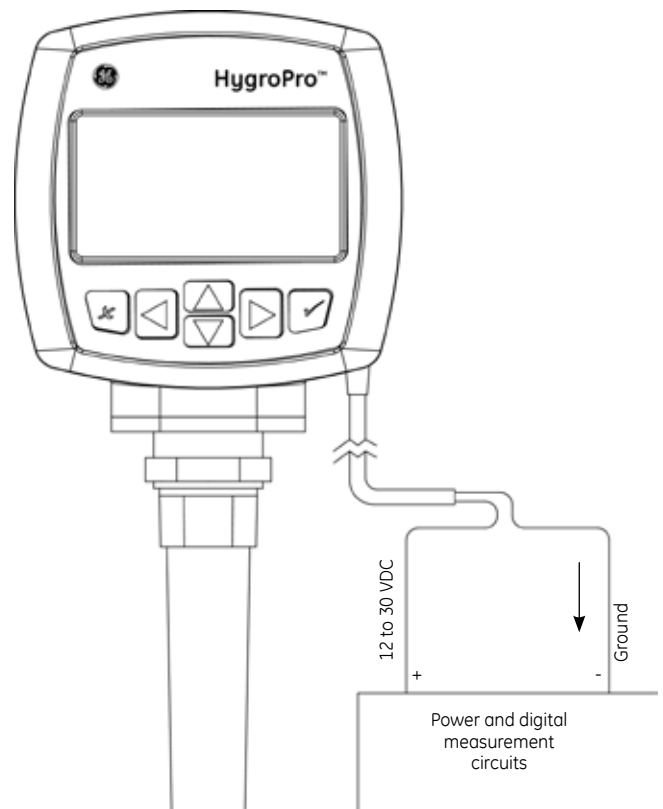
The HygroPro combines a technologically advanced aluminum oxide moisture sensor with state-of-the-art software and electronics for unequalled overall performance.

## NIST-Traceable Calibration

Superior sensitivity, speed of response, calibration stability, and wide dynamic range have made GE aluminum oxide moisture probes the standard of performance and value in industrial moisture measurement. They are suitable for laboratory and industrial moisture measurement applications in gases and non-aqueous liquids over a wide range of process conditions.

All moisture probe calibrations are traceable to the NIST.

The rugged, compact HygroPro transmitter is designed specifically for installations where space is at a premium. It can be installed directly in the process stream or, if necessary, in a sample system. If required, GE can design and build a sample conditioning system to meet unique application demands.



Standard analog output communications connection

# HygroPro Specifications

## Dew Point/Frost Point Calibration Ranges

- Overall: 68°F to -166°F (20°C to -110°C)
- Standard: 68°F to -112°F (20°C to -80°C)

## Operating Temperature

-4°F to 140°F (-20°C to 60°C)

## Storage Temperature

158°F (70°C) maximum

## Warm-Up Time

Meets specified accuracy in three minutes

## Calibrated Accuracy @ 77°F (25°C)

- $\pm 3.6^\circ\text{F}$  ( $\pm 2^\circ\text{C}$ ) from  $-85^\circ\text{F}$  to  $50^\circ\text{F}$  ( $-65^\circ\text{C}$  to  $10^\circ\text{C}$ ) dew/frost point
- $\pm 5.4^\circ\text{F}$  ( $\pm 3^\circ\text{C}$ ) from  $-112^\circ\text{F}$  to  $-86^\circ\text{F}$  ( $-80^\circ\text{C}$  to  $-66^\circ\text{C}$ ) dew/frost point

## Repeatability

- $\pm 0.9^\circ\text{F}$  ( $\pm 0.5^\circ\text{C}$ ) from  $-85^\circ\text{F}$  to  $50^\circ\text{F}$  ( $-65^\circ\text{C}$  to  $10^\circ\text{C}$ ) dew/frost point
- $\pm 1.8^\circ\text{F}$  ( $\pm 1.0^\circ\text{C}$ ) from  $-112^\circ\text{F}$  to  $-86^\circ\text{F}$  ( $-80^\circ\text{C}$  to  $-66^\circ\text{C}$ ) frost point

## Response Time

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

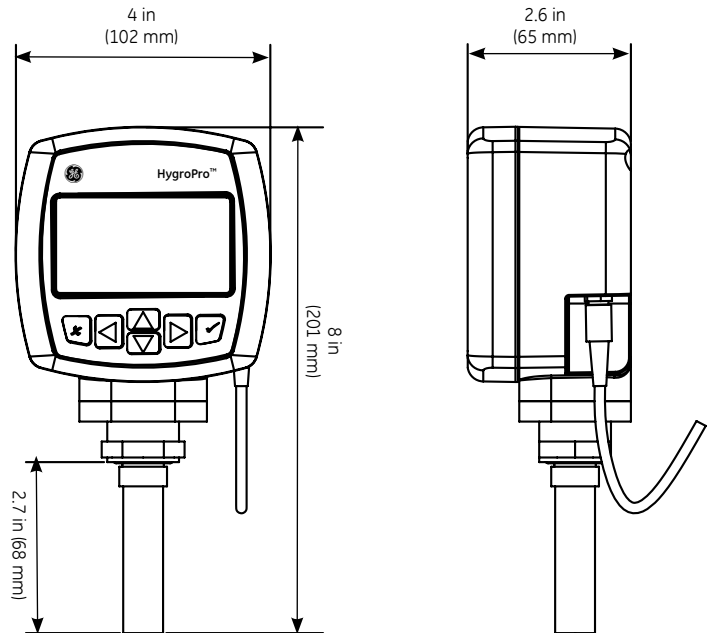
## Electrical

### Power

- 12 to 30 VDC (loop-powered, customer supplied)
- Output: 4 to 20 mA analog, RS485 digital
- Output Resolution: 0.01 mA/12 bits
- Max R = (PSV x 33.33) - 300  
Example: (24 x 33.33) - 300 = 500  $\Omega$
- Cable: 6 ft (2 m), standard (consult factory for custom lengths); cable includes molded weatherproof connector with flying leads

### Display

- 128 x 64 LED backlit LCD
- Display from one to three parameters and diagnostics



## Mechanical

### Sample Connection

- 3/4-16 in (19 mm) straight male thread with O-ring
- G 1/2 with optional adaptor

### Operating Pressure

5  $\mu\text{Hg}$  to 5000 psig (345 bar)

### Enclosure

Type 4X/IP67

### Dimensions (h x w x d)

- Overall: 7.88 in x 3.99 in x 2.56 in (200 mm x 101 mm x 65 mm)
- Weight: 1.2 lb (550 g)

### European Compliance

Complies with EMC Directive 2004/108/EC and PED 97/23/EC for DN<25

### Hazardous Area Certification

- C-US Class I, Division 1, Groups A,B,C&D, Type 4X
- $\text{Ex}$  II 1 G EEx ia IIC T4 (ATEX)
- Ex ia IIC T4 (IEC Ex)

## Moisture Sensor

### Sensor Type

Thin-film aluminum oxide moisture sensor

### Calibration

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

### Calibration Interval

Sensor recalibration by GE is recommended every six to twelve months depending on application.

### Flow Rate

Gases: Static to 100 m/s linear velocity at 1 atm

## Built-In Temperature Sensor

### Type

NTC thermistor

### 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

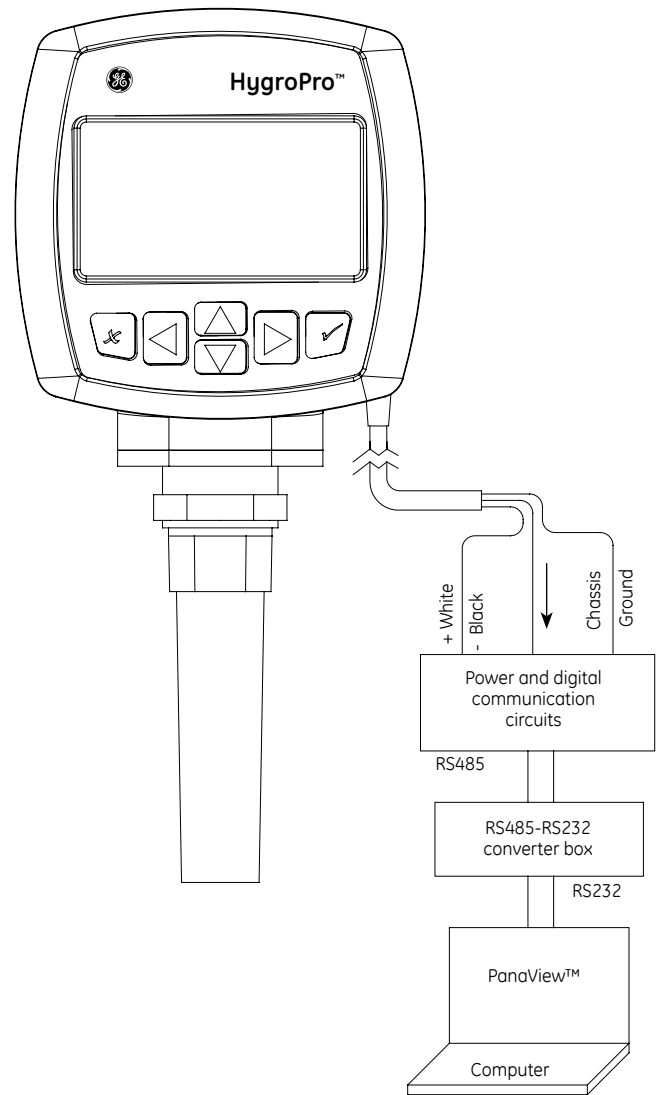
## Built-In Pressure Sensor

### 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)



*Digital communications wiring connection and networking capability*

### Accuracy

±1% of full scale (FS)

### Pressure Rating

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



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920-145D