Process Insights™
Premium Insights Into Process

REAL-TIME GAS ANALYZERS

PRODUCT BROCHURE

MODEL ESS-SCVP™

Mission Critical Process Moisture Analyzer

Fast

Accurate

Low Maintenance

- Natural Gas
- Hydrocarbon Processing
- Catalyst Protection
- Heat Treating
- Industrial Gases
- Dryer Control

MODEL ESS-SCVP
Mission Critical Process Moisture Analyzer

Advantages

- High confidence in measurement
- Automatic Field-Calibration/Validation
- NIST Traceability
- Long Sensor Life
- Low Maintenance
- Low Installation Cost

Taking advantage of the uniquely strong and quasi-linear response characteristics of its HTF™ aluminum oxide moisture sensors, we have developed a cost effective solution for demanding and mission critical moisture monitoring applications.

The system has an integrated, fully automatic self-calibration procedure, in which the sensor is periodically exposed to a NIST certified calibration gas and recalibrated. Thus, there can be a high (NIST traceable) confidence in the measurement. Sensors do not need to be returned to the factory for calibration on a yearly basis.

This system has proven to produce consistently accurate monitoring results in natural gas and hydrocarbon processing applications, where conventional analyzers have failed.

Mission-Critical Moisture Applications

In many applications, where control of moisture concentration has mission-critical character, industry has struggled with finding a stable, reliable and cost-effective measurement solution. Conventional sensors drift, vary with temperature or fall asleep; even when measuring clean inert gases. When measuring in the presence of contaminants or corrosive constituents, most measurements have failed completely or sensor life is prohibitively short.

Consequently, moisture measurements are used in most cases to provide a general indication only, but not for actual process control and if used for alarming, large safety margins are applied. Thus, large potential savings that could result from true process optimization based on a reliable moisture measurement, had to be foregone.

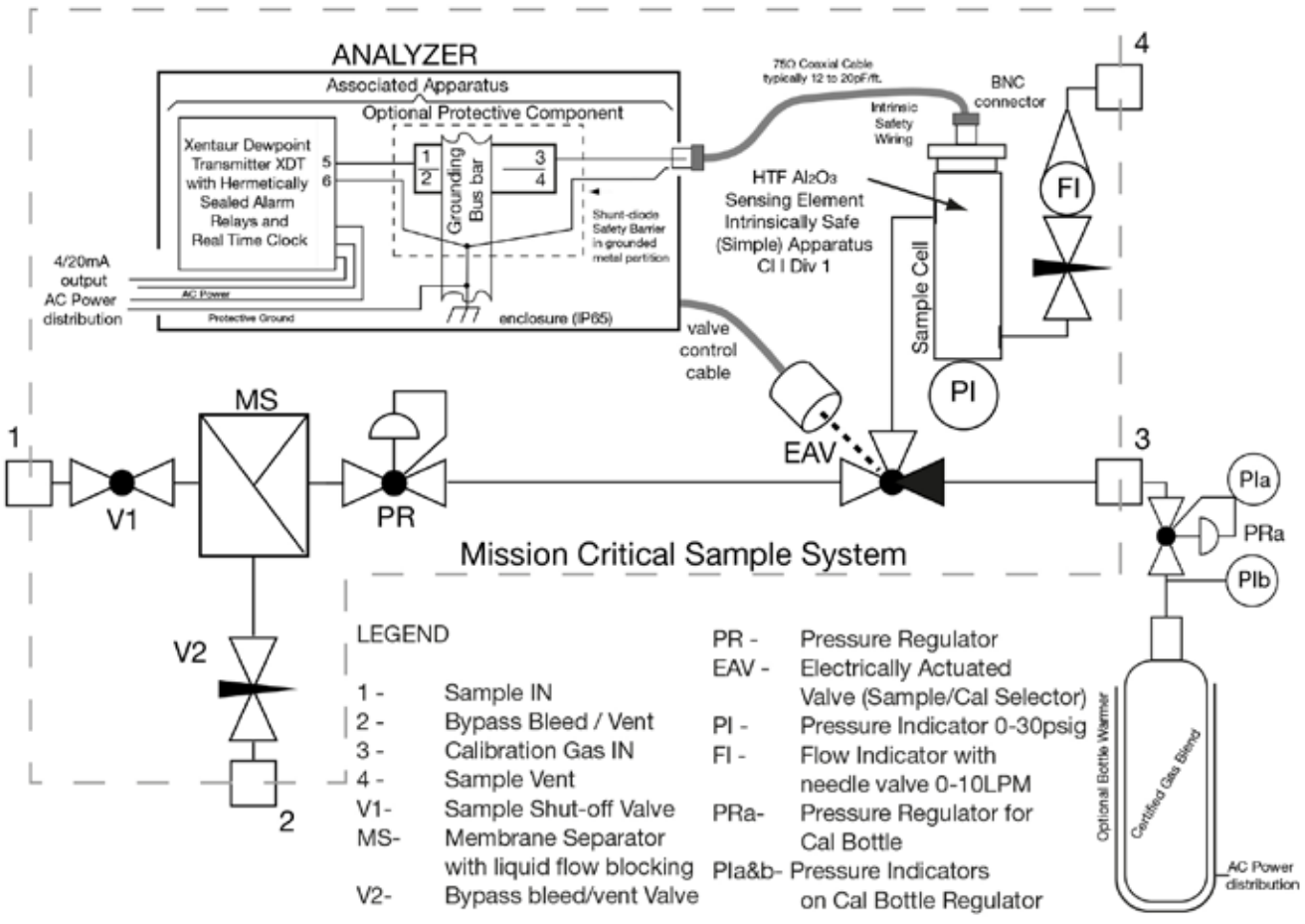
Hyper-Thin-Film (HTF) Aluminum Oxide Sensor Technology has proven already to provide stable and reliable measurements in many applications where other technologies have failed. Now, with our NEW Moisture Analyzer Model ESS-SCVP, we offer you a tool for true process control with integrated traceable field calibration and validation capabilities.

Sensor Calibration Using A Traceable Standard

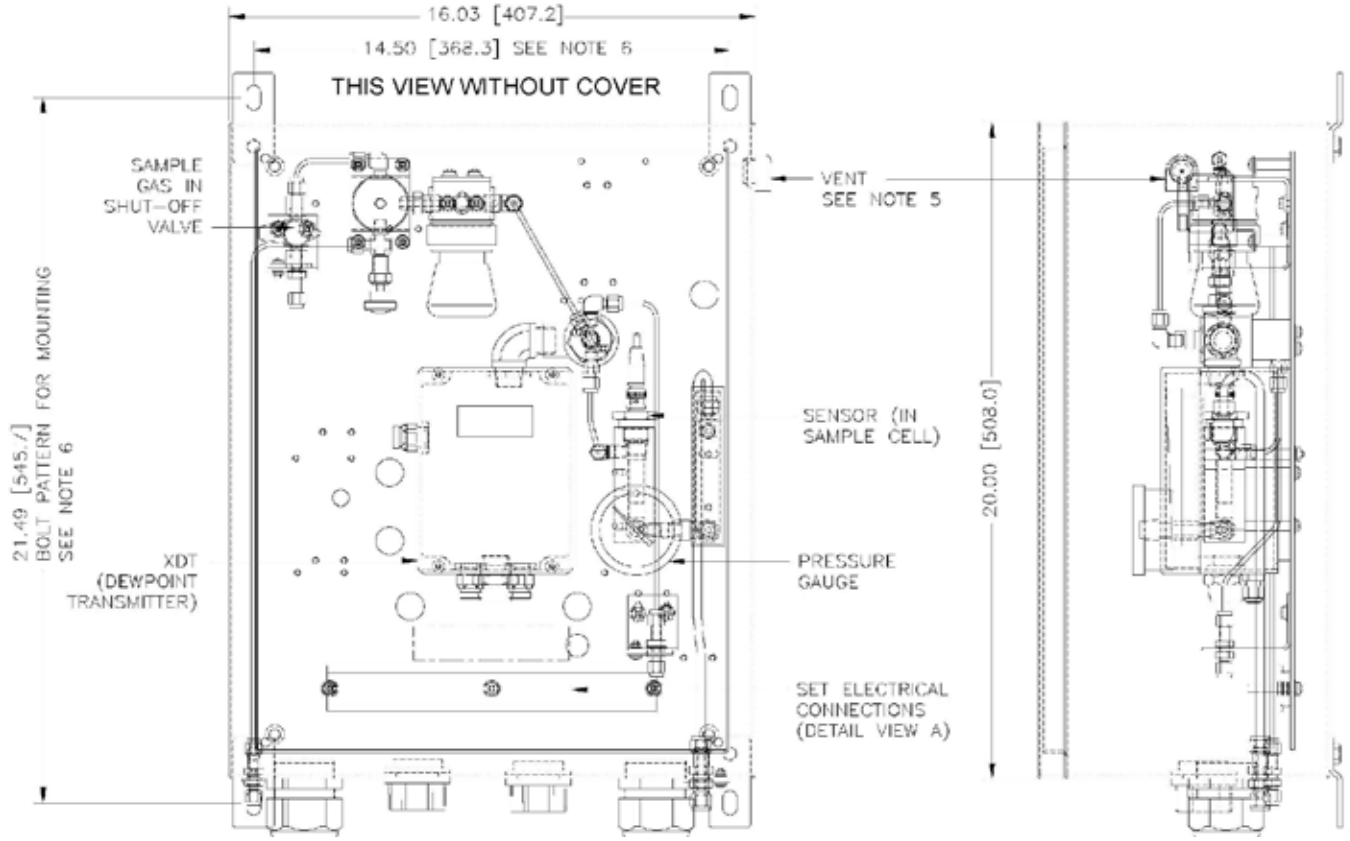
Borrowing from a calibration procedure that is standard to many other process measurement technologies, we have developed a self-calibrating moisture system that periodically exposes the sensor to a NIST certified calibrating gas and automatically adjusts for observed deviations.

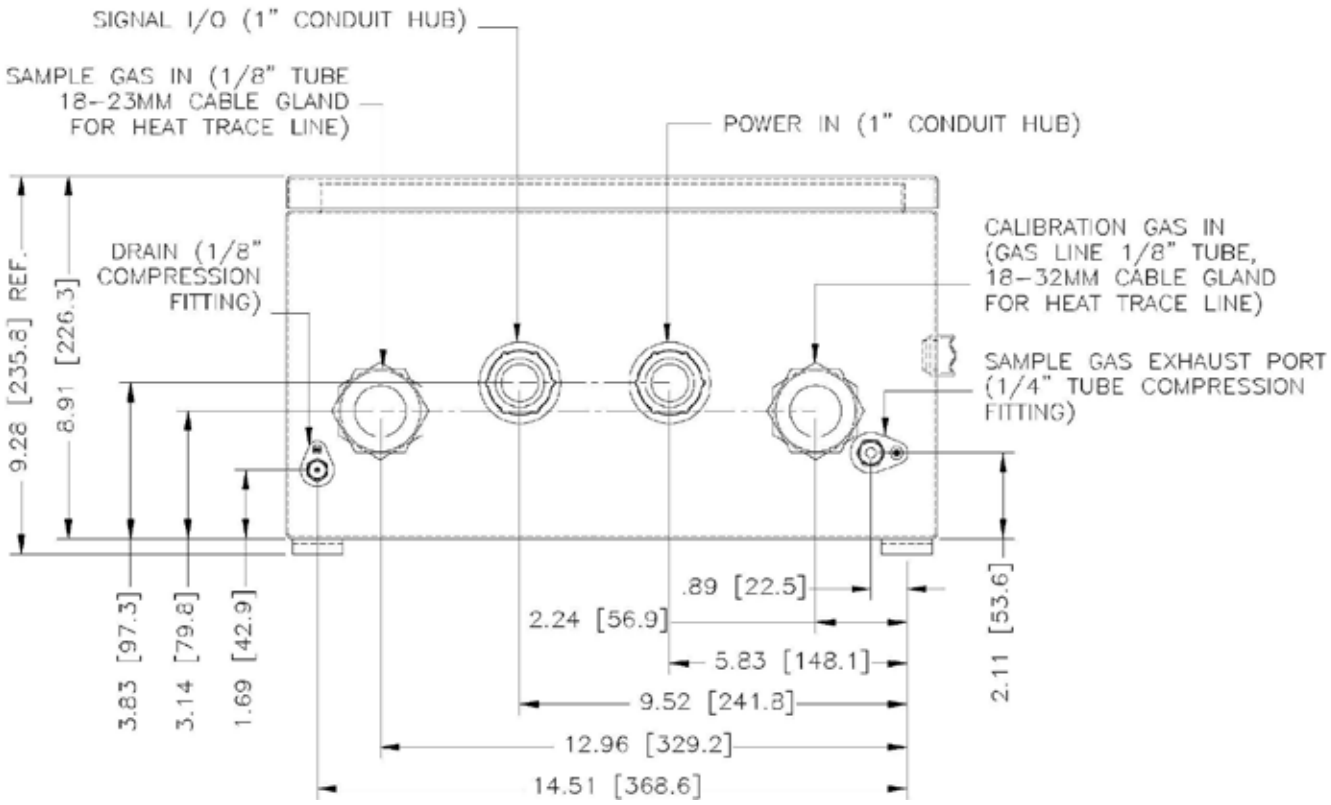
To perform the calibration procedure, a valve is included in the sample system, such that under the instrument's control, the sensor can be switched from the process gas to a NIST traceable Nitrogen/ water blend bottle. The known water content of the bottle is pre-entered into the instrument's memory together with a time schedule of verification/recalibration. The unattended instrument follows the schedule and performs the pre-programmed task of recalibrating. Thus the measurement near the water content of the bottle is essentially with NIST traceable accuracy even if the contaminants in the process gas have caused the sensing element to drift. As the measurements get further and further from the calibration point, the accuracy diminishes slightly but, because of the high capacitance sensor, the measurement can be easily kept within the specified tolerance of the instrument.

This method is particularly attractive for uses where there is an accepted alarm point, e.g. for Natural Gas 7 lbsH_2O/mmscf (0.11 gH_2O/m^3) – the calibration bottle can be ordered to contain the corresponding 140 parts per million by volume (ppmV) of water. When an alarm is generated, one can have an extremely high confidence in the measurement near that point, and suspicions can quickly be settled with a verifciation/recalibration against the traceable bottled standard.



Process Gas Online Moisture Analyzer with Integral Bottled Gas Calibration System

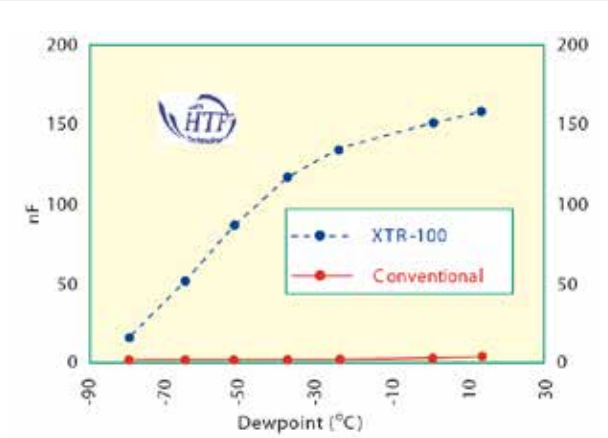




Hyper-Thin-Film (HTF) Aluminum Oxide Sensor Technology

The success of this approach in moisture measurement is centered on the high sensitivity of our Hyper-Thin-Film (HTF) Aluminum Oxide Sensor Technology which has set a new standard for moisture measurement. Our HTF sensors provide a very large and quasi-linear response to changes in moisture, which is an absolute requirement for adjusted moisture computations based on a single point calibration.

Additionally, our HTF sensors can tolerate many contaminants commonly found in hydrocarbon processing and natural gas applications, such as H2S, HCl, glycol, mer-captans, mercury, etc., which cause other sensors to deteriorate quickly and fail. HTF sensors will provide many years of useful life, even in the presence of such contaminants.



Hyper-Thin-Film vs. Conventional Al_2O_3 Sensor Change of Capacitance with Dewpoint

Operating Principle

The HTF and all other aluminum oxide sensors share the same basic operating principle: the capacitance measured between the sensor's aluminum core and a gold film deposited on top of the oxide layer varies with the water vapor content in the pores of the oxide layer. Three fundamental structural improvements in the oxide layer give our HTF sensors much increased sensitivity and stability: HTF sensors have much thinner oxide layer, a better defined barrier layer between the aluminum and the aluminum oxide and a unique pore geometry enhancing the entrapment of water molecules.

Hyper-Thin Layer

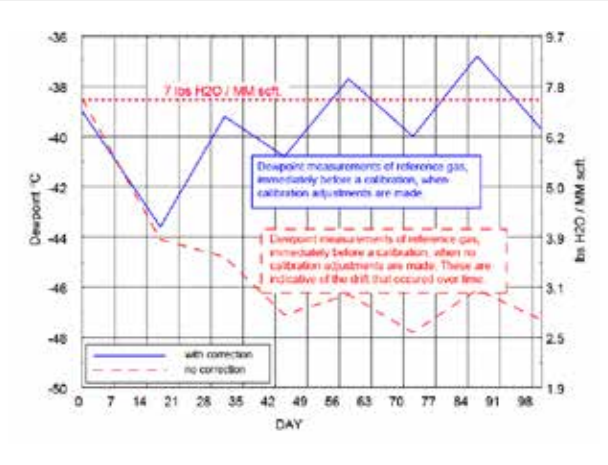
With the our HTF Technology, sensors can be produced with hyper-thin oxide layers without compromising insulation strength. The thinner oxide layer of HTF sensors results in much higher capacitance changes because capacitance is inversely proportional to the distance of the capacitor's plates from each other. The thinner layer also means that water molecules will travel faster in and out of the pores. HTF aluminum oxide sensors therefore respond several times faster than conventional sensors.

Barrier Layer

In HTF sensors, the transition between the aluminum oxide and the aluminum is sharp and clearly defined. This thinner barrier layer produces a capacitor with its electrodes very close together, which in turn causes the sensor's wet to dry capacitance ratio to be high. The benefit of high wet to dry capacitance ratio is that drift in capacitance due to undesirable factors is less significant. This is clearly a benefit as can be seen in HTF vs. conventional sensor comparisons of temperature sensitivity and aging drift. The sharp transition from aluminum to aluminum oxide also reduces metal migration, one of the major causes of aging drift in conventional sensors.

Field Proven In Challenging Applications

Our Model ESS-SCVP is field proven to work in challenging applications. The graph shows 90 days of dew point monitoring data with calibration adjustment in an applications where glycol carry-overs have prevented conventional systems from performing. After a settling period of two weeks, the system has reliably provided accurate results.



Self Calibrating System Test in Natural Gas at DOW
Sep- 27- 1999 to Jan- 6- 2000

ESS-SCVP DIV 1

System with air actuated valve in fiberglass enclosure with window and sunshade. Certified for Class 1 Div 1 Grps A, B, C, D, T4 hazardous areas.

ESS-SCVP DIV 2

System with electrically actuated calibration valve in stainless steel enclosure, certified for Class 1 Div 2, Grps A, B, C, D, T4 hazardous areas.

Recommendation for Certified Calibration Gas

The calibration gas should be supplied in specifically lined high pressure aluminum 152 cylinders, which will discharge a constant water concen-tration from 1800 psi to 200 psi for nitrogen/water blends from 1 to 150 ppmv. One cylinder will typically provide over 30 calibrations and last for over one year, based on two-week calibration intervals. A blend of 140ppm H_2O in a N_2 background is recommended.

SPECIFICATIONS

System Highlights:	
Sensor type	High capacitance HTF Al_2O_3
Measurement range with XTR-100	-100°C(dp) to +20°C(dp) / 0.014 ppmv to 23700 ppmv / 0.0009 lbs to 1105 lbs 65°C(dp) to +20°C(dp) / 5.400 ppmv to 23700 ppmv / 0.2747 lbs to 110 lbs
Measurement range with XTR-65	15nf to 200nf
Capacitance	±0.5°C(dp) at -100°C(dp); ±1°C(dp) at -20°C(dp) / ±10% of reading in ppmv, lbs H_2O
Accuracy	±0.3°C(dp) at -100°C(dp); ±0.6°C(dp) at -20°C(dp) / ±5% of reading in ppmv, lbs H_2O
Repeatability	For a step change from -40°C(dp) to -60°C(dp) / from 120 ppmv to 10 ppmv / 63% in 90 seconds, 90% in 450 seconds
Transmitter Electronics:	
Input Resolution	0.1°C(dp)
Indicators	LCD with backlight, 3.5 digits and custom legends for units and mode, audio alert
Engineering units	°C(dp), °F(dp), ppmv, g H_2O/m^3, lbs H2O/mm scf
Controls	4 push buttons, all settings stored in EEPROM
Output options	4-20 mA or 0-24mA outputs, linear to selected engineering units, programmable span and range, 0.1°C(dp) resolution; RS-232
Isolation	Sensor is isolated from the power supply, analog output and digital outputs
Alarm relays option	Two programmable alarm relays with programmable variable hysteresis, rated at 10A@240V Failure indication programmable to trigger alarm relays
Power requirements	100-250 VAC, 50 or 60 Hz, autoranging, 24 VDC optional
Electrical connections	Screw terminals on DIN rail
Transmitter enclosure	Class 1 Div 1 Explosion proof box, Class 1 Div 2 – Polycarbonate, NEMA 4/4X , W-4.7", H-6.3", D-3.5" (12cm x 16cm x 9cm) (optionally can be mounted remotely with sensor output for Class 1 Div 1)
Sampling System:	
Materials	316 or 316L stainless steel for all wetted parts
Gas connections	1/4" (6mm optional) Swagelok, when ordered with optional enclosure there are 2 heat tracing entries for 3.12cm (1.25") dia. heat tracing tubing/cable.
Filtering	Membrane filter with flow limiting in the presence of liquids, included drain needle valve, and 1/8" Swagelok drain (fast loop) bulkhead
Allowable pressure	Min pressure, 0.345 bar (5 psi), Max inlet pressure of standard regulator Outlet pressure 0.07 bar-2 bar (1-30 psi) adjustable, (higher optional)
Optional System enclosure:	Stainless steel with insulation, W-17.5", H-21.5", D-8" (45cm x 55cm x 20cm)
Other:	
Calibration factory	NIST/NPL traceable multipoint table
Field	Fully automatic at user programmable intervals, using NIST certified gas standard
Temperature range of electronics	-10°C to +50°C (14°F to 122°F); temperature coefficient of electronics: negligible
Temperature range of sensor	-30°C to +50°C (-22°F to 122°F); temperature coefficient of sensor: negligible
Temperature range of storage	-40°C to +50°C (-40°F to 122°F)
Options:	
Thermostatically controlled enclosure heater and/or cooler; Sunshade; 2"pipe mounting; Calibration gas bottle regulator; Bottle warmer; Pipeline sampling probe; Startup and commissioning assistance.	

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REAL-TIME GAS ANALYZERS

GAIN REAL-TIME INSIGHT INTO YOUR PROCESS

Process Insights manufactures and delivers premium sensors, monitors, detectors, analyzers, instrumentation, and software that are mission-critical to keep your operations, personnel, and the environment safe – every day across the globe.

Get the most reliable, precision analytical technologies available on the market today. We will work to match your needs and budget, and provide the optimal, and most stable process analysis solution for your application.

CENTERS OF EXCELLENCE | PROVIDING PROVEN SOLUTIONS

Process Insights is committed to solving our customers' most complex analytical, process, and measurement challenges everyday.

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