

# Mission Critical Process Moisture Analyzer MODEL ESS-SCVP



Class I Div 1 Grps A, B, C, D, T4  
and  
Class I Div 2 Grps A, B, C, D, T4

Taking advantage of the uniquely strong and quasi-linear response characteristics of its HTF™ aluminum oxide moisture sensors, Xentaur has 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.

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

## **Advantages:**

- High confidence in measurement
- Automatic Field-Calibration/Validation
- NIST Traceability
- Long Sensor Life
- Low Maintenance
- Low Installation Cost
- No Need for Factory Recalibrations

## **Applications:**

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

## 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.

HTF™ moisture sensors have proven already to provide stable and reliable measurements in many applications where other technologies have failed. Now, with the Moisture Analyzer Model ESS-SCVP, Xentaur is offering a tool for true process control with integrated traceable field calibration and validation capabilities.

## SENSOR CALIBRATION USING A TRACEABLE STANDARD

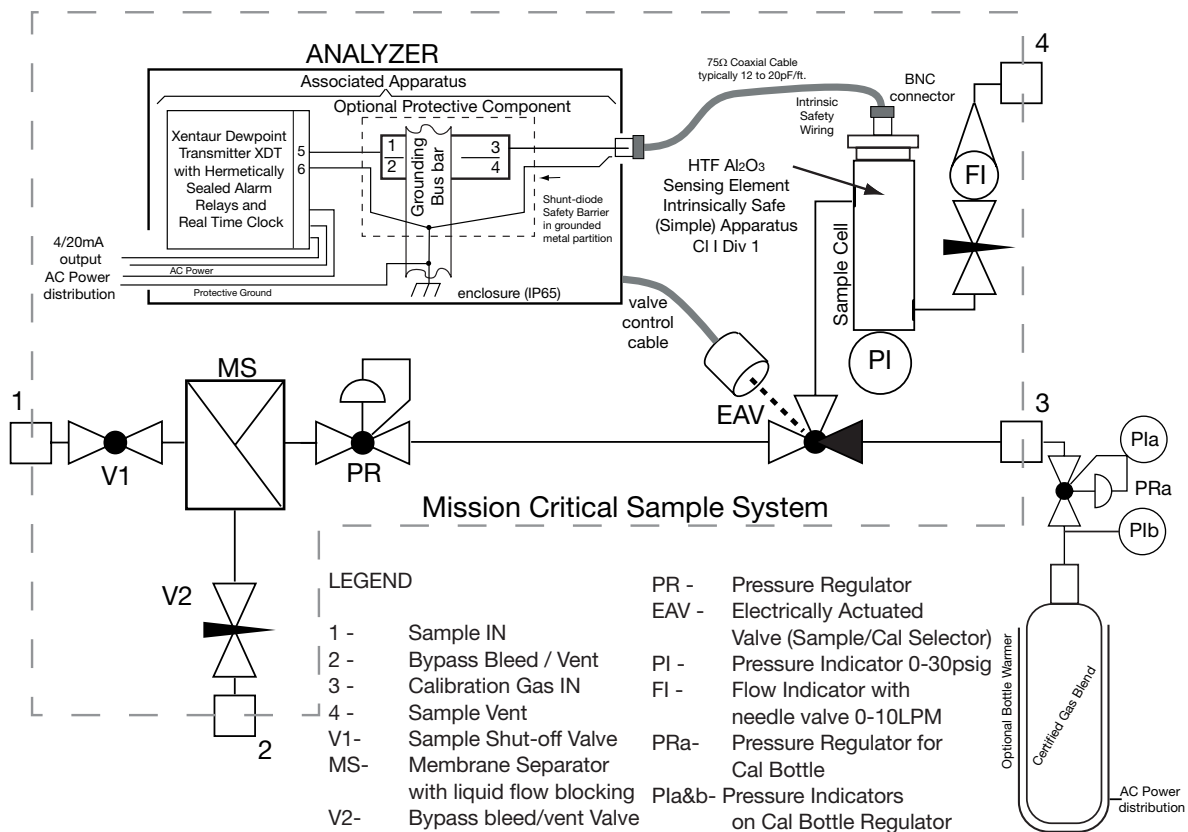
Borrowing from a calibration procedure that is standard to many other process measurement technologies, Xentaur has developed a self-calibrating moisture system that periodically

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 Xentaur's 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 – 0.11 gH<sub>2</sub>O/m<sup>3</sup> (7 lbsH<sub>2</sub>O/mmscf) – the calibration bottle can be ordered to contain the corresponding 143 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 verification/recalibration against the traceable bottled standard.

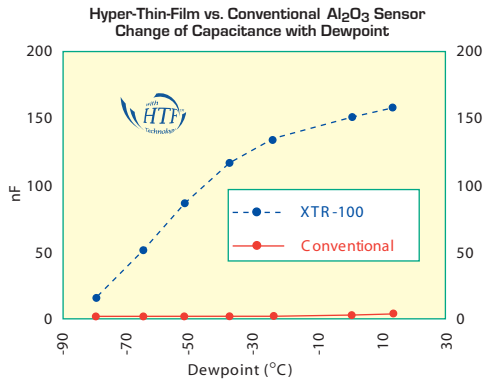
## PROCESS GAS ONLINE MOISTURE ANALYZER WITH INTEGRAL BOTTLED GAS CALIBRATION SYSTEM



## HTF™ TECHNOLOGY

The success of this approach in moisture measurement is centered on the high sensitivity HTF™ sensor, which has set new standards for moisture measurement. 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, HTF™ sensors can tolerate many contaminants commonly found in hydrocarbon processing and natural gas applications, such as H<sub>2</sub>S, HCl, glycol, mercaptans, 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.

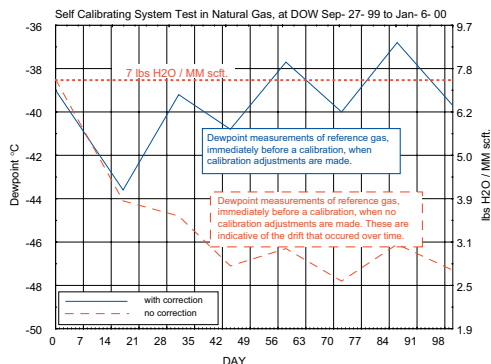


## CERTIFIED CALIBRATION GAS

The calibration gas is supplied in specifically lined high pressure aluminum 152 cylinders, which will discharge a constant water concentration from 1800 psi to 200 psi for nitrogen/water blends from 1 to 150 ppmv. Blending accuracy is ±10% and analytical accuracy is ±2%. The concentration is guaranteed for two years. One cylinder will typically provide over 30 calibrations and last for over one year, based on two-week calibration intervals.

## FIELD PROVEN IN CHALLENGING APPLICATIONS

Model ESS-SCVP is field proven to work in challenging applications. The graph shows 90 days of dewpoint 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.



## ESS-SCVP DIV 1

System with air actuated valve in fiberglass enclosure with window and sunshade. Certified for Class I 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 I Div 2, Grps A, B, C, D, T4 hazardous areas.



## ESS-MCVP DIV 2

System with manually actuated calibration valve for 19" rack mounting, certified for Class I Div 2 Grps A, B, C, D, T4 hazardous areas.

## SPECIFICATIONS

### SENSOR

Sensor type ..... High capacitance HTF™ Al<sub>2</sub>O<sub>3</sub>

Measurement Range:

with XTR-100 ..... -100°C(dp) to +20°C(dp) / 0.014 ppmv to 23700 ppmv / 0.02 mg/m<sup>3</sup> to 17690 mg/m<sup>3</sup>

with XTR-65 ..... -65°C(dp) to +20°C(dp) / 5.400 ppmv to 23700 ppmv / 4.38 mg/m<sup>3</sup> to 17690 mg/m<sup>3</sup>

Capacitance ..... 15nf to 200nf

Accuracy ..... ±0.5°C(dp) at -100°C(dp); ±1°C(dp) at -20°C(dp) / ±10% of reading in ppmv, mg H<sub>2</sub>O/m<sup>3</sup>

Repeatability ..... ±0.3°C(dp) at -100°C(dp); ±0.6°C(dp) at -20°C(dp) / ±5% of reading in ppmv, mg H<sub>2</sub>O/m<sup>3</sup>

Response Time ..... For a step change from -40°C(dp) to -60°C(dp) / from 120 ppmv to 10 ppmv /  
from 99 mg/m<sup>3</sup> to 8.6 mg/m<sup>3</sup>: 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<sub>2</sub>O/m<sup>3</sup>, lbs H<sub>2</sub>O/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 or RS-485, baud rate 9600

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 I Div 1 Explosion proof box

Class I 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 I Div 1)

### SAMPLING SYSTEM

Materials ..... 316 or 316L stainless steel for all wetted parts

Gas connections ..... 1/8" (3 mm 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 206 bar (3000 psi),  
Max inlet pressure of optional regulator 340 bar (5000 psi)  
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)

### CALIBRATION GAS (optional)

Gas ..... Nitrogen/Water blend, NIST certified in the range of 1 ppmv to 150 ppmv

Accuracy ..... Blending = ±10%; Analytical = ±2%

Cylinder ..... 152 passivated aluminum cylinder at 124 bar (1800 psi)

### 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

of sensor ..... -30°C to +50°C (-22°F to 122°F); temperature coefficient of sensor: negligible

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

## XENTAUR CORPORATION

84F Horseblock Road

Yaphank, NY 11980

Phone: (631) 345-3434

Fax: (631) 345-5349

email: [xentaur@xentaur.com](mailto:xentaur@xentaur.com)

[www.xentaur.com](http://www.xentaur.com)

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