cosa+xentaur

ABLE Instruments & Controls

MODEL XPDM

cosa+xentaur

High-Speed Portable Dewpoint Meter

QUICK AND PRECISE

SPOT CHECKS OF MOISTURE

-100°C to +20°C (-148°F to +68°F)

CE

Ex II 1 G Ex ia IIC T4 Ta = -10°C to 40°C
FM09ATEX0029X

FM APPROVED
INTRINSICALLY SAFE FOR
CLASS I, DIV1, GROUPS A, B, C, & D
T4 at 40

FPAL empowered by Achilles Registered

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OVERVIEW

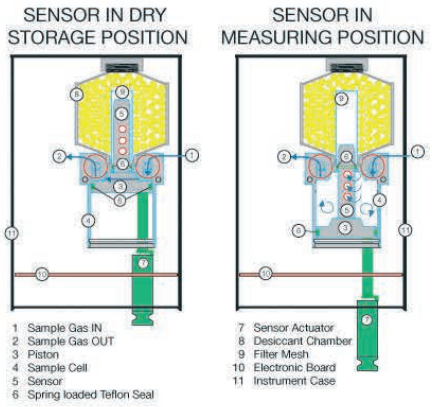
The portable Dewpoint Meter Model XPDM is a battery operated, hand-held instrument, designed for applications where quick and accurate dewpoint measurements have to be made. With the XPDM, accurate spot-checks of moisture in gases can be made faster and easier than ever, over the range of -100°C to +20°C (-148°F to +68°F) dewpoint.

APPLICATIONS

Important uses of the XPDM include: petrochemical, feedstock gases, instrument air, transformer and switch gear insulating gases, gas cylinders and air separation plants, welding gases, shipboard LNG and aviation oxygen, transfer standard, custody transfer and others.

OPERATING PRINCIPLE

Aluminum oxide sensors adsorb much faster than they desorb water molecules. It is therefore an advantage, if at the beginning of the measurement the sensor is dryer than the sample to be measured. The XPDM keeps the sensor in dry storage until the measurement is taken. The sensor slides directly from the dry storage into the sample cell, without ever coming in contact with ambient air. After the measurement is completed, the sensor slides back into the dry storage, where it is dried down for the next sample.



DRY STORAGE SYSTEM

The diagram above shows the mechanical design of the XPDM dry storage sample cell system. The picture on the left shows the sensor immersed into the desiccant for dry storage. The sensor is separated from the desiccant by a very fine stainless steel mesh with a thickness of approximately 5 mm. Close proximity of the sensor to the desiccant is crucial for fast dry down. With the sensor in the dry storage position, the sample flows through the head space between the bottom of the sample cell and the sensor piston. In order to take a measurement, the gas outlet is blocked temporarily. The pressure of the sample flow pushes the piston and pulls the sensor into the sample cell, where it wets up quickly to the moisture content in the sample flow. An accurate reading can be taken within 1 to 2 minutes. Afterwards, the sensor is pushed back into the dry storage position by means of the sensor actuator which protrudes through the front of the instrument.

SAMPLE CELL DESIGN

All surfaces in contact with the sample are made from 316 stainless steel and are electropolished to assure rapid equilibrium with the sample. Sensor and piston slide through spring-loaded PTFE seals protecting the sample cell as well as the desiccant cartridge from intrusion of wet air or gas.

The sample cell can measure gas flows of up to 20 liters per minute. The flow rate has no effect on the measurement. The pressure in the sample cell is near atmospheric and should not exceed 2 bar (29 psi).

The instrument computer gives a read out at sensor pressure as well as at any line pressure the user enters for the particular sample. No correction is needed for different gases.

SAMPLE CONNECTIONS

Sample connections can be made by means of a variety of different fittings, depending on the application. The primary port fittings are 1/4" VCO. The following table shows the recommended fittings for different dewpoint ranges and instrument uses:

Type of Adapter	Range	Remarks
VCO to barbed hose	Used above -65°C (-85°F)	Make sure sample flow rate is sufficient. Use PTFE hoses only
VCO to VCO	All ranges	Where flexible connection is required, use flexible stainless steel hoses
VCO to Swagelok	All ranges	Where rigid connections are acceptable

FIELD EXCHANGEABLE DESICCANT CARTRIDGE

The desiccant cartridge and its connection to the sample cell have been designed for maximum gas tightness. The sensor movement between desiccant chamber and sample cell occurs with a minimum amount of gas transfer. Thus, the desiccant life is prolonged. The desiccant can be replaced in the field in a matter of minutes, by simply exchanging the cartridge.

SPAN CHECK WITHOUT REFERENCE STANDARDS

Xentaur HTF™ high capacitance sensors have a very low residual capacitance when dry, and saturate at a predesigned level of humidity above +20°C (+68°F). This allows a span check of the sensor by cupping the sensor in the palm of one's hand for one minute, and adjusting the instrument to its upper range limit. The advantages of this span check system are obvious: Xentaur sensors can be field calibrated anywhere, anytime without using expensive and cumbersome calibration standards. Sensors do not have to be returned to the factory for recalibration, which also eliminates the need for a second stand-by sensor.

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USER INTERFACE

The instrument is operated through a simple user interface consisting of a digital LCD display, and four push buttons.

The user can select from the following engineering units:

- dewpoint in °C or °F
- ppmv
- lbs H_2O/ million scf. (Natural Gas)
- grams of H_2O/m3 (Natural Gas)

Results are displayed at sensor pressure (atmospheric) or by pushing the Pressure Correct key at a user selectable alternative pressure, such as the line pressure.

Faceplate Actual Size

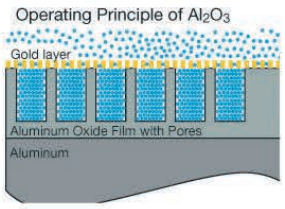
POWER SUPPLY AND SIGNAL OUTPUTS OPTION

The instrument is powered by a 9V battery which lasts for 100 hours of continuous operation. An automatic shut-off feature makes sure that the battery is not kept in use unnecessarily.

Optionally, the instrument can be equipped with an external power supply jack and signal output board. The instrument can then operate from 15 - 20 V AC or DC, or from a car battery adapter. All signal outputs are isolated from the sensor. The analog output can be current or voltage. The RS-232 output can be easily connected to a PC or a modem.

XENTAUR HYPER-THIN-FILM (HTF™) Al_2O_3 MOISTURE SENSOR TECHNOLOGY

The HTF™ aluminum oxide sensor installed in the model XPDM is the product of years of intensive research at the laboratories of Xentaur Corporation. It offers significant performance advantages over all other aluminum oxide moisture sensors.



The operating principle is similar to that of other aluminum oxide sensors: a hygroscopic layer of aluminum oxide adsorbs or releases water molecules within its pores, depending on the water vapor pressure in its environment. Thus, the electrical capacitance of the aluminum oxide layer changes with the surrounding water vapor pressure. The electrical capacitance is measured between the aluminum core of the sensor and a porous conductive gold layer on the outside.

The advantage of the Xentaur sensor is a proprietary manufacturing method in which the aluminum oxide layer is made to be hyper-thin as well as extremely hygroscopic. This results in a very sensitive sensor with fast response.

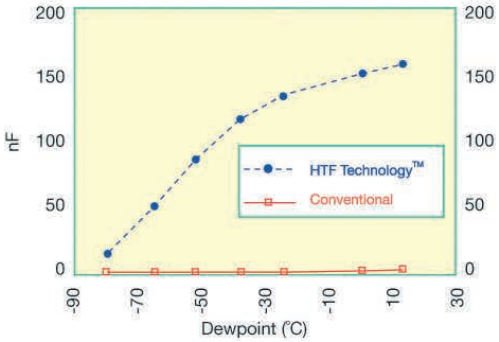
with HTF™ Technology

HIGH CAPACITANCE RESPONSE

Due to the HTF™ Hyper-Thin-Film and a special pore geometry, Xentaur sensors have a capacitance change over their full range, several orders of magnitude larger than that of conventional aluminum oxide sensors. Additionally, this change is quasi-linear and its sensitivity to temperature is negligible.

The advantages of a linear high capacitance response are: better sensitivity, better repeatability and faster response times. Also, the measurement system is less prone to noise and drift, and signal conditioning is kept to a minimum.

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



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TECHNICAL SPECIFICATIONS

DEWPOINT SENSOR ELEMENT

Type: . . . . . Hyper-Thin-Film high capacitance Al_2O_3
Dewpoint range . . . . . -100°C to +20°C (-148°F to +68°F)
Accuracy: . . . . . ± 3°C (±5.5°F)
Repeatability: . . . . . ±0.5°C (±0.9°F)
Response time*: . . . . . For a step change from -40°C to -60°C: 63% in 90 seconds; 90% in 450 seconds

TEMPERATURE RANGE

Sensor: . . . . . -30°C to +50°C (-22°F to 120°F)
Electronics: . . . . . -10°C to +50°C (14°F to 120°F)
Storage temperature: . . . . . -20°C to +60°C (-4°F to +140°F)
Sample flow range: . . . . . Static to 100 m/s(linear velocity @1atm)
Calibration method: . . . . . This field calibration procedure is fully automated and the user is prompted though a simple one minute procedure, which requires no additional equipment. NIST traceable factory calibration optionally available.

TEMPERATURE AND PRESSURE MEASUREMENTS

The sample temperature is measured with a precision integrated circuit temperature sensor.
Units may be optionally fitted with a pressure sensor.

MECHANICAL

Enclosure . . . . . Anodized Aluminum, Dimensions: 6.4 cm x 10.8 cm x 19.1 cm. Regulator and Filter mounting facilities.
Sampling chamber . . . . . Electropolished 316 stainless steel
Moving parts seals: . . . . . Spring energized PTFE seals
Pressure operating range: . Standard: 2 bar (29 psig)
Absolute max.: 6.8 bar (100 psig)
Gas sample connections: . . 1/4" VCO input and output ports
Electrical connections: . . . . Optional 2mm DC power jack, 9 pin "D" for analog & RS-232.
Power requirements: . . . . . 9v battery and optional 15-25V AC or DC wall transformer.

* These response times are not directly comparable to competitors data, because of differences in measurement methodology and data presentation. Please inquire for detailed comparisons between Xentaur and other major sensor manufacturers.

FEATURES

Sensor storage: . . . . . When not in use the sensor is retracted in a molecular sieve container and kept at an approximate dewpoint of -80°C. The sample gas pressure activates a piston which automatically moves the sensor into the sampling chamber, thus even low dewpoints can be measured extremely quickly.
Area classification . . . . . Approved for use in hazardous (classified) areas Class I, Div. 1, Groups A, B, C & D. Available as an option.
Input resolution: . . . . . 0.1°C dew point.
Indicators: . . . . . LCD with backlight, 3.5 digits and custom legends for units and mode, audio alert.
Engineering units: . . . . . °C,°F, PPM, lbs H_2O/mm scf, g H_2O/m^3
Controls: . . . . . 5 push buttons, all settings stored in EEprom. Manual Sensor Actuator.
Outputs: . . . . . Optional 4/20mA or 0/24mA and RS-232.
Isolation: . . . . . Sensor and case are isolated from the power supply , analog output and RS-232.
Battery saver: . . . . . Auto power off after 6 minutes.
Pressure correct: . . . . . Programmable pressure correction button.

For more detailed technical comparisons
with other technologies visit:
http://www.xentaur.com

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