# Pura Hygrometer Solutions
## Ultra-Pure Moisture Transmitters and Online Hygrometers

This small, rugged pure gas moisture sensor/hygrometer is an ideal economical solution for moisture breakthrough indication in ultra-dry moisture purification applications.

The Pura is easy to install and use, either as a transmitter or hygrometer, for a wide variety of pure gas measurement applications. A service exchange program is also available, reducing the cost of maintenance.



## Highlights

- Measures down to -120 °Cdp (-184 °Fdp) (1 ppb$_V$)
- Stable and repeatable measurement
- Fast response
- Economical and advanced monitor solutions
- Dew-point or moisture content output
- 4...20 mA and Modbus RTU over RS485 outputs
- Traceable 7-point calibration certificate
- 1/2", 1/4" male VCR process connections
- MiniDIN 43650 C, M12 electrical connectors
- Optional hazardous area approval
- Sensor exchange program

## Applications

- Gas purification systems
- Semiconductor manufacture
- Pure gases
- Fibre optic production
- Optical coating processes
- Electronic component manufacture
- Speciality gas production and distribution

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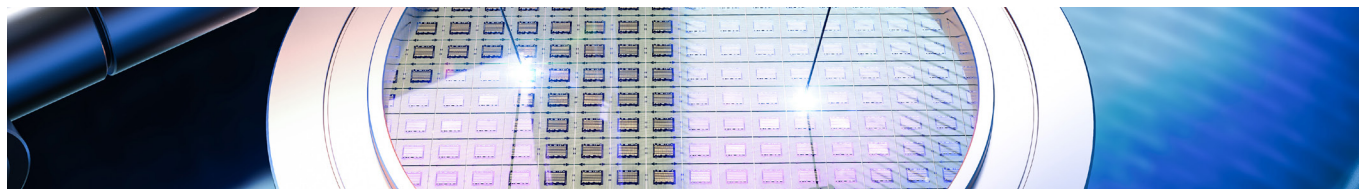
# Pura Advanced Hygrometers

## The Versatile Hygrometer Solutions

The Pura ultra-pure gas moisture transmitter can be supplied with an advanced or economical monitor, depending on your application requirement and budget.

The Pura Advanced Online 2 Hygrometer offers users complete versatility with the following benefits:

- Moisture and Pressure dual display with live pressure compensation
- Touch-screen end user-selectable dew-point or moisture content scalings
- Triple 4...20 mA analog outputs
- Modbus RTU over RS485 digital output
- 4 programmable relay alarms

The Pura Online Hygrometer offers users an economical monitor with the following essential features:

- Order selectable dew-point or moisture content scaling
- Single 4...20 mA analog output
- Modbus RTU over RS485 digital output
- 2 programmable relay alarms

## The Pure Gas Moisture Transmitter

In many high-purity gas applications, such as the semiconductor industry, the residual moisture content of the gas is critical to the satisfactory operation of a process.

Historically, trace-moisture measurement has been problematic, demanding the use of complex moisture analyzers or expensive analytical techniques. Michell Instruments has introduced a simple, economical solution for online measurement of dew-point temperatures down to -120 °C (-184 °F) (less than 1 part per billion).

The Pura transmitter benefits from Michell's experience and expertise in the production and calibration of the ceramic metal-oxide dew-point sensor. Incorporation of industry-standard materials and manufacturing processes gives the first low-cost transmitter suitable for large-scale integration into a semiconductor fabrication plant or high-purity gas line.

The Pura family of pure gas transmitters provides a stable, reliable and repeatable moisture measurement for all pure gas trace moisture applications.

## Ease of Installation

Flexible product design ensures the unit can be quickly and economically installed.

- ¼" male or 1/2" male VCR process connections
- MiniDIN 43650 form C or M12 5-pin electrical connectors
- Cold drawn stainless steel, 0.1...0.2 Ra µm electro-polished internal sample block finish

- Clean room double-bagged or industrial single-bagged product packaging
- Configuration and diagnostic communication tool
- Order selectable AC or DC power supply

## Service Exchange/Recalibration Program

Michell offers 2 services for customers who want minimum downtime and sensor traceability, while maintaining the reliability of their online system:

- **Sensor Exchange** – Customers place an order for a guaranteed, reconditioned sensor, supplied with a 13-point traceable calibration. When this arrives, they exchange it for the installed sensor which is returned to Michell, resulting in zero process downtime.
- **Recalibration** – Customers return their installed hygrometer to Michell, where it is inspected, checked and re-calibrated before being returned. This provides on-going system traceability for the process.

## Global Certifications

The Pura series has a broad range of certifications to ensure a single stocked unit can be used in any global application.

- Pura I.S. – ATEX, UKCA & IECEx
- Pura I.S. – cQPSus (US and Canada)
- Pura I.S. – EX-TR CU
- Pura – UL approval

Michell has a team of experienced application engineers, based both in field and factory, who are available to assist with any dew-point sensor application.

## Speed of Supply

The online system is manufactured within Michell's world-leading high-volume moisture transmitter manufacturing center in the United Kingdom, which ensures reliability and repeatability of delivery and field supported by a network of Michell's global service centers.

- Manufacturing calibration system traceable to NPL & NIST
- ISO/IEC 17025 UKAS accredited calibration available on request

## Installation Accessories

Transmitters are available with a range of practical accessories.

- Mating 1/4" female VCR Swagelok adaptors
- 1/4" VCR electropolished sample blocks
- Mating electrical connector and cables

## Customization

We have specialized design and manufacturing capability to cover any customized sensor requirements for your application.

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## Transmitter Technical Specifications

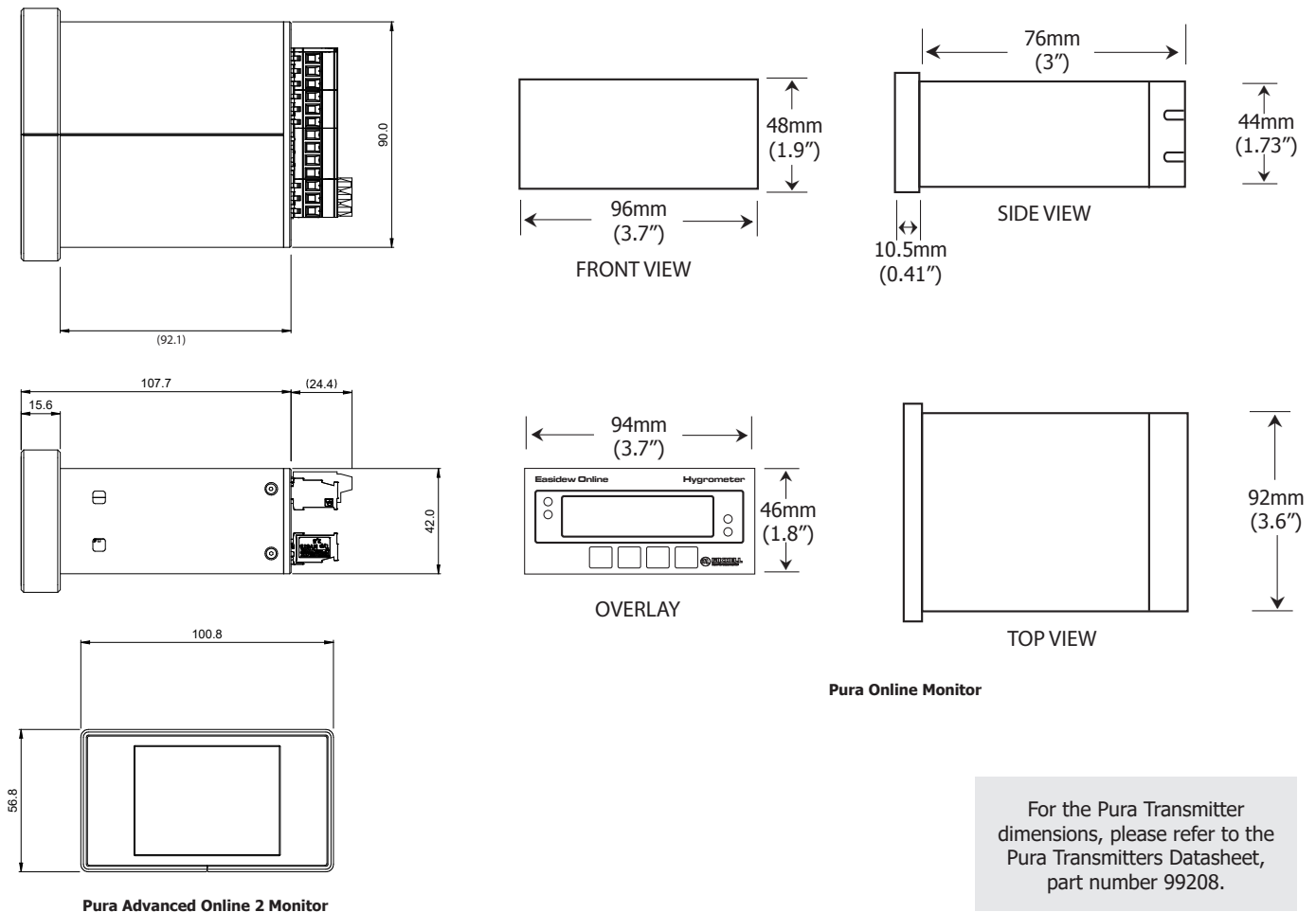| Product | Pura 2-wire, 3-wire & Digital Transmitters | Pura I.S. Transmitter |
|---|---|---|
| **Performance Specifications** | | |
| Measurement Range | -120...-40 °Cdp (-184...-40 °Fdp); non-standard ranges available on request | |
| Accuracy | ±1 °C from -40 to -60 °Cdp (±1.8 °F from -40 to -76 °Fdp)<br>±2 °C from -60 to -100 °Cdp (±3.6 °C from -76 to -148 °Fdp)<br>±4 °C from -100 to -120 °Cdp (±7.2 °C from -148 to -184 °Fdp (extrapolated) | |
| Calibration | Traceable 7-point calibration certificate | |
| **Electrical Specifications** | | |
| Output Signal | 4...20 mA (2-wire connection, current source)<br>4...20 mA (3-wire connection, current sink)<br>**Pura M12:** Modbus RTU over RS485<br>**Pura 3-wire PUR-AOL-SEN-D:** Michell Mnet digital | 4...20 mA (2-wire connection, current source) |
| Output | Dew point or moisture content (ppm$_V$, ppb$_V$) | |
| Analog Output Scaled Range | **Dew point:** -120...-40 °C (-184...-40 °F); **Moisture content in gas:** 0...127 ppm$_V$; | |
| Supply Voltage | **Pura 2-wire/3-wire & Pura I.S.:** 12...28 V DC<br>**Pura M12:** 5...28 V DC (digital)* | |
| Load Resistance | Max 250 Ω @ 14 V (500 Ω @ 24 V) | |
| Current Consumption | 23 mA max, depending on output signal | |
| Compliances | CE & UKCA | |
| **Operating Specifications** | | |
| Operating Temperature | -40...+60 °C (-40...+140 °F) | |
| Compensated Temperature Range | -20...+50 °C (-4...+122 °F) | |
| Storage Temperature | -40...+60 °C (-40...+140 °F) | |
| Operating Pressure | Minimum 10$^{-7}$ Pa (10$^{-9}$ torr);<br>Maximum 24 MPa (240 barg/3481 psig) | |
| Flow Rate | 1...5 Nl/min mounted in standard sampling block; 0...10 m/sec direct insertion | |
| **Mechanical Specifications** | | |
| Ingress Protection | IP66 in accordance with standard BS EN 60529:1992; NEMA 4 protection in accordance<br>with standard NEMA 250–2003<br>**Pura M12**: IP65 | |
| Intrinsically Safe Area Certificates | | ATEX/UKCA: II 1 G Ex ia IIC T4 Ga (-20...+70 °C)<br>IECEx: Ex ia IIC T4 Ga (-20...+70 °C)<br>TR CU: 0Ex ia IIC T4 Ga (-20...+70 °C)<br>cQPSus: Class I, Division 1, Groups A, B, C & D, T4<br>Class I, Zone 0, AEx ia IIC T4 Ga, Ex ia IIC T4 Ga<br>Tamb +70 °C |
| Housing Material | 316 stainless steel | |
| Dimensions | Please refer to the dimensional drawings on page 4 of this datasheet | |
| Packaging | **Pura Premium:** Double bagged and sealed in UHP inert gas<br>**Pura OEM and Pura Sensor:** Single bagged in 1000 gauge polythene<br>**All options:** shipped individually in a profiled cardboard carton<br>Sensor version supplied with protective guard over sensor technology for transportation and handling | |
| Process Connection | **Pura Premium (PRM):** 2 x 1/4" male VCR<br>**Pura OEM (OEM):** 2 x 1/4" male VCR<br>**Pura Sensor (SEN):** 1/2" male VCR | |
| Weight | **PRM and OEM versions:** 450 g (0.99 lb)<br>**SEN version:** 180 g (0.4 lb) | |
| Electrical Connections | **Pura:** MiniDIN 43650 form C<br>**Pura M12:** M12 5 Pin (A coded) | MiniDIN 43650 form C |
| Mating Electrical Connectors | Mating connector supplied as standard<br>**Pura M12:** optional 0.8, 2, 5 metre (2.62, 6.56, 16.4 foot) M12 A coded connector/cable available | |
| Diagnostic Conditions<br>(factory programmed) | Sensor fault: 23 mA<br>Under-range dew point: 4 mA<br>Over-range dew point: 20 mA | |
| Approved Galvanic Isolators | | KFD2-CR-EX1.20200<br>KFD2-CR-EX1.30200<br>KFD0-CS-EX1.50P<br>KFD0-CS-EX2.50P<br>KFD2-STC4-EX1.H<br>MTL5041<br>MTL5040 |

\* Applicable on digital Modbus RTU output only

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# Pura Advanced Online Hygrometer

## Monitor Technical Specifications

| Product | Pura Advanced Online 2 | Pura Online |
|---|---|---|
| Online Range | -120...-40 °Cdp (-184...-40 °Fdp) | |
| Online Resolution | 51/2 digit | 4 digit |
| Auxiliary Pressure Input | Maximum 24 MPa (240 barg/3481 psig) | Not available |
| Pressure Compensation | Live 4 ...20 mA pressure transmitter or fixed programmable value | Not available |
| Moisture Content Scales | Automatic compensation for ppm$_V$, lbs/MMscf, g/m$^3$ units | Dew-point and ppm$_V$ ranges available |
| Relay Alarm Type/Rating | 2 x Form A, 2 x Form C 30 V DC 5A Namur compliant programmable relay outputs for process and fault conditions | Alarm 1 relay: single pole make contact, rating 3 A @ 250 V AC<br>Alarm 2 relay: changeover contacts, rating 5 A @ 250 V AC |
| Sensor Input Signal | Modbus RTU over RS485 | 4...20 mA |
| Online Output Signals (analog) | 3 x 4...20 mA fully user-configurable and scalable | 1 x 4...20 mA or 0...20 mA fully user-configurable and scalable |
| Online Output Signal (digital) | Modbus RTU over RS485 | Modbus RTU over RS485 |
| Online Supply Voltage | 85...265 V AC<br>18...28 V DC | 85...265 V AC<br>24 V DC |
| Online Power Consumption | AC Power: 7.5 VA<br>DC Current: 170 mA @24 V DC | 60 mA max. |
| Electrical Safety | BS/EN61010-1: 2010 | |
| Operating Temperature | 0...+50 °C (+32...+122 °F) | |
| Storage Temperature | 0...+60 °C (+32...+140 °F) | -10...+60 °C (+14...+140 °F) |
| Ingress Protection | IP54 & NEMA Type 2 & 12K front panel only | IP65 front panel<br>IP20 rear panel |

## Monitor Product Dimensions

90.0

(92.1)

107.7    (24.4)

15.6

42.0

100.8

56.8

**Pura Advanced Online 2 Monitor**

48mm (1.9")

96mm (3.7")

FRONT VIEW

94mm (3.7")

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46mm (1.8")

OVERLAY

76mm (3")

44mm (1.73")

SIDE VIEW

10.5mm (0.41")

92mm (3.6")

TOP VIEW

**Pura Online Monitor**

For the Pura Transmitter dimensions, please refer to the Pura Transmitters Datasheet, part number 99208.