



MS2100 series Dew point analyzer

## Moisture & Humidity Transmitter

on-line Gas Moisture Measurement Application

Ref:gMS2100IntE  
Version:2002-01-08

**Ideal for Laboratory and Quality Control in the Industrial Production  
Specially Powerful for Scientific Convert**

Absolute moisture, Volume ratio, Partial pressure, Saturation moisture, Relative humidity,  
Specific quantity, Dew point, Water content/moisture, and temperature  
And Pressure Test for compensation under process conditions

\_\_\_IEEE1451.2 STIM Compatible, 1451.1 NCAP and Modbus Network support. Analog and Digital Signals Output. Remote Setup and Operate.

- **Continuous analysis. Direct measurement in simple way**
- **Multi-parameters test: Humidity, Dew-point, AH, Water content/moisture, and temperature as well.**
- **Accurate and reliable, rugged design, low-maintenance**
- **Quickly response, <15 sec at typical cases**
- **Self diagnostic, professional intelligent, Menu-driven digital user interface**
- **Auto diagnostic and alarm**
- **Data log of measurements for day/month/year**
- **One-year warranty**

MS2100 is a fast, reliable and accurate on-line detection technology for moisture of gases, based on new capacity sensors.

Low limit moisture on-line test has been always troubles in some crisis industry process. Both of on-line and laboratory analyzers are expensive, and time costing in the past time.

It was hoped to replace some process instruments at certain cases, to save lots of equipment investment and maintenance cost. What is most important is it's easy way to test directly and real time response, and also excellent accuracy. Speed is very important in modern chemical process.

The system measure *Humidity, Dew-point, AH, Water activity, Water content/moisture, and temperature as well.* With T-BD5xMD STIM, all these parameters can be displayed at field, and could be read by NCAP controller or computer in remote area. The analog signal output port of the transmitter could be set to output any one of these parameters

### Why Measure Moisture & Humidity?

Human beings as well as animals all like to live in certain humidity environment. Humans are best suited to and feel most comfortable at certain humidity and temperatures; excessively high or low humidity or temperatures cause discomfort.

As most materials are hygroscopic, their water content always tries to reach equilibrium with the surrounding relative humidity. Thus each material has its own ideal storage humidity which should be maintained. Too dry or too humid conditions could ruin the material.

In many production processes, the measurement and adjustment of humidity is extremely important for sustaining the high quality of products and the correct level of energy consumption. The right humidity makes it possible to optimize energy consumption and improve end product quality as well as product yield.

At low humidity cases, static electricity increases. This can be crucial in the chemical industry where dry powdery material is handled, to avert environ explosions caused by static electricity in extreme cases.

Humidity always plays important role in industrial corrosion, either from environment or pipeline. Keeping certain humidity is the most popular industry project.



T001-BD5xCD+IMS2100p

# Applications

## PSYCHROMETRICS & MOISTURE

**MOISTURE** measurements involve different terms and units.

Moisture terms and units all fall under the area of psychrometrics, the study of water vapor concentration in air as a function of temperature and pressure. Selecting a moisture term depends on the application at hand.

Dew points and frost points are often used when the dryness of the gas is important, (moisture condensation from gas at low process temperatures must be avoided). Dew point is also used as an indicator of water vapor in high temperature processes, such as industrial drying.

**Mixing ratios, volume percent, and specific humidity** are usually used when water vapor is either an impurity or a defined component of a process gas mixture used in manufacturing. Mixing ratios are also used, like **dew point**, in industrial drying.

**Relative humidity** is most commonly used in HVAC applications where it directly impacts human comfort and indoor air quality issues. Relative humidity is also of interest to process control personnel as low RH can cause brittleness and static electricity problems, while high RH can cause swelling and clumping regardless of temperature.

**PSYCHROMETRICS** deals with the thermodynamic properties of moist gases while the term **Humidity** simply refers to the presence of water vapor in air or other carrier gas. Psychrometrics concerns mixtures of water vapor and dry air. Much of it also applies to other carrier gases since the thermo-dynamic characteristics of water vapor are fairly independent of the carrier gas. In addition, as the composition of atmospheric air is fairly constant, dry air is treated as a homogeneous gas with a molecular weight of 28.9645. The molecular weight of water is 18.01528.

**WATER VAPOR PRESSURE:** When a mixture of air and water vapor is in equilibrium with liquid water or with ice, it is considered to be saturated (RH 100%).

Term	Definition	Unit
Absolute Humidity, (Vapor concentration)	$\frac{\text{Mass, Vapor}}{\text{Volume}}$	Grains/ft <sup>3</sup> Grams/m <sup>3</sup>
Mixing Ratio	$\frac{\text{Mass, Vapor}}{\text{Mass, dry gas}}$	lb/lb, grains/lb, kg/kg, grams/kg
Relative Humidity	$\frac{\text{Mass, actual vapor}}{\text{Mass saturated vapor}}$ $\frac{\text{Actual vapor pressure}}{\text{Saturation vapor pressure}}$ $\frac{\text{Partial pressure, vapor}}{\text{Vapor pressure water}}$	%
Dew Point	Temperature of saturation (condensation)	°F or °C
Volume Ratio	$\frac{\text{Partial pressure, vapor}}{\text{Partial pressure, dry gas}}$	% by volume
Mass Ratio	Same as Mixing Ratio	PPM by weight, PPM <sub>w</sub>
PPM by volume	$\frac{\text{Volume, vapor} \times 10^6}{\text{Volume, dry gas}}$	PPM by volume, PPM <sub>v</sub>
PPM by weight	$\text{PPM}_v \times \frac{\text{Mole weight of water}}{\text{Mole weight of carrier gas}}$	PPM by weight, PPM <sub>w</sub>
Hygrometer	Instrument for measuring moisture in gas (from Greek hygros – wet, moist)	
Psychrometer	Instrument using wet/dry bulbs to measure moisture in gas (from Greek psychros – cold)	

## Features

- Not necessary to calibrate
- Rugged Construction, Unaffected by Vibration or Unit Orientation
- High accuracy
- Fast response
- Stable, low drift performance
- Chemically resistant
- Simple to Operate
- Specific to Moisture
- Alarms and Outputs Available
- Easily Remoted Sensor
- Auto range from ppb to 660ppm

## Electronic Function of STIM Transducer

- BD5 CPU based STIM, perfect design with complete instrument functions
- Auto temperature compensation
- Linear analog signal output, 0/4 to 20 mA select. default status is 0 to 20 mA for activity. Moisture and Separation point output is selective for users.
- RS232 serial port always available
- RS485 with STIMcom or Modbus protocol attached to BD5xB upper configuration. BD5s has simple SCom data communication ability.
- Power supply: DC 9 to 24 V; consumption <100 mW at Max.
- Intrinsic safe design

For more details, please refer to : [BD4&5IntE](#)

## Applications

- Direct sampling installation moisture on-line test
- Moisture in compressed air
- Humidity of refrigerant and desiccant dryers

Call: (86)10-8264.0226; 8264.0225; Fax: (86)10-8264.0221; 8264.0238;  
P.o.Box: 603 BDTI Beijing, China 100080 <http://www.fullsense.com/>

- Heating, ventilation and air conditioning
- Chemical process measurement, Chemical manufacturing
- Industrial controls
- Industrial drying (e.g., paper, foods, pharmaceuticals)
- Instrument/plant air
- Heat treating furnaces and gas generators
- Natural gas pipeline and storage

## Technical specifications

### MS2123

- Measurement range:  
Relative Humidity: 0-100%RH(No condensing)  
Absolute Humidity: 0-600g/M<sup>3</sup>;

Sample conditions	Saturated Point
1atm,-20 °C:	0.790 g/M <sup>3</sup> ;
1atm,-10 °C	1.9923g/M <sup>3</sup> ;
1atm,0 °C:	4.846g/M <sup>3</sup> ;
1atm,10 °C:	9.395 g/M <sup>3</sup> ;
Atmosphere,20 °C :	17.289g/NM <sup>3</sup> ;
1atm,30 °C:	30.350 g/M <sup>3</sup> ;
1atm,40 °C:	51.151 g/M <sup>3</sup> ;
1atm,80 °C:	293.34 g/M <sup>3</sup> ;
1atm,100 °C:	597.73 g/M <sup>3</sup> ;
1atm,120 °C:	1121.7 g/M <sup>3</sup> ;
1atm,180 °C:	5160.0 g/M <sup>3</sup> ;

Dew point range(Difference from testing sample temperature): 0-50/100 °C

Mixing ratio: 0-500g/kg d.a.

Lower Detect Limit: 0.0865g/NM<sup>3</sup> at 20°C

- Accuracy: ±2% of reading, 0-1.00 aw, 25 °C
- Operating temperature:  
MS2123N: -40 to 85 °C  
MS2123p:-40...+180 °C
- Working Pressure: N:<0.3 Mpa; p:<1.0 Mpa
- Sensor Interchangeability: ±5% of reading
- Hysteresis ±1.2% of reading
- Repeatability ±0.5% of reading
- Response Time: 15 sec typical at 25 °C
- Stability: ±1% of reading /typical at 0.50 aw in 5 years

### MS2110

Just for application when the temperature of sample is over 180°C

## Environment Requirements:

Environmental Humidity:

Operating:0 to 90% RH, non-condensing

Storage:0 to 90% RH, non-condensing

Environmental Temperature Range:

N:Operating -40 °C to 85 °C (-40 °F to 185 °F)

N:Storage -51 °C to 125 °C (-60 °F to 257 °F)

T001-BD5xMx+IMS2100N

	T-BD5CMD	T-BD5MM	T-BD5IB
Environmental Temperature	-10 to 60 °C	-30 to 70 °C	-40 to 85 °C
Environmental Humidity:	10-90%	0-100%( non-condensing)	0-100%

\* if with LCD, the environ property is limited to -10 to 60 °C, 10-90%

## Transducer Safety:

Safety: Ia, intrinsic designed. Could be used at Class 1,Group A/B/C/D;Class II,Group E/F/G;

Package: NEMA 7, NEMA 8, NEMA 9, NEMA 6/6p, IP67

## gMS2100 series

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**T001-BD5CMD+MS2123N**  
**Insertion Moisture Transducer**

Sampling temperature: -40 to 85°C  
Sampling pressure: <0.3Mpa  
Insertion length: 40- 200mm  
Installation connect: ZG1" /1"NPT



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**T001-BD5CMD+MS2123p**  
**Insertion Moisture Transducer**

Sampling temperature: -40 to 85/100°C  
Sampling pressure: <1.0 Mpa  
Insertion length:200mm  
Installation connect: ZG1" /1"NPT



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**T001-BD5CMD+MS2110pHT200**  
**Insertion Moisture Transducer**

Sampling temperature: -40 to 180°C  
Sampling pressure: <1.0 Mpa  
Insertion length:200mm  
Installation connect: ZG1" /1"NPT

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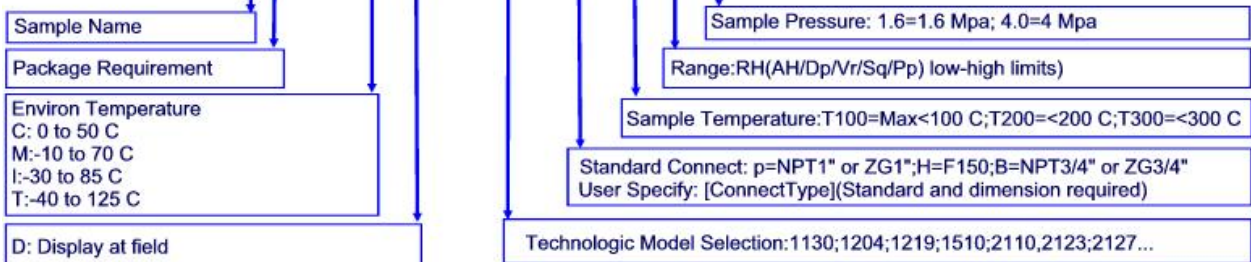
**T001-BD5CMD+MS2110pHT300**  
**Insertion Moisture Transducer**

Sampling temperature: -40 to 300°C  
Sampling pressure: <1.0 Mpa  
Insertion length:200mm  
Installation connect: ZG1" /1"NPT

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Selection coding

User Selection: I-T-BD5xMx-MSxxxxSet T R P



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**BIG DIPPER TECHNOCHEM INSTITUTE**

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