



MICHELL GROUP

Advanced Industrial Hygrometry
and Process Instrumentation

Company Profile, 2011



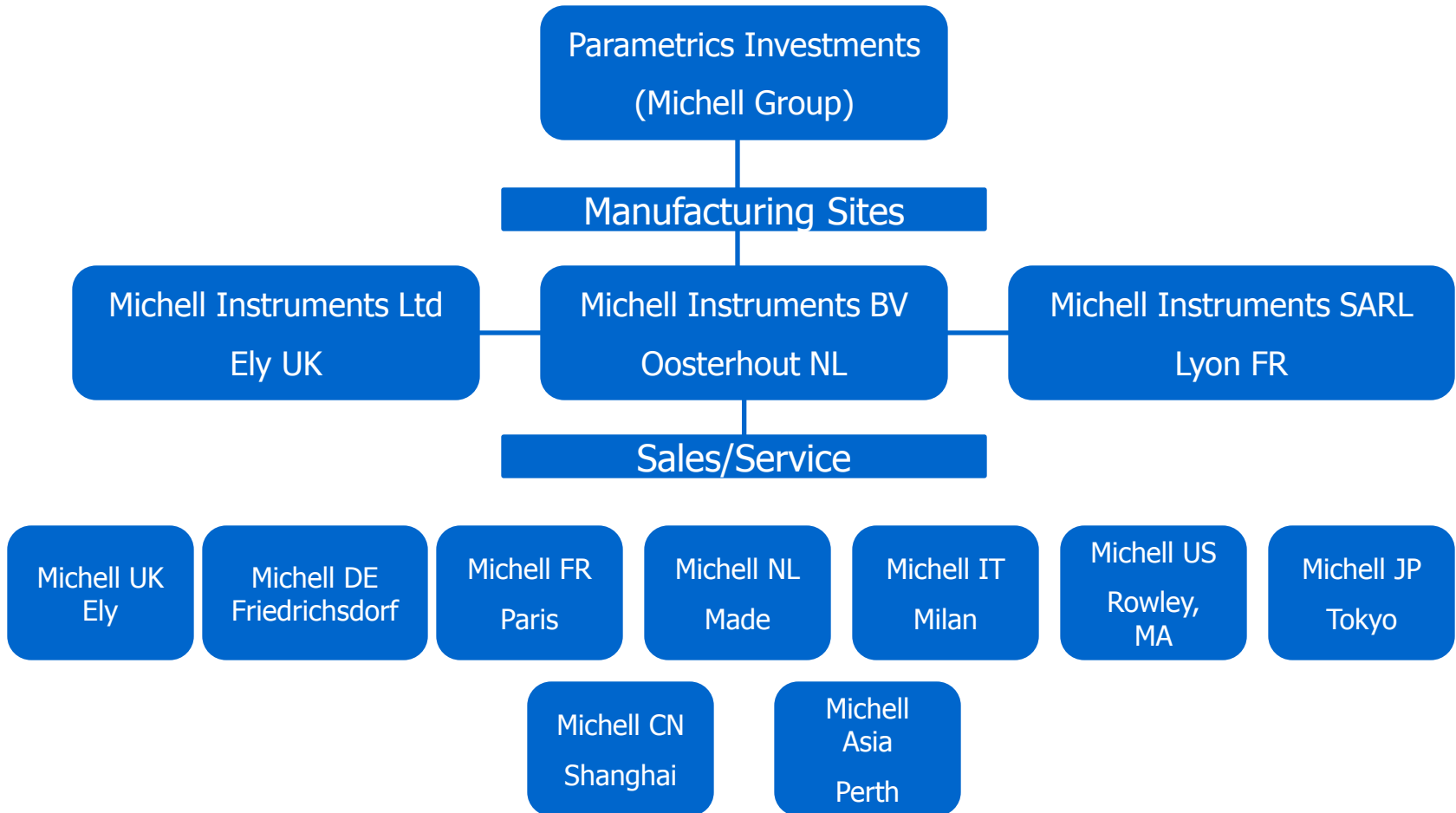


Who is the Michell Group?

- Leading in the world of solutions for humidity and gas analysers
- More than 30 years of experience in humidity measurement equipment
- Multiple product range
- Fast growing organization
- Global sales and service network



Corporate Structure



Extensive Sales and Service Network



3 manufacturing sites

9 Subsidiaries

50+ Distributors

140 Employees

● Michell Offices ● Michell Representatives



Michell Group History

- 1974 Michell Instruments established
- 1980 Awarded contract to build EC Humidity Transfer Standard
- 1984 S4000 becomes part of the British National Humidity Standard
- 1986 Humidity calibration laboratory becomes first in the world to be UKAS accredited
- 1989 BS5750 part 2 awarded (ISO9002)



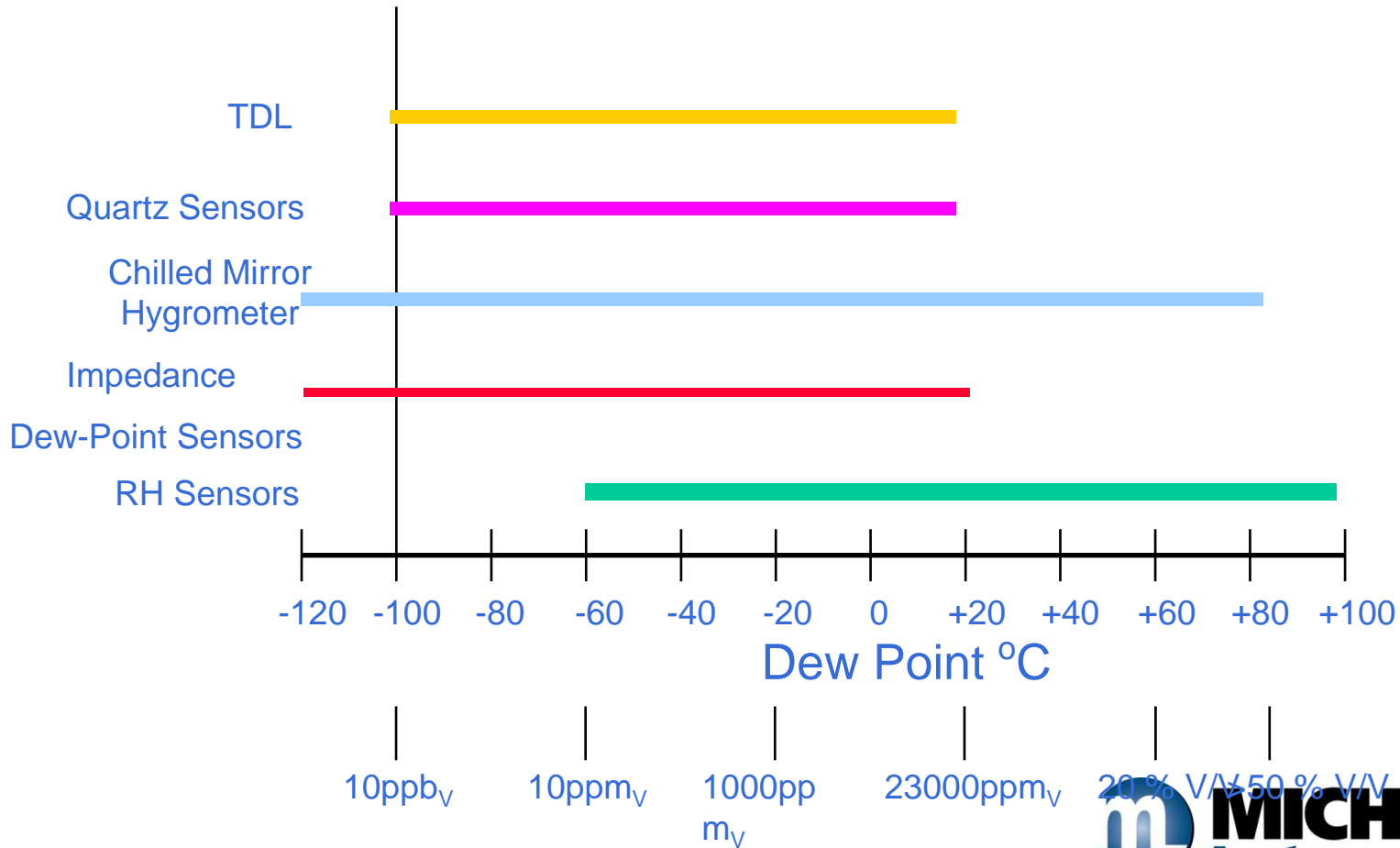
Michell Group History

- 1990 Sales and Service Centre opened in Germany
- 1994 World first 2-wire dew-point transmitter launched
- 1997 S4000TRS launched, giving -100 ° C dew point capability
- 2000 Subsidiary opened in Holland
- 2003 Subsidiary opened in France
- 2004 Subsidiary opened in China
- 2005 Subsidiaries opened in Italy and Japan
- 2006 Acquisition of Rense Instruments BV in Made, NL
- 2007 Subsidiary opened in USA
- 2008 First Far East Agent Training

Technologies

Moisture technologies and their ranges

No single technology can cover the entire range
All have limitations

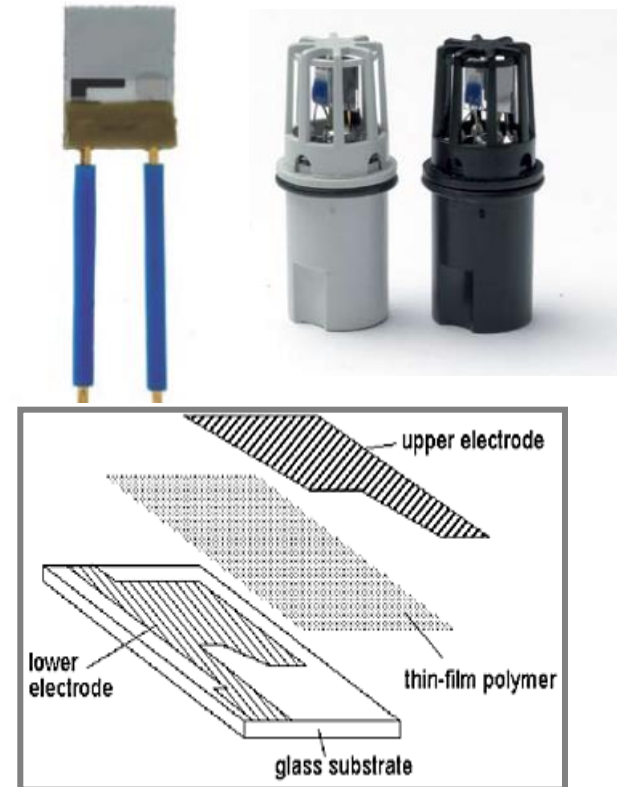


Capacitive RH Sensor

Most are based on the principle of adsorption of humidity into a porous polymer film that has a direct electrical response to changes in relative humidity. Ambient temperature **MUST** be measured and recorded to give readings and validity.

Can give good repeatability but need regular calibration for integrity.

Fast responding in the relative humidity range



Advanced Ceramic Moisture Sensor

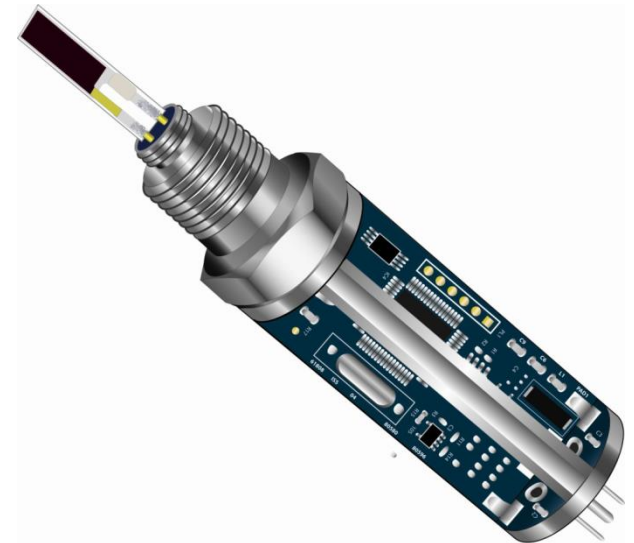
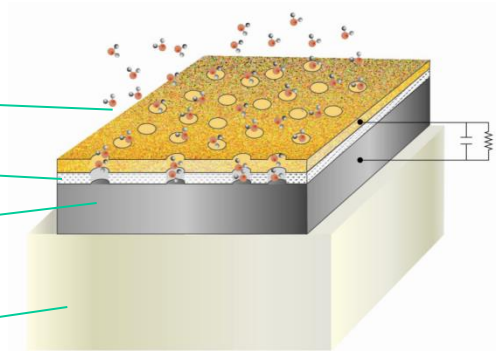
Our highly successful ceramic moisture sensor offers a measurement range from -100 to $+20$ ° C dew point with superb accuracy and stability

Porous Conductive Layer

Hygroscopic Active Layer

Conductive Layer

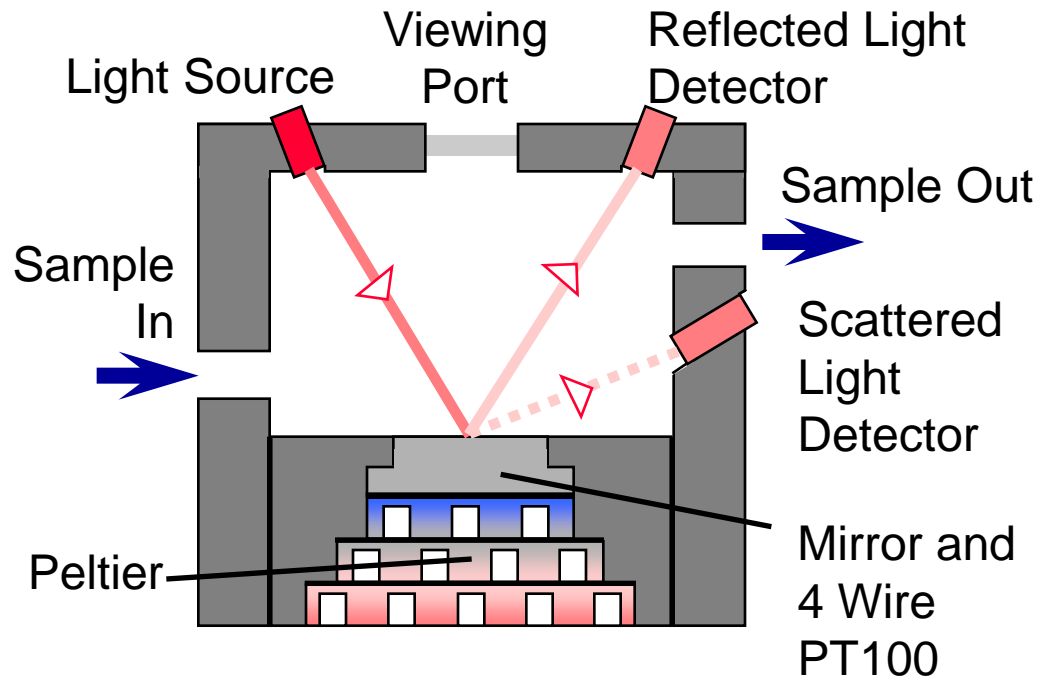
Ceramic Substrate



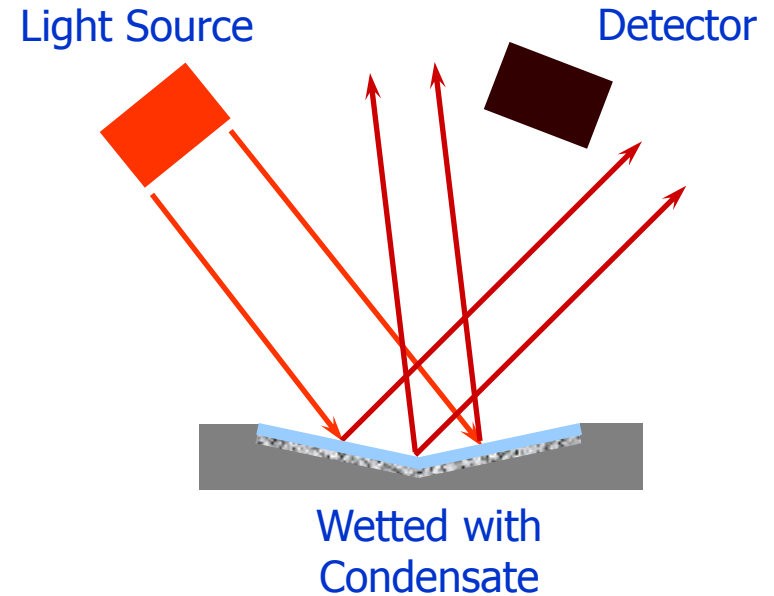
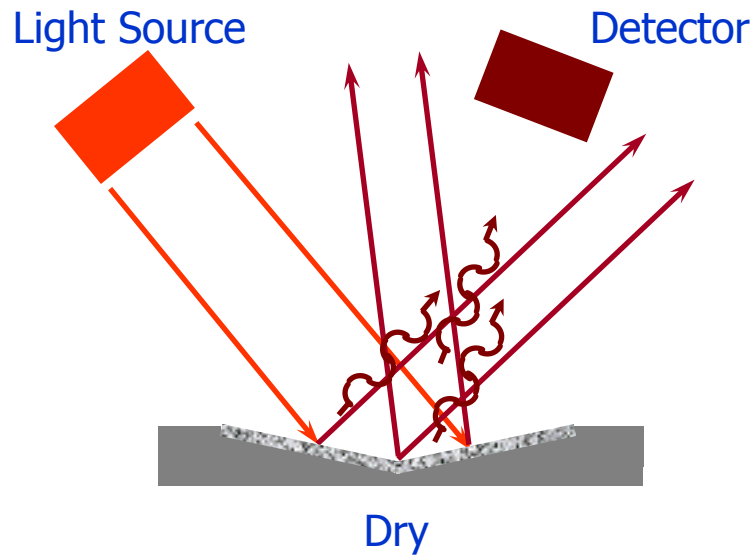
Cooled Mirror Dew-point Sensor

The cooled mirror sensor principle relies upon the cooling of a metal mirror by a thermoelectric cooler. At dew point, the mirror temperature is measured by a precision platinum resistance thermometer.

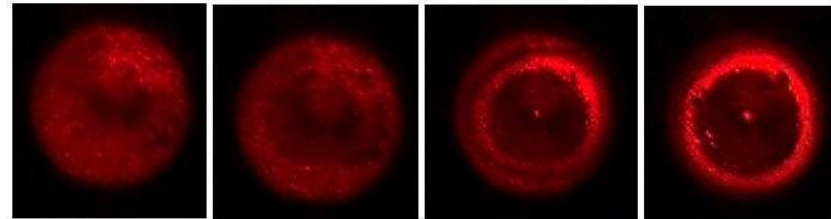
Fundamental, high accuracy and long-term stability.



Hydrocarbon Dew Point: The DARK SPOT Technique



The DARK SPOT Technique

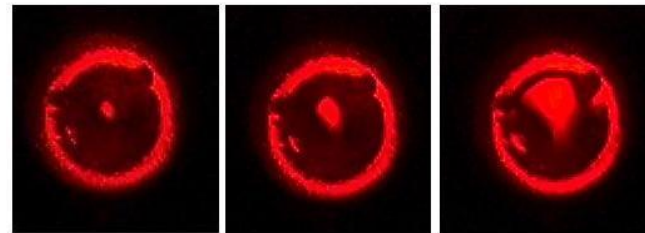


- 33°C

- 33.5°C

- 34°C

- 34.5°C



- 35°C

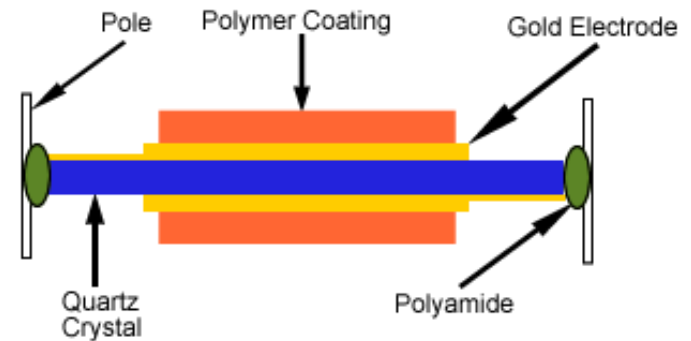
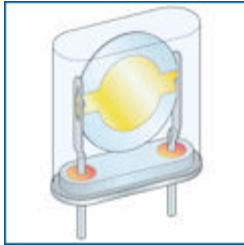
- 35.5°C

- 36°C

The dark spot forming

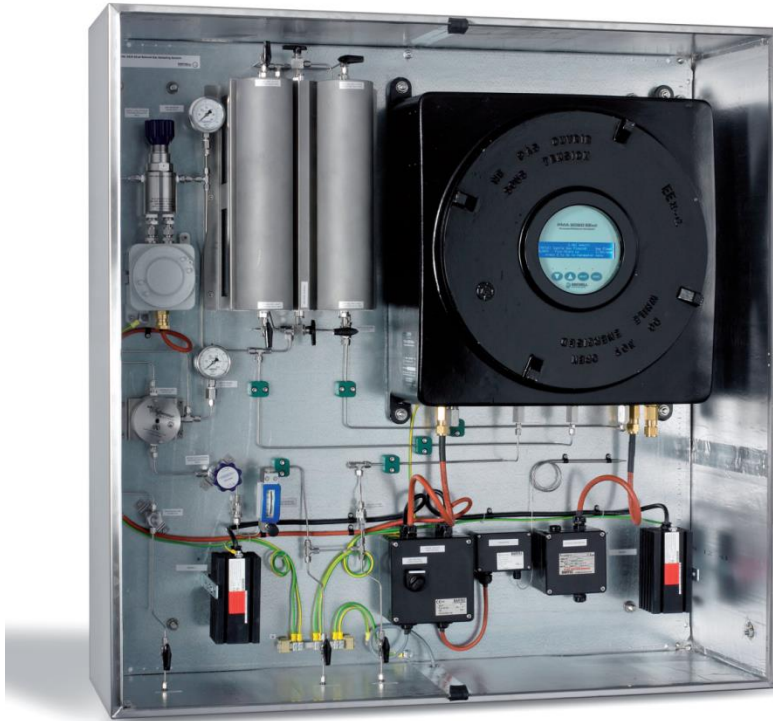
Quartz Crystal

Quartz Disk Diameter: 15,5mm
Quartz Disk Thickness: 0,1665mm



- Moisture adsorbs or desorbs on polymer layer
- Causes a change in mass of the vibrating crystal
- Increase in mass reduces frequency, a decrease has opposite effect
- Sorption process fully reversible
- No long term drift
- Reliable and repeatable performance

Michell's New Quartz Crystal PMA 2020 Series



- Exd Zone 1
- 0.5 – 500 ppmV, trend to 1000ppmV
- On line verification
- $\pm 10\%$ reading accuracy
- -20 to +60°C ambient conditions
- Selectable 0-1v, 4-20mA (2of), RS485 serial communications

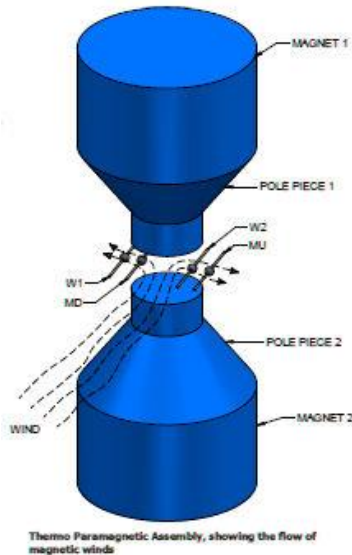
Oxygen Analyzers

An wide range of oxygen analyzers for all applications from clean gas to stack.

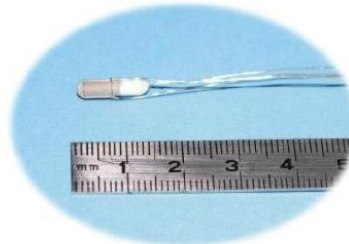
- Thermo-paramagnetic sensor.
- Advanced zirconium oxide



Thermo-paramagnetic Sensor



MSRS Zirconia Sensor



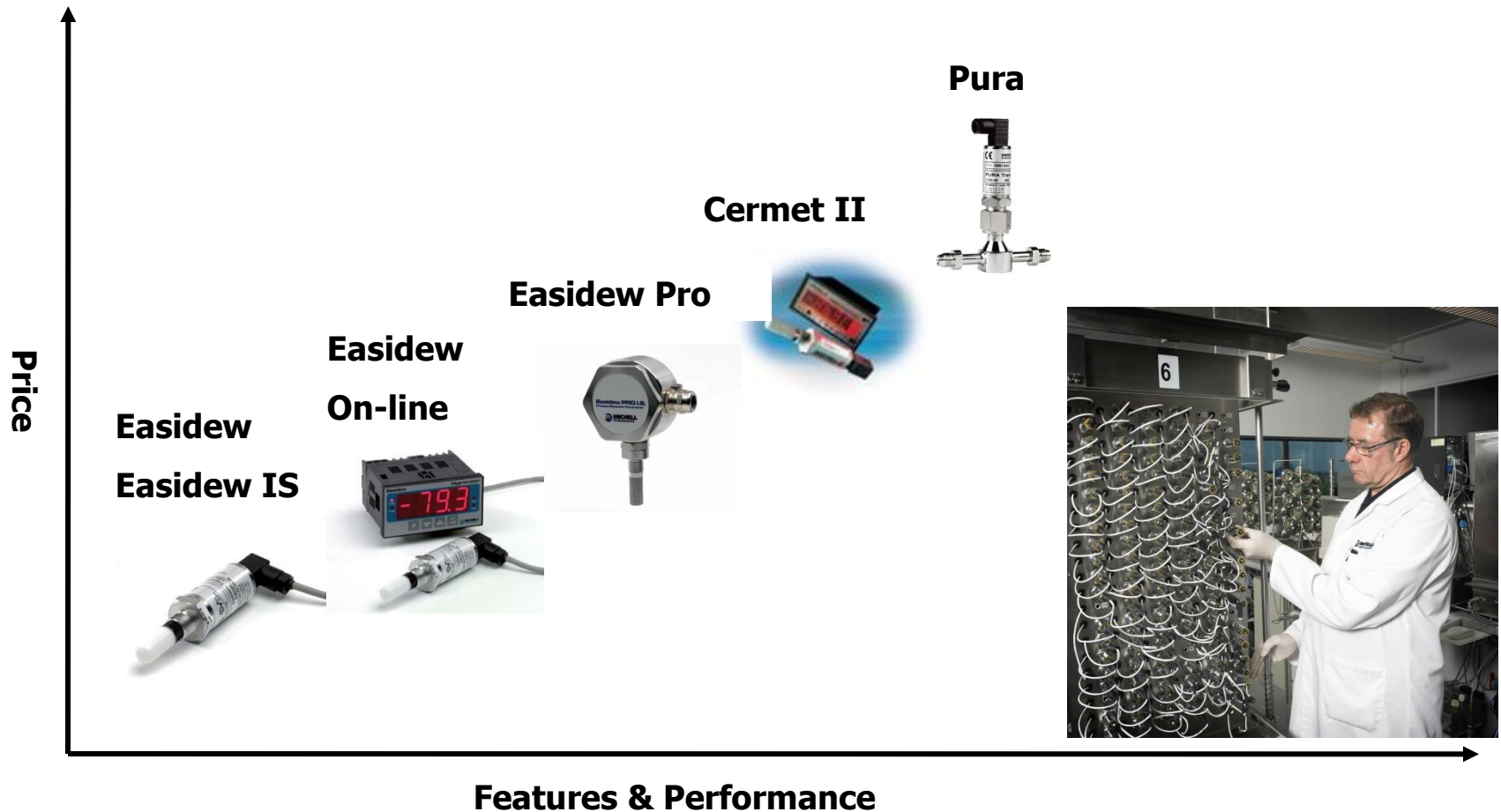


Product Groups

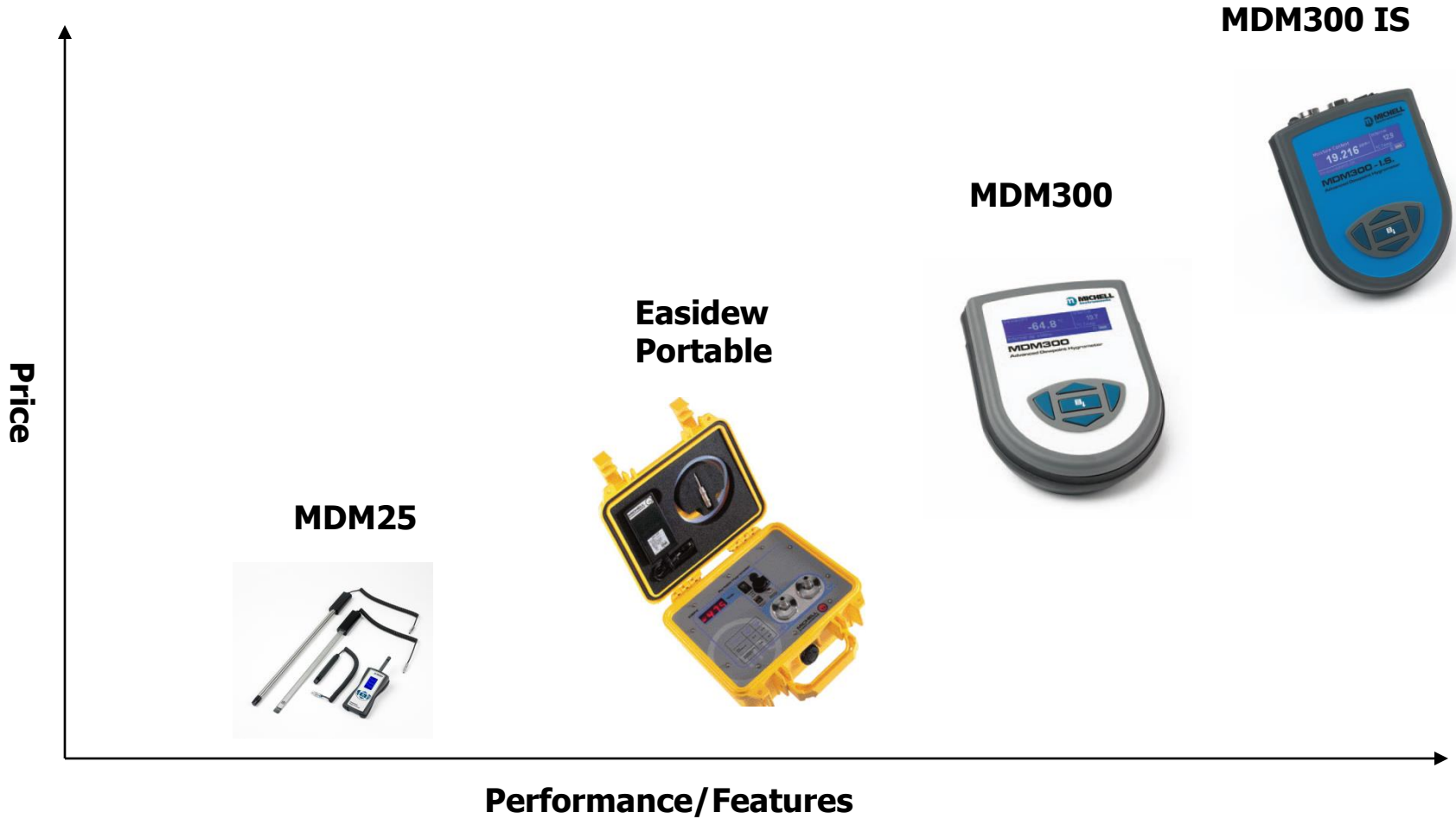
Sensors and Transmitters Relative Humidity



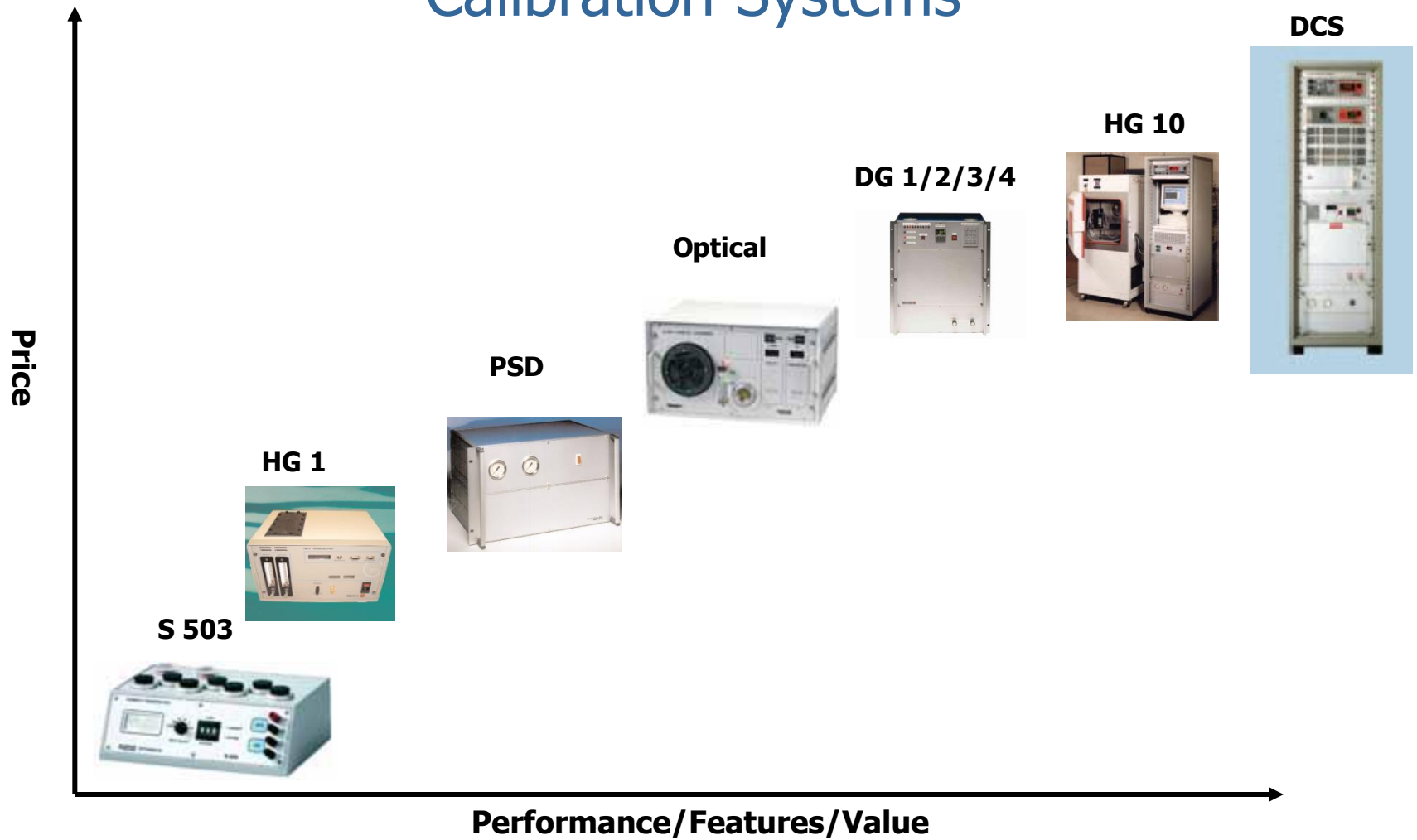
Sensors and Transmitters without RH



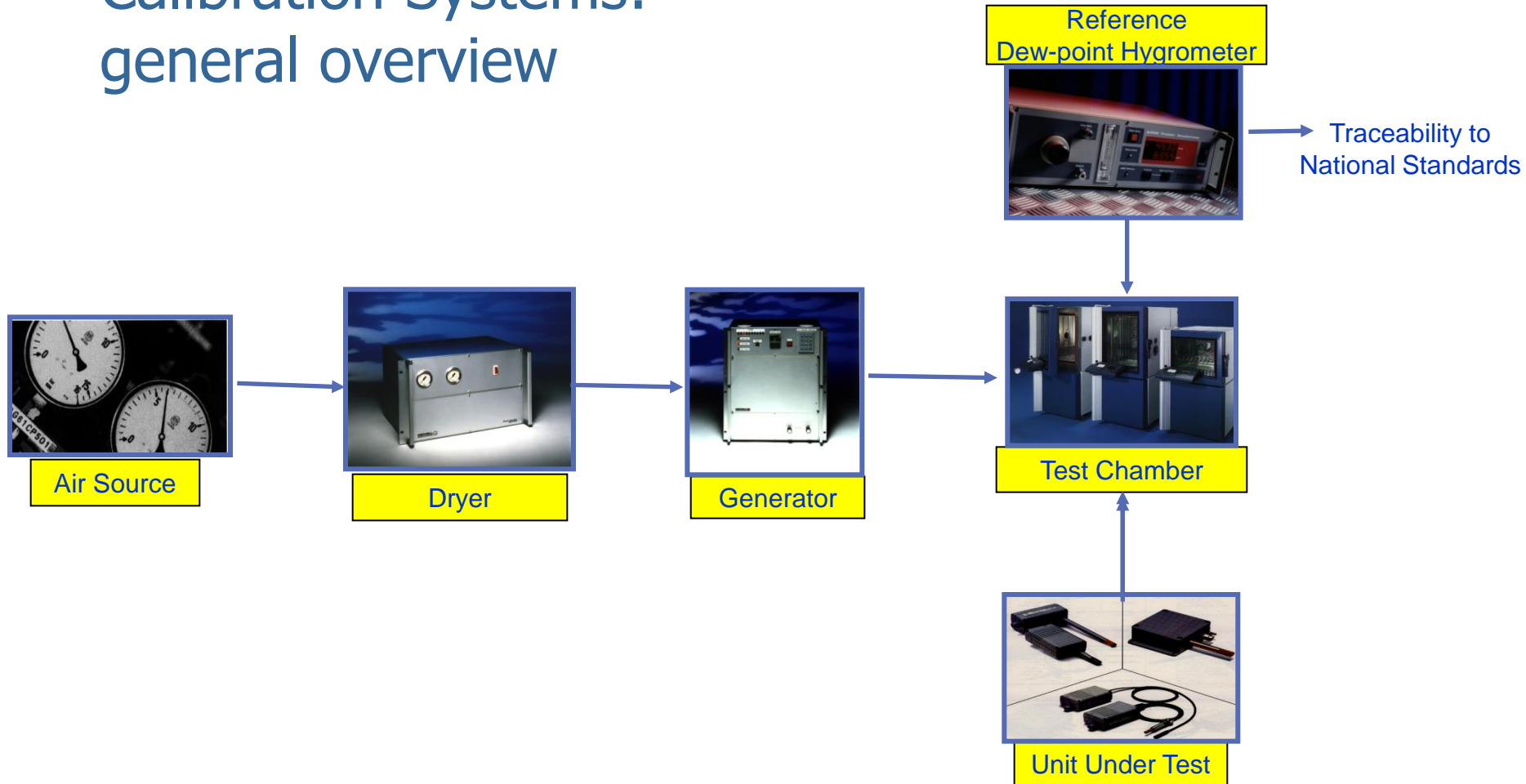
Portable Instruments



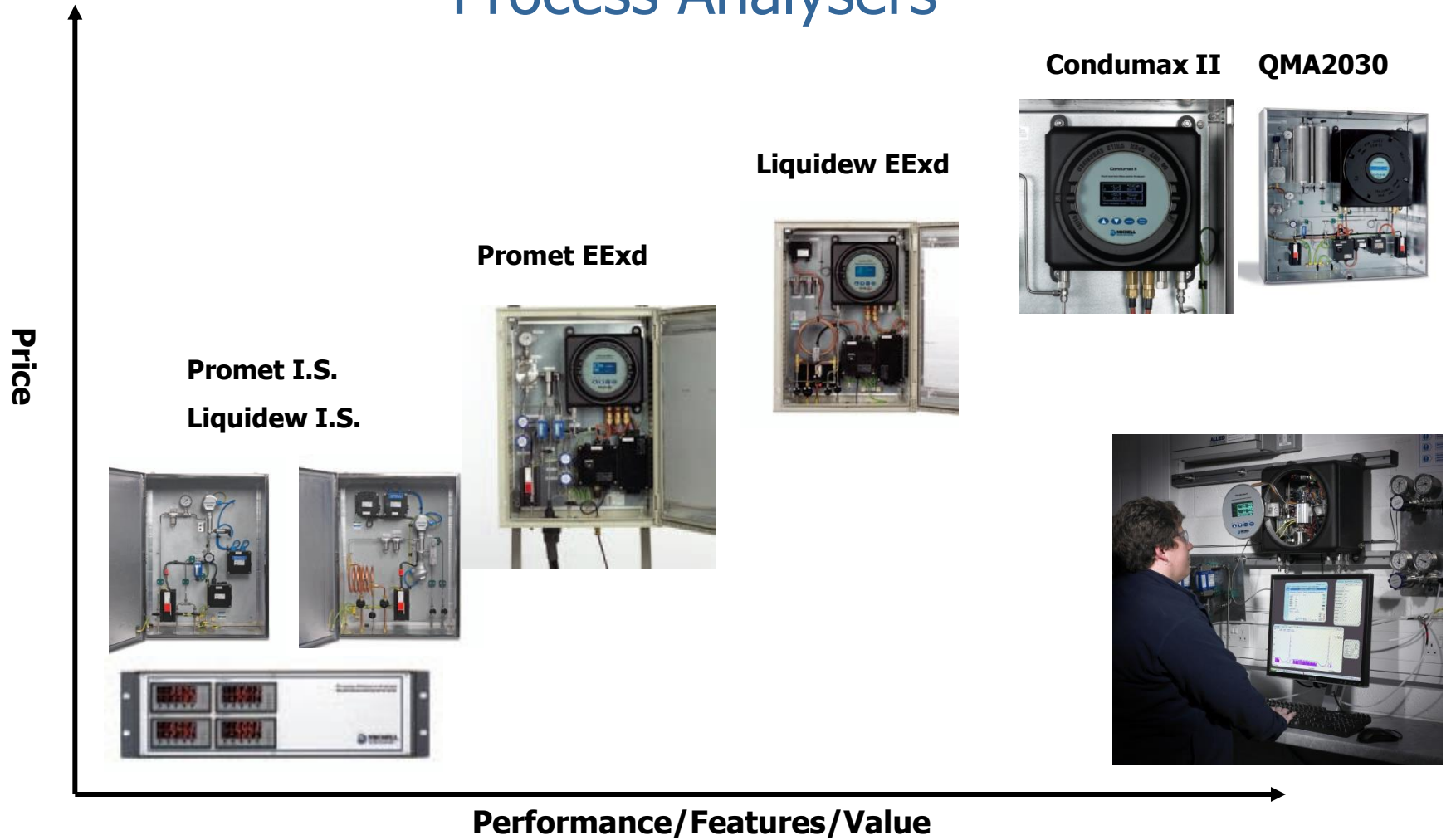
Calibration Systems



Calibration Systems: general overview



Process Analysers





Product Groups

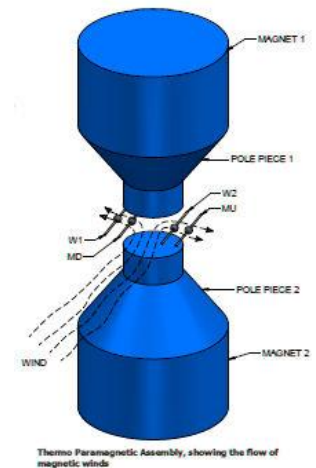
Oxygen analyzers

XTP600 – Thermo-paramagnetic Oxygen analyzer

A robust, linear and stable oxygen analyzer for measurements in gases such as hydrogen, nitrogen or air. The sensor is housed in an explosion-proof casing, making it suitable for a wide range of applications in hazardous areas.

Applications

- Oxygen measurement at inlet of compressors in steel or gas industries to monitor safety
- Biogas, waste, landfill and digester plants
- Inert gas for pharmaceutical industry and painting gas
- Monitoring inert blanketing gases in oil tankers
- Furnace gas control in steel industry
- Hydrogen coolant in electricity turbines
- Pure gas measurement
- Catalyst regeneration
- And many more...



XZR-400 – Zirconia Oxygen analyzer

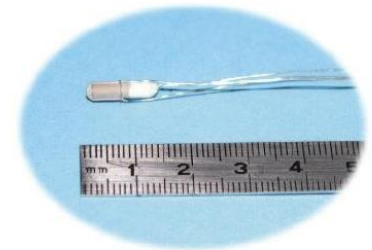
The XZR-400 oxygen analyzer detects trace oxygen in gas and is used to control the purity of gases such as Nitrogen, Argon, Helium and Carbon Dioxide. It is available in wall-mountable, rack-mountable and portable versions, each suited to a range of applications.

Applications

- Control of pure gas for semiconductor and nuclear industries
- Control of gas purity for industrial gas manufacturers
- Tracing leaks in glove boxes
- Measuring oxygen traces in Carbon Dioxide for breweries
- Heat-treating applications such as galvanizing furnaces
- Simulation in laboratories



MSRS Sensor



XZR-500 – Zirconia Oxygen analyzer

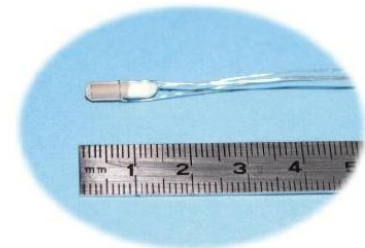
The XZR-500 oxygen sensor from Michell Instruments is designed to determine the excess of air required for optimum combustion. It uses advanced Zirconium Oxide technology to measure levels of oxygen in harsh conditions such as boilers, incinerators and furnaces. Together with the XCU-500 analyser, it provides fast, accurate readings taken in the harshest conditions.

Applications

- Combustion and control efficiency in boilers
- Emissions monitoring (NFIE certified, Mcert pending)
- Waste and industrial incinerators
- Coal-fired power plants
- Petrochemical furnaces
- Annealing and galvanizing furnaces
- Soaking pits
- Glass and melting furnaces
- Cement kilns

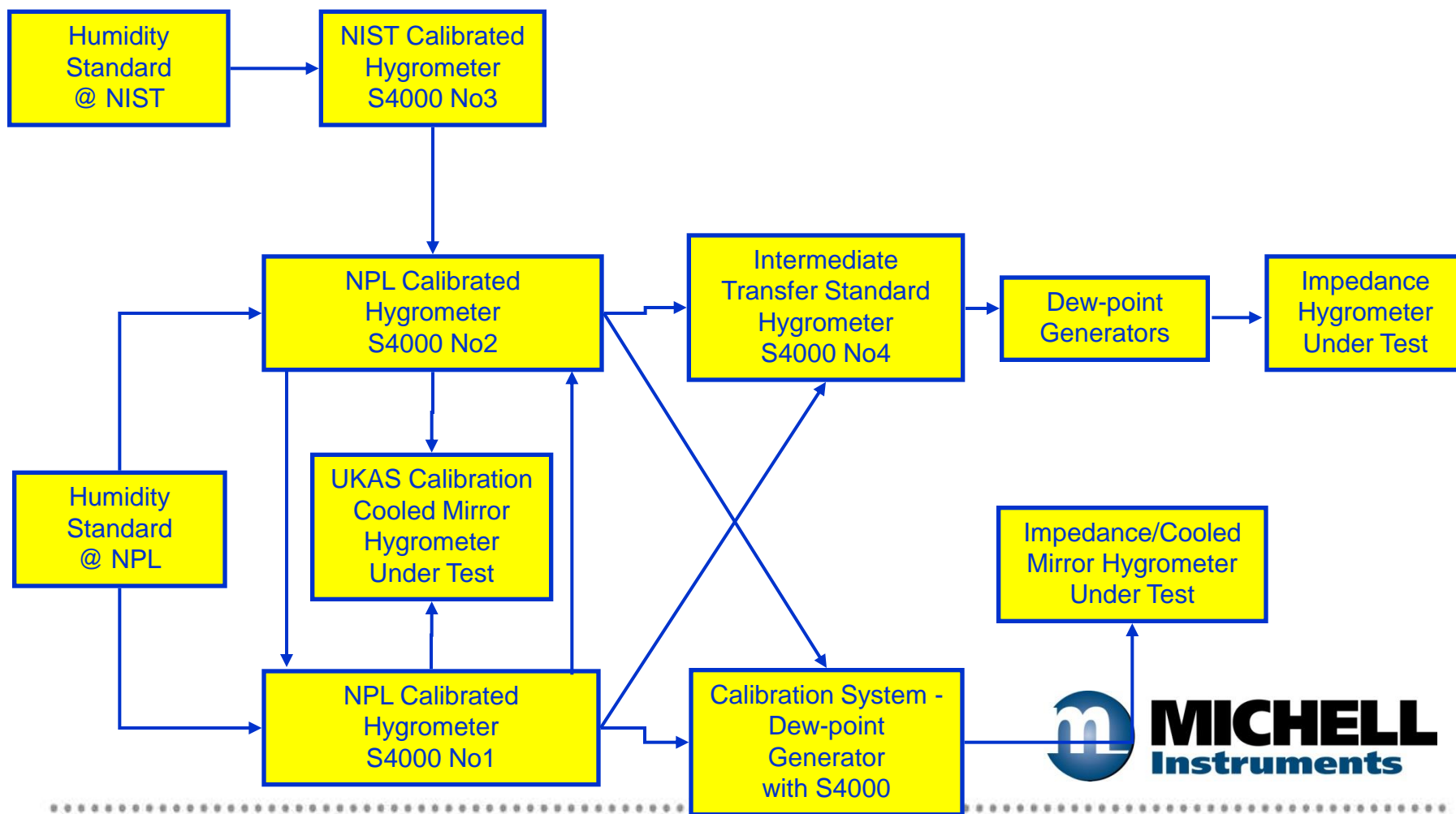


MSRS Sensor



Traceability to National Standards

Calibration Traceability Chart for Michell Dew-point Hygrometers



UKAS Calibration

Michell Humidity Calibration Laboratory offers:

UKAS traceable calibration capability from -90 to $+20^{\circ}$ C dew point with a measuring capability of $\pm 0,15^{\circ}$ C dew point @ 20° C dp rising to $\pm 0,45^{\circ}$ C at -90° C dp (at a coverage factor of $k=2$)

Traceable dew point calibration over the dew point range of -100 to $+82^{\circ}$ C dp with the traceability to national standards over the range -90 to $+82^{\circ}$ C dew point.

NIST traceable calibration available

