



# Uses of Cooled Mirror Hygrometers in Automotive Development

## Engine Testing

Engine emission and performance testing is an important environmental requirement in the design and production of any engine that uses the internal combustion process.

Petrol and diesel engined cars and trucks, and diesel locomotive engines must all be type tested for conformity with national and international regulations. Typical emissions that are monitored and regulated by various government agencies include NO, NO<sub>2</sub>, N<sub>2</sub>O<sub>4</sub>, SO<sub>2</sub>, SO<sub>3</sub>, CO, CO<sub>2</sub>, Pb and residual hydrocarbons. The quality and relative concentrations of these emissions are affected by various factors, including humidity. In order to minimise variability of test results, these factors need to be controlled or eliminated.

The Michell Optidew or S8000 Precision Cooled Mirror Hygrometer are ideal products for this application, providing excellent accuracy and long term stability.

\*For more information, please request our Engine Testing application note.



S8000 Remote

## Powertrain Development

During the development process, new engines and vehicle/engine combinations undergo exhaustive testing to optimise efficiency and performance using a variety of techniques, including rolling road tests, wind tunnel tests and also on-road evaluation. The relationship between moisture level admitted to the engine and the fuel/air ratio is important in optimising fuel efficiency and power output, as well as in minimising emissions. Therefore engine developers are keen to have a precise measurement of the air inlet dewpoint. Again, Optidew and S8000 Precision Cooled Mirror Hygrometers are chosen for this vital measurement application.

*Reference Users - Cosworth Racing, Ford Motor Company, Jaguar Cars, Mercedes-Ilmor, Volvo Cars, Saab, Daimler Chrysler, Peus Systems.*

## Environmental Testing

Motor vehicles are required to operate in a wide range of environmental conditions, from hot desert to cold arctic. In order to confirm their reliability in these demanding conditions, real-life testing is often supplemented by accelerated environmental testing in specially designed environmental chambers.



Environmental Testing at Jaguar



Michell's cooled mirror hygrometers, the Optidew and S8000 Series are used extensively to monitor and sometimes control the environmental humidity at dew points between -50 and +50°C. Due to their open sensor cell design, both the Optidew and S8000 Remote are ideal to mount directly in the test chamber – removing the need for a pump or sampling arrangement required by a closed sensor design.

*Reference users - MIRA (Motor Industry Research Association),  
MoD, Behr, Daimler Chrysler, Siemens VDO Automotive*

## Pneumatic Braking Systems

Commercial road vehicles (and railway carriages) often use pneumatic braking systems. Ambient air is compressed using an on-board compressor system, with a single-charge or regenerative air dryer to remove excess moisture. It is important that the excess moisture is removed effectively, as any residual liquid water in the air brake pipes will freeze in sub-zero operating conditions. The danger of frozen brake lines is two-fold - firstly a complete line blockage will render the braking system inoperative. Secondly, the frozen water may cause a fracture in the air line due to expansion on freezing, which on subsequent thawing will then lead to leakage and reduce braking efficiency. Michell Instruments offers a range of on-line and portable hygrometers that are specifically suited to the measurement of air brake dew point. Cermax and Easidew products are all used by braking system manufacturers and vehicle manufacturers around the World.

\*For more information on railway applications please see our Rail Vehicle Compressed Air application note.



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