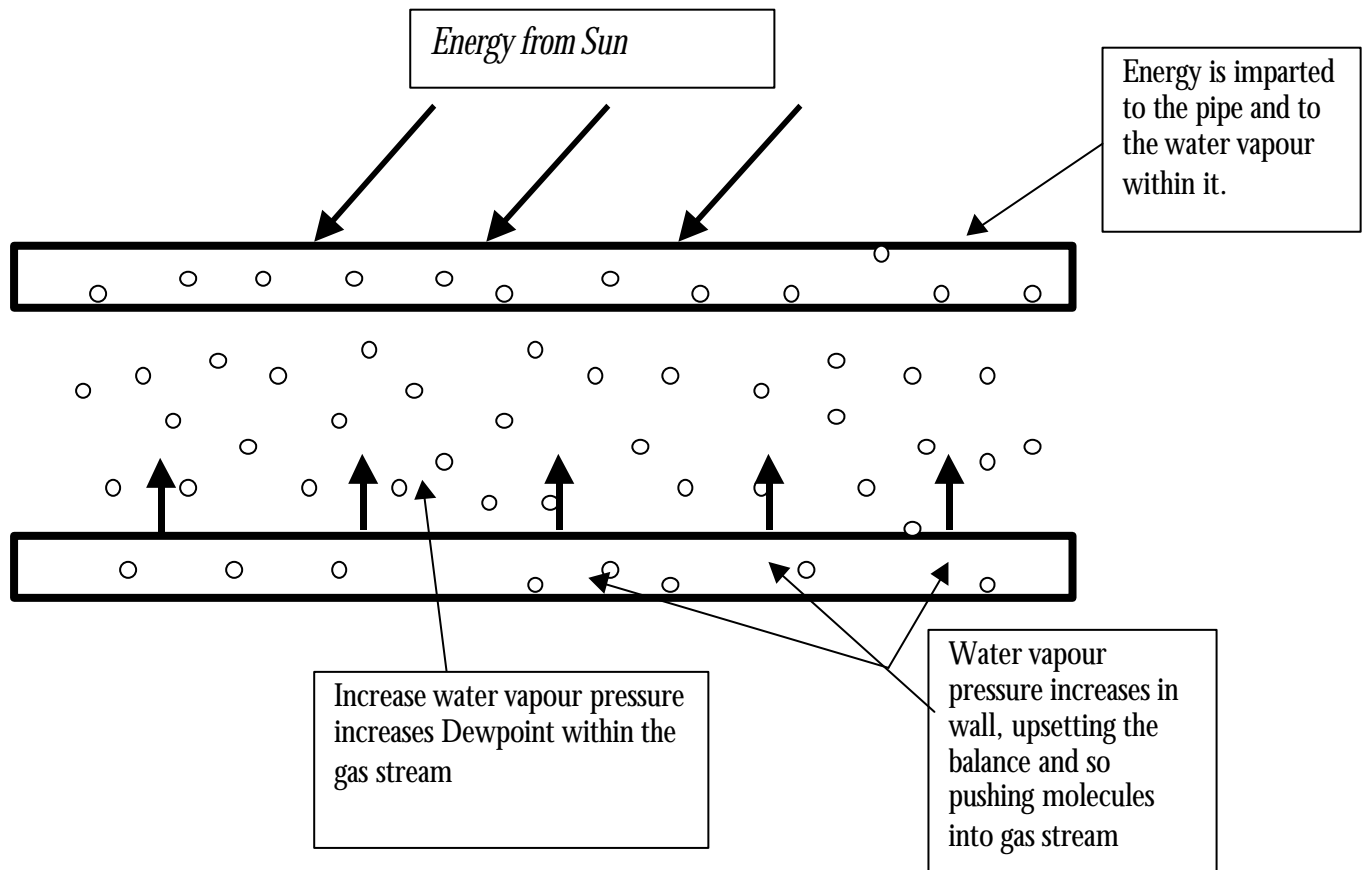


The Diurnal Effect On Dewpoint

The Diurnal Effect is the effect that the sun has on a dewpoint measuring system. The classic symptoms appear as if the increased system temperature is causing the analyser to become 'temperature sensitive'. Although some manufacturer units are sensitive to temperature fluctuations, especially at the wet end, Xentaur have developed very sophisticated compensation techniques to nullify these factors. It is more likely that the analyser is in fact reading correctly and that the system's dewpoint has indeed changed.

Take a stable dry Nitrogen system. The metal crystalline/PTFE piping of the system is porous, albeit only to a very small molecule like water, which will migrate into the pipe wall. In a stable system the water vapour in the nitrogen and within the pipe walls will have achieved an equilibrium, at a steady and balanced gradient partial water vapour pressures across the pipe wall to the outside ambient. As the sun shines onto the system, a tremendous amount of energy is transferred to the pipes and to the diffused water. As you add energy to the water, the molecule oscillates, Brownian motion increases and hence the pressure rises.





IMA Limited
Parkwell House
Otley Road
Guiselley, West Yorkshire
LS20 8BH, England

The additional energy has upset the equilibrium, the higher pressure water in the walls now migrates in towards the dry gas. Eventually the system will find a new balance point however generally hight time come first! Generally the gas temperature will not increase as is is stored in bulk and hence is slower to heat.

Diurnal effects are easy to detect and eliminate. If plotting the moisture and temperature against time shows synchronicity then there is liable to be a problem. The time base will show the solution, cycling daily with the sun simply requires the pipe work to be insulated and sun shades erected. If the response is in time with an anticondensation heater then a narrow band thermostat is required. However if it's in time with the process then the increased/decreased moisture is a function of the system and therefore the analyser's reading is valid.