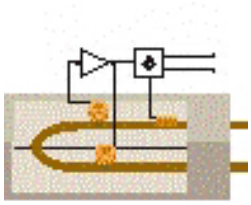
Application Report

On-line Determination of Gas Density

Gas density is an important parameter in the determination of the air to fuel ratio in the feed to a gas fired boiler. It ensures that efficient, clean combustion takes place providing for a clean burn with a minimum requirement in raw fuel. The Anton Paar combination of the DPRn density cell with the mPDS1000 evaluation unit and associated sampling system provides for a temperature compensated density to accurately determine the composition of the feed gas.

Industries & Applications
Power & Cogeneration Plants
Petroleum Refining
Chemical Manufacture
Minerals Processing

How is the Density Measured ?
Inside the DPRn427 transducer is an oscillating U-tube system. It is excited and kept oscillating at its resonant frequency by two coils and an electronic circuit. The oscillation period and sample temperature are measured and transferred to the mPDS1000 evaluation unit for data processing and the result is expressed as density in a number of units (g/cm^3, kg/m^3, SG).



The Oscillating U-tube

The mPDS1000 evaluation unit and DPRn427 are provided as a system certified for use in Hazardous Areas (Ex ia). The mPDS1000 provides for a local display as well as mA outputs (temperature and density) and two relay contacts for setting of high and low alarm points. An option also exists for the use of Profibus DP. The mPDS1000 also accepts external inputs (both analogue and digital) which allows for the connection of other instruments (flow, pressure etc).

mPDS1000 Evaluation Unit **DPRn 427S Density Cell**

The system can be supplied complete with a stainless steel in-line fitting (sized according to your requirements) to provide for a total package. This ensures correct flow through the sensor for improved accuracy and performance.

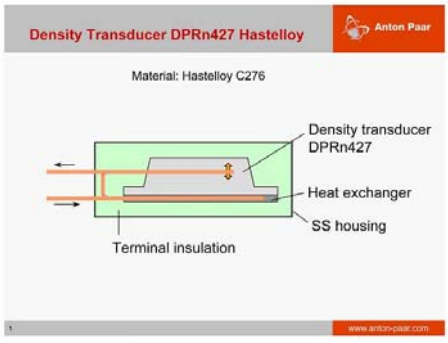
Sampling System

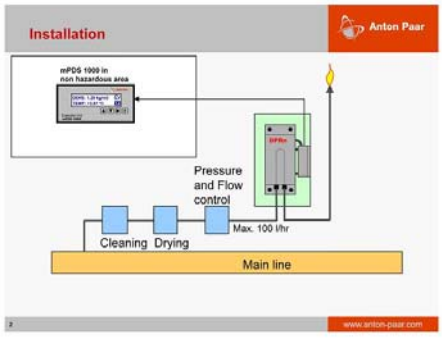
The sampling system is crucial for the accurate determination of gas density. As gas density is heavily dependant on both temperature and pressure of the sample it is important that these two variables are measured as accurately as possible in order to obtain an accurate gas density. To eliminate these problems the Anton Paar sampling system incorporates various techniques to ensure accurate measurement.

As the mPDS1000 can accept external inputs from other instruments, a pressure gauge can be connected directly which is used in line to measure the pressure of the gas sample. This result is then used to compensate the gas density result to a reference value.

Since gases have relatively low thermal capacities in comparison to liquids it is difficult to use external temperature sensors that are mounted to the sample lines. To overcome this issue, Anton Paar utilize a special heat transfer plate which is mounted to the bottom of the density cell which allows the gas temperature to come into equilibrium with that of the density instrument. The two components are then enclosed in an insulated cabinet to ensure temperature drift is kept to a minimum.

The sampling system is completed by the use of a coalescing filter to ensure a clean and dry sample is presented to the instrument.





For more information on the Anton Paar Gas Density monitor or to discuss your application please contact us at:

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