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Core Lab

HPM Densitometer System Datasheet

Fluid Characteristics



HPM Densitometer System



The HPM Densitometer System was developed to allow the measurement of dry gases to fluid densities at elevated temperatures (max. 2000°C, 3920°F) and pressures (max. 20,000 psig). The oven is also capable of operating at sub-ambient temperatures (min. approx. 10°C, 180°F below ambient) due to the inclusion of an air vortex cabinet cooler.

The system as supplied requires a reliable electrical supply and a supply of laboratory compressed air at a pressure of between 100 to 130 psig, for drying and air vortex cooling if required.

The HPM Densitometer system consists of five (5) major components; a temperature controlled oven, a Paar DMA HPM cell, Paar mPDS5 evaluation unit, an electronics enclosure and an aluminium roll around frame.

The oven is custom manufactured to a Core Laboratories design. The oven is constructed from stainless steel which encapsulates an insulating board. This board is of standard density in the walls, door and roof but is of a higher density in the base of the oven. The use of the higher density insulating board is necessary to avoid bowing of the base due to the weight of the HPM density cell and its mounting blocks. The oven has 4 rubber feet that help locate the oven securely on the top shelf of the frame and also help to decouple the oven from external vibrations which may be detrimental to the accurate operation of the densitometer.



The Paar DMA HPM cell is modified by Core Laboratories. The modifications have been made at safe, approved locations by Anton Paar GmbH. These modifications allow for additional heat-sinks to be attached. These additional heat-sinks ensure that there is a very efficient heat transfer between the oven air and the cell.

To operate accurately and consistently, the DMA HPM cell has to be isolated from external vibrations. To isolate the DMA HPM from external vibrations a custom mounting system has been incorporated into the design. The DMA HPM cell is not directly connected to the oven. The inlet and outlet plumbing tubes are designed to minimise vibration transmission from the inlet and outlet valves. Note that the custom mounting pads age with increasing temperature and ultimately lose their resilience, which will affect the calibration. The pads are designed so that they can be easily replaced as necessary.

The enclosure is a standard 19 inch case with custom designed front and rear panels. The enclosure houses the mPDS5 evaluation unit (and signal conditioner), the pressure display, cell/oven temperature controller, trace heating temperature controller, solid state relays, power supply unit, switchgear and electrical safety equipment. Access to the enclosure internals, which must be done with the unit isolated from the power source, is via the top cover which is removed by partially withdrawing two release screws which are accessed through holes in the top corners of the rear panel.

System Plumbing

The plumbing incorporated into the sample handling system of the densitometer is rated for use to 20,000 psig. For convenience of plumbing externally to lower pressure-rated 1/8" tubing, if you don't wish to calibrate/use the system above approximately 10,000 psig, the system includes adapters. Two adapters are fitted to the system outlets (Purge Outlet valve attached to the transducer and the Sample Outlet bulkhead) which are connected with low pressure 1/8" tubing to a waste container. The third adapter is fitted to the sample inlet port prior to shipping.

The sample is always filtered before passing through to the densitometer cell. This is crucial to prevent inevitable debris, such as stray Teflon tape from lodging in the cell. Occasional dismantling of the inlet filter is recommended to allow debris to be physically extracted and the filter elements replaced as required.