

APP NOTE: 350R POSITIVE DISPLACEMENT METER TESTER

Problem: Differential Pressure drop test across Positive Displacement type natural gas meters.

The Manager of Measurement and Regulation at a municipal natural gas distribution utility needed a device to measure the pressure drop across rotary vane positive displacement meters. These meters are used by the gas utilities to bill large volume customers such as commercial, large residential and small industrial accounts.

Rotating vanes or impellers trap a volume of gas as it enters the device. As the gas passes through, the rotating vanes turn gears which turn dials indicating the amount of gas used. To accurately trap a finite volume of gas and to avoid unmeasured leaks in the meters, they are manufactured to very close tolerances. However, the gas must be able to flow through the meters with a minimum amount of resistance. The resistance to this flow is measured as a differential pressure between the inlet and the outlet of the meter. Typically, this differential pressure is between 0.10" H₂O and 2" H₂O.

Contamination of the rotating vanes, measuring chamber, gears or bearings with dirt and/or grease increases the resistance to rotation. An increase in resistance means gas can pass through the meter without being measured. Resistance to rotation also increases the differential pressure across the meter. Gas utilities measure this pressure drop across the meter to determine if it needs to be removed from service and repaired.

Pulsations and surges in flow create widely fluctuating pressures that are virtually unreadable using conventional measurement devices. Static pressures of up to 100 PSIG further limit the number of instruments that can be used. U-tube manometers and mechanical DP gauges can be used to make these measurements; however, they have serious drawbacks such as poor resolution, parallax, static pressure, temperature errors, and durability. Correcting these problems on mechanical gauges result in units that are bulky and expensive.

Solution: Meriam Instrument's 350R Rotary Vane Positive Displacement Meter Tester

The 350R PD METER TESTER is a proven instrument that addresses all these measurement concerns.

The 350R PD METER TESTER is specially programmed to measure the differential pressure, and display the true average of those measurements. The amount of time over which the averaging occurs is controlled by the user. This feature addresses the flow surge and pulsation concerns.

The 350R PD METER TESTER has an accuracy of 0.1% FS (20" H₂O range) or 0.05% FS (200" H₂O range). This provides better accuracy in the low DP ranges as compared to mechanical gauges or manometers. The 350R PD METER TESTER is well suited for use in the field, its accuracy is not affected by temperature over its calibrated range of 23° F to 122° F. This temperature effect on mechanical gauges and liquid manometers can result in serious accuracy errors.

The digital display eliminates parallax errors, and depending on the range of the gauge, it can have a resolution of 0.01 or 0.001" H₂O. A min/max feature also allows the user to see the minimum and maximum pressures recorded during the test. The unit is portable, and with the integral push to read manifold, the 350R PD METER TESTER can safely be used with lines having a static pressure of up to 150 PSIG.

