

DP Flow Application Note

The Mass ProBar[®] Flowmeter Measures Untreated Natural Gas Over a Wide Range of Static Pressures

Since natural gas is the cleanest burning fossil fuel, it is used as an alternative to more polluting energy sources and has a direct impact on the quality of air and water. Natural gas combustion results in virtually no sulfur dioxide emissions and significantly less nitrogen oxide emissions, which contribute to acid rain. Greenhouse gases including carbon monoxide are also significantly reduced. Industrialization, especially in developing countries, has increased the demand for a cleaner burning alternative to traditional fossil fuels.

An independent test clearly demonstrated the Mass ProBar[®] Flowmeter's capability of producing highly accurate mass flow measurement of natural gas.

As part of a reallocation project at gas fields, a major French oil and gas company in northern Holland was investigating a more efficient way for the flow measurement of untreated (wet) natural gas. Most gas producing companies use a square edged orifice plate, absolute pressure, differential pressure and RTD signal into a flow computer for a compensated mass flow output measurement. The customer wanted to determine the viability of an alternative technology to be used in their custody transfer applications to reduce costs and simplify the installation.

The Mass ProBar[®] flowmeter was tested at the

Ruhrgas-Pigsarä test facility in Dorsten, Germany. Of particular concern was the stability of the Annubar[®] primary flow elements's coefficient (K) at different pressures. The flow reference was a calibrated turbine meter and the mass flow was calculated from pressure temperature and gas composition. The total uncertainty of the test set-up was $\pm 0.15\%$ of rate. The Mass ProBar[®] test units were installed in a spool section, the size of a conventional turbine type flowmeter to avoid installation errors when the unit is calibrated/tested elsewhere. The test was conducted at static pressures of 20 and 40 Bar G.



Ruhrgas Test Facility, Dortsen, Germany

Flow reference at the facility is a calibrated Turbine meter, and the mass flow is calculated from pressure temperature and gas composition. The total uncertainty is $\pm 0.15\%$ of rate.

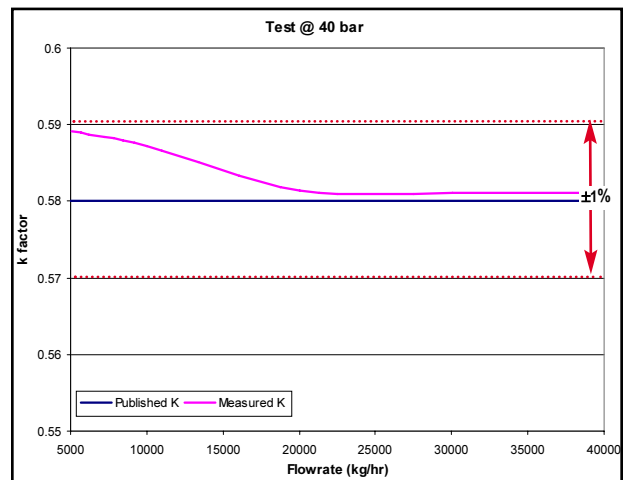
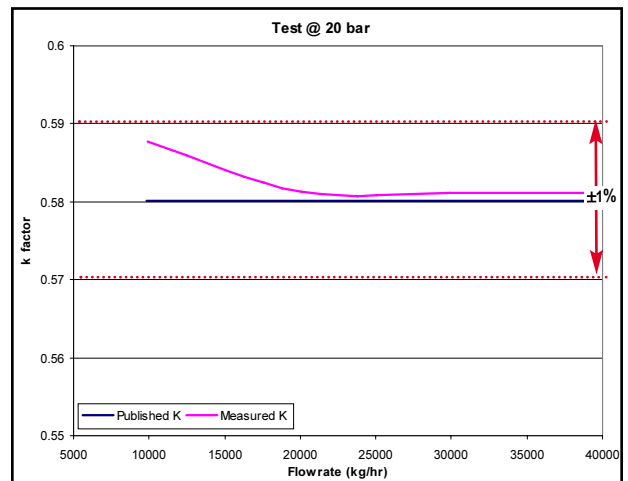
The test clearly demonstrated the Mass ProBar[®] flowmeter's capability of producing a highly accurate mass flow measurement of natural gas with the flow coefficient (K) independent static pressure.





The value of the Mass ProBar[®] flowmeter was readily apparent to the customer. By combining the integrated electronics with insertion flowmeter technology, only one pipe hole and two wires are needed to measure all process variables. They found that the integrated solution offered by the Mass ProBar[®] could save them money and time during the ordering process, instrument installation, commissioning, and operation. The customer realized the cost savings by specifying and ordering one Mass ProBar[®] flowmeter, which eliminated tubing, valves, adapter unions, transmitter mounting, excessive welding and fugitive emission point. This significantly reduced installation and commissioning time. A typical Mass ProBar[®] application will require approximately 4 linear inches of welding in comparison to an orifice plate's requirement of two times the circumference of the pipe.

The permanent pressure loss across the diamond shape sensing element of the Mass ProBar[®] flowmeter provided additional benefits to the customer. The reduced pressure drop across the Annubar[®] primary flow element converted directly into energy savings for the customer in decreased operating costs.



June 30, 2000 Ruhgas Test

Independent test to verify that the Mass ProBar flowmeter's flow coefficient (K) would not change at higher static pressures.

The customer determined that the Mass ProBar[®] met the requirements for the measurement of untreated natural gas. The test highlighted the opportunity that exists in the growing natural gas industry. The continuing trend towards regulation of hazardous emissions also contributes to the increased demand for natural gas production. The customer was impressed with the cost reducing benefits and high accuracy of the Mass ProBar[®] flowmeter for their natural gas measurement.

Related Literature

Literature Type	Publication No.
Mass ProBar [®] Flowmeter Product Data Sheet	00813-0100-4762
Mass ProBar [®] Flowmeter Installation & Operating Manual	00809-0100-4762
3095MV Multivariable Mass Flow Transmitter Product Data Sheet	00813-0100-4762
Improving Flow Measurement by Real-Time Flow Calculation in Transmitters Having Multiple Process Variables	00816-0100-3219

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