



**V-Cone Flow Meter Improves Efficiency
and Reduces Costs in Gas Lift Applications**

Application Note

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By Nick Voss
V-Cone Product Manager
McCrometer, Inc.

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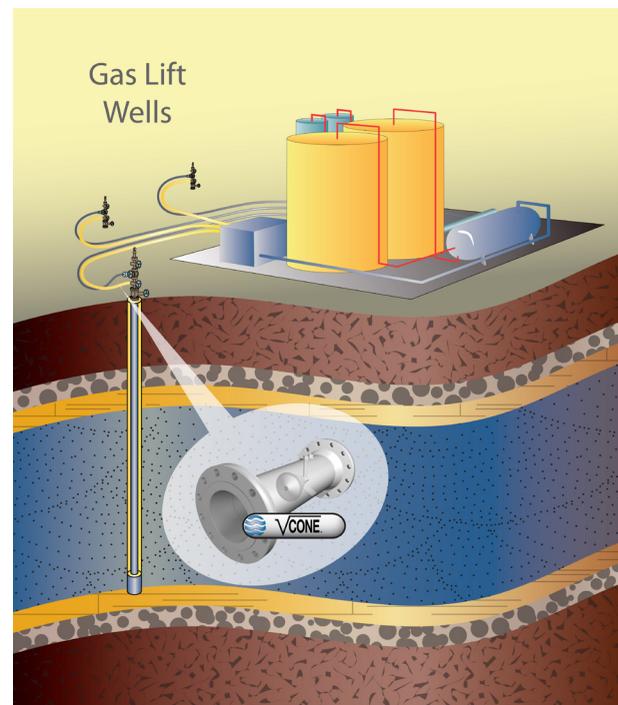
Ideal for Low Pressure Oil / Gas Production Sites

Process engineers responsible for crude oil production from wells that employ gas lift systems to increase oil production will find that the rugged, highly accurate V-Cone® Flow Meter from McCrometer features a wide turndown, small footprint and virtually no maintenance, which reduces total installed costs and operating life cycle costs while improving crude oil production efficiency.

Gas lift or artificial lift systems employed for Enhanced Oil Recovery (EOR) increase crude oil production by injecting gas at the base of the well, just above the reservoir. The introduced gas bubbles in the liquid lower the hydrostatic pressure of the well making it easier for the liquid to flow. Most commonly, produced natural gas is used as the injection gas. Most oil wells produce some natural gas that is separated from the oil stream once it reaches the surface. In order to raise the reservoir pressure and reduce the density of that oil, the well operator re-injects a portion of this by-product gas, in turn maximizing production from the well. Carbon dioxide, nitrogen, or engineered chemical solutions can also be employed in gas lift wells. Accurate measurement and accurate control of the injected media reduces costly over-injection while maximizing crude oil production from the reservoir.

Through EOR techniques such as gas lift, oil producers can increase recoverable reserves from 10 to 40 percent to 30 to 60 percent. Reliable, accurate flow meters that are virtually maintenance free, such as McCrometer's V-Cone flow meter, are ideal for these EOR applications. McCrometer's V-Cone flow meters

feature accuracy of $\pm 0.5\%$ of rate and repeatability of $\pm 0.1\%$. With its unique, no-moving parts design, the differential pressure V-Cone flow meter provides built-in flow conditioning, which nearly eliminates the up and downstream straight pipe runs required by other flow meter technologies. The space-saving V-Cone flow meter reduces typical straight pipe run by 70% or more requiring only 0-3 straight pipe diameters upstream and 0-1 downstream for precise operation.



V-Cone Flow Meter for Gas Lift Systems

The versatile V-Cone flow meter operates over a wide flow range of 10:1 and supports line sizes from 0.5 to greater than 120 inches. Engineers in the oil/gas industry rely on the V-Cone flow meter for low cost of

ownership because it requires virtually no recalibration or maintenance over an exceptionally long life that can exceed 25 years of installation in the toughest of environments.

Unlike traditional dP instruments such as orifice plates and venturi tubes, the V-Cone flow meter's design is inherently more accurate because the flow conditioning function is built into the basic flow sensor. The V-Cone flow meter's centrally located cone interacts with the fluid steam, reshaping the velocity profile to provide a stable signal that increases accuracy.

The pressure difference, which is exhibited between the static line pressure and the low pressure created downstream of the cone, can be measured via two pressure sensing taps. One tap is placed slightly upstream of the cone and the other is located in the downstream face of the cone itself. The pressure difference is then incorporated into a derivation of the Bernoulli equation to determine the fluid flow rate.

McCrometer's versatile V-Cone flow meter is compatible with the demanding standards set by the oil/gas production and refining industry. The V-Cone flow meter has been proven to the American Petroleum Institute's API 22.2 Testing Protocol for Differential Pressure Flow Measurement Devices, and international certifications such as Measurement Canada, Brazilian INMETRO for allocation and custody transfer, and Russian GOST.