



**A Proven
Solution For
The Oil & Gas
Industry's Most
Difficult Flow
Measurement
Problems.**



McCrometer's innovative V-Cone Flowmeter is designed for high performance in harsh environments and restrictive spaces. This groundbreaking flowmeter measures the widest range of fluids, including wet gas, condensate, and dirty or abrasive flows, under the most challenging conditions. The V-Cone offers easy installation, superior accuracy and repeatability, and long-term, low-cost operation for refinery and on-shore/off-shore production and delivery applications.



- Little or no straight pipe run requirements
- High accuracy and repeatability
- Low headloss
- Easy installation – ideal retrofit!
- Measurement of wet gas, abrasive and disturbed flows
- Little-to-no maintenance
- No recalibration
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V-Cone



The V-Cone is an advanced flowmeter that takes differential pressure flow measurement to a new level. The V-Cone has proven its performance in the oil and gas industry in some of the harshest operating conditions and for the widest variety of fluid types. In these applications, the V-Cone consistently outperforms traditional DP devices and other major flow technologies.

Low Installed Cost

Because it does not require long straight pipe runs or flow conditioning devices, the V-Cone can fit into the tight spaces that would defeat the accuracy of other flow devices, and into existing piping layouts as a retrofit. This installation flexibility saves cost, space, and

minimizes weight penalty problems while maintaining highly accurate measurements.

Measures Wide Range of Flows and Fluids

The V-Cone handles the industry's most difficult flow conditions because it acts as its own flow conditioner. This not only allows maximum installation flexibility, but accurate measurement of disturbed or swirling flows. In addition, the V-Cone is designed to withstand abrasive, dirty and particle-laden flows without significant wear.

Ideal for Wet Gas and Condensate Measurement

The V-Cone's ability to measure wet gas and condensate is unique in the industry. In side-by-side tests with orifice plates, only the V-Cone provided accurate measurement of these challenging flow regimes.

Superior Performance

The V-Cone delivers accuracy of up to $\pm 0.5\%$ of reading and 0.1% repeatability (depending on fluid type) under a variety of conditions. It also handles turndowns of 10:1 and greater, without loss of accuracy or wear and tear on the measurement element.

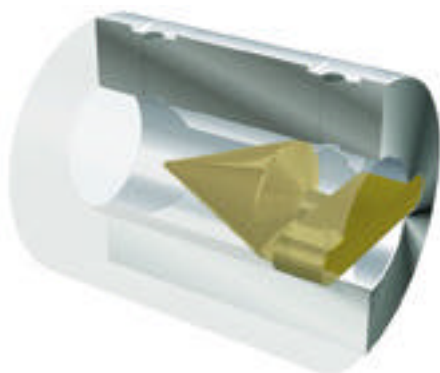
How the V-Cone is Meeting the Needs of the Oil & Gas Industry

Current Applications:	Fluid Types:	Place:
<i>Custody transfer</i>	<i>Natural Gas</i>	<i>on/off-shore</i>
<i>Well head measurement</i>	<i>Natural Gas</i>	<i>off-shore</i>
<i>Gas inlet compressor</i>	<i>Hydrocarbon Gas</i>	<i>off-shore</i>
<i>Gas injection</i>	<i>Hydrocarbon Gas</i>	<i>off-shore</i>
<i>Seawater pumps</i>	<i>Seawater</i>	<i>off-shore</i>
<i>Test separator</i>	<i>Production water/Hydrocarbon Gas</i>	<i>off-shore</i>
<i>Flare extinguishing</i>	<i>Hydrocarbon Gas</i>	<i>off-shore</i>
<i>Fuel gas</i>	<i>Hydrocarbon Gas</i>	<i>off-shore</i>
<i>Chimney stack</i>	<i>Flue Gas</i>	<i>on-shore</i>
<i>White oil blending</i>	<i>Crude Oil</i>	<i>on-shore</i>

Innovative technology. Unbeatable performance.

Low Total Cost of Ownership

With no moving parts to replace or maintain, the V-Cone assures long-term performance without the operating costs of other flowmeters. The contoured aerodynamic shape of the cone profiles the flow in the pipe without impacting it against a sharp beta edge. Instead, a boundary layer forms along the cone, directing fluid away from the beta edge. The V-Cone beta edge does not change its dimension, thus allowing extremely long usage without physical re-calibration.



Design Flexibility

The V-Cone offers an exceptional sizing range. It can be sized for line diameters of 1/2" to over 120". Its design also accommodates a variety of construction materials because it doesn't have internal sensors or external extrusions.

The V-Cone can be jacketed, painted, coated and treated like any other piece of the piping.

Cost Benefits

- Low installed cost
- Low-to-no maintenance cost
- Low operating cost

The new Wafer V-Cone can be fitted between two flanges for more compact installation. It is available in a variety of materials and the cone can be easily replaced to accommodate changing flow conditions.

Orifice Plate

Disadvantages

- High installed cost—requires 10 to 50 diameters of straight pipe runs, machining of upstream pipes and heavy support fittings
- Subject to abrasion, and loss of accuracy, when measuring dirty or particle-laden fluids
- Not easily retrofitted because of piping requirements
- Cannot accurately measure disturbed flow
- Not reliable for wet gas or condensate measurement
- High signal noise—not suited for "fast" control loops like anti-surge compressors
- Higher maintenance costs—beta edge is prone to wear by abrasive fluids and high velocity flows, requiring recalibration and/or replacement
- High head loss
- Low turndown ratio (4:1)
- Requires routine maintenance while under pressure, posing safety risk to workers

Cost Comparison

- High installed cost: 2 to 3 times higher than a V-Cone
- High maintenance

To find out more about the V-Cone, talk to our o&g experts at 909-652-6811



Venturi

Disadvantages

- High installed cost
- Requires upstream straight pipe runs
- Not easily retrofitted due to piping requirements
- Not applicable for wet gas or condensate measurement
- Bulky and expensive when used on large line sizes
- Low turndown ratio (5:1)
- Susceptible to plugging by particle-laden fluids
- Slow signal response time—not suited for “fast” control loops like anti-surge compressors
- Requires routine maintenance and periodic recalibration
- Long lay lengths
- Heavy



Averaging Pitot

Disadvantages

- High installed cost—requires 10 to 20 diameters of straight pipe runs
- Not easily retrofitted due to piping requirements
- Not applicable for wet gas or condensate measurement
- Cannot accurately measure disturbed flow
- Only measures partial flow—less reliable
- Susceptible to plugging by particle-laden fluids
- Structural problems
- Needs flow conditioning to achieve stated accuracy



Ultrasonic

Disadvantages

- Very high cost per unit
- Questionable accuracy for wet gas or condensate measurement
- Cannot accurately measure disturbed flow
- Not suited to high-temperature fluids
- Limited design options—sensitive electronics limit construction materials and use of exterior coatings or jackets
- Susceptible to stray currents affecting output signal/accuracy
- Only measures partial flow—less reliable
- Requires periodic recalibration to correct signal drift
- Subject to vibration and blockage

Cost Comparison

- High installed cost
- High maintenance cost

Cost Comparison

- High installed cost
- High maintenance cost

Cost Comparison

- High installed cost due to expense per unit
- High maintenance cost

or visit our website at <http://www.mccrometer.com/oilandgas>

The Best Solution for Challenging Flow Measurement!

Pipe flow profiles are rarely ideal. Practically any change to the piping can disturb even a well-developed flow. The contoured shape and location of a suspended cone in the V-Cone flowmeter overcomes this by reshaping the velocity profile upstream.



As the flow approaches the cone, the flow profile "flattens" toward the shape of a well-developed profile—even in extreme flow conditions.

The V-Cone forms very short vortices as the flow passes the cone. These short vortices create a low amplitude, high frequency signal for excellent signal stability.



The V-Cone's contour-shaped cone directs the flow without impacting it against an abrupt surface and minimizes headloss. As a result, the beta edge of the cone is not subject to wear by dirty fluids. Because it remains unchanged, V-Cones rarely, if ever, require recalibration.

For nearly a decade, the oil and gas industry has turned to the V-Cone to solve its toughest flow measurement problems. And consistently, this advanced flowmeter has provided a level of performance thought unachievable in many difficult, real-world environments.

Whether your challenge is limited installation space, disturbed flow, high turndowns, wet gas, or dirty or

abrasive fluids, McCrometer's knowledgeable staff can accurately evaluate your application and specify the best metering technology to meet your needs. For a free evaluation, detailed V-Cone specifications or information about McCrometer's other flowmeter products, contact your McCrometer representative today.



3255 West Stetson Avenue, Hemet, CA 92545-7799 USA
Tel: 909-652-6811 • FAX: 909-652-3078
email: oilandgas@mccrometer.com
Web Site: www.mccrometer.com/oilandgas