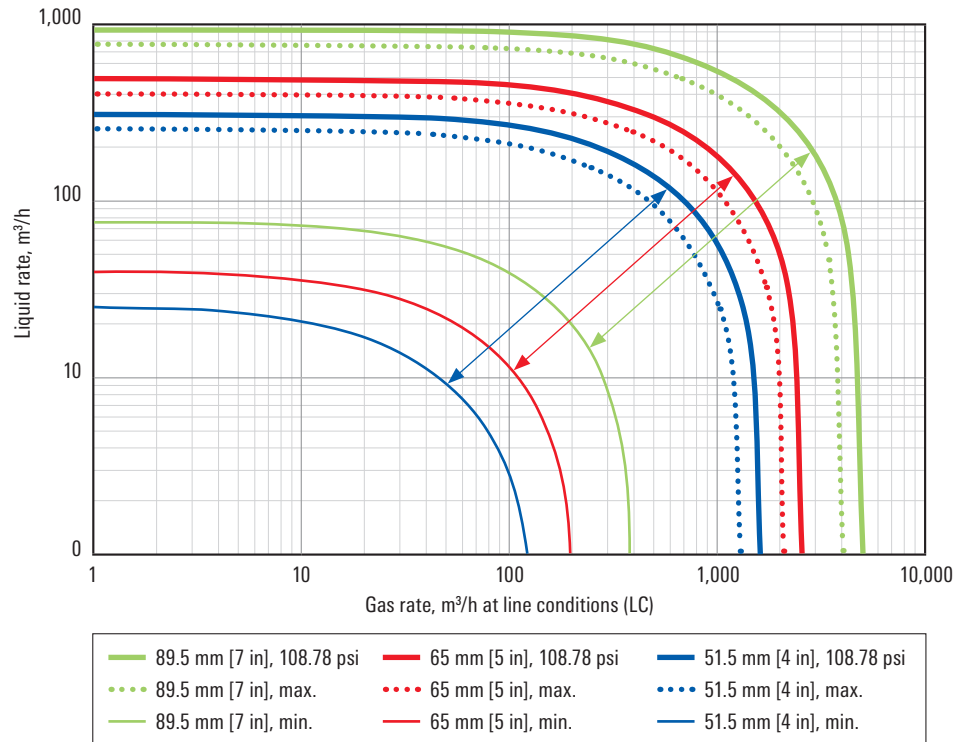


Vx Omni Subsea Multiphase Flowmeter Performance Specifications

Performance and operating envelopes

The operating envelopes of the various sizes of Vx Omni* subsea multiphase flowmeters are determined by the combination of venturi sizes and the differential pressure range. The nominal range for the differential pressure measurement is 0.73 to 72.5 psi. In addition, there is an extended upper limit with reduced accuracy up to 108.78 psi. There is considerable overlap between the flow rate ranges for the three standard venturi sizes.



Vx Omni flowmeter operating envelopes.

Method for calculating performance specifications

Performance specifications have been calculated based on flow loop measurements and the 95th percentile from the cumulative performance plot as described in NFOGM Handbook of Multiphase Flow (NFOGM 2005) and API RP 86 (API 2005). Note that API MPMS 20.3 (2013) supersedes RP 86 and still refers to the uncertainty analysis methods of NFOGM (2005). However, it does not show the cumulative performance plot.

The principle of this method is to assemble a large set of flow loop tests that cover an appropriate range of flow conditions and calculate the absolute differences between the flow loop reference meters and the outputs for each flow period. A cumulative plot of these deviations can then be used to calculate the 95th percentile—i.e., the value for which 95% of the data points are within and 5% outside.

Measurement Uncertainty

Parameter	Gas volume fraction (GVF) range, %	Performance specification, %	Relative or absolute %
Liquid rate	0–90	3	Relative
	90–96	6	Relative
	96–98	12	Relative
	98–100	— [†]	—
Gas rate	0–100	5	Relative
	>90	2.5 [‡]	Relative
Water-liquid ratio	0–90	2	Absolute
	90–96	5	Absolute
	96–98	8	Absolute
Water volume fraction	>95	0.2	Absolute
Hydrocarbon mass rate	Q _{hc} >3 kg/s	5 [§]	Relative
Total mass rate	0–100	2.5 [‡]	Relative

Notes:

[†] Vx Omni flowmeter 51.5 = 1.8 m³/h, Vx Omni flowmeter 65 = 1.9 m³/h, Vx Omni flowmeter 89.5 = 2.3 m³/h. In the GVF range 90–98% the largest of the absolute and relative uncertainties is applicable.

[‡] For absolute throat pressures greater than 507.63 psi.

[§] 7% for absolute throat pressures less than 362.6 psi.

Gas rate: At low gas volume fraction (GVF), the uncertainty is limited by an absolute value of 2 m³/h at line conditions.

Water volume fraction sensitivity: 0.05% can be achieved with 30 minutes logging time.

Downwards flow: Gas flow rate uncertainties should be increased by 1%, liquid flow rate uncertainties should be increased by 2%. Absolute throat pressures greater than 290.08 psi. Differential pressures greater than 1.45 psi.

Repeatability and reproducibility is typically better than 1% for most measurements.