

# Vx Spectra

## Surface Multiphase Flowmeter

High-accuracy multiphase flow rate measurement during surface production testing and monitoring operations

### Applications

- » Continuous production monitoring for resources ranging from heavy oils to gas condensates
- » Production well testing
- » Sand/solids quantification for plug drill outs
- » Flow rate measurement in unstable, foaming, or emulsion-prone wells and low-rate producers
- » Well performance evaluation
- » Artificial lift system surveillance and optimization

### Benefits

- » Simplified, tankless surface facilities
- » Reduced infrastructure development and maintenance costs
- » Elimination of vented emissions versus traditional separation
- » Repeatable flow rate measurements at unstable flow conditions
- » Highly accurate phase measurements unaffected by foams or emulsions
- » Elimination of major pressure loss in the production stream
- » Unmanned metering operations
- » Ease of maintenance
- » Real-time cloud-based production data and visualization via Agora
- » Understanding of well dynamics

### Features

- » Compact, robust design
- » No need for separation for production measurement
- » No moving parts
- » Single-point measurement
- » Multiple sizes across broad operating envelope
- » Low-rate extender available to expand turn down ratio
- » Full-gamma spectroscopy
- » High-frequency measurement for detailed flow dynamics
- » Remote operation and data acquisition



The Vx Spectra\* surface multiphase flowmeter uses full-spectrum analysis to accurately measure oil, gas, and water flow rates without phase separation. The Vx Spectra\* can be used for accurate production allocation and real-time flow and sand quantification during plug drill out and flow back periods.

Vx Spectra has been tailored for North America Land by implementing basin specific reservoir engineering, flow modeling, and computation for the unconventional plays. The flowmeter offers multiple advantages over existing production measurement devices, including higher measurement accuracy, smaller footprint, expanded operating envelope, and the ability to monitor and analyze high-frequency production data.

The Vx Spectra flowmeter is comprised of three sections: a venturi section and multivariable transmitter for measuring total flow rate; a nuclear source and detector that obtains oil, gas, and water holdups; and a compact flow computer that performs all calculations and converts flow measurements from line to standard

### Accurate, robust metrology

The Vx Spectra flowmeter is the industry's first multiphase metering technology that measures flow rate and phase fractions at high frequency and at a single point in the venturi throat. This method ensures repeatable flow rate measurement in any multiphase flow regime and in production fluids ranging from heavy oil to wet gas. The Vx Spectra uses an ultra-low activity gamma-ray source that does not contribute toward background radiation when installed in the meter, making it safer for the environment and for the operators working with and around it.

The Vx Spectra flowmeter underwent extensive proving through flow loop testing at multiple industry-recognized metering reference facilities. The flowmeter acquired more than 800 flow loop points, incorporating varying pressures, flow regimes and fluids, confirming excellent metrological accuracy and repeatability.

## Where you can use it

### The Vx Spectra flowmeter can be deployed in a variety of applications:

For **production allocation**, the meter can be placed at the wellhead, at the battery or anywhere in between for obtaining accurate production rates. Production facilities can be simplified and production automated while reducing CAPEX and OPEX. The onboard flow computer will provide real-time production data at standard as well as actual conditions.

**Flowback operations** can be dramatically simplified by reducing flowback package footprint by replacing conventional test separators, manifolds and complex pipework with a compact multiphase flowmeter, requiring fewer interventions and on-site personnel. The Vx Spectra\* has no moving parts and requires no physical adjustments during operation.

Accurate quantification of returned sand and solids during **plug drill-out** is critical. The Vx Spectra allows for pump and flow rate optimization to ensure adequate sand mobilization from the wellbore while preserving reservoir quality.

### Real-time data monitoring and analysis

Production testing data can be remotely monitored, managed, and analyzed using Vx Live\* production monitoring application. Vx Live\* enables continuous remote surveillance of accurate production measurements, with automated verification of well performance parameters and diagnostics.

### Emissions reduction

Lightweight and compact, the Vx Spectra flowmeter has no moving parts, significantly reduces footprint, connections, valves, and requires little maintenance. When used to replace separators, it simplifies well pad architecture and reduces operating expenses. For separators that use methane bleeding to actuate control valves, the Vx Spectra flowmeter replacement can reduce emissions by 99.8%. By removing the need for separators, the associated gas flaring is completely eliminated.

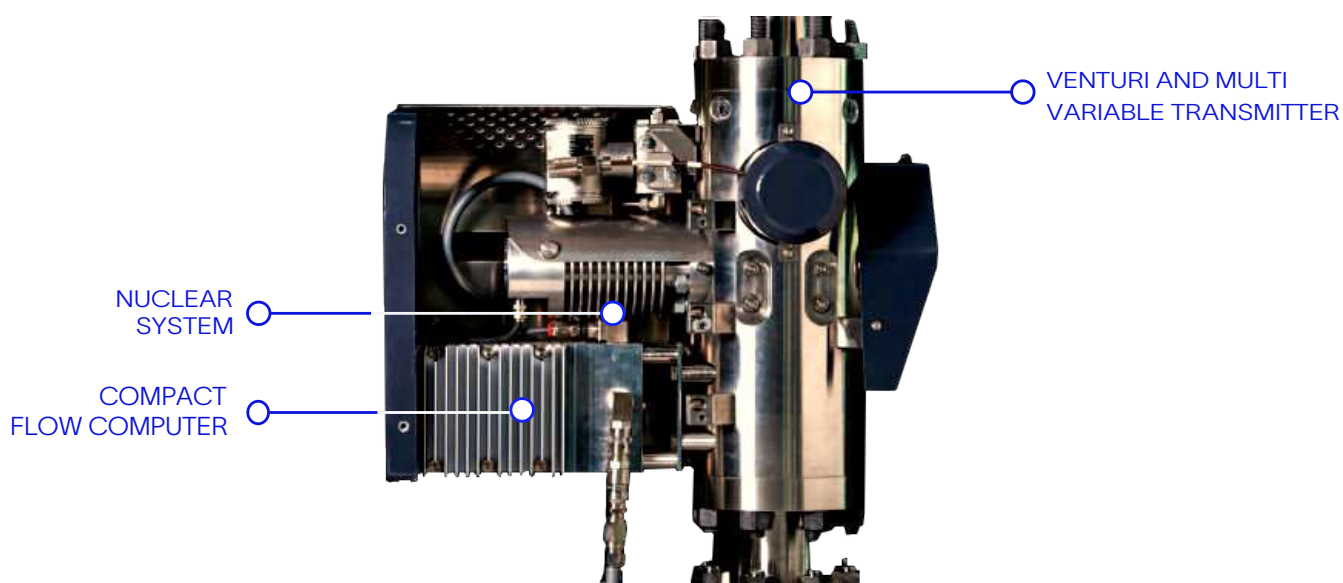
### Track record

Vx technologies have been extensively adopted and deployed in North America, as of January 2023:

Over 600 meters permanently installed

Over 300 meters connected via Vx Live\*

Over 1000 wells optimized during plug drill-out



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# Specifications

Venturi size	19 mm	29 mm	40 mm	65 mm	88 mm
Service	Sour per NACE MR0175/ ISO 15156	Sour per NACE MR0175/ ISO 15156	Sour per NACE MR0175/ ISO 15156	Sour per NACE MR0175/ ISO 15156	Sour per NACE MR0175/ ISO 15156
Max working pressure, psi [MPa]	5,000 [34.5]	5,000 [34.5]	5,000 [34.5]	5,000 [34.5]	5,000 [34.5]
Design temperature, degF [degC]	-50 to 250 [-46 to 121]	-50 to 250 [-46 to 121]	-50 to 250 [-46 to 121]	-50 to 250 [-46 to 121]	-50 to 250 [-46 to 121]
Electronics temperature, degF [degC]	-40 to 185 [-40 to 85]	-40 to 185 [-40 to 85]	-40 to 185 [-40 to 85]	-40 to 185 [-40 to 85]	-40 to 185 [-40 to 85]
Water/liquid ratio, %	0 to 100	0 to 100	0 to 100	0 to 100	0 to 100
Gas volume fraction, %	0 to 100	0 to 100	0 to 100	0 to 100	0 to 100
Liquid viscosity at line conditions, cP [Pa.s]	0.1 to 2,000 [0.0001 to 2]	0.1 to 2,000 [0.0001 to 2]	0.1 to 2,000 [0.0001 to 2]	0.1 to 2,000 [0.0001 to 2]	0.1 to 2,000 [0.0001 to 2]
Max. flow capacity Liquid flow rate bbl/d [m <sup>3</sup> /d]	4,000 [635]	11,000 [1,749]	21,000 [3,340]	55,000 [8,745]	100,000 [15,898]
Gas flow rate at 10 MPA/ 1450 Psi MMsci/d [MMm <sup>3</sup> /d]	26 [0.74]	11 [0.31]	50 [1.42]	130 [3.68]	250 [7.08]
Repeatability (total mass rate at line conditions)	Better than 1%	Better than 1%	Better than 1%	Better than 1%	Better than 1%
Resolution (total mass rate at line conditions)	Better than 0.1%	Better than 0.1%	Better than 0.1%	Better than 0.1%	Better than 0.1%
Dimensions (L H W J. in [mm])	28.4 x 20.1 x 19.7 [720 510 x 500]	28.4 20.1 19.7 [720 510 500]	28.4 20.1 19.7 [720 510 500]	31.3 27.6x22.3 [795 700 565]	34 30.86 21.1 [885 x 783 x 537]
Weight, lb in [kg]†	550 [250]	550 [250]	550 [250]	990 [450]	1,170 [530]
Power consumption, W	20	20	20	20	20

† Typical configuration; may vary depending on selected options

# Configurable options

Venturi body	UNS S31803 (duplex stainless steel) or UNS N06625 (INCONEL 625)
Pressure Certification	PED 2014/68/EU, ASME B31.3 2018, CRN
Hazardous area classification	Class 1, Zone 1, CSA, UL
Ingress protection	IP† 67 or NEMA 4X
Pressure sensor connections	Remote seals combined with isolation blocks
Electrical power	24 VDC
Data connectivity	RS-485 or Ethernet TCP/ IP (Modbus®)
Typical process connections	Compact NORSOK combined with crossovers to weldneck, ANSI flange, API flange, Grayloc

† Ingress Protection

\* Example of typical process connections available; additional options may be applicable depending on requirements to Standards Relating to Equipment for Use in Explosive Atmosphere

\* Norsk Sokkels Konkurranseposisjon

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