

# Vx Spectra Surface Multiphase Flowmeter

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

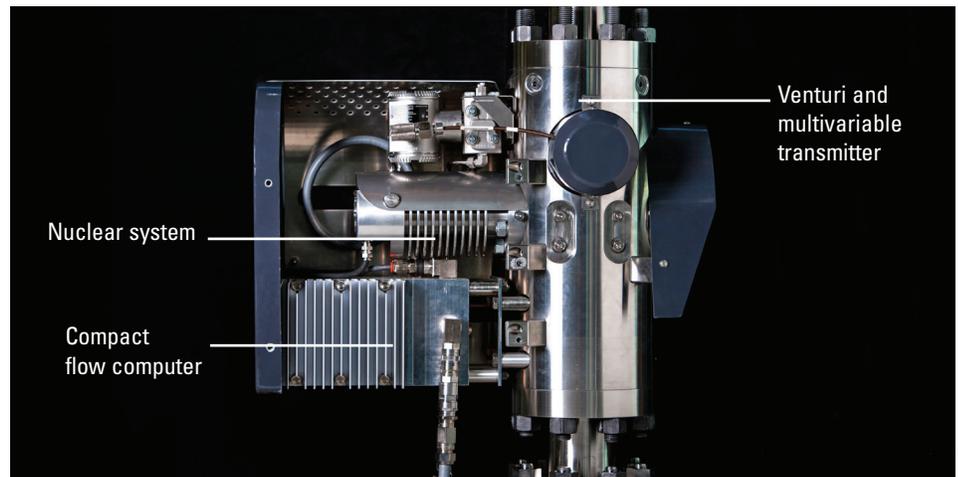
## APPLICATIONS

- Offshore topside and land production well testing
- Continuous production monitoring
- Fiscal allocation and custody transfer
- Well performance evaluation
- Artificial lift system surveillance and optimization
- Flow rate measurement in unstable, foaming, or emulsion-prone wells and low-rate producers
- Production measurement for resources ranging from heavy oils to gas condensates

## BENEFITS

- Repeatable flow rate measurements at unstable flow conditions
- Highly accurate phase measurements unaffected by foams or emulsions
- Understanding of well dynamics
- Elimination of major pressure loss in the production stream
- Precise allocation factor
- Delivery of real-time production flow rate data
- Updated flow rates for reservoir production forecast
- Reduced field development costs
- Unmanned metering operations
- Simplified surface systems
- Significant space savings with smaller footprint compared with bulk tanks or separator
- Ease of maintenance
- Accelerated lead time

The Vx Spectra\* surface multiphase flowmeter uses full-spectrum analysis to accurately measure oil, gas, and water flow rates without phase separation. The flowmeter offers multiple advantages over existing multiphase flowmeters, including higher measurement accuracy, smaller footprint, expanded operating envelope, and the ability to monitor and analyze high-frequency production data.



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

## Accurate, robust metrology

The Vx Spectra flowmeter is based on rugged Vx\* multiphase well testing technology, which determines flow rates without requiring separation. The flowmeter is the industry's only 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.

Whereas current nuclear systems rely on empirical correlation to allocate photons to their proper energy levels, the new nuclear acquisition system in the Vx Spectra flowmeter deploys full-gamma spectroscopy. Full-spectrum analysis precisely measures photon counts in all energy levels, delivering the most accurate individual oil, gas, and water fraction measurements to date.

The Vx Spectra flowmeter underwent extensive flow loop testing at different metering reference facilities—SINTEF, TÜV National Engineering Laboratory (NEL), DNV GL, National University of Singapore (NUS), Alfa Laval Flatøy, and OneSubsea Horsøy. The flowmeter acquired more than 800 flow loop points incorporating varying pressures, flow regimes, and fluids, confirming excellent metrological accuracy and repeatability.

## Broader operating envelope

The Vx Spectra flowmeter has five venturi throat sizes that expand the operating envelope to better match flow rates of most oil and gas fields in the production phase. The 19-mm version obtains precise measurements at lower flow rates. The 29-mm and 40-mm venturi versions are for midrange multiphase metering at the majority of oil production fields. The 65-mm venturi version addresses high-rate oil producers and the majority of wet gas production flow rates. The 88-mm venturi version is primarily for high-rate wet gas wells and commingled production metering.

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## FEATURES

- Full-gamma spectroscopy
- Single-point measurement
- New sizes that expand operating envelope
- High-frequency measurement for detailed flow dynamics
- Compact, robust design
- Modular system with versatile configuration
- Remote operation and data acquisition
- No need for separation and flow calibration
- No moving parts

## Innovative, efficient design

Specially developed for surface production facilities, the compact Vx Spectra flowmeter saves significant rig space on offshore platforms compared with conventional metering equipment. Its modular design and advanced electronics minimize downtime and reduce running costs while ensuring measurement robustness. Additionally, the flowmeter allows customization with an extensive set of configurable options to fit specific surface equipment requirements.

## Real-time data monitoring and analysis

Production testing data can be remotely monitored, managed, and analyzed using PRODCast Vx\* production testing monitoring software, which is built on the Avocet\* production operations software platform. The software enables continuous remote monitoring of accurate production measurements, with automated verification of permanently installed Vx technology enabling well testing program optimization and the acceleration of field production allocation.

## 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      |
| 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]             |
| Electronics temperature, degF [degC]                   | -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]          |
| 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, MMscf/d [MMm <sup>3</sup> /d] | 11 [0.31]                            | 26 [0.74]                            | 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 x H x W), in [mm]                        | 28.4 x 20.1 x 19.7 [720 x 510 x 500] | 28.4 x 20.1 x 19.7 [720 x 510 x 500] | 28.4 x 20.1 x 19.7 [720 x 510 x 500] | 31.3 x 27.6 x 22.3 [795 x 700 x 565] | 34 x 30.86 x 21.1 [885 x 783 x 537] |
| Weight, <sup>†</sup> lbm [kg]                          | 550 [250]                            | 550 [250]                            | 550 [250]                            | 990 [450]                            | 1,170 [530]                         |
| Power consumption, W                                   | 20                                   | 20                                   | 20                                   | 20                                   | 20                                  |

<sup>†</sup> Typical configuration; may vary depending on selected options

## Configurable Options

|  |  |
|--|--|
| Venturi body                             | UNS S31803 (duplex stainless steel) or UNS N06625 (INCONEL® 625)                       |
| Hazardous area classification            | ATEX, IECEx, CSA, UL   |
| Ingress protection                       | IP <sup>†</sup> 67 or NEMA 4X  |
| Pressure sensor connections              | Remote seals combined with isolation blocks  |
| Electrical power                         | 100–240 V AC or 24 V DC  |
| Data connectivity                        | RS-485 or Ethernet TCP/IP (Modbus <sup>§</sup> )                                       |
| Typical process connections <sup>‡</sup> | ANSI flange, API flange, Grayloc <sup>®</sup> , weld neck, compact NORSOK <sup>§</sup> |

<sup>†</sup> Ingress Protection

<sup>‡</sup> Example of typical process connections available; additional options may be applicable depending on requirements to Standards Relating to Equipment for Use in Explosive Atmospheres

<sup>§</sup> Norsk Sakkels Konkurranseposisjon

[slb.com/VxSpectra](http://slb.com/VxSpectra)

**Schlumberger**