Vx Spectra
Surface multiphase flowmeter for accurate flow rate measurement and improved production testing
The Vx Spectra* surface multiphase flowmeter uses advanced full-gamma spectroscopy to accurately capture multiphase flow dynamics while enabling real-time data monitoring and analysis, helping you make better-informed decisions to maximize your reservoir productivity.
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 in low-rate producers
- Production measurement for resources ranging from heavy oils to gas condensates

Benefits

- Accurate flow rate measurements under 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 measurements
- Updated flow rates for reservoir monitoring and production forecast
- Reduced field development costs
- Unmanned metering operations
- Simplified surface systems
- Significant space savings with smaller footprint compared with bulk tanks or separator
- Easy to maintain
- Accelerated lead time

Features

- Full-gamma spectroscopy
- Proven metrological performance against reference flow loops
- 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
Metrology

Measure multiphase flow with industry-leading accuracy

Full-spectrum analysis
Current nuclear interpretation relies on empirical correlation to correctly allocate photons to the proper energy-level window. The Vx Spectra flowmeter uses full-gamma spectroscopy to precisely measure in all energy levels of the gamma-source spectrum, providing the most accurate individual oil, gas, and water fraction measurements to date.

![Diagram showing photon count versus energy for full spectrum and specific energy levels.]

Current nuclear interpretation uses empirical correlation to allocate photons to their proper energy levels.

The new nuclear system used in the Vx Spectra flowmeter brings a continuous photon count across the full spectrum of gamma measurements, providing accurate multiphase flow measurements.
High-frequency, single-point measurement
Based on the robust principle of Vx® multiphase well testing technology, the Vx Spectra flowmeter is the only multiphase meter in the industry that measures in high frequency at a single point in the venturi throat, thereby avoiding cross correlation of measurements from multiple locations throughout the system. This technique ensures accurate and repeatable flow rate measurements in any multiphase flow regime and in production fluids ranging from heavy oil to wet gas.

Improved production allocation factor
Accurate production monitoring secures a precise allocation factor that helps you make better-informed decisions to maximize reservoir productivity.
Streamline production testing and monitoring with a fit-for-purpose system

Reduced footprint
Specially engineered for surface production facilities, the compact Vx Spectra flowmeter saves significant rig space on offshore platforms compared with conventional metering equipment.

Greater reliability
Its modular design and advanced electronic components increase reliability to minimize downtime and reduce running costs while improving measurement integrity.

Modular equipment
With a highly versatile configuration, the Vx Spectra flowmeter allows customization to fit your surface equipment requirements.

Expand the operating envelope with four venturi sizes

Based on more than 15 years’ experience in multiphase flowmetering, three new venturi throat sizes are available in the Vx Spectra flowmeter to expand the operating envelope.

- The 19-mm venturi version successfully monitors low-rate producers.
- The 29-mm and 40-mm venturi versions introduce solutions to midrange multiphase metering operations and are applicable to the majority of the world’s oil production fields.
- The 65-mm venturi version addresses high-rate oil producers and the majority of wet gas flow rates worldwide.
The simplified design of the Vx Spectra flowmeter comprises three distinct sections. First, a venturi section and multivariable transmitter cover the fluid mechanics measuring total flow rate. Second, a gamma source and advanced detector make up the nuclear system, obtaining holdup of oil, gas, and water. Third, a compact data-acquisition flow computer performs all calculations and converts line flow measurements from line to standard conditions.
Maximize the value from high-frequency production data with continuous online monitoring

Production data analysis and diagnostics
Extract the maximum benefit from high-frequency multiphase flow measurements with PRODcast Vx* production testing monitoring software. Historical and real-time data can be analyzed by functional workflows fed by SCADA, historians, and corporate databases. PRODcast Vx software is built on the Avocet* production operations software platform, and the solution stores and manages your production testing data.

- Optimize well testing programs to accelerate field production allocation through high-frequency and reliable measurements.
- Monitor production measurements obtained by the Vx Spectra flowmeter in a collaborative interface linked to your local connectivity infrastructure.
- Remotely access automated equipment verification of permanently installed Vx technology flowmeters for enhanced operations planning and reduced costs.
- Integrate historical and real-time validated data with production optimization workflows.

Well test management
PRODcast Vx software enables the continuous evaluation of production tests for one well or a group of wells to optimize the well test sequence, frequency, and duration. Users can apply unique practices to each well based on behavior, instead of using a standard approach. The streamlined workflow is integrated with traceable actions for production test validation.

- Identify well test candidates
- Quickly validate production well tests
- Reduce well test rejection rates with an intuitive interface linked to your production data repository.
Developed with specific Vx technology expertise, PRODcast Vx software is a desktop application that provides auditable and reliable production data for end users to extract the maximum value of high-frequency multiphase flowmeter measurements.
Physically testing a multiphase flowmeter in flowing conditions, rather than relying on error propagation calculations or similar analytical techniques, is critical to accurately verify metrological performance.

Flow loop testing lets you test multiphase flowmeter performance against redundant single-phase flowmeters that guarantee a high-quality reference measurement. These tests precisely evaluate multiphase measurement accuracy by minimizing all possible unknowns in a controlled environment.

The Vx Spectra multiphase flowmeter was tested for robustness and accuracy using an extensive test matrix performed at different metering reference facilities—Alfa Laval Flatøy, OneSubsea Horsøy, SINTEF, NUS, DNV GL and NEL—in both wet-gas and high-viscosity flow loops.

During testing, the Vx Spectra flowmeter acquired more than 800 flow loop points, which were performed with varying pressures, test fluids, and different flow regimes. Results confirmed excellent metrological accuracy and repeatability, independent of a reference test flow loop facility.

More than 800 flow loop test points verify Vx Spectra flowmeter accuracy and reliability under diverse conditions

VERIFICATION FACILITIES
Alfa Laval Flatøy
OneSubsea Horsøy
SINTEF
TÜV National Engineering Laboratory (NEL)
DNV GL
National University of Singapore (NUS)
Enhance production testing and monitoring with the only multiphase flowmeter that accurately measures multiphase flow rates using full-spectrum analysis.

With industry-leading metrology delivered in a compact design, the Vx Spectra surface multiphase flowmeter provides a precise production outlook for your reservoir development decisions, so you can be certain.
### Configurable Options

<table>
<thead>
<tr>
<th>Specification</th>
<th>19 mm</th>
<th>29 mm</th>
<th>40 mm</th>
<th>65 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Venturi body</strong></td>
<td>UNS S31803 (duplex stainless steel) or UNS N06625 (INCONEL® 625)</td>
<td></td>
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<tr>
<td><strong>Hazardous area classification</strong></td>
<td>ATEX,† IECEx,‡ CSA, UL</td>
<td></td>
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<tr>
<td><strong>Ingress protection</strong></td>
<td>IP§ 67 or NEMA 4X</td>
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<tr>
<td><strong>Pressure sensor connections</strong></td>
<td>Impulse tubing; impulse tubing combined with isolation blocks; remote seals; remote seals combined with isolation blocks</td>
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<tr>
<td><strong>Electrical power</strong></td>
<td>100–240 V AC or 24 V DC</td>
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<tr>
<td><strong>Data connectivity</strong></td>
<td>RS-485 or Ethernet TCP/IP (Modbus™)</td>
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<tr>
<td><strong>Typical process connections</strong></td>
<td>ANSI flange, API flange, Grayloc®, weld neck, compact NORSOK‡‡</td>
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### Specifications

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</thead>
<tbody>
<tr>
<td><strong>Venturi size</strong></td>
<td>19 mm</td>
<td>29 mm</td>
<td>40 mm</td>
<td>65 mm</td>
</tr>
<tr>
<td><strong>Service</strong></td>
<td>Sour per NACE MR0175/ISO 15156</td>
<td></td>
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<tr>
<td><strong>Max. working pressure, psi [MPa]</strong></td>
<td>5,000 [34.5]</td>
<td></td>
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<tr>
<td><strong>Design temperature, degF [degC]</strong></td>
<td>–50 to 250 [–46 to 121]</td>
<td></td>
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<tr>
<td><strong>Electronics temperature, degF [degC]</strong></td>
<td>–40 to 185 [–40 to 85]</td>
<td></td>
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<tr>
<td><strong>Water/liquid ratio, %</strong></td>
<td>0 to 100</td>
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<td></td>
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<tr>
<td><strong>Gas volume fraction, %</strong></td>
<td>0 to 100</td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Liquid viscosity at line conditions, cP [Pa.s]</strong></td>
<td>0.1 to 2,000 [0.0001 to 2]</td>
<td></td>
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</tr>
<tr>
<td><strong>Max. flow capacity</strong></td>
<td>Liquid flow rate, bbl/d [m³/d]</td>
<td>4,000 [635]</td>
<td></td>
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<tr>
<td><strong>Repeatability (total mass rate at line conditions)</strong></td>
<td>Better than 1%</td>
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<tr>
<td><strong>Resolution (total mass rate at line conditions)</strong></td>
<td>Better than 0.1%</td>
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<tr>
<td><strong>Dimensions</strong></td>
<td>L × H × W, in [mm]</td>
<td>28.4 × 20.1 × 19.7 [720 × 510 × 500]</td>
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<tr>
<td><strong>Weight,† lbm [kg]</strong></td>
<td>550 [250]</td>
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<tr>
<td><strong>Power consumption, W</strong></td>
<td>20</td>
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† Atmosphères Explosives
‡ International Electrotechnical Commission System for Certification to Standards Relating to Equipment for Use in Explosive Atmospheres
§ Ingress Protection

†† Example of typical process connections available; additional options may be applicable depending on requirements
‡‡ Norsk Sakkels Konkurranseposisjon

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