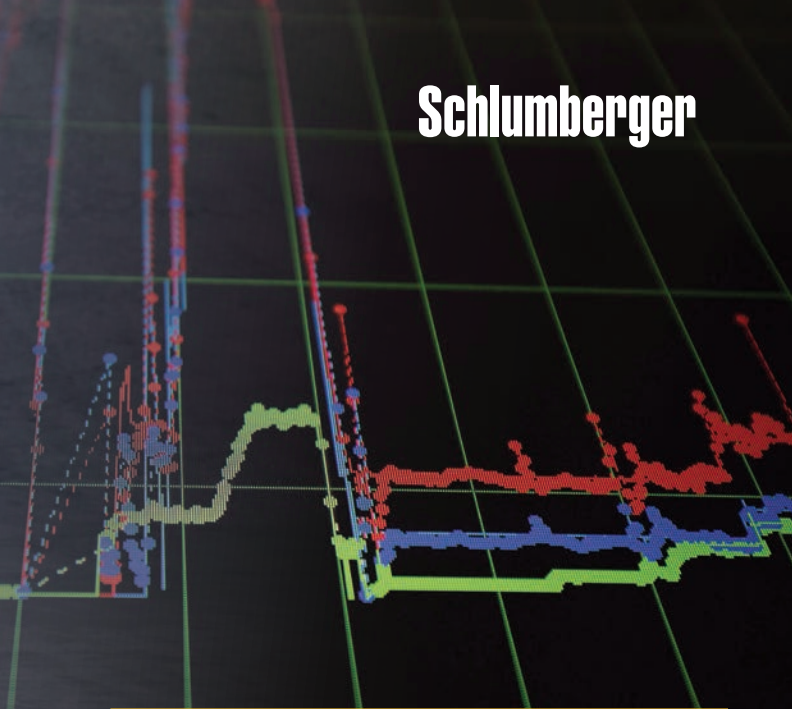
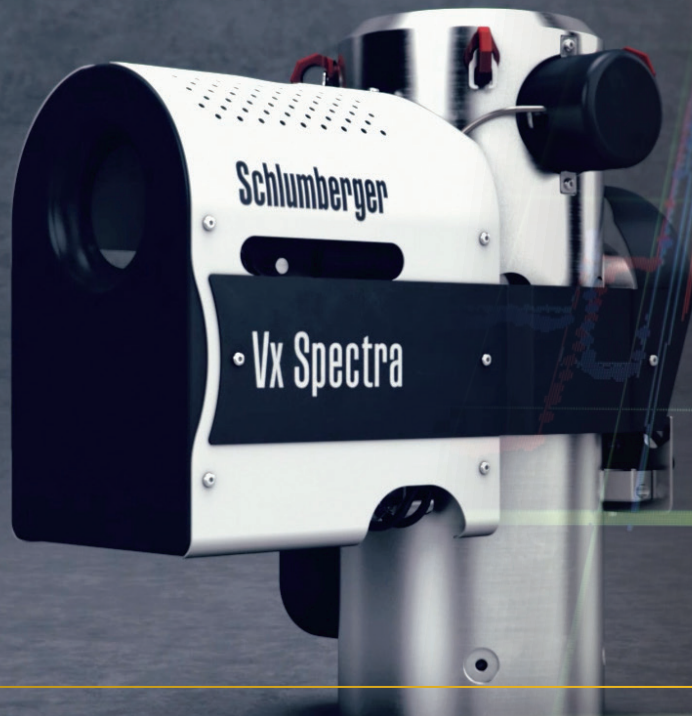


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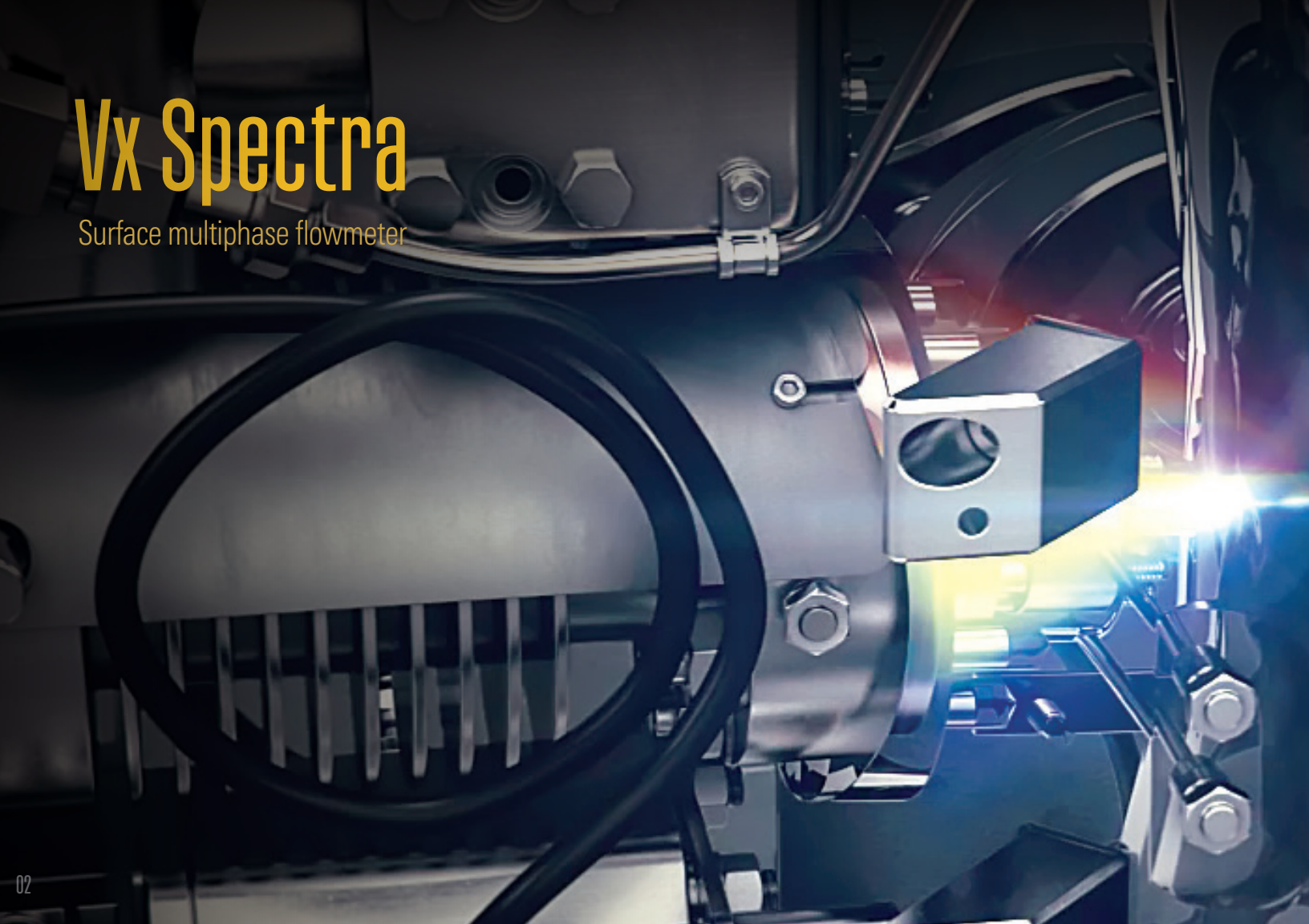
## Vx Spectra

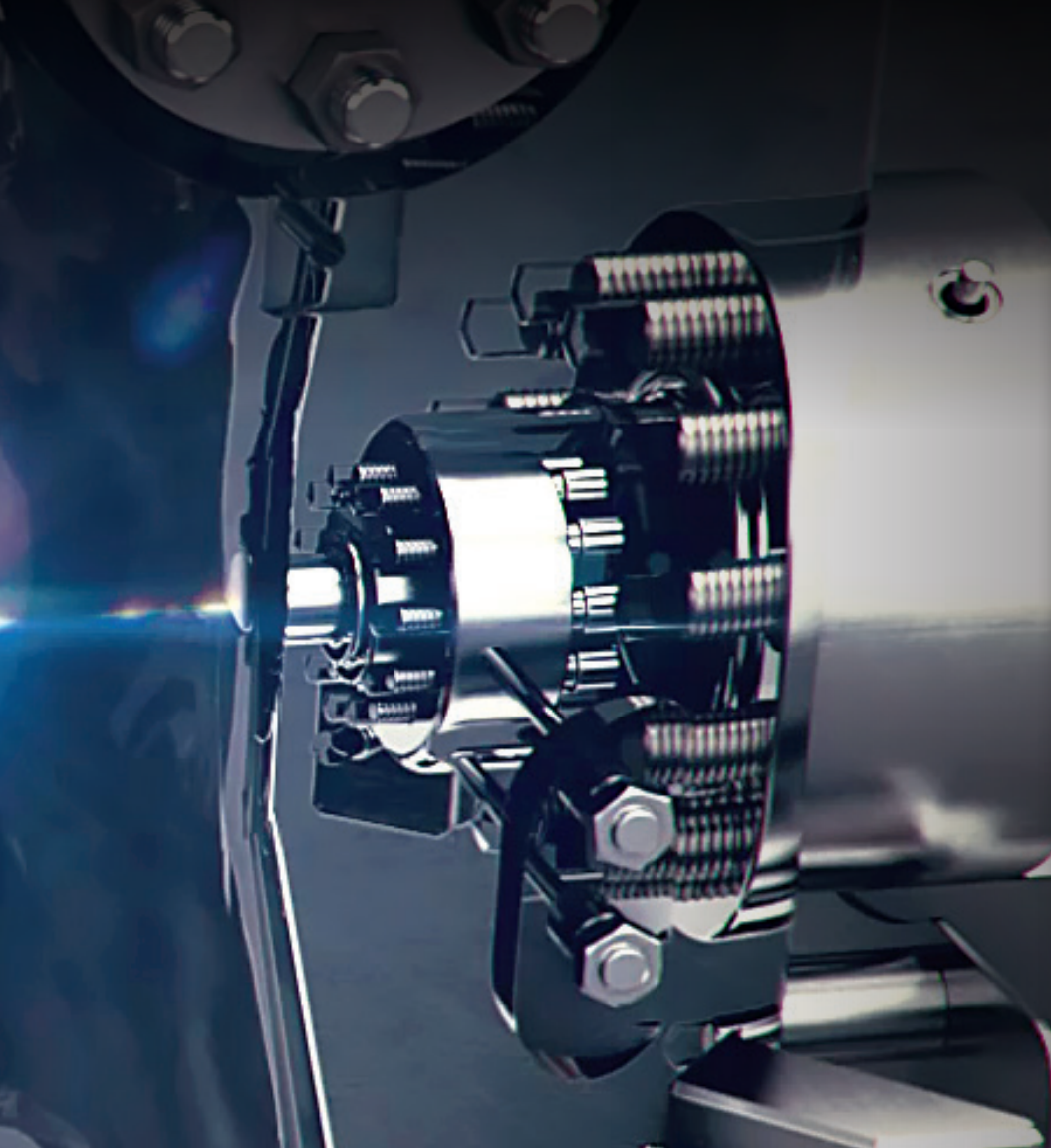
Surface multiphase flowmeter for accurate flow rate measurement and improved production testing



# Vx Spectra

Surface multiphase flowmeter





Oilfield operators deal with complex operating conditions. The nature of produced flow is no exception. Oil, gas, and water travel in many different multiphase flow patterns, from heavy oil to wet gas.

Launched in 2000, Vx\* multiphase well testing technology leads the market in multiphase flow metering technology.



# Global Application

Better rate measurements in any flow regime  
for all fluid types makes better decisions

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

## Features

- Accelerated lead time
- Full-gamma spectroscopy
- Verified metrological performance in reference flow loops
- Single-point measurement
- Five venturi sizes for an expanded 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

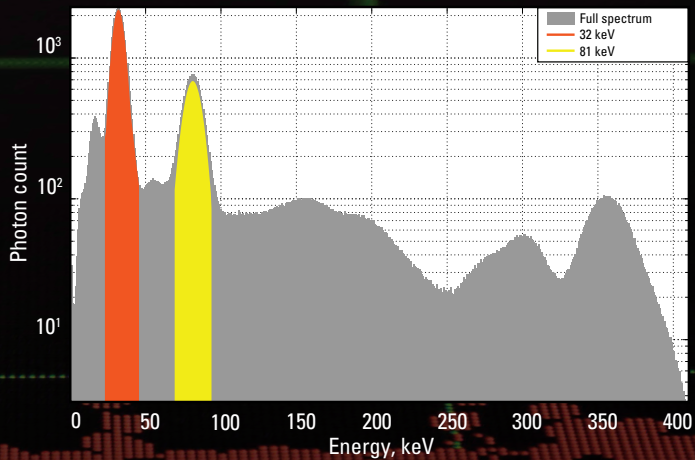
Conventional nuclear interpretation relies on empirical correlation to correctly allocate photons to the proper energy-level window. The Vx Spectra flowmeter uses full-gamma spectroscopy to precisely measure in all energy levels of the gamma-source spectrum, providing the most accurate individual oil,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

## High-frequency, single-point measurement

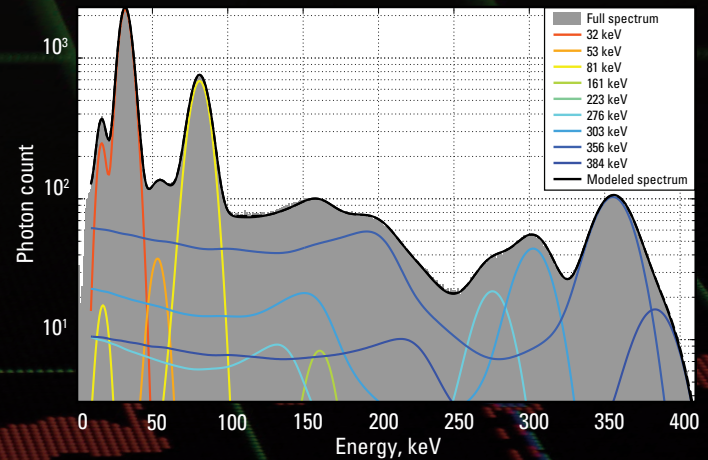
Based on the robust principle of Vx multiphase well testing technology, the Vx Spectra flowmeter is the only multiphase meter in the industry that measures in high frequency at a single point in the venturi throat, thereby avoiding cross correlation of measurements from multiple locations throughout 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.



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



*The advanced nuclear system in the Vx Spectra flowmeter brings a continuous photon count across the full spectrum of gamma measurements, providing accurate multiphase flow measurements.*

# Innovative Design

Streamline production testing and monitoring  
with a fit-for-purpose system

## Reduced footprint

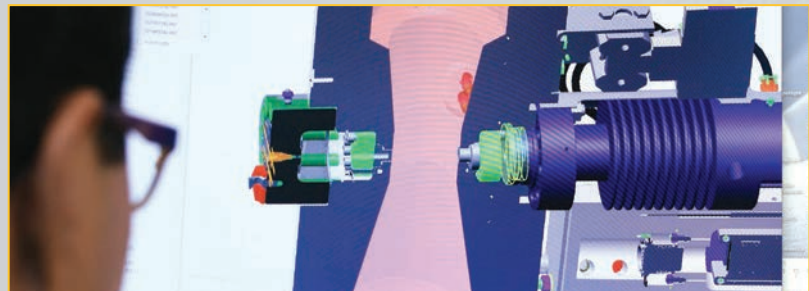
Specially engineered for surface production facilities, the compact Vx Spectra flowmeter saves significant rig space on offshore platforms compared with conventional metering equipment.

## Greater reliability

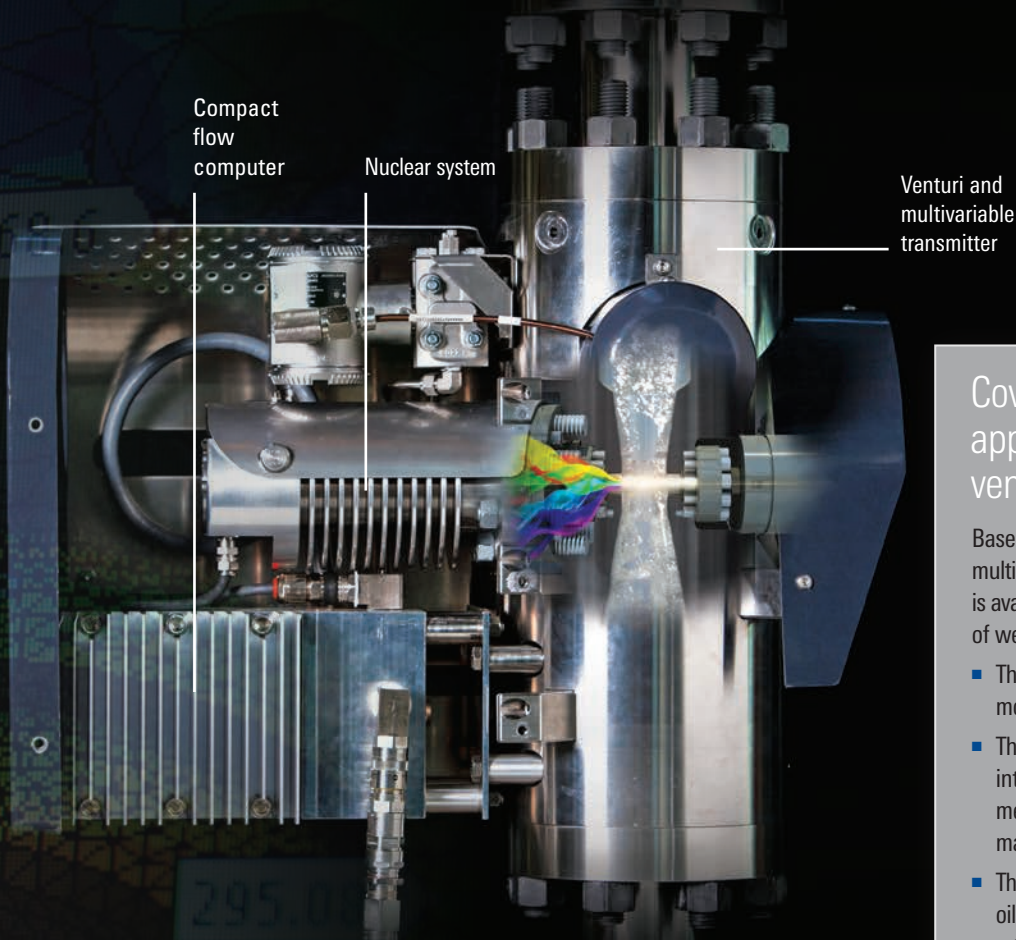
Its modular design and advanced electronic components increase reliability to minimize downtime and reduce running costs while improving measurement integrity.

## Modular equipment

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







*The simplified design of the Vx Spectra flowmeter comprises three distinct sections. First, a venturi section and multivariable transmitter account for the fluid mechanics in measuring the 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 flow measurements from line to standard conditions.*

## Cover all your measurement applications with five venturi sizes

Based on more than 20 years' experience in multiphase flowmetering, the Vx Spectra flowmeter is available in five venturi sizes to cover the majority of wells worldwide.

- 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 88-mm venturi version is primarily for high-rate wet gas wells but also serves commingled production metering.

# Data Management and Analysis

Maximize the value from high-frequency production data with continuous online monitoring

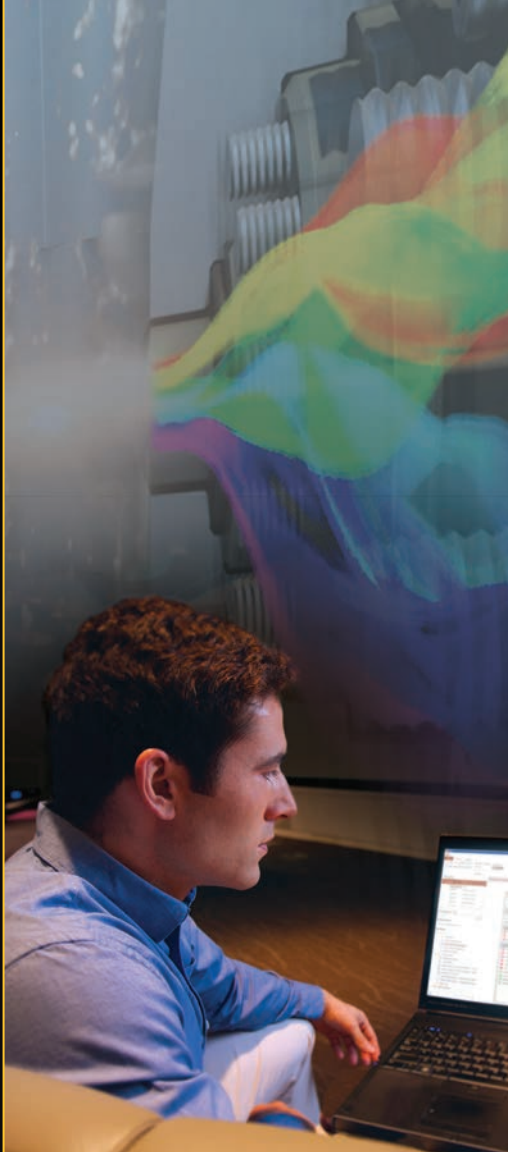
## Production data analysis and diagnostics

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.

## 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.





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Entity ID	Oil	Water (M)	GOR	Unit
100001	100001			unitless
100002	100001			unitless
100003	100001			unitless
100004	100001			unitless
100005	100001			unitless
100006	100001			unitless
100007	100001	200	0.5	unitless
100008	100001	200	0.5	unitless
100009	100001	200	0.5	unitless
100010	100001	200	0.5	unitless
100011	100001	200	0.5	unitless
100012	100001	200	0.5	unitless
100013	100001	200	0.5	unitless
100014	100001	200	0.5	unitless
100015	100001	200	0.5	unitless
100016	100001	200	0.5	unitless
100017	100001	200	0.5	unitless
100018	100001	200	0.5	unitless

Unit ID	Current Flow Rate	Current Cumulative	Latest Production	Previous Production	Diff %
Liquid	200	200	200	200	0.00
Oil	180	180	180	180	0.00
Water	20	20	20	20	0.00
Gas	0	0	0	0	0.00
Water Cut (%)	10	10	10	10	0.00
GOR	0.5	0.5	0.5	0.5	0.00
Line Pressure	100	100	100	100	0.00
Choke Size	10	10	10	10	0.00

The map displays the North Sea region with several wells marked by colored dots: a black dot for 'Well 01', a green dot for 'Well 02', a yellow dot for 'Well 03', and a red dot for 'Well 04'. The map includes geographical features like coastlines and major cities like London, Oslo, and Stockholm.

*PRODcast Vx software simplifies production data management so production engineers and specialists can focus on value-adding tasks such as data interpretation and analysis.*

# Engineering and Manufacturing

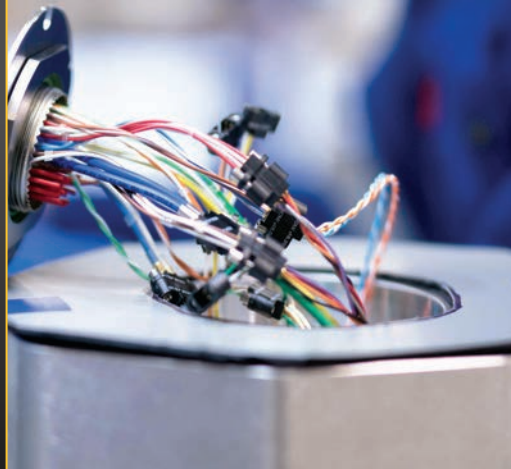
A technology center dedicated to the development and manufacturing of multiphase metering products

## Development and engineering

The team of engineers and scientists at the Singapore Well Test Technology Center and multiphase manufacturing facility works continuously on the development and refinement of the Vx Spectra flowmeter.

## Manufacturing

The assembly line for the Vx Spectra flowmeter was fully conceived based on the principles of lean manufacturing. As a consequence, the Vx Spectra flowmeter has set a new standard in low lead time for multiphase flowmeters. An optimized supply chain and rigorous quality control of individual components complete our commitment to excellence that resides in absolute attention to detail—from start to finish—to ensure that every Vx Spectra flowmeter is manufactured to the highest quality possible.





*From pressure integrity to complete functional analysis, each component of a Vx Spectra flowmeter is extensively tested throughout the entire build process.*

# State-of-the-Art Flow Laboratory

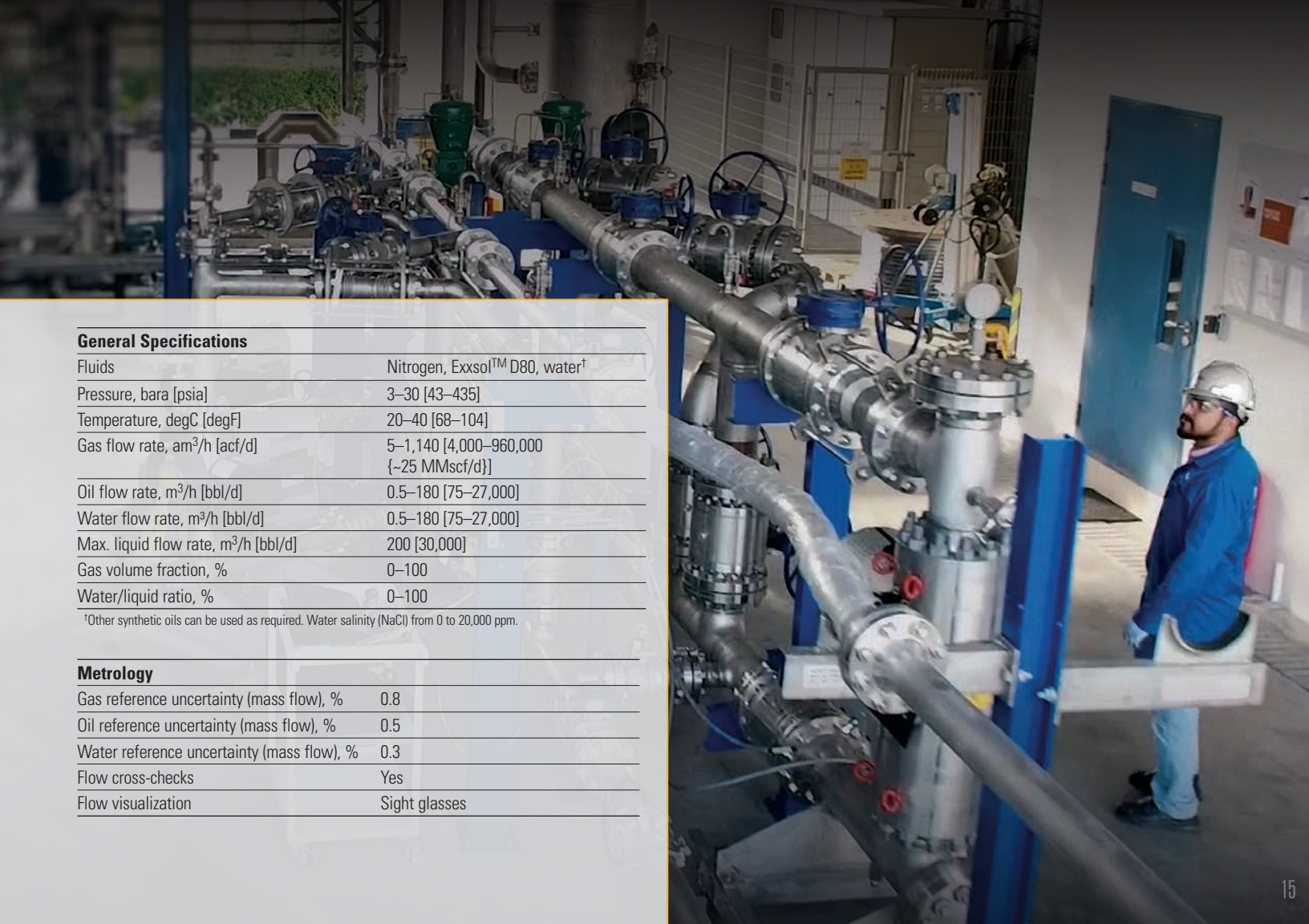
Extensive physical tests in flowing conditions to confirm metrological performance

## Flow loop verification

Adjacent to the assembly line at our Singapore facilities, Schumberger has built a state-of-the-art multiphase flow loop. This flow laboratory is used for the research and development of multiphase products. It is also used for conducting onsite flow checks of the manufactured Vx Spectra flowmeters as required by internal quality control processes or on customer request. The Singapore Well Test Technology Center's flow laboratory complies with the highest standards of quality and full auditability for calibration laboratories, rendering it suitable for independent flow loop testing for performance verification purposes, as often witnessed by customers.



*Flow loop tests verify flowmeter accuracy under diverse conditions.*



### General Specifications

Fluids	Nitrogen, Exxsol™ D80, water†
Pressure, bara [psia]	3–30 [43–435]
Temperature, degC [degF]	20–40 [68–104]
Gas flow rate, am <sup>3</sup> /h [acf/d]	5–1,140 [4,000–960,000 {~25 MMscf/d}]
Oil flow rate, m <sup>3</sup> /h [bbl/d]	0.5–180 [75–27,000]
Water flow rate, m <sup>3</sup> /h [bbl/d]	0.5–180 [75–27,000]
Max. liquid flow rate, m <sup>3</sup> /h [bbl/d]	200 [30,000]
Gas volume fraction, %	0–100
Water/liquid ratio, %	0–100

†Other synthetic oils can be used as required. Water salinity (NaCl) from 0 to 20,000 ppm.

### Metrology

Gas reference uncertainty (mass flow), %	0.8
Oil reference uncertainty (mass flow), %	0.5
Water reference uncertainty (mass flow), %	0.3
Flow cross-checks	Yes
Flow visualization	Sight glasses

# Vx Spectra

## 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, 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, † lbm [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)
Hazardous area certification	ATEX, IECEx, CSA, UL
Ingress protection	IP† 66/67 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®)
Typical process connections‡	ANSI flange, API flange, Grayloc®, weld neck, compact NORSOK§

† 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 Atmospheres

§ Norsk Sokkels Konkurranseposisjon

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

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