


Diligens

Mobile production testing

The image shows an industrial oil well production site. In the foreground, there is a large, complex piece of red-painted metal machinery, likely a wellhead or valve assembly, with several large red handwheels. In the background, two workers in blue jumpsuits and white hard hats are standing near a white and blue mobile office trailer. To the left, a large satellite dish is mounted on a tripod. The scene is set in an open, dry area with some vegetation and hills in the distance under a cloudy sky.

Bring your well online faster
and empower your production
optimization decisions



Fit-for-purpose mobile production testing brings efficiency and agility to your job through dedicated equipment, the highest operational standards, and experienced local personnel. Backed by a global footprint and track record, we deliver committed testing services when and where you need them.

Diligens Spectra

Mobile multiphase production testing unit



Diligens SEP

Mobile production testing unit



Mobility, agility, and efficiency

Fit-for-purpose testing solution

Achieve accurate, real-time flowback, cleanout, and production testing measurements from both conventional and unconventional reservoirs—including those with complex fluid and flow regimes. With technology, operating procedures, and personnel best suited to the environment, Diligens* testing maintain operational efficiency while working along other service teams, such as pressure pumping, coiled tubing, slickline, and artificial lift.

Dedicated mobile technology

Fitted on a trailer, the compact and modular design of both the Diligens Spectra* mobile multiphase production testing unit and the Diligens SEP* mobile production testing unit provide agility and mobility, allowing you to test multiple wells per day.

- Ruggedized design for off-road conditions and remote environments
- Rapid rig-up and rig-down without requiring an onsite forklift or crane
- Reduced footprint at the wellsite

Local experts, local experience

With extensive training and experience specific to your job and location, our local production testing teams are the foundation for more efficient mobile production testing solutions. Local training and certification programs—backed by our global support network—enables us to provide high-quality, committed service.

Highest operational standards

Both the Diligens Spectra and Diligens SEP units are designed and manufactured to the highest industry standards, such as API, ASME, and NACE International. Thorough QA/QC procedures across the job—from planning and preparation through execution—ensures the reliability and quality of our mobile testing fleet deployed to your operation.





Diligens Spectra

MOBILE MULTIPHASE PRODUCTION
TESTING UNIT

Superior metrology

The Diligens Spectra unit expands your operating envelope with superior metrology and efficiency. Two Vx Spectra* surface multiphase flowmeters on the same trailer—19-mm and 40-mm venturi throat sizes—provide repeatable flow rate measurements in any multiphase flow regime and in production fluids ranging from heavy oil to wet gas.

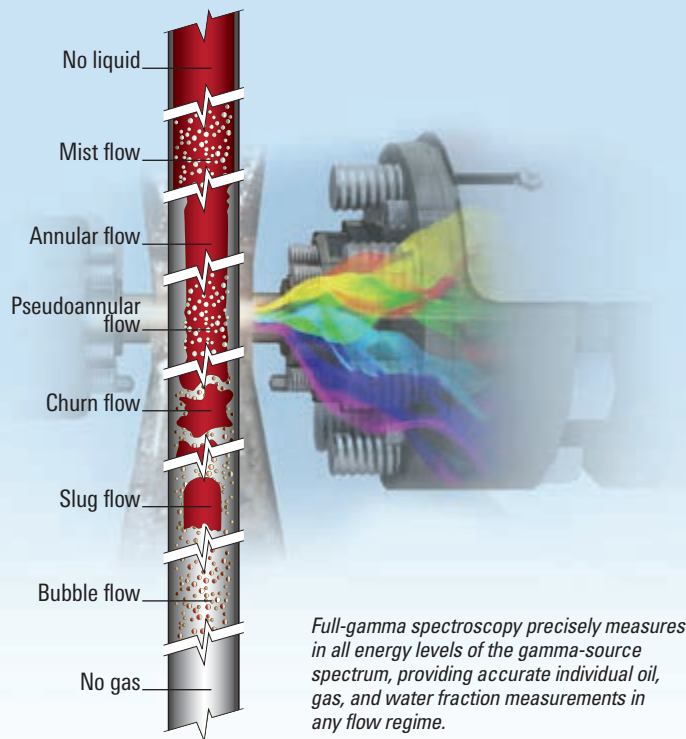
The dual-leg configuration enables the optimal venturi size to be applied based on the flow rate of the specific well. The unit is also available in a single-leg configuration.

Real-time data and support are available through the InterACT* global connectivity, collaboration, and information service.

High-frequency, single-point measurement

The Vx Spectra flowmeter is the only multiphase flowmeter that measures in high frequency at a single point across the venturi throat, thereby avoiding the conventional combination of measurements from multiple locations and flow rate conditions throughout the system. This produces unmatched metrological performance that is independent of flow regime and fluid type.

Powered by
Vx Spectra Flowmeter



Full-gamma spectroscopy precisely measures in all energy levels of the gamma-source spectrum, providing accurate individual oil, gas, and water fraction measurements in any flow regime.



Schlumberger

Vx Spectra

Schlumberger

Vx

Diligens SEP

MOBILE PRODUCTION TESTING UNIT

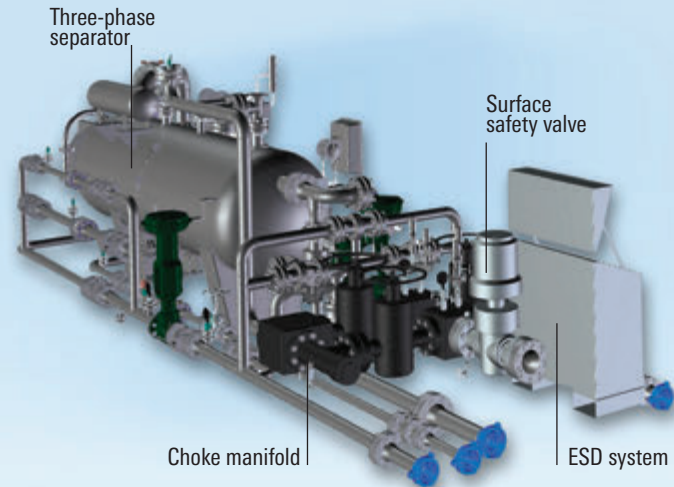
Bring your well online faster

The Diligens SEP mobile production testing unit receives and handles effluents to efficiently support workover operations during the well cleanout and flowback phases. During production testing, the unit delivers high-quality flow rate data to enable accurate production profile and forecast building.

The Diligens SEP unit comprises a surface safety valve, choke manifold, emergency shutdown (ESD) system, and separator. The inlet is connected directly to the wellhead, while the outlets can be recombined to flow back to production, or the separated fluids can be treated, stored, or disposed individually. High-quality separation is achieved with optimized vessel internals.

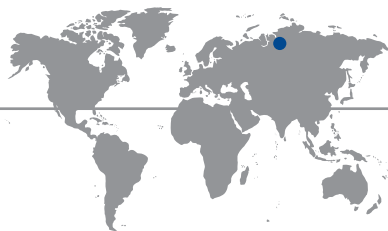
Units can be equipped with the DigiSWAN* surface wireless acquisition network to improve data quality and process monitoring during operation.

Three-phase Separator for Effective Effluent Handling



With three-phase separation capabilities and highly effective safety and well control technologies, the Diligens SEP unit enhances efficiency at any wellsite.





Dual-Leg Diligens Spectra Mobile Multiphase Production Testing Unit Tests 347 Wells Over Four-Month Campaign

Extensive production well test campaign conducted across a large, remote oilfield

When developing a large oilfield in Russia, an operator wanted to maintain high production levels of a complex multilayered sandstone reservoir, which has known permeability and fluid property heterogeneity. To maintain production, each well in the field had to be periodically tested for gas, oil, and water flow rates, which range 70 to 10,000 bbl/d.

This requires advanced technology, ruggedized equipment, and experienced personnel to ensure accurate measurement of the complex fluid and flow regimes including:

- Gas volume factor (GVF) spanning from 10% to 98%
- Effluent temperature as low as -20 degC [-4 degF]
- Foaming, emulsion, and wax formation tendencies as well as 0 to 95% water cut.

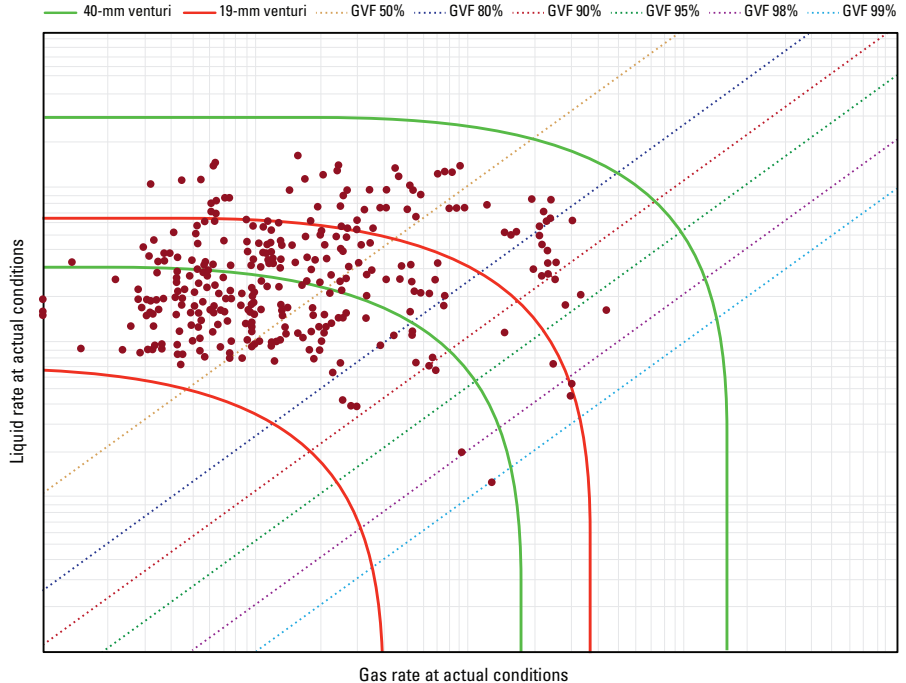
Diligens Spectra unit provided superior metrology and efficiency

Beyond providing the most accurate rate measurements under these challenging flow conditions, the dual-leg Diligens Spectra unit offered mobility and agility enabling quick rig-up and rig-down—requiring no stabilization time and enabling well tests within three hours of arriving on location. For real-time support, the Schlumberger Operations Support Center in Moscow was made available through the InterAct global connectivity, collaboration, and information service.

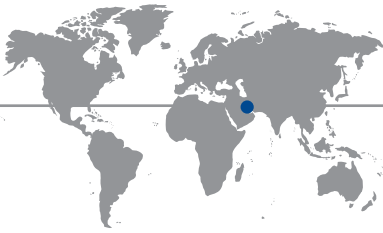
Three wells tested per day during four-month campaign

During the four-month production testing campaign, 347 wells were tested using the Diligens Spectra unit. With two multiphase flow meters on the same trailer, the operator was able to choose the optimal venturi throat size for each well. This enabled three wells—with very different flow rates and flow regimes—to be tested per day.

A smaller footprint at the wellsite, enabled the operator to spend less time and resources on logistics, reduce NPT for rig-up, and incur fewer maintenance-related issues. During the campaign, the Diligens Spectra unit was driven 4,300 km [2,670 miles]. No HSE or quality issues were experienced, and the operator's production testing objectives were achieved.



The expanded operating envelope with dual 19-mm and 40-mm venturi throat sizes made it possible to successfully test a wide range of flow rates and gas volume factor (GVF) rates in meeting the operator's objectives during the 347-well test campaign.



Diligens Spectra Unit Accurately Tests Wells Despite Challenging Multiphase Flow Environment

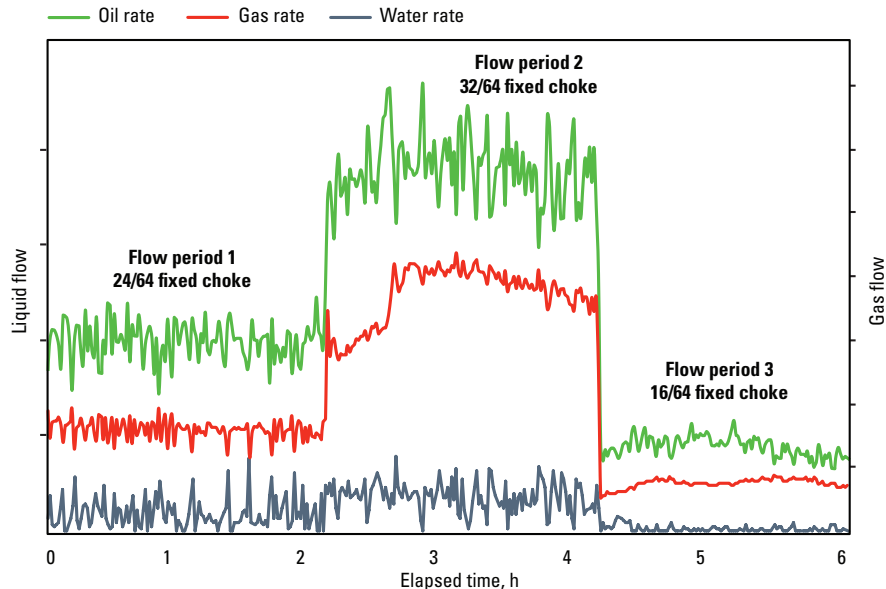
Numerous flow challenges experienced

With production at 100 bbl/d of liquid and 10 Mcf/d of gas, an operator found it difficult to conduct production well tests using conventional multiphase flowmeter technology. Slug flow conditions and the presence of strong emulsions compounded the challenge, and the true flowing nature of the wells could not be assessed because of rapid and sizable flow variations.

These conditions challenged production well testing, especially when the backpressure applied resulted in noncritical flow and wells producing below potential. In addition, the water cut could not be accurately measured owing to the presence of emulsions and low gas production partially trapped in the viscous fluids.

Diligens Spectra unit expands the operating envelope

Schlumberger recommended the operator deploy the Diligens Spectra unit, which features two multiphase flowmeters mounted on the same skid, expanding the operating envelope with speed and accuracy. The two Vx Spectra multiphase flowmeters—19-mm and 40-mm venturi throat sizes—provide repeatable flow rate measurements in any multiphase flow regime and fluid type.



Using the Diligens Spectra mobile multiphase production testing unit, accurate and repeatable measurements were obtained under slug flow conditions.

Superior measurements obtained for production allocation and optimization

The high mobility of Diligens Spectra unit enabled the operator to accurately test many previously untestable wells. With dual-leg metering capabilities, individual wells could be continuously evaluated, despite the water cut and presence of strong emulsion and slug flow. With only minimal backpressure applied, the wells were successfully tested to yield truly representative results for production allocation and well production optimization.

Case Studies



Diligens Mobile Production Testing Streamlines Operations During 120-Well Cleanup Campaign

Fit-for-purpose technology and personnel deployed at multiple PDVSA wellsites increased measurement efficiency during cleanup.



Enhance operational efficiency during high-volume well cleanup campaign

For a campaign of more than 120 oil wells in the Furial and Punta de Mata fields of eastern Venezuela, PDVSA sought a compact production testing solution that would save space at the wellsite during the well cleanup phase. By employing technologies and a standard operating procedure best suited for the environment, PDVSA could apply the same operational efficiency to multiple wells in the region.

Deploy fit-for-purpose, mobile solution

The Diligens mobile production testing units were outfitted specifically for PDVSA—ensuring the availability of technologies and experienced personnel for the multiwell project. The fit-for-purpose design of the mobile units took into consideration Venezuelan restrictions on imports and equipment on wheels.

With an agreed-upon design, Schlumberger could rapidly mobilize additional units and spare parts to supply the high volume of PDVSA activity.

Tested multiple wells per day during multiwell campaign

By using a smaller footprint at the wellsite, PDVSA was able to transport the dedicated mobile units and personnel from one wellsite to another with speed and agility. This allowed the operator to successfully test a greater number of wells each day during the 120-well cleanup campaign.



Diligens testing reduces rig-up and rig-down time during a large multiwell operation in Venezuela.

Diligens

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Diligens Spectra

Mobile multiphase production testing unit

Diligens SEP

Mobile production testing unit



slb.com/Diligens

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