

Low-Rate Extender Expands Operational Envelope of Surface Multiphase Flowmeter

Retrofitting the Vx Spectra flowmeter reduces costs and enables high-accuracy metering in a depleting well

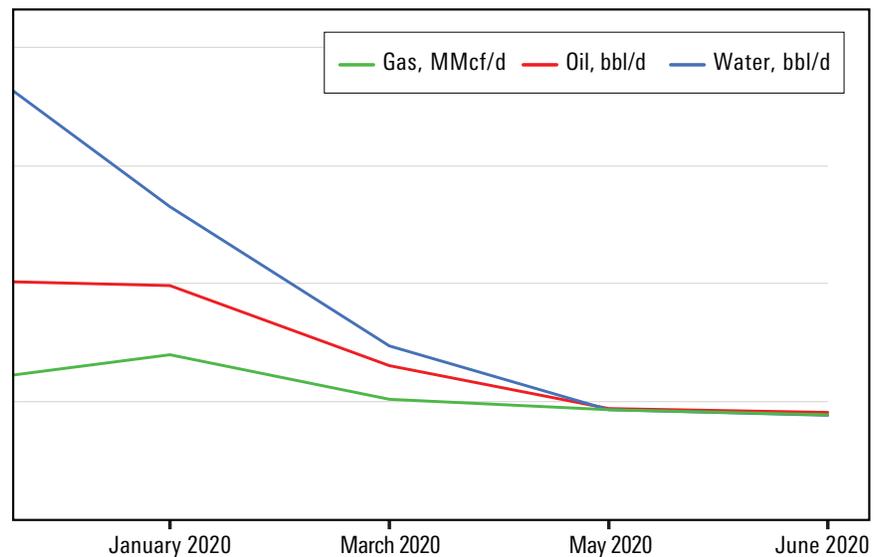
An operator maintained high-accuracy metering of the Vx Spectra* surface multiphase flowmeter for the life of the well—eliminating the need to replace the existing flowmeter for a smaller size, which saved capex and nonproductive time.



The lightweight and compact low-rate extender is easy to install in existing or new Vx Spectra surface multiphase flowmeters.

Expand flowmeter operational envelope

An unconventional shale well in Texas was brought online in 2019, and production started to gradually decline. Within 6 months, liquid production decreased by half, and gas production decreased by 25%. Multiphase flowmeters are sized for specific flow rate ranges before installation, and due to production decline, the well's low flow rate was outside the installed flowmeter's operational envelope. The field's operator was faced with needing to replace the existing 29-mm flowmeter for a smaller size to maintain differential pressure values above the low limit and operate in the working envelope for metering accuracy.



The unconventional shale well showed a steep production decline from January 2020 to May 2020. Measurements are under standard conditions.

Eliminate the need to replace existing flowmeter

To avoid infrastructure changes, lost production time, and additional costs, Schlumberger proposed retrofitting the existing Vx Spectra flowmeter with a low-rate extender. Developed specifically for depleting wells, the low-rate extender expands the operational capacity of the Vx Spectra flowmeter by increasing the measured differential pressure across the venturi throat—extending the flowmeter's turndown ratio and operational lifetime to avoid replacing an existing flowmeter. Flowmeters are easily retrofittable due to the low-rate extender's lightweight and compact design. With a special flow model validated with multiple flow loop tests, the low-rate extender maintains high-accuracy metering of the Vx Spectra flowmeter in both conventional and unconventional wells.

Case study: Low-rate extender enables high-accuracy metering in depleting well, Texas

Maintain flowmeter accuracy while decreasing capex and nonproductive time

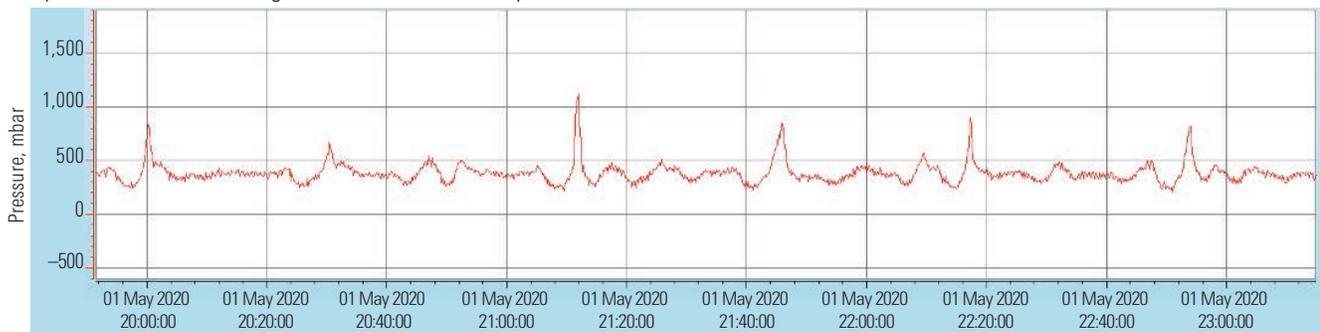
The low-rate extender was installed for a trial test in June 2020. Because it reduced the Vx Spectra flowmeter venturi cross-sectional area, the measured differential pressure increased by about four times—expanding the existing 29-mm flowmeter operating envelope and resulting in more accurate flow rate measurement versus replacing the meter for a smaller 19-mm size.

After the low-rate extender installation, Vx Spectra flowmeter measurements were compared with production separator data in real

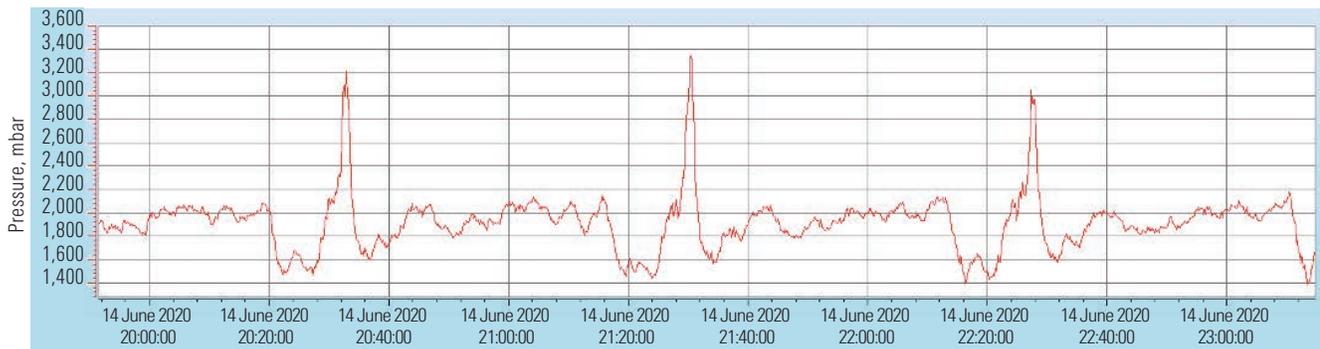
time, and the flowmeter metrological specifications and operating envelope were proven to be maintained.

The operator saved capex and nonproductive time by running the same unit for an extended period, accommodating the flow rate changes from an initial high production to production decline. This demonstrates the low-rate extender's capability to maintain high-accuracy metering for the life of the well. It can even be added during the initial meter installation to proactively plan for flow rate changes in depleting wells.

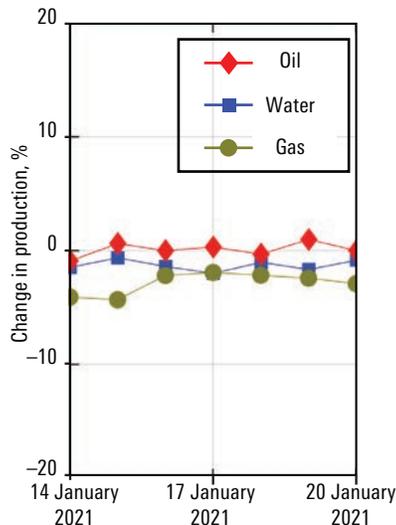
Vx Spectra flowmeter average measured differential pressure before installation of the low-rate extender = 400 mbar



After installation of the low-rate extender, average measured differential pressure = 1,800 mbar



Graphs show the comparison before and after the low-rate extender installation adjusted the measured differential pressure, which resulted in more accurate metering during production decline.



Production separator data confirmed that the Vx Spectra flowmeter retrofitted with the low-rate extender maintained high metrological performance.

slb.com/lowrateextender

Schlumberger