HALLIBURTON

WELL COMPLETIONS | INTELLIGENT COMPLETIONS

DataSphere® FloStream™ venturi flowmeter

Reduce operational risks and costs associated with production logging runs

FEATURES AND BENEFITS

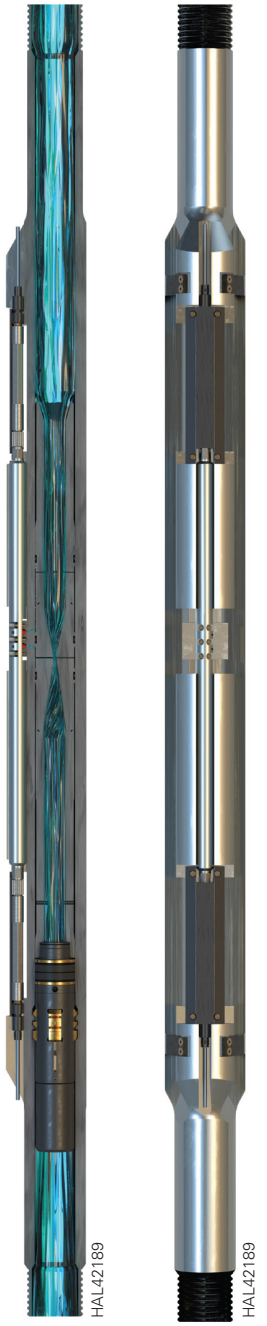
- Accurate downhole flow rate measurement
- Reduces future well intervention for production logging requirements
- High reliability, with no moving parts and proven permanent gauge technology
- Wireline-retrievable Venturi section allows replacement of the Venturi due to significant changes in flow rates without a workover
- Venturi design allows for a wide flow rate window
- Minimum pressure loss over entire system

Overview

Halliburton's FloStream™ flowmeter is a Venturi design that can handle a variety of production rates and fluid properties and is designed specifically to meet the requirements of the well. Utilizing a FloStream flowmeter reduces operational risk and cost associated with production logging runs later in the life of the well.

The Venturi device consists of a conical, convergent inlet connected to a cylindrical restriction (called the "throat") and a divergent conical section, which allows the pressure drop to be recovered. The FloStream flowmeter employs two Opsis® high accuracy quartz permanent downhole gauge (PDG) sensors to measure absolute pressures at the Venturi inlet and the throat. When flow occurs through the Venturi, there is a drop in pressure between the inlet and the throat sections. The calculated pressure drop can then be converted to mass flow rate.

Both of the Opsis gauge sensors are installed in one housing thereby reducing potential leak paths associated with two separate gauge assemblies. An optional second gauge assembly can be used above the FloStream flowmeter in the well to enable continuous calculation of downhole fluid density. A precise density measurement allows for a more accurate calculation of mass flow rate.



The FloStream flowmeter uses the same modular design as other Halliburton gauge mandrels with identical gauges, mounting arrangements and terminations. The downhole cable, cable protectors, connectors, and subsea control system interface for the flowmeter is also the same as for standard gauge systems. The time required and run-in-hole procedures for both systems are also identical.

Depending on completion design, there may be a wireline run required to set the Venturi after the completion is landed; however, if no intervention work is required below the flowmeters, the Venturi can be installed in the mandrel prior to running in the wellbore.

The lock profile and seal bores for the Venturi section are machined in the production bore of the mandrel. The Venturi is then suspended from a lock mandrel to allow insertion or removal of the Venturi using standard wireline tools.

Accuracy and resolution

An accuracy of ±0.6% has been demonstrated when the flowmeter is operating under the design conditions. Even when these change, an accuracy of ±2.5% is achievable, provided the limits of the Venturi principle are not exceeded. Resolution in flow rate measurement is ±0.25%

Operational design parameters

The Venturi flowmeter mandrel incorporates a wireline-retrievable Venturi section which allows for changing of the Venturi should the flow rate change significantly or removal of the restriction should it become necessary to carry out well maintenance operation below the flowmeter.

For more information, contact your local Halliburton representative or visit us on the web at www.halliburton.com