MARS™ Multiphase Flowmeter (MPFM)

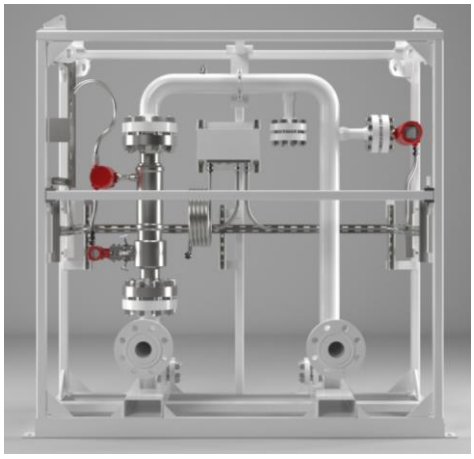
Provides unprecedented flow intelligence with non-nuclear simplicity

Applications

- Individual or group wells
- Wells where nuclear-sourced flowmeters are restricted
- Wells with challenging fluid regimes, including corrosive fluids, high pressures, salinity, impurities, and transient slug conditions
- Wells with space limitations
- Test-separator replacement
- Wells without existing or permanent flow measurement installation or capability

Features and Benefits

- Continuous, real-time multiphase flow-measurement capabilities provide precise reservoir and production reporting with split-second resolution for every well environment from heavy oil to wet gas.
- Full-range, flow-measurement data without restrictions, costs, or HSSE risks associated with nuclear-source management by eliminating the gamma densitometer.
- Production 4.0 capabilities and intuitive dashboards deliver real-time data, alarms, and alerts to any PC or smart device.
- Intelligent built-in diagnostic mechanism confirms the system is performing within the design and operating conditions.
- Remote connectivity allows users to automate the well-testing process, validate results, and deliver production-management analysis and recommendations. It also supports remote meter configuration, PVT uploading, and data-reprocessing capabilities.
- Sonar technology delivers precise flow rates at any gas-to-liquid ratio.
- Industry-leading Red Eye® near-infrared absorption technology measures the full range of water cut from 0 to 100 percent for any environment, including wet gas.
- Separation-free measurement reduces equipment, installation, and maintenance costs associated with three-phase separation systems.
- Simplified design with no moving parts, level-control issues, or frequent calibration requirements provides improved personnel efficiency.
- Durable construction withstands extreme environments and works with solar-powered applications.
- Skid mounted for easy deployment and installation.



The MARS multiphase flowmeter provides continuous, real-time flow-measurement data reporting in every well environment.

Weatherford®

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Tool Description

The Weatherford multiphase flowmeter (MPFM) is a full-range, non-nuclear multiphase flowmeter that delivers unprecedented flow-data intelligence with non-nuclear simplicity. This technology monitors individual or group wells with real-time, split-second accuracy.

Built for any production environment, including heavy oil and wet gas, this exclusive flow-measurement system performs flawlessly in any gas-to-liquid ration without requiring separation or gamma densitometer. By eliminating test separators from the wellsite and erasing the nuclear-source management associated with other multiphase flowmeters, MPFM is the only three-phase surface system to combine two Weatherford exclusive technologies – Red Eye water-cut meters and sonar-based velocity measurements – along with traditional Venturi measurements. Using an integrated flow computer, the flowmeter manages all fluid properties and set-up parameters for multiple well profiles.

The unique sonar array, combined with Venturi measurements, provides total gas to liquid rates. An array of external strain sensors collects data for gas, liquid, and gas/liquid mixtures that is then processed with a proprietary algorithm that never requires recalibration. The Red Eye meter provides water-cut measurements that are independent from the gas volume fraction (GVF) and water chemistry. By measuring key wavelengths in the near-infrared spectrum, the Red Eye meter distinguishes water, methanol, and liquid hydrocarbon at the molecular level.

Accessible from any laptop, tablet, or smartphone, MPFM presents intuitive dashboards that provide real-time production rates and fluid properties for true reservoir behavior and production insight. Through flow-measurement accuracy, operators can access up-to-the-second data for wells with any gas-to-liquid ratio, while automating well-test processes and validations.

Options

Included with MARS as an optional component to the advanced all-in-one remedial thru-tubing reservoir-surveillance system.

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Specifications

Operating

Supply voltage	11 to 30 VDC / 110 to 230 VAC
Power requirement[A]	<30 W
Host communications interface	Modbus RS485 or TCP/IP
Process temperature	-4 to 300°F (-20 to 150°C)

[A]Varies based on display options

Mechanical

Material options	316 stainless steel, duplex, and corrosion-resistant alloys
Nominal pipe sizes	2 in., 3 in., 4 in., 6 in., 8 in., and 10 in.
Flange pressure rating	ANSI 600, 900, 1500, and 2500
Pressure compliance	CRN and PED available

Environmental

Hazardous location ratings	Class 1, Div. 1; ATEX Zone 1; IECEx Zone 1; N.A. Class 1, Zone 1
Material	NACE MR0175/ISO 15156 compliance
Ambient temperature rating	Flowmeter: -40 to 158°F (-40 to 70°C); Flow computer: 14 to 140°F (-10 to 60°C)

Water/Liquid Ratio Performance

GVF percentage	GVF < 20%	20% < GVF < 95%	95% < GVF < 98%	98% < GVF < 99.5%
Water/liquid ratio absolute uncertainty	±2%	±3%	±4%	±10%
Water/liquid ratio absolute repeatability	±0.2%	±0.5%	±1%	±3%

Gas and Liquid Flow-Rate Performance

GVF percentage	GVF < 20%	20% < GVF < 90%	90% < GVF < 98%	GVF > 98%
Gas flow-rate relative uncertainty	±10%	±7%	±5%	±5%
Gas flow-rate repeatability	±0.1%	±0.1%	±0.05%	±0.05%
Liquid flow-rate relative uncertainty	±5%	±7%	±10%	±1.5 bbl/MMSCF
Liquid flow-rate repeatability	±0.05%	±0.1%	±0.1%	±0.1 bbl/ MMSCF

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Flow Envelope at 25 bar and 50°C

The ForeSite Flow operating envelope accommodates nearly any liquid and gas flow rate across a wide range of meter sizes. Use the chart below to select the appropriate multiphase solution for your operation: